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Excavation and Analysis

Clifford's Tower, York
Report on Cores through the Mound, 2015

Matthew Canti, Gill Campbell, Alice Forward, Simon Mays, Sarah Paynter and Fay Worley

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SUMMARY

Seven cores through the earth mound under Clifford's Tower, York were commissioned by Ramboll in 2015 as part of a geotechnical study of the mound's properties in advance of construction work. This report contains descriptions and images of the cores, which represent the only reliable information on the stratigraphy of the mound's full depth. Finds of human and animal bones, as well as plant remains were found in a number of cores. Sediment sampling from the basal parts of the cores was therefore carried out to help understand the make-up, retrieve further datable material and try to establish whether the construction might have made use of an existing prehistoric mound. Many of the plant remains recovered from these samples were post-Roman or medieval in character. All samples also contained ceramic building material, suggesting a Roman and/or later dates. The mound of Clifford's Tower appears, therefore, not to have augmented an earlier mound, but instead was constructed directly on top of part of the Roman cemetery, recorded within the Castle Yard. It appears that base of the mound was made by simply excavating and piling up the local topsoil, subsoil and sediments and their contents, with little regard for the Roman burial ground.

CONTRIBUTORS
Core description and analysis was by Matthew Canti and Gill Campbell. Additional information and identifications were provided by Alice Forward, Simon Mays, Sarah Paynter and Fay Worley

ARCHIVE LOCATION
Fort Cumberland, Portsmouth

DATE OF RESEARCH
Sept 2015 – Sept 2016

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CONTENTS

Introduction

Cores through the earth mound under Clifford's Tower, York were commissioned by Ramboll in 2015 as part of a geotechnical study of the mound's properties in advance of construction work. Previous information on the make-up of the mound came only from the underpinning works carried out in the eastern half during the early 1900s (Benson and Platnauer 1902). These produced five sections through the mound (see Figure 69 in Appendix 1), but they are limited to one area, and the descriptions are partly vernacular.

The 2015 cores, therefore, although also quite limited in extent, represent the only reliable up-to-date information on the stratigraphy of the mound's full depth.

Location of the 2015 cores

Three cores (BH 1, BH 2 and BH 3) were taken through the central area of the mound, and 4 more (BH 5, BH 8, BH 10 and BH 11) were taken on the peripheral slopes (Figure 1).

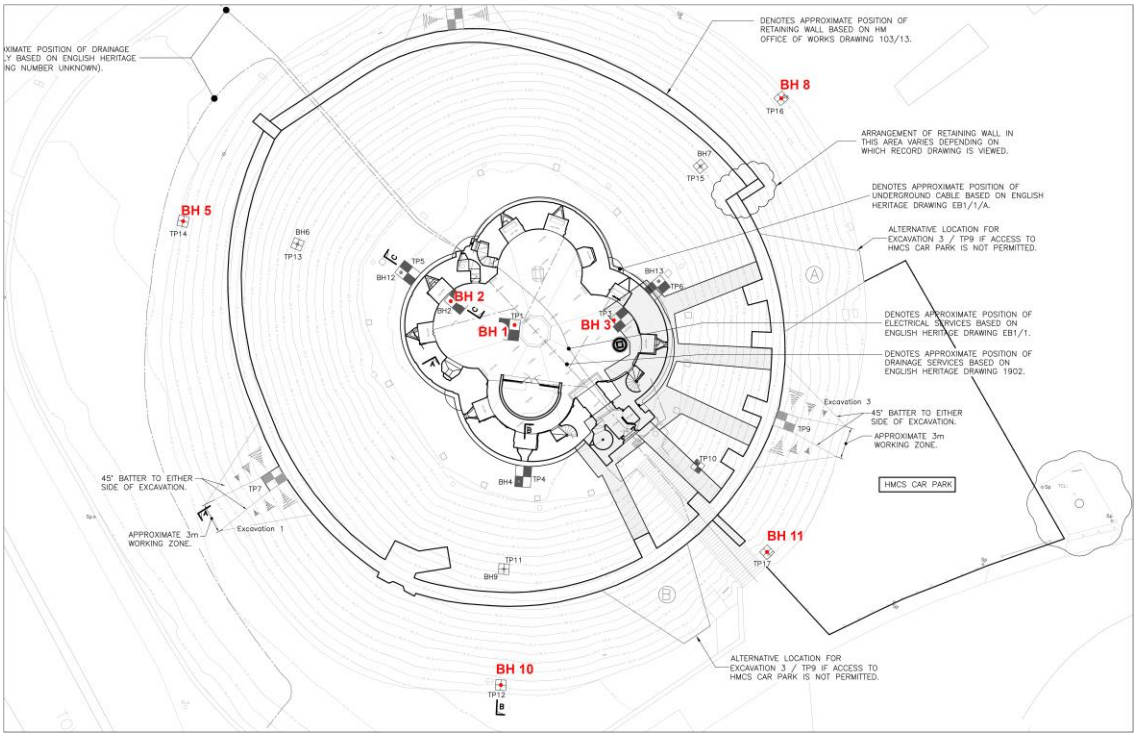

Figure 1. Plan showing location of the 2015 boreholes and also the 5 underpinning sections from the early 1900s.

The three deep central cores (BH 1, BH 2 and BH 3)

Figures 2, 3 and 4 show a summary of the three deep central cores taken from around 23 – 24 m OD near the centre of the mound.

Two of the cores (BH 1 and BH 3) come down onto loamy material at around 13 - 14 m depth. This was interpreted by the Ramboll engineers as geological material of the Vale of York formation (Ramboll 2015, fig 2.13). The second core (BH 2) appears to have terminated before reaching this underlying natural layer. All three cores show a preponderance of black sandy silt loam or loamy sand towards the base, i.e. from 7.34 m to 13.00 m in BH 1, 8.00 m to 11.50 m in BH 2, and 7.10 m to 13.10 m in BH 3. It is not known whether any of this material represents an old land surface. It could perhaps be partly a remnant of a deep peaty sediment overlying the Vale of York formation. Above this layer, in all three cases, there appears to be no other pattern in the deposits; they are made up of mixtures of topsoil, subsoil and building rubble with a variety of textures and colours. Bone, plant material, wood and sometimes charcoal were found in the cores and were sampled where coherent enough for identification.

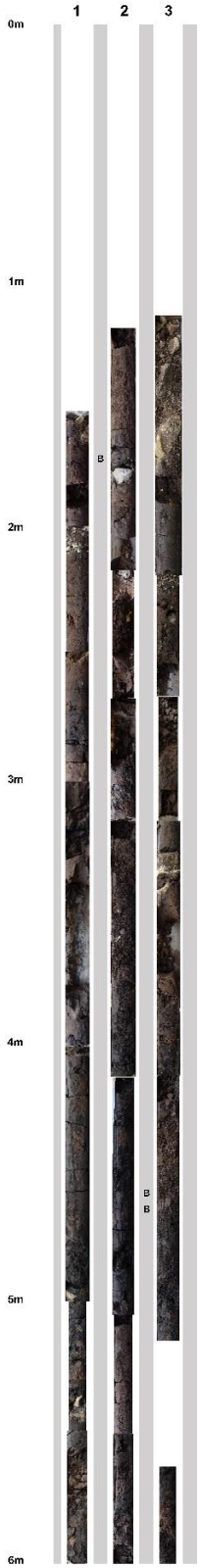

Figure 2. Summary montage showing the top 6m of the three central cores. Finds of bone (B) and wood (W) are indicated to the right of the core. All measurements are approximate only.

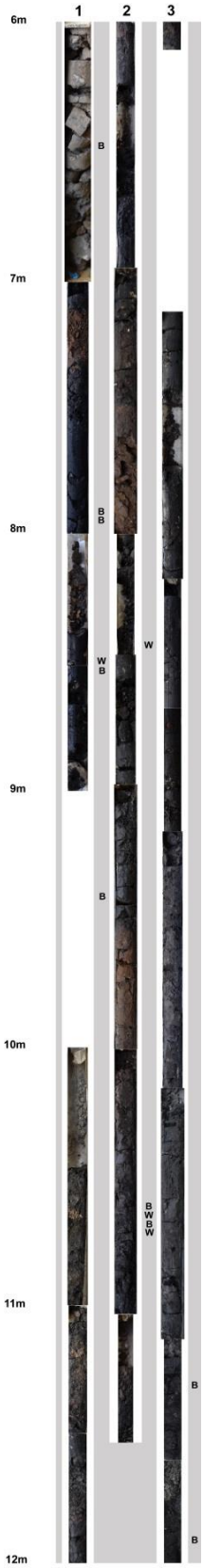

Figure 3. Summary montage showing the middle 6m of the three central cores. Finds of bone (B) and wood (W) are indicated to the right of the core. All measurements are approximate only.

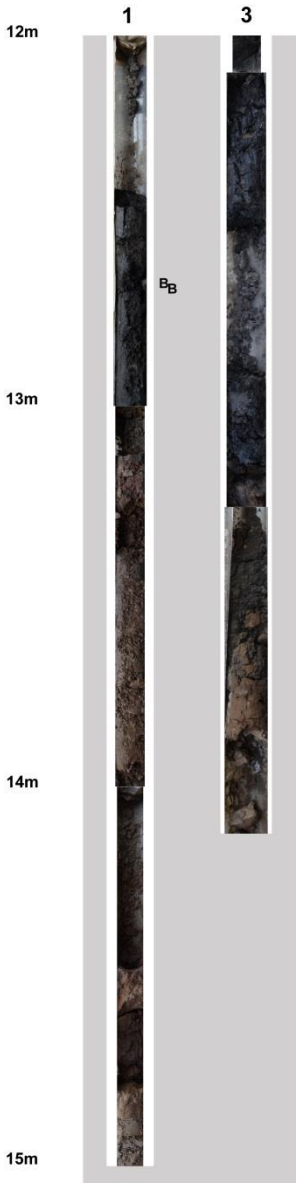

Figure 4. Summary montage of the bottom part of the central cores. Finds of bone (B) and wood (W) are indicated to the right of the core. All measurements are approximate only.

The four shallow peripheral cores (BH 5, BH 8, BH 10 and BH 11)

Figure 5 shows a summary of the four shallow peripheral cores taken from around 12 – 13 m OD on the slopes of the mound. Three of the cores (BH 5, BH 10 and BH 11) come down onto dense yellowish, reddish or dark brown clays at around 3 - 4 m depth. This probably corresponds with the terms “stiff yellow clay” and “original clay” at the base of the underpinning section descriptions from the 1900s (Appendix 1). The fourth core (BH 8) appears to have terminated before reaching this (presumed) underlying natural layer. In all other respects, there appears to be no pattern in the deposits, and they are random mixtures of topsoil, subsoil and building rubble.

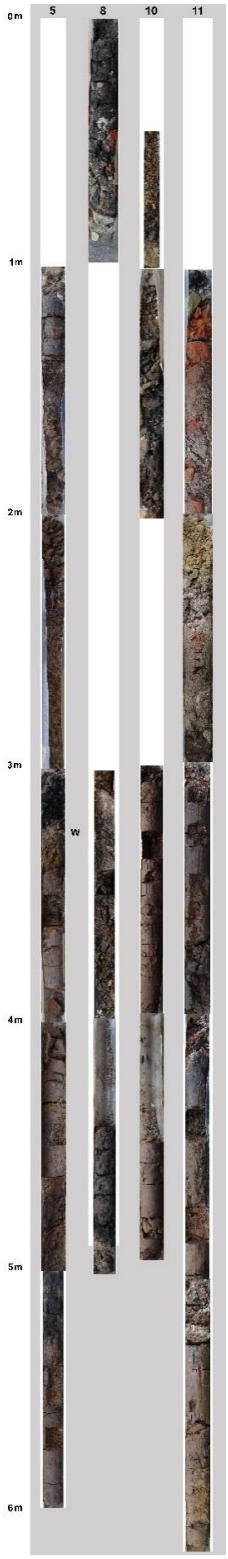

Figure 5. Summary montage of the four peripheral cores. Only one core (BH 5) yielded a find of wood (W), indicated to the right of the core. Visual adjustments have been made to improve depth alignment, so any measurements are approximate only.

Full Descriptions: Borehole 1

0.00 – 1.0 0	Bagged only.
1.00 – 1.50 m	Empty slot in wooden box.
1.50 –1.58/1.66 m	Angled cut of single very pale brown (10 YR 7/3) limestone block taking up whole core width.
1.58/1.66 – 2.00 m	Dark brown (7.5 YR 4/2) moist and brown (7.5 YR 5/2) dry sandy clay loam with a few patches of dark brown (7.5 YR 3/2) moist and brown (7.5 YR 4/2) dry sandy clay loam. <1 %, angular, 1 – 10 mm limestone fragments. Animal bone at 1.79 m.

Figure 6. Borehole 1, 1.50 – 2.00 m

2.00 – 2.10/2.17 m	Smashed very pale brown (10 YR 7/3) limestone rubble taking up whole core width, angled base.
2.10/2.17 – 2.50 m	Dark brown (7.5 YR 4/2) moist and brown (7.5 YR 5/2) dry sandy clay loam with a few patches of dark brown (7.5 YR 3/2) moist and brown (7.5 YR 4/2) dry <1 %, angular, 1 – 10 mm limestone fragments mainly near the top.

Figure 7. Borehole 1, 2.00 – 2.50 m

2.50 – 2.63/67 m	Strong brown (7.5 YR 4/6) moist and reddish yellow (7.5 YR 6/6) dry loamy sand with no stones. 4 cm boundary to:-
2.63/67 – 2.92/2.96 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry sandy clay loam with 1%, 1 – 2 mm, subangular stones. 4 cm boundary to:-
2.92/2.96 – 3.00 m	Strong brown (7.5 YR 4/6) moist and reddish yellow (7.5 YR 6/6) dry loamy sand with no stones, except a single 60 mm subangular sandstone fragment.

Figure 8. Borehole 1, 2.50 – 3.00 m

3.00 – 3.15/3.17 m	Strong brown (7.5 YR 4/6) moist and reddish yellow (7.5 YR 6/6) dry loamy sand with no stones. 2 cm boundary to:-

3.15/3.17 – 3.29/3.30 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry sandy clay loam with 1%, 1 – 2 mm, subangular stones. 1 cm boundary to:-
3.29/3.30 – 3.39 m	Strong brown (7.5 YR 4/6) moist and reddish yellow (7.5 YR 6/6) dry loamy sand with no stones.
3.39 – 3.79 m	Geotechnical sample cut.
3.79 - 4.00 m	Strong brown (7.5 YR 4/6) moist and reddish yellow (7.5 YR 6/6) dry loamy sand with no stones.

Figure 9. Borehole 1, 3.00 - 4.00 m

4.00 – 4.73/4.78 m	Mix of 50% dark brown (7.5 YR 4/4) moist and brown (7.5YR 5/4) dry with 50% very dark grey (7.5 YR 3/0) moist and dark grey (7.5 YR 4/0) dry silty clay loam with no stones. 5 cm boundary to:-
4.73/4.78 – 5.00 m	Very dark grey (7.5 YR 3/0) moist and dark grey (7.5 YR 4/0) dry silty clay loam with no stones but a single 100 mm sandstone lump at 4.94 – 4.98 m.

Figure 10. Borehole 1, 4.00 - 5.00 m

5.00 – 5.50 m	Mix of 50% dark brown (7.5 YR 4/4) moist and brown (7.5YR 5/4) dry and 50% very dark grey (7.5 YR 3/0) moist and dark grey (7.5 YR 4/0) dry sandy clay loam with no stones. Single 100 mm limestone block takes up all of 5.40 – 5.50 m.

Figure 11. Borehole 1, 5.00 – 5.50 m

5.50 – 6.00 m	Mix of 70% dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry and 30% very dark grey (7.5 YR 3/0) moist and dark grey (7.5 YR 4/0) dry sandy clay loam with two subangular, 50 mm burnt stones at 5.87 – 5.89 m, and at 5.90 – 5.93 m.

Figure 12. Borehole 1, 5.50 - 6.00 m

6.00 - 7.00 m	Jumble of dried soil lumps loose in the box. Very dark greyish brown (10 YR 3/2) moist and dark greyish brown (10 YR 4/2) dry silty clay loam with < 5%, 2 - 20 mm subangular to rounded stones. CBM and oyster shell in one area. Animal bone in another area.

Figure 13. Borehole 1, 6.00 - 7.00 m

7.00 – 7.14 m	Black (5 YR 2.5/1) moist and reddish grey (5 YR 5/2) dry sandy silt loam with 2%, 1 – 10 mm subangular to subrounded stones. 2 mm boundary to:-
7.14 - 7.34 m	Dark brown (7.5 YR 4/2) moist and pinkish grey (7.5 YR 6/2) dry sand with no stones. 1 cm boundary to:-
7.34 – 8.00 m	Black (5 YR 2.5/1) moist and reddish grey (5 YR 5/2) dry sandy silt loam with 2%, 1 – 10 mm subangular to subrounded stones. 2 animal bone fragments at 7.95 – 7. 97 m.

Figure 14. Borehole 1, 7.00 - 8.00 m

8.00 –8.40 m	Gap as seen, but soil was loose, so could be anywhere in the 50 cm tube.

8.40 – 8.50 m	Black (5 YR 2.5/1) moist and reddish grey (5 YR 5/2) dry sandy silt loam with 5%, 10 – 50 mm subangular to angular smashed stones. Wood at 8.40, but all of 8.40 – 8.50 could be out of position.

Figure 15. Borehole 1, 8.00 – 8.50 m

8.50 – 8.58 m	Black (5 YR 2.5/1) moist and reddish grey (5 YR 5/2) dry sandy silt loam. Wood at 8.50 m is mature oak. Animal bone at 8.58 m.
8.58 – 8.67 m	Gap (unknown origin).
8.67 – 8.86 m	Black (5 YR 2.5/1) moist and reddish grey (5 YR 5/2) dry sandy silt loam with 5% angular, 10 – 50 mm sandstone.
8.86 – 9.00 m	Smashed stone taking up whole of core, with some black soil adhering.

Figure 16. Borehole 1, 8.50 – 9.00 m

9.00 - 10.00 m	A bag of soil with unreadable label inside the core tube. A single bone unstratified in that bag. Possibly human.
10.00 – 10.45 m	Empty (reason unknown).
10.45 – 11.00 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry sandy silt loam with 5% angular to subrounded sandstone, limestone and CPM, 1 – 70 mm. Rotted sandstone in band around 10.65 m.

Figure 17. Borehole 1, 10.00 - 11.00

11.00 – 11.06 m	Gap.
11.06 – 11.50 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry sandy silt loam with <2%, 1 – 5 mm, subangular to subrounded sandstone and limestone.

Figure 18. Borehole 1, 11.00 - 11.50 m

11.50 – 12.00 m Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry sandy silt loam with <2%, 1 – 5 mm, subangular to subrounded sandstone and limestone.

Figure 19. Borehole 1, 11.50 - 12.00 m

12.00 – 12.41/12.48 m Empty (angled boundary)

12.41/12.48 – 13.00 m Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry sandy silt loam with <2%, 1 – 5 mm, subangular to subrounded sandstone and limestone. Indeterminate bone fragment at 12.67 m. Non-human bone at 12.70 m.

Figure 20. Borehole 1, 12.00 - 13.00 m

13.00 – 13.15 m Geotechnical sample cut.

13.15 – 13.55/13.60 m Dark greyish brown (10 YR 4/2) moist and brown (10 YR 5/3) dry loamy sand with 95% subrounded and rounded, 1 – 50 mm stones. Very dark grey (10

	YR 3/1) moist and very dark greyish brown (10 YR 3/2) dry patches of topsoil material. Dense, almost cemented. 5 cm smooth boundary to:-
13.55/13.60 – 14.00 m	Dark brown (10 YR 4/3) moist and brown (10 YR 5/3) dry loamy sand with 95% subrounded and rounded, 1 – 50 mm stones. Dense, almost cemented.

Figure 21. Borehole 1, 13.00 - 14.00 m

14.0 – 14.46 m	Geotechnical sampling cut (sharp boundaries).
14.46 – 14.57 m	Dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry loamy sand. No stones.
14.57 – 14.76 m	Geotechnical sampling cut (sharp boundaries).
14.76 - 15.00 m	Dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry loamy sand with no stones.

Figure 22. Borehole 1, 14.00 - 15.00 m

Full Descriptions: Borehole 2

0 – 1.2 m	Bagged only.
1.20 – 1.33 m	Gap (unknown origin).
1.33 – 1.57/1.62 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry sandy loam with 1%, 1 – 5 mm, rounded and subrounded stones. 5 cm boundary to:-
1.57/1.62 – 1.83 m	Black (5 YR 2.5/1) moist and dark grey (5 YR 4/1) dry. A single 100 mm (10 YR 7/2) smashed sandstone fragment at base, taking up whole width of core.
1.83 – 2.04 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry, and black (5 YR 2.5/1) moist and dark grey (5 YR 4/1) dry sandy loam with 2%, 10 – 50 mm, subangular sandstone fragments.

Figure 23. Borehole 2, 1.20 - 2.10 m

2.04 - 2.10 m	Gap (unknown origin).
2.10 – 2.26 m	Dark reddish grey (5 YR 4/2) moist and reddish brown (5 YR 5/3) dry sandy loam with 1 – 2 % subangular to rounded stones. Sharp boundary to:-
2.26 – 2.52 m	Gap (unknown origin).
2.52 - 2.60 m	Dark reddish grey (5 YR 4/2) moist and reddish brown (5 YR 5/3) dry sandy loam with 1 – 2 %

subangular to rounded stones. Single 80 mm smashed sandstone fragment.

Figure 24. Borehole 2, 2.10 – 2.60 m

2.60 – 2.65 m	Mix of dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry, and black (5 YR 2.5/1) moist and dark grey (5 YR 4/1) dry sandy loam with 2%, 10 – 50 mm, subangular stones.
2.65 – 2.84 m	Gap (unknown origin).
2.84 – 3.10 m	Mix of dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry, and black (5 YR 2.5/1) moist and dark grey (5 YR 4/1) dry sandy loam with 2%, 10 – 50 mm, subangular stones.

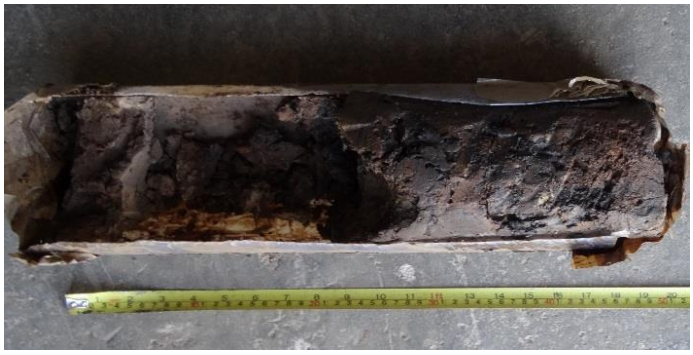

Figure 25. Borehole 2, 2.60 - 3.10 m

3.10 - 4.00 m	Mix of dark brown (7.5 YR 4/2) moist and pinkish grey (7.5 YR 6/2) dry clay. Middle area has 5% subrounded and rounded, 2 – 20 mm stones. Oyster shell, smashed at 3.43 – 3.47 m.

Figure 26. Borehole 2, 3.10 - 4.00 m

4.00 – 5.00 m	Chaotic mix of 70% very dark grey (5 YR 3/1) moist and dark grey (5 YR 4/1) dry and 30% dark brown (7.5 YR 4/4) moist and light brown (7.5 YR 6/4) dry sandy clay loam with 2% subangular to subrounded stone fragments, 1 – 50 mm. Two animal bone fragments at 4.70 - 4.80 m.

Figure 27. Borehole 2, 4.00 - 5.00 m

5.00 - 5.50 m	Dark brown (7.5 YR 4/2) moist and pinkish grey (7.5 YR 6/2) dry, clay or sandy clay in discrete patches with <1% subrounded and rounded, 1 – 2 mm stones. Single rounded 100 mm stone visible at back of core around 5.10 m.

Figure 28. Borehole 2, 5.00 - 5.50 m

5.50 – 5.72/5.74 m	Dark brown (7.5 YR 4/4) moist and light brown (7.5 YR 6/4) dry sandy clay loam with < 1%, 1 – 2 mm rounded stones. 2 cm boundary to:-
5.72/5.74 – 5.81/5.82 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry sandy clay loam with < 1%, 1 – 2 mm rounded stones. 2 cm boundary to:-
5.81/5.82 – 6.00 m	Dark brown (7.5 YR 4/4) moist and light brown (7.5 YR 6/4) dry sandy clay loam with < 1%, 1 – 2 mm rounded stones.

Figure 29. Borehole 2, 5.50 - 6.00 m

6.00 – 6.30 m	70 % dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry with 30% patches of dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry sandy clay loam with < 1%, 2 - 10 mm rounded stones.
6.30 – 6.70 m	Geotechnical sampling gap.

6.70 - 7.00 m	Very dark grey (5 YR 3/1) moist and dark grey (5YR 4/1) dry sandy clay loam with < 1%, 2 - 10 mm rounded stones.

Figure 30. Borehole 2, 6.00 - 7.00 m

7.00 – 7.06	Gap (origin unknown).
7.06 – 7.51/7.53	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry sandy silt loam but with small patches of dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry sandy clay loam, all with 5% subrounded sandstone fragments, 2 – 20 mm and occasional CBM fragments. 2 cm boundary to:-
7.51/7.53 – 8.00 m	Dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry sandy clay loam with occasional areas of black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry sandy silt loam, all with 5% subrounded sandstone fragments, 2 – 20 mm. Also a single rounded platy stone.

Figure 31. Borehole 2, 7.00 – 8.00 m

8.00 – 8.20 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and rounded, 1 – 5 mm stones and occasional mortar streaks. Sharp boundary to:-
8.20 – 8.42 m	Empty
8.42 – 8.50 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and rounded, 1 – 5 mm stones all interspersed with a large fragment of smashed wood (*Salix/Populus)*.

Figure 32. Borehole 2, 8.0 – 8.50 m

8.50 – 8.60 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and rounded, 1 – 5 mm stones and occasional mortar streaks. Sharp boundary to:-
8.60 – 8.85 m	Probable geotechnical sample cut.
8.85 – 9.00 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and rounded, 1 – 5 mm stones and occasional mortar streaks.

Figure 33. Borehole 2, 8.50 – 9.00 m

9.00 – 9.11 m	Gap.
9.11 – 9.53/9.56 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and rounded, 1 – 5 mm stones and occasional mortar streaks. 3 cm smeared boundary to:-
9.53/9.56 – 10.00 m	Dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry sandy clay loam with <1% rounded, 1 -2 mm sandstone fragments. Occasional large construction stone fragments up to 60 mm.

Figure 34. Borehole 2, 9.00 – 10.00 m

10.00 – 10.09 m	Gap (origin unknown).
10.09 – 10.50/10.53 m	Dark brown (10 YR 4/3) moist and greyish brown (10 YR 5/2) dry, loamy sand with rare patches of very dark greyish brown (10 YR 3/2) moist and dark greyish brown (10 YR 4/2) dry, loamy sand with 1%,

	3 – 5 mm, subangular and occasional 20 mm subrounded stones. 3 cm boundary to:
10.50/10.53 – 11.00 m	Very dark greyish brown (10 YR 3/2) moist and dark greyish brown (10 YR 4/2) dry, loamy sand with patches and streaks of dark brown (7.5 YR 4/2) loamy sand. 2%, 3 – 5 mm, subangular stones. Wood at 10.80 – 10.84 m sampled and identified as mature oak. Bone at 10.80 – 10.84 m sampled: 1 not human, 1 probably human. Bone at 10.70 m sampled and identified as unfused cattle distal metapodial in very good condition and with possible butchery; bone at 10.86 m sampled and identified as human.

Figure 35. Borehole 2, 10.00 – 11.00 m

11.0 – 11.20 m	Geotechnical sample cut.
11.20 – 11.30/11.32 m	Dark greyish brown (10 YR 4/2) moist and greyish brown (10 YR 5/2) dry, loamy sand patches of black (10 YR 2/1) moist and very dark greyish brown (10 YR 3/2) dry, loamy sand. 2 cm boundary to:-
11.30/11.32 – 11.50 m	Black (10 YR 2/1) moist and very dark greyish brown (10 YR 3/2) dry, loamy sand with 2%, 20 – 50 mm subangular stones.

Figure 36. Borehole 2, 11.0 –11.50 m

11.50 – 11.65 m	Two very large loose stones took up this space. The box partition had “11.60” written on it, along with another one saying “11.90 CPT”.
11.65 – 12.00 m	A tube empty except for a few stones.

Full Descriptions: Borehole 3

0.00 – 1.10 m	Bagged only.
1.10 – 1.61 m	Very dark greyish brown (10 YR 3/2) moist and greyish brown (10 YR 5/2) dry, silty clay loam with 70 – 80% subangular to rounded, 1 – 30 mm stones and occasional patches of dark greyish brown (10 YR 4/2) moist and light brownish grey (10 YR 6/2) dry silty clay loam. Some crumbled mortar, and two very large limestone fragments (100 – 120 mm). Sharp boundary at base of the limestone to:-
1.61 - 1.67 m	Very dark greyish brown (10 YR 3/2) moist and greyish brown (10 YR 5/2) dry, silty clay loam with 5% subangular sandstone, 1– 10 mm, and subrounded limestone 2 – 10 mm. Sharp boundary to:
1.67 – 1.76 m	Probable geotechnical sample cut.
1.76 – 2.10 m	Very dark greyish brown (10 YR 3/2) moist and greyish brown (10 YR 5/2) dry, silty clay loam with 5% subangular sandstone, 1– 10 mm, and subrounded limestone 2 – 10 mm. Occasional brick fragments.

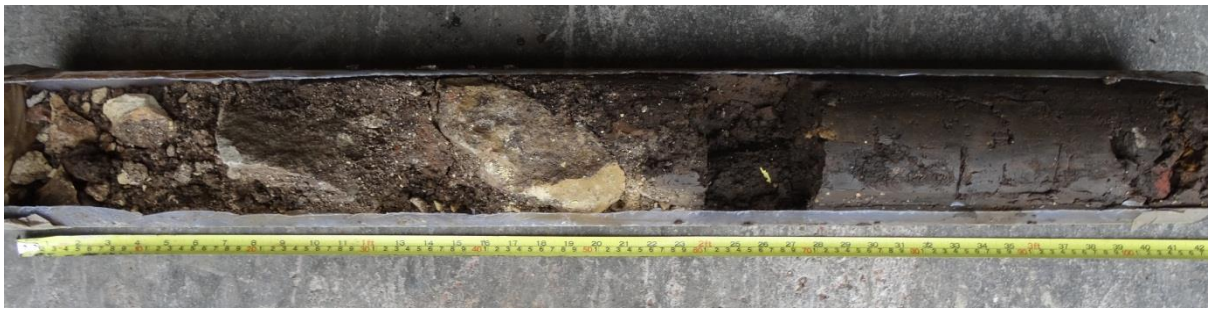

Figure 37. Borehole 3, 1.10 – 2.10 m

2.10 – 2.17 m	Rubble of mixed, soil lumps not in situ.
2.17 – 2.45 m	Very dark greyish brown (10 YR 3/2) moist and greyish brown (10 YR 5/2) dry, silty clay loam with 5% subangular sandstone, 1– 10 mm, and

subrounded limestone, 2 – 50 mm. Smashed 50 mm animal bone at 2.24 – 2.26 m. Sharp boundary to:-

2.45 – 2.60 m Gap (origin unknown).

Figure 38. Borehole 3, 2.10 – 2.60 m

2.60 – 2.81/2.85 m Gap full of displaced soil rubble.

2.81/2.85 – 3.10 m Angled upper surface (hence 21/25). Patchy mix of dark brown (7.5 YR 3/2) moist and pinkish grey (7.5 YR 6/2) dry with dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry silty clay loam with < 1%, subrounded, 1 – 5 mm stones and a single 40 mm piece of CBM at 3.09 m depth. (Part geotechnically sampled, but still describable).

Figure 39. Borehole 3, 2.60 - 3.10 m

3.10 – 3.22/3.23 m	Dark brown (10 YR 4/3) moist and greyish brown (10 YR 5/2) dry, silty clay loam with 2% angular and subangular, 1 – 2 mm stones. 1 mm boundary to:-
3.22/3.23 – 3. 33 m	Solid drilled very pale brown (10 YR 8/3) limestone.
3. 33 – 3.45/3.48 m	Dark brown (7.5 YR 4/4) moist and pinkish grey (7.5 YR 6/2) dry silty clay loam with 2% angular and subangular, 1 – 2 mm stones.
3.45/3.48 - 3.69 m	Probable geotechnical sample gap. (Angled cut).
3.69 – 3.76 m	Solid drilled very pale brown (10 YR 8/3) limestone.
3.76 – 3.93/3.95 m	Dark brown (7.5 YR 4/4) moist and pinkish grey (7.5 YR 6/2) dry silty clay loam with 2% angular and subangular, 1 – 2 mm stones. Occasional patches of (10 YR 3/2) topsoil material. 2 cm boundary to:-
3.93/3.95 – 4.10 m	Very dark grey (7.5 YR 3/0) moist and brown (7.5 YR 5/2) dry silty clay loam with a single 50 mm rounded flint pebble at 4.08 m.

Figure 40. Borehole 3, 3.10 - 4.10 m

4.10 - 5.10 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 4/2) dry, sandy clay loam with occasional patches of very dark grey (7.5 YR 3/0) moist and brown (7.5 YR 5/4) dry sandy clay loam. Single aggregate of dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry clay at 4.65 m. No stones.

Figure 41. Borehole 3, 4.10 - 5.10 m

5.10 - 5.60 m	About 1 kg of displaced soil rubble.
5.60 – 5.76/5.78 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 4/2) dry, sandy clay loam with no stones. 2 cm boundary to:-
5.76/5.78 – 5.88/5.90 m	Reddish brown (5 YR 4/4) moist and light reddish brown (5 YR 6/4) dry, sandy clay loam with no stones. 2 cm boundary to:-
5.88/5.90 - 6.10 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 4/2) dry, sandy clay loam with no stones.

Figure 42. Borehole 3, 5.60 - 6.10 m

6.10 - 7.10 m	Empty tube.
7.10 – 7.45 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and

rounded, 1 – 5 mm stones. Some crumbled mortar streaks. Sharp boundary to:-

7.45 – 7.69 m Geotechnical sample cut.

7.69 – 8.10 m Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and rounded, 1 – 5 mm stones. Some crumbled mortar streaks. Sharp boundary to:-

Figure 43. Borehole 3, 7.10 – 8.10 m

8.10 – 8.14 m Gap (origin unknown).

8.14 – 8.60 m Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and rounded, 1 – 5 mm stones. Some crumbled mortar streaks. Sharp boundary to:-

Figure 44. Borehole 3, 8.10 – 8.60 m

8.60 - 9.10 m Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and

rounded, 1 – 5 mm stones. Some crumbled mortar streaks.

Figure 45. Borehole 3, 8.60 - 9.10 m

9.10 - 10.10 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with 2% subrounded and rounded, 1 – 5 mm stones. Some crumbled mortar streaks and a single 50 mm rounded limestone fragment.
10.10 – 10.19/10.22 m	Empty.

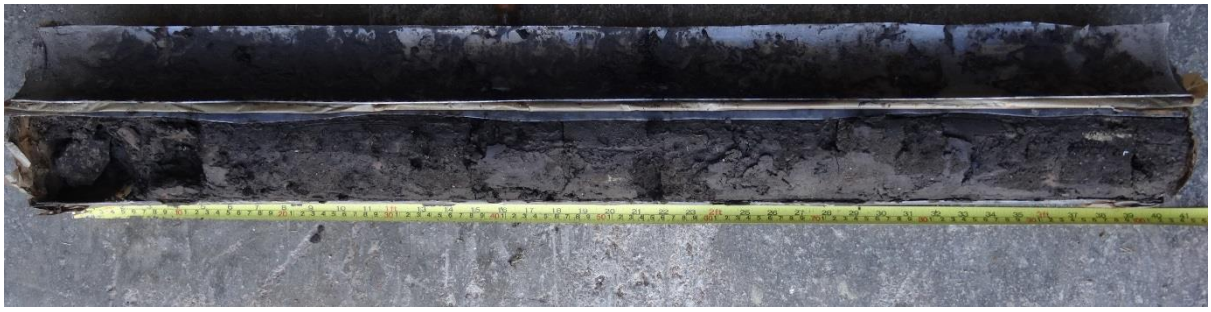

Figure 46. Borehole 3, 9.10 - 10.10 m

10.19/10.22 m – 11.10 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with <1%, 1– 25mm, angular to rounded stones. Occasional patches slightly more organic-rich (partially reworked in the core by soil

fauna) might yield datable plant remains. Single large stone (50 mm) at 10.79 m.

Figure 47. Borehole 3, 10.10 - 11.10 m

11.10 – 11.19 m	Empty.
11.19 – 11.60 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with <1%, 1– 25mm, angular to rounded stones. Occasional patches slightly more organic-rich might yield datable plant remains. Animal bone at 11.36 m.

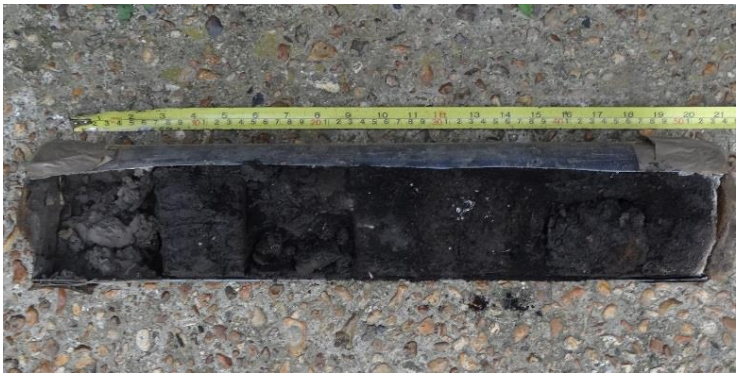

Figure 48. Borehole 3, 11.10 - 11.60 m

11.60 – 11.93/11.95 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with no stones. A few tiny shell fragments. Generally organic-rich and might yield datable plant remains. Animal bone at 11.88 m. 3 cm boundary to:-
11.93/11.95 – 12.10 m	50:50 mix of black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry sandy silt loam and pale brown (10

YR 6/3) moist and very pale brown (10 YR 7/3) dry rotted limestone.

Figure 49. Borehole 3, 11.60 - 12.10 m

12.10 – 12.41/12.42 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with <5%, 5 - 60 mm subrounded and rounded stones.
12.41/12.42 – 12.77/12.79 m	Empty.
12.77/12.79 – 12.96/12.99 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry, sandy silt loam with <5%, 5 - 60 mm subrounded and rounded stones. 3 cm boundary to:-
12.96/12.99 – 13.10 m	Brown (10 YR 4/3) moist and pale brown (10 YR 6/3) dry sandy silt loam with 60%, 5 - 60 mm subrounded and rounded stones.

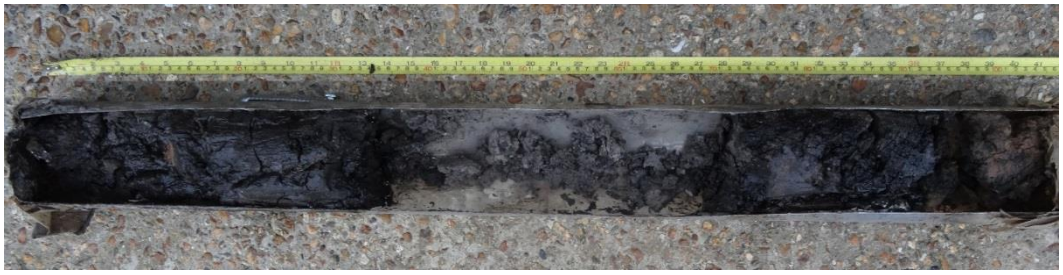

Figure 50. Borehole 3, 12.10 - 13.10 m

13.10 – 13.48/13.51 m (0 – 57/62 cm)	Empty.

13.48/13.51 – 13.60/13.66 m (57/62 – 75/84 cm)	Very dark greyish brown (10 YR 3/2) moist and dark grey (10 YR 4/1) dry silty clay loam with 5% subangular to subrounded, 1– 40 mm. Indeterminate boundary possibly slumped to:-
13.60/13.66 – 13.75/13.77 m (75/84 – 98/100 cm)	Dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/2) dry silty clay loam with 5% subangular to subrounded, 1– 40 mm. 2 cm boundary to:-
13.75/13.77 – 13.95/13.97 m (98/100 – 127/130 cm)	Empty.
13.95/13.97 – 14.05/14.07 m (127/130 – 142/145 cm)	Dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/2) dry silty clay loam with 5% subangular to subrounded, 1– 40 mm. 3 cm boundary to:-
14.05/14.07 m – 14.10 m (142/145 – base (150) cm)	Empty.

Figure 51. Borehole 3, 13.10 – 14.10 m. 1 m appears to have slumped into a 150mm tube. Description depths recalculated (x 0.66) to follow that hypothesis. Original depths (cm) are in brackets.

14.10 - 15.00 m	Empty.

Full Descriptions: Borehole 5

0.50 - 1.00 m	Empty.
1.00 – 1.10/1.13 m	Very pale brown (10 YR 8/3) shattered sandstone. 2 cm boundary to:-
1.10/1.13 – 1.38/1.39 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 4/2) dry sandy clay loam with < 2%, 30 – 50 mm, subangular sandstone. Sharp boundary to:-
1.38/1.39 – 1.49/1.50 m	Gap (reason not known).
1.49/1.50 – 1.60/1.63 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 4/2) dry sandy clay loam with no stones. 2 cm boundary to:-
1.60/1.63 – 2.00 m	Yellowish red (5 YR 4/6) moist and reddish yellow (5 YR 6/6) dry sandy clay loam with no stones and occasional shell fragments.

Figure 52. Borehole 5, 1.00 - 2.00 m

2.00 – 2.31/2.36 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 4/2) loamy sand with < 5% angular to subrounded stones and CBM fragments. Slumped and uncertain boundary to:-
2.31/2.36 – 3.00 m	Dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry sandy silt loam with < 5% angular to subrounded stones and CBM fragments.

Figure 53. Borehole 5, 2.00 - 3.00 m (Most of this core is only partially in-situ).

3.00 – 3.10/3.15 m	Very dark greyish brown (10 YR 3/2) moist and dark greyish brown (10 YR 4/2) dry sand with 10%, 1 -30 mm limestone and CBM. Unclear collapsed boundary to:-
3.10/3.15 – 3.22/3.25 m	Black (7.5 YR 2.5/0) moist and black (7.5 YR 2.5/0) dry sand with 10%, 1 -30 mm limestone and CBM. Large amounts of charcoal and charcoal dust colour the soil material. Charcoal from 3.18 – 3.21 m is mature oak. 3 cm boundary to:-
3.22/3.25 – 3.48 m	Dark brown (7.5 YR 4/4) moist and brown (7.5 YR 5/4) dry sand with no stones.
3.48 – 3.66 m	Geotechnical sample cut.
3.66 – 3.88 m	Dark brown (7.5 YR 4/2) moist and brown (7.5 YR 5/4) dry clay with < 2% 2 – 6 mm, subangular whitish ?rotted limestone and occasional rounded pebbles up to 60 mm.
3.88 – 4.00 m	Gap (reason unknown)

Figure 54. Borehole 5, 3.00 - 4.00 m

4.0 – 4.31/4.33 m	Dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry sandy clay loam with no stones. 3 cm boundary to:-
4.31/4.33 - 4.71/4.72 m	Dark brown (7.5 YR 4/2) moist and brown (7.5 YR 5/2) dry sandy clay loam with <5%, 1 - 5 mm subangular and subrounded stones. 1 cm boundary to:-
4.71/4.72 – 5.00 m	Dark brown (7.5 YR 4/2) moist and brown (7.5 YR 5/2) dry clay with <5%, 1 - 5 mm subangular and subrounded stones. Single patch of strong brown (7.5 YR 5/6) moist and reddish yellow (7.5 YR 6/6) at 4.64 – 4.66 m depth.

Figure 55. Borehole 5, 4.00 - 5.00 m

5.0 – 5.23/5.26 m	Black (7.5 YR 2.5/0) moist and brown (7.5 YR 4/2) dry sandy silt loam with no stones.
5.23/5.26 – 5.90/5.91m	Dark brown (7.5 YR 4/2) moist and brown (7.5 YR 5/2) dry sandy clay loam with <5%, 1 - 5 mm subangular and subrounded stones. Angled cut to:-
5.90/5.91 – 6.00 m	Empty.

Figure 56. Borehole 5, 5.00 - 6.00 m

Full Descriptions: Borehole 8

0.00 – 0.10 m	Gap (soil fallen out of tube).
0.10 – 0.40/0.42 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry sandy silt loam with <2%, 2 – 30 mm, subangular to subrounded brick and sandstone fragments. 2 cm boundary to:-
0.40/0.42– 0.64/0.67 m	Black (10 YR 2/1) moist and dark grey (10 YR 4/1) dry sandy silt loam with 50%, 2 – 80 mm, subangular to subrounded brick and sandstone fragments. 3 cm boundary to:-
0.64/0.67 – 0.87 m	Very pale brown (10 YR 8/3) shattered sandstone, with drilling insert embedded.
0.87 – 1.00 m	Empty except for drilling insert.

Figure 57. Borehole 8, 0.00 - 1.00 m

1.00 - 2.00 m	Tube was empty.
2.00 - 3.00 m	No tube.
3.00 – 3.18/3.21 m	Mixed crushed brick and mortar. 3 cm boundary to:-
3.18/3.21 – 3.42 m	Very dark greyish brown (10 YR 3/2) to dark brown (10 YR 3/3) moist and greyish brown (10 YR 5/2) to brown (10 YR 5/3) dry, sandy silt loam in unstructured mixture, with no stones except a single 50 mm angular mortar fragment.
3.42 – 3.52 m	Geotechnical sampling cut (sharp boundaries).

3.52 – 4.00 m	Very dark greyish brown (10 YR 3/2) to dark brown (10 YR 3/3) moist and greyish brown (10 YR 5/2) to brown (10 YR 5/3) dry, sandy silt loam in unstructured mixture, with 2% rounded fragments of reddish brown (5 YR 4/4) CBM, 10 – 30 mm in size and a single smashed mortar fragment.

Figure 58. Borehole 8, 3.00 - 4.00 m

4.00 – 4.42/4.43 m	Empty.
4.42/4.43 – 4.75/4.76 m	Very dark grey (10 YR 3/1) moist and greyish brown (10 YR 5/2) dry sandy silt loam with no stones. Diffuse yellowish brown (10 YR 5/8) moist and brownish yellow (10 YR 6/8) dry mottles occupying < 5%. 1 cm boundary to:-
4.75/4.76 – 4.82/4.83 m	Black (10 YR 2/1) moist and greyish brown (10 YR 5/2) dry sandy silt loam with no stones. Organic – rich layer. 1 cm boundary to:-
4.82/4.83 m – 5.00 m	Very dark grey (10 YR 3/1) moist and greyish brown (10 YR 5/2) dry sandy silt loam with < 10%, rotted yellow (10 YR 7/6) moist and (10 YR 8/6) limestone concentrated near top of layer.

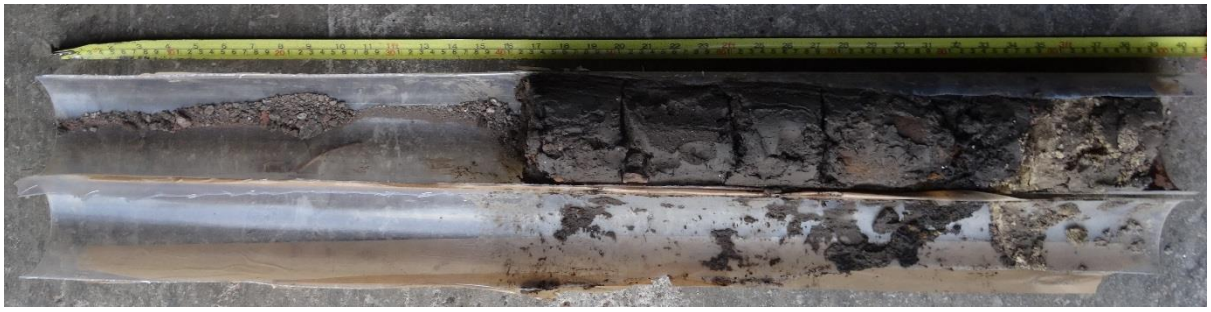

Figure 59. Borehole 8, 4.00 - 5.00 m

Full Descriptions: Borehole 10

0.50 – 0.88/0.90 m
(0 – 54/57 cm) Rubble of loose subangular sandstone 1 – 30mm, rounded pebbles, 1 – 40 mm and blackish angular to subangular roadstone, 20 – 60 mm. 3 cm boundary to:-

0.88/0.90 – 1.13/1.15 m
(54/57 – 90/93 cm) Yellowish brown (10 YR 5/4) moist and very pale brown (10 YR 7/3) dry, probably sandy loam with 95% subangular sandstone 1 – 30mm, rounded pebbles, 1 – 40 mm and blackish angular to subangular roadstone, 20 – 60 mm.

1.13/1.15 – 1.20 m
(90/93 – 100 cm) Single sandstone block yellowish brown (10 YR 5/4) moist and very pale brown (10 YR 7/3) dry.

Figure 60. Borehole 10, 0.50 - 1.20 m. This appears to be 70 cm of true borehole depth spread over 100 cm of core depth; complete description therefore uses corrected figure based on this hypothesis; i.e. all depths are x 0.7. Original depths (cm) are in brackets.

1.20 – 1.51/54 m
(0 – 39/42 cm) Rubble of loose subangular sandstone 1 – 30mm, rounded pebbles, 1 – 40 mm and blackish angular to subangular roadstone, 20 – 60 mm. 3 cm boundary to:-

1.51/54 – 1.94 m
(39/42 - 92 cm) Very dark greyish brown (10 YR 3/2) moist and dark greyish brown (10 YR 4/2) dry sandy clay loam with < 2%, 30 – 50 mm, subangular to subrounded sandstone. Sharp boundary to:-

1.94 – 2.00 m (92 cm – 100cm)	Single sandstone block yellowish brown (10 YR 5/4) moist and very pale brown (10 YR 7/3) dry.

Figure 61. Borehole 10, 1.20 - 2.00 m. This appears to be 80 cm of true borehole depth spread over 100 cm of core depth; complete description therefore uses corrected figure based on this hypothesis; i.e. all depths are x 0.8. Original depths (cm) are in brackets.

2.00 - 3.00 m	Empty.
3.00 – 3.12/3.14 m	Rubble of dried soil lumps comprising dark brown (7.5 YR 3/2) moist and brown (7.5 YR 5/2) dry sandy silt loam with 2 – 4%, 1 – 20 mm subrounded and rounded stones. Occasional areas of very dark grey (7.5 YR 3/0) moist and brown (7.5 YR 4/2) dry. 2 cm boundary to:-
3.12/14 – 3.29 m	Dark brown (7.5 YR 4/2) moist and brown (7.5 YR 5/2) dry sandy clay with very occasional large 50 mm sized CBM or mortar.
3.29 – 3.40 m	Geotechnical sampling cut (sharp boundaries).
3.40 – 4.00 m	Dark brown (7.5 YR 4/2) moist and brown (7.5 YR 5/2) dry sandy clay with very occasional large 50 mm sized CBM or mortar.

Figure 62. Borehole 10, 3.00 - 4.00 m

4.00 – 4.52/4.53 m	Empty.
4.52/4.53 – 5.00 m	Dark brown (7.5 YR 4/2) moist and brown (7.5 YR 5/4) dry clay with < 1%, 1 – 50 mm subrounded and rounded stones.

Figure 63. Borehole 10, 4.00 - 5.00 m

Full Descriptions: Borehole 11

0.00 - 1.00 m	Tube empty.
1.00 – 1.30 m	Rubble of displaced brick, stone and topsoil.
1.30 – 2.00 m	In situ mix of red (2.5 YR 4/6) moist and red (2.5 YR 5/6) dry brick and brown (10 YR 5/3) moist and very pale brown (10 YR 7/3) dry rotted or smashed stone.

Figure 64. Borehole 11, 1.00 - 2.00 m

2.00 – 2.86/2.92 m	Very pale brown (10 YR 7/4) moist and very pale brown (10 YR 8/3) smashed limestone and rubble with 5% brick fragments. Some areas very pale brown (10 8/3) moist and white (10 YR 8/1) dry. Slumped and uncertain boundary to:-
2.86/2.92 – 3.00 m	Very dark greyish brown (10 YR 3/2) moist and brown (10 YR 5/3) dry sandy silt loam with <1%, 1 - 3mm subrounded and rounded stones.

Figure 65. Borehole 11, 2.00 - 3.00 m

3.00 – 3.12/3.14 m	Very pale brown (10 YR 7/4) moist and very pale brown (10 YR 8/3) limestone and rubble with ca. 2% brick fragments.

3.12/3.14 – 3.71/3.72 m	Very dark greyish brown (10 YR 3/2) moist and brown (10 YR 5/3) sandy silt loam with <1%, 1 - 3mm subrounded and rounded stones. 2 cm boundary to:-
3.71/3.72– 4.00 m	Very dark grey (10 YR 3/1) moist and dark greyish brown (10 YR 4/2) dry sandy clay loam with no stones.

Figure 66. Borehole 11, 3.00 - 4.00 m

4.00 – 4.22/4.24 m	Rubble of dried, ex-situ soil and sediment lumps, mainly limestone, topsoil and CBM. 2 cm boundary to:-
4.22/4.24 – 4.40 m	Very dark greyish brown (10 YR 3/2) moist and greyish brown (10 YR 5/2) dry sandy silt loam with <1%, 1 - 5 mm subangular to subrounded stones, mainly rotted limestone and CBM.
4.40 – 4.50 m	Geotechnical sample cut.
4.50 – 5.00 m	Reddish brown (5 YR 4/4) moist and light reddish brown (5 YR 6/4) dry clay with no stones.

Figure 67. Borehole 11, 4.00 - 5.00 m

5.00 – 5.26/5.27 m	Rubble of dried, ex-situ soil and sediment lumps, mainly limestone and CBM. 1 cm boundary to:-
5.26/5.27 – 5.68 m	Reddish brown (5 YR 4/4) moist and light reddish brown (5 YR 6/4) dry clay with no stones.
5.68 – 6.00 m	Yellowish brown (10 YR 5/6) moist and light yellowish brown (10 YR 6/4) dry sandy silt loam with no stones.

Figure 68. Borehole 11, 5.00 - 6.00 m

Investigation of samples from BH 1 and BH 2

Background

Given the finds of human and animal bones from the bottom of cores BH 1 and BH 2, 10 cm length samples comprising the entirety of the core contents were cut out of the two cores as follows:-

Sample <5015> from BH 1, 12.65 - 12.75m.
Sample <5016> from BH 2, 10.70 - 10.80m.
Sample <5017> from BH 2, 10.80 - 10.90m.
Sample <5018> from BH 2, 10.90 - 11.00m.

The aim of this sampling was to try and understand more about the make-up of the motte, retrieve further material that could potentially be used for radiocarbon dating, and try to establish whether there was evidence suggesting that the motte might have made use of an existing prehistoric mound as suggested by Benson and Platnauer (1903, 69-70).

Methods

Three of the samples (<5015>, <5016> and <5018>), were wet-sieved using a simple wash-over technique (Kenward *et al* 1980). The remaining sample (<5017>) was not processed given the results obtained from the two samples below and above it (see below). This sample has been archived with the material extracted from the other samples.

The washed-over material was collected on a 0.25mm mesh and kept wet. The material that did not wash over was sieved down to 0.5mm and dried before being split into >4mm and 4 - 0.5mm fractions. The >4mm fraction was sorted in its entirety to recover any finds; the 4 - 0.5mm fraction was left unsorted. A portion of each wash-over was examined under a binocular dissecting microscope at up to x50 magnification and notes made on the material present. The animal bone from the samples was confirmed as such, but will be assessed in detail with the material from the test pit excavations undertaken in 2015.

Results

The results are presented in Table 1. Nomenclature follows Stace (1997) for wild plants and Zohary and Hopf (2000, table 3, table 5 traditional classification) for cereals.

Table 1 Results of assessment of samples from the bottom of cores BH 1 and BH 2. Key : + = 1 to 5 items, ++ = 6-25 items, +++ 26-100 items.

Sample	**Wash-over**	**>4mm residue**
<5015> BH 1 12.65-12.75 m	Fragments of waterlogged wood + Charcoal (including oak) ++ Bone ++ Insect remains (mainly puparia) +++ Well preserved waterlogged plant remains include: *Ranunculus* Section *Ranunculus* sp. (buttercup) + *Urtica dioica* L. (stinging nettle) + *U. urens* L. (small nettle) + *Corylus avellana* L. (hazel) nutshell fragment +, *Chenopodium* cf. *album* L. (fat hen) + *Chenopodium* sp, (goosefoot) ++ cf. *Agrostemma githago* L. (corncockle) + *Euphorbia helioscopia* L. (sun spurge) + *Viola* subgenus *Melanium* (pansy) + *Hyoscyamus niger* L. (henbane) + *Sambucus nigra* L. (elder) ++ *Lapsana communis* L. (nipplewort) + cf. *Carex* sp. (sedge) + Charred plant remains: *Triticum* cf. *spelta* L. (spelt wheat) grain *Triticum* sp. (wheat) grain 1 *Hordeum* sp. (barley) grain +, including 2 twisted , hulled grains indicating the presence of *Hordeum vulgare* var. *vulgare* L. (six-row hulled barley)	Animal bone ++ Burnt bone + CBM +, 1 large, high-fired fragment fuel ash slag +
<5016> BH 2 10.70-10.80 m	Fragments of waterlogged wood, principally oak trunk wood +++ Charcoal (mixed taxa) +++	*Mytilis* edulis (common mussel) fragments. +

	Fish bone ++ Fish scales + Insect remains + Moderately preserved waterlogged plant remains include: *Ranunculus* sp. (buttercup) ++ *Urtica dioica* L. (stinging nettle) + *Corylus avellana* L. (hazel) nutshell fragment +, *Chenopodium* cf. *album* L. (fat hen) + Polygonaceae indet. (dock family) + *Prunus spinosa* L. (sloe) fruit-stone + cf. *Brassica* sp. (cabbage, charlock, mustard etc.)+ *Sambucus nigra* L. (elder) ++ *Juncus* sp. (rush) + *Carex* sp. (sedge) + Poaceae indet. (grass family) + Charred plant remains: *Triticum* sp. (wheat)- free-threshing type grain) 1 Poaceae indet. (grass family) grain 1	Human bone ++, includes one left humerus with an ancient break Animal bone ++ CBM + Un-diagnostic ironworking slag +
<5018> BH 2 10.90-11.00 m	Wood fragments, including one large twig ++ Charcoal (mixed taxa, some oak) ++ Fish bone + Insect remains ++ Well preserved waterlogged plant remains include: *Alnus* sp. (alder) female catkin scale + *Corylus avellana* L. (hazel) nutshell fragment + *Chenopodium* cf. *album* L. (fat hen) + *Atriplex* sp. (orache) + *Polygonum aviculare* agg. (dock family) + *Salix* sp. (willow) bud + *Rubus* sp. (bramble) + *Potentilla* sp. (cinquefoil) +	Animal bone ++ Burnt bone ++ CBM +, includes -1 large, post-medieval brick fragment Stone with mortar adhering + Fuel ash slag + Pot +

	Hyoscyamus niger L. (henbane) + *Lamium* sp. (dead-nettle) + *Glechoma hederacea* L. (ground-ivy) + *Sambucus nigra* L. (elder) ++ *Schoenoplectus lacustris* L. Palla (common club-rush) + Indeterminate bud scale + Ignota + Charred plant remains: *Corylus avellana* L. (hazel) nutshell fragment 1 *Hordeum* sp. (barley) hulled grain 1 *Hordeum* sp. (barley) sprouted, hulled grain 1 *Avena* sp. (oat) grain 1 cf. *Bromus* sp. 1 Cereales indeterminate grain 1 Indeterminate stem 1	

Discussion

The processed samples all produced biological remains preserved as a result of anoxic conditions (permanent waterlogging). Some well-preserved charred plant remains were also recorded. Animal bone was obtained from all three samples and human bone from sample <5016>. The human bone included a left humerus with evidence for breakage in antiquity.

All three samples also contained ceramic building material (CBM), suggesting a Roman and/or or medieval date. In addition, a post-medieval brick fragment was recovered from <5018> along with stones with mortar adhering. This suggests that the bottom of core BH 2 is contaminated with material pushed down from the surface. <5018> also produced a piece of undiagnostic ironworking slag.

The waterlogged plant remains from all three samples were rather similar with hazel nutshell fragments and elder seeds recorded in all three. There is slightly more evidence for trees and shade from the bottom of core BH 2, <5018>, in the

form of twigs, buds and shade loving species such as ground ivy. The base of core BH 1 contained more evidence for disturbed ground with small nettle, stinging nettle, nipplewort and goosefoots all present.

Henbane, an annual to biennial weed of waste ground (Stace 1997, 527) and regarded as an archaeophyte by Preston *et al* (2004, 266), was recorded in both cores (<5015> and <5018>). Although this species may have been present in Britain from the beginning of the Bronze Age, it becomes abundant from the Roman period onwards, forming part of the typical urban flora of Roman and medieval towns. Similarly corncockle, tentatively identified from <5015>, is only recorded in northern England from the Roman period onwards (Hall and Huntley 2007, 249), whilst sun spurge, also noted in <5015>, is believed to be a medieval introduction. A single charred seed of sun spurge was recorded in a cremation burial at the Bronze Age cemetery at Ewanrigg, Maryport (Huntley 1992, 350) but this is regarded as suspicious (Preston *et al* 2004, 266) and likely to be the result of intrusion (cf. Pelling *et al* 2015), especially as some of the radiocarbon dates from obtained from the site produced unexpected early or late dates in comparison with other evidence from the same context (Bewley *et al* 1992, 350-1).

The numbers of charred cereal grains recovered within such small samples would be unusual in a Bronze Age or Neolithic context. Furthermore, the presence of spelt wheat and free-threshing type wheat, albeit only single grains, suggests a Roman/ medieval origin.

Conclusions

Considering the various lines of evidence obtained from these samples, it is reasonably certain that the motte was not built by augmenting a pre-existing mound of prehistoric date but rather that it was constructed directly on top of part of the Roman cemetery, recorded within the Castle Yard (Ramm 1956-8), with evidence for the fragmentation and re-deposition of human remains and the incorporation of occupation rubbish from the city. It appears that base of the mound was made by simply excavating and piling up the material at hand on-site: topsoil, subsoil, sediment and their contents, with little regard for the Roman burial ground.

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Appendix 1

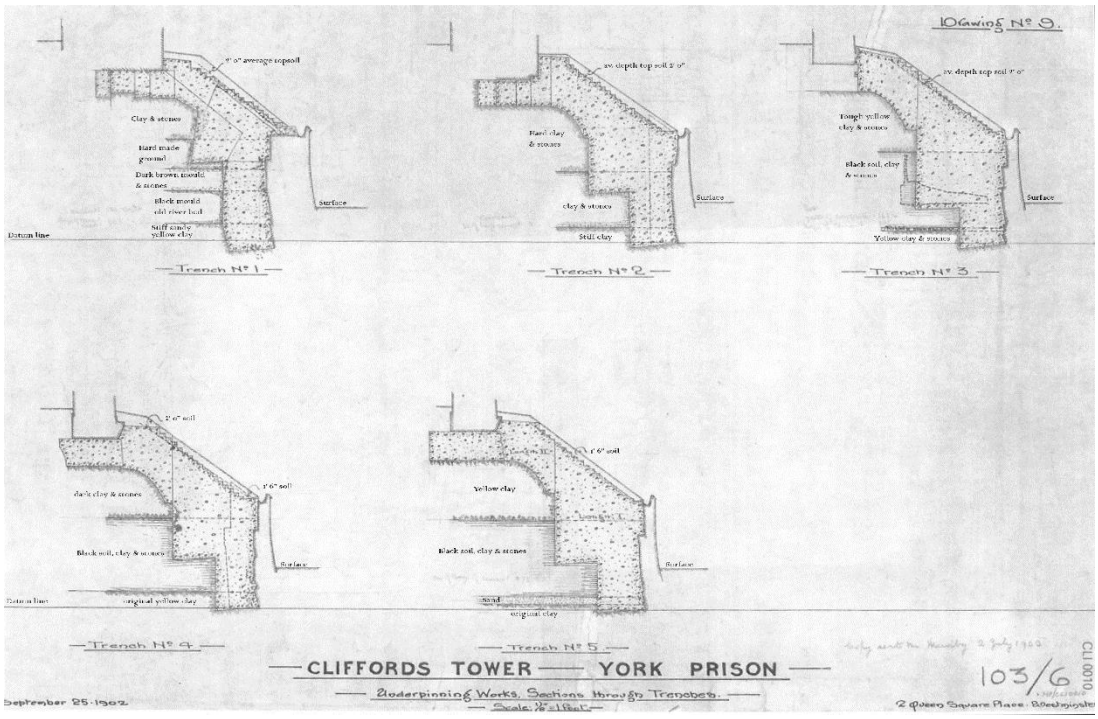
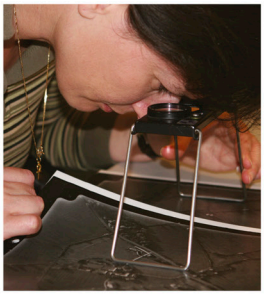


Figure 69. The five underpinning sections from the eastern half of the mound recorded in the early 1900s.





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