MEDWAY VALLEY PALAEOLITHIC PROJECT
FINAL REPORT:

THE PALAEOLITHIC RESOURCE
IN THE MEDWAY GRAVELS (KENT)

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CONTENTS

TABLES

FIGURES

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SUMMARY

At its heart the *Medway Valley Palaeolithic Project* (MVPP) is about aiding the curatorial community in managing the Lower/Middle Palaeolithic resource contained in the aggregate extraction landscape. The project was implemented in the Medway region, but many of its methods and outcomes are directly transferable to the wider aggregate resource. Within the context of this broad goal, the project included:

- Development of a Medway region *Palaeolithic Research Framework*, incorporating (a) an integrated chronological and stratigraphic framework for sand/gravel aggregate deposits, (b) a regional framework of cultural change/patterning and hominid settlement history and (c) regional research priorities

- Characterisation and predictive modeling of the Palaeolithic resource in the Medway region, identification of zones of significance and research priorities

- Specification of appropriate methods for evaluation/excavation of Palaeolithic remains within different zones of the Medway Palaeolithic resource

- Enhancement of Palaeolithic SMR datasets in the Medway region

The MVPP has built on previous work, in particular the *Southern Rivers Palaeolithic Project* (SRPP) and *The English Rivers Palaeolithic Survey* (TERPS) in the 1990s, and the *Thames Estuary Survey of Mineral Extraction Sites* (TESMES). These projects were essentially about collating known information on Palaeolithic find-spots, and relating them to existing British Geological Survey (BGS) mapping.

The MVPP built on this work in three main directions. Firstly, fieldwork was carried out to validate and develop the essential chrono-stratigraphic framework. Current geological attribution of most Pleistocene aggregate deposits is highly suspect, with inconsistencies between adjacent map-sheets and major problems of correlation between more widely separated groups of deposits. The fieldwork focused on dating, environmental sampling and artefact recovery.

Secondly, the MVPP has involved a more detailed analysis of previous Palaeolithic finds from aggregate deposits in the study region, including: recording of typology and condition and reviewing provenance information. These data have contributed to assessing the significance of surviving aggregate bodies, as well as in constructing a regional framework of Palaeolithic occupation and cultural change.

Thirdly, while previous projects have generally produced relevant information from which to develop a predictive model, this step has not yet been taken. The MVPP has combined collation and analysis of findspot information with better understanding of the Pleistocene framework to, for the first time, generate a GIS *Palaeolithic Resource Predictive Model* that both characterises the Palaeolithic resource and predicts zones of higher interest and significance. This model (Section 7 of the report) is perhaps the most important product of MVPP, not so much in itself, but as a starting point for a future dynamic resource, that can predict areas of interest based on algorithms applied to relatively simple raw data.

In course of addressing these core curatorial objectives, MVPP has also contributed to a number of national and regional Palaeolithic research priorities. These primarily concern developing the framework of cultural change and settlement history in the Medway region, and comparing/contrasting this with that of other parts of southeast England. In addition, work has been carried out that has enhance understanding of a number of key sites; in particular: (a) Cuxton in Kent, where we have done new dating analyses, and recovered important new finds; and (b) Westcliff High School for Girls, in Southend, Essex, where we have identified lithic artefactual evidence of pre-Anglian hominin presence.

The Cuxton site has been reliably dated by OSL to *c.* 230,000 years before present (BP) (the start of Marine Isotope Stage 7), making it the youngest site in the country with an almost exclusively handaxe-focused material culture, and raising important questions over the implications of the broadly contemporary (it is thought!) occurrence of almost exclusively Levalloisian material at sites such as Crayford, Baker's Hole and the Lion Pit tramway cutting. In addition, we recovered at Cuxton, immediately beside each other and in the same specific archaeological level, two magnificent specimens of contrasting types of handaxe — a cleaver and a ficron (cf. cover image). Confirmation of (a) the deliberate manufacture of specific types of handaxe, and (b) the co-occurrence of contrasting types within the same material cultural tradition, has a number of implications for our thinking about the cognitive capabilities of these early hominins.

In marked contrast to the spectacular finds at Cuxton, but no less important, a single small flint waste flake was recovered by MVPP sieving of Clinch Street/Canewdon Gravel at Westcliff High School for Girls. This gravel is, however, dated to *c.* 600,000 BP, before the Anglian glaciation, and thus this one unprepossessing piece of flint is the earliest evidence of hominin presence in Essex or Kent.

The project also recognised the need to promote understanding and appreciation of aggregates archaeology to the widest possible audience beyond the curatorial and professional archaeological constituency, and included a number of initiatives aimed at achieving this.

1 INTRODUCTION

This archive report is a summary report on the scope, core achievements and archive constituents of the *Medway Valley Palaeolithic Project* (MVPP), focusing on the Kent part of the study region. It synthesises a new dating and stratigraphic framework for the aggregate resource, and integrates this with a record of early hominin settlement. In addition, it identifies research priorities in different areas of the study region, and provides a more strategic overview of how to approach curation of the Palaeolithic resource within the current curatorial framework. This overview encompasses both an overall research framework and guidelines on suitable field methods.

This report provides one aspect of the overall output of the project. A number of digital resources have been delivered direct to the Kent County Council historic environment team. These comprise GIS polygons identifying the Palaeolithic remains and potential in different zones of the project region, as well as an enhanced database of information about Palaeolithic finds and sites.

2 BACKGROUND

2.1 Circumstances of project

The MVPP was developed in response to the priorities and objectives of the Aggregates Levy Sustainability Fund. The project was focused within the Thames Gateway development area on sand/gravel aggregate deposits in southeast Essex and north Kent associated with the palaeo-Medway River. This area has a long history of aggregate extraction, as well as still containing a substantial aggregate resource liable for future extraction or impact by other development.

2.2 Curatorial consultation and involvement

The project was developed following consultation with archaeological curators for Kent and Essex, where the project is located. It followed from work carried out under the ALSF round 1 on the project *Thames Estuary Survey of Mineral Extractions Sites* (TESMES) based at Essex County Council, but also implemented on the Kent side of the Thames Estuary.

The TESMES project included a review of Palaeolithic remains recovered from aggregate extraction sites in the Thames Gateway. It became clear that in order to make sense of these, and also to improve the capability to manage the aggregate extraction landscape, it would be helpful (a) to take account of remains recovered from other areas than merely those affected by extraction and (b) to carry out a dating and correlation programme of aggregate deposits to place them in a synthesised chrono-stratigraphic framework. Therefore the *Medway Valley Palaeolithic Project* was conceived to address these aims.

2.3 Aggregate extraction and curation of the Palaeolithic resource

There is a strong and unavoidable correspondence of interest between Palaeolithic archaeology and aggregate extraction. The great majority of sands and gravels used as aggregates were formed during the Pleistocene and so contain evidence of the Palaeolithic. In the study region for this project, there has been substantial extraction since the second half of the 19th century.

While previous extraction has inevitably impacted upon the Palaeolithic archaeological resource, it has also provided exposures of the sediments, and there is a long history of co-operation and tolerance between Palaeolithic investigators and commercial quarrying. Early hand-digging and screening of gravel provided ideal conditions for the recognition and recovery of artefacts, and quarry owners such as the Associated Portland Cement Company cooperated with archaeological investigation on numerous occasions. Our current understanding of the Palaeolithic would be much reduced without the opportunities afforded by previous aggregate extraction. Far from being in conflict with the needs of Palaeolithic archaeology, ongoing and future aggregate extraction can be of benefit, so long as appropriate mitigating investigations are carried out.

The current planning legislation provides for mitigating the archaeological impact of all development, including aggregate extraction, under PPG 16 (DoE 1990). However, substantial unmitigated impact upon Palaeolithic evidence has taken place prior to PPG 16. This impact can to a large extent still be mitigated through study of surviving quarry faces and of material recovered from known sites, and this is one objective of this project.

Secondly, the piecemeal nature of mitigation work under PPG 16 — which is inevitably focused on areas chosen for development and hence can deliberately avoid key archaeological sites — means that it has been impossible to target key areas that can increase curatorial understanding of the region. Carrying out such targeted work under ALSF complements, and enhances the value of, other work carried out under PPG 16.

2.4 Study region

The project is focused on aggregate deposits in north Kent and southeast Essex associated with the Medway River (Fig. 1). In the present day, the Medway rises in Ashurst Forest, in the centre of the Weald, and flows northwards through Kent, through Maidstone and through the Chalk escarpment of the North Downs to join the Thames Estuary at Chatham. Earlier in the Quaternary, the river drainage of the Thames Estuary was very different. The Thames had a more northerly route, and the Medway flowed across southeastern Essex to its confluence with the Thames. Thus substantial sand/gravel aggregate deposits in southern and eastern Essex are also associated with the early Medway.

The project region comprises the Medway Valley north of Maidstone, the Hoo peninsula and the southeast quarter of Essex, up to Clacton-on-Sea. The early Medway sand/gravel aggregate deposits here have in many places produced Palaeolithic and palaeo-environmental remains. The region has been divided into eight contiguous areas, four in Kent (KT 1–4), and four in Essex (EX 1–4). Each contains distinct bodies of sand/gravel aggregate deposits with particular problems, potential and Palaeolithic remains (Table 1).

2.5 Archaeological and geological background

2.5.1 The Pleistocene

The initial Palaeolithic occupation and subsequent settlement of Britain has taken place against the backdrop of the Quaternary period, characterised by the onset and recurrence of a series of alternating cold–warm/glacial–interglacial climatic cycles. Over 60 cycles (or marine isotope stages) have been identified over the last 1.8 million years, numbered by counting back from the present-day interglacial (MIS 1), with interglacials having odd numbers and glacials even numbers. These stages have been dated by a combination of radiometric dating and tuning to the astronomical timescale of orbital variations, which are now known to have been a fundamental causative agent of the climatic fluctuations. The Quaternary is divided into two epochs — the Holocene and the Pleistocene. The Holocene represents the present-day interglacial. The Pleistocene represents the remainder of the Quaternary and is divided into Early, Middle and Late parts (Table 2). The Middle and Late Pleistocene are of most relevance to British Palaeolithic archaeology, with the first occupation of Britain occurring *c.* 700,000 years before present (BP) in the Middle Pleistocene, and continuing thereafter with regular gaps.

2.5.2 The Palaeolithic

The Palaeolithic covers the time span from the initial colonisation of Britain in the Middle Pleistocene, possibly as long as 700,000 years ago (Parfitt *et al.* 2005), to the end of the Late Pleistocene, corresponding with the end of the last ice age *c.* 10,000 years ago. Thus the Palaeolithic period occupies almost 700,000 years, and includes at least ten major glacial–interglacial cycles (cf. Table 2), accompanied by dramatic changes in climate, 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, mollusc species that now inhabit the Nile were abundant in British rivers, and tropical fauna such as hippopotamus and forest elephant were common in the landscape. For the majority of the time, however, the climate would have been somewhere between these extremes.

The British Palaeolithic has been divided into three broad, chronologically successive stages — Lower, Middle and Upper — based primarily on changing types of stone tool (Table 3). This framework was developed in the 19th century, 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 nonetheless broadly stood the test of time, proving both to reflect a general chronological succession across Britain and northwest Europe, and to correspond with the evolution of different ancestral human species. Lower and Middle Palaeolithic remains have been shown to date before *c.* 50,000 (BP), and to be associated with the extinct Neanderthal lineage and their ancestors ('Archaics'). Upper Palaeolithic remains date from *c.* 40,000 BP, and are associated with the first appearance of modern type humans.

The MVPP is only concerned with Lower and Middle Palaeolithic evidence associated with the Archaic humans of the Middle and early Late Pleistocene. Besides the fact that there is no known Upper Palaeolithic evidence in the Medway study region, the sand/gravel aggregate deposits that are the focus of the project were mostly formed during the Middle and early Late Pleistocene, and so the Lower and Middle Palaeolithic is inevitably the focus of their consideration as an archaeological resource.

2.5.3 Palaeolithic of the Medway region

The study region has been divided into eight stretches for the MVPP (Fig. 1), four in Kent and four in Essex, downstream from south to north:

KT 1 — Maidstone
KT 2 — Medway Gap
KT 3 — Rochester
KT 4 — Hoo Peninsula

EX 1 — Rochford/Southend
EX 2 — Dengie Peninsula
EX 3 — Mersea Island
EX 4 — Clacton/Holland

The remainder of this report focuses on the Kent part of the overall MVPP region, and the Essex part is covered by a separate, complementary report (Wenban-Smith *et al.* 2007b).

Geological mapping and a substantial body of Quaternary research (eg. Lake *et al.* 1977 & 1986; Bridgland 1983a; Roe 1999; Bates *et al.* 2002; Bridgland 2003) have provided a basic understanding of the distribution in each of these areas of aggregate and other Pleistocene deposits of relevance to the Lower/Middle Palaeolithic. Deposits in some areas (such as the Hoo Peninsula) are relatively abundant and well-mapped. In other areas (such as Maidstone, Medway Gap and Rochester) the deposits are scarcer and less well-mapped, often being obscured by substantial younger colluvial deposits.

The sand and gravel aggregate deposits in these areas have produced substantial quantities of Palaeolithic archaeological material, recently summarised in the survey of (for the Kent part of the study region) the *Southern Rivers Palaeolithic Project* (Wessex Archaeology 1993; Fig. 2). In total 35 sites were reported in this survey (Table 4). A few key sites — eg. Cuxton and Aylesford — have produced large quantities of finds. Most sites are, however, find-spots of much more limited numbers of implements, often only single handaxes. However, these are usually the result of very limited investigation and chance finds, and may still represent significant sites.

A detailed review of the Pleistocene and Palaeolithic background of the study region was presented in the original Project Design (Wenban-Smith 2004); the main points are reiterated here.

KT 1 — Maidstone
At least 5 discrete terrace features have been mapped within this area. Additionally occasional patches of higher level gravels, probably dating to the early Pleistocene

(Cobham Park Gravel), are also present. Unfortunately because of the downstream plunge of these deposits and probable mismatches between mapping of adjacent geological sheets there is often difficulty in tracing and correlating individual gravel bodies. The 5 terraces remain undated although Terrace 2 at Aylesford contains a mammalian fauna including material of Ipswichian and Devensian dates (Skempton & Weeks 1976; Bridgland 2003) while Terrace 1 has produced material of late glacial character (Burchell & Davis 1957).

Numerous Palaeolithic artefacts have been recovered in the area, mostly from pits near Aylesford. Levalloisian material is reasonably abundant, being reported from five of the 16 recorded sites. There are also two sites in the Maidstone area with *bout coupé* handaxes — Johnsons Pit and Clubb's Ballast Pit. The provenance of these handaxes is uncertain, although both probably came from Devensian gravels underlying the present Medway alluvial floodplain. *Bout coupé* handaxes are thought to date to the middle of the last (Devensian) Ice Age, and so represent late Middle Palaeolithic Neanderthal presence in the region.

KT 2 — Medway Gap

Few Pleistocene fluvial deposits are mapped in the area. However it does include the site of Cuxton, which is contained in a small patch of fluvial gravel with a base at *c.* 15m OD (Tester 1965; Cruse 1987). Furthermore, patches of gravel mapped as "Head Gravel" are shown by BGS mapping on the inside (east side) of the river bend, where Pleistocene fluvial deposits would be most likely to be preserved. These are surrounded by extensive spreads of superficial Head deposits that may also hide fluvial deposits. Cuxton is one of Britain's most spectacular Palaeolithic sites, having produced very many fine handaxes from a few tiny test pits. However, at the outset of this project, we had very little idea of its date, and consequently where it fits in with the wider regional and national Palaeolithic picture.

KT 3 — Rochester

A cluster of terrace deposits are preserved at Frindsbury, north of Rochester, where there is a southward extending Chalk spur associated with a sharp doubling back in the present course of the Medway. There are also patches of fluvial gravel mapped on the east side of the river, under the urban spread of Gillingham. At least three separate terrace levels have been recognised. Again, these are of uncertain date. This region includes the site of discovery of a straight-tusked elephant (*Palaeoloxodon antiquus*) at Upnor, which is one of the few instances of the recovery of biological evidence in deposits north of the Medway Gap (Andrews 1915; Dines *et al*. 1954). The area has not produced many Palaeolithic sites, the most notable being the undisturbed knapping site at Frindsbury (Cook & Killick 1924). It is not, however, associated with a terrace deposit, making it difficult to date.

KT 4 — Hoo Peninsula

Deposits on the Hoo Peninsula are better mapped and understood than those further upstream. Both Bridgland (2003) and the British Geological Survey identify at least eight distinct terrace aggradations spanning the Middle to Late Pleistocene (Bridgland 2003). Recent investigations (Bates *et al.* 2002) have established that the area also contains deeply buried channels infilled with fossiliferous Pleistocene sediments in places, which extend under the Thames Estuary and into the Essex Medway areas.

Few investigations have been made for Palaeolithic remains, and few are known. A handaxe was recovered *in situ* in the Shakespeare Farm Pit (Bridgland & Harding 1984), in one of the higher terraces attributed to *c.* 400,000 BP (MIS 11) shortly after the Anglian glaciation, making it one of the earliest sites in the study region.

Overview

A number of key points can be made:

- Present geological mapping has probably over-simplified the complexity of the sequences within each of the study areas. Correlation of deposits between adjacent areas is also problematic.

- No overall dating framework exists, although Bridgland (2003) has attempted a framework for the extensive terraces on the Hoo based on their proposed correlation with Thames (upstream) and Thames-Medway (downstream in Essex) gravels. The majority of the mapped deposits probably span the last 0.5 million years but deposits laid down during the earlier Middle and Lower Pleistocene are also present.

- Molluscan and other biological evidence are scarce in the Medway gravels, which has made dating harder. However, they typically contain sand-rich beds that would be suitable for dating by optically stimulated luminescence (OSL), yet this approach had not yet been systematically applied, prior to MVPP.

- The mapped distribution of fluvial sediments, particularly within the Medway Gap and Hoo areas, is probably an under-representation of their true extent due to the difficulty of mapping small remnants of fluvial deposits and the masking properties of overlying Head deposits.

- Existing artefact surveys have collated information on find-spots and the present whereabouts of artefactual material. However, they do not use this information to provide specific recommendations on Palaeolithic potential and significance for areas of sand/gravel deposits, or to develop a broader picture of the history of Palaeolithic settlement and cultural change of the region. The present lack of dating and correlation also hampers attempting this task.

- A number of key sites lack good chrono-stratigraphic context — New Hythe (KT 1); Upnor elephant, Cuxton and Frindsbury (KT 3) — and the context and age of the Levalloisian material and *bout coupé* handaxes in the Maidstone area (KT 1)is uncertain.

- The number of *in situ* finds from gravel pit faces suggests much more material could be recovered if properly investigated, eg. from Shakespeare Farm Pit (KT 4)

- In light of the evidence from the Norfolk site of Pakefield that England was occupied as long ago as *c.* 700,000 BP, far earlier than previously realised, there is a need to start investigating Anglian and pre-Anglian deposits for early occupation evidence — eg. the Dagenham and Clinch Street Gravels on the Hoo (KT 4) and Terrace 5 deposits in Maidstone (KT 1).

2.6 Research context

2.6.1 National framework

Research themes and priorities

The English Heritage publication *Exploring our Past* (1991) identified three main themes for Palaeolithic research — physical evolution, cultural development and global colonisation. More recently a working party of the Prehistoric Society has defined three main strands for a national Palaeolithic Research Framework (English Heritage/Prehistoric Society 1999):

- Identification of research themes and priorities
- Development of specific projects of immediate relevance
- Education and dissemination initiatives

While regularly under review, and subject to changing emphasis in light of new discoveries and research directions, a comprehensive list of fourteen current core national research themes and priorities (N 1–15) is given (Table 5), and these have provided an overarching academic context for MVPP research objectives.

The resource

The main resource for addressing these themes is lithic and faunal archaeological evidence from Middle and Late Pleistocene contexts. Undisturbed horizons have been rightly highlighted (Roe 1980; English Heritage 1991) as of particular significance for their stratigraphic and chronological integrity, and their fascinating glimpses into short-lived episodes of activity. Disturbed and transported material, such as predominates in fluvial contexts, has in contrast been generally downgraded in its potential significance, to the extent that some in the current curatorial environment would regard such material as being of insufficient significance to merit any protection or research in advance of destruction. However, besides avoiding the risk of writing off large quantities of the finite Palaeolithic resource just because we don't yet know what to do with it (cf. Chippindale 1989), the study of such material in fact *complements* the evidence from undisturbed sites by bringing a different chronological and spatial perspective to bear. Collections of transported artefacts represent a time and space-averaged sample, giving a more representative view of lithic production and diversity than the evidence from a few square metres representing one afternoon in the distant past. Such evidence may in fact be of more value in documenting and explaining general patterns of material cultural change, since it is less vulnerable to local heterogeneity caused by, for instance, specific tasks or raw material availability.

Besides the direct evidence of human activity, such as artefacts and cut-marked faunal remains, associated biological evidence plays a central role. It can be used to:

- Reconstruct the palaeo-climate and local environmental context of early hominid activity

- Date the sedimentary context of any archaeological evidence, through chronometric means such as OSL or amino acid dating, and by biostratigraphic comparison (particularly for mammalian assemblages)

- Identify the depositional and post-depositional processes of sedimentary contexts

Even where direct archaeological evidence is absent, the study of biological evidence has a major contribution to make to Palaeolithic research. As mapping and lithostratigraphic correlations of depositional units are developed in a region, accurate dating of even a few key units can provide foundations to tie in the whole sequence, and its contained archaeological horizons, with the wider national and global frameworks. Dating will most likely be achieved from the study of biological evidence — pollen, large vertebrates, molluscs or small vertebrates — from archaeologically sterile deposits. Thus a central aspect of the Palaeolithic archaeological agenda in any region has to be the discovery and study of such deposits.

Key points — Palaeolithic remains

In summary, the following key points can be made concerning how national Palaeolithic research goals can be addressed:

- The main evidence is lithic artefacts and dietary faunal remains

- It is essential to know the stratigraphic context of such material

- Evidence from *both* undisturbed primary context *and* disturbed secondary context sites is significant

- The interpretive potential of any archaeological material depends upon understanding of depositional and post-depositional processes that have affected it

- Dating is essential to document the degree and spatial scale of contemporary variability, and the trajectories of cultural stasis and change through the changing climatic framework of the Pleistocene

- Biological palaeo-environmental evidence plays a fundamental role in Palaeolithic research, even on sites without artefacts, by contributing to the construction of chrono-, climato- and litho-stratigraphic frameworks

2.6.2 Palaeolithic research priorities in the Thames Estuary

At the regional level, the *Archaeological Research Framework for the Greater Thames Estuary* (Williams & Brown 1999, Section 3.2) defines an overall framework objective for Palaeolithic archaeology and Pleistocene palaeoenvironment of:

- *To increase understanding of the physical evolution of the Thames Estuary during the Pleistocene, and of the social and cultural strategies of early human populations in relation to changes in environment and climate*

This would be taken forward by the specific regional objectives (R) of:

R 1 Developing the framework for, and understanding of, environmental and climatic change during the Pleistocene

R 2 Developing knowledge of the evolution of the Thames drainage system at the regional level, and relating this to other regional terrestrial sequences and the global Oxygen Isotope framework

R 3 Developing appreciation of human interaction with this environment through identifying key areas where primary context sites might be preserved and where evidence relating to current research objectives might be located

The MVPP addressed all three of these specific regional objectives through investigation of both the surviving aggregate resource and remains previously recovered from aggregate deposits. Artefacts in museum collections from known find-spots and contexts were examined. Combined with field investigations to date the source deposits, and new sampling for biological remains, it has been possible to, for the first time, provide a wider picture of Palaeolithic settlement history and cultural change in the region, within the wider framework of Pleistocene landscape and climatic change. The project also involved an intensive survey at a single site to try and investigate models of site formation and to test/enhance the effectiveness of present methods of investigation.

2.7 Aims and objectives

2.7.1 Strategic aims

The core aim of the project was to aid the curatorial community in developing the capacity to manage the Palaeolithic archaeological heritage of the aggregate extraction landscape in the study region. Within this context, there were also intended to be significant contributions towards (a) addressing recognised national and regional research priorities and (b) promoting wider public understanding and appreciation of the Palaeolithic.

The project built on previously collated information about Palaeolithic finds and Quaternary evidence. It combined study of artefact collections from aggregate deposits with (b) fieldwork at key sites. This involved environmental sampling and dating studies to develop an overall framework of settlement history and cultural change within a more secure Pleistocene chrono-stratigraphic context. Enhanced data on Palaeolithic sites and new fieldwork locations was incorporated in the SMR, and the new framework provides an essential context for future curatorial management of the aggregate extraction landscape.

The MVPP had two further strategic aims. Firstly, it was concerned to test and develop current protocols for field evaluation and interpretation of artefactual remains in sand/gravel aggregate deposits. Secondly it was concerned to explore development of a national *Palaeolithic Resource Predictive Model*. The MVPP pilot study used the data collected in the MVPP region to develop, for the first time, a predictive curatorial tool that characterises the Palaeolithic resource and identifies zones of Palaeolithic significance within the context of national and regional research priorities.

Thus MVPP provides both (a) a necessary and useful development of curatorial capacity in the core Kent/Essex study region, and (b) a pilot for subsequent expansion of characterisation and predictive modeling (cf. Section 7) into other regions.

2.7.2 Specific objectives

Eight specific project objectives were identified (cf. Table 6, which identifies how these relate to national and regional research priorities):

1 — Palaeolithic resource characterisation
To characterise the Palaeolithic resource in the study region, and so provide baseline information for the curatorial community on the distribution, Palaeolithic archaeological content and significance of fluvial sands and gravels that are potentially vulnerable to aggregate extraction.

2 — Pleistocene resource distribution and framework
To improve mapping of the distribution of Pleistocene fluvial sands and gravels in the study region, and develop an integrated chronological and lithostratigraphic framework, supported where possible by interpretation of climate, environment and depositional processes/regimes. This provides a context for (a) future investigations in the region carried out in relation to aggregate extraction and other development and (b) archaeological material already recovered.

3 — Hominid settlement history and cultural development
To provide an integrated framework of hominid settlement history and cultural change/patterning in the study region. This arose from combining the improved characterisation with the integrated chronological framework. It provides a context and enhanced research framework for past, present and future Palaeolithic investigations in areas of sand/gravel due for aggregate extraction.

4 — Key sites initiative
To provide an improved context for certain key Palaeolithic sites, particularly Cuxton, New Hythe Lane, Shakespeare Farm, Upnor, Wagon's Pit and Ham Hill. All these sites have produced important Palaeolithic remains, and all are associated with areas of sand/gravel that either have already been, or may in the future be, the target of development or further aggregate extraction.

5 — Predictive Palaeolithic modeling
The landscape of the study region will be divided into zones of different Palaeolithic potential, characterising the Pleistocene context and highlighting areas of high potential, with summaries of the expected nature of Palaeolithic evidence, its significance within the context of national and regional research frameworks, and signposting appropriate approaches to field investigation. This was produced as a GIS layer with linked attribute tables suitable for integration with county SMRs and HERs.

This element of the project served as a pilot for expanding predictive Palaeolithic modeling beyond the study region, building on the work of other projects such as *Palaeolithic Archaeology of the Sussex/Hampshire Coastal Corridor* and the *National Ice Age Network*.

6 —Palaeolithic resource curation
To develop improved methodology for the field evaluation, characterisation and interpretation of Palaeolithic evidence in Pleistocene sand and gravel bodies threatened by aggregate extraction. This included development of a simplified guide for curatorial use summarising the Palaeolithic research framework, the types of evidence that contribute to Palaeolithic research and suitable methods for field investigations, particularly evaluation in advance of extraction or other development (cf. Section 8).

7 — SMR enhancement
To contribute to enhancement of the quantity and quality of Palaeolithic SMR information available to aid curators.

8 — Community appreciation
To promote public appreciation and understanding of "Early Man" and "The Ice Age", through an integrated range of multimedia resources (web, leaflets, posters) and accessible events (talks, displays).

2.7.3 Relevance to ALSF priorities

The project produced a number of benefits corresponding to the priorities of the ALSF in: (a) promoting environmentally friendly extraction and transport (ALSF Objective 2); and (b) reducing local effects of aggregate extraction (ALSF Objective 3). The project:

(a) Develops the capacity to manage the aggregate extraction landscape

(b) Collates and assesses baseline information on the Quaternary archaeology of the study area

(c) Helps improve curatorial decision-making wrt evaluation/mitigation of Quaternary archaeology of aggregate deposits

(d) Develops improved/appropriate methods for field investigations of aggregate deposits

(e) Develops an up-to-date research framework for Palaeolithic archaeology in the study area

(f) Identifies areas of aggregate of potentially higher Palaeolithic significance

(g) Mitigates previous and ongoing aggregate extraction impact where not addressed under present planning conditions

(h) Helps develop understanding and appreciation of Quaternary archaeology in the wider community

2.7.4 Addressing research framework priorities

The project also contributed to a number of current objectives in:

- The national Palaeolithic research framework (English Heritage/Prehistoric Society 1999; Table 5)

- The Greater Thames Estuary regional research framework (Williams & Brown 1999)

3 METHODS AND PRIMARY DATA

Detailed expositions of the methods employed are provided in the original MVPP Project Design (Wenban-Smith 2004) and the subsequent assessment report (Wenban-Smith 2006a). In summary, there were five main elements of the project, supplemented by a range of specialist analyses on material recovered from fieldwork (Table 7).

3.1 Data design and documentation

An Access database was constructed to record information on museum collections of lithic artefacts and fieldwork locations. The structure of the database followed the requirements and guidance of Kent and Essex curatorial staff, and duplicated key SMR entry fields and thesauri. The database and recording protocols were developed and circulated between the other related ALSF projects *National Ice Age Network* and *Trent Valley Palaeolithic Project*, and improved as the project developed. The database also includes a system of lithic technological/typological analysis evolved by FF Wenban-Smith over the last decade for Lower/Middle Palaeolithic material that could perhaps become more widely applied.

The current version of the database structure and the FFWS lithic analysis system is appended (Appendix 2).

3.2 Museum collections study

All known Palaeolithic material in the study region was traced using the information provided in the *Southern Rivers Palaeolithic Project* (Wessex Archaeology 1993), in published sources, in county gray literature and in SMRs. All published primary sources were examined to verify information on the location and context of finds, associated faunal remains and palaeo-environmental evidence. Relevant archival material held in museums and libraries in the study area was also sought. All information on find-spots in the study region and locations of collection holdings was recorded on the project database. All lithic material was examined and characterised technologically and typologically, using the classificatory system developed in the first element of the project (cf. Appendix 2, Annex 1). Data was also recorded on raw material, condition, cortical condition and a digital record shot made of all handaxes, cores, flake-tools and Levalloisian flakes. Several artefacts listed in the Southern Rivers Projects were not located where listed, and so could not be looked at. Conversely, many museums held relevant material not listed in the SRPP and ERPP, and this was recorded for MVPP.

In addition to recording lithic information, all material was attributed to a "Field event" and information collected on its period, instigator, nature *etc.* (cf. Appendix 2, Section 6). Following KCC guidelines, different collection/recovery events at a site were given different Field Event identifiers, based on the same letter code but with an incrementing numerical suffix. New fieldwork events carried out for MVPP were integrated into this record of field events. Unique codes were chosen to avoid overlap, and sequential codes were developed where MVPP carried out fieldwork at sites with historical collections. For instance previous phases of work at Cuxton were allocated field event codes CXTN1, CXTN2 and CXTN3, and then the MVPP fieldwork event code was CXTN4 05.

A full record of field events reflecting MVPP work, sites represented in museum collections and known sites for which the artefacts could not be located is appended (Appendix 3). Overall, material from 30 different sites in the study region was looked at in museum collections, comprising 2027 artefacts (Table 8). Some collections were excluded from study, due to either insufficient provenance (eg. the material from the general Aylesford area), or because publications of recent analyses were more than sufficient to characterise the material in terms of technology, typology and condition (eg. from Shakespeare Farm Pit, Hoo).

For each museum collection studied, summaries were prepared listing the quantities of technological categories (cores, flakes, flake-tools, handaxes *etc.*), the types represented and the presence of any distinctive technological approaches (such as Levalloisian), with an associated breakdown of the proportions of artefacts in different conditions.

The lithic analysis was followed by a reconsideration of all evidence as to the provenance of each collection, taking account of both published information and information discovered during analysis such as date of collection or collector. So far as possible all collections were then tied in with the lithostratigraphic model developed during the project (cf. Section 3.3).

3.3 Geological data collection and modeling

Geological mapping and borehole records in the project area were reviewed, including unpublished annotated large scale maps in the British Geological Survey archive. A range of published and unpublished literature was also consulted for primary geological data, particularly grey literature arising from commercial archaeological investigations (Eg. Peter's Village Medway Crossing, MoLAS 2004) and unpublished PhD theses (eg. Bridgland 1983). The distribution of data available was found to be uneven and skewed towards major infrastructure projects (e.g. Kingsnorth Power Station, Beluncle Gravel extraction area, Medway Tunnel portals, M2/CTRL Medway Crossing, M20 corridor) and relatively poor across much of the region.

In particular the Hoo Peninsula gravel sequences are poorly serviced by this archive; other areas such as the Snodland to Rochester area also poorly provided for with the exception of the M2/CTRL Medway crossing. The Hoo lacuna was to a certain extent mitigated by incorporation of very recent field data derived from fieldwork being done under PPG 16 in advance of proposed gravel extraction at Beluncle Farm.

In total, almost 1250 borehole records were accumulated from these sources. This body of material was then supplemented by over 60 sediment logs recovered from test pits and boreholes carried out specifically for MVPP (cf. Section 3.5).

Stratigraphical details of the sedimentary sequences were entered into Rockworks 2004 stratigraphical software (see Table 9 for the data categories held within the database). Solid and Drift Geological mapping were overlaid onto OS landline data, and then point data representing (a) artefact find spots and (b) MVPP fieldwork sites were added.

This body of work guided attribution of mapped geological deposits to different groups (a) within each of the study areas and (b) between study areas, leading to development of a new lithostratigraphic framework for the region (cf. Section 5). This model then provided the baseline for artefact collection provenancing and identification of new areas of Palaeolithically relevant deposits (cf. Section 6).

3.4 Dissemination and community engagement

A web-site was developed that gives background information on the project, as well as a general and accessible overview of the Palaeolithic. The link to this site is:

http://www.arch.soton.ac.uk/Research/MedwayValley/welcome/index.php

This site was supplemented by a leaflet (reproduced as Appendix 9) that was widely distributed to schools, museums, curators, education officers and libraries within the project area, as well as to all landowners and aggregate extractors contacted in course of the project. The leaflet gives a very basic introduction to the project and the Palaeolithic, and provides the link to the web-site for more information.

An addition to these tangible products, a number of presentations/outreach events took place aimed at expanding the horizons of a diverse audience including farmers, aggregate extractors and the wider public community (cf. Section 4.2).

3.5 Fieldwork

Fieldwork was carried out at 16 sites. Over 50 test pits were dug, 7 sections were cleaned and two boreholes were done. Field data from 3 other sites were also brought into the project, and these provided information (and samples) from 27 test pits, 11 sections and two further boreholes. Summary details of the investigations at different sites are appended (Appendix 4); and full details of the sedimentary sequences seen in the MVPP fieldwork are also given (Appendix 5).

The greatest numbers of sites were in the area KT 4 (Hoo Peninsula). OSL dating samples were taken from 36 different horizons, with 23 of these being represented by duplicate pairs. There were also a range of bulk environmental and clast lithological and samples (Appendix 4). Lithic artefact recovery was generally sparse, with the notable exception of the fieldwork at Cuxton which produced abundant finds from two small test pits. Small quantities of lithic material were found at four other sites. Larger faunal finds were particularly scarce, with material being recovered from only one site.

3.5.1 Phases of fieldwork

Fieldwork was carried out in three main phases:

- Systematic investigation (test pits, boreholes and cleaning of sections in old quarries) of mapped terrace deposits in each of the four study areas KT 1–4; the focus of this work was on exposing sediments suitable for OSL dating or with palaeo-environmental remains, and on sieve-sampling for lithic artefacts.

- Supplementary investigations of a number of key sites that were either known to be of particular potential importance, or where no deposits were mapped, but where the geological modeling suggested the likelihood of unmapped deposits; the focus of this work was on proving the existence of unmapped Pleistocene sediments of potential Palaeolithic significance in certain types of location; when such sediments were found, OSL dating, palaeo-environmental sampling and sieving for lithic artefacts was also carried out. Key sites that were reinvestigated included Cuxton and Upnor, and a number of test pits were dug into mapped Head deposits on both the east and west banks of the Medway to investigate for unmapped buried fluvial terraces

- An intensive test pit and sieve-sampling survey of a specific site earmarked for aggregate extraction

3.5.2 Methods of test pit excavation and sampling

The methods used for test pit excavation and sampling were broadly similar for all fieldwork phases. A detailed exposition is provided in the original Project Design (Wenban-Smith 2004). In summary:

Test pit excavation

Each fieldwork site was given a unique project code, and each test pit a unique number within the site sequence and its location tied in with OS mapping. Test pits were dug with mechanical excavator and were one bucket-width wide, 3–4m long and *c.* 4m deep. Excavation ceased at a shallower depth if pre-Quaternary deposits were reached. Each test pit was taken down in horizontal spits of 15cm, respecting the interface between geological contexts when changes are encountered. The stratigraphic sequence was recorded as excavation progressed.

When Pleistocene sediments suitable for on-site sieving were encountered, samples of 100 litres were numbered and set aside at regular (*c.* 25cm) intervals as excavation progressed, and dry-sieved on site through a 1cm mesh for recovery of lithic artefacts and biological evidence. When the sediment was not suitable for dry sieving, excavation proceeded in shallower spits of 5cm, looking carefully for the presence of any archaeological evidence. Consequently the position of anything found was provenanced to a specific spit sample of known depth within a unique geological context from a unique test pit location.

OSL sampling and *in situ* dosimetry measurement

All bodies of sediment suitable for OSL dating (ie. dominated by coarse silt/fine sand, and constituting a lens of minimum thickness 15cm and ideally 30–40cm) had light-sealed tube-samples taken, supplemented by *in situ* gamma-ray dosimetry measurements. Pairs of samples were usually taken. On some occasions blocks of sediment from locations to which direct access could not be achieved were recovered and light-sealed, but without supplementary gamma-ray dosimetry. Whilst not ideal, reasonable dates can still be obtained from such samples, which mostly comprised borehole U4s and pieces of sediment from the base of deep test pits.

Sampling for palaeo-environmental remains

When suitable sediments were encountered, samples were taken for a range of biological palaeo-environmental remains, namely: pollen, molluscs, ostracods, plant macro-fossils and small vertebrates.

Clast lithological sampling

Major gravel beds were sampled for clast lithological analysis. A certain amount of work has already been done in the study region by Bridgland (1983a, b; 1988) and the technique provides an important means of establishing whether gravel bodies are pre- or post the Anglian glacial period, and whether they are of Thames origin, Medway origin or joined Thames/Medway origin.

3.5.3 Boreholes

Certain sediment bodies were too deeply buried to be accessed by test-pit. Many of these have already been investigated by drilling of boreholes, for instance in the Hoo area, and these were brought into the project. In addition to this material, two new boreholes were carried out for MVPP in Kent. A drill-rig and crew were hired to take a continuous series of 10cm diameter U4 tube-samples and intervening drill-shoe samples down to the base of Pleistocene deposits. These were then sealed for later analysis. A certain amount of sub-sampling has been already been done for environmental assessment.

Of the two boreholes, both at Binney Farm, one provided good continuous sequences of U4/shoe samples through relevant deposits. The other borehole entered the Binney Gravel and confirmed its basal depth, but the gravelly nature of the deposits meant U4 samples could not be recovered.

3.5.4 Intensive test pit survey

This involved intensive test-pitting and archaeological recovery at one location, aimed at investigating the spatial concentration and vertical distribution of Palaeolithic remains within a gravel body, and testing/establishing the most appropriate sampling volumes and test pit density for field evaluation and artefact recovery. After much difficulty a suitable site earmarked for gravel extraction was identified at Roke Manor Farm, Romsey, in the Test Valley, Hampshire (SU 335

237). There was a proven history of artefact finds in nearby gravel bodies, notably the seminal site of Dunbridge, and the extraction footprint formed a transect across the terrace. Over 40 test pits were dug on a closely spaced grid to try and resolve any spatial clustering of artefact finds.

The gravel extraction area comprised approximately 8 hectares. The site was thought suitable for the intensive survey as:

- It was at a level, and in an area, where there is a history of previous Palaeolithic finds, with some sites producing rich concentrations (Eg. Dunbridge)

- The earmarked plot includes two distinct gravel bodies at separate elevations — the westerly end of the site contains a gravel body outcropping between *c.* 60 and 62 m OD; the easterly end contains a gravel body outcropping between *c.* 55 and 58 m OD. Thus investigation allowed the possibility of discovering contrasts in the remains from the different periods represented by each gravel deposit

- The main east–west axis of the earmarked plot runs at right angles across the main flow of the river channel that laid down the two gravel bodies. The site includes areas of gravel both at the palaeo-channel bank and at different distances towards the centre of the palaeo-channel. This makes it possible to investigate whether Palaeolithic remains are more likely to occur near the channel bank, or are evenly distributed across the deposit

Forty-three test pits were dug at intervals of *c.* 40m. These were strung out along the main east–west axis of the site, with a series of north–south transects (Fig. 3). Unfortunately, hardly any artefacts were found in the sieved samples from the gravel deposits, despite two handaxes being found as surface finds in one part of the site. Therefore it was not possible to pursue the objectives of this part of the project. Although not the desired result, the almost complete lack of artefact recovery in fact serves to support one of the ideas the study was designed to test: namely that artefacts are not evenly dispersed throughout aggregate bodies, but are concentrated in accumulations that can legitimately be thought of as "sites".

3.6 Specialist analyses

Following from assessment (cf. Wenban-Smith 2006a), specialist work was focused on the aspects of the field archive that directly led to delivery of the enhanced regional chrono-stratigraphic and Palaeolithic framework. Work was thus focused on dating (OSL only, no molluscan material suitable for AAR analysis was recovered), clast lithology, lithic analysis and molluscan analysis.

3.6.1 Lithic analysis

For the excavated collections, the methods of lithic analysis duplicated those of the museum collection study (cf. Section 3.2), apart from artefacts weren't individually photographed. Summary details of the lithic material recovered from MVPP fieldwork are provided (Table 10), and fuller details (along with the details from the museum collection study) have been incorporated in the data and GIS project (cf. Section 7) provided to KCC.

3.6.2 Optically stimulated luminescence (OSL) dating

Methods for the OSL dating analysis are described in detail in the specialist report (Appendix 6), also submitted independently to English Heritage (Schwenninger *et al.* 2007). Sixteen of the 36 sampled horizons (cf. Appendix 4) were selected for analysis. This selection focused upon the most important archaeological sites (such as Cuxton) and locations that were of particular importance as stratigraphic tie points. Summary details of the OSL results are provided (Table 11), and the implications of these are considered further in sections 5 and 6.

3.6.3 Clast lithology

Samples for clast lithological analysis were taken from six sites in Kent (cf. Appendix 4). It was hoped that these could help distinguish between Thames, Medway and Medway tributary gravels. The full report is provided as an appendix (Appendix 7), and the results are taken account of where appropriate in Sections 5 and 6.

3.6.4 Molluscan analysis

Samples with molluscs potentially worthy of analysis were recovered from three sites (cf. Appendix 4). The full report is provided as an appendix (Appendix 8), and the results are taken account of where appropriate in Sections 5 and 6.

4 PROJECT OUTPUTS

4.1 Curatorial resources

The main outputs of this phase of the MVPP are digital/curatorial resources for KCC. These comprise:

- Updated field event and lithic find-spot records for incorporation in existing SMRs (to be delivered directly to KCC as worksheets within an Excel file)

- A GIS *Palaeolithic Resource Predictive Model* project that delimits, characterises and prioritises the Palaeolithic resource in the study region, identifying areas of known importance as well as areas of uncertainty, and identifying research priorities for different zones (to be delivered directly to KCC as a GIS project with appropriate shape and attribute tables)

- An accompanying report *Palaeolithic Archaeology and Development Control* outlining a revised research framework for the region and reviewing the significance and potential of different types of Palaeolithic evidence and appropriate methods of intervention. Apart for the regionally specific research framework, much of this manual would have wider national relevance in setting out goals, priorities and methods of Palaeolithic archaeology, particularly within the context of development control (this is covered in Sections 6 and 8 of this report).

Details of the digital files submitted to KCC are summarised (Table 12). The range of data submitted in the Excel worksheets within the file GIS (KT-extra).xls is reviewed in more detail in Section 7, as is the overall content and philosophy of the GIS project.

4.2 Community dissemination

As well as the web-site and leaflet detailed above (Section 3.4), a number of events/activities took place over the course of the project directed at the wider public.

- A junior outreach session was held at Aylesford Primary School, Maidstone, talking in general terms about the idea of the past, what archaeologists do and the survival and interpretation of things, with a focus on the Stone Age so far as feasible for young children. The session incorporated handling experience of a range of archaeological artefacts, clothing and equipment and was, in the words of one young participant "much less boring than she had expected".

- A public lecture was given in Maidstone Museum to talk about the project fieldwork at Cuxton, which was fully attended and well-received (cf. Appendix 10)

- The spectacular finds from Cuxton were publicised in the local press and an article was consequently placed on the main BBC web site, with a link to the MVPP site, which generated an enormous number of hits

- A short popular summary of the fieldwork at Cuxton was also produced for the Kent Archaeology Society Spring Newsletter (Wenban-Smith 2006b), reproduced here as an appendix (Appendix 11)

- An assembly was held at the West Cliffe High School for Girls, Southend, providing a basic introduction to the Palaeolithic/Pleistocene and the MVPP work in Essex, and this was supplemented by an article for inclusion in the school magazine.

- During fieldwork at Foulness we had a round-table discussion session at the Foulness Museum with eight members of the local community. These included landowners and other interested parties as well as Peter Carr, the Chairman of the Foulness Conservation and Archaeology Society. We discussed the aims of our fieldwork and the types of questions we hoped to answer in terms of landscape and sea level change in the area. This proved a very useful meeting as Peter Carr in particular was very knowledgeable about the local area, and provided useful advice on the best locations for test pits. We supplied the museum with brochures and details of the project website.

4.3 Academic publication

Academic publication has not been part of the programme to date due to the limitation of resources for post-excavation work, although it is planned to produce some academic output in the following year (cf. Section 9). Some of the site-specific results, notably the spectacular results from the test pits at Cuxton are definitely of national importance.

At Cuxton, the assemblage from test pit 1 includes two spectacular and contrasting examples of the specific handaxe types of ficron and cleaver (Fig. 4), both recovered from immediately beside each other in the same horizon. This discovery is of national importance for its potential to increase understanding of (a) the range and diversity of cultural material and artefact-bearing horizons at Cuxton, (b) the association of particular types of handaxe with particular stages of the Palaeolithic and (c) the cognitive implications of handaxe manufacture at this point in the Palaeolithic.

It has been argued that the manufacture of deliberate types of tool implies a symbolic capacity suitable, for instance, for language, but that handaxes cannot be regarded as conforming to deliberate types. However, the new finds from Cuxton undermine the latter assumption, with the consequence that we should now recognise a higher symbolic capacity in the Lower Palaeolithic than previously accepted. It also appears that the co-occurrence of ficrons and cleavers may be a feature of the terminal Lower Palaeolithic in Britain; a similar co-occurrence is known from later Lower Palaeolithic sites in the Solent region (Roe 2001), and also at the recently discovered site of Harnham in Wiltshire, which has a very similar date to Cuxton (Bates & Wenban-Smith 2003). The significance of the Cuxton finds within the context of the wider regional framework is discussed further below (Section 6.2).

Furthermore the development of an overall regional chronostratigraphic framework and the accompanying history of Palaeolithic settlement and cultural change will be of interest to the national academic community, as well as to the regional curatorial staff. A preliminary note on the finds from Cuxton was published (Wenban-Smith 2004), but this publication did not include the key information of the OSL dating result from the site, which is of particular interest and importance.

4.4 Archive

In addition to the above archival material associated with specialist analysis, the project has produced a substantial paper archive (Table 13) supporting the sampling and artefact recovery, as well as a large collection of digital photographs resulting from fieldwork (c. 250) and the museum collection study (c. 1200).

The written archive from MVPP fieldwork is divided into three sections, detailing fieldwork data for the Kent, Essex and the Roke Manor intensive study site respectively (Table 13). The layout for each is identical and is set out as follows: The *Site index* provides summary information (including location and geology) for sites in each county, listed by four regions (EX1-EX4 and KT1-KT4), while each site will also have appropriate *Site layout/location maps*. Each site has a *Site investigation summary,* in which information relating to the test-pits, sections and/or boreholes that may have been carried out is recorded. Each will be provided with its NGR, surface height and context data, along with a list of any samples that were taken from particular contexts and any finds from those contexts. *Section drawings* are stored for each test-pit or section investigated, giving context descriptions, and written *Borehole logs* are also in this part of the archive. The *Sediment samples* section of the archive gives information on each sample taken from a site (sample number, context, sample size), what it was sampled for, and when and by whom the analysis process was carried out. The *OSL samples* section records which sites had such samples taken and details codes and times for each sample. The *Finds* section lists each artefact found at each site (by context), while the *Photos* section details each digital photograph that was taken at each site (including direction and a description of the photograph). The *Survey sheets* are provided to keep information regarding the various height levels that were recorded during the surveying of test-pits or sections. Finally, the last two parts of the archive hold correspondence, notes and administrative information (a) by site and (b) non-site specific.

These latter three sections have not been digitally entered, whereas all other sections have been typed up into Word tables. There is also a digital file with test pit survey data from the Roke Manor intensive study.

In total, the paper archive comprises almost 600 items. Agreement has been reached that the artefacts and relevant accompanying paper archive from the project will be lodged at the Maidstone Museum and Bentlif Art Gallery (archaeological curator: Giles Guthrie) once all reporting and analysis has been completed.

5 GEOLOGICAL FRAMEWORK

"A most beastly place: mudbank, mist, swamp, and work"
(Charles Dickens, Great Expectations, Chapter 28, referring to the Medway/Hoo area)

5.1 Geological background

Local topography of the study region is dominated by the twin rivers of the Thames and Medway either side of a ridge of higher ground known as the Hoo Peninsula and the chalk of the North Downs. The Medway has been active throughout the Pleistocene (Bridgland, 2003) (Table 14) and rises in Ashurst Forest, in the centre of the Weald from where it flows northwards through Kent and the Chalk escarpment of the North Downs to join the easterly flowing Thames at Sheerness. Earlier in the Quaternary, the pattern of river drainage across the area now occupied by the Thames Estuary was very different when the confluence with the Thames was to the north in Essex (Bridgland, 2003). Today substantial tracts of sand/gravel aggregate deposits exist from the Maidstone area to the Hoo Peninsula that document these former courses.

5.1.1 Basement geology and geomorphology

The study area lies at the margins of the basin known as the London Basin and the Weald Anticline. The central feature of this region is the Chalk of the North Downs that separates the estuary of the modern Medway (bounded to the west by the Hoo

Peninsula) from the Maidstone region. Through the chalk of the North Downs the river occupies a narrow, steep sided valley. To the north and south of the North Downs Gap (Figure 5) the river occupies a wider valley form in which extensive morphological terraces of the river exist. The river may therefore be divided into 3 distinct zones:

1. Maidstone Medway area. KT1

This area forms part of the Weald Anticline in which Lower Cretaceous sediments of the Wealden Beds, Atherfield Clay, Hythe Beds, Sandgate Beds, Folkestone Beds and Gault Clay are present. Gault Clay forms the base of the North Downs scarp slope. The river is relatively unrestricted through this region and has deposited sand and gravel over a wide area in the vicinity of Maidstone. Gravels here are derived from the deposits present within the Weald.

2. North Downs area. KT2/3

This area forms the northward dipping northern limb of the Wealden Anticline consisting of Lower, Middle and Upper Chalk. The North Downs present a steep south facing scarp slope and a more gently dipping northwards facing dip slope. Dry valley characterise much of this region. The gravel deposits associated with former courses of the Medway are present within this area and consist primarily of flint derived from the Chalk mixed with clasts derived from the older deposits of the Weald. Head deposits characterise the dry valley systems.

3. Medway Estuary/Hoo Peninsula area. KT4

Younger Eocene sediments occur within the synclinal feature between the Chilterns and the North Downs (Sumbler, 1996; Ellison, 2004) that define this part of the study catchment. This structure defines the distribution of the local basement geology of the study area which is dominated by the Thames Group sediments to the east with elements of the Lambeth Group, Thanet Sand Formation and the Upper Chalk towards the west end of the study area. These differences in bedrock geology have important implications for the nature of the overlying superficial geologies in terms of both the nature of sedimentary sequences and the preservational potential of the deposits. For example, the Thames Group sediments (London Clay) forming the spine of the Hoo Peninsula contribute significantly to the formation of Head deposits throughout the Hoo. This contrasts with the gravel bodies that are largely derived from the Chalk bedrock of the North Downs. Within this area gravel bodies are usually sterile of fossiliferous material while in places the ‘Head’ deposits may contain fossil plant and animal remains such as those reported at Allhallows Golf Course (Bates *et al*., 2002) and Kingsnorth (Bates, 1999).

5.1.2 Pleistocene sediments

Pleistocene sediments throughout the study area (Table 14) consist of material from the River Medway with the exception of the Grain Gravel that is part of the Thames system. Until c.500,000 years ago the Medway, that had been in existence for over 2,000,000 years, drained northward from the centre of the Weald and was confluent with the Thames in eastern Essex (Bridgland, 2003). Consequently the landscape of southern England was substantially different to the present day. This geography was modified by the advance of ice to London in the Anglian period around 500,000 BP when the course of the Thames was diverted further south. The new course of the Thames joined with the Medway north of the Hoo Peninsula, and the combined river flowed across southeast Essex to enter the North Sea at Clacton (Bridgland, 2003, 2006).

Today evidence for these earliest courses of the Medway exist as bands of sediments distributed along the spine and eastern side of the Hoo Peninsula, through the North Downs Gap and into the area around Maidstone. Considerable difficulties have been noted when attempting to correlate deposits along the river due to the presence of the Chalk gorge in the North Downs Gap (Figure 5) in which relatively few deposits have been mapped as well as the gorge to the south of Maidstone through the resistant sandy limestone of the Hythe Beds. Consequently despite the geological mapping to produce a substantial body of Quaternary research (eg. Dines *et al*., 1954; Lake *et al.,* 1977; Bates *et al.,* 2002; Bridgland, 2003) the basic distribution of fluvial sands and gravels as well as other Pleistocene deposits of relevance to the Lower/Middle Palaeolithic within the study area is known but poorly dated and correlated. For example, within the Hoo area deposits are relatively abundant and well-mapped however, older Pleistocene sediments may be buried and obscured by substantial accumulations of younger colluvial deposits. Consequently considerable difficulties are still encountered in attempting to determine the precise number, age and correlation of the deposits within this area prior to attempting correlations with deposits in the North Downs Gap or Medway Maidstone area.

5.2 Pleistocene geology of the Hoo Peninsula

Both Bridgland (2003) and the British Geological Survey identify at least eight distinct terrace aggradations spanning the Middle to Late Pleistocene in the Hoo area (Bridgland, 2003) (Table 14). Other investigations (Lake *et al*., 1977) have established that the area also contains deeply buried channels (not incorporated adequately into either the Bridgland or BGS models). Bates (1999) and Bates *et al*. (2002) have shown that these channels may contain fossiliferous material in places. Pleistocene deposits are also likely to be buried beneath the alluvium in both systems as terraces or incised channels at various elevations beneath the alluvium. Today our understanding of the Pleistocene deposits of the region are elucidated by reference to work on the major river systems of the south by Bridgland (2006) who provides a model for sequence accumulation and terrace formation. This model has been used to interpret the evidence from the range of resources available to us in the project in order to drive the rationale for further stages of evaluation work. The terraces of the Hoo only exist within the region due to a combination of erosional downcutting and uplift of the earth's crust in southeast England. This has effectively meant that the river has flowed at progressively lower levels thereby preserving sand and gravel deposits as "terraces" high above the banks of the present river channel. On the Hoo a classic "staircase" of terrace deposits is preserved, with successively older deposits occurring higher up the valley sides.

Investigation of the Hoo area as part of MVPP (Figure 10) have attempted to link our stratigraphic observations with those of Bridgland and other workers through terrace long profiles (Figure 6, Table 15) and other on-going projects has indicated the following:

1. Beneath the floodplain of the Medway adjacent to the Isle of Grain a complex sequence of deposits are present. Three possible sequences of fluvial sand and

gravel have been noted buried at elevations below -15m O.D. here. On the basis of our current knowledge for the area it is likely that the highest of these terraces is the oldest and the lowest terrace the youngest with the lowest possibly dated to the very final episode of the Devensian (i.e. post 20,000 B.P. and equated to the Shepperton of the Thames). If correct then the other terraces may be of early Devensian or earlier date (equivalent to the East Tilbury Marshes terrace). These sequences were not examined in detail by Bridgland (2003) and would be time equivalent to the Halling Gravel of Table 14.

2. Beneath the Holocene sediments at the edge of the Medway Marshes floodplain Pleistocene deposits consisting of clay-silts and sands lying sandwiched between gravels have been identified at a number of locations including Allhallows (Bates *et al*., in press) (Figures 7 and 8) and east of Stoke (Figure 9). These may be up to 5m in thickness (Figure 7), vary from estuarine to freshwater in environments of deposition and were deposited under temperate conditions. They have been demonstrated to contain a range of palaeoenvironmental indicators including foraminifera, ostracoda, pollen and plant macrofossils. These deposits are discussed by Bridgland (2003) but are not incorporated successfully into the model described in Table 14. A single age estimate on sediments at Allhallows (KMP 05) provides a date in MIS 4 and probably represents reworking of the fluvial sediments during the Devensian.

3. Greater complexity in sub-surface fluvial sediment architecture is now recognized in the lower slopes of the Hoo than previously. Work at Kingsnorth/Beluncle (Figures 10-13) show that 2 buried terraces are present here that have little surface expression in terms of topographic change (Figure 12) but in which near surface electrical signatures (Figure 13) suggest the complexity of these sequences. Their age is presently difficult to ascertain but recent dating of the higher of these two terraces suggests deposition of fine grained sediments towards the top of the sequences during MIS 8. These deposits broadly correlate with those mapped as the Binney and Stoke Gravels by Bridgland (2003).

4. Boreholes and test pits at higher elevations across the eastern part of the Hoo (Figure 6) demonstrate that Pleistocene deposits including gravels exist both within areas previously mapped by the British Geological Survey as containing river gravel deposits and beyond in those areas mapped previously as Head. This (coupled with the results of the geo-electrical survey (conducted as part of evaluations measures associated with pipeline construction proposals) confirm that fluvial gravels are likely to be more widespread than previously anticipated. Ground investigation density and spacing is insufficient to precisely define boundaries and distributions of these sand and gravel deposits at present. These broadly correlate with those mapped as Stoke (U), Newhall (T), Shakespeare (S), Dagenham (R) and Clinch Street (Q) Gravels. A single date from the Stoke Gravel at Mackay's Court Farm provides an estimate of MIS 7. A single date from the Newhall Gravel at Newhall Farm (NHFM 05) provides an age estimate within MIS 4 and probably represents Devensian reworking of older sediments. A date from the Older Shakespeare Gravel at Dagenham Farm (DGFM 05) provides a date within MIS 6 and probably represents a minimal age for the main body of gravel (perhaps even a date on reworking of the sediments).

5. At Clubb's Pit, Isle of Grain a series of 3 OSL ages indicate an age for deposition of the gravel within MIS 6. This contradicts previous expectations that correlations of the Grain Gravel were to be made with the Stoke Gravel and the Corbett's Tey Gravel (MIS 10-8) of the Lower Thames.

The age of these sequences are constrained at present by geomorphological sequence, contained microfossil data and the OSL dates obtained as part of this project. Assuming normal patterns of fluvial sediment distribution and downcutting then the older sequences will occur at higher elevations in the region. This works well for those sediments deposited under fluvial conditions in freshwater rivers during cold climates. However, extensive sequences of estuarine sediments do exist within the area (e.g. at Allhallows). At present the typical Bridgland model does not accommodate substantial estuarine bodies within the model and therefore care needs to be taken over the use of the Bridgland model in this context. For example microfossil remains from the Allhallows Channel are similar to those at Barling and Purfleet (both sites dated to MIS 9) (Figure 14) however their relationship with the Stoke and Binney Gravels present in the immediate vicinity of the site remains unclear.

Finally some limited fluvial sediments are seen at the foot of the dip slope of the North Downs between Chatham and Gillingham. Buried terraces have also been found beneath the eastern end of the Medway Tunnel site (Barham *et al*., 1995) (Figure 15A). The age and nature of these deposits remains unclear but testify to the Medway flowing further to the east at some point during the past.

An attempt to correlate the Bridgland terraces with those identified in the MVPP project is presented in Figure 16 and Table 15.

5.3 Pleistocene geology of the North Downs Gap

Constriction of the river upstream of Upnor signals the start of the North Downs Gap to a point immediately north of Snodland. Pleistocene sediments within this region (Figures 15 and 16) consist of the following:

1. Dry valley deposits associated with valleys feeding into the east and west banks of the Medway. These valleys, such as that at Nashenden on the east, contain extensive sequences of chalk rich solifluction deposits that may in places be interbedded with late glacial soil horizons (Figure 18).

2. Clay-with-flints on the upper reaches of the valleys and the adjacent plateau surfaces. These are derived from Tertiary weathering of the chalk (in places).

3. Head deposits mantling the valley sides. These typically consist of poorly sorted chalk rich gravels and silts formed under cold climate periglacial conditions. Typically these are likely to be of Devensian date towards the surface but significantly older Head deposits are likely in places. In places Head overlies deeply buried fluvial sands and gravels suggesting the presence of widespread buried fluvial sequences in this area. Age estimates on sediments from the east bank of the Medway at Ringshill Farm indicate a variety of ages of

sediment are preserved with ages of MIS 6 (RHLLF 05, 01) from a test pit towards the base of the valley side and MIS 8 (RHLLF 05, 05) from higher on the valley side.

4. Fluvial deposits existing as remnants of former more extensive floodplains of the Medway. Presently those mapped (e.g. at Cuxton, Figure 15B) are limited in extent however the possibility that more extensive fluvial deposits may exist beneath Head deposits suggests the fluvial sediments may be more common that perceived. Age estimates from Cuxton appear to cluster around the end of MIS 7. This contradicts the anticipated age of the sequence (based on Bridgland, 2003) where a correlation with the Stoke Gravel of MIS 9 age had been anticipated.

5. Fluvial deposits existing as remnants of former tributary systems of the Medway. Terraces are well developed on the west bank of the Medway where a presently minor stream flows into the Medway at Upnor (Figure 15). This valley system through Chattenden and Mockbeggar exhibits an internal sequence of at least 3 river terraces on the south bank. This flight of terraces (linked here to the now-extinct "Higham River") includes those associated with the Frindsbury area. The age of these terraces are likely to be broadly equivalent with those of the Hoo. A single OSL age estimate was obtained from Whitehouse Farm that provides an estimate within MIS 6 for elements of this tributary valley stratigraphy.

5.4 Pleistocene geology of the Maidstone area

Upstream from Snodland through Maidstone to the gorge south of Maidstone where the river traverses the resistant sandy limestone of the Hythe Beds Pleistocene sediments are well preserved on both sides of the Medway. Traditionally five terraces have been mapped by the BGS through this area (Table 14) and include the important fossiliferous site at Aylesford. This site forms the bench mark for correlation within this part of the Medway drainage system and the fauna includes both Ipswichian and Devensian material that is similar to the Kempton Park Formation of the Lower Thames (Bridgland, 2003).

Significantly borehole evidence from this part of the catchment indicates the presence of buried Pleistocene sands and gravels in the vicinity of Snodland (Figure 18) as well as additional terraces, here we designate terraces A to I and demonstrate their relationship to the BGS mapping in Table 15 (Figure 19; 20). A date from New Hythe Lane, associated with Terrace 3 has provided a single age estimate compatible with MIS 8/9 while a single date from Sandling Place (Terrace 3) has given an age within MIS 7.

5.5 Discussion

It is clear from the evidence presented here that the stratigraphic sequences in the different areas are complex and that difficulties in correlation within and between zones are significant factors. The correlations made between the conventional frameworks for the stratigraphy and those identified in the course of this project are shown in Table 15.

It is clear that additional terrace sequences are proposed in both the Maidstone and Hoo areas. It is possible that some of these terraces represent depositional phases within temperate MIS stages but at present the lack of interglacial deposits and the problems encountered with attempting to place the estuarine sediments of the Hoo area within the terrace framework makes it impossible to define a firm correlation framework for the area.

6 PALAEOLITHIC SYNTHESIS AND RESEARCH PRIORITIES

6.1 Introduction

At the outset of the project four areas for separate study were defined along different stretches of the Medway downstream from Maidstone (cf. Section 2.4). These areas were:

- Maidstone (KT 1)
- Medway Gap (KT 2)
- Rochester (KT 3)
- Hoo Peninsula (KT 4)

These areas were based on natural hiatuses in the downstream progression of the Medway, alongside different character areas and groups of Pleistocene geological mapping. The details of the Pleistocene deposits in these areas are fully reviewed above (cf. Sections 2.5 and 5) so they are not fully reiterated here. In essence, the main concentrations of Pleistocene deposits are the relatively extensive terrace sequences at each end of the project area, and deposits are relatively sparse and poorly mapped in the intervening area. On the Hoo Peninsula, where much previous mapping and analysis has taken place, particularly by Bridgland (2003), the soft Tertiary deposits have been conducive in the formation and preservation of at least eight, and perhaps as many as ten, distinct terrace formations at different levels. Further upstream at Maidstone, the British Geological Survey have mapped a number of fluvial gravel outcrops at various heights, and grouped these into five distinct terrace formations.

For the purposes of this project, the terrace formations in each of these two main areas were studied separately. Terraces in the Hoo area were attributed to a series of formations starting with the letter Z for the lowest buried Devensian Channel, and then working one's way progressively back up the alphabet, ultimately reaching as far as O for the high level gravels outcropping at Lodge Hill, making 12 distinct formations being recognised. In the Maidstone area, the lowest buried Devensian channel was given the letter A, and progressively higher terraces numbered forward through the alphabet, ultimately reaching the letter I at Barming Heath, making nine distinct terraces. A tenth (DE) was also provisionally recognised in the intervening area, although it remains uncertain whether this is truly a distinct terrace, or a slightly greater than usual altitudinal excursion from either of the adjacent terraces D or E.

Thus there is a reasonably good correlation purely in terms of the number of terraces between both ends of the project region. However it proved difficult to move from the local relative chronologies to a unified absolute dating framework. The main technique applied was OSL dating. Often this gave results that matched expectations, but on occasion it gave results at marked variance with downstream correlations made with reasonable confidence. A complicating factor was that OSL dating was usually applied to fine-grained sand bodies that directly overlay the main gravel deposits associated with a terrace. Although it was hoped that these sands would usually have formed shortly after the underlying gravels, it is always possible that some sedimentary junctions reflect a significant chronological gap, therefore invalidating our dating. Absolute chronology and correlations with the MIS framework are discussed more fully in Chapter 5 (cf. Table 15), and this chapter focuses upon local stratigraphic sequences. Nonetheless, attention is paid to some dates on good sand deposits indisputable associated with key archaeological material, such as at Cuxton (KT 2).

It became clear in the course of the project that the concentration of Pleistocene terrace deposits mapped between Higham and Chatham on the west side of the Medway downstream of the sharp kink in its course at Frindsbury could not be related to the mainstream Medway, but must be associated with a west bank tributary, entering the main Medway from the northwest. Consequently a fifth study region was defined for this group of deposits (KT 3a), provisionally associated with a now-defunct "Higham River". This region now has its own group of terraces, the downstream ones of which can be correlated with the main Medway sequence at Frindsbury (where we now interpret those recorded in Cook and Killick's (1924) classic section as Higham River rather than Medway gravels); upstream, correlation quickly becomes problematic, as evidenced by the recovery of an indisputably Levalloisian core deep within terrace deposits at 40 m OD, only about 3 km upstream from the presumed Higham–Medway confluence.

The main end products of this stage of the Medway Valley Palaeolithic Project are the archaeological data and assessment separately provided to Kent and Essex County Councils. This summary chapter briefly reviews the geological framework and associated Lower/Middle Palaeolithic evidence in each of these study areas, and provides summaries of priorities for future research in the individual study areas and the region as a whole.

6.2 Maidstone (KT 1)

6.2.1 Maidstone — overview

The highest (and consequently oldest) terrace deposits associated with any finds are those at Barming Heath (Terrace I), where Harrison (1888) found at least two handaxes on the surface. It is uncertain therefore whether these originate from the gravels, or whether they are residual finds resulting from deposition on the pre-existing gravel surface long after its formation. Unfortunately no information was available on the type and condition of these finds, although this information is potentially recoverable through assiduous research in the Harrison archive at Maidstone Museum. Another relatively high level find is the handaxe from Sandling (Terrace F), although again provenance details are lacking. Deposits of this terrace were exposed and OSL dated at Sandling Manor for MVPP, but the resulting date of c. 200 ka (Table 11, RLAHA-X2677) was discounted as being unfeasibly low. It seems likely either that there was some problem with the OSL sample, or that the bedded sands/silts that were dated were younger colluvial deposits rather than part of the main terrace aggradation.

Lower/Middle Palaeolithic evidence becomes more abundant in Terraces E, DE and D. The main sites are:

- Terrace E: the Preston Hall Sand/Gravel Pit
- Terrace DE: New Hythe Lane Pits
- Terrace D: Silas Wagon's/Nico Pits complex at Aylesford and Ham Hill Pits near Snodland

The Preston Hall Pit was reliably relocated by dint of the inscription of latitude and longitude on a fine ficron recovered from the site (Fig. 21), although it is possible that the site included excavations into both Terraces E and DE in different parts. The collections from the site include the afore-mentioned ficron and several cleavers, all very reminiscent of the assemblage from Cuxton (cf. Section 6.3.1), which would make it desirable to relate the deposits to the same terrace; in this synthesis, however, here we relate Cuxton to Terrace DE, although it is a fair distance downstream past the Medway Gap, which perhaps causes problems for long-profile correlations.

There is a large collection of material attributed to "pits at New Hythe Lane" (Roe 1981, p.260). This collection includes quite abundant fresh condition Levalloisian material, as well as a range of pointed and sub-cordate handaxes, many of which are also fresh or slightly rolled. However there are well-documented (Roe 1981) doubts over the provenance of this material, some of which may have come from other pits in the vicinity. The Terrace DE deposits at New Hythe Lane were OSL dated for MVPP to 300.16±29.23 ka (Table 11, RLAHA-X2672). However this result was singled out as being more unreliable than the others, due to (a) a suspiciously low Potassium content, and (b) increased inter-aliquot variability, suggesting some sedimentary reworking and contamination (although the sampled section was one of the cleaner and most nicely fluvially bedded units dated).

The most abundant material in this area comes from the various sites excavated into Terrace D. This includes a wide range of handaxe types (pointed, sub-cordate and cleavers), as well as Levalloisian material. The Terrace D deposits at the Aylesford Sand Quarry were OSL dated to c. 250–270 ka by Toms in 2004 (Jarzembowski pers. comm.). It is worth noting (a) that lower terrace (B–C) deposits outcrop in the southern side of the quarry and (b) that the original quarry landscape was overlain by extensive sheets of solifluction gravels sweeping down the south-facing slope of the Wealden scarp. Both these factors could have led to the discovery at the site of archaeological material not related to Terrace D.

In addition to the finds from higher terraces, at least two *bout coupé* handaxes have been recovered from gravels (Terraces B and A) associated with the current Medway alluvium between East Malling and Snodland. These reflect Neanderthal occupation in the later part of the last Ice Age.

Overall, very similar material is attributed to Terraces E, DE and E. Frustratingly, none of the material is precisely provenanced to specific horizons at specific locations. However, reasonably abundant remnants of these terraces survive in the area, and MVPP has been able to develop a good understanding of where these are and how they relate to each other litho-stratigraphically. OSL dating work has also provided an initial dating framework suggesting these terraces probably span the period MIS 10 to MIS 8, c. 350,000 to 250,000 BP. Therefore it is to be hoped that future investigations targeted at surviving fluvial terraces in the area lead to recovery of better provenanced finds, and that it might consequently be possible to investigate cultural change in more detail over this period.

If this dating is right, it would suggest that Terraces F, G and H (mapped as BGS T3–4) are related to the period MIS 12–10, and thus, based on the prolific evidence in the Thames deposits elsewhere in Kent (eg. at Swanscombe), might be expected to contain material. There is however, just one dubious record from these terraces in the area (Sandling). This is perhaps merely a factor of investigation. Quite extensive spreads of these terraces extend east from Maidstone along the Len Valley (including one in the vicinity of County Hall!) and these perhaps should also be targeted for investigation.

Finally, although no artefacts have been recovered, it is worth drawing attention to the potential of the various outcrops of Head Brickearth that occur in the area, capping the plateau of Hythe and Folkestone Beds. TL dating of one patch of these brickearths at Spotlane Quarry (TQ 794541) produced a result of c. 50k BP (Parks & Rendell 1992). This is contemporary with the Mid-Late Devensian Neanderthal occupation of the area, and it is possible that this deposit might in places (as in the much deeper loessic deposits of north France) preserve undisturbed evidence of Neanderthal activity.

6.2.2 Maidstone — key questions/areas for further investigation

- Artefacts in Terrace I (BGS T5) at Barming?
- Artefacts in Terraces F, G and H (BGS T3–4)?
- Deposits/finds in vicinity of Preston Sand Pit (TQ 72331 57641); more than one terrace?
- Brickearth
- More intensive logging and geo framework construction
- Notable staircase of well-defined (and archaeologically rich) deposits at Ham Hill, representing Terraces E, D, C, B and A

6.3 Medway Gap (KT 2)

6.3.1 Medway Gap — overview

The majority of Pleistocene deposits in this area are deep sheets of colluvial/solifluction deposits that line the sides of the Medway Valley as it cuts north through the North Downs towards the Thames, fed by dry valleys cut into Chalk bedrock. However, there are occasional fluvial outcrops, and two contentions investigated by MVPP were (a) that the extensive colluvial/solifluction deposits buried terrace deposits, and (b) that, if present, these deposits might have good archaeological potential.

High level fluvial gravels of Terrace G (BGS 4) outcrop in places along the east side of the Medway, and these were investigated at Ringshill Farm (TP 6, TQ 758651), but no artefacts were found.

Fluvial deposits of Terrace E outcrop at Snodland, and are also present in the vicinity (proved from boreholes) under Head deposits. These deposits form the upper part of the notable terrace staircase exploited by quarrying at Ham Hill. Although no finds are known from the Snodland Terrace E deposits, this is perhaps because they are mostly deeply buried and have not been quarried, but have mostly been built over. Buried fluvial gravel deposits of Terrace E were identified by MVPP at Whittings Farm (TP3, TQ 702637) beneath 3 m of colluvial overburden, and at Ringshill Farm (TP 11, TQ 718655). One small waste flake was found at Whittings Farm, which may not seem much, but it does (a) prove human presence in the area at or before this period, and (b) provide a possible indication of the richness of the deposit if more extensive sieving is carried out, since this was the outcome of sieving only 350 litres of the gravel. The Terrace E outcrop at Ringshill Farm was OSL dated to 268.64±29.64 ka (Table 11, RLAHA-X2674). High inter-aliquot variability for this date indicated likely grain contamination, suggesting that the true date is probably older. This brings it broadly into line with the dates for Terraces D and DE in the Maidstone area (cf. above).

Terrace DE is represented by the small outcrop of fluvial deposits at Cuxton, which may be equivalent to Terrace D, but might also be a separate, and slightly older and higher aggradation. This outcrop is notable for the spectacularly prolific Lower/Middle Palaeolithic finds recovered on previous occasions (Tester 1965; Cruse *et al.* 1987). Previous work by Bridgland (in Cruse *et al.* 1987) has confirmed that the terrace is part of the main Medway river system, and not associated with the west bank tributary that enters the Medway from the west here (here provisionally named "the Luddesdown River"). The main focus of the MVPP in relation to Cuxton was to OSL date the Medway deposits, and this was achieved with two dates of different sand beds in the terrace. The lower date, within the sediment sequence associated with the main handaxe-rich horizons at the site, was 232.64±13.75 ka (Table 11, RLAHA-X2561) BP. The upper date, above an erosional break associated with possible development of a palaeo-landsurface (which incidentally was associated with mint condition *in situ* debitage), was 197.54±17.09 ka (Table 11, RLAHA-X2563).

Archaeologically, the Cuxton outcrop is associated with abundant handaxes — predominantly pointed forms (including several ficrons), but alongside a small but significant proportion of cleavers — and a relatively high proportion (for an Acheulian site) of unstandardised flake-tools. There is no Levallois material from the site. One of the test pits dug for MVPP (TP 2, TQ 711 665, the one which exposed the dated sediments discussed above) also produced abundant material of exactly this nature, including a giant ficron and an equally giant cleaver, lying side by side in the same thin bed, confirming the co-occurrence of these two highly contrasting handaxe types in the same cultural tradition at this period. The OSL dating of Cuxton places it in early MIS 7, or right at the end of MIS 8. This would make it the youngest Acheulian site in Britain (and perhaps Europe), which is in keeping with (a) the increased focus on, and variety in, specifically shaped forms of handaxe and (b) the MIS 8 date on another similar site at Harnham in Wiltshire (Bates & Wenban-Smith 2003).

No younger/lower terraces than that of Cuxton are mapped in the area. A patch of gravel at Ringshill Farm mapped by BGS as T2 was investigated (TQ 719660) but this proved to be entirely Head Gravel solifluction deposits. Two stray surface handaxe finds from the west side of the Medway (Starkey's Farm, and from near the old church at Burham (Wessex Archaeology 1993)) are from a suitable level to be associated with Terrace D, but clearly their provenance is too imprecise to be relied upon, and they are most likely residual finds derived from the North Downs plateau capped with Clay-with-flints, or the lower junction of the Clay-with-flints with Chalk bedrock, which must have been an attractive area for Lower Middle Palaeolithic activity, exposing flint raw material.

During the MVPP, attention was drawn to construction work on a roundabout on the A228 at Holborough (TQ 704 626). Closer inspection revealed fluvial sand and gravel between 10 and 13 m OD, buried beneath almost 5 m of chalk and gravel solifluction deposits. These fluvial deposits were correlated with Terrace D and, although no artefacts were found, OSL dating of the sand capping the gravel produced a date of 181.55±13.68 ka (Table 11, RLAHA-X2478).

Finally, the patch of Clay-with-flints in the northeast of the area at Ranscombe has produced quite numerous handaxes with shapes varying from pointed/sub-cordate to cordate. This material can be regarded as residual. None of these handaxes can have moved far from where they were originally discarded, but, stratigraphically, they form part of a palimpsest of material in which all finds from the last 500,000 years (and any of even greater antiquity) are combined into a single horizon. Thus, although they do represent Palaeolithic activity on the Clay-with-flints plateau, they cannot be linked to any period of activity, which lessens their value for current research.

The most notable feature of this area is the general lack of material and deposits, other than the single spectacular site of Cuxton. The key questions are: is this because there is nothing there? Or is it because we haven't yet identified and investigated potentially relevant deposits? Two aspects of the area seem to require further attention before we accept the former. Firstly, as indicated by both the Whittings Farm test pitting and the sequence revealed on the A228 roundabout at Holborough, it does seem likely that terrace sediments are present, but deeply buried, under the sheets of colluvial/solifluction deposits that flank both the east and west sides of the Medway Valley in the area. The fact that they are deeply buried may mean, that if Palaeolithic remains are present, they have well-preserved fauna in association which would make them of high importance.

Secondly, there may be small, unmapped outcrops of terrace deposit in various places. Two places of high potential on this basis are: (a) up and down the main Medway Valley in the vicinity of Cuxton; and (b) along the flanks of the dry tributary valley that enters the Medway from the west at Cuxton, coming from Luddesdown and hence here provisionally named the Luddesdown River. Although there is now no stream in this valley, it must have contained substantial drainage periodically through the Pleistocene, and terrace remnants may be preserved at various places along its flanks.

6.3.2 Medway Gap — key questions/areas for further investigation

- Buried terraces under colluvium above east and west sides of Medway
- Unmapped terraces in "Luddesdown River"
- Unmapped outcrops of artefact-rich deposits in Cuxton vicinity

6.4 Rochester (KT 3)

6.4.1 Rochester — overview

On the west bank of the Medway, a large and fresh condition pointed handaxe was recovered from Strood Hill (Evans 1924). Besides being a fine specimen, the site is associated with a patch of gravel at c. 80 m OD mapped by the BGS as Head, although there is no obvious source of sediment, this being one of the highest points in the local landscape. The gravel, if fluvial, is likely of Lower Pleistocene date, making it most likely that the handaxe is a residual find discarded on the gravel surface at some point in the Lower/Middle Palaeolithic. There are various other gravel outcrops in the vicinity, many probably representing high level terrace remnants of Anglian and pre-Anglian date. Some may contain early archaeological material.

On the opposite side of the Medway, numerous handaxes have been found associated with deposits of Terrace D, DE and/or E deposits in Gillingham (MVPP zone 22) (Wessex Archaeology 1993). Due to its urban nature, it was not possible to carry out further investigations in this area as part of MVPP. However, it is clearly a locale that merits further investigation, particularly in advance of any development, with a view to clarifying the source of existing collections, making new and reliably provenanced collections, mapping/distinguishing terrace outcrops more accurately and dating them, and recovering biological remains.

Intruding into this area from the southeast is a dry valley (the Luton Valley), which must regularly throughout the Pleistocene have formed a sustained water course ("the Luton River"). Handaxe finds are abundant at the head of this dry valley, and at various points along its southern flank (MVPP zone 26), particularly from the gravel quarry at Stonecross. Patches of gravel at various points between the small dry valleys which enter the Luton Valley from the south are mapped by the BGS as Head, but this is probably erroneous, and they probably represent Luton River terrace deposits. Considering their proven Palaeolithic potential, and the potential for faunal/biological preservation due to the Chalk bedrock, these outcrops merit further investigation. Being a tributary, it is not possible to relate these outcrops to the main Medway system, since they occur upstream from the Medway confluence.

A *bout coupé* handaxe was recovered from the eastern side of the Medway Tunnel crossing in the early 1990s (Allen et al. 1995). However, despite being recovered relatively recently as part of a formal archaeological investigation, and being a rare instance of mid/late Devensian Neanderthal presence in the UK, it is very unclear from the archive report (ibid.) what its stratigraphic attribution was in relation to the wider Medway terrace system. It appeared to come from a silt/sand bed overlying Terrace B (BGS T1), but which contained Holocene archaeological material. The handaxe probably has been derived from the underlying terrace.

6.4.2 Rochester — key questions/areas for further investigation

- Further investigation of Medway terrace deposits at Gillingham
- Devensian occupation associated with Terrace B

- Unmapped terrace remnants on west bank of Medway, either outcropping, or buried under Head

6.5 Higham River (KT3a)

6.5.1 Higham River — overview

This area has been treated separately because (a) it relates to a tributary rather than the main Medway, and (b) it contains relatively abundant and potentially significant terrace remnants and Palaeolithic material. There is a well-defined staircase of terrace deposits preserved at Wainscott (mapped as Head, T2 and T3 respectively by the BGS). These outcrop in the classic section at Frindsbury quarry, recorded by Cook and Killick (1924), which is here interpreted as showing deposits associated with the Higham River tributary, rather than the main Medway., although at this point they are so close to the confluence with the Medway that they can be tied in with the Medway terrace system.

First and foremost among the archaeological sites of this area is the rich flake/core dominated assemblage from Frindsbury. This was not however associated with a fluvial terrace, but was contained in a depression in the Chalk bedrock above the bank of the upper terrace, here correlated with Medway terrace E. The collection is dominated by large flakes struck from one preferred face of flint cores, and thus is to a certain extent proto-Levalloisian, although there is no indication of any attempt to influence in advance the shape of the resulting flakes. The date of the site is uncertain, but if one speculates that it is sited above a river which was flowing at the time of its formation, then it is associated with Terrace E, which we are here broadly correlating with MIS 10–8.

One of the important aspects of Frindsbury is, not so much its archaeological content, but that it exemplifies a type of site formation process that can lead to the preservation of minimally disturbed Palaeolithic remains on Chalk bedrock slopes, which is not normally a topographic situation that would be regarded as of high Palaeolithic potential. Another similar site is Red Barns in Hampshire (Wenban-Smith *et al.* 2000). In both instances, Lower/Middle Palaeolithic activity has taken place in a minor, relatively horizontally based, depression within an area of sloping ground. The evidence has then been gently buried by fine-grained colluvial slopewash deposits that have sealed it with minimum disturbance. Similar sites could be present at many places in areas of sloping Chalk bedrock where colluvial sediments are thought to have been forming over substantial periods, and attention should be paid to monitoring for their recovery, particularly as they are likely to contain undisturbed material from short periods of occupation; such situations may also favour faunal and palaeoenvironmental preservation.

An attempt was made to relocate the site of the Upnor elephant, hoping to clarify its date and perhaps reinvestigate the associated sediments. The original site location was easily identified (c. TQ 758603), but we did not relocate the original context. The site is in a parcel of land that has been used for training for over 100 years by the royal engineers, and this has involved extensive earth movement and re-landscaping —the elephant was originally discovered by a trench-digging exercise. The elephant does not seem to have been contained in fluvial sediments, and therefore cannot be related to the

MVPP Medway terrace framework, so its age is uncertain, although it is at a level correlated with Terrace DE or D, which would tie in with MIS 7. An additional point is that, contrary to the Southern Rivers Project (Wessex Archaeology 1993), the original reports on the site (eg. Bather 1927) explicitly state that no artefacts were recovered in association, so there is no indication that it is associated with any hominin activity.

The test pit dug at the site for MVPP reached fluvial gravels deposits at a lower horizon, equivalent to Terrace C of the new MVPP Medway framework, and these produced two flint artefacts from just one gravel sample of 100 litres. No other finds were identified from Terrace C in the course of the project, which might make this worthy of further investigation, although deposits in the vicinity are heavily disturbed due to centuries of military training.

The Higham River terrace staircase extends from Upnor northwest under Wainscott, where it is transected by the cutting for the A 289, and it is unfortunate that monitoring and recording did not take place when this cutting was made. A number of test pits were dug by MVPP in the widespread colluvial deposits even further northwest in the vicinity of Higham, in a field owned by Whitehouse Farm (TQ 727718) to investigate for the presence of buried terrace deposits. This operation was successful, and a significant body of fluvial gravel was identified at c. 40 m OD. Correlation and dating of this body is problematic, since, despite its high level and old-looking clast lithology (cf. Bridgland's clast lithology report, Appendix 7), the gravel contained a neat Levalloisian flake core. Overall, there are (a) definitely buried terrace deposits of potential Lower/Middle Palaeolithic interest in the vicinity and (b) there is something unusual going on in this area concerning the Pleistocene history of landscape development and sediment deposition — both should be investigated further.

It is also worth remembering that the giant Stopes Collection (held at Cardiff Museum) includes a number of handaxes from the Higham area, catalogued as find-spots 54 and 55 (Wenban-Smith 2004). Three very nice ovate handaxes came from a site called Odgers Street, Higham, which was the only site that could not be relocated.

Finally, parts of a mammoth tusk have been reported from roadworks in the vicinity of Four Elms roundabout (c. TQ 751714). In this area, it is most likely that younger Higham River deposits correlatable with Terraces A and B of the Medway are present; as such they are liable to contain similar Ice Age faunal remains, as well as potentially Neanderthal archaeological evidence such as *bout coupé* handaxes. Consideration should be give to archaeological monitoring for these remains in the event of further impacts in the area.

6.5.2 Higham River — key questions/areas for further investigation

- More detailed terrace mapping and Pleistocene landscape history reconstruction
- Systematic investigation for Lower/Middle Palaeolithic remains and associated biological evidence
- Date and context of Upnor elephant
- Undisturbed sites in colluvially buried bedrock depressions
- Date of Whitehouse Farm Levalloisian deposits

6.6 Hoo Peninsula (KT 4)

6.6.1 Hoo Peninsula — overview

As discussed above, we have not for MVPP attempted to finalise a correlation of the Hoo terrace sequence with the Maidstone sequence, but have retained a separate sequence from Z (buried Devensian talweg) through to O (Lodge Hill Gravel). Possible correlations of this sequence with the MIS framework are discussed in Chapter 5 and summarised in Table 15. The oldest/highest gravel in which artefacts occur is Terrace S (Bridgland's Shakespeare Gravel). At least three handaxes are known from the vicinity of the gravel as 19th century surface finds; but, of greater importance, four artefacts including two handaxes, one of which was recovered *in situ* direct from the gravel, were found during Bridgland's fieldwork in the 1980s (Bridgland & Harding 1984). All the artefacts were rolled, and the handaxes were of contrasting shape, one being pointed (like the earlier surface finds) and the other ovate.

Lithic artefacts are also known from the next terrace down (Terrace T, = Bridgland's original Newhall Gravel, dispensed with in Bridgland 2003). There is one 19th century surface find of a handaxe, and four flakes (3 rolled, 1 fresh) were recovered direct from the gravel by sieving during MVPP, in test pit 1 at Newhall Farm (TQ 830768). Whether these finds represent continued occupation in this terrace, or whether they are derived from nearby outcrops of Terrace S is uncertain.

The only other finds known from Medway deposits on the Hoo (besides a handaxe from the beach at Allhallows, which could have originated from almost any terrace, either Thames or Medway) are associated with Terrace U (Bridgland's Stoke Gravel, equated by him with the Lynch Hill and Barling gravels of the Thames). There is a 19th century surface find of a crude pointed handaxe in the area of Stoke. There is also, more interestingly, a report of a concentration of mint condition material (flakes and two flake-tools) discovered in a possible fine-grained remnant of Terrace U in a quarry cutting at Hoo St. Werburgh. The quarry still exists, although the artefact collection could not be relocated.

A large lump of worked flint was also found during MVPP fieldwork at Clubb's Pit, Isle of Grain, where the main gravel body (equivalent to Barling/Lynch Hill deposits acc. Bridgland) was dated by OSL to 196.10±14.14 ka (Table 11, RLAHA-X2553).

Generally, finds are scarce in the Hoo Peninsula, which is not surprising since it is in an area of Tertiary bedrock lacking lithic raw material for tool manufacture. Bearing this in mind, and considering the low level of quarrying and investigation, it is in fact the prevalence rather than the paucity of finds that is surprising. Q derived/transport?

6.6.2 Hoo Peninsula — key questions/areas for further investigation

- More detailed terrace mapping and Pleistocene landscape history reconstruction
- Systematic and larger scale investigation of various gravel bodies for Lower/Middle Palaeolithic remains
- Investigation of Hoo St. Werburgh site
- Assessment of gravels from the point of view of a viable raw material source

6.7 Conclusions and regional priorities for further work

Overall, the study region contains quite abundant archaeological material, particularly in the Maidstone area, as well as the nationally important site of Cuxton, which was dated by MVPP to early in MIS 7 or the very end of MIS 8. The main phases of occupation seem to be related to deposits in the period MIS 10 through to 7, rather than MIS 12 through to 11 as in other parts of Kent, and indeed as in much of southern England. Whether this reflects the chances of local investigation, the pattern of occupation in the region or problems with the suggested dating remains to be considered. General priorities for further work, as well as the area-specific questions listed above, include:

- Dating work to correlate the sequences between different areas, particularly making the link through the Rochester/Frindsbury area between the Higham River, the Hoo Peninsula and the Maidstone area
- Identifying, mapping and archaeological investigation of buried terraces in the Medway gap
- More intensive collection and analysis of sediment logs to map terrace distribution more accurately
- Looking for pre-Anglian occupation
- Monitoring for further colluvially buried undisturbed sites such as Frindsbury and Red Barns in areas of sloping Chalk bedrock
- Investigation of unmapped terrace systems associated with various dry Medway tributary valleys

7 GIS *PALAEOLITHIC RESOURCE PREDICTIVE MODEL*

7.1 Introduction

The overall concept of the model is to create a GIS resource for the MVPP area that: (a) presents and synthesizes information about the Palaeolithic and Pleistocene resource; and (b) identifies/predicts areas of Palaeolithic potential and importance. The structure and data incorporated in this model have been discussed and agreed with Kent County Council's Heritage Conservation team to fit in with their existing SMR resource. The digital datasets that comprise the PRPM are summarised in Table 16, and have been delivered directly to KCC. The remainder of this section comprises companion text to the digital material, briefly summarising the philosophy behind the PRPM and specifying the datasets and attribute options contained within it.

The MVPP Palaeolithic GIS model includes two main themes:

- Palaeolithic site characterisation
- Palaeolithic assessment zones

7.2 Palaeolithic site characterisation

The project area includes a number of Palaeolithic artefact sites, documented in the Southern and English Rivers Projects. In addition to these there are certain findspots of important environmental remains that are not necessarily in the SRPP and ERPP, but that are of Palaeolithic importance. There are also sites in the "grey literature" that have been discovered/investigated subsequent to the SRPP/ERPP. Finally, there are also some further sites investigated during MVPP fieldwork in 2005 that have produced Palaeolithic artefactual and/or zoological remains.

Each site will be represented by a point grid reference, and will have a related table of data that characterises it and specifies its importance in relation to English Heritage criteria, where applicable for Palaeolithic sites (Table 16). It will then be possible to filter the sites shown by combinations of these data, creating a powerful and flexible tool for representing information about the Palaeolithic resource.

7.3 Palaeolithic assessment zones

Using the enhanced Pleistocene base map with the Solid and Drift geology and the records of Palaeolithic finds, zones of Palaeolithic significance were hand-drawn onto the original base maps developed as part of the working method for investigating the geological framework of the area. These zones (Eg. Fig. 22, representing the Maidstone area KT 1) were then digitised and georeferenced. as polygons within a GIS model project. Although the geological and OS data is not licensed for distribution, the resulting polygons are the main end-product of the process, and these have been passed on to KCC.

Each zone has an associated attribute table that synthesises the Palaeolithic site data and identifies key research framework objectives, landscape zone priorities and strategies for investigation (Table 17).

A key aspect of the PRPM is that it provides a pilot attempt to generate predictions on Palaeolithic potential, based on the occurrence and distribution of artefactual finds and biological remains. These are represented in fields #8–14 of the zonal attributes (cf. Table 17). These include both a primary level of automatically generated data (such as polygon area, and find density within polygons) and also a secondary level (such as higher/lower than average find density in a polygon). One point of subsequent critique for this model will be to compare and contrast the automatically generated assessments of importance (field #14) with those that are the product of specialist consideration (field #15); it is of course possible to tinker with the rules governing the automatic assessments, and this is one avenue of future expansion of the PRPM.

A second, and more fundamental future development of PRPM is a move towards a more dynamic model. The current version of PRPM is static, in that data have been generated independently, and then the values fed into the attribute tables in the model. An improved second generation PRPM would be more dynamic, in that it would incorporate coding that continually revised its predictions and auto-generated content, as additional data was discovered and fed into the data tables supporting the model.

This would be a key improvement upon the *Southern Rivers Palaeolithic Project*, which is the main current curatorial resource for the Lower/Middle Palaeolithic. Although without doubt of great utility as a starting point for reviewing the history of early finds in an area, the SRPP is essentially a static snapshot of information, most of which originates with Roe's survey of the 1960s (Roe 1968a). As was shown by MVPP, when it came to trying to examine the material listed in the SRPP, much of it could not be located.

8 PALAEOLITHIC ARCHAEOLOGY, DEVELOPMENT CONTROL AND A RESEARCH FRAMEWORK FOR THE LOWER MEDWAY

8.1 Development control and Palaeolithic archaeology

PPG 16 serves as a powerful tool to mitigate the impacts of development activity upon the archaeological resource. For this to take place it is, however, vital that those who carry out the curatorial functions of developing archaeological programmes and imposing archaeological planning conditions have a confident understanding of:

- The nature of the Palaeolithic resource
- Palaeolithic research priorities (both national and regional)
- Appropriate methods of investigation to realise the potential of the resource

The Palaeolithic poses particular problems since, unlike all other archaeological periods, the main evidence of human activity is not archaeological features or structures (as in the conventional archaeological resource) but artefacts, and occasionally other evidence (such as cut-marked faunal remains), contained within naturally deposited sediments. Thus it has been possible for some in the curatorial environment to overlook (and sometimes actively dismiss) Palaeolithic remains as "natural" rather than archaeologically relevant, particularly when, as is usually the case, they have been subject to some degree of disturbance by the natural burial processes that have led to their preservation. It has in the past often been easy, therefore, for some in the curatorial environment to focus on artefacts from undisturbed occupation surfaces as the only type of Palaeolithic evidence worthy of mitigation, and disregard the evidence from a wide range of other contexts. Part of the following discussion directly addresses this perspective, and attempts to explain why derived material is of importance for Palaeolithic research.

A second potential area of disagreement concerns the importance of various faunal and palaeoenvironmental remains. Despite the value of biological and palaeo-environmental remains in enhancing understanding of the wider landscape, in other parts of which human activity may well be contemporarily occurring, some curators and consultants are reluctant to impose archaeological conditions under PPG 16 unless there is direct evidence of human activity. This is not solely a concern of the Palaeolithic/Pleistocene research community but has equal resonance for the wider archaeological community.

This section attempts to provide a curatorial introduction to the Palaeolithic resource, explaining how, alongside undisturbed remains, the significant Palaeolithic resource also embraces disturbed/transported artefacts, as well as faunal remains, palaeo-environmental evidence and artefactually sterile deposits. All these types of evidence contribute to addressing national and regional research priorities (cf. Sections 2.6 and 8.3). Even though the importance of a patch of Pleistocene river gravel may be less immediately apparent than a well-defined Roman villa, both have their role to play in studying the respective periods, and both are worthy of appropriate evaluation and mitigation under PPG 16.

It is not possible to provide a recipe book of methods for each and every situation. The Palaeolithic resource is too diverse. Nonetheless, some guidelines are presented on how the key archaeological investigative stages of desk-based assessment, field evaluation and mitigation should be approached.

8.2 The Palaeolithic Resource

8.2.1 Pleistocene deposits

The Palaeolithic resource comprises all material remains and deposits that contribute to investigating the Palaeolithic period, and addressing national and regional research priorities. Palaeolithic occupation has taken place through the Pleistocene period, thus the artefactual and faunal evidence of human behaviour and occupation is contained within Pleistocene deposits. These also contain biological, lithological and palaeo-environmental evidence that help in dating the deposit, and providing information of the local climate and environment at any particular time. Such information is essential if we are to carry out core research objectives such as dating sites, constructing a framework of cultural change and development, and understanding human activity and behaviour in its environmental and landscape context.

The core resource for the Palaeolithic is, therefore, *all* Pleistocene deposits. All of these are not necessarily significant, but all have the potential to be so. It is then necessary to consider, for any preserved patch of Pleistocene deposits, what Palaeolithic remains are present, and what is the potential information available for addressing Palaeolithic research priorities.

8.2.2 Palaeolithic remains and relevant information

The most widely recognised type of Palaeolithic remains are lithic artefacts. Handaxes are the most commonly found and easily recognised type of lithic artefact, but the earliest lithic technology embraces simple core and flake strategies and attention should also be paid to their recognition. However, lithic artefacts are just one of a wide range of evidence relevant to Palaeolithic research. This can be divided into three main categories: human activity, biological/palaeoenvironmental evidence and intrinsic sedimentological data (Table 18).

Human activity

Besides lithic artefacts, which also incidentally include stones with batter marks used as percussors, there are several other ways in which the direct evidence of human activity can leave traces. Artefacts can be made from other material such as wood, bone and antler. These are much more perishable, and so very rarely found. They are only preserved under certain combinations of swift burial, usually by fine-grained clay-silt sediments that promote anaerobic conditions. The alkalinity of coarser sands and gravels in areas of Chalk bedrock also often aids faunal preservation. However, because of this rarity, one should be particularly aware of the possibility of their recovery from suitable contexts. Other forms of activity can also leave direct traces, such as cut-marks on dietary faunal remains or decoration of stones. Although no decorated/carved objects are yet known from the Lower/Middle Palaeolithic, there is some evidence of a capacity for ritual behaviour at this period (for instance the deposition of Neanderthal and *Homo erectus* skeletons in association with grave goods in Spain), so it is not out of the question that evidence of this type could be found.

Secondly, humans can move or re-arrange natural objects. Lithic raw material can be collected and transported, without any sign of knapping. And there is also the possibility of simple features and structures, such as stone pavements. Again, none are known from Britain as yet, and the claims for this type of evidence from Africa and southern France are questionable, but one should still be open to the possibility of such evidence.

Finally, there is the question of the earliest evidence of fire. On the continent and the Middle East, there is reliable evidence for the controlled use of fire for at least the last 100,000 years, ie. coincident with the occupation of northwestern Europe by the Neanderthals in the last Ice Age. However there is little evidence of this period in Britain, and no uncontroversial evidence of the use of fire before the Upper Palaeolithic. There is no doubt that natural fires were a regular occurrence through the Pleistocene, probably often caused by lightning strikes. The evidence of these fires is preserved in deposits of the time, in the form of burnt out tree stumps, spreads of charcoal and then reworked charcoal fragments that enter fluvial sedimentary systems. There has never been any evidence that reliably links any of this evidence, which regularly crops up on Palaeolithic sites, with human control of fire. Nonetheless, one should still recognise the possibility of more satisfactory evidence occurring at some point.

Biological/palaeo-environmental

One of the key categories of evidence for researching the Palaeolithic is biological/palaeo-environmental evidence. This is often large mammalian, small vertebrate or molluscan, but there is a wide range of other evidence that may be present (cf. Table 18). This may be present at the same sites as artefactual remains, either in the same horizon or in stratigraphically related horizons. Or it may be present at sites where direct evidence is absent. In all these cases, the evidence has the same value and potential for Palaeolithic research, and should be recognised as significant. It can help in dating the deposit, and providing information of the local climate and environment at any particular time. Such information is essential if we are to carry out core research objectives such as dating sites, constructing a framework of cultural change and development, and understanding human activity and behaviour in its environmental and landscape context

Intrinsic sedimentological

Besides artefactual and environmental evidence, there is a range of other information associated with Pleistocene deposits that is relevant to Palaeolithic research objectives (Table 18). Information on their height above OD, their three-dimensional geometry, their position in the landscape and their sedimentary characteristics are all integral to interpreting their origin and date. Other factors such as the range of lithologies represented in the solid clasts, heavy mineral signatures and the occurrence of sand bodies suitable for OSL dating also have a role to play.

8.2.3 Disturbance and integrity

The burial and preservation of Palaeolithic remains is dependent upon where they have been deposited in the landscape, and which depositional processes have acted upon that part of the landscape. A wide range of processes are possible, ranging from total dispersal by glacial action, solifluction or high energy fluvial torrents, to gentle burial by fine-grained aeolian, colluvial or alluvial processes, leaving evidence essentially undisturbed. Thus Palaeolithic remains, and lithic artefacts in particular which are relatively indestructible, have the potential to be preserved and recognisable, although usually showing signs of wear-and-tear, after substantial transport and disturbance.

Consequently, understanding and interpretation of Palaeolithic remains is heavily dependent upon interpretation of the depositional and post-depositional processes that have affected them between their original deposition and their present context. Evidence from both disturbed and undisturbed sites has a role to play in addressing Palaeolithic research priorities. What is most important is, therefore, not necessarily to identify a lack of disturbance, but to be confident about the degree of disturbance. This knowledge then underpins the spatial/chronological scale at which the evidence can be interpreted.

Undisturbed horizons have been rightly highlighted (Roe 1980; English Heritage 1991) as of particular significance for their stratigraphic and chronological integrity, and their fascinating glimpses into short episodes of activity. Disturbed and transported material, such as predominates in fluvial contexts, has in contrast been widely downgraded in its potential significance, to the extent that some in the current curatorial environment would regard such material as being of insufficient significance to merit any protection or research in advance of destruction. However, besides avoiding the risk of writing off large quantities of the finite Palaeolithic resource just because we don't yet know what to do with it (cf. Chippindale 1989), it is becoming clear that the study of such material in fact *complements* the evidence from undisturbed sites by bringing a different chronological and spatial perspective to bear. Collections of transported artefacts represent a time and space-averaged sample, giving a more representative view of lithic production and diversity than the evidence from a few square metres representing one afternoon in the distant past. Such evidence may in fact be of more value in documenting and explaining general patterns of material cultural change, since it is less vulnerable to local heterogeneity caused by, for instance, specific tasks or raw material availability.

8.2.4 Significance

English Heritage (1998) has published eleven criteria, any of which are deemed sufficient to identify a Palaeolithic site as of national importance (Table 19). Assessment of significance depends upon the extent to which the evidence in a particular deposit can contribute to addressing national and regional research priorities. The English Heritage criteria successfully pinpoint a number of situations where there is particularly high potential to address a number of research priorities. It should be noted that remains in a primary undisturbed context represent just one of these criteria. Many sites without undisturbed remains may meet these criteria for national importance. Thus, by these guidelines, the absence of undisturbed primary context remains is not a basis for disregarding the potential of a Palaeolithic site, and failing to carry out mitigating archaeological works.

Furthermore, national importance should not serve as the bar for initiating mitigating works. It provides a useful means of measuring the relative significance of sites for, for instance, dispersing grant-aid funds, considering whether to preserve remains *in situ* or for attributing some form of statutory protection. Many sites that are not of national importance in themselves may contain good evidence that contributes to addressing national and regional research priorities, and impacts upon these should be mitigated.

Finally, and this is a key strategic point, significant knowledge — ie. that contributes to both national and regional research priorities — can also be acquired, not only from single sites with high quality evidence, but also from repeated observations at sites with evidence that is in itself of little apparent potential. The incremental accumulation of information from, for instance, a single mapped fluvial terrace can lead, over time, to a reliable picture of the density, distribution and nature of Palaeolithic remains. This can not be achieved other than through a coherent strategy of investigation that recognises this from the outset, and sets in place a standardised methodology that leads to systematic small-scale data gathering exercises at every impact occasion. A single event may involve excavation of a couple of test pits, sieving of eight 100 litre gravel samples and recovery of no evidence. This in itself fails to provide sufficient information to make a more general summary of the Palaeolithic remains in a body of gravel that may cover several hundred hectares. However, once this exercise has been repeated a hundred times over a period of maybe 20 years, *then* we will actually begin to learn something that can make a major contribution to core national and regional research objectives.

An important corollary is to recognise the significance of finding no Palaeolithic artefacts. When investigating patterns of human colonisation and settlement, identifying the absence of human presence at particular periods is just as important as identifying presence. Thus, as discussed above (Section 8.2.1), it is necessary to focus upon Pleistocene deposits as the core resource for Palaeolithic investigation, and then one relevant fact for a body of sediment is the presence/prevalence of artefacts — a result of "no artefacts" would be just as significant an observation as "many pointed handaxes". The significance and potential of this data is tied in with the degree of spatial disturbance and chronological integrity of a deposit, which is why assessing this is such an important aspect of evaluation (cf. Section 8.2.3).

8.3 Research Framework for the Lower Medway

It was recognised in the 1980s that the present structure of archaeological curation and investigation in advance of development requires a framework of academic and research priorities against which to consider the significance of sites and to guide their investigation. The seminal English Heritage publication *Exploring our Past* (1991) identified three main themes — physical evolution, cultural development and global colonisation. More recently a working party of the Prehistoric Society has defined three main strands for a national Palaeolithic Research Framework (English Heritage/Prehistoric Society 1999):

- Identification of research themes and priorities
- Development of specific projects of immediate relevance
- Education and dissemination initiatives

8.3.1 National Research themes and priorities

While regularly under review, and subject to changing emphasis in light of new discoveries and research directions, a comprehensive list of fourteen core national research themes and priorities (N 1–15) can be put forward (cf. Table 5).

8.3.2 Broad themes

Broad themes for a regional research framework encompass:

1. Human activity.
2. Spatial distribution of stratigraphic units.
3. Chronology.
4. Palaeogeography.
5. Environmental change.

8.3.3 Specific regional research priorities

Regional and sub-regional priorities for the specific study areas KT 1–4 have been specified above (Section 6). Particular aspects that have been highlighted in more than one area include:

1. Establishing evidence for Pre-Anglian occupation, (likely to be found in terraces Terrace G (BGS T4) and above in the Maidstone area Terrace R (Bridgland's Dagenham Gravel) and above in the Hoo area). In particular attention should be given to sieving for artefacts and fieldwalking programmes where these deposits are present

2. Establishing well-provenanced evidence of Devensian occupation during MIS 4 and 3. this would focus particularly on the investigations of terraces A and B in the Maidstone and Medway Gap areas; and on the potential of Head Brickearth deposits capping level higher plateaux within the Weald

3. The identification of zoological remains in Medway terraces. They must exist somewhere, and there are a few records of molluscan and mammalian remains. In particular, such remains might be present in deeply buried terrace deposits along the flanks of the Medway Gap, and investigations/monitoring should be targeted in these areas.

4. Investigation of spatial concentration of finds within terrace bodies — are

they evenly scattered, or do they occur as distinct spatial concentrations; similarly, are finds evenly dispersed vertically through a gravel body, or are they associated with a specific horizon?

8.3.4 Suggestions for strategic projects

A number of strategic projects can be identified that follow from the regional research priorities and landscape zone objectives. This list is not intended to exhaustive or prescriptive. Many other worthy projects could be developed, and aspects from the different projects suggested could be extracted and woven together to form projects of different focus. All serve the multiple and complementary aims of:

- Improving the ability to curate the archaeological heritage in the Medway region

- Developing understanding of the character and distribution of the Pleistocene archaeological resource in these region

- Addressing national and regional research priorities

Systematic fieldwalking of Pleistocene terrace exposures

Most of our current understanding of the Palaeolithic of the region comes from stray finds and amateur collection from quarries. However this knowledge results from the unstructured activities of a few individuals, mostly many decades ago. Some areas have been intensively searched, others on a one-off basis but most not searched at all, particularly higher terrace spreads in the Medway Valley and its tributaries (sometimes now defunct, such as the Luton River and the Higham River). The region is agricultural in places, with some arable fields that may regularly be available for fieldwalking. A project could be developed that applies a systematic and controlled fieldwalking survey of Pleistocene deposits through the Medway region. This may (a) pick up entirely new significant concentrations/sites [for instance the major new Wiltshire site of Harnham was found following identification of a concentration of handaxe finds in a ploughed field] and (b) would lead to a more balanced view of the distribution of Palaeolithic remains and settlement across the region. Such a project could also serve as a useful means of engaging with local archaeological groups and museums and promoting wider understanding of and interest in the Palaeolithic and Pleistocene.

Research excavations

There are a number of sites, for instance Ham Hill, New Hythe Lane and Preston Hall Sand/Gravel Pit where we are already aware that Palaeolithic remains were once present and abundant, but we lack information on their context and provenance. These would benefit from excavations and a machine-dug test pit programme aimed at (a) providing more controlled information on artefact context, presence, density and intra-site distribution, (b) better understanding of the nature, sequence and extent of Pleistocene deposits at the site, and (c) application of dating studies such OSL to date the deposits.

An intensive study at a single site

Unfortunately, the attempt to do this as part of MVPP was frustrated by the lack of artefacts at the only site that could be found for such an invasive investigation.

However, carrying out such a study remains an urgent priority, since its results will underpin our thinking on the nature of the Lower/Middle Palaeolithic resource contained in sand/gravel aggregates. The central issue to resolve is whether lithic artefacts are present within sand/gravel deposits as tight concentrations at specific horizons, or whether they are homogenously distributed throughout deposits in which they occur. If the former (which is my suspicion) then we can be justified in thinking of such remains as representing proper sites, rather than scattered and derived remains of sites; and this will have implications for how we approach the investigation and interpretation of lithic artefacts from sand/gravel deposits.

8.3.5 Dissemination, education and community involvement

The English Heritage/Prehistoric Society Palaeolithic Research Framework (1999) emphasised the importance of disseminating results to the wider community, and encouraged a more proactive role in this through education and outreach initiatives. Early prehistory, even more possibly than other areas of archaeology, is an area that stimulates the public imagination with its combination of Ice Age climate, exotic extinct animals and Early Man. However, general awareness is limited of the nature of the evidence, its presence all around and the potential for public contribution to advances in knowledge. In general, mechanisms are already in place, with an existing framework of professionals in the museum and education world whose remit already covers promoting wider appreciation and understanding of the archaeological heritage. There is, however, perhaps a need to get the Palaeolithic and Pleistocene higher on the agenda of those whose work already lies in this area. There are a number of avenues that could be developed.

Portable Antiquities Scheme

This scheme is already in place with officers based at regional centres around the country. While originally conceived in relation to metal-detecting, it can also serve as a first point of contact for reporting the recovery of lithic antiquities. This aspect can be flagged up in the outreach publicity material for the scheme and the antiquities officers can be given basic training in the identification of lithic artefacts. The *Lithic Studies Society* has held training days and developed a standardised recording proforma for lithic antiquities. Details are available from Elizabeth Walker at the National Museums & Galleries of Wales, Cardiff.

Popular dissemination and community/educational outreach

Perhaps greater efforts should be made, and resources applied, as part of the reporting requirements of both small and large projects, to working with museum and education officers in disseminating results in more publicly accessible form. This could include:

- Wider reporting of even small finds/projects in local media
- Visits to schools with artefacts and fossils to give short talks
- Teacher packs with visual resources and information summaries
- Public access open-days to sites
- Collaboration with museums over exhibitions and web resources
- Web-sites
- Production/distribution of leaflets, posters and CDs
- Public lectures, knapping demonstrations, artefact identification sessions

Specific recommendations for action

- Contact with Portable Antiquities Officer, training in lithics identification and development/application of a standardised proforma for recording lithic finds
- Increased emphasis in development control work for reporting requirements concerning public/community dissemination
- Increased emphasis in reporting objectives for larger strategic and development control projects of public/popular dissemination and museum/education liaison
- A specific strategic project whose prime objective is promoting understanding and appreciation of the Palaeolithic in the wider community

8.4 Strategy and methods

The core aim of these proposals is to ensure that maximum and optimum Palaeolithic archeological knowledge is recovered from deposits impacted by development. There is already a strong curatorial framework concerned with mitigating the archaeological impact of development, and involving the collaboration of three principal parties: developers and their consultants, the Local Planning Authority advised by the archaeological curators and commercial contractors. Custom and practice within this framework have, however, developed in relation to the needs of the post-Palaeolithic archaeological heritage. Nonetheless the current framework is also suitable for mitigating impact upon the Palaeolithic resource. Thus the overall strategy adopted is not for revolution in law or planning guidance, but for evolution of current practices and curatorial thinking. The potential of the existing curatorial and legislative framework for effective Palaeolithic recognition and mitigation can then be fully realised.

8.4.1 Curatorial awareness

Perhaps the most important issue is to raise awareness and understanding of the Palaeolithic amongst the key players in the curatorial system — namely local authority curators, consultants and contractors. Ultimately it is the local authority curators who have the role of advising on the extent of archaeological conditions on planning applications under PPG 16. However consultants often also have a major role in advance of planning applications in determining the amount and scope of archaeological work that accompanies planning applications, as well as in determining archaeological programmes that satisfy the requirements of local authority curators. In most regions good communications between those involved in these two functions are an integral part of delivering satisfactory archaeological mitigation. Therefore it is vital that those active in these functions, as well archaeological contractors, recognise that the Palaeolithic is as much a part of the heritage as the Neolithic, the Roman or the Medieval, and have a good and shared understanding of (a) the nature of the resource, (b) the types of evidence that contribute to addressing national and regional research priorities and (c) appropriate methods of investigation.

Hopefully dissemination of documents such as this, alongside engagement with bodies such as the Association of Local Government Archaeological Officers, English Heritage, the Council for British Archaeology and the Institute of Field Archaeologists, can play a role in developing awareness and evolving curatorial practice and thinking.

8.4.2 Desk-based assessment

From previous experience outside the study region, we are not confident that DBAs always correctly identify the potential Palaeolithic impact of developments or infrastructural projects. The scope and accuracy of DBAs are clearly heavily dependent upon initial baseline resource characterisation. They are also affected by (a) access and availability of the best possible information and (b) use made of this information.

There is one particularly fruitful source of information that should also be taken account of at the DBA stage. Most development projects, and particularly larger ones, have a range of geo-technical investigations that are carried out early in project cycle. These often involve excavation of test pits and bore-holes. Besides the point that these in themselves have archaeological impact, and perhaps should be monitored, they also provide an excellent opportunity for archaeological knowledge to be gathered on a site piggy-backing on the geo-technical investigations. These investigations provide exposures that reveal the presence and nature of any Pleistocene sediments present. All that is required is monitoring by a person with appropriate expertise, who can record the stratigraphic sequence, and observe and recover Palaeolithic remains if present.

We suggest that good practice for DBAs should include information from archaeological monitoring of geo-technical investigations. Implementation of this suggestion requires engagement with the consultancies and archaeological contractors who habitually carry out DBAs before large development projects. This is currently the case in Kent for instance, where consultancies such as CgMs Ltd now habitually organise monitoring of geo-technical investigations in sensitive Palaeolithic landscapes. The results have in many cases obviated the need for a Palaeolithic aspect to conventional evaluation, and thus resulted in cost reductions rather than increases.

Access to the best information then needs to be complemented by appropriate interpretation. Again, in the future, this could substantially be addressed through a GIS model. Presently, this is probably most effectively carried out by specialists who can combine interpretation of geological mapping with understanding of the potential of the Palaeolithic remains found, or potentially likely to be present, to contribute to current research priorities. Hopefully those involved in DBA preparation can be encouraged to assimilate information in documents such as this, and take further account of the Palaeolithic resource. Key factors to identify and consider are:

- Presence/nature of Pleistocene deposits
- Presence/nature Palaeolithic remains
- Relevance to national/regional research priorities

8.4.3 Evaluation

It is necessary, in areas where there is potential for Pleistocene deposits and Palaeolithic remains, that special methods are applied to investigating their presence and potential. Identification of such areas depends in the first place on the quality of the baseline resource characterisation and the DBA. In these areas deeper test pits need to be dug. A detailed proforma method statement for Palaeolithic evaluation test pits is given in Appendix 12. A key aspect of this is the application of standardised sedimentological recording and volume controlled sieving.

In areas where there is not thought to be even the possibility of Pleistocene deposits, there is no need to carry out a full Palaeolithic/Pleistocene evaluation. However, it would be good practice to at least ask the question as part of conventional evaluation: "Have Pleistocene deposits been encountered, and if so what is their nature and Palaeolithic potential?". Significant deposits may be found in unsuspected areas, and these may then require further evaluation specifically in relation to their Palaeolithic potential. This has been the case in a number of recent projects, which make useful case studies.

At Red Barns (Hants), an undisturbed floor of Palaeolithic artefacts was found 2.5m beneath the ground surface, in an area mapped as Chalk bedrock, but in fact covered by a thick layer of colluvial deposits (Wenban-Smith *et al.,* 2000). The remains were identified during monitoring of drainage works for later archaeological remains during construction of a housing development. At the Swan Valley Community School (Kent), the development was over half a km from the nearest mapped boundary of Pleistocene deposits, yet a handaxe and fluvial sands/gravels were found in the base of the conventional 30m evaluation trenches. Further deeper test pits identified artefact-bearing fluvial deposits across the site, and ultimately a full archaeological programme was requested by Kent County Council to mitigate the Palaeolithic impact the school construction (Wenban-Smith & Bridgland, 2001). Finally, at Harnham (Wilts), handaxes were found on a ploughed field surface adjacent to a conventional trench, and varied Pleistocene deposits of uncertain origin were present in the base of the trenches. Subsequent deeper test pits then led to discovery of a complex suite of deposits in a restricted area, with abundant Palaeolithic artefacts, humanly modified faunal remains and undisturbed primary context material (Bates & Wenban-Smith, 2003; Whittaker et al., 2004).

As discussed above, much relevant information can be gathered from monitoring of geo-technical investigations. If this has not been carried out for the DBA, then such monitoring should be carried out and the information fed into the evaluation stage of the archaeological curation cycle.

8.4.4 Mitigation

If Palaeolithic remains are present, it is advisable to take specialist advice on their potential and suitable methods for further study or mitigation of any impact. As discussed above (Section 8.2.4) significant contributions to Palaeolithic knowledge can be gained from both one-off studies of single high quality sites and the incremental long term accumulation of relevant data from sites that in themselves are of very little significance, and possibly lacking in evident remains altogether. The best example of this is fluvial terrace deposits. Although it is in fact uncertain (and a subject of current research) how long a time period is represented by their deposition, material within such deposits is generally thought to be datable to the level of the marine isotope stage, ie. a period of *c.* 30,000 years. Far from being the disaster that some (used to the more precise dating of later periods) might think, these deposits thus represent relatively tightly defined time capsules within a period of 600,000 or 700,000 years of possible Palaeolithic occupation. There is a lot of knowledge to be gained from large-scale and long term sampling of such terrace deposits, leading to a full picture of the nature and prevalence of any contained Palaeolithic archaeological remains. This can easily be achieved through accumulated evaluation and mitigation test pit investigations. Urbanised regions, where they overlie Pleistocene terraces, are particularly suitable for development of such a programme, since there is likely to be regular development scattered over the terrace, and works such as foundations or services trenches will provide regular opportunities for sampling.

9 FURTHER WORK

Three main avenues for further work can be identified.

- Firstly, reporting so far has focused upon the core curatorial objective of developing a Palaeolithic research framework in the Medway area. This has been achieved, and if the end product is found useful, the same approach can be expanded to adjacent areas. The highest immediate priority is more academic reporting of the results. This aspect was not included in the current programme, but discussions are taking place with a view to carrying this out over the coming year.

- Secondly, the project generated a significant quantity of samples for OSL dating, only a small proportion (c. 25%) were actually analysed. This resource has potential in two areas:

(a) further analysis, particularly of further samples from stratigraphic series at the same site, can provide more dates for the overall Chrono-stratigraphic framework and refine the accuracy of the results using Bayesian analysis;

(b), and perhaps most importantly, almost all of the dated samples have an undated duplicate from exactly the same location. Many of the OSL dates were significantly younger than expected, and one factor that *might* be playing a role is the specific lab where the dating work is carried out. Two different labs were used for the majority of ALSF OSL work: Jean-Luc Schwenninger at Oxford, and Phil Toms at Gloucester. Without casting any aspersions at all, it would be of scientific value to test the consistency of dating results when archaeologically identical samples are submitted to these different laboratories. Further validation/testing of the results can also be achieved through application of single grain analysis.

Carrying out these analyses would both provide expanded and improved dating results, and validate the consistency of the results in different areas of the country resulting from the work of the two labs involved; ultimately after all, we are trying to build from a regional to a national Palaeolithic picture, and confirming the consistency of the dating results in the different regions will help in this goal. Preliminary discussions have already taken place with a view to moving this forward also over the coming year.

- Finally, in the longer term, the GIS *Palaeolithic Resource Predictive Model* should be reviewed with curators at both the national and county levels. There are various aspects that can be adjusted or modified. Firstly, there is the selection of data that is fed into it at the outset. Secondly, one could reconsider how this data is used to identify/predict zones of importance, and whether it will ever be possible to develop algorithms that match specialist assessment — my own view on this is that it probably won't, but algorithms can be useful in a triage between areas of definite importance, areas of almost certain unimportance and areas of definite uncertainty; and these assessments can then form the starting point for involvement of specialists. Thirdly, there is potential for a move from the static pilot model developed here, towards a more dynamic model. This needs to be tied in with an SMR enhancement programme that codifies relevant data and thesauri for the Lower/Middle Palaeolithic resource, and there is perhaps scope for further work in this area too.

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