

LAND AT PUMP FARM / BLOORS FARM LOWER RAINHAM, KENT

**Pleistocene and Palaeolithic
Desk-Based Assessment**

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1. INTRODUCTION

1.1 Site context

This report summarises the findings arising from a Palaeolithic and Pleistocene desk-based deposit assessment undertaken by Quaternary Scientific (University of Reading) in connection with required works on Land at Pump Farm / Bloors Farm, Lower Rainham, Kent. The work was commissioned by A C Goatham & Son. The site is in North Kent near Lower Rainham, midway between the Upnor reach of the Medway to the west and Upchurch to the east (Figure 1). It is located on agricultural land, mainly orchards, between the northern edge of urban development in Gillingham and the estuarine reach of the River Medway. The site (Figure 2) is irregular in outline, with maximum dimensions of ca. 1.15km from NW-SE and ca. 0.7km NE-SW, enclosing in total an area of some 50ha.

1.2 Pleistocene and Palaeolithic significance and potential

The site has the potential to contain both Pleistocene and Palaeolithic remains. Pleistocene remains are the geological and biological deposits laid down by various agents – water, wind and ice between 2.6 million and 11,500 years ago; the gravel and sand deposits recorded at the site represent such sediments. In some places, such as within the Aylesford area, artefacts, plant and animal remains are contained within Pleistocene deposits.

Palaeolithic remains therefore form part of the Pleistocene record and can include stone tools and the flakes produced when making them, and, much more rarely, tools of wood and bone, bones bearing marks of butchery, rudimentary structures and the remains of early humans (hominins). Such remains are important as they are the evidence that enables us to understand our earliest prehistory – how the landscape of Britain was shaped and where and how our earliest ancestors fit into it. Significantly, the site is immediately adjacent to Twydall Chalk Pit which has been the source of large numbers of Palaeolithic artefacts, now dispersed in several museums (Roe 1968) but including a significant collection in Rochester Museum. The pit is now backfilled and reclaimed as agricultural land.

Even in the absence of artefact remains, the Pleistocene sediments and their contained biological remains can be significant as they enable the reconstruction of landforms, climatic conditions and environments occupied by Palaeolithic communities. In many cases we already have, in museum collections, artefacts from geological units equivalent to those being investigated (often river terrace gravels), but because of the way in which Palaeolithic artefacts were collected in the 19th and early 20th centuries, we often lack the environmental record that modern investigations of the deposits can supply. In addition, it is important to build up an understanding of the way in which the character and preservation of Pleistocene remains varies from place to place, even in the same geological unit. Recent advances in direct dating techniques, including OSL (optically stimulated luminescence), ESR (electron spin resonance), and AAR (amino acid racemization), have added further significance to Pleistocene remains, enabling us to achieve more reliable dating, relevant both to artefacts and to an understanding of landscape evolution.

1.3 Aims & Objectives

The aims of the Pleistocene and Palaeolithic Desk-Based Assessment are as follows:

1. To determine the Pleistocene and Palaeolithic significance and potential of the site.
2. To determine whether there are justifications for further work on the site based on current knowledge
3. To outline a preliminary strategy for on-site investigation.

In order to address these aims, the following objectives are proposed:

1. To review relevant existing documents and sources related to the geoarchaeological and palaeoenvironmental history of the site
2. To propose a strategy for further investigation (if necessary).

2. METHODS

The following documents and sources were reviewed in an attempt to determine the Pleistocene and Palaeolithic significance and potential of the site including but not limited to: (1) a Kent Historic Environment Record (HER) search focussing on a 1km radius around the site; (2) Historical mapping; (3) historical borehole data held by the British Geological Survey (<http://mapapps.bgs.ac.uk>), and (4) relevant geological, Quaternary and archaeological literature relating to this area of Lower Rainham.

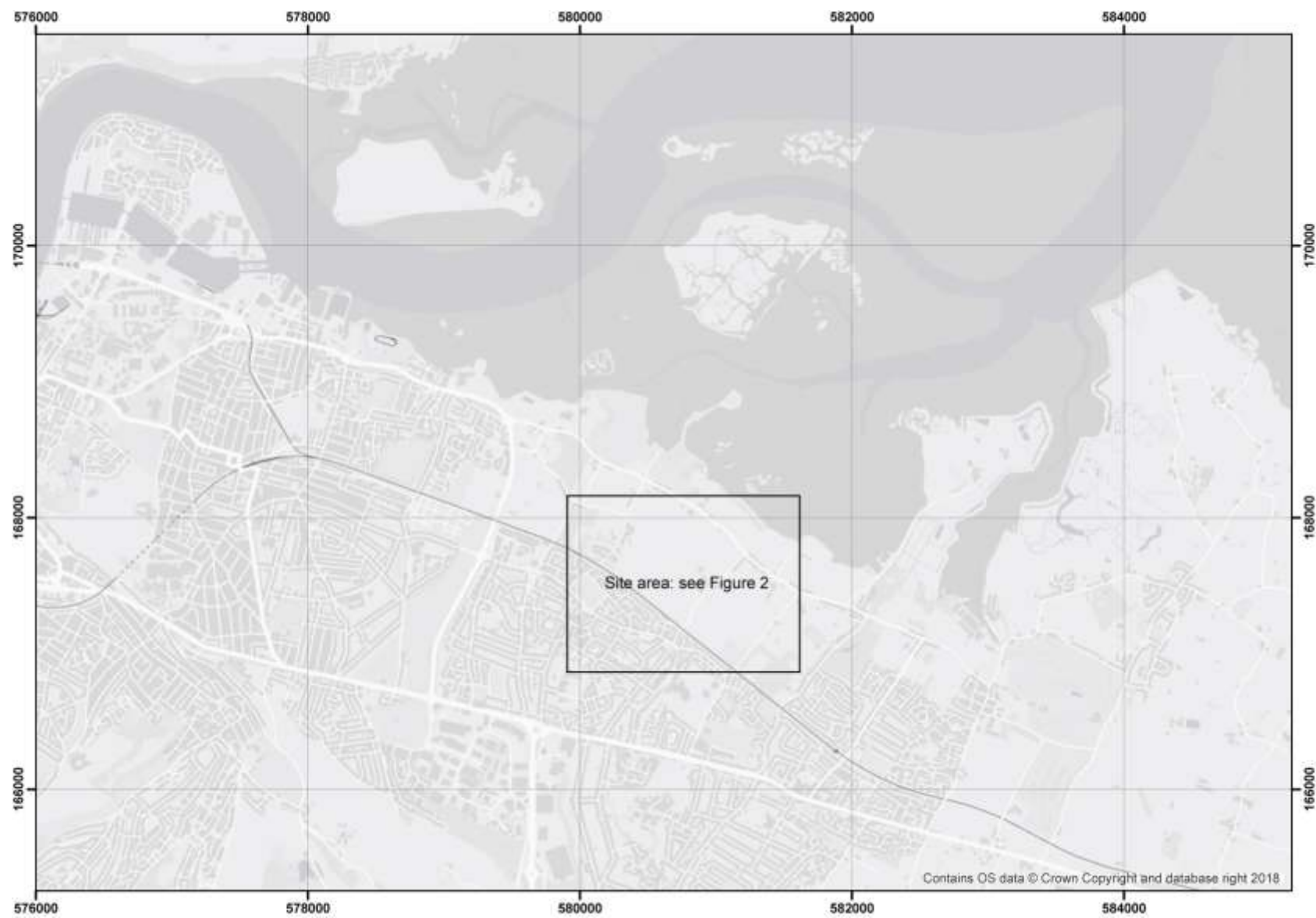


Figure 1: Site location map

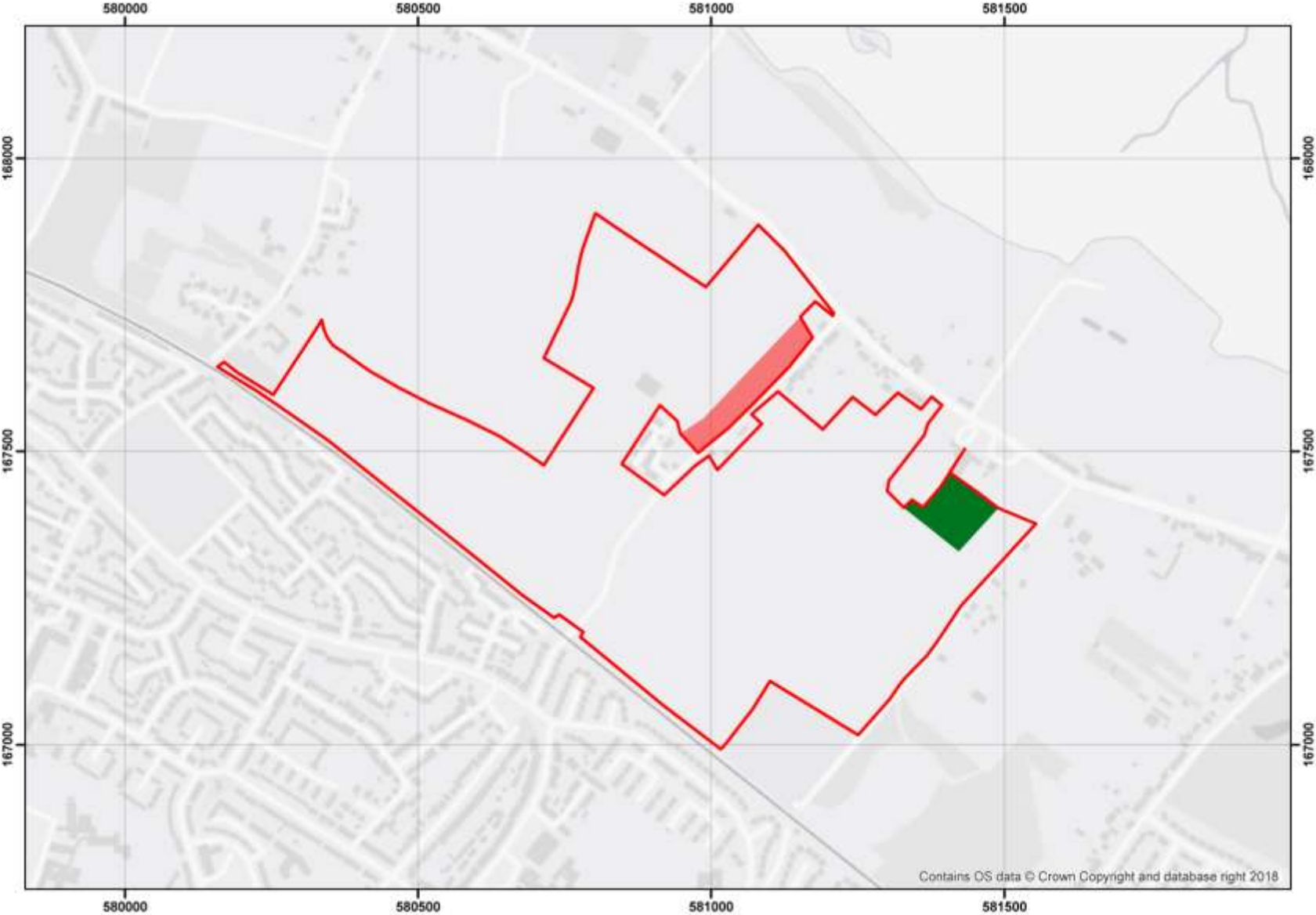


Figure 2: Proposed Development Area (the area in green is outside the PDRA)

3. TOPOGRAPHIC SETTING

The site is on the lower dip-slope of the North Downs. Its south-west boundary coincides closely with the 30m contour. From this level the ground falls north-eastward as a gently concave slope with no obvious irregularities to a level of ca. 7.0m OD near the north-east edge of the site. The upper part of this slope, within the site falls at ca. 14° flattening downslope to ca. 7°. The lower dip-slope of the North Downs within the site and nearby is dissected by shallow dry valleys approximately parallel with one another and aligned from SW to NE. Near the middle of the site, Pump Lane occupies one of these dry valleys, and an even shallower depression, marked by slight re-entrants in the contours, is present near the NE end of the site. Immediately downslope from this part of the site, this depression was formerly occupied by Twydall Chalk Pit.

4. GEOLOGICAL SETTING

4.1 Bedrock Geology

The British Geological Survey (BGS) (1:50,000 Sheet 272 Chatham 1977) (Figure 3) shows most of the Lower Rainham site underlain by bedrock Thanet Formation (sand, silt and clay) which forms two outcrops separated by the Pump Lane dry valley. Beneath the Thanet Formation, the Chalk underlies the whole site but is mapped at the surface only in the Pump Lane dry valley where it forms narrow outcrops on both sides of the valley.

4.2 Superficial Geology - Head and 'Brickearth'

In the axis of the Pump Lane dry valley and on the lower ground to the east of Pump Lane BGS shows the Chalk overlain by Head, described as:

Polymict deposit: comprises gravel, sand and clay depending on upslope source and distance from source. Poorly sorted and poorly stratified deposits formed mostly by solifluction and/or hillwash and soil creep. (www.bgs.ac.uk/lexicon).

Although BGS mapping shows bedrock outcropping at the surface across much of the site, a thin layer of superficial deposits may well be present as the Geological Survey has not traditionally mapped such deposits where they are thinner than about 3 feet thick.

There are no BGS archive boreholes within the Lower Rainham site and very few of adequate quality at similar levels on the Chalk dipslope between Upnor and Upchurch. Where adequate borehole logs exist (Figure 4), a major part of the sediment sequence overlying bedrock is 'brickearth' recorded as such, e.g. to the east of the site TQ86NW29 (24.2m OD) 2.1m of 'brickearth'; or recorded as sandy silt or similar, e.g. to the east of the site, TQ86NW3 (32.16m OD) 5.5m of 'sandy silt', TW86NW5 (23.98m) 6.9m of 'firm silty sandy clay'. In addition on, the BGS 1:50,000 Sheet 272 Chatham (1977) spreads of 'Head Brickearth' are mapped within the height range of the Lower Rainham site both to the west of the site in Gillingham and more extensively to the east around Upchurch and Otterham. Numerous brickpits worked these deposits in the 19th and early 20th century. Archive boreholes also record typical Head deposits within the height range

of the Lower Rainham site, e.g. to the east of the site, TQ86NW12/B (30.33m OD) 1.22m of 'sandy clay with gravel'.

4.3 Superficial Geology - River Gravel

On the lower dip slope of the Chalk on the south side of the estuarine reach of the River Medway in the area between Upnor and Upchurch that includes the Lower Rainham site there is little mapped evidence of river terrace development, or of any fluvial deposition above the level of the Holocene floodplain. This is in contrast with the situation on the north side of the Medway in the Hoo peninsula. Here, BGS (1977) has mapped a sequence of four river terraces at levels from less than 10.0m OD (1st Terrace) up to the highest summits in the peninsula above 50.0m OD (4th Terrace). Within this terrace sequence, Bridgland (1983), identified seven separate gravel aggradations, forming his Hoo Gravel Formation (Bridgland & Harding 1984). In a later paper Bridgland (2003) discarded one of his aggradational stages and suggested a chronology for the revised sequence, as follows (approximate equivalence with the BGS terrace sequence is also indicated):

High Halstow	60.0m OD		Cromerian Complex
Clinch Street	50.0m OD	BGS 4 th Terrace	MIS14-12?
Dagenham Farm	45.0m OD	BGS 4 th Terrace	MIS12
Shakespeare	35.0m OD	BGS 3 rd Terrace	MIS12/11/10
Stoke	16.0m OD	BGS 2 nd Terrace	MIS10/9/8
Binney	8.0m OD	BGS 1 st Terrace	MIS8/7/6

To the south of the River Medway, on the dip slope of the Chalk this terrace sequence is poorly represented. There are historic gravel pits recorded in the Upchurch area (e.g. OS 1:10,600 Sheet: Kent XX NE 1896 and Kent HER TQ86NW34) though not at levels above about c.7.0m OD.

The only River Gravel mapped by BGS is in Gillingham where three small spreads are mapped as 3rd Terrace Gravel at levels of ca. 30.0-35.0m OD, equivalent to the Shakespeare Gravel of the Hoo peninsula. These spreads are, rather surprisingly in view of their elevation, mapped by Bridgland (2003, Fig. 3) as part of his Stoke Gravel. Elsewhere between Upnor and Upchurch 'gravel' has rarely been recorded in the superficial deposits overlying the Chalk. Only two of the BGS archive boreholes reviewed in the preparation of this report in the height range of the Lower Rainham site, recorded a separate bed of gravel, in both cases less than 0.5m thick:

TQ86NW3 (32.16m OD) 0.3m of 'gravel' resting directly on the bedrock Chalk.

TQ76NE796 (no OD but by railway line at c.30m OD) 0.4m of gravel overlain and underlain by beds of sandy silt.

The BGS archive also includes a record of three sections in NGR TQ 806 680, directly downslope from the Twydall Chalk Pit (Section 01 - TQ86NW14, Section 02 - TQ86NW15, Section 03 - TQ86NW16) described as Twydall Survey 2, dated 14.03.1971. This record relates to

investigations reported by Williams (1972) and mentioned (with plan - see Figure 5), by Barnes (1989).

The depth of Section 01 is recorded as 3.6m. No depth is recorded for Sections 02 and 03. Gravel deposits are recorded in Sections 01 and 02, but no thicknesses are recorded:

Section 01

Deposit 1 - Shallow deposit of topsoil over light brown sandy earth with chalk specks

Deposit 2 – Deposit of coarse flint gravel

Deposit 3 – Mid brown sandy earth, brickearth with the odd flint mixed in

Deposit 4 – Large deposit of coarse flint gravel mixed with brickearth

Deposit 5 – Chalk

Section 02

Deposit 1 – Shallow topsoil over mid brown earth, brickearth

Deposit 2 – Deposit of coarse flint gravel

Deposit 3 – Deposit of sandy mid brown earth, brickearth

Deposit 4 – Deposit of coarse flint gravel

Deposit 5 – As above but separate deposit

Deposit 6 – Deposit of mixed chalk fragments and flints

Deposit 7 – Chocolate brown, humus like, deposit

Deposit 8 – Chalk

This archive record includes a note that 'six struck flakes were found within the find horizon'. A second note records that 'course (*sic*) flint gravel in all sections: stained brown and rolled'.

A brief description of the superficial deposits overlying the Chalk in the Twydall Chalk Pit is provided by Whittaker (1990) (see below Section 4.2.2)

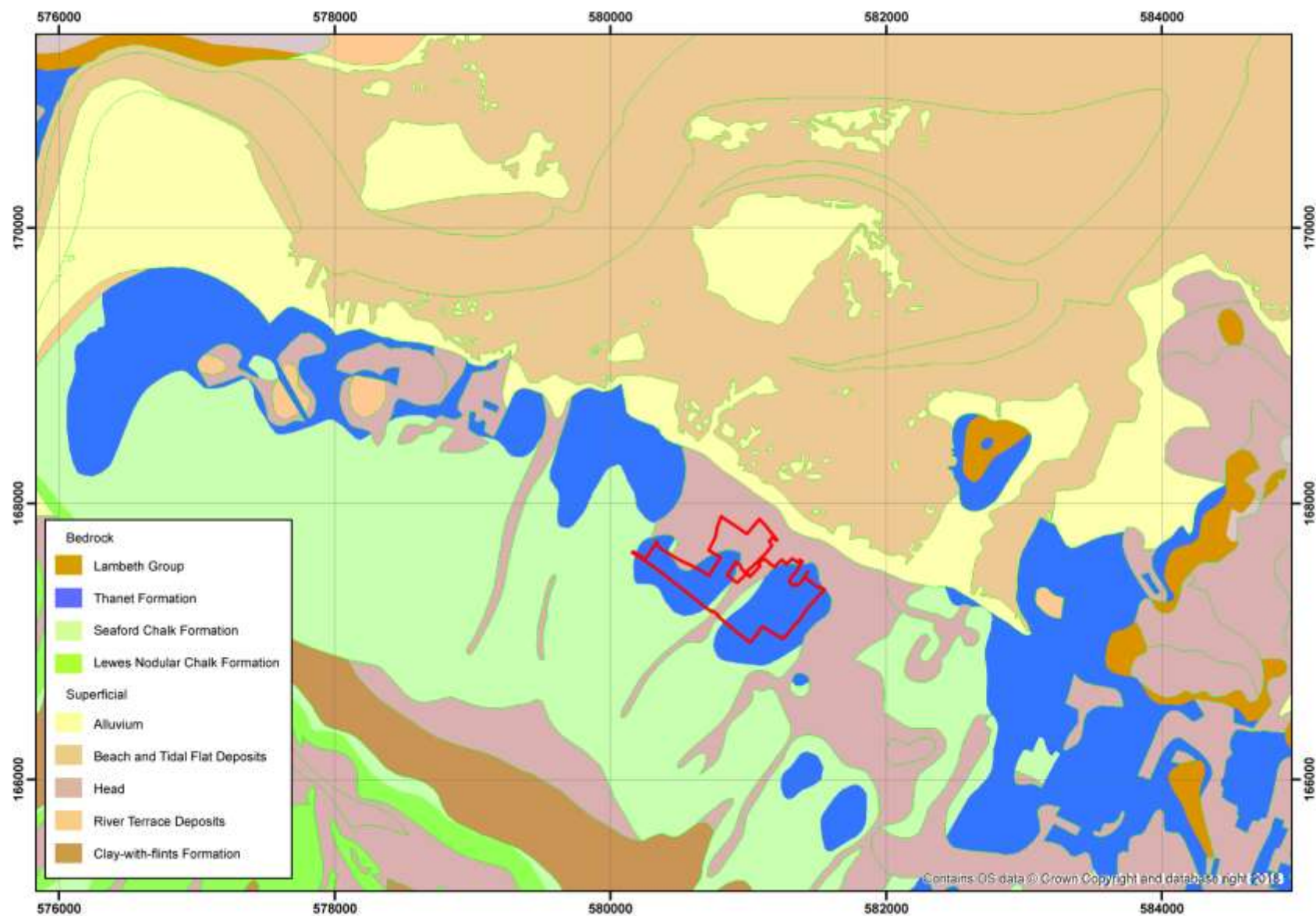
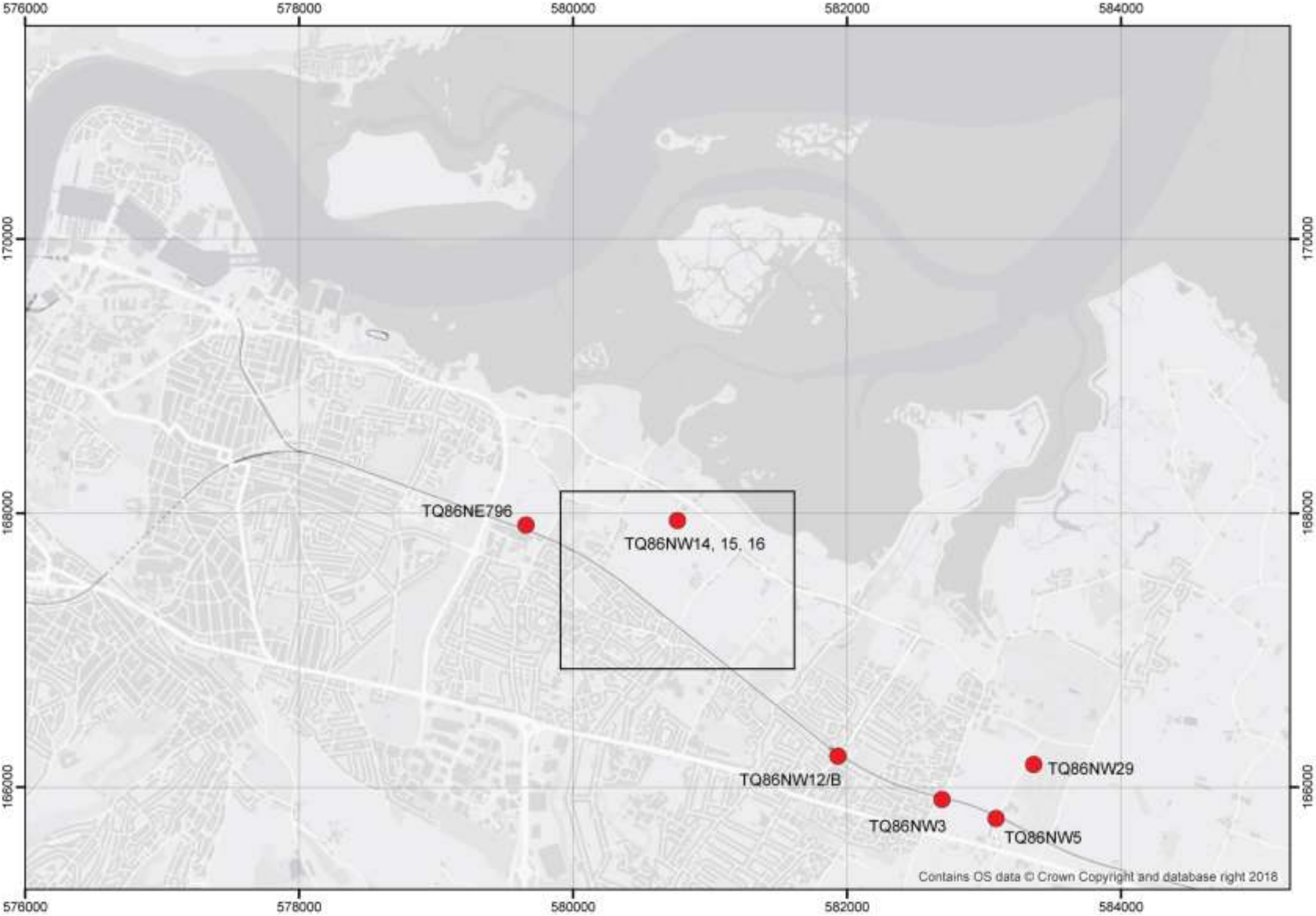


Figure 3: Geological setting of the site (© British Geological Survey, 2018)



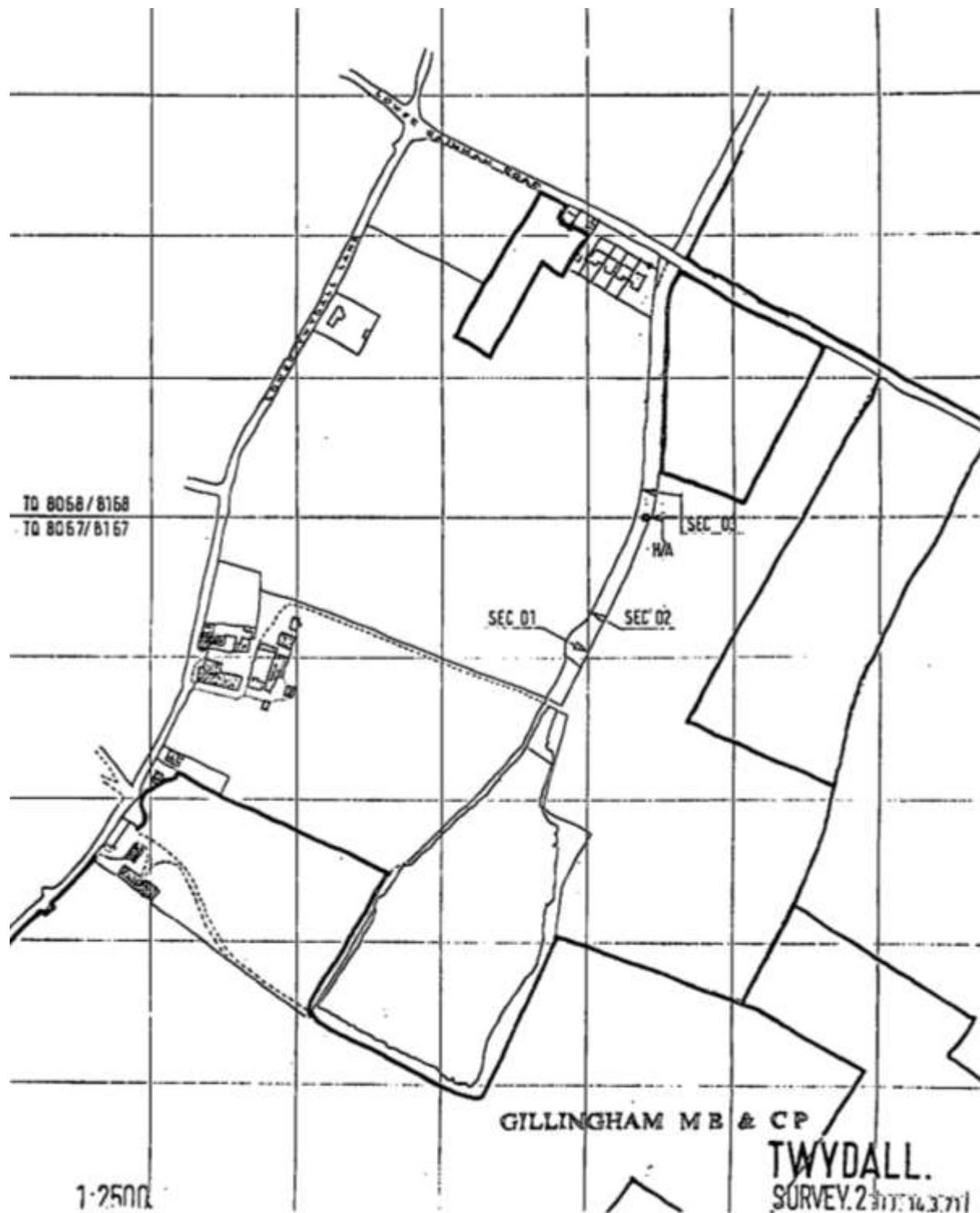


Figure 5: Location of Twydall Survey 2 sections (BGS archive TQ86NW14, TQ86NW15, TQ86NW16) (from Barnes 1989, Fig. 2)

5. PALAEOLOGIC ARCHAEOLOGY

5.1 Local find-spots

In the Kent Historic Environment Record (HER) Palaeolithic find spots in the area between Upnor and Upchurch at or above the level of the Lower Rainham site (Figure 6) relate mainly to discoveries of isolated artefacts lacking precise details of location, e.g. TQ86NW1191 'from the area of Sharp's Green', TQ86NW203 by the A2 in Rainham. An exception is TW76NE405 St Georges Road Gillingham (TQ 773 688 c.30m OD) which records 'abundant Palaeolithic finds' including 40 handaxes and a Levallois core. This material probably came from the most westerly of the three 3rd Terrace gravel spreads mapped by BGS in the Gillingham area. More generally, Hutchings (1925) mentions that 'Palaeolithic implements have been obtained in large numbers' from the gravels of the 'Hundred-Foot Terrace in the Gillingham area. There are also find-spots at lower levels, notably in the Otterham Quay/Upchurch area (Kent HER TQ86NW25, TQ86NW34, TQ86NW1198).

There are no Palaeolithic find spots definitely within the Lower Rainham site. However TQ86NW205 of which the exact location is unknown must have been within or very close to the site and comprises 12 handaxes and 8 pieces of debitage 'from Mr Stewart's fields, Bloor Place. Surface finds by H. Stopes and others in the late 19th century.'

5.2 Twydall Chalk Pit

Immediately adjacent to the site is Twydall Chalk Pit (Kent HER: TQ86NW4). The SW limit of this pit at a level of ca. 23m OD coincides with the downslope boundary of the Lower Rainham site towards its western end. As noted above this pit was excavated in a shallow dry valley extending from SW to NE down the dipslope of the Chalk. The downslope end of the pit was at a level of ca. 15m OD.

5.2.1 History of investigation

The Twydall Chalk Pit served a cement works at Horrid Hill (TQ 811 688) in the intertidal zone on the south side of the estuarine Medway and was linked to it by a tramway. Where the tramway crossed the estuarine mudflats it was elevated on an artificial causeway which was constructed using the superficial deposits that overlay the Chalk in the Twydall Chalk Pit. The material forming the causeway has been the source of large numbers of Palaeolithic artefacts. Roe (1968) records 85 handaxes and 179 retouched and flake implements. The initial discovery of these artefacts was reported by Payne (1915). He describes himself, with his 'trusted scout, George Baker' finding in 1908 'several hundreds of flint implements of various forms and types.' He described the 'greater part' of them as 'fresh as the day they were made', and he attributed wear on others to the action of the sea on the foreshore. However, Whittaker (1990) reports that all the Twydall Paleolithic material seen by him in Rochester Museum is in an abraded condition.

Other investigators have continued to collect material from this site, but there are no detailed records of these investigations and it is difficult to piece together exactly what was collected where and by whom. Roe (1981) describes A.G. Woodcock as 'collecting 700 artefacts in a few hours'. This may be a reference to the 'field survey' mentioned by Barnes (1989) as undertaken by the Upchurch Archaeological Research Group 'for Dr A. Woodcock', and resulting in the recovery of

700 mainly Palaeolithic artefacts. This 'field survey', or possibly a second phase of the same investigation, appears to have involved the inspection of sections downslope from the Twydall Chalk Pit, as recorded in the BGS archive - Twydall Survey 2 dated 14.03.1971 (see above Section 3.2.2).

Roe (1981) assigns the Twydall handaxes to his 'Pointed Tradition – Group1 with cleavers', but he also records that the material collected by Woodcock consisted largely of flakes and cores 'in the Clactonian manner'. He concluded that the causeway represents 'the remnants of a fine Palaeolithic site with at least two major levels.'

5.2.2 Superficial Geology

Although the Twydall Chalk Pit is not within the Lower Rainham site, there is clearly the likelihood that deposits present in the pit extend into the site. Whittaker (1990) provides the only description of the superficial deposits overlying the Chalk in the Twydall Chalk Pit that incorporated the Palaeolithic assemblage subsequently discovered in association with the causeway. Whittaker (1990) who regarded the deposits as being associated with the 3rd Terrace of the Medway describes them as being up to 2.0m thick overlying a chalk surface penetrated in places by 'angular or ill-defined depressions' which he regarded as solution features; or cut into by 'shallow well-defined features' which he regarded as 'stream channels formed within a braided stream environment'. The solution features he described as occupied by 'weathered chalk and massive blocks of dark "soil" within a matrix of light brown loam'. The 'stream channels' he described as occupied by 'layers of laminated sands'. However, the superficial deposits seem also to have incorporated large amounts of flint. Payne (1915) describes the flints washed out of the causeway by the sea as forming a stony beach extending for 150 yards on either side of it.

5.2.3 Palaeolithic depositional context and stratigraphy

The Kent HER describes the Twydall Palaeolithic assemblage as 'originating from terrace deposits', but the geology around the pit is mapped by BGS as Thanet Formation around the upslope end of the pit and Head around the downslope end. Accordingly, Wymer (1999) regards the Twydall Palaeolithic assemblage as coming 'from a quarry dug into Head gravel'. He continues: 'Presumably this is another instance of occupation on the downs above the river with discarded palaeoliths slumping down the slope towards it during some later cold phase.'

While this is a possible explanation, consistent in particular with the situation of the chalk pit in a dry valley, there is some evidence, noted above, for gravel deposition on the lower part of the Chalk dipslope between Upnor and Upchurch. In addition, the only account of the superficial geology in the Twydall Chalk Pit (Whittaker (1990) hints at the presence there of water-laid deposits. By comparison with the terrace record on the north side of the estuarine River Medway in the Hoo peninsula, and adopting the interpretation of this terrace sequence offered by Bridgland (2003), terrace gravel in the height range of the Twydall Chalk Pit (23m-15m OD) might form part of Bridgland's Stoke Gravel, assigned by him to MIS10/9/8. The apparent presence in the Twydall Chalk Pit Palaeolithic assemblage of a handaxe (Acheulian) industry and a flake-based (?Clactonian)

industry suggests comparison with the Palaeolithic sequence at Purfleet, also of MIS10/9/8 age. In the Medway valley the most prolific Palaeolithic site related by Bridgland (2003) to his Stoke Gravel is the site at Cuxton, where the handaxe industry is assigned by Roe (1981) to the same Pointed Tradition Group as the Twydall material. Although this interpretation of the stratigraphic context of the Twydall Palaeolithic material is attractive, an alternative river terrace context is possible with the Palaeolithic material having originated at a higher level in deposits equivalent to the Shakespeare Gravel of the Hoo peninsula and possibly of the same age as the Palaeolithic assemblages recorded in Gillingham by Hutchings (1925) and in the Kent HER.

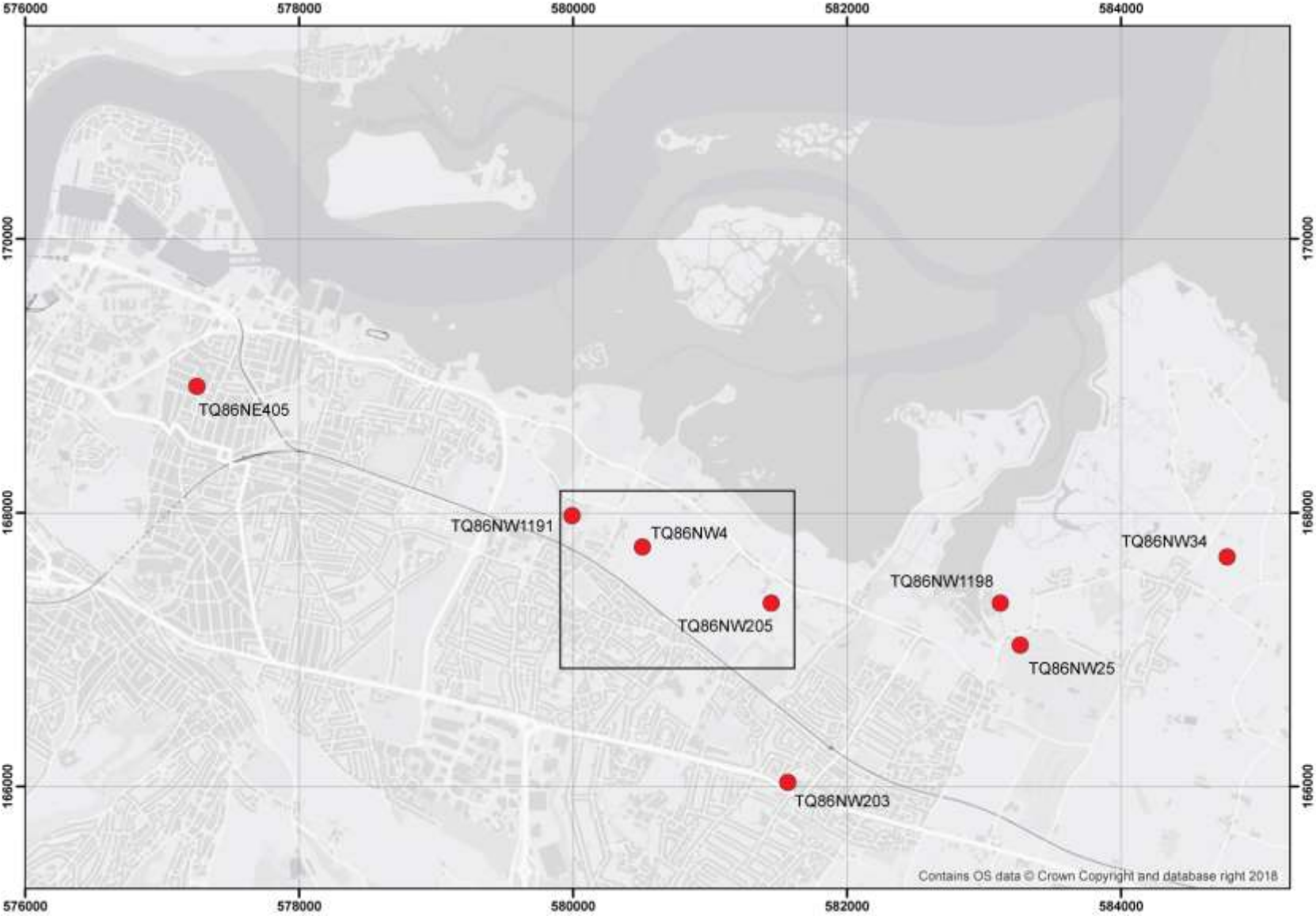


Figure 6: Location of Kent HER Palaeolithic find-spots referred to in the text

6. SUMMARY

The Lower Rainham site is on the dipslope of the Chalk that forms the North Downs. The ground level within the site slopes northward from ca. 30m OD to ca. 7.0m OD towards the estuarine reach of the River Medway. The site is underlain mainly by the Thanet Formation with smaller areas mapped as Head, all resting on bedrock Chalk. There are no BGS archive boreholes or other good quality records of sub-surface conditions within or close to the Lower Rainham site. It is not possible therefore to develop deposit models to illustrate the stratigraphy beneath the site. However, examination of mapped outcrops and scattered borehole records in the area between Upnor and Upchurch in the height range of the Lower Rainham site shows that the superficial deposits overlying the Chalk are variable. A major component in these deposits is sandy silt often described in the record as 'brickearth', together with sandy and stony clays forming Head, and much less commonly beds of gravel. There is no evidence within the Lower Rainham site or elsewhere on the south side of the estuarine Medway for the well-developed sequence of river terraces recognized on the north side of the river in the Hoo peninsula. There are spreads of River Gravel in Gillingham, to the west of the Lower Rainham site and at a slightly higher level, which have been a significant source of Palaeolithic material, but the age of these gravels and their place in the Medway terrace sequence has not been established on the basis of detailed investigation. In particular it is not known whether they are equivalent to the Shakespeare Gravel of presumed MIS12/11/10 age, or equivalent to the Stoke Gravel of presumed MIS10/9/8 age.

There are no Palaeolithic find spots that are definitely within the Lower Rainham site. There is however ample evidence for Palaeolithic occupation on the lower dipslope of the Chalk in the height range of the site, mainly as records of isolated artefacts but with a few records of more prolific sites, e.g. St George's Road in Gillingham; and of more direct significance for the Lower Rainham site, Twydall Chalk Pit which lay immediately downslope from the site towards its western end. This chalk pit served a cement works at Horrid Hill and was connected to it by a tramway which crossed the estuarine mudflats on an elevated causeway. The causeway was constructed using the overburden above the Chalk in the Twydall Chalk Pit and it was this material, redistributed by marine action in the intertidal zone that became a prolific source of Palaeolithic artefacts. There is no record that artefacts were ever recovered from the chalk pit itself. There appears to be Palaeolithic material representing both a handaxe (Acheulian) industry and a flake-based (?Clactonian) industry.

The artefacts appear to have been associated in the causeway with large amounts of flint gravel but there are no detailed descriptions of the superficial deposits in which the artefacts were originally incorporated overlying the Chalk in the Twydall Chalk Pit. There is therefore no way of knowing whether they were preserved in Head or River Terrace Deposits, or possibly in Head reworking River Terrace Deposits. Furthermore, if terrace deposits are present within the Lower Rainham site, there is no agreement as to the stratigraphic position that they may occupy, in particular how they may relate to the various Members of the Hoo Gravel Formation in the Hoo peninsula.

7. RECOMMENDATIONS

There is good evidence of Palaeolithic occupation in the immediate vicinity of the site and a real possibility that deposits incorporating Palaeolithic material are present within the site. It will therefore be appropriate to undertake a programme of intrusive interventions to gain a clearer understanding of the superficial geology within the site during the evaluation phase. Where possible test pits/boreholes should extend down to the bedrock. The precise strategy will be agreed with Kent County Council and the Developer in advance of the works, and could (depending on timing and distribution) be carried out in tandem with any planned Site Investigation works. Figure 7 identifies areas for investigation and in Table 1 a rationale for prioritization is set out in order of decreasing Palaeolithic potential; this should be used to guide the necessary evaluation and potentially mitigation measures.

Table 1. Heritage Environment Areas (HEAs)

HEA No.	Location	Geology	Palaeolithic potential
HEA.1	Upslope from Twydall Chalk Pit (Palaeolithic find spot – Kent HER: TQ86NW4). Upslope continuation of shallow dry valley	BGS mapping shows Thanet Formation, but possibly up to 2.0m of variable superficial deposits	High potential especially if Palaeolithic material has been derived by slope processes from upslope
HEA.2	Western side of shallow dry valley	BGS mapping shows Thanet Formation, but a thin superficial layer of Head is likely to be present	If Palaeolithic material has been derived from upslope, concentration in dry valleys is likely. This is probably the location of Palaeolithic find spot – Kent HER: TQ86NW205.
HEA.3	Pump Lane dry valley	Head in valley bottom, possibly 3-4m thick; Chalk exposed on valley sides	If Palaeolithic material has been derived from upslope, concentration in dry valleys is likely
HEA.4 & HEA.5	Mid slope, higher ground relative to dry valleys	BGS mapping shows Thanet Formation, but a layer of superficial deposits is likely to be present	These Areas occupy the height range of the Twydall Chalk Pit. If the Twydall Palaeolithic material was associated with undisturbed river terrace deposits, other remnants of such deposits are likely to be preserved at this level
HEA.6 & HEA.7	Higher ground flanking the Twydall Chalk Pit dry valley	BGS mapping shows Thanet Formation, but a thin layer of superficial deposits is likely to be present.	Possible source areas for Palaeolithic material moving downslope to lower ground immediately upslope from Twydall Chalk Pit
HEA.8 & HEA.9	Higher ground flanking the Pump Lane dry valley	BGS mapping shows Thanet Formation, but a layer of superficial deposits is likely to be present	Possible source areas for Palaeolithic material moving downslope to lower ground in Pump Lane dry valley
HEA.10 & HEA.11	Lower slope, below the height range of the Twydall Chalk Pit	Head in HEA.10; Head on the lower ground in HEA.11, Thanet Formation on the higher ground	Low Palaeolithic potential. Possibility of artefacts derived from upslope.

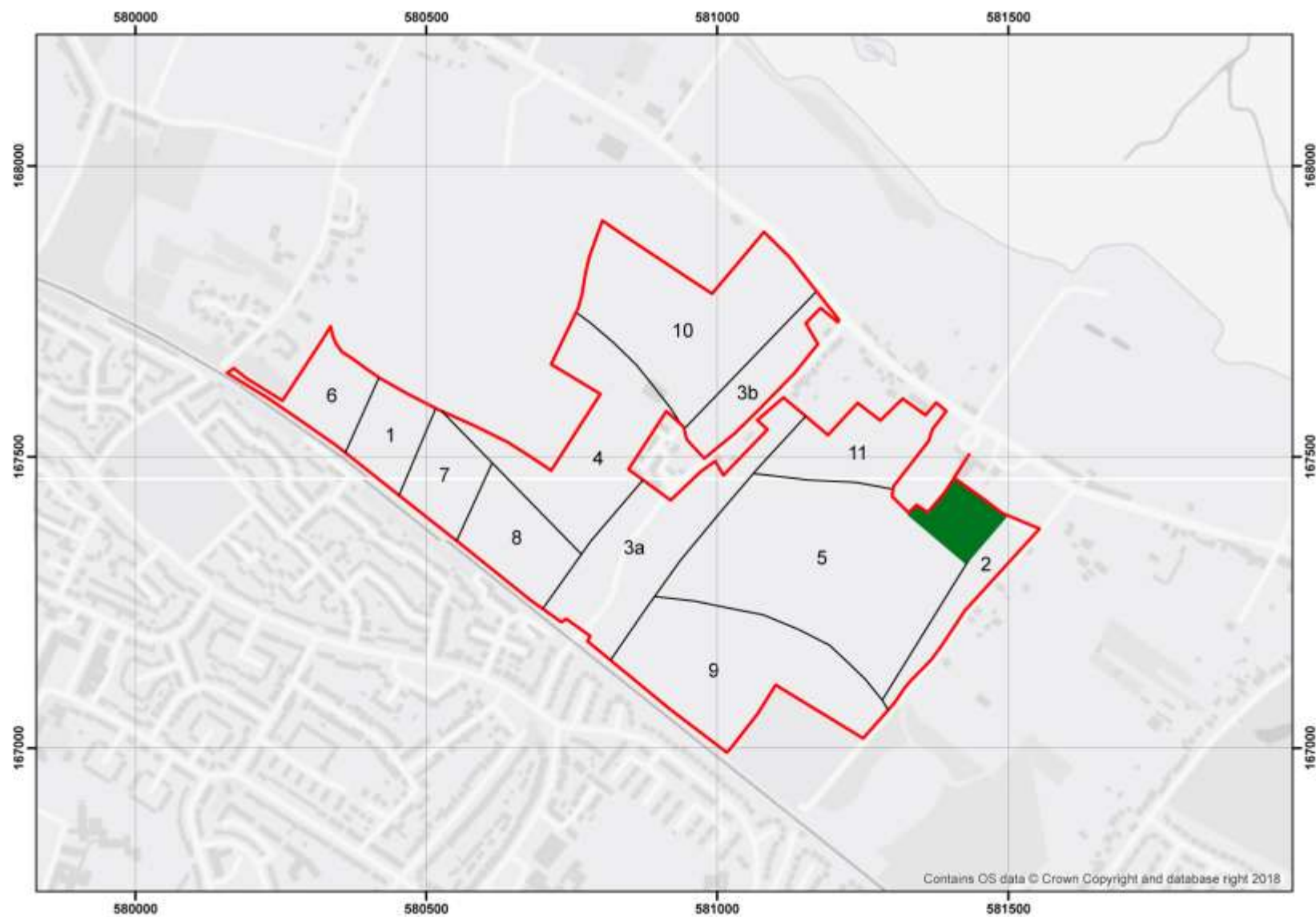


Figure 7. Heritage Environment Areas (see Table 1 for details) (the area in green is outside the PDRA)

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