Chapter 2

Background

by Francis Wenban-Smith

PERIOD BACKGROUND AND GEOLOGICAL FRAMEWORK

This volume covers the earliest parts of the prehistoric past investigated during construction of HS1, not only in the Ebbsfleet Valley but also along the whole of the route. *Settling the Ebbsfleet Valley* (Andrews *et al.* 2011a; 2011b; Biddulph *et al.* 2011; Barnett *et al.* 2011) covers a relatively restricted burst of settlement activity and political/cultural upheaval associated with the pre-Roman Iron Age, the Roman occupation of southern Britain and the subsequent Saxon settlement. Each of these settlement phases covers at most a few centuries of activity in the general period within a millennium either side of 0 AD, set against the backdrop of a climate and landscape broadly similar to today. In contrast, the earlier prehistory of the Ebbsfleet Valley, covered in the other HS1 Ebbsfleet volume *Prehistoric Ebbsfleet* (Wenban-Smith *et al.* forthcoming), stretches deep into the past, spanning several hundred thousand years and embracing major climatic oscillations and landscape change. *Prehistoric Ebbsfleet* covers both the later Prehistoric evidence, including final Palaeolithic, Mesolithic, Neolithic and Bronze Age, from the end of the last ice age *c* 10,000 years ago and the subsequent Holocene epoch, to earlier evidence of hominin presence and landscape development between *c* 250,000 BP [years Before Present] and the end of the last ice age. This *Ebbsfleet Elephant* (Southfleet Road) volume stretches even further into the prehistoric past, focussing on the period between about 425,000 and 360,000 BP, associated with one particular episode of climatic warmth within the wider framework of Pleistocene climatic change, the Hoxnian interglacial of marine isotope stage (MIS) 11. This framework is recapped here, since it provides the essential background to discussion of the period and interpretation of the remains found at the Southfleet Road site.

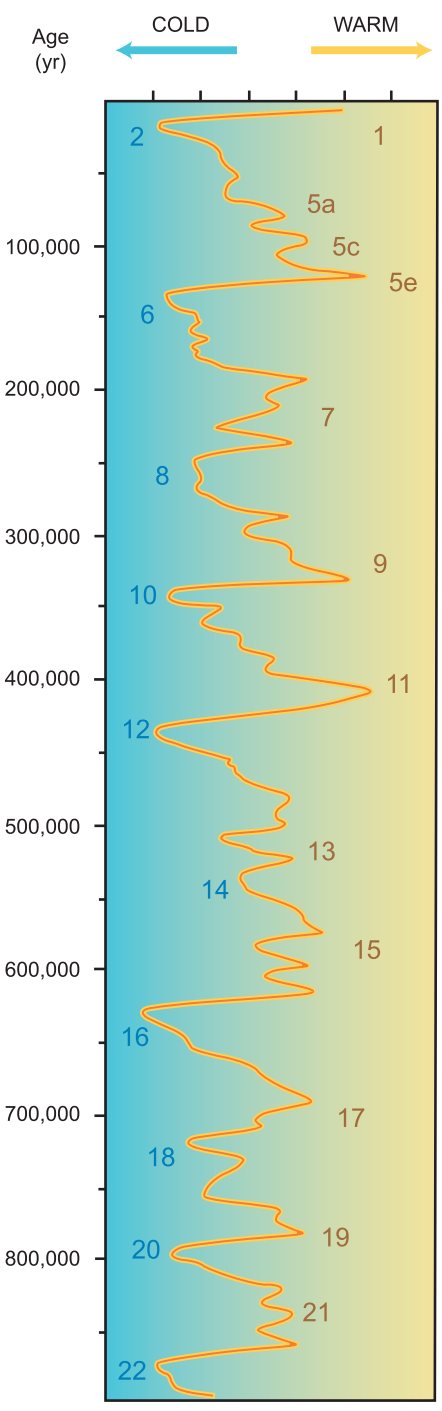
The initial Palaeolithic occupation and subsequent settlement of Britain occurred during the Quaternary, a period of time characterised by the onset and recurrence of a series of alternating cold–warm/glacial–interglacial climatic cycles (Lowe and Walker 1997). Over 60 cycles have been identified during the last 1.8 million years, corresponding with fluctuations in proportions of the Oxygen isotopes O^{16} and O^{18} in selected foraminifera from deep-sea sediment sequences. These marine isotope stages (MIS) have been numbered by counting back from the present-day interglacial, or Holocene epoch (MIS 1), with interglacial peaks having odd numbers and glacial peaks even numbers (Fig. 2.1). Peaks and troughs representing specific stages have been dated by a combination of radiometric dating and tuning to the astronomical timescale of orbital variations, which are now regarded as the fundamental causative agent of the climatic fluctuations represented in the MIS sequence (Hays *et al.* 1976; Martinson *et al.* 1987). These stages are now the yard-stick by which Quaternary scientists (and Palaeolithic archaeologists) consider the evidence and contemplate correlations between sites.

The Quaternary is divided into two epochs: the Holocene and the Pleistocene. The Holocene represents the present-day interglacial, covering the warm period since the end of the last ice age *c* 10,000 BP. The Pleistocene represents the remainder of the Quaternary, and is divided into early, middle and late parts. The great difficulty and fundamental challenge in Pleistocene geology is to match the discontinuous terrestrial sequence, represented in sparse and isolated outcrops of surviving sediment, with the MIS record derived from continuous deep-sea sediment sequences. On the British mainland, surviving Pleistocene sediments have been (where possible) collated into a sequence of named glacial and interglacial periods, and these have so far as possible been tied in with the MIS framework (Fig 2.1). It is generally agreed that deposits attributed to the last glacial (Devensian) are represented in MI Stages 2–5d, dating from *c* 10,000–115,000 BP and that deposits of the preceding last interglacial (the Ipswichian) correlate with the short-lived peak warmth of MIS 5e, dating from *c* 115,000–125,000 BP (eg see Bowen 1999). Beyond that disagreement increases (eg, compare Gibbard 1994 with Bridgland 1994). However most British workers currently feel confident in accepting that the widespread till deposits of the major Anglian glaciation, when ice-sheets reached as far south as the northern outskirts of London, correlate with MIS 12 which ended abruptly *c* 425,000 BP (Shackleton 1987; Bridgland 1994).

The Palaeolithic in Britain covers the timespan from initial colonisation in the late Lower or early Middle Pleistocene, possibly as long ago as MIS 21 *c* 850,000 BP based on artefacts from deposits at Happisburgh on the Norfolk coast (Parfitt *et al.* 2010a, but see Westaway 2011 and response by Preece and Parfitt 2012), to the end of the Late Pleistocene, corresponding with the end of the last ice age some 10,000 years ago. Thus the

Palaeolithic occupies over 800,000 years and includes at least ten major glacial–interglacial cycles and numerous minor cycles which nonetheless represent significant swings of climate for sustained periods (Fig. 2.1). These climatic cycles would have been accompanied by dramatic changes in landscape and environmental resources. At the cold peak of glacial periods, ice-sheets 100s of metres thick would have covered most of Britain, reaching on occasion as far south as London, and the country must have been uninhabitable. At the warm peak of interglacials, the climate was broadly similar to the present day, although sometimes a little warmer based on study of fossil faunal assemblages – in particular insects, molluscs and mammals (Candy *et al.* 2010) – which show an increased presence of what are now slightly more southerly species. For the majority of the time, however, the climate would have been somewhere between these extremes.

The early evidence at Happisburgh consists of a very simple core and flake industry made from locally available flint nodules and pebbles. It was presumably made by descendants of *Homo erectus/ergaster*, or their descendants, known to be present in Africa and central Europe between 2 and 1.5 million years BP (Gabunia *et al.* 2000). Given



Epoch sub-series	*MIS*	*Traditional stage (Britain)*	*Climate and landscape*
Holocene	1	Flandrian	Rise of Channel and North Sea levels to form Britain as an island
Late Pleistocene	2	Devensian	Mainly cold; coldest in MIS 2 with the maximum advance of the Devensian ice sheets; occasional short-lived periods of relative warmth ("interstadials"), and more prolongued warmth in MIS 3 Britain periodically connected to the continent across the Channel and North Sea
	3		
	4		
	5a-5d		
	5e	Ipswichian	Warm - full interglacial Britain is an island
Middle Pleistocene	6	Saalian complex*	Alternating periods of cold and warmth; period includes more than one glacial - interglacial cycle; changes in faunal evolution and assemblage associations help to distinguish the different stages
	7		
	8		
	9		
	10		
	11	Hoxnian	Warm - full interglacial Britain probably first becomes an island with the breaching of the Dover Straits
	12	Anglian	Cold - maximum extent southward of glacial ice in Britain; may incorporate interstadials that have been confused with Cromerian complex interglacials
	13-19	Cromerian Complex and Beestonian glaciation	Cycles of cold and warmth; still poorly understood due to obliteration of sediments by subsequent events
Early Pleistocene (last part)	20-22	Bavelian Complex (late part of)	Cycles of cold and warmth; but generally not sufficiently cold for glaciation in Britain

* Netherlands terminology - undefined in Britain

Figure 2.1 British Quaternary and Marine Isotope Stage framework

the lack of hominin remains from Britain and north-west Europe at this time, it is not possible to identify the species involved at Happisburgh, or to establish whether it descends from the *erectus/ergaster* line, or is related to *Homo antecessor*, known to be present in Spain *c* 1 million to 800,000 BP (Klein 2009).

Similar evidence from Pakefield, another early East Anglian interglacial site perhaps dating to MIS 17 to 19 (Parfitt *et al.* 2005), shows the sustained occupation in Europe of this early population, probably expanding their range northwards as climate warmed, but dying out in their northern range as climate cooled (Dennell *et al.* 2011). Following these early occurrences, there are a number of UK sites dating from the immediate pre-Anglian interglacial MIS 13, *c* 500,000 BP associated with the later western European *Homo heidelbergensis* (Pettitt and White 2012). At Boxgrove in Sussex an extensive area of undisturbed evidence from handaxe manufacture and faunal exploitation is associated with a rich range of other palaeo-environmental indicators (Roberts and Parfitt 1999).

The climate must have been too harsh for occupation during the Anglian glacial of MIS 12, but after it Palaeolithic occupation becomes more frequent in Britain, although not continuous. Numerous sites, some of them with exceptional quantities of lithic remains, attest to relatively prolific occupation in the period from the end of MIS 12 to MIS 8 (Wymer 1988; 1999). After this, there seems to have been a decline of activity in the UK through MIS 7, and it appears that Britain may have been deserted during MIS 6 and the Ipswichian interglacial, MIS 5e (Wymer 1988; Ashton and Lewis 2002; Stringer 2006). Until recently, the earliest post-Ipswichian presence in the UK was thought to have occurred in MIS 3, between *c* 60,000 and 40,000 BP. At this time there are a number of sites in Wales and southern England with distinctive *bout coupé* handaxes, thought to represent a late Neanderthal population, as well as the East Anglian site of Lynford (Boismier *et al.* 2012). A newly discovered site at Junction 2 of the M25, near Dartford, Kent suggests, however, that there were probably also earlier Neanderthal incursions into the UK during MIS 5d-5a, around 100,000 BP (Wenban-Smith *et al.* 2010).

The British Palaeolithic has for a long time been divided into three broad, chronologically successive stages, Lower, Middle and Upper, based primarily on changing types of stone tool (see for example Wymer 1968; 1982; Roe 1981) (Table 2.1). This framework has its origins in the 19th century (de Mortillet 1869; 1872), developed before any knowledge of the types of human ancestor associated with the evidence of each period, and without much knowledge of the timescale. This tripartite division has (with minor modifications) nonetheless broadly stood the test of time, proving, at least across Britain and north-west Europe, both to reflect a general chronological succession of lithic technology, and to correspond with the evolution of different ancestral hominin species. Typical Lower and Middle Palaeolithic remains have been shown to date before 40,000 BP and to be associated with the extinct Neanderthal lineage and their ancestors ('Archaic' *Homo*). Upper Palaeolithic remains date from after about 40,000 BP, after which no Neanderthal remains are known from northern Europe, and are associated with the appearance of anatomically modern humans.

It has, however, become clear in recent decades, with improved dating and lithic analysis of several key sites, that the definition and distinction of Lower and Middle Palaeolithic are less clear-cut in Britain than has hitherto been thought. Earlier 'Lower Palaeolithic' sites embrace a variety of lithic technologies besides handaxe manufacture. Typically 'Middle Palaeolithic' Levalloisian technology has its origins much earlier than previously realised, occurring alongside (typically 'Lower' Palaeolithic) handaxe manufacture, for example at Red Barns, in Hampshire (Wenban-Smith *et al.* 2000), and even at the classic 'Lower' Palaeolithic locality of Swanscombe where a recently investigated site dominated by handaxe-making evidence includes a very Levalloisian-looking core (Wessex Archaeology 2006a). It also seems that later handaxe industries persist alongside fully developed Levalloisian technology in Britain in the period MIS 8-7, for instance at Harnham, Wilts (Whittaker *et al.* 2004; Bates *et al.* in prep.) and Cuxton, Kent (Wenban-Smith *et al.* 2007; Wenban-Smith *et al.* forthcoming). On current evidence, both these sites date to *c* 250,000 BP, or younger, contemporary with Levalloisian activity in the Ebbsfleet Valley (Wenban-Smith *et al.* forthcoming) and Purfleet, Essex (Schreve *et al.* 2002).

In light of these problems, it is perhaps better to talk about a combined Lower/Middle Palaeolithic for the post-Anglian and pre-Ipswichian period, and to reserve the term 'Lower Palaeolithic' for pre-Anglian phases of occupation. After the Ipswichian absence, it seems that *bout coupé* handaxes are specifically associated with occupation from MIS 3 in the middle of the last (Devensian) glaciation (White and Jacobi 2002). So, whether or not labelled 'Middle', they genuinely represent a distinct post-Ipswichian phase of later Neanderthal occupation, prior to the Neanderthal demise and the advent of modern humans, taken here as 'British Mousterian'. These suggested nomenclatural revisions are summarised in the accompanying table (Table 2.1), which also outlines the correspondence of these cultural stages of the British Palaeolithic with the geological and MIS framework.

SITE AREA: LANDSCAPE, TOPOGRAPHY AND GEOLOGY

The Southfleet Road site (national grid reference TQ 6115 7355) is located 2.5km south of the Thames, on the south-east outskirts of Swanscombe village, north-west Kent, at *c* 30m OD [before excavation] on the upper flanks of the western side of the Ebbsfleet Valley (Fig. 2.2). As shown by geological mapping (British Geological Survey 1998), at a macro-scale the site is situated above an east-west ridge of Chalk that divides

Table 2.1 British Prehistoric periods [occupation was almost certainly not continuous within these periods, for instance there is no current evidence for occupation persisting into MIS 6 at the end of the Lower/Middle Palaeolithic and occupation is also unlikely to have persisted through MIS 8 and 10]

Traditional period	*Updated period*	*Hominim species*	*Lithic artefacts and other material culture*	*MI Stage*	*Date (BC)*	*UK geo-logical stage*
Bronze Age	Bronze Age	Anatomically modern humans (*Homo sapiens*)	Some ceremonial lithic artefacts, barbed-and- tanged arrowheads; Beaker pottery	1	700-2,300	Flandrian
Neolithic	Neolithic		Polished stone axes, leaf-shaped arrowheads; pottery		2,300-4,000	
Mesolithic	Mesolithic		Unpolished tranchet axes, blade-based microlithic and scraper industry		4,000-9,500	
Upper Palaeolithic	Upper Palaeolithic		Blade technology and tools made on blade blanks; personal adornment, cave art, bone/antler points	2–3	9,500-35,000	Late Devensian
Middle Palaeolithic	British Mousterian	Neanderthals (*Homo neanderthalensis*)	The appearance of *bout coupé* handaxes; discoidal flake/core reduction strategies	3–5d	35,000-115,000	Early/ Middle Devensian
	-	-	Britain uninhabited	5e	115,000-125,000	Ipswichian
	Lower/ Middle Palaeolithic	Early pre-Neanderthals, evolving into *Homo neanderthalensis*	Still handaxe-dominated sites (Red Barns, Cuxton and Harnham), but growth of standardised (Levalloisian) production techniques (eg Crayford; Baker's Hole)	6–10 11a-b	125,000-375,000	Saalian Complex
Lower Palaeolithic			Handaxe-dominated (eg Swanscombe), occasional appearance of proto-Levalloisian techniques; early industry without handaxes (Clactonian)	11	375,000-425,000	Hoxnian
	-	-	Britain uninhabited	12	425,000-480,000	Anglian
	Lower Palaeolithic	*Homo heidelbergensis?*	Handaxe-dominated (eg Boxgrove), with unstandardised flake production techniques and simple flake-tools; occasional flake-tool industries without handaxes (High Lodge)	13	480,000-650,000	Cromerian Complex IV
		Homo heidelbergensis? Homo antecessor? Homo ergaster?	Simple flake/core industries (Pakefield)	13-17	500,000-650,000	Cromerian Complex I-III
			Simple flake/core industries (Happisburgh 3)	18–21?	650,000-850,000	Bavelian Complex (late part of)

the London Basin from the Weald, forming the southern boundary of the main axis of the Lower Thames valley. A minor synclinal fold in the Chalk bedrock under the site contains a sequence of Palaeocene and Eocene deposits (Thanet Sand, Woolwich Beds, Blackheath Beds and, in places, patches of London Clay) overlying the Cretaceous Chalk. It forms higher ground to the south-west of the site, where the clayey capping of Woolwich Beds and London Clay has resisted erosion.

The local landscape has been heavily quarried since the 19th century, primarily for chalk for cement manufacture, although the overlying clays and gravels were also exploited for brick manufacture and general building ballast. The site itself survives on an unquarried outcrop between the large quarried areas of Eastern Quarry (to its west) and Baker's Hole (to the east). Pre-quarrying geological and topographic mapping (Fig. 2.3) shows the ground rising steeply to the west of the

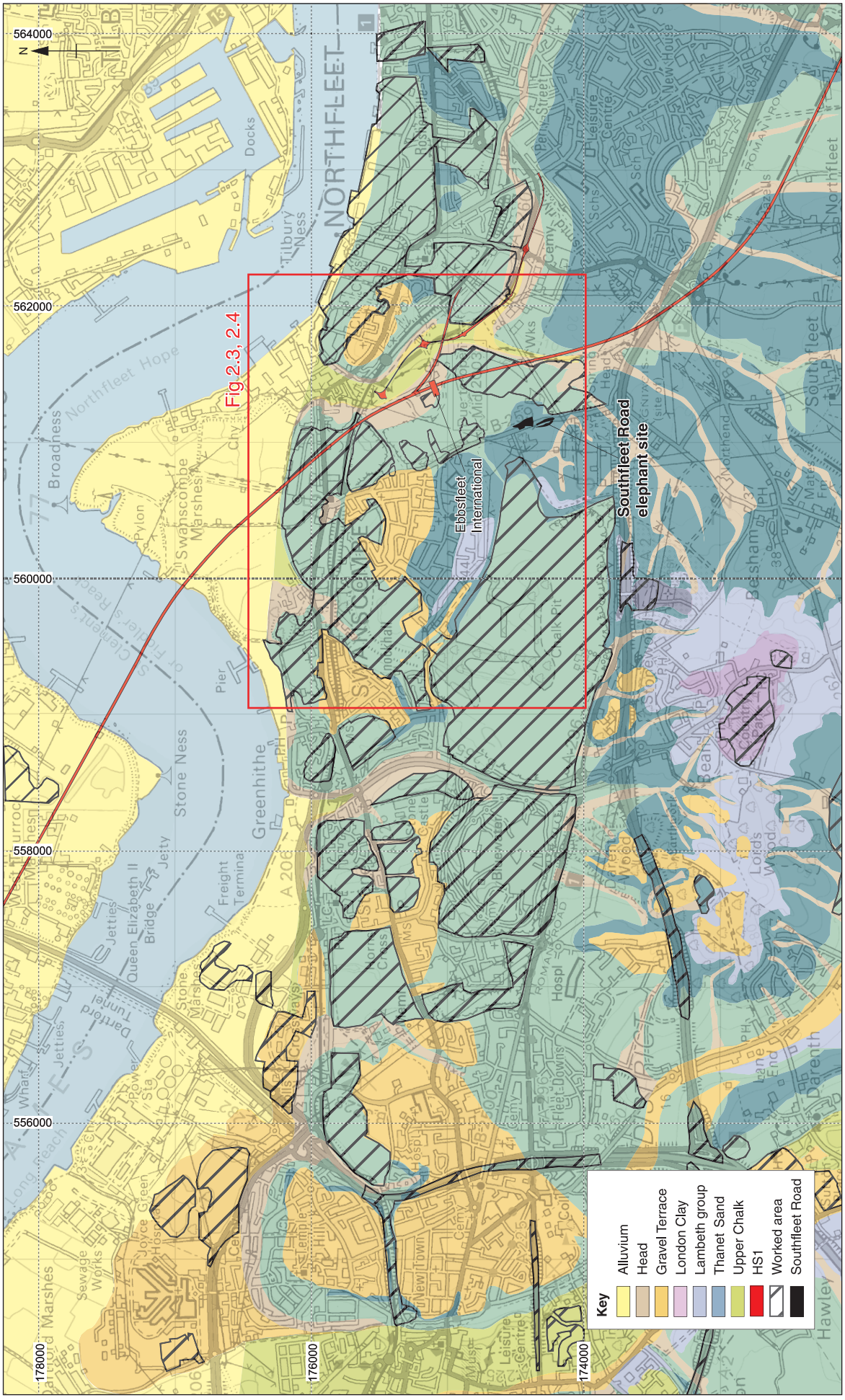


Figure 2.2 Landscape and geological setting of the Southfleet Road elephant site

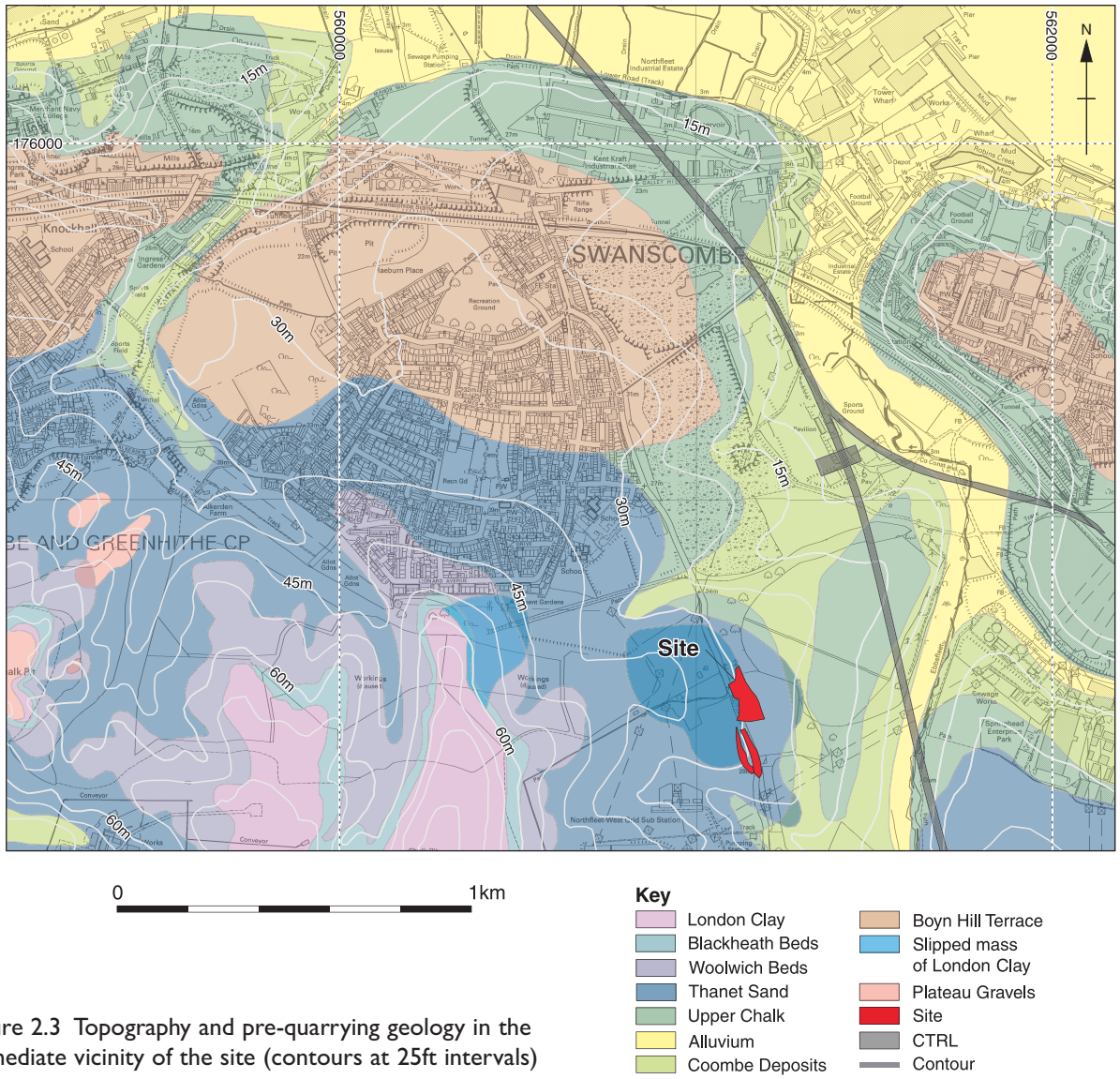


Figure 2.3 Topography and pre-quarrying geology in the immediate vicinity of the site (contours at 25ft intervals)

site to form what was known in the 19th century as Swanscombe Hill, which was a loosely landscaped wooded park also known as Swanscombe Wood or Swanscombe Park. This park had a high point of about 90m OD formed of London Clay, capping shelly clay and gravel deposits of the Woolwich and Blackheath Beds, overlying a thick body of Thanet Sand. A clayey mass fans out towards the site down the west slope of Swanscombe Hill, mapped in the early 20th century as 'slipped mass, mainly London Clay' (Geological Survey 6' series, edition of 1910, sheet X-NW). The site itself is, according to both early and the most recent geological mapping, situated at the eastern tail-end of the slipped clayey mass, which is underlain by a sand body attributed (wrongly, as it later proves, see Chapter 4) as Thanet Sand. To the east of the site, the pre-quarrying Ebbsfleet Valley contained a continuation of this 'Thanet Sand' outcrop, fading into a north-south spur of Chalk as the ground surface dipped westward. This truncated what was evidently regarded as the broadly horizontal junction between the base of 'Thanet Sand' and the underlying Chalk

SITE AND VICINITY: PALAEOLITHIC AND PLEISTOCENE BACKGROUND

Pleistocene overview

The Lower/Middle Palaeolithic background in the area of the site is inextricably linked with the Pleistocene geology (Fig. 2.2). This is also true for the recovery of flint artefacts from Pleistocene deposits that underpins our recognition of their age and provides contextual information on climate, environment and depositional processes associated with their burial. Patches of high-level gravel (interpreted as terrace deposits of uncertain, but early, Pleistocene age) overlie the Palaeocene high ground to the south-west of the site, and these extended into the now-quarried Eastern Quarry, shown as patches of 'Plateau Gravel' on the pre-quarrying geological mapping (Fig. 2.3). However the main Pleistocene formation in the vicinity is the Middle Pleistocene Boyn Hill/Orsett Heath Formation that underlies much of Swanscombe. Initially recognised in the late 19th and early 20th century as the 'Swanscombe 100-ft terrace'

and attributed to the 2nd highest terrace of the Lower Thames sequence (Hinton and Kennard 1905), these deposits were attributed to 'Boyn Hill Gravel' in Geological Survey mapping of the 1920s following nomenclature from the Middle Thames terrace sequence (Dewey *et al.* 1924). More recently, the Swanscombe 100-ft terrace/'Boyn Hill Gravel' deposits have been formally included in the Orsett Heath Formation of the Lower Thames (Bridgland 1994). This Formation is preserved on the south side of the Lower Thames as an intermittent east–west trending series of deposits from Dartford Heath through Dartford, Stone, Greenhithe and Swanscombe to Northfleet. The deposits mostly occur between about 22 and 40m OD in this stretch. They consist of predominantly fluviatile loam, sand and gravel units laid down by the ancient Thames in the immediate post-Anglian interglacial period MIS 11, otherwise generally called the Hoxnian, between *c* 430,000 and 350,000 BP, between MIS 12 and MIS 10 (ibid.). At Swanscombe, the Boyn Hill/Orsett/Heath deposits have mostly been attributed (Bridgland 1995: 43) to a basal 'Orsett Heath Lower Gravel' Member and a middle 'Swanscombe interglacial deposits' Member, despite the former also containing interglacial faunal assemblages. The term 'Swanscombe 100-ft terrace' is used throughout the remainder of this volume to refer to the specific outcrop of the Boyn Hill/Orsett Heath Formation that is present less than 1km to the north of the site, underlying much of Swanscombe, and the nomenclature 'Boyn Hill/Orsett Heath Formation' retained for discussion of the wider Formation of which the Swanscombe 100-ft terrace outcrop is a part. As discussed further below, this Swanscombe outcrop is especially rich in Lower/Middle Palaeolithic remains of high importance, and has in particular been intensively investigated at the site of Barnfield Pit.

Besides the Boyn Hill/Orsett Heath Formation (Swanscombe 100-ft terrace deposits), the patches of older/higher undifferentiated terrace and plateau gravels and the clayey landslipped mass, the only other Pleistocene deposits mapped in the vicinity of the site are Coombe 'Head' deposits. These fill both larger Thames south-bank tributary valleys such as the Ebbsfleet Valley, and smaller dry valley systems feeding into these tributary valleys. The Ebbsfleet Valley cuts northward towards the Thames to the east of the site, through the Swanscombe 100-ft terrace deposits, and consequently is filled with younger sediments at progressively lower levels, down to the Holocene alluvial floodplain and its underlying early post-glacial gravel-filled channel. The major spread of Head deposits on the west side of the Ebbsfleet Valley bury outcrops of silts, sands and gravels occurring between about 0 and 15m OD, which mostly represent different phases of fluvial (and at lower levels perhaps estuarine) deposition between MIS 8 and MIS 5e (Bridgland 1994; Wenban-Smith 1995a; Wenban-Smith *et al.* forthcoming). As with the Swanscombe 100-ft terrace deposits, the Head and fluvial deposits of the Ebbsfleet Valley, which have undergone repeated investigation since the later 19th century, contain rich and well-investigated Lower/Middle Palaeolithic remains, likewise discussed further below.

The lesser trails of Head deposits filling the numerous minor dry valleys that feed into the Ebbsfleet Valley and towards the Thames and Darent basins are not known to conceal any fluvial outcrops nor to have produced any Lower/Middle Palaeolithic remains. Larger dry valleys with deep and well-developed Head deposits may conceal remnants of fluvial terrace systems or palaeo-landsurfaces, as at the M25/A2 junction where a landsurface of Neanderthal occupation dating to MIS 5 has been identified (Wenban-Smith *et al.* 2010). Small dry valleys probably mostly only contain colluvial slopewash deposits from the last glacial and the Holocene, dating between *c* 110,000 and 3,000 BP, as has been established for those feeding down into the Ebbsfleet Valley from the west by recent investigations in Eastern Quarry (Wessex Archaeology 2006a) and the central Ebsfleet Valley (Wenban-Smith *et al.* forthcoming). Any Lower/Middle Palaeolithic remains found in them are likely to be reworked from earlier Pleistocene deposits. These remains are hence of little importance (unless of very distinctive type, such as a *bout coupé* handaxe) beyond attesting a general distribution of the geographical range of Lower/Middle Palaeolithic presence beyond the surviving outcrops, where the majority of evidence has been recovered.

The Swanscombe 100-ft terrace (Boyn Hill/Orsett Heath Formation)

The Swanscombe 100-ft terrace outcrop of the Boyn Hill/Orsett Heath Formation is rich in Lower Palaeolithic archaeological remains, with numerous locations having produced flint artefacts, faunal remains and biological evidence relating to climate and environment (Wymer 1968; Wessex Archaeology 1993; Table 2.2). The best-investigated site is Barnfield Pit (Fig. 2.4, site 1; Ovey 1964; Conway *et al.* 1996), 2km to the north-west of the HS1 Southfleet Rd elephant site. The deposits at Barnfield Pit contained abundant lithic and faunal remains incorporated in stratified fluvial sand and gravel units, accompanied by biological remains and palaeo-environmental evidence (Table 2.3). The lower levels of the sequence (Phase I, Lower Gravel and Lower Loam) are characterised by a non-handaxe industry, identified as Clactonian since the 1920s (Breuil 1926; Wymer 1968; Roe 1981). This is preserved as undisturbed horizons with intact scatters of flint artefacts representing hominin activity in the Lower Loam (Conway *et al.* 1996). The middle levels (Phase II, Lower Middle Gravel and Upper Middle Gravel) are characterised by a handaxe-dominated industry with a strong emphasis on pointed and sub-cordate handaxe forms with a thick, often only partly worked, butt (Wymer 1968, 338-343). One horizon within the middle phase of the Barnfield Pit sequence, at the base of the Upper Middle Gravel, produced an early human fossil skull (the Swanscombe Skull), as well as copious flint artefacts (Ovey 1964). This makes it one of only two sites in

Table 2.2 Swanscombe 100-ft terrace: key Lower/Middle Palaeolithic sites

Site # (Fig. 2.4)	*Name*	*NGR*	*Acc.*	*Summary of finds*	*Reference/s*	*Notes/comments*
1	Barnfield Pit, Swanscombe	TQ 598 745	A	Classic sequence of Clactonian under Acheulian, along with Swanscombe skull; also good faunal preservation, and mollusc-rich in some parts	Smith & Dewey 1913, 1914; Swanscombe Committee 1938	Prolific source of material 1890s to 1960s; mostly quarried out, but deposits preserved in southern parts
a	Skull site, Wymer excavations 1955-1960	TQ 59800 74230	A	Third skull part discovered at channelled junction where Upper Middle Gravel overlay Lower Middle Gravel	Ovey *et al.* 1964; Wymer 1968	-
b	Waechter excavations 1968-1972	TQ 59840 74250	A	Investigation of Lower Gravel and Lower Loam, *c* 50m NE of skull site area	Conway *et al.* 1996	-
2	Globe Pit, Greenhithe	TQ 58850 74600	A	Numerous handaxes, many in fresh condition; well-made, and with varied typology, but provenance uncertain	Dewey 1932; Wymer 1968; Wenban-Smith 2004a	Large collection made by H Stopes (site 758)
3	Dierden's Pit/Yard	TQ 59450 74750	A	Varied artefact collections and rich faunal and molluscan preservation in places; uncertain association of collections with various faunal/molluscan records	Stopes 1900; Newton 1901; Smith & Dewey 1914; Kerney 1971; Wenban-Smith 2004a & 2009	H Stopes (site 65); over 100 handaxes from site held at NMGW in Cardiff
4	Craylands Lane Pit (New/East)	TQ 60150 74700	A	Deep Pleistocene sequence pit recorded by Smith & Dewey (1914) thought by them to be equivalent to upper part of Barnfield Pit sequence, and containing: (a) an assemblage of twisted ovates at one horizon; and (b) a capping clayey gravel containing Levalloisian-looking flakes	Smith & Dewey 1914; Wymer 1968; Wenban-Smith 1999	Fluvial deposits recorded in 1999 along N side of old pit
5	Rickson's/ Barracks Pit	TQ 60900 74250	A	Abundant Clactonian, handaxe and Levalloisian remains recovered, but mostly not with good provenance	Dewey 1932; Wymer 1968	Unclear how sequence relates to Barnfield Pit sequence
6	Swan Valley Community School	TQ 60750 73750	A	Pleistocene river deposits (Boyn Hill/Orsett Heath, Swanscombe Middle Gravels) with abundant lithic artefacts (handaxes, cores and flakes) and some faunal remains	Wenban-Smith & Bridgland 2001	Discovered 1997; excavated 1997-2001
7	Sweyne County Primary School	TQ 60650 73800	A	Clay deposits interpreted as Upper Loam	Wenban-Smith & Bridgland 2001	Watching brief in 1997
8	Eastern Quarry, Area B	TQ 60850 73700	A	Fluvial deposits of Thames and Ebbsfleet with abundant flint artefactual remains; thick sequences of undisturbed material, deeply buried	Wessex Archaeology 2006a & 2009a	

Table 2.2 (continued)

Site # (Fig. 2.4)	*Name*	*NGR*	*Acc.*	*Summary of finds*	*Reference/s*	*Notes/comments*
12	Bevans Wash-Pit	TQ 610 735	A	22 handaxes and 4 debitage	Spurrell 1890; Wenban-Smith 2004a [Stopes Catalogue, sites 14, 27, 593 & 598]	Two large and fresh pointed sub-cordate handaxes '17ft from the surface'
16	Carreck's ferruginous loam	TQ 6110 7350	A	Has produced occasional very fine mint condition handaxes	Wessex Archaeology 2006b	

Acc: A = accurately known location; E = estimated location; G = general location

Table 2.3 Stratigraphic and archaeological summary of Barnfield Pit sequence, Swanscombe

Phase	*MI Stage*	*Date BP*	*Stratigraphic unit*	*Height OD*	*Palaeolithic archaeology*
III	11b–10/10/10–8?	300,000–375,000?	Upper Gravel Upper Loam	*c* 33–34m *c* 32–33m	Uncertain; no reliably provenanced material
II	11c–11b	375,000?–400,000?	Upper Middle Gravel	*c* 28.5–32m	Mostly pointed and sub-cordate handaxes with thick partly trimmed butts (often large and well-made, but also small and crude); also occasional cores, debitage and ad hoc flake-tools – 'Acheulian' [Swanscombe Skull was found at the junction between the Upper and Lower Middle Gravels]
			Lower Middle Gravel	*c* 26.5–28.5m	
I	11c	400,000–425,000	Lower Loam	*c* 25–26.5m	Cores, debitage, ad hoc flake tools (often single notches), and very occasional crude 'proto-handaxes' – 'Clactonian'
			Lower Gravel	*c* 22–26.5m	

England with Lower or Lower/Middle Palaeolithic hominid skeletal evidence, the other being Boxgrove in West Sussex (Roberts and Parfitt 1999). The upper levels (Phase III, Upper Loam and Upper Gravel) are not rich in archaeological remains. None is known with secure provenance, although there are anecdotal reports of a white-patinated ovate-dominated industry from the base of the Upper Loam (Smith and Dewey 1913).

Other important Palaeolithic sites nearby within the Swanscombe 100-ft terrace outcrop of the Boyn Hill/Orsett Heath Formation are the New Craylands Lane Pit (Fig. 2.4, site 4), Dierden's Pit/Yard at Knockhall (Fig 2.4, site 3) and the Globe Pit, Greenhithe (Fig. 2.4, site 2), details of the material from which are tabulated (Table 2.2). At the east side of Swanscombe, the basal terrace deposits (Phase I of the Barnfield Pit sequence) are cut through by the Ebbsfleet Valley and the quarry of Rickson's Pit, also known as Barracks Pit (Fig. 2.4, site 5). The latter exposed the terrace deposits in its west face (Dewey 1932), although it probably contained younger (Phase II, or even younger) sediments in its main part. At all of these sites there are reliable records of abundant Palaeolithic flint artefacts, often recovered in association with biological remains and from different stratigraphic horizons (Wymer 1968). However, the provenance of much of the material is insufficiently precise to make much contribution to present-day research, although it highlights the potential importance of these locales for further investigations.

The Swanscombe 100-ft terrace outcrop of the Boyn Hill/Orsett Heath Formation is currently mapped by the British Geological Survey (1998) as having its southern boundary between the north edge of the large quarried area of Eastern Quarry and the south edge of the Globe Pit, Greenhithe (Fig. 2.4, site 2). This boundary is then shown as continuing broadly eastward through the centre of Swanscombe, passing to the north of the Swan Valley School (Fig. 2.4, site 6). However, fieldwork from 1997 to 2001 at the school, and between 2003 and 2009 in Eastern Quarry, Area B (Fig. 2.4, site 8), has established the presence of Phase II deposits of the Barnfield Pit sequence significantly further south than

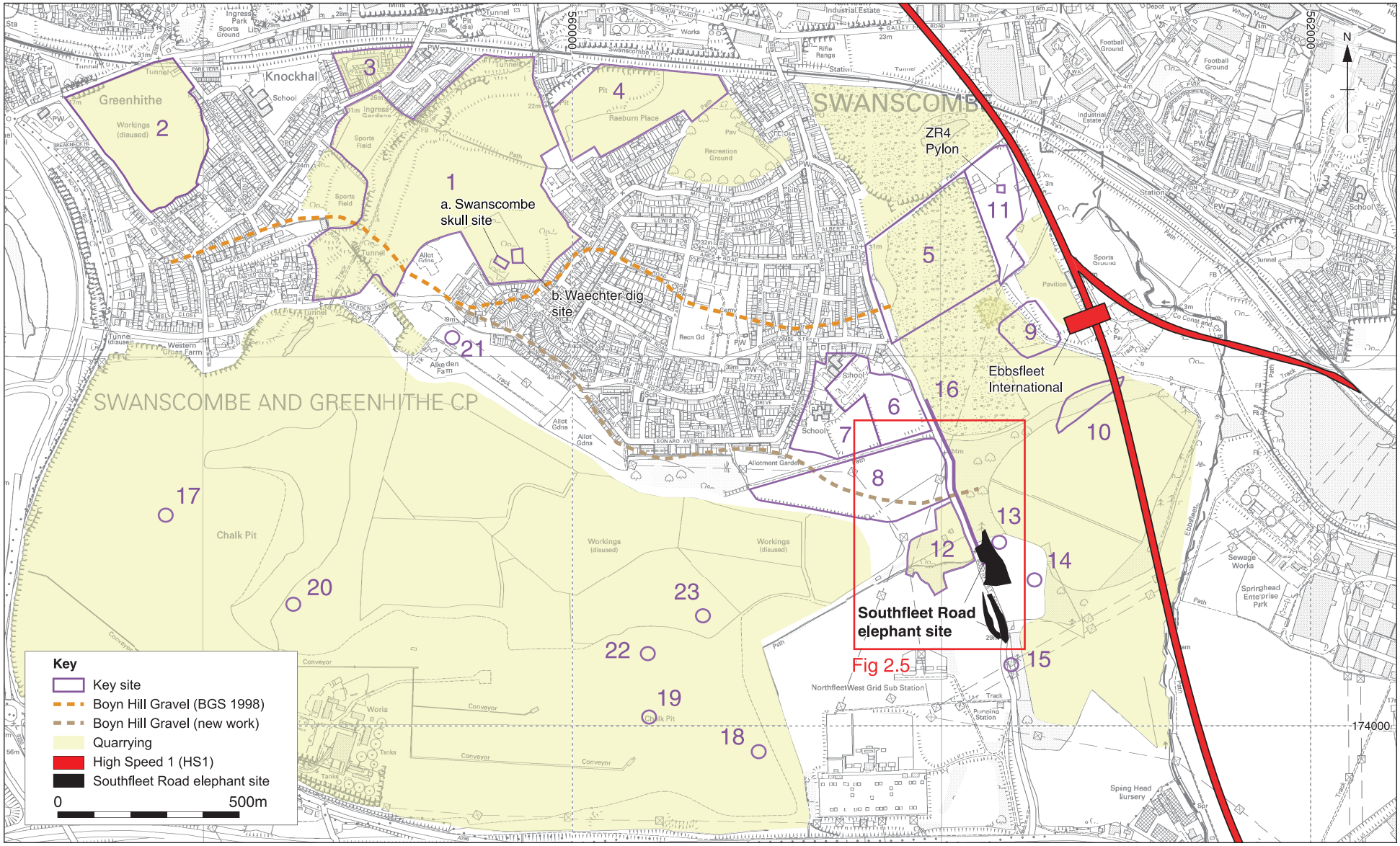


Figure 2.4 Sites in the Swanscombe area: 1 - Barnfield Pit; 2 - Globe Pit, Greenhithe; 3 - Dierden's Pit; 4 - New Craylands Lane Pit; 5 Ricksons Pit (aka Barracks Pit); 6 - Swan Valley Community School; 7 - Sweyne County Primary School; 8 - Eastern Quarry, Area B; 9 - Burchell's Ebbsfleet Channel (Temperate Bed) site [SAM Kent 267b]; 10 - RA Smith's Southfleet Pit Levallois site; 11 - Northfleet Allotments [Baker's Hole SAM Kent 267a]; 12 - Stopes' site 14 'Bevan's Wash Pit'; 13 - Stopes' site 748A 'New Barn Farm'; 14 - Stopes' site 33 'Treadwell's Farm'; 15 - Stopes' site 19 'Treadwell's Hop Ground'; 16 - Carreck's 'Ferruginous Loam'; 18 - Stopes' site 25 'Caerberlarber Hole'; 19 - Stopes' site 29 'Swanscombe Wood'; 20 - Stopes' site 31 'Bartholomew's Hill'; 21 - Stopes' site 588 'Chamber's Farm'; 22 - Swanscombe Wood clay pit; 23 - Swanscombe Hill

mapped (Wenban-Smith and Bridgland 2001; Wessex Archaeology 2009a) in the area mapped as Thanet Sand to the south of the Swanscombe 100-ft terrace outcrop (Fig 2.5). At both sites, fluvial gravels have been found in a number of test pits that are at similar levels to the Swanscombe Lower Middle Gravel and contain non-Wealden clast lithologies indicative of a mainstream Thames origin (analyses carried out by D. R. Bridgland, University of Durham, and T. S. White, University of Cambridge). The gravels also produced handaxes and debitage comparable to material from the Lower Middle Gravel, further cementing their correlation, and consequently extending the southern margin of the Thames channel of MIS 11 significantly further south than recognised in current geological mapping.

An additional relevant record results from rediscovery of the location of the site of 'Bevan's Wash-pit' (Fig. 2.4, site 12), one of numerous sites in the Swanscombe vicinity from which Henry Stopes collected Palaeolithic material in the 1890s. Stopes amassed a massive collection of lithic material, over 100,000 items at its peak. The surviving parts of it have languished unpublished and little-known since the early 20th century in the basement of the National Museum and Galleries of Wales, in Cardiff, due to his untimely early death and the consequent need of his widow to sell his flint collection

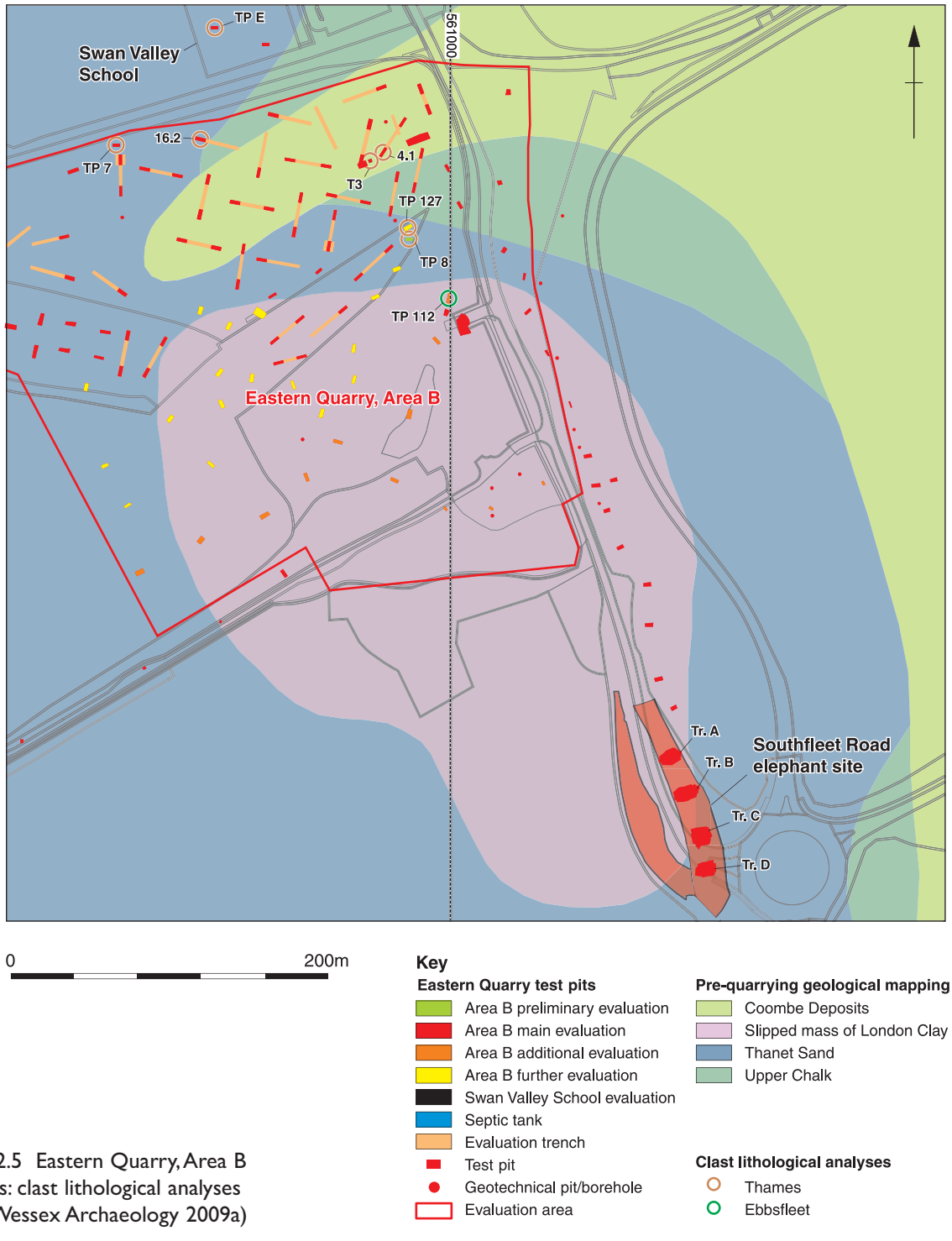


Figure 2.5 Eastern Quarry, Area B test pits: clast lithological analyses (from Wessex Archaeology 2009a)

(Walker 2001). A study was made of this collection between 2002 and 2004, leading to identification of the locations of most of Stopes' sites and analysis of the surviving finds (Wenban-Smith 2004a and 2009). Stopes recovered more than 20 handaxes from his 'Bevans Wash-pit' site. The location of this site can be pinpointed from the ancillary information in Stopes' records ('opposite New Barn Farm') as the brickearth quarry in the slipped clayey mass the other side of Southfleet Road, a short distance to the north-east of the site (Fig. 2.4, site 12). This quarry was also obliquely referenced by Spurrell (1890, cxlv). He provides a description of the stratigraphy as 'masses of brickearth lying on gravel' and also states that 'implements' were found in the brickearth and 'teeth of *Elephas primigenius*' [mammoth; although it is possible that Spurrell has failed to correctly distinguish between mammoth and the extinct straight-tusked elephant *Palaeoloxodon antiquus*, remains of which were, and are, relatively abundant in the Swanscombe area, particularly in the 100-ft terrace deposits to the north-west of Southfleet Road]. Spurrell also states that the gravel under the brickearth can be equated with 'the Dartford Gravel' [ie the Boyn Hill/Orsett Heath Formation in present-day terminology], and can be traced around Swanscombe Hill into the 100-ft terrace outcrop underlying Swanscombe, where it was well exposed in 'the extensive cutting' at Milton Street [ie, Barnfield Pit]. The majority of Stopes' artefacts from Bevan's Wash-pit lack stratigraphic provenance. However two large and fresh condition pointed sub-cordate handaxes are recorded by him as found *in situ* '17ft from the surface' (Stopes Catalogue, # 598), and therefore come either from towards the base of the brickearth, or from the gravel reported by Spurrell as underlying the brickearth in the pit.

Complementing these records, Carreck (1972, 61) reported a body of 'ferruginous loam' up to 5m deep and extending 365m northward from New Barn Farm in the quarry section along the east side of Southfleet Road (Fig. 2.4, site 16). He suggested, on the basis of height above OD, that it was probably associated with the Barnfield Pit 'Boyn Hill Terrace' sequence, although acknowledging it was not easily equated with any of the known beds.

This accumulation of background records indicates, alongside the more recent research at Swan Valley School and Eastern Quarry, that Pleistocene deposits representing, or broadly contemporary with, the Swanscombe 100-ft terrace extend towards the vicinity of the site. Therefore it is not so unexpected that it has now been shown to contain significant Lower/Middle Palaeolithic remains. They also provide points of reference to contextualise and correlate the deposits later found at the site, as discussed in the remainder of this volume.

The Ebbsfleet Valley: Head and fluvial deposits

To the east of Swanscombe, and to the north-east of the site, the Ebbsfleet Valley is filled (or at least, was once filled, before extensive quarrying) with a varied and complex array of late Middle and Late Pleistocene

Table 2.4 Ebbsfleet Valley: key Lower/Middle Palaeolithic sites

Site # (Fig 2.4)	*Name*	*NGR*	*Acc.**	*Summary of finds*	*Reference/s*	*Notes/comments*
5	Rickson's/ Barracks Pit	TQ 60900 74250	A	Abundant Clactonian, handaxe and Levalloisian remains recovered, but mostly not with good provenance	Dewey 1932; Wymer 1968	Unclear how stratigraphy relates to Barnfield Pit sequence; probably also contained later deposits
9	Burchell's Ebbsfleet Channel and Temperate Bed site	TQ 61210 74060	A	Middle Palaeolithic artefacts (Levallois flakes and cores) in Pleistocene fluvial deposits with faunal remains and other palaeo-environmental evidence	Burchell 1935 & 1957; Wenban-Smith 1995	SAM Kent 267b
10	RA Smith's 'Baker's Hole' Levallois site (Southfleet/ New Barn Pit)	TQ 61370 73850	A	Abundant Levallois flakes and cores, plus range of fossil fauna including rhino, horse and mammoth	Smith 1911; Wenban-Smith 1995	Site now quarried away
11	Northfleet Allotments Pleistocene site	TQ 61150 74360	A	Pleistocene fluvial deposits with faunal remains and other palaeo-environmental evidence; excavation at 'Site A' in 1970 by British Museum; further work at 'ZR4 pylon' site in 1998 and 2000, for HS1	Kerney & Sieveking 1977; Wenban-Smith 1995; Wenban-Smith *et al.* 2013	SAM Kent 267a; contains CTRL site of ZR4 pylon

*Acc: A = accurately known location; E = estimated location; G = general location

Table 2.5 General Lower/Middle Palaeolithic sites and find-spots near the Southfleet Road elephant site

Site # (Fig. 2.4)	*Name*	*NGR*	*Acc.**	*Summary of finds*	*Reference/s*	*Notes/comments*
12	Bevans Wash-Pit	TQ 610 735	A	22 handaxes and 4 debitage	Spurrell 1890; Wenban-Smith 2004a [Stopes Catalogue, sites 14, 27, 593 & 598]	Two large and fresh pointed sub-cordate handaxes '17ft from the surface'
13	New Barn Farm	TQ 61260 73550	A	Handaxe (ovate)	Wenban-Smith 2004a [Stopes Catalogue, site 748A]	Found 12ft down in clear brickearth
14	Treadwell's Farm	TQ 61240 73440	E	2 handaxes and 2 debitage	Wenban-Smith 2004a [Stopes Catalogue, site 33]	Surface finds; Treadwell was evidently at New Barn Farmhouse
15	Treadwell's Hop Ground	TQ 61180 73160	E	2 handaxes and 9 flakes	Wenban-Smith 2004a [Stopes Catalogue, site 19]	Surface finds
16	Carreck's ferruginous loam	TQ 6110 7350	A	Has produced occasional very fine mint condition handaxes	Wessex Archaeology 2006b	
17	The Mounts	TQ 58900 73450	G	11 handaxes and 2 debitage	Wenban-Smith 2004a [Stopes Catalogue, site 5]	Probably mostly residual surface finds, now quarried away
18	'Clabber-labber Hole' [aka Caerberlarber Hole]	TQ 60545 72810	A	27 handaxes, 3 flake-tools and 38 flakes	Bull 1990; Wenban-Smith 2004a [Stopes Catalogue, sites 25, 25A-C]	An underground cavern complex entered through a narrow denehole in SE corner of Eastern Quarry, possibly parts of which still survive; finds made on the fields around the entrance
19	Swanscombe Wood	TQ 60300 73000	E	3 handaxes and 9 debitage	Spurrell 1890; Wenban-Smith 2004a [Stopes Catalogue, site 29]	Finds from 'top gravel turned up in planting young trees'
20	Bartholo-mew's Hill	TQ 59500 73200	E	12 handaxes and 3 debitage	Wenban-Smith 2004a [Stopes Catalogue, site 31]	Surface finds
21	Chamber's Farm, Alker-dene [sic]	TQ 59800 73950	G	2 handaxes and 2 debitage	Wenban-Smith 2004a [Stopes Catalogue, site 588]	Surface finds
22	Swanscombe Wood clay pit	Prob. *c.* TQ 60350 73000	E	Handaxe	Wymer 1968, 352	Various clay pits at different times; other possible locations include TQ 60500 73690, or TQ 59700 73000; apparently 'found 15ft below surface'
23	Swanscombe Hill	TQ 6025 7325	G	4 handaxes	Roe 1968, 185	Prob. surface finds

*Acc: A = accurately known location; E = estimated location; G = general location

sediments. These resulted from fluvial deposition by early northward-flowing channels of the Ebbsfleet and colluvial/solifluction deposition down the sides of the Ebbsfleet Valley (Bridgland 1994; Wenban-Smith 1995a; Wenban-Smith *et al.* forthcoming). The sediments occur at lower levels than the Swanscombe suite of deposits, and mostly date to the younger periods MIS 8 through to MIS 2 (250,000-10,000 BP). These deposits, isolated patches of which still survive in places despite the history of quarrying and the HS1 and Ebbsfleet International station developments, have produced rich Palaeolithic and faunal remains, including prolific Levalloisian flint artefacts and some key fossiliferous locations for MIS 7 (Wymer 1968; Wenban-Smith *et al.* forthcoming). Particularly important locations, shown on Fig. 2.4 and summarised in Table 2.4, include: RA Smith's Baker's Hole Levallois site (Fig. 2.4, site 10); the Northfleet Allotments site, now Scheduled Ancient Monument Kent 267a (Fig. 2.4, site 11), which includes the ZR4 pylon site investigated in 2000 as part of the pre-HS1 programme (Wenban-Smith *et al.* forthcoming); and JPT Burchell's Ebbsfleet Channel Temperate Bed site, Scheduled Ancient Monument Kent 267b (Fig. 2.4, site 9).

Other sites and findspots

As well as these important well-known and well-investigated sites, where artefactual and environmental remains have been recovered from known Pleistocene deposits in the Swanscombe 100-ft terrace and the Ebbsfleet Valley, there are also numerous records of Palaeolithic artefacts (mostly handaxes) recovered as surface finds and/or from forgotten or unknown sites (Table 2.5). Many of these result from the activities of Henry Stopes in the late 19th century, a particularly vigorous collector in the Swanscombe area (Wenban-Smith 2004a and 2009). As well as Carreck's (1972, 61) exposure of 'ferruginous loam' immediately to the north of the site and Stopes' 'Bevan's Wash-pit' site, previously mentioned above, there are three of Stopes' other findspots in the immediate vicinity (Table 2.5 and Fig. 2.4, sites 13, 14 and 15). Two of these were surface findspots, but at one of them (site 13, 'New Barn Farm') Stopes records a handaxe found *in situ* in brickearth, further attesting to the site's Lower/Middle Palaeolithic potential.

There are two more of Stopes' handaxe findspots close to the west of the site (Fig. 2.4 and Table 2.5, sites 18 and 19). These probably represent residual material from activity contemporary with the occupation reflected in the prolific evidence from the Swanscombe 100-ft terrace gravels, discarded on the surface of what would have been the high ground to the south of the Thames at that time. It is, however, also possible that they (all, or partly) represent material of far older age, derived from the earlier Pleistocene gravel outcrops that were once present on the higher ground within Eastern Quarry, and specifically recorded by Spurrell (1890) as occurring at the 'top of Swanscombe Hill'. In addition to these are four other records representing similar surface finds from the general area above the site to its west (Fig. 2.4 and Table 2.5, site 23). Also, three other records, including two more resulting from Stopes' work, from a slightly wider area in the vicinity of the site (Fig. 2.4 and Table 2.5, sites 17, 20 and 21). Likewise, these remains may represent residual evidence of activity on the higher ground above the Thames of the Boyn Hill/Orsett Heath Formation. Alternatively they (or some them) may represent much earlier material derived from the higher level gravel outcrops, possibly of Early Pleistocene age, that capped the high ground in Eastern Quarry. This latter possibility could still be investigated in the vicinity of TQ 575 718, where there are still surviving outcrop of these high level gravels, with a record of at least one nearby handaxe find (Wessex Archaeology 1993, map NWK 4, findspot # 10).

Finally, there is a record (Fig. 2.4 and Table 2.5, site 22) of a handaxe apparently 'found 15ft below surface' from a clay pit in 'Swanscombe Wood'. This would be of more import if it could be determined which of the various clay pits was the source of this find. Various clay pits were opened between the first edition of the OS survey in 1865 and the 1960s, after which Eastern Quarry expanded to engulf the area. These included pits into the London Clay capping the high ground, which would make this a very curious discovery, and, more likely, pits into slipped clayey fans down the sides of Swanscombe Hill, such as Bevan's Wash-pit (Fig. 2.4 and Table 2.5, site 12), already discussed.

Lower/Middle Palaeolithic background overview

It was therefore clear even before work began at the site that it was not in the archaeologically sterile (from the Lower/Middle Palaeolithic viewpoint) area suggested by BGS mapping. Rather, the site was in close proximity to unmapped and poorly investigated Pleistocene deposits that nonetheless had previously produced Lower/Middle Palaeolithic remains, including numerous handaxes and elephant or mammoth remains from Bevan's Wash-pit, a short distance to the north-west. Furthermore, it was also clear that in interpreting any Pleistocene deposits and Palaeolithic remains found at the site it would be necessary to bear in mind the considerable alterations to the topography of the local landscape caused by quarrying. In particular this included the previous existence of a significant area of high ground rising immediately to the west of the site, which was liable to have influenced Pleistocene deposition in the vicinity of the site, on its eastern slopes.

LOWER/MIDDLE PALAEOLITHIC RESEARCH FRAMEWORK

Since the 1990s and the growth of archaeology as a material consideration in the planning process resulting from *Planning Policy Guidance Note 16* (Department of the Environment 1990), the need to curate and manage

the archaeological resource in the face of the impact of building and other infrastructural development has stimulated the development of an increasingly formalised framework of research agendas. These specify priorities against which the importance of sites is measured. They also guide decision-making over preservation *in situ* and the allocation of resources for investigation in advance of development.

For the Palaeolithic, the seminal English Heritage publication *Exploring Our Past* identifies three main themes for Lower/Middle Palaeolithic research: physical evolution, cultural development and global colonisation (English Heritage 1991). This strategy document did not go into much detail on how these themes might be addressed and the nature of the relevant evidence. It did, however, echoing Roe (1980), emphasise the importance of undisturbed *in situ* occupational evidence, especially when in association with biological remains, as the key type of evidence for investigating these questions. This was followed up in the later 1990s by two further documents: (1) *Research Frameworks for the Palaeolithic and Mesolithic of Britain and Ireland* (English Heritage/Prehistoric Society 1999); and (2) *Identifying and Protecting Palaeolithic Remains* (English Heritage 1998).

In the former of these later documents, three revised strategic themes were presented: colonisation, settlement and social organisation, alongside, for each of these major themes, a subsidiary list of research questions and priorities (Table 2.6). Again, however, there was no discussion about the methods by which these issues could be addressed or, critically for curatorial purposes, the most relevant archaeological remains. In the latter document, by contrast, there was a list of 11 criteria for the selection of particularly important

Table 2.6 National primary strategic themes and research priorities for the Palaeolithic in Britain (English Heritage/Prehistoric Society 1999)

Strategic themes	*Research priorities*
Colonisation and recolonisation	Patterns of interaction with, and impact on, fauna and flora Determination of earliest occupation, and relating this to other well dated deposits across the region and in Northern Europe Examining patterns of recolonisations Tracing relations between Britain, Ireland and NW Europe through archaeological remains, physical anthropology and bio-molecular evidence
Settlement patterns and settlement histories	Establishing when Britain and Ireland were occupied through the Pleistocene Investigating how this settlement history relates to cycles of climatic change through the Pleistocene Investigating changes in landscape use and the organisation of technology in relation to lithic raw materials
Social organisation and belief systems	Application of the chaîne opératoire concept to the analysis of a social technology, rather than just the mechanics of lithic artefact manufacture Investigation of the relationship between social organisation and the spatial distribution of archaeological remains Investigation of regional scale of social systems and social territories, measured through artefact studies

Table 2.7 English Heritage (1998) criteria for recognition of national importance in Palaeolithic sites

Criterion	*Details*
Human bone	If any human bone is present in relevant deposits
Primary context	The remains* are in an undisturbed, primary context
Period/area rare	The remains* belong to a period or geographic area where evidence of human presence is particularly rare or was previously unknown
Organic artefacts	If any organic artefacts, such as the wooden spear from Clacton-on-Sea, are present
Associated bio-evidence	If there are well-preserved indicators of the contemporary environment (eg. floral, faunal, sedimentological) which can be directly related to remains *
Evidence of lifestyle	There is evidence of lifestyle (such as interference with animal remains)
Stratigraphic relationships	One deposit containing Palaeolithic remains has a clear stratigraphic relationship with another
Artistic evidence	If any artistic representation is present, no matter how simple
Hearths or structures	If any structure, such as a hearth, shelter, floor or securing device survives
Resource exploitation	If the site can be related to the exploitation of a resource, such as a raw material
Artefact abundance	If artefacts are particularly abundant within a particular horizon at a site

* Throughout this table, the word 'remains' generally refers to lithic artefacts; however, in principle it can also cover other evidence of human behaviour, such as: tools made on other materials such as bone, scatters of organic refuse, and structural remains such as paved floor areas or walls

Lower/Middle and Upper Palaeolithic remains (Table 2.7). Even these criteria were primarily aimed at identifying sites of national importance worthy of preservation and protection, although one might reasonably suppose that they also correspond with the types of site most useful for addressing the contemporarily designated research priorities. There also persists a lack of open discussion both on how these remains feed into addressing research priorities, and also most importantly, on the potential of the more abundant instances of less individually important remains to contribute to research. Consequently, a key role in the curatorial process, particularly in relation to Palaeolithic remains, is now played by specialists. These individuals assess the nature and quality of evidence at development sites and attempt to explain to the satisfaction of curators and consultants how the evidence contributes to national and regional research agendas.

Alongside these national curatorial initiatives, the HS1 programme was carried out within the context of its own parallel *Archaeological Research Strategy* (Drewett 1997). This defined five broad landscape zones which the route passes through, and identified five broad archaeological periods. For each period a number of key research objectives was also specified. It was then considered for each of the HS1 landscape zones what the priorities were for archaeological investigation in terms of the period/s and quality of surviving remains represented. This overall HS1framework was later supplemented for the Section 2 works, between the Ebbsfleet Valley and the St. Pancras terminal, by a more detailed *Research Strategy for Palaeolithic Archaeology and Pleistocene Geology* (Roberts 2000). This provided more specific details of research objectives for different areas of Palaeolithic/ Pleistocene remains along Section 2 between Pepper Hill and the St. Pancras terminus, focusing on remains already known to exist in the central Ebbsfleet Valley and at Purfleet, in Essex on the other side of the Thames. Under the combination of these two research strategy frameworks, three main research aims P1-P3 were defined for Palaeolithic archaeology and Pleistocene geology in the Ebbsfleet Valley, each with a number of specific subsidiary objectives (Table 2.8).

In contrast to the national framework, these subsidiary objectives incorporated more detail on the nature of remains most relevant to the designated research priorities, and suitable methods of investigation. They provided a vital context within which surviving evidence, as revealed either by targeted evaluations or by unforeseen discovery, could be assessed by specialists and a case made for its potential importance. In the case of the Southfleet Road elephant site, it was not immediately clear that the evidence there was indisputably of high national importance and worthy of significant attention. However there was sufficient evidence to merit some attention within these frameworks. It ultimately became clear not only that the evidence there *was* of high national importance within the context of English Heritage's specified criteria, with potential to contribute significantly to addressing many of the established research priorities in both the national and the RLE frameworks, but also that it was directly relevant to addressing, and perhaps resolving, one specific and long-standing debate in the British Palaeolithic: the so-called 'Clactonian question'.

This debate concerns the interpretation of the technological/typological contrasts between lithic remains from several early Hoxnian sites, and those from several later ones. These contrasts are exemplified in the sequence from nearby Barnfield Pit (Fig. 2.4, site 1), where the lithic remains from Phase I (the Lower Gravel and Lower Loam) comprise nothing but flakes, cores and simple flake-tools. In contrast, those from the directly overlying Phase II deposits (the Lower Middle

Table 2.8 High Speed 1 research objectives for Palaeolithic archaeology and Pleistocene geology in the Ebbsfleet Valley

Landscape zone research priorities	*Site objectives*	*Details*
P1. Investigation of Pleistocene landscape history and evolution	P1a	Clarification of the sequence, lithostratigraphic relationships and geometry of Pleistocene units present
	P1b	Recovery of faunal remains and biological palaeo-environmental evidence from well-provenanced Pleistocene contexts
	P1c	Interpretation of the mode of formation of Pleistocene units
	P1d	Integration/correlation of surviving Pleistocene units with those known from earlier work
P2. Investigation of the range and locations of early hominid activity	P2a	Identification and investigation of undisturbed occupation horizons
	P2b	Recovery of archaeological artefacts from well-provenanced Pleistocene contexts
	P2c	Recovery of faunal remains and biological palaeo-environmental evidence associated with lithic artefacts
P3. Investigation of the effect of climatic and environmental changes on early hominid lifeways and adaptive strategies	P3a	Integration/correlation of previously investigated artefact-bearing horizons and surviving Pleistocene sediments into overall regional framework
	P3b	Integration/correlation of newly discovered artefact-bearing horizons and Pleistocene sediments into overall regional framework

Gravel and Upper Middle Gravel) comprise very numerous handaxes, often well-made with careful shaping and sharp points, with only rare instances of flake/core production (Table 2.3).

The core/flake dominated material from Phase I, subsequently christened Clactonian by Breuil (1926), was interpreted initially by Smith and Dewey (1913) as a culturally distinct non-handaxe industry, occurring earlier within the same interglacial than the subsequent hand-axe dominated industry characteristic of the Phase II deposits. This initial interpretation was subsequently reinforced by further discoveries of Clactonian material from the same period, in particular at the East Anglian site of Barnham where the Clactonian layers were also sealed beneath deposits containing handaxes (Paterson 1937). Since the 1970s, this 'culture-traditional' (or indeed, 'traditional cultural') explanation has been challenged by a series of alternative suggestions. Singer *et al.* (1973) were the first to specifically suggest the possibilities: (a) that the Clactonian was an early precursor of the subsequent Acheulian industry within the Hoxnian interglacial, the latter industry being the product of the descendants of the manufacturers of the former, or (b) that both industries were essentially contemporary, being complementary facies of a single cultural tradition, that incorporated a differing emphasis on handaxe manufacture and flake/core production in different parts of the landscape. A third possibility was later raised in the late 1970s, that (c) the Clactonian was an integral part of the Acheulian, with the former merely representing large and undiagnostic flakes from the early stages of handaxe manufacture, with the apparent distinction resulting from a spatial separation between the early stages of handaxe manufacture and their subsequent finishing and discard (Ohel 1979). Under continuing contention since the 1970s (Ashton and McNabb 1994; Wenban-Smith 1998; White 2000), this debate has such traction because it revolves around fundamental ideas on the nature of the Lower/Middle Palaeolithic record, and the behavioural processes behind its formation. This is subsequently discussed more fully in Chapter 22.