Geoarchaeology

ARCA

March 2022

Report Number: 2122-8

LAND AT HORTON WOOD SOLAR FARM, EAST OF HORTON KIRBY, KENT: GEOARCHAEOLOGICAL STUDY OF ONE MONOLITH

Prepared for Red River Archaeology Ltd

by
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Version	Date	Status*	Prepared by	Author's signature	Approved by	Approver's Signature
001	11/03/22	E	Nick Watson		Keith Wilkinson	
*I – Internal draft; E – External draft; F – Final						

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SUMMARY

In March 2022, at the request of Red River Archaeology Ltd, ARCA examined one monolith of sediment from Trench 53 excavated at Land at Horton Wood Solar Farm, east of Horton Kirby in Kent. The sediment is colluvium with a fine to very fine sandy silt/clay lithology. Occasional clasts of chalk and flint are present. No dateable artefacts have been found in the colluvium, however, it buries a pit and scoop of possible prehistoric date. No buried soils are recognisable. The presence of palaeoenvironmental proxies in the sediment is considered to be unlikely: there are no molluscs; and the grain size and oxidised nature militate against the survival of pollen. No further work is recommended.

1 INTRODUCTION

1.1 This report discusses the results of a geoarchaeological investigation of one monolith sample taken from excavations (trench 53) at Land at Horton Wood Solar Farm, east of Horton Kirby, Kent (henceforth 'the site'). The work is in accordance with Historic England's (2015) guidance on geoarchaeology and environmental archaeology (Campbell *et al.* 2011); and the Chartered Institute for Archaeologist's (CIfA) (2014) 'Standards and guidance for archaeological field evaluation'. ARCA carried out the work in March 2022 on behalf of Red River Archaeology Ltd.

1.2 The site occupies *c.* 1km^2 of farm land to the east of Horton Kirby in Kent and is centred on National Grid Reference TQ 57778 67851 (Weston 2021) (Figure 1). It lies on the west flank of a north northeast trending Chalk spur between the 100m and 80m contours, the highest ground being in the south. The ground gently slopes to the northwest to *c.* 20m OD some 2km distant in the River Darent Valley and to the north towards the village of Pinden also 2km distant. Excavation on the site has revealed a possible prehistoric enclosure, several late Iron Age/Romano-British features and a possible prehistoric pit and scoop in trench 53 (Weston 2021).

1.3 The British Geological Survey map the site as lying on the Seaford Chalk Formation laid down in the late Cretaceous Epoch *c.* 89.8 Ma (BGS 1998) In the north of the site the Chalk is overlain by an outlier of the Thanet Sand Formation laid down in the Palaeocene Epoch *c.* 59.2 Ma. The Chalk contains both nodular and tabular flints. The lithology of the Thanet Sand Formation is a yellow brown, silty fine sand that contains darker glauconite grains (BGS 2022).

1.4 Two superficial units unconformably overly the bedrock Chalk: Clay-with-Flints and Head. The Clay-with-Flints lies on the high ground to the south and east of the site and dates from the Palaeogene to the end of the Pleistocene 66 Ma – 11.7 ka. It is an unstructured, orange brown clay deposit formed by decalcification of the Chalk and cryoturbation with Palaeogene deposits, and contains both well-rounded and angular flint clasts of all sizes. The unit was more extensive earlier in the Holocene and is a source of the colluvial sediment excavated on the site. In the northeast of the site a thin superficial deposit of Head is mapped in the course of a dry valley trending north northeast. Head is a poorly stratified polymict deposit of gravel, sand and

clay that was laid down on sloping ground as a result of mass wasting via freeze/thaw processes operating under a periglacial climate in the Pleistocene (2.58 Ma – 11.7 ka). The Head was most probably derived from the Clay-with-Flints.

1.5 One monolith sample <015> was taken using plastic pipe with an open rectangular section (60x60mm) by the excavation staff from trench 53 (Figure1). The sample was delivered to Oxford in March 2022 for assessment by the author:

- <015> (1.15m long). Southwest facing section trench 53; eight contexts: (5301) to (5308); drawing 28 (see Figures 1 and 2).

1.6 The aims of the work were to:

1.6.1 Characterise the sedimentary sequence preserved in the monolith sample; and
1.6.2 Report on the palaeoenvironmental potential of the deposits.

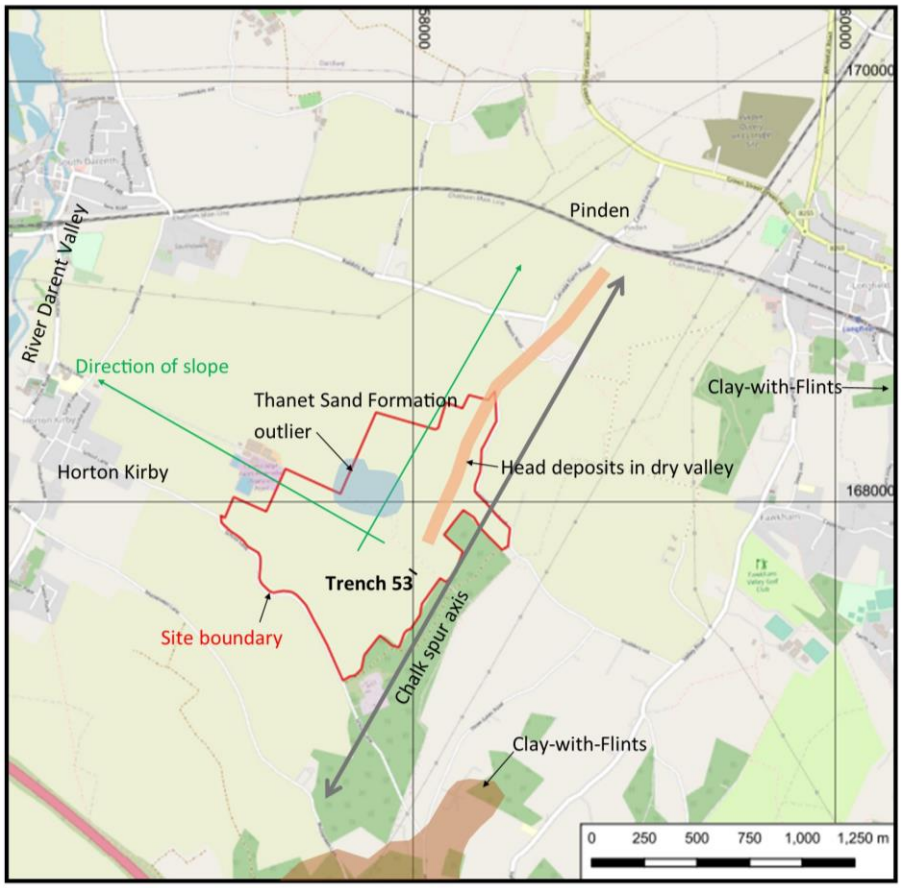

Figure 1. Sketch map of the site showing the geomorphology (Curtesy Weston 2021 fig.1).

2 METHODOLOGY

2.1 The monolith samples were cleaned by scalpel to expose fresh surfaces and photographed. Recording of the bulk lithology took place according to standard geological criteria (Jones *et al.* 1999; Munsell Color 2000; Tucker 2011).

2.2 The material archive comprises the monolith sample which will remain in storage at the University of Winchester pending decisions on further work until 9th March 2023 whereupon it will be discarded with no further notification.

2.3 The digital archive consists of photographs in JPG format and this report in PDF format. These digital archives are stored both on the University of Winchester server and on an external hard drive stored outside the University of Winchester. Copies of these data can be supplied on request.

2.4 OASIS records will be completed on approval of this report.

3 RESULTS

3.1 The results are tabulated below (Table 1) and discussed in the following sections: first the deposits are described and then their mode of deposition interpreted in Section 4. Section 5 provides an assessment of the potential of the sediments to contain information on the palaeoenvironment. The sedimentary units described in the monolith are referred to by their archaeological context numbers (in parentheses) wherever it is possible, rather than by geological unit numbers for ease of comprehension.

Figure 2. Trench 53 showing Archaeological features (black spreads). Monolith sample <015> from section on the right.

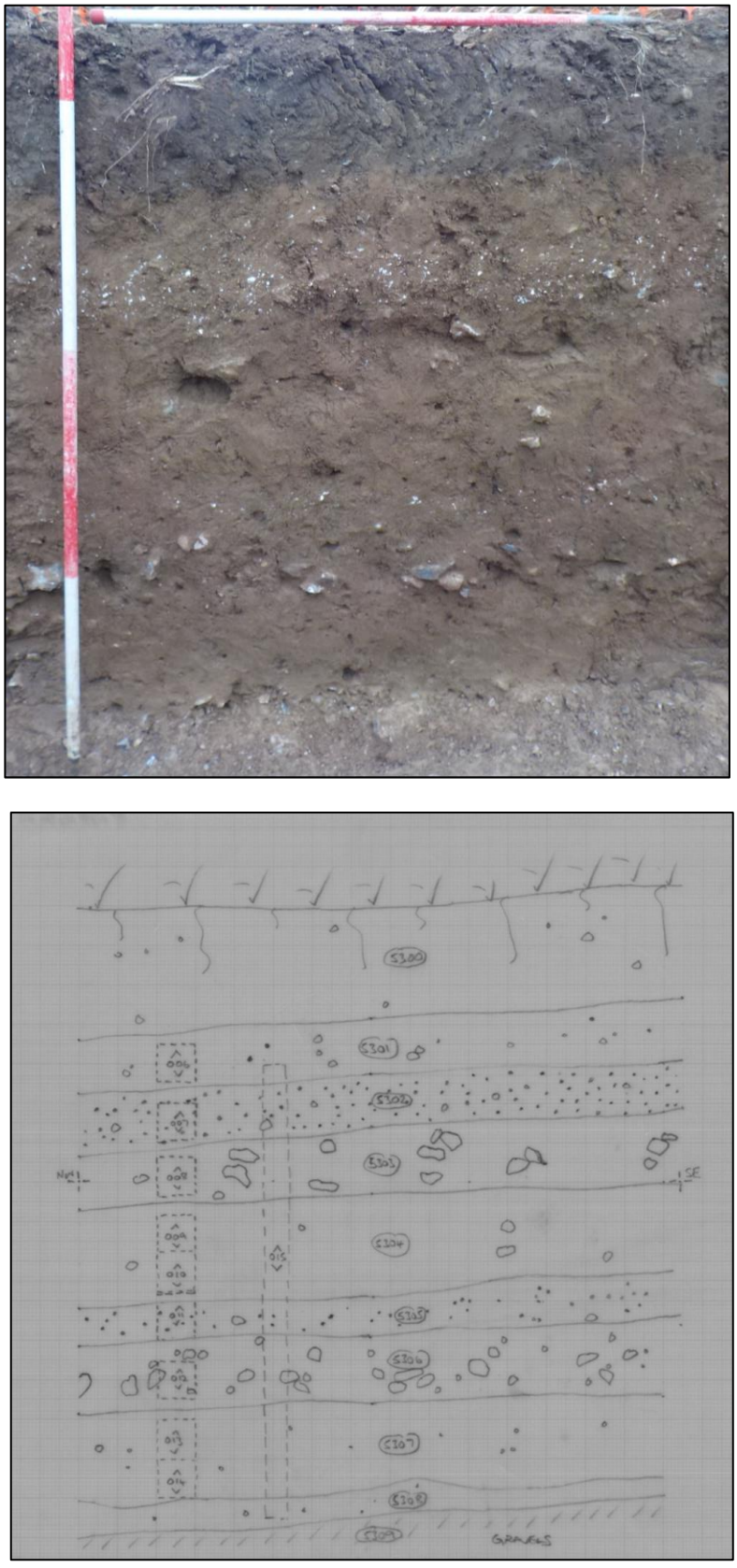

Figure 3. Photograph and drawing (Number 28) of southwest facing section trench 53 showing location of monolith sample <015>.

<015>	Depth m	Unit (context)	Description
	0-0. 22	1 (5301), (5302)	7.5YR 5/4 Brown damp and friable fine to very fine sandy silt/clay (soapy texture=silt). Occasional fine roots and rare earthworm galleries with humic topsoil within. Occasional sub-angular to sub-rounded chalk grains and granules, and occasional fine to medium pebble of angular and well-rounded patinated flint. (E horizon?) Diffuse boundary to:
	0.22-0.66	2 (5303), (5304)	7.5YR 4/4 Brown, damp and friable fine to very fine sandy silt/clay. Homogenous, tending to exhibit very fine to fine angular blocky structures. Rare fine pebble of angular flint. Boundary to unit 3 not recognised.
	0.66-0.71	3 (5305)	7.5YR 4/4 Brown, damp and friable fine to very fine sandy silt/clay (soapy texture=silt). Homogenous, tending to exhibit very fine to fine angular blocky structures. Unit 3 distinguished by occasional granular to fine pebble-sized subangular to subrounded chalk granules. Boundary to unit 4 not recognised.
	0.71-1.15	4 (5306), 5307), (5308)	7.5YR 4/4 Brown, damp and friable very fine to fine sandy silt/clay. Homogenous, tending to exhibit sub parallel wavy cracking and occasional very fine to fine angular blocky structures. Rare chalk grains and rare fine pebble of angular flint. Possible faint value increase towards base. (note: Cracks and blocky structure as a result of extraction and transport.)

Table 1. <015> lithology.

3.2 *<015>; Table 1; Figures 3 and 4.* The lithology of the basal deposit, (5308)-(5306), is an homogenous matrix of friable, fine to very fine sandy silt/clay, brown (7.5YR 4/4) in colour. Clastic content is rare and limited to an angular, fine pebble-sized flint and chalk grains particularly at the base. The succeeding unit, (5305), is only distinguishable by the presence of occasional chalk granules otherwise there is no discernible colour or textural change nor top and base boundaries. The same brown, sandy silt/clay lithology continues in the overlying unit, (2) (5303) and (5304). Rare angular flints are noted. The uppermost deposit, unit 1, (5302) and (5301), is distinguished from earlier deposits by three factors: first, its value is lighter (recorded as Munsell 7.5YR 4/5 Brown); second, the clastic content is greater, there are occasional chalk grains and granules; and third, bioturbation is evident in the form of fine roots and earthworm galleries. The matrix continues to be a fine to very fine sandy silt/clay.

4 ASSESSMENT: MODE OF DEPSOITION

4.1 The sedimentary stack overlying the bedrock is a fine colluvium with a modern topsoil developed in the top and measures *c.* 1.5m in depth (Figure 2 and 3). The monolith sample is too narrow (60mm) to adequately capture the distribution of clasts throughout the deposits, however, this can be appreciated in the photograph of the section and the detailed section drawing (Figures 2 and 3).

4.2 The lithology in the monolith sample is uniform: fine to very fine sandy silt/clay with a faint soapy texture indicative of the presence of silt grade particles. The fine grained matrix is acidic and oxidised. Clasts are rare and consist of chalk granules and flint. There are two preferred concentrations of chalk particles at 0.66-0.71m which corresponds to (5305) and at *c.* 0-0.22m corresponding to (5302). Both these contexts have been described by the excavator as buried soils.

4.3 The original source of the sediment forming the colluvium are upslope deposits of Thanet Sand Formation, Clay-with-Flints and exposures of bedrock Chalk. The two former units were once more extensive and outcrops exist within the environ of the site; remnants will be more extensive but too unsubstantial to be mapped.

4.4 The colluvium appears to blanket the head of a shallow north northeast trending dry valley and is exposed in trench 53

excavated approximately normal to the axis of the valley (Figure 1). The strata dip very gently towards the north northwest. On the higher ground 170m northwest of trench 53, there is evidence of Romano-British activity. It is suggested that intensification of agriculture from the Romano-British period probably through to the medieval/post-medieval periods has resulted in the colluvial sequence (Weston pers. com. 8/3/2022). Archaeological features are present in the trench and are described as pit [5314] and its fills (burnt flint and charcoal) and scoop [5316] (Figure 2). They are found towards the base of the sequence and overlain by (5305). The features are however undated (possibly prehistoric) and no artefactual dates are available for the sequence.

4.5 The location of a pit and scoop presupposes a level from which they were dug normally the (old) ground surface. There is no evidence in the basal deposits of the monolith sample for a humic (darker coloured) stratum that could represent an ancient ground level and therefore such a surface has presumably been truncated by erosion along with the top sections of the features. The succeeding deposit (5305) is distinguished by the presence of chalk particles, however, it has no humic colouration that could imply pedogenesis and the formation of a soil over the pit and scoop. Rather, the lithology indicates an active environment of erosion and deposition (colluviation) instead of one of hiatus and stability (soil formation). A source of chalk upslope appears to have been activated albeit briefly. In general, buried soils only tend to be preserved within hollows on a slope from which they resist erosion.

4.6 Colluviation takes place on slopes bare of vegetation particularly when worked under the plough. Contexts (5304 and (5303) record the continued deposition of material from upslope. The deposits will have a tabular aspect tending to thicken downslope and be composed of interdigitating fans of sediment with weak lateral extension. Tillage, sheet flow, rill and gullying, and to a lesser extent rain splash all contribute to the flow of particles downslope (Wilkinson 2009). Colluviation ceases once a period of stability is achieved often via a cessation or change in agricultural activity, ploughing to pasture for example. The exhaustion of a sediment source leading to hard bedrock exposure will also halt colluviation. In the monolith sample, and in Figures 3 and 4, this cessation is seen in the development of a soil profile within the top of the colluvium. The profile appears to be composed of three horizons: a plough soil or topsoil (A)(this horizon is not sampled in the monolith), an eluviated horizon (E) and a B horizon. The contexts are respectively (5300), (5301) and (5302). The E horizon

is paler in colour (Munsell value is higher: 5 instead of 4) having been leached of mineral iron oxides which accumulate in the underlying B horizon. Here, too, there is a concentration of chalk grains and granules which are probably the result of earthworm action. On the other hand, (5302) has been described as a buried soil (section 4.3), in contrast, the interpretation offered here considers it to be a horizon of the modern soil.

5 CONLUSION AND PALAEOENVIRONMENTAL POTENTIAL

5.1 The monolith sample <015> represents a fine grained colluvium developed on the east side of a dry valley on the site. The date of its formation is unclear, however, it is probably later than the prehistoric period. It has formed as a result of weathering of an unstable regolith which was caused by the removal of vegetation and exacerbated by tillage.

5.2 The colluvial sediment retained in the monolith sample is both acidic and oxidised. The predominant grain size is within the very fine to fine sand calibres (62.5µ - 250µ). Both oxidation and the relatively large grain size (sand rather than clay) militate against the survival of pollen grains. Furthermore, no evidence for molluscs was found. As a result of these two factors and combined with the fact that the sequence is undated, the potential for a profitable investigation of the environment under which the deposits were laid down is deemed to be low.

5.3 No further work on the monolith sample is recommended.

6 ACKNOWLEDGEMENTS

ARCA would like to thank the following for their help during the present project: Phil Weston of Red River Archaeology Ltd and Dr Eleanor Standley of the University of Oxford.

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