YORK ARCHAEOLOGICAL TRUST

FLOOD ALLEVIATION SCHEME,

THIRSK, NORTH YORKSHIRE

WATCHING BRIEF REPORT

by K. Hunter-Mann

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List of Abbreviations

AOD	Above Ordnance Datum
HER	Heritage Environment Record (North Yorkshire)
NGR	National Grid Reference
NMR	National Monument Record
YAT	York Archaeological Trust

ABSTRACT

Trial pits were monitored during the site investigation stage of a proposed flood alleviation scheme in, and to the north of, Thirsk. The main finding of note was a sequence of Holocene deposits within the Cod Beck valley, including well preserved organic deposits of Late Bronze Age date. The presence of several archaeological sites and monuments in the vicinity of the scheme was also noted.

1. INTRODUCTION

An archaeological watching brief was carried out during geotechnical investigations in and around Thirsk during 24th June – 3rd July 2009, in advance of a proposed flood alleviation scheme. The work took place in two locations along the Cod Beck valley: one on the northern edge of Thirsk, where flood defences were planned (NGR SE428827 centred); and the other some 5km north-north-west of Thirsk, the proposed location of a storage area intended to retain flood water (NGR SE 410 875 centred; Fig. 1).

The watching brief was undertaken on behalf of the Environment Agency. The investigations were managed by Royal Haskoning, and the ground works were carried by Allied Exploration and Geotechnics (AEG). The watching brief was assigned YAT project number 5247, and the YAT accession code YORAT: 2009.1.

2. METHODOLOGY

The ground works comprised trial pits and boreholes, and the watching brief involved monitoring a selection of the trial pits. In Thirsk, the trial pits monitored were TPTWs 001, 001A and 002 (Fig. 2); at the Storage Area, those monitored were TPSAs 001-10, 101-3 and 109-19 (Fig. 3). A total of 27 trial pits were therefore recorded. The boreholes (not monitored) were identified by the prefixes BHTW or BHSA. The suffix elements TW and SA refer to the Thirsk and Storage Area parts of the scheme.

The trial pits were excavated by machine, using a toothless ditching bucket in order to maximise the visibility of any archaeological deposits, particularly in the uppermost 1-2m of each trench. The trial pits measured 2-3m long, 0.3-0.6m wide and 3.0-4.5m deep. The trenches were not entered once they had exceeded a depth of about 1m, for health and safety reasons.

The deposits observed were described, their depths below ground level measured, and they were assigned context numbers. Digital colour photographs were taken, mostly in the form of a view of the deposits visible in one side of each trench. Environmental samples were taken from three highly organic deposits, but no artefacts were recovered.

For the purposes of this report, the information obtained from the watching brief is presented as an overall deposit sequence in the form of a narrative. The detailed descriptions of the deposits found in each trial pit are shown in Appendix 1.

3. LOCATION, TOPOGRAPHY AND GEOLOGY

Thirsk lies 33km north-north-east of York and 15km south of Northallerton. It is situated towards the south end of the Vale of Mowbray, an area of low morainic hills in excess of 60m AOD that forms the watershed between the river systems draining northwards to the Tees and southwards to the Ouse. The Cod Beck drains southwards, to the River Swale and ultimately the River Ouse. To the west are the Pennines and to the east are the Hambleton Hills, the western escarpment of the North York Moors. The Cod Beck is in an area of piedmont, the foothills between the North Yorkshire Moors and the Vale of York.

The Storage Area site lies within the morainic hills. At this point, the Cod Beck valley is about 45m AOD, and the ground rises steadily to either side to over 60m AOD. To the south the hills diminish and the land opens out into a more level plain. Thirsk itself lies at around 35m AOD and straddles the Cod Beck. The area of the watching brief in Thirsk was some 750m north-west of the town centre, in an area known as The Holmes, alongside Cod Beck close to its confluence with Whitelass Beck.

The low-lying nature of the land, in the flood-plain of the Cod Beck, is reflected by the occurrence of topographical names such as holme and carr (and the place-name elements Bray and Thirsk), which tend to be associated with marshland or riverside meadow (Gelling 1984, 50).

The solid geology is Triassic Mercia Mudstone. This is primarily red marl (red calcareous silt and clay), with some beds of siltstone and sandstone (Kent 1980, 4). Above this is a drift geology of alluvium over glacial till (Butlin 2003, 10ff;).

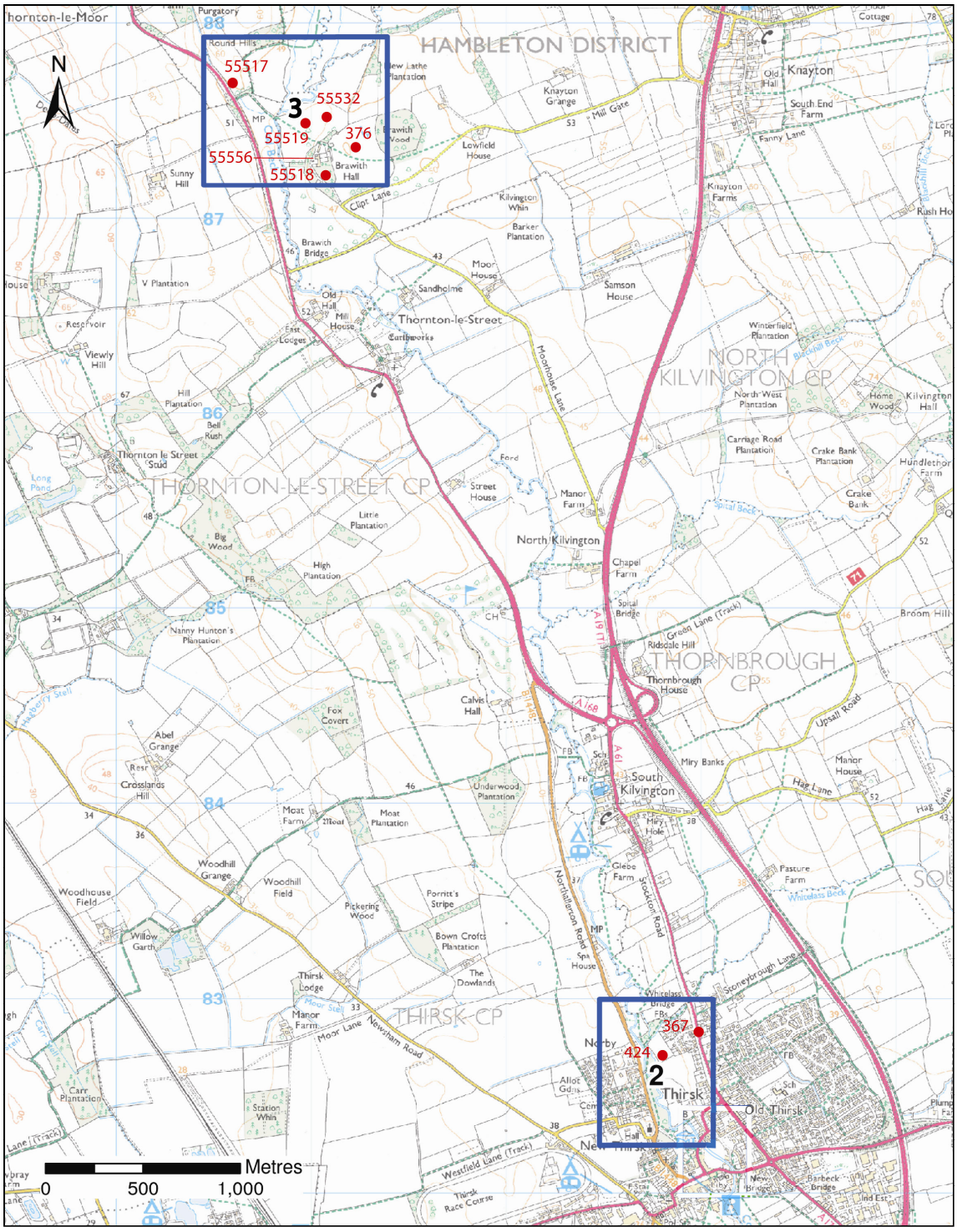

Figure 1 *Site location*

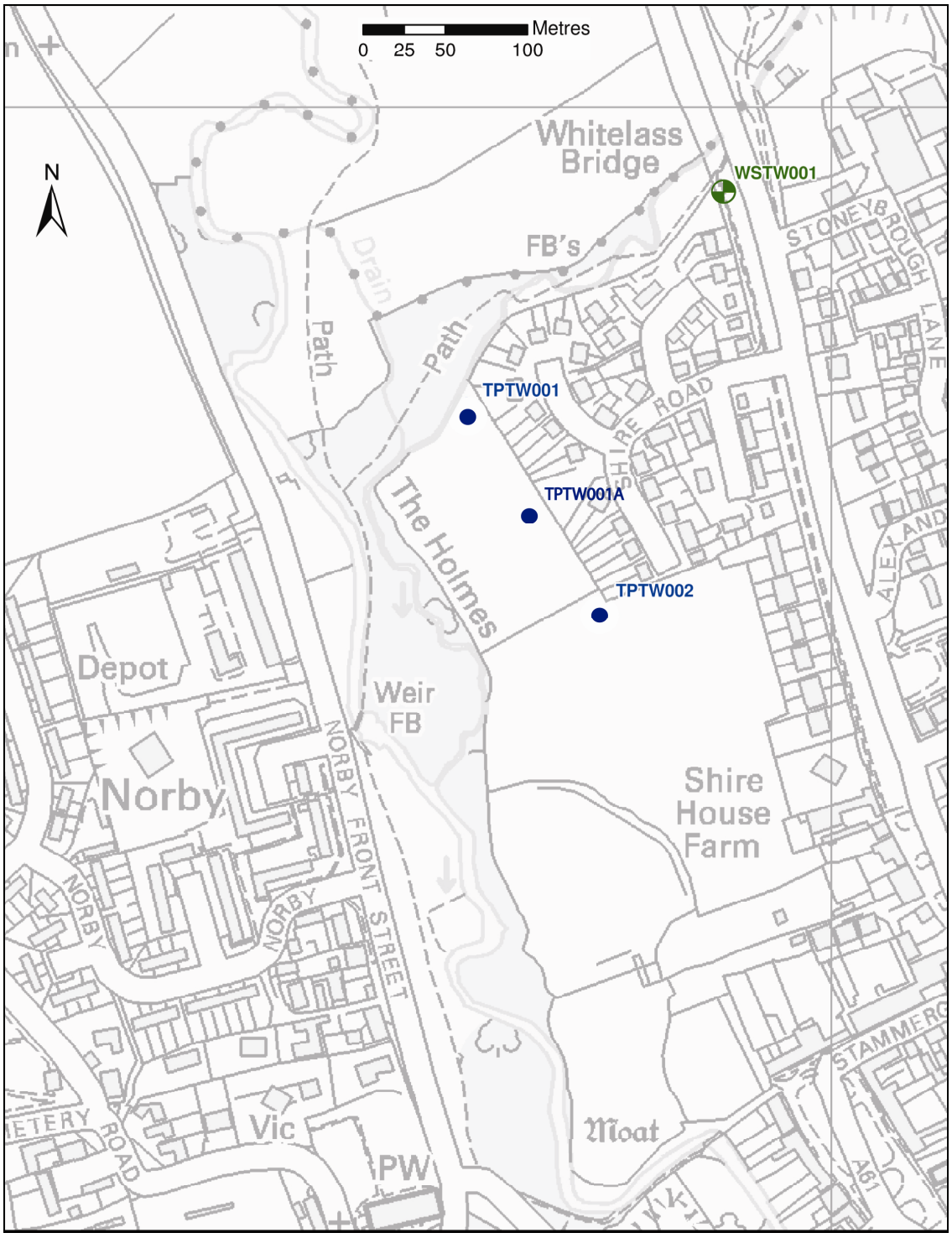

Figure 2 *Location of trial pits and boreholes, Thirsk*

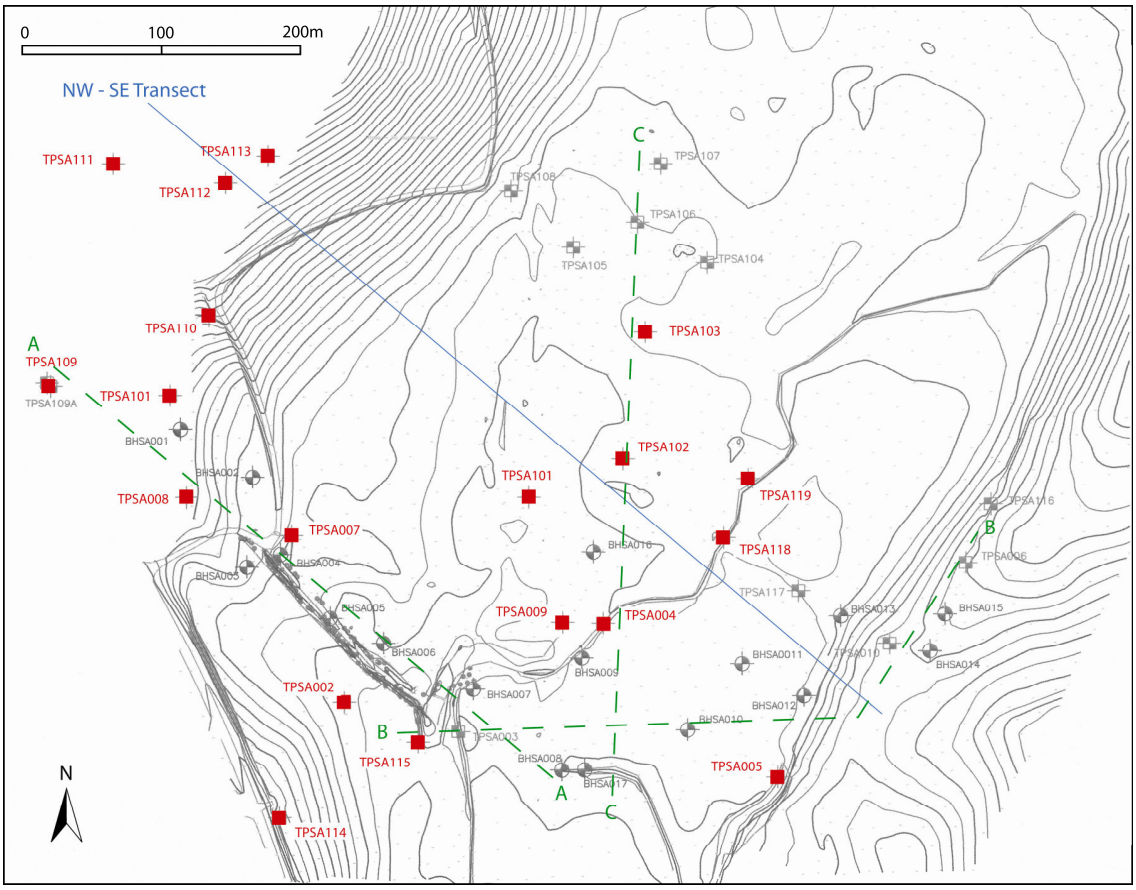

Figure 3 *Location of trial pits and boreholes, Storage Area*

4. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

4.1 THIRSK

There are a considerable number of listed buildings, sites and monuments in Thirsk, but only two within a 250m radius of the trial pits observed on the northern outskirts of the town (Table 1: Fig. 1).

NMR/HER No.	NAME	GRID REF.	DETAILS
HER MNY367 LB 333337	Mile post	SE 4298 8283	19th cent, metal, shows distances to London etc
HER MNY424	The Holmes	SE 428 827	Water meadows, medieval/post-medieval

Table 1 *Sites and monuments close to the observed trial pits in Thirsk*

There is little evidence of Prehistoric activity in this area. Mesolithic hunter-gatherers may have been attracted by the fresh water and the wetland resources. However, such a low-lying site is likely to have been useful only as meadow and for pasture. In the absence of any evidence to the contrary, the same probably applied during the Roman and Anglian periods, although the proximity of Roman road Margary 80a (see below) could have attracted settlement to the area.

The place-name Thirsk is derived from the Old Norse *thresk*, meaning 'marsh', which suggests the presence of Anglo-Scandinavian settlers in the area (Mills 1998, 343). Thirsk is recorded in Domesday Book as 'Tresche', and had 60 inhabitants but no church. It had a market by 1145, when it was listed as a borough, and it became an important market town during the medieval period.

The area of the watching brief in Thirsk was on the edge of the township, and was probably exploited as meadowland and pasture from at least the medieval period. It was partially built on for housing in the 20th century.

4.2 STORAGE AREA

A number of sites and monuments are recorded within a 1km radius of the proposed Storage Area dam (Table 2; Fig. 1).

NMR/HER No.	NAME	GRID REF.	DETAILS
HER MNY376	Neollithic arrowhead	SE4187	Flint, leaf arrowhead
NMR 55517	Road or track	SE40608771	Stone surface 24' wide, 6" thick, with kerbs
HER MNY193 NMR 55518	Roman coin(s)	SE411872	1 or 2 Roman coins
NMR 55519	Watermill	SE40958750	A mill recorded in 1702 (not operating)
NMR 55535	Braywith village	SE410875	Medieval vill
NMR 55556	Braywith Hall	SE40148730	18th century, Grade II*

Table 2 *Sites and monuments in the vicinity of the Storage Area*

Evidence for Prehistoric activity in the area is confined to a single Neolithic flint leaf arrowhead, found in Braywith Park. It is likely that the river valley would have attracted

Mesolithic hunter-gatherers (10th-5th millennium BC), but the character of any Neolithic-Iron Age (4th-1st millennium BC) settlement and land-use is unclear.

There is some evidence for activity of Roman date in the area (1st-5th centuries AD). A Roman road running between Stamford Bridge northwards towards Hadrian's Wall (Margery 80) is thought to follow roughly the line of the Thirsk to Northallerton road. This is supported by the occurrence of 'street' names, such as Street Houses and Thornton-le-Street, which indicate the presence of a Roman road. The exact line of the Roman road for some distance north of Thirsk is uncertain, although the road or track recorded immediately east of the current Northallerton Road (NMR 55517) could be this Roman road. The only other evidence of Roman activity is the one or two coins found in the valley south of Braywith Hall (HER MNY193/NMR 55518).

There is little evidence of settlement in the area dating to the Anglian or Anglo-Scandinavian periods (5th-11th centuries). The prevailing settlement pattern in the Cod Beck valley, which apparently was established during this time, comprises villages on the higher ground to either side of Cod Beck. There, the villages were able to exploit the land in the flood-plain, presumably as meadow and pasture, while avoiding the risk of flooding. The Storage Area lies on the flood-plain within the townships of Knayton, Thornton-le-Street and Thornton-le-Beans, and was probably mostly used as meadow and pasture. However, it is possible that there was a watermill alongside the beck at this time (see below).

There are indications of activity dating to the medieval and post-medieval periods (11th-19th centuries). A settlement known as Brawith is recorded in 1301, probably within the parish of Knayton (NMR 55535; Beresford 1954, 295). The place-name may be derived from the Norman French *bray*, meaning 'marsh'; and the Old English *withig*, meaning 'willow tree' (Gelling 1984). The place-name survives in Brawith Hall. The current hall dates to the 18th century, but it is recorded as held by the Danby family by the early 17th century (NMR 55556). The hall occupies some raised ground in the valley, possibly a terrace, which could have been a suitable site for a village. The likeliest explanation of this evidence is that Brawith was a daughter settlement, carved out of the original township of Knayton after the Norman Conquest as the population rose during the 12th-13th centuries; this village would have been one of many Deserted Medieval Villages that were abandoned in the later 14th century (or a little later) as the climate deteriorated and the population fell due to plague, leaving only the hall. It is also quite possible that the watermill, recorded as disused in 1702 (NMR 55519), was in use in the medieval period.

5. RESULTS

5.1 THIRSK

The three trial pits examined reached a maximum depth of 3.4m (Fig. 4). The earliest deposit encountered was wet, compact grey/brown clay with frequent rounded cobbles, at least 1.3m thick (1115). Above this were mixed sandy and clayey gravels with frequent rounded pebbles, which were an average of 1m thick (1106-7; 1114). These were overlain by grey and brown clay deposits, which varied in thickness between 0.25m and 1.25m (1105; 1112-3). All of these deposits are regarded as alluvium. They were below poor silty clay topsoil under rough vegetation, which was a maximum of 0.3m thick (1104; 1111).

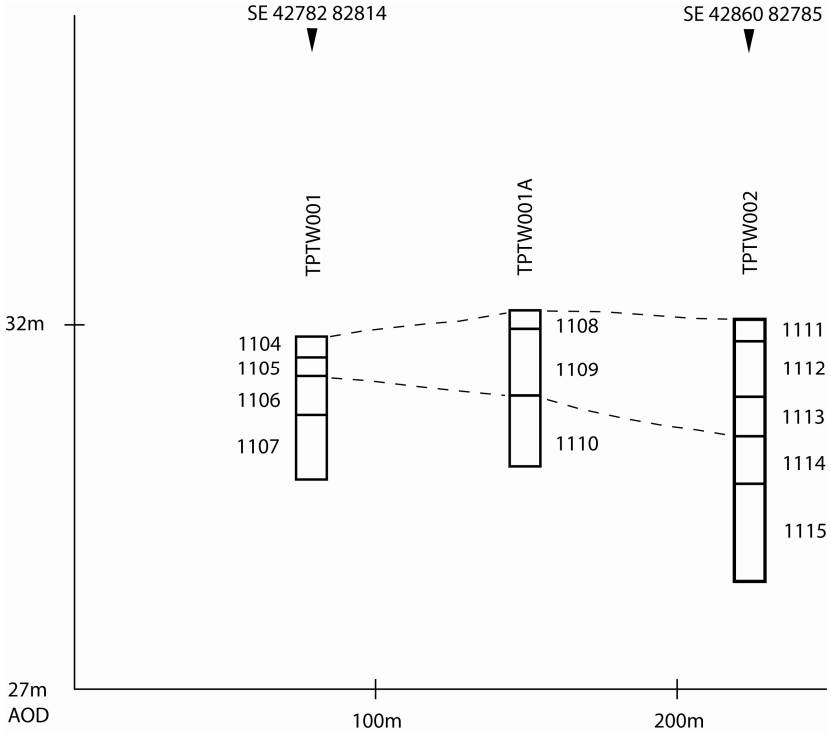

Figure 4 *South-west facing deposit profile, Thirsk*

5.2 STORAGE AREA

The trial pits examined in this area reached a maximum depth of 4.5m. A selection have been incorporated in a composite transect across the Cod Beck valley, along with some boreholes that provide information on the deeper lying deposits; this transect forms the basis for the following narrative of the deposit sequence (Fig. 4).

The solid geology was mostly Mercia Mudstone (1065, 1071, 1076, 1082) although a layer of clayey shale 1.8m thick was found overlying the Mudstone in TPSA 111 (1070), and limestone was reached at the bottom of BHSA 002. The top of the solid geology was around

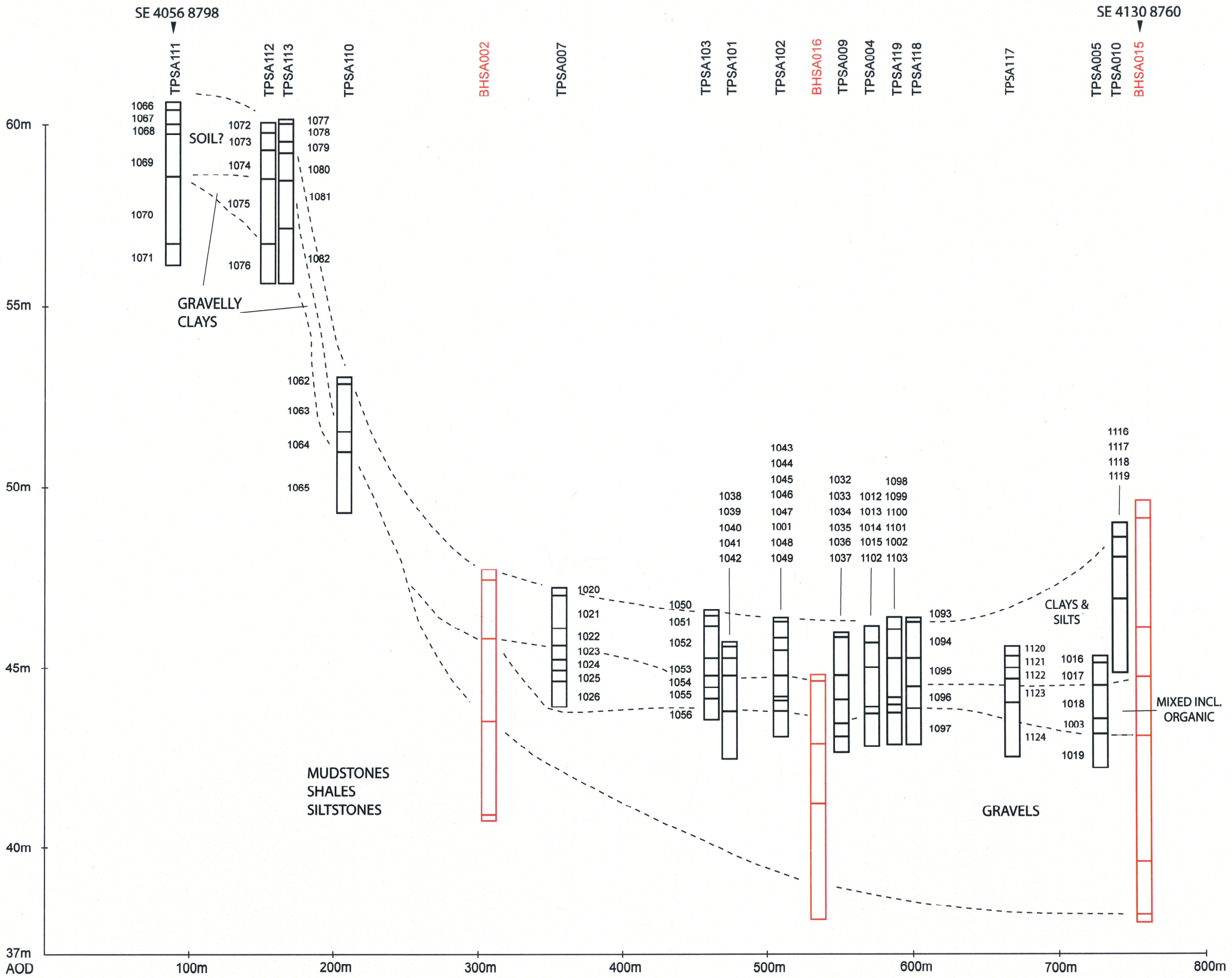

Figure 5 *South-west facing composite deposit profile, Storage Area*

58.5m AOD at the north-west end of the transect but sloped down steadily south-east of TPSA 113, reaching barely 38m AOD in BHSA 015, forming a concave profile.

Overlying the shale in TPSA 111 was compact clay, 1.5m thick, which is regarded as weathered bedrock (1068-9). Above that was a layer of silty clay, probably a subsoil (1067). In TPSA 110 on the slope below TPSA 111, the Mudstone was overlain by a layer of clay 0.5m thick, possibly weathered parent material (1064). This deposit was beneath silty clay 1.3m thick, which is thought to have been a subsoil (1063). The deposits in these two trial pits seem to represent the uninterrupted formation of soil profiles.

In TPSAs 112-3, however, the Mudstone was overlain by gravelly layers of silty clay (1075) and disturbed clayey shale (1081) around 1.5m thick. Above these deposits were layers of sandy clay (1073), clay (1074, 1079) and clayey silt (1080) These trial pits point to the formation of fluvial deposits at around 57-60m AOD towards the north-west end of the transect.

On the lower ground in the south-east part of the transect, there was considerable evidence for the formation of fluvium. Overlying the Mudstones in BHSAs 002 and 015-6 were gravelly clays, sands and silts, up to 6.7m thick at the south-east end of the transect; the top of these deposits was around 44m AOD. The uppermost part of this sequence of gravelly deposits was apparently observed in TPSAs 004 (1102), 005 (1019), 009 (1036-7), 101 (1042), 102 (1049), 118 (1097) and 119 (1103). These deposits are thought to indicate deposition in a high-energy riverine environment.

Above the gravelly deposits was a more mixed series of less gravelly silts, sands and clays that were sometimes laminated: TPSAs 004 (1014-5), 005 (1017-8), 007 (1023-6), 009 (1035), 101 (1041), 102 (1047-8), 103 (1054-5), 118 (1095-6) and 119 (1100-1); also BHSA 016. These deposits were no more than 2m thick overall, and the top was around 45.5m AOD. A notable feature of some of these deposits was the presence of alder and willow roundwood, sometimes in a matrix of organic material, in TPSAs 005 (1003), 102 (1001), 103 (1055) and 119 (1002). A radiocarbon date of 1120-810 BC (95% probability) was obtained from a wood sample from Context 1003 (see Appendix 2). It is suggested that these deposits were alluvial, mostly formed in a low energy riverine environment with occiasional flood episodes.

Overlying these mixed deposits were mostly clay or silt deposits, sometimes with sand laminations: TPSAs 004 (1013), 007 (1021-2), 009 (1033), 101 (1039-40), 102 (1044-6), 103

(1051-3), 118 (1094) and 119 (1099); also BHSA 002. These deposits were an average of 1m thick overall, and are interpreted as low-energy alluvia.

A slightly different process appears to have taken place at the south-east end of the transect, where the gravelly deposits were sealed by primarily clay deposits with some sand and gravel: TPSA 010 (117-9) and BHSA 015. These deposits were some 4m thick overall, and the top was around 49m AOD. It is likely that they represent an alluvial episode separate from that observed further north-west.

The uppermost deposit in all of the Trial Pits and Boreholes was a generally silty loam topsoil under turf, or a ploughsoil, an average of 0.2m thick.

6. ANALYSIS OF WOOD FROM SAMPLES

by S.J. Allen

Sample 001 was from a soil sample from TPSA 102. The block of soil was broken apart, the matrix returned to its packaging and the wood fragments taken out. These were washed, recorded, sampled for species identification and placed in a small bag in the same sample tub as the main soil sample, should the whole of the material need to be looked at in the future. Sample 002 from TP 119 was treated in the same way. Sample 003 from TPSA 005 was a single piece of wood, which was assessed following the normal procedures for archaeological wood. In addition, Sample 003, which was the only sample with enough wood to be certain of obtaining a ^{14}C date, was sampled for dating and the sample despatched to the laboratories of Beta Analytic of Miami, Florida, for dating (see Appendix 2).

The wood from sample 001 consisted of fifteen fragments of roundwood, some with bark present, some without. All the fragments have broken ends but none could convincingly be refitted. It is uncertain how many original buried pieces of wood are represented by this number. All are *Salix spp*., willows whose sub species cannot be determined from the available wood. None of the wood exhibits any working marks or any evidence of human modification apart from the breakage during sample collection.

Sample 002 included sixteen wood fragments, derived from roundwood but significantly more broken up. Some of this may have happened during burial, but equally, some may have happened during sampling. None of the fragments convincingly refit to others and it is uncertain how many original wood pieces were present. All fragments are *Alnus spp*., alders,

but their sub species cannot be determined from the surviving remains. There is no working or other evidence of human activity beyond damage resulting from excavation.

Sample 003 was a single piece of wood. This was a halved section of *Alnus spp.* roundwood, perhaps from a small trunk or large branch. The section is evidently from the junction of the main stem with a smaller side branch which has affected the apparent conversion at one end, with two distinct piths present. The split face is irregular and appears to be a natural rather than man-made split. Both ends have been truncated recently. There is no evidence of intentional working.

The wood species are both native trees and there is no need to suppose the wood has been brought in from any significant distance. Alders and Willows are both tolerant of high water tables and consequently survive in damp growing environments much better than other, less well adapted, tree species. If the burial matrix is, as it appears to be, a water-lain deposit, it is entirely possible that this wood has arrived there through natural agency rather than through direct human activity. There are no obviously datable aspects of the wood which would allow it to be ascribed to any particular era.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

The interpretation of geotechnical data from scattered Trial Pits and Boreholes in such a varied landscape is difficult, but some observations and suggestions can be made. To begin with, it is likely that the solid geology was exposed during the last (Devensian) glaciation, which ended around 10,000BP, as ice sheets extended as far south as York (Kent 1980). The highest point of the Mudstones around 57m AOD, at the south-west end of the Storage Area transect, may represent the general ground level during the glaciation.

The fall in the solid geology down to the south-east in the Storage Area is thought to represent the north-west edge of a channel, cut by glacial meltwater beneath or beyond the ice sheet towards the end of the last glaciation. The base of the channel is uneven, ranging from 44.9m AOD (not illustrated) to as low as 29.6m AOD (not illustrated), which suggests that there were several braided sub-channels. This channel would appear to have been at least 1km wide; indeed, it may well have extended as far as the high ground in the vicinity of North Kilvington, some 2.5km to the south-east. In comparison, a meltwater channel later occupied by the River Ure was about 2.5km wide by a maximum of 60m deep, reaching a

depth of 20m below current sea level (Long et al 2004, 4). The gravels in the base of the channel were probably laid down at the end of the last glaciation (Long et al 2004, 12f.).

The presence of fluvial deposits at higher levels, above 45m OD on the south-east side of the Storage Area and some 50-60m AOD on the north-west side, is problematical. They could be terraces, in which case there would once have been much thicker fluvial deposits that were subsequently removed in the centre of the channel by renewed downcutting. Alluviation in the piedmont region of the Ouse system prior to 1850BC, followed by incision during the 2nd millennium BC, has been identified. The incision phase apparently resulted from a change to wetter conditions; but it is also possible that human clearance of woodland, resulting in increasing runoff, was also a factor, as earlier climatic downturns had not resulted in such geomorphic activity (Macklin et al 2000, 90-2; Foulds and Macklin 2006, 594-6; Chiverrell et al 2007; Brown 2008).

The upper deposits in the centre of the channel are alluvial in character, and according to a radiocarbon date obtained from a context towards their base, date to the Late Bronze Age and later. These deposits apparently reflect the relative rise in sea level that has prevailed in recent millennia, reducing the energy of the rivers. However, the varied nature of the alluvium may be the result of shorter episodes of incision and alluviation that have occurred as recently as the post-medieval period (Macklin et al 2004, 92-95; Chiverrell et al, 2007).

7.2 RECOMMENDATIONS

The geotechnical investigation and the watching brief have revealed intriguing evidence of the river regime of Cod Beck, the climate and possible human impact during the Holocene,. This includes well-preserved environmental material dating to the Late Bronze Age. Any further investigations or groundworks should be monitored in order to refine this evidence.

Several sites and monuments lie in close proximity to the Storage Area, including a probable Roman road, medieval village and medieval mill. The archaeological impact of any further investigations as well as the Storage Area works, should the scheme progress, should be considered.

8. ACKNOWLEDGEMENTS

Watching brief	K. Hunter-Mann, A Winterburn
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Wood samples	S.J. Allen

Illustrations	M. Johnson
Editor	M. Stockwell

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APPENDIX 1: LOGS OF MONITORED TRIAL PITS

TPSA001

0-0.2m BGL	Friable mid grey/brown sandy clay silt topsoil under turf. 1004
0.2-0.4	Friable-compact mid brown poorly sorted sandy clay, occasional limestone flecks (reworked soil/hillwash?). 1005
0.4-1.0	Compact light brown/yellow slightly laminated sandy clay, with sudden increase to frequent small-large slabby sandstone fragments at bottom (subsoil?). 1006 (Excavation ceased at 1.0m due to presence of a ceramic field drain)

TPSA002

0-0.3m	Friable mid brown sandy clay silt ploughsoil under wheat. 1007
0.3-0.9	Friable light brown sandy loam, becoming mid brown in lower half (soil). 1008
0.9-1.8	Compact light brown sand, moderate small cobbles, occasional sandy clay lenses (alluvium). 1009
1.8-2.6	80% sandstone gravel in dark brown sandy silt matrix (alluvium). 1010
2.6-3.0	90% pea gravel in light brown sand (alluvium). Water at 2.7m. 1011

TPSA003

0-0.2m	Friable mid brown sandy clay silt topsoil under turf. 1125
0.2-0.4	Friable light brown sand. 1126
0.4-0.85	Friable/compact mid brown clay. 1127
0.85-1.7	Compact/friable orange-brown sandy clay. One lens of compact light brown clay 50mm thick. 1128
1.7-2.4	Very compact gravel. Frequent rounded pebbles-cobbles. Light grey sand matrix. 1129
2.4-2.8	Friable/compact light orange-brown clay. 1130

TPSA004

0-0.4	Good topsoil under turf. 1012
0.4–1.1	Moderately friable brown clayey sand (soil?). 1013
1.1–2.2	Moderately compact patchy grey and brown sandy clay (alluvium). 1014
2.2–2.4	Moderately friable grey sandy clay (alluvium). 1015
2.4–3.3	Friable grey sand with frequent rounded gravel and pebbles (alluvium). 1102

TPSA005

0–0.15	Good topsoil under turf. 1016
0.15–0.8	Moderately friable slightly sandy clay. 1017
0.8–1.7	Moderately friable bright brown / orange slightly sandy clay. 1018
1.7–2.1	Moderately compact grey sandy clay with frequent rounded pebbles and gravel and good organic preservation. Slightly less organic than context 1002. Sample 003 taken: large fragment of wood. 1003
2.1–3.1	Friable dark grey sandy gravel. Frequent rounded pebbles. 1019

TPSA006

0-0.25m	Friable clay silt topsoil under turf. 1131
0.25-1.9	Friable/compact mid brown sandy clay, frequent pebbles. 1132
1.9-4.2	Compact mid red-brown clay, frequent pebbles. 1133

TPSA007

0-0.2m	Friable mid brown sandy clay loam ploughsoil under wheat. 1020
0.2-1.1	Friable light/mid brown sandy clay silt, occasional small stones (soil). 1021
1.1-1.5	Compact dark brown sandy silt, moderate small stones (subsoil?). 1022
1.5-1.85	60% gravel-cobbles in compact light/mid brown/grey sandy clay (alluvium). 1023
1.85-2.3	Firm light/mid grey sandy clay, occasional cobbles (alluvium). 1024
2.3-2.6	Soft light grey slightly sandy silt (alluvium). Water at 2.6m. 1025
2.6-3.3	Compact interleaved light brown clay and light grey sand, frequent small-large cobbles, occasional gravel and pebbles (alluvium). 1026

TPSA008

0-0.2m	Friable mid brown sandy silt topsoil under turf. 1027
0.2-0.7	Compact mottled mid brown and yellow sandy clay (soil). 1028
0.7-1.3	Compact mid brown sandy clay. Occasional small decayed fragments, increasing to moderate on lower half (subsoil). 1029
1.3-2.5	Soft interleaved mid blue and brown laminated shale/mudstone, partially decayed into clay (weathered bedrock). 1030
2.5-4.2	Compact mid blue/purple laminated shale/mudstone. Includes ammonite fossil, indicating Late Jurassic Redcar Mudstone. 1031

TPSA009

0-0.1m	Friable mid/dark brown sandy clay silt topsoil under turf. 1032
0.1-1.2	Friable mid brown sandy clay silt (soil). 1033
1.2-1.8	Moist, soft, slightly laminated mid grey/brown clay silt (altered alluvium). 1034
1.8-2.5	Soft light/mid grey silty clay, becoming dark in lower half (alluvium). 1035
2.5-2.8	Loose light grey sand, 50% gravel-cobbles. 1036
2.8-3.3	90% gravel-cobbles in layers of mid grey silty clay, light orange/brown sand and mid brown sandy silt. Water at 3.0m. 1037

TPSA010

0-0.45m	Topsoil under turf. 1116
0.45-0.95	Compact mid brown sandy clay. Occasional rounded pebbles. 1117
0.95-2.1	Compact mid orange/brown sandy clay. Frequent stones up to boulders in size. 1118
2.1-4.2	Compact mid red/brown clay. Occasional rounded pebbles. 1119

TPSA101

0-0.1m	Friable mid brown clay silt topsoil under turf. 1038
0.1-0.4	Compact mid brown silty clay (soil?). 1039
0.4-1.0	Compact mid brown clay (alluvium). 1040
1.0-2.0	Compact light brown sandy clay, occasional fine light brown sand laminations increasing to frequent in lower part (alluvium). Water at 2.0m. 1041
2.0-3.2	90% gravel-cobbles in lenses of light brown sand and mid brown silt (alluvium). 1042

TPSA102

0-0.1m	Friable dark brown sandy clay silt topsoil under turf. 1043
0.1-0.5	Friable mid brown sandy clay silt (soil?). 1044
0.5-0.9	Compact mid brown clay loam, occasional decayed wood fragments, some burnt (altered alluvium?). 1045
0.9-1.6	Compact light brown silty clay, very occasional small twigs (alluvium). 1046
1.6-2.2	Compact laminated light grey silty sand and mid brown silty clay (alluvium). 1047
2.2-2.3	1001: Very organic mid brown clay silt (decayed vegetable matter?), frequent small twigs and roundwood up to 40mm diameter (Sample 001). 1001
2.3-2.6	Organic mid grey silty clay, moderate twigs and roundwood. 1048
2.6-3.3	60% gravel, moderate cobbles in coarse sand. Water at 3.0m. 1049

TPSA103

0-0.1m	Topsoil under turf. 1050
0.1-0.4	Friable/compact mid brown sandy silty clay (soil). 1051
0.4-1.3	Compact mid brown clay silt (altered alluvium?). 1052
1.3-1.8	Compact light brown grey poorly sorted silty clay (alluvium?). 1053
1.8-2.1	Compact laminated light grey sand and light orange/brown sandy clay (alluvium). 1054
2.1-2.4	Compact slightly organic mid brown silty clay, occasional small twigs (alluvium). Water at 2.4m. 1055
2.4-3.0	Coarse sand to medium cobbles (alluvium). 1056

TPSA109

0 – 0.15m	Good topsoil covered by turf. 1057
0.15 – 1.3	Compact plastic mid brown slightly silty clay. 1058
1.3 - 2.2	Compact plastic mid greyish brown clay with occasional rounded limestone cobbles. 1059
2.2 – 3.3	Compact brownish grey silty clay (alluvium?). 1060
3.3 – 4.5	Compact grey silty clay mudstone (alluvium). 1061

TPSA110

0 – 0.2m	Topsoil covered by rough turf. 1062
0.2 – 1.5	Moderately compact mid brown silty clay (soil?). 1063
1.5 – 2.05	Moderately compact mid brownish grey clay. 1064
2.05 – 3.7	Moderately compact mid grey clay mudstone. Becomes cleaner as deposit gets deeper but stopped at this level due to water ingress (alluvium). 1065

TPSA111

0 – 0.2m	Topsoil covered by rough turf. 1066
0.2 – 0.6	Moderately compact mid brown silty clay (soil?). 1067
0.6 – 0.9	Moderately compact mid brown clay (alluvium). 1068
0.9 – 2.1	Moderately compact mid brownish grey clay (alluvium?). 1069
2.1 – 3.9	Moderately friable mid brown clay shale (alluvium). 1070
3.9 – 4.5	Moderately friable mid grey silty clayey mudstone (alluvium?). 1071

TPSA112

0 – 0.3m	Rich topsoil covered by turf. 1072
0.3 – 0.75	Moderately compact mid brown slightly sandy clay. 1073
0.75 – 1.55	Compact brownish grey clay. 1074
1.55 – 3.3	Moderately compact brown silty clay with frequent gravel (alluvium). 1075
3.3 – 4.4	Very compact grey silty clay mudstone (alluvium). 1076

TPSA113

0 – 0.05m	Usual topsoil covered by turf. 1077
0.05 – 0.6	Moderately compact mid brown slightly silty clay (soil?). 1078
0.6 – 0.9	Compact mid brown clay. 1079
0.9 – 1.7	Compact mid greyish brown clayey silt (alluvium?). 1080
1.7 – 3.0	Compact grey clayey shale with frequent gravel (alluvium). 1081
3.0 – 4.5	Very compact grey silty clayey mudstone (alluvium). 1082

TPSA114

0 – 0.15m	Good topsoil with turf at edge of crop field. 1083
0.15 – 0.5	Moderately friable light brown sandy clay. 1084
0.5 – 2.4	Compact brown slightly sandy clay. 1085
2.4 – 4.3	Compact grey slightly sandy clay mudstone. 1086

TPSA115

0 – 0.2m	Rich topsoil with turf at edge of crop field. 1087
0.2 – 0.8	Friable mid brown sandy clay (soil?). 1088
0.8 – 1	Moderately friable mid brown silty sandy clay (soil?). 1089
1 – 1.8	Friable light brown sand. Clean. 1090
1.8 – 2	Moderately friable grey slightly silty sand with lots of gravel especially towards the base of this deposit (alluvium). 1091
2 – 2.6	Moderately compact brown sand with lots of gravel and frequent rounded pebbles. Lots of water ingress as now at same level as water within stream <8m away (alluvium). 1092

TPSA116

0-0.3m	Topsoil under turf. 1134
0.3-0.6	Compact/friable mid brown sandy clay (soil?). 1135
0.6-1.7	Compact mid red-brown clay, moderate gravel and small pebbles. 1136
1.7-4.2	Compact mid grey-red clay, frequent gravel and small rounded pebbles, occasional shale fragments. 1137

TPSA117

0-0.3m	Topsoil under turf. 1120
0.3-0.6	Friable-compact mid brown sandy clay. 1121
0.6-0.9	Compact mid grey/brown clay. 1122
0.9-1.5	Compact mottled orange and grey silty sand. 1123
1.5-3.0	Pebbly gravel in friable grey sand matrix. 1124

TPSA118

0 – 0.1m	Usual topsoil with rough wild plants at edge of crop field. 1093
0.1 – 1.1	Moderately friable brown clayey sand (soil?). 1094
1.1 – 1.8	Moderately compact brown sandy clay. 1095
1.8 – 2.5	Compact brown grey clay (alluvium). 1096
2.5 – 3.5	Moderately friable grey sandy gravel with frequent rounded pebbles (alluvium). Excavation stopped here due to water ingress and collapse. 1097

TPSA119

0 – 0.3m	Good thick topsoil covered in rough turf and wild plants at edge of crop field. 1098
0.3 – 1.1	Moderately friable brown clayey sand (soil?). 1099
1.1 – 2.2	Moderately friable brown sandy clay. 1100
2.2 – 2.4	Moderately compact patchy grey and brown clay (alluvium). 1101
2.4 – 2.6	Moderately compact silty sandy clay. Highly organic deposit with occasional rounded gravel and excellent twig and small roundwood preservation. Sample number 002. (alluvium). 1002
2.6 – 3.5	Friable grey sand with frequent rounded gravel and pebbles (alluvium). 1103

TPTW001

0 – 0.3m	Poor but deep topsoil covered in rough wild plants. 1104
0.3 – 0.55	Plastic/sticky brownish grey clay (alluvium). 1105
0.55 – 1	Compact brown and grey patchy clay with frequent rounded pebbles (alluvium). 1106
1 – 1.8	Soft mid brown sandy gravel with frequent rounded pebbles. Water ingress at 1.1m and very soft running sands/gravels causing quick collapse of sections (alluvium). 1107

TPTW001A

0 – 0.25	Poor topsoil covered in rough wild plants. 1108
0.25 – 1.1	Moderately friable brown sandy clay. 1109
1.1 – 2	Moderately compact patchy brown grey clay with frequent rounded gravel. Excavation stopped here due to severe water ingress starting at about 1.2m and collapse. 1110

TPTW002

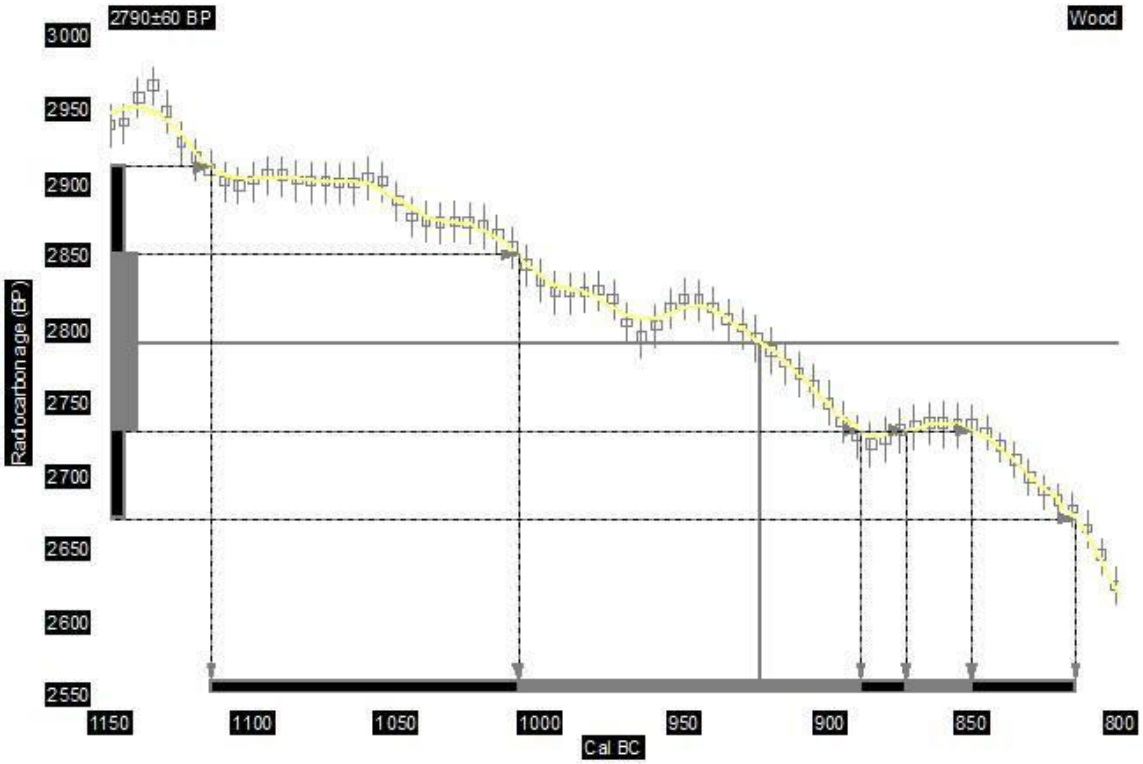
0 – 0.25m	Poor topsoil covered in rough wild plants. 1111
0.25 – 1	Dry yet plastic brown clay. 1112
1 – 1.5	Plastic patchy grey and brown clay. 1113
1.5 – 2.1	Moderately compact, wet, brownish grey clay with frequent rounded gravel and rounded pebbles (alluvium). 1114
2.1 – 3.4	Moderately compact very wet brownish grey clay with frequent rounded boulders especially towards the base of this deposit. Excavation stopped here due to severe water ingress and collapse. 1115

APPENDIX 2: RADIOCARBON DATING REPORT

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-27.8:1ab. mult=1)

Laboratory number:	**Beta-262110**
Conventional radiocarbon age:	**2790±60 BP**
2 Sigma calibrated result: (95% probability)	**Cal BC 1120 to 810 (Cal BP 3060 to 2760)**
Intercept data	
Intercept of radiocarbon age with calibration curve:	Cal BC 920 (Cal BP 2870)
1 Sigma calibrated results: (68% probability)	Cal BC 1010 to 890 (Cal BP 2960 to 2840) and Cal BC 870 to 850 (Cal BP 2820 to 2800)



References:

Database used

INTCAL04

Calibration Database

INTCAL04 Radiocarbon Age Calibration

IntCal04: Calibration Issue of Radiocarbon (Volume 46, nr 3, 2004).

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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Plate 1 *TPTW 002 looking east. The Holmes (foreground), Stockton Road (background)*

Plate 2 *TPTW 002. Clays over gravel*

Plate 3 *TPSA 009 looking north. Cod Beck in trees (right and background), floodplain (foreground)*

Plate 4 *TPSA 005 looking east. Flood plain (foreground), terrace (background), Brawith Hall behind trees (right)*

Plate 5 *TPSA 003. Sands and clays*

Plate 6 *TPSA 009. Clays over silts (alluvium?)*

Plate 7 *TPSA 010. Clays and silts (fluvial?)*

Plate 8 *TPSA 101 fluvial deposits (south-west terrace?)*

Plate 9 *TPSA 109. Clays over silts (alluvium)*

Plate 10 *TPSA 111. Clays over shale*

Plate 11 *TPSA 113. Mudstone in base, below possible fluvial deposits*

Plate 12 *TPSA 116. Fluvial deposits (Brawith terrace?)*

Plate 13 *TPSA 119. Organic deposit over gravel in base, clays above*