

July 2017

Report Number: 1617-27

**GEOARCHAEOLOGICAL
INVESTIGATION OF
DEPOSITS AT LAND AT
SOUTH CERNEY CASTLE,
GLOUCESTERSHIRE**

Prepared for Rubicon
Heritage Services Ltd

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Version	Date	Status*	Prepared by	Author's signature	Approved by	Approver's Signature
01	21/07/17	E	Nick Watson			

*I – Internal draft; E – External draft; F - Final

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SUMMARY

In July 2017 ARCA undertook a walk over survey of the site of South Cerney Castle, South Cerney, Gloucestershire at the request of Rubicon Heritage Services Ltd. Evidence for the presence of the bedrock Kellaways Formation was observed. Allochthonous materials in the form of flints and quartzites were derived from nearby Pleistocene deposits, and limestone building materials of the Cornbrash Formation. Evidence for the formation of levees/banks was noted although no palaeosols were preserved.

1 INTRODUCTION

- 1.1 On 20th July 2017, at the request of Simon Roper of Rubicon Heritage Services Ltd, ARCA carried out a geoarchaeological walk over survey at Land at South Cerney Castle, South Cerney, Gloucestershire (henceforth 'the site'). The site is centred at NGR SU 04731 97670. Part of the site is scheduled as South Cerney Castle and part of the remainder is being considered for development (see Collard 2017, 1)
- 1.2 This document presents the results of the investigation. It is arranged as follows: first an account is provided of the local geology and site context, then the methodology is described, followed by the results, and finally conclusions complete the document.
- 1.3 The report is intended to address the following aims:
 - 1.3.1 To investigate the geology of the site and determine the depth and nature of any superficial sediments and the bedrock;
 - 1.3.2 To determine the relationship of the archaeological features to the superficial and bedrock geology known otherwise as the 'natural' in archaeological parlance.

2 GEOLOGY AND SITE CONTEXT

- 2.1 The site is located on the east slope of a prominent, north-south trending spur west of Silver Street in South Cerney. It consists of a complex series of earthworks, now given over to pasture and copse, covering c. 3ha and lying at an elevation of between c. 90m and c. 100m OD. A drain fed by a spring on the 100 m contour runs west to east on the north boundary and appears to have been excavated in the recent past to widen and deepen its down slope terminal. The drain is banked. A pond possibly dug (or at least formalised) and lined in the 20th century lies close to the modern entrance to the site from Silver Street.
- 2.2 The British Geological Survey (BGS 1:25,000, 2012) map the site as lying on the Kellaways Sand Member that dates to the Callovian Age of the Middle Jurassic Epoch 166.1 – 163.5 Ma. The lithology is recorded as grey, silicate sandstones and

siltstones with calcareous cement. To the northeast overlying the Kellaways Sand Member is the Oxford Clay Formation. Two Pleistocene terrace deposits are recorded; the first and older, is the Hanborough Gravel Member spread along the top of the spur to the northeast and is a remane deposit of Bunter quartz and quartzites; the second and younger, is the Northmoor Sand and Gravel Member located east of Silver Street and is dominated by limestone clasts with some Bunter quartz, quartzites and flint.

- 2.3 The BGS also map the Kellaways Clay Member impinging on the south of the site on the 1:50,000 map (2016) (however, it is not mapped on the larger scale 1:25,000 map). This Member is a grey silicate mudstone the lies conformably below the Kellaways Sand Member as part of the bipartite Kellaways Formation (Barron *et al*, 92).

3 METHODOLOGY

- 3.1 Five test pits (TP#) c. 2m x c. 2m had been excavated by machine and the strata in each was examined. The test pits all reached the water table. Two trenches – shallower than the test pits and dry – were also examined one at the east of the site (Trench 3) and one on higher ground to the south of the site (Trench 1). To determine the thickness and nature of deposits below the trench bases an Edelman soil auger with extension rods was employed and the sediment recovered described according to standard geological criteria (Jones *et al* 1999, and Tucker 2011).

4 RESULTS

- 4.1 **Test Pit 3** is located next to an old brick well and on the south bank of the drain. Five units are exposed in section (see Figure 1). The lowest (5) is below the water table and is a stiff grey silt/clay. It represents the weathered top of the Kellaways Clay Member. It is conformably overlain by oxidised silt/clay (Unit 4) that is also part of the top of the Kellaways Clay Member which has been subject to fluctuating water levels that result in the deposition of manganese oxide (black) and iron oxide (orange brown), which have mottled the grey silt/clays. The succeeding deposit (Unit 3) is redeposited silt/clays derived from repeated maintenance of the drain that forms a low levee or bank. This deposit is dark yellowish brown, clast-free and oxidised

(Munsell: 10 YR 4/4). A sharp boundary marks the following stratum (Unit 2) composed of cobble-sized angular clasts/lenses of grey silt/clay (Munsell:2.5 Y 5/1) interdigitated with yellowish brown pebble-sized silt/clay clast/lenses. Rare limestone granules are also present. This well-defined deposit is the most recent episode of drain clearance. A dark brown (Munsell: 10 YR 2/2) clast-free topsoil (Unit 1) has developed in the top of this clearance deposit.

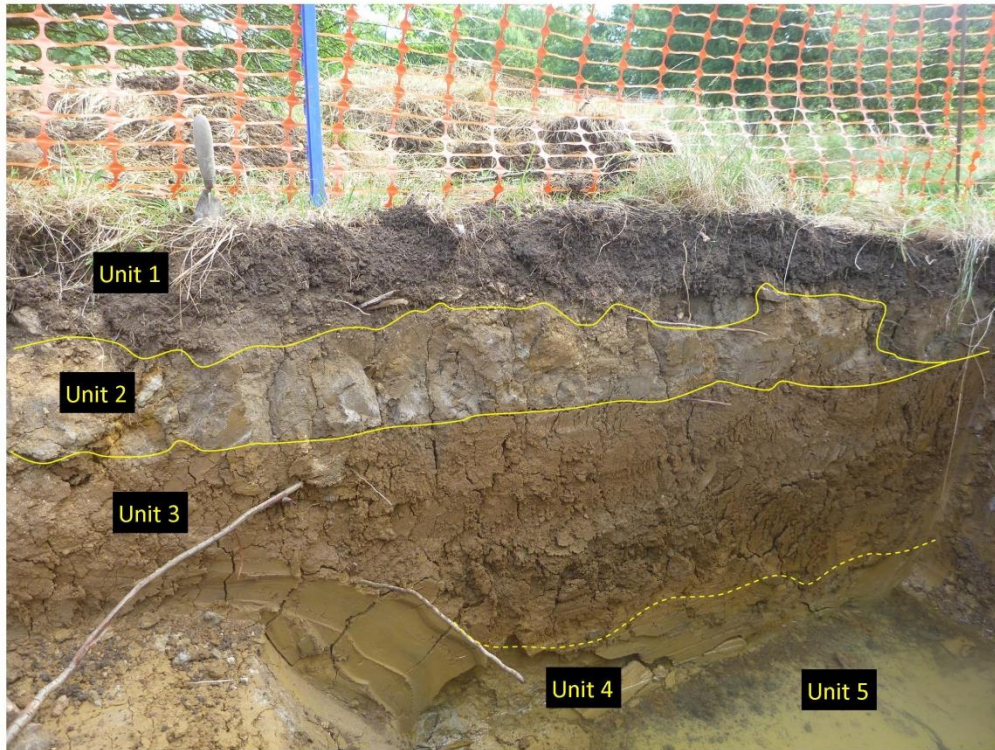


Figure 1. Test pit 3 north section.

- 4.2 **Test Pit 1** is located c. 20m to the north east of TP3 on the north side of the drain. The stratigraphy is the same as in TP3 except that Unit 2 in TP3 is absent (see Figure 2). The TP has in all probability cut through or into the levee, although at this location the levee is low and poorly defined, and the oxidised top of the bedrock cannot be distinguished from the redeposited silt/clays.



Figure 2. Test pit 1 south section.

- 4.3 **South end of Transect 1.** This location is a test pit c. 20m further down slope from TP1. The lowermost deposit (Unit 5/6) is the Kellaways Clay Formation with a thin and irregular and possibly truncated, oxidised top (see Figure 3). It is overlain by an heterogeneous deposit (Unit 4) c. 0.8m thick that is composed of very dark greyish brown (Munsell: 10 YR3/2) silt/clay with frequent yellowish brown (Munsell: 10 YR 4/4) coarse pebble to cobble-sized lenses of homogenous silt/clay and frequent fine to coarse clastics. The fine clasts are composed of occasional charcoal grains and frequent granules of heavily eroded, rounded granules of fossiliferous, whitish yellow limestone. The limestone granules are distributed irregularly throughout the unit except at the top where they form a pea grit horizon (Unit 3). The coarse clasts are frequent medium pebble to cobble-sized, eroded, sub angular to sub-rounded, fossiliferous limestone with rare reddish, sub-rounded quartzites and rare white patinated flints. These clasts are distributed throughout the unit including some set into the top of the underlying bedrock. A clast-free topsoil and B horizon (Unit 1 and 2) cap the stratigraphy.



Figure 3. South end of Transect 1 west section.

- 4.4 The sequence described above (Section 4.3) is believed to represent an anthropogenic deposit laid down on a truncated bedrock as a result of excavation from elsewhere on the site. The coarse limestone clasts are probably building rubble derived ultimately from the local Cornbrash Formation. The fine limestone granules are the product of on-site erosion of the limestone via human action and natural processes. Their accumulation as a pea grit horizon is the result of earthworms moving the particles down the profile of the topsoil and is evidence that the site at this location has not been ploughed. Rare quartzites and flints are probably derived from one or other of the Pleistocene deposits. The action of gravity would account for their derivation from the Hanborough Gravel Member on the top of the spur whereas human action would be needed to move them up from the Northmoor Sand and Gravel Member below the site. A soil profile has developed in the top of the deposit. Medieval pottery sherds were recovered from the spoil of the test pit.

- 4.5 **Test Pit 4** is located c. 20m east and downslope of South end of ?Transect 1. Five units are present in the west section (see Figure 4). The lowermost unit is the bedrock (Unit 5 is below the water level) that is overlain by an oxidised top (Unit 4). The succeeding unit (3) is very dark greyish brown (Munsell: 10YR 3/2) compact silt/clay with very rare coarse pebble-sized limestone clast. This unit is overlain with a sharp boundary by a dark yellowish brown, compact silt/clay (Munsell: 10 YR 4/4) that is clast-free (Unit 2) and appears to be redeposited sediment that forms a very low hummock. It is overlain by a clast-free topsoil. It is significant that there is an almost complete dearth of limestone clasts, both fine and coarse, which probably indicates an area of the site unaffected by stone buildings.

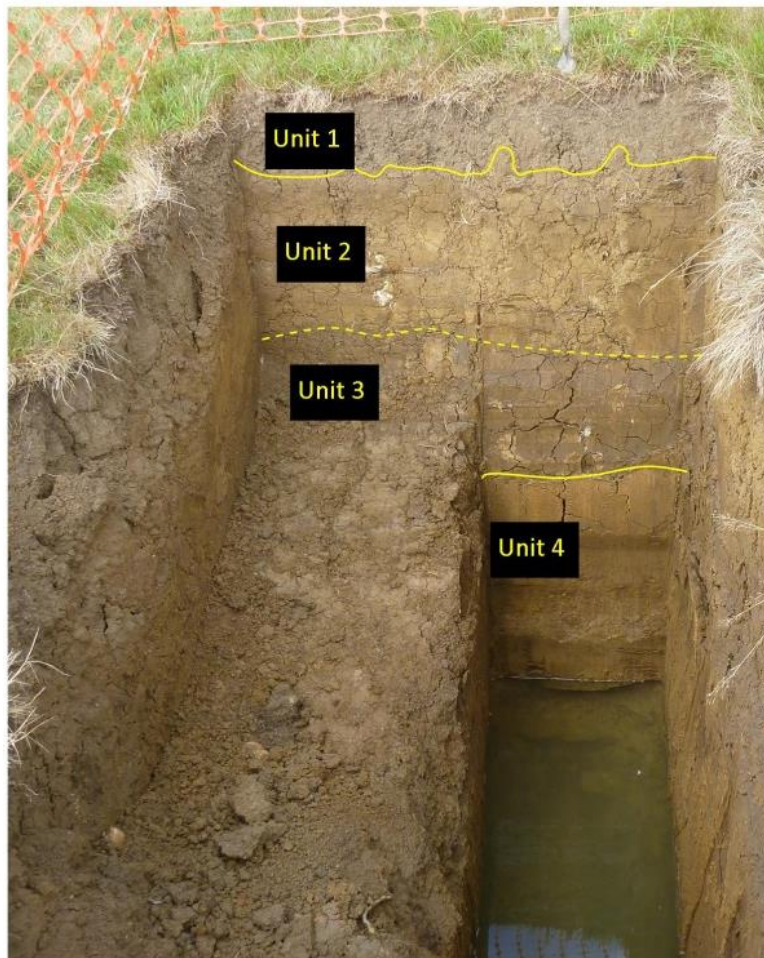


Figure 4. Test pit 4 west section.

- 4.6 **Test pit 5** is located c. 25m downslope of south east of TP 4 on the west side of a pond. The lowermost unit (5) below the water level is the bedrock that has a ubiquitous oxidised top (Unit 4) as discussed above. Manganese oxide grains (streaked black

from the digger bucket) and orange iron oxide mottling is very prevalent in the section and reflects the fluctuating water table. The overlying unit (3) is a brown (Munsell: 7.5 YR 4/4) silt/clay and represents redeposited material probably excavated from the pond. The succeeding unit (2) has distinct cobble-sized lenses of grey silt/clay within a yellowish brown silt/clay. Limestone granules are frequent. This unit appears to be the same as Unit 2 in TP 3 and is redeposited sediment from maintenance of the pond. A clast-free topsoil caps the sequence. Deeply rooted *Juncus* sp. bioturbates the entire sequence (c. 1.9m).

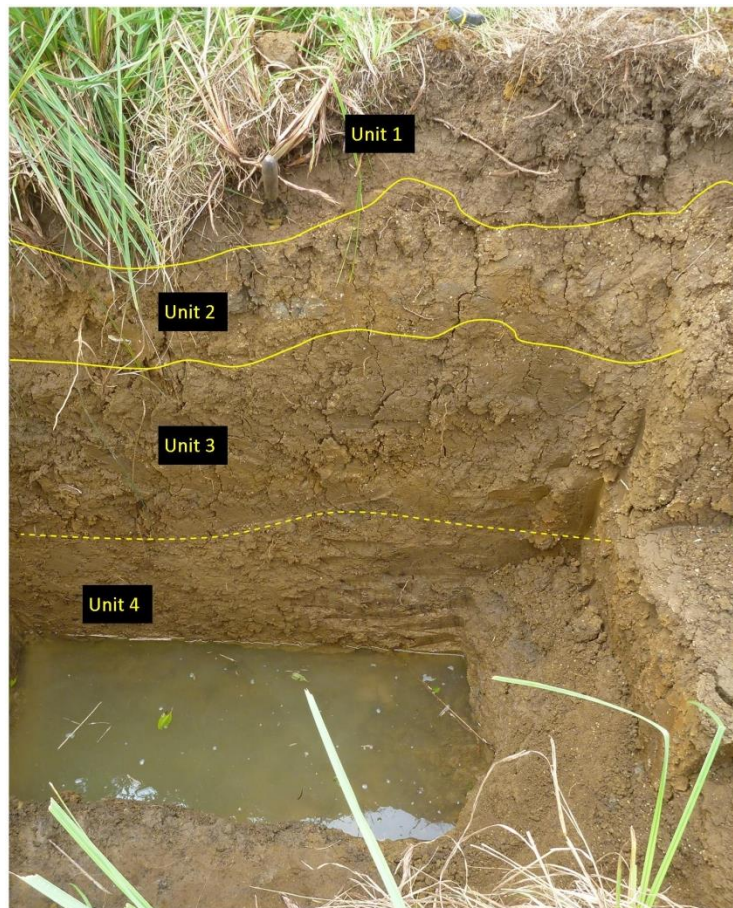


Figure 5. Test pit 5 south section.

4.7 **Trench 3** is located at the east entrance to the site downslope of the pond. An auger hole was sunk through the base of the trench at 0.8m BGL to investigate the underlying deposits and the following sequence was recorded:

0-0.3m: 10 YR 3/2 Very dark brown silt/clay with a fine crumb-like ped structure. Frequent fine roots particularly in the top 0.05m. Clast-free. (Top soil). Diffuse boundary to:

0.3-0.8m: 10 YR 4/4 Dark yellowish brown silt/clay with frequent granules of eroded sub-rounded limestone. Trench base. (Colluvial unit).

0.8-1.4m: a mixed unit of 10 YR 4/6 Dark yellowish brown silt/clay and 10 YR 5/3 Brown mottled silt/clay with occasional coarse sand-sized grains of white patinated, angular flint and rare reddish quartzite. Rare granular-sized organic material (modern roots) (Oxidised top of the Kellaways Clay Member)

1.4-1.9m: 2.5 YR 4/1 Dark grey silt/clay possibly laminated becoming stiffer and lighter in colour with depth. (Kellaways Clay Member).

1.9-2.3m: Gley 1 5/10GY Greenish grey stiff silt/clay, possibly laminated, with rare fine sand grains, granular sized silicate tabular particles and occasional lenses of black (?phosphatic), coarse sand-sized particles. (Kellaways Clay Member). End of auger hole.

4.8 Immediately below the base of the trench is the oxidised top of the bedrock. It contains allochthonous sand-sized particles (flint and quartzite) derived from the Northmoor Sand and Gravel Member to the immediate east. The overlying deposit is a structureless colluvium that has accumulated via hillslope processes and human action on the level ground in the east of the site. Limestone granules are indicative of human building activity upslope and a clast-free topsoil, as elsewhere on the site, indicates a long period of stability. On account of the earthworks it is probable that the site has not been cultivated since its abandonment.

4.9 **Trench 1** is located in the south west of the site towards the 100m contour. A compact, continuous spread of tabular cobble-sized Cornbrash limestone clasts marked an area of past human activity. The clasts – building material brought on to the site – lie on the Kellaways Sand Member, one of only two locations where this bedrock lithology was found to be present (the other is in badger sets at a similar altitude c. 60m north west). Augering in Trench 1 exposed at least 0.6m of homogenous, compact, fine to medium, oxidised orange sands that become greyish with depth.

5 CONCLUSIONS

The following are the conclusions of the survey:

- The bedrock in the vicinity of Trench 1 was determined to be the oxidised top of the Kellaways Sands. At lower altitude the bedrock is the oxidised top of the Kellaways Clay member.
- Redeposited silt/clays form levees/banks in TP3, TP1, TP4 and TP5. There was no evidence of preserved palaeosols although in TP4 Unit 3 is darker in colour. The oxidised and acidic nature of the sediments are not conducive to the preservation of organic palaeoenvironmental proxies.
- In TP3 and TP5 (Unit 2 in both cases) there is conclusive evidence of the redeposition of grey and mottled bedrock silt/clays.
- Allochthonous material on the site include flint and quartzites derived from the local Pleistocene deposits. Limestone in the form of large clasts and granules, are derived by human action from the Cornbrash Formation.
- On abandonment of the site a topsoil developed in the archaeological deposits that included limestone granules. Over time these granules were redeposited at the base of the evolving topsoil. Their presence at this location is evidence that the site has not been cultivated for a long period of time, because ploughing, for example, would redistribute them throughout the unit.

6 ACKNOWLEDGMENTS

- 6.1 ARCA would like to thank the Simon Roper and Mark Collard both of Rubicon Heritage Services Ltd, and Dr Eleanor Standley of the University of Oxford for their help with the field work.

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