CHAPTER 8

RECOMMENDATIONS FOR THE MANAGEMENT, PROTECTION AND RECORDING OF THE SECONDARY CONTEXT ARCHAEOLOGICAL RESOURCE

1. INTRODUCTION

Whilst the previous chapters have been primarily concerned with the structure and interpretation of the secondary context archaeological resource, this chapter turns its focus upon the current state of management practice with respect to that resource. This review of resource management is driven by the notion that the secondary context resource has a clear, unambiguous value, and that this resource is continuously threatened by aggregates industry activities, construction and other developments. The review is intended to provide the basis of new recommendations for the management, protection and recording of this archaeological resource. These recommendations are based on the value of the archaeological resource, the available categories of evidence and their differing implications for management and practice, the current position of archaeology within the aggregates extraction industry and the planning process, and the nature of professional archaeological practice. This chapter therefore draws upon the material discussed in previous chapters, summarised here, with references to the related discussions where relevant. The review of current practice and proposed recommendations also draw upon documents from a wide range of sources including: government (Department of Culture, Media and Sport (DCMS)); English Heritage; professional archaeological units (Cotswold Archaeological Trust and Wessex Archaeology); archaeological organisations (e.g. the Institute of Field Archaeologists); amateur archaeologists (e.g. T. Hardaker and the late R.J. MacRae); and academic sources (e.g. the University of Birmingham-led Shotton Project).

Section 2 summarises the background to the management of the archaeological resource, principally with respect to the PPG16 legislation. Section 3 assesses the value of secondary context archaeological resource, as proposed by this project. Specific focus is given to the research questions and spatio-temporal frameworks that may be addressed through these data, while attention is also paid to the different types of evidence that are available, their frequency of occurrence and range of applications. These categories of data are prioritised in Section 4, against a series of different demands including: management strategies; logistics (field strategies); professional archaeological requirements; and academic archaeological requirements. Current watching brief practice is reviewed in Section 5, with respect to the overall planning frameworks for the aggregates industry, archaeology and the planning process (PPG16), and case studies of recent watching briefs at the sites of Dunbridge (Bridgland & Harding 1993; Harding 1998) and Squabb Wood (Cotswold Archaeological Trust 2000). Section 6 proposes a series of recommendations for future watching brief practice, based on the current planning framework, future aggregates demands, and the potential of the archaeological data and the means of maximising this potential through time-efficient and economic strategies.

In summary, the chapter highlights four main issues:

- The relative value of the secondary context archaeological resource, both as a whole and with respect to the different categories of new evidence (artefactual, biological, sedimentary, and dating samples) that can be potentially recovered from pre-excavated secondary context sediments.

- Prioritisation of the different categories of evidence occurring within the secondary context archaeological resource, with respect to management strategies, logistics and archaeological requirements (both academic and commercial).
- A review of current watching brief practise on aggregate sites, based on an analysis of strategy documents produced by professional archaeological units.
- The recommendation of generic and specific strategies for the future management, protection and recording of the aggregate resource. These recommendations will focus upon the potential impact for the aggregates industry (financial and logistical), the relative value of the different components of the geoarchaeological record, strategy efficiency (in terms of time and geoarchaeological data output), and the potential for the training of aggregates industry employees in the recognition of different sedimentary facies.

2 ARCHAEOLOGY AND PLANNING

2.1 PPG16

Issued by the Department of the Environment in 1990, *Planning Policy Guidance Note 16: Archaeology and Planning* (PPG16; DoE 1990) set out the government's policy for the protection of archaeological sites within plans for future development. Central to PPG16 was the argument that:

"Archaeological remains should be seen as a finite and non-renewable resource, in many cases highly fragile and vulnerable to damage and destruction. Appropriate management is therefore essential to ensure that they survive in good condition. In particular, care must be taken to ensure that archaeological remains are not needlessly or thoughtlessly destroyed. They can contain irreplaceable information about our past and the potential for an increase in future knowledge. They are part of our sense of national identity and are valuable both for their own sake and for their role in education, leisure and tourism."

(DoE 1990: paragraph 6)

Despite this recognition of their significance, it was also acknowledged that it is not physically or economically viable to preserve all archaeological remains. Within PPG16, archaeological remains are implicitly attributed different scales of significance. Those sites and their environs that can be described as "nationally important" are subject to "a presumption in favour of their physical preservation" (DoE 1990: paragraph 8), irrespective of scheduling status:

"…where nationally important archaeological remains, whether scheduled or not, and their settings, are affected by proposed development there should be a presumption in favour of their physical preservation in situ i.e., a presumption against proposals which would involve significant alteration or cause damage, or which would have a significant impact on the setting of visible remains."

(DoE 1990: paragraph 27)

The status of archaeological remains where national significance cannot be demonstrated is less clear-cut however. PPG16 advocates that whenever a planning proposal is put forward the archaeology of the affected region should always be considered as part of the overall planning process:

"…planning authorities will need to weigh the relative importance of archaeology against other factors including the need for the proposed development."

DoE 1990: paragraph 8)

PPG16 does not explicitly stipulate the criteria necessary for achieving the status of national significance, instead deferring this decision to professional bodies (e.g. County Archaeologists and English Heritage) and extant legislative guidelines (e.g. the Secretary of State's *Criteria for Scheduling Ancient Monuments* (PPG16 Annex 4)). However, PPG16 does officially and incontrovertibly place archaeological remains among those concerns that must be considered during the planning process.

Overall therefore, PPG16 seeks to provide a framework for safeguarding the entirety of the nation's archaeology within planning proposals and long-term development strategies. When one considers the diversity of the archaeological record of England, spanning all periods from "the camps of the early hunter gatherers…to the remains of early 20th century activities" DoE 1990: paragraph 4), this is a huge remit. The archaeology that PPG16 seeks to protect varies enormously and as such will be of varying vulnerability depending both on the nature of the archaeological remains themselves and the extent of the proposed development.

2.2 Palaeolithic Archaeology and Planning Policy

Sediments that may contain Palaeolithic archaeology are commonly deeply buried under Holocene deposits. In many cases this depth of over-lying Holocene sediments acts as a buffer zone protecting Palaeolithic archaeology from disturbance during domestic planning applications and construction activities. However, when planning applications are concerned with mineral extraction it is these underlying Pleistocene sediments that will be removed, making any Palaeolithic archaeology they contain extremely vulnerable to destruction. The overlying Holocene deposits may contain a relative wealth of later prehistoric and historical archaeology, which in many cases can be evaluated in pre-planning phases of analyses, through mechanisms such as the Sites and Monuments Record (SMR), National Monuments Record (NMR), topographic surveys, non-invasive archaeological investigations (e.g. geophysical prospection techniques), and archival research utilising historical documents and maps. Unfortunately the presence of deep landscape Palaeolithic archaeology cannot be determined in this manner, much less the presence of nationally important Palaeolithic sites as determined by the outlined English Heritage criteria (discussed below).

Although PPG16 recognises that different types of planning application will affect the archaeological record in different ways, the nature and location of mineral extraction places Palaeolithic archaeology at particular risk. As mineral extraction of sands and gravels can only take place in regions where these sediments exist, there can be considerable overlap between identified areas of potential mineral extraction and areas of known archaeological occurrences, not least due to the demonstrated sustained attraction of river valleys throughout the Palaeolithic occupation of the British Isles (English Heritage 1998; Wymer 1999). Moreover, Palaeolithic archaeology presents a unique suite of characteristics that make it particularly vulnerable to destruction during construction and mineral extractions:

"Most Palaeolithic sites occur in valleys which have been infilled with sediments, often laid down by former rivers, which have buried the archaeological evidence. These sediments, whether brickearth, sand or gravel, are often sought for modern construction, and commercial quarrying for the minerals can inadvertently remove archaeological evidence…it is vital therefore that developers and planners are aware of the circumstances under which this might occur and take effective steps to minimise the risk of destroying important remains. Development plan policies and the assessment of individual proposals should take account of the Palaeolithic remains…so that they may be located, protected or investigated as is appropriate to their significance."

(English Heritage 1998: 2)

In addition to commonly being situated in sediments viewed as highly desirable for mineral extraction, it can be argued that Palaeolithic archaeology is particularly prone to inadvertent destruction during construction/extraction activities, due to the absence/rarity of large structures or features such as hearth complexes or graves (features readily identifiable to the non-specialist and therefore of increased visibility) which are much more common in the archaeology of subsequent periods. The primary archaeological remains for the Lower Palaeolithic are lithic artefacts, most typically the biface (handaxe), which could easily be overlooked during gravel extraction. Secondary context Palaeolithic archaeology is particularly vulnerable during mineral extraction, as these sites occur exclusively in gravel and sand deposits, and typically consist solely of lithic artefacts that have become incorporated into these high-energy fluvial deposits. This can be described as an archaeological signature of very low visibility, though this should not be taken to be synonymous with low value.

Irrespective of period, the definition of archaeological 'value' in response to PPG16 has been controversial, though the realities of selective preservation in the face of continued urban/economic growth cannot be escaped. In order to emphasise the value of Palaeolithic archaeology, guidelines for the selection of important remains have been devised by English Heritage (1998). As has been demonstrated for the archaeology of other periods, Palaeolithic sites are of varying importance and evaluation is necessary in order for the degree of protection, management or recording merited by each site to be determined. According to these guidelines, Palaeolithic remains have particular importance if (*ibid*: 7):

1. Any human bone is present in relevant deposits.
2. The remains are in an undisturbed primary context.
3. The remains belong to a period or geographic area where evidence of a human presence is particularly rare or was previously unknown.
4. Organic artefacts (such as the wooden spear from Clacton-on-Sea) are present.
5. Well-preserved indicators of contemporary environment (floral, faunal, sedimentological etc) can be directly related to the remains.
6. There is evidence of lifestyle (such as interference with animal remains).
7. One deposit containing Palaeolithic remains has a clear stratigraphic relationship with another.
8. Any artistic representation, no matter how simple, is present.
9. Any structure, such as a hearth, shelter, floor, securing device etc survives.
10. The site can be related to the exploitation of a resource, such as a raw material.
11. Artefacts are abundant.

"Sites containing any of these types of evidence are so rare in Britain that they should be regarded as of national importance and whenever possible should remain undisturbed."

(English Heritage 1998: 7)

The establishment of these eleven criteria of Palaeolithic importance leads to the rather interesting question of how this importance can actually be demonstrated. With the partial exception of criteria #2, (the identification of fine-grained sediments which may *potentially* contain *in situ* Palaeolithic archaeology could, in certain circumstances, be identified from extant geological knowledge — e.g. Pope 2001), none of the criteria identified as significant by English Heritage can reasonably be assessed through desk-top approaches (Table 55). Reviews of the relevant Sites and Monuments Record (SMR) may indicate the presence (or absence) of similar Palaeolithic remains in the vicinity, although the absence of evidence/evidence of absence problem (Roebroeks 1996) is paramount in under-studied regions. Understanding of the Palaeolithic archaeology of a specific region will of course be greatly enhanced by consultation of the relevant volume of the recently completed Southern Rivers Palaeolithic Project (SRPP), the Welsh Lower Palaeolithic Survey, and The English Rivers Palaeolithic Project (TERPS), an extensive survey commissioned by English Heritage to generate (among other purposes) a common database which can be used to assist management strategies in the protection of Palaeolithic remains (Wessex Archaeology 1993a, 1993b, 1994, 1996a, 1996b, 1996c, 1997). This might lead to the preservation of sediments adjacent to the handful of scheduled, significant Palaeolithic sites in this country (primarily located in south-eastern England) that have met enough criteria to have been deemed of national importance. Such a strategy would advocate the preservation of sediments *adjacent* to known, substantial, Palaeolithic sites and in accordance with PPG16 such areas would be preserved *in situ*. This preservation *in situ* would protect sediments primarily on the basis of their proximity to known, significant Palaeolithic sites. Yet paradoxically their very preservation would prohibit their Palaeolithic potential from ever being demonstrated.

	'Significant' Criteria as Identified by English Heritage (1998)	Detectable via Desktop Assessment?	Caveat	Ground truthing confirmation through excavation/watching brief necessary?
1	Any human bone is present in relevant deposits	NO	Identification of sediments known to contain hominid remains would allow desktop assessment of the *potential* of directly adjacent sites (limited applicability).	YES
2	The remains are in an undisturbed primary context	NO	Identification of sediments which may *potentially* contain *in situ* materials may be possible in locations directly adjacent to known sites (limited applicability).	YES
3	The remains belong to a period or geographic area where evidence of a human presence is particularly rare or was previously unknown	NO	Absence in adjacent areas can be demonstrated via desktop assessment, but cannot be assumed in unexcavated locations.	YES
4	Organic artefacts (such as the wooden spear from Clacton-on-Sea) are present	NO	Identification of sediments which may *potentially* contain organic artefacts may be possible in locations directly adjacent to known sites (limited applicability).	YES
5	Well-preserved indicators of contemporary environment (floral, faunal, sedimentological etc) can be directly related to the remains	NO	Identification of sediments which may *potentially* contain biological data may be possible in locations directly adjacent to known sites (limited applicability).	YES
6	There is evidence of lifestyle (such as interference with animal remains)	NO	-	YES
7	One deposit containing Palaeolithic remains has a clear stratigraphic relationship with another	NO	The *potential* for stratigraphic superpositioning may be identified from known adjacent sites (limited applicability)	YES
8	Any artistic representation, no matter how simple, is present	NO	-	YES
9	Any structure, such as a hearth, shelter, floor, securing device etc survives	NO	-	YES
10	The site can be related to the exploitation of a resource, such as a raw material	NO	-	YES
11	Artefacts are abundant	NO	The *potential* for artefact proliferation may be determined from known adjacent sites	YES

Table 55: The potential for desktop assessment of significant Palaeolithic remains during planning applications

Table 55 illustrates the limitations of desktop assessment of potential Palaeolithic sites. Geographical and geological proximity to known sites will allow a degree of extrapolation to adjacent sites of comparable sedimentology, although such work is inevitably hypothetical. Moreover, in regions where little is known about the nature and extent of Palaeolithic occupations, or no significant sites have been documented, desktop assessment prior to planning and/or mineral extraction approval cannot facilitate the pro-active assessment of the Palaeolithic potential of the threatened sediments.

The limitations of desktop assessment for Palaeolithic sites springs partly from the criteria, identified by English Heritage (1998), used to determine significance and partly from the nature of Palaeolithic archaeology in general. Sediments that may contain Palaeolithic archaeology are commonly overlain by substantial depths of more recent, typically Holocene, sedimentation. This depth of overburden prohibits the identification of Palaeolithic archaeology by non-destructive mechanisms such as desktop evaluations and/or geophysical prospection. Therefore the character of Palaeolithic archaeology at individual sites or regions can only be realistically evaluated once the overlying sediments have been removed and the archaeology itself becomes accessible. In addition to these logistical issues, Palaeolithic archaeology is dominated by low resolution signatures, most commonly (although not exclusively) lithic artefacts incorporated within sand and gravel deposits — the secondary context archaeological record.

2.3 The Characteristics of Palaeolithic Secondary Context Sites

The Palaeolithic record of England is dominated by assemblages of lithic artefacts (primarily bifaces) recovered from fluvial gravels. The majority of these assemblages were acquired during commercial mineral extraction activities. Despite their dominance in the archaeological record, secondary context Palaeolithic assemblages are perceived as being of a lower academic value than those sites in primary context with *in situ* archaeology and behaviours (e.g. Boxgrove (Roberts & Parfitt 1998). This project has sought to redress the balance with respect to the perceived value of the various components of the archaeological record (see Chapters 1–7 & Section 3 below), and has outlined new approaches by which the secondary context data may be meaningfully interpreted within the framework of current Palaeolithic research questions.

With regard to the potential significance of secondary context sites, a strong case can be made for the value and potential of secondary context sites through reference to the criteria devised by English Heritage (1998) for determining the significance of Palaeolithic sites (Section 2.2; Table 55 & Table 56). Of the eleven criteria identified, secondary context sites could readily fulfil six:

- *Any human bone is present in relevant deposits*: the hominid skeletal record of the British Isles is very limited, however preservation is not limited to *in situ* localities, as skeletal material can (and has) been recovered from gravel contexts (Swanscombe (Ovey 1964)).
- *The remains belong to a period or geographic area where evidence of a human presence is particularly rare or was previously unknown*: the expansion of the range of known Palaeolithic activity is not dependant on the depositional context of this activity. Indeed as mineral extraction provides one of the few ways of accessing deposits which may potentially contain Palaeolithic archaeology, it is highly probable that with appropriate archaeological assessment during extraction, more artefacts and therefore 'sites' will be identified from previously 'blank' areas.
- *Organic artefacts (such as the wooden spear from Clacton-on-Sea) are present*: preservation of organic artefacts is generally very limited, although it could occur within fluvial sediments where local conditions (e.g. sediment chemistry and/or waterlogging) are favourable.
- *One deposit containing Palaeolithic remains has a clear stratigraphic relationship with another*: secondary context sites can potentially provide stratigraphic superposition at two scales. Superposition of artefacts can occur within a single terrace (e.g. as claimed at Dunbridge), potentially providing evidence of changing (or continuing) lithic industrial traditions. Stratigraphic superpositioning can also occur between individual terraces in a single river system (e.g. as demonstrated in the River Thames), enabling changing industrial or manufacturing traditions, and technological stability and innovation to be examined within this framework. Given the scarcity of primary context sites, secondary context data can be invaluable in addressing such long-term issues.

'Significant' Criteria as Identified by English Heritage (1998)		Potential Preservation in Primary Contexts?	Potential Preservation in Secondary Contexts?
1	Any human bone is present in relevant deposits	YES	YES
2	The remains are in an undisturbed primary context	YES	N/A
3	The remains belong to a period or geographic area where evidence of a human presence is particularly rare or was previously unknown	YES	YES
4	Organic artefacts (such as the wooden spear from Clacton-on-Sea) are present	YES	YES, but dependant on local conditions (see below)
5	Well-preserved indicators of contemporary environments (floral, faunal, sedimentological etc) can be *directly related* to the remains	YES	NO, however, detailed sedimentological data can be generated
6	There is evidence of lifestyle (such as interference with animal remains)	YES	UNLIKELY, though cut-marked bone may be preserved
7	One deposit containing Palaeolithic remains has a clear stratigraphic relationship with another	YES	YES
8	Any artistic representation, no matter how simple, is present	YES	YES, it is possible that portable pieces (*art mobilier*) may become incorporated within fluvial context
9	Any structure, such as a hearth, shelter, floor, securing device etc survives	YES	NO, such structures would not occur within fluvial gravels
10	The site can be related to the exploitation of a resource, such as a raw material	YES	PERHAPS, it may be possible to link specific raw materials to a known source
11	Artefacts are abundant	YES	YES

Table 56: The preservation potential of secondary context sites

- *Any artistic representation, no matter how simple, is present*: Palaeolithic art is largely unknown within Britain, however the possibility of the preservation of portable pieces (*art mobilier*) within secondary contexts cannot be totally discounted.
- *Artefacts are abundant*: abundant assemblages of palaeoliths (especially bifaces) have been recovered from numerous secondary context sites (e.g. Swanscombe (Conway *et al.* 1996; Wymer 1999), Dunbridge (Dale 1912a, 1918; Harding 1998) and Broom (Green 1988)). Large assemblages, such as these, become additionally significant as continued refinements are made to our geochronological techniques and methods of modelling the spatial and temporal origins of derived secondary context artefacts (Chapters 2–5).

It is therefore argued that secondary context Palaeolithic sites can provide a range of significant data. It should consequently be apparent that the consideration of Palaeolithic archaeology within the planning/mineral extraction licensing applications should not be limited to a search for *in situ* archaeology and that secondary contexts themselves should be being examined in as meaningful a manner as possible. The following section highlights the specific value of the secondary context resource, explicitly linking these data with current and original models of Palaeolithic research.

3. THE VALUE OF THE SECONDARY CONTEXT ARCHAEOLOGICAL RESOURCE

One of the principal driving forces behind this research project has been the recognition that for the British Lower and Middle Palaeolithic, the secondary context archaeological resource represents the majority of the extant data. This project has therefore been concerned with developing new models and frameworks for the re-interpretation of these extant data, which will maximise their potential and apply the data to the resolving of current and new archaeological questions. It is proposed that the secondary context archaeological resource has a clear and unambiguous value with respect to the investigation of early prehistoric archaeology. This statement is based on the following arguments, discussed and developed within the course of this project:

1. Geochronological frameworks have been established for fluvial sedimentary sequences and the secondary context archaeological resource at the scale of marine isotope stages (MIS) over the last ten years. This has based upon climatically-driven models of river terrace formation (e.g. Bridgland 2000, 2001; Maddy *et al.* 2001), allied with models of uplift rates (e.g. Maddy 1997; & Bridgland 2000), characteristic faunal assemblages (e.g. Schreve 2001b), and diagnostic artefact types as geochronological markers (e.g. Bridgland 1996). These frameworks support the modelling of long-term archaeological patterns (e.g. population sizes, using artefact densities as a proxy), as demonstrated recently by Ashton & Lewis (2002), Hosfield (in prep), and illustrated here (Chapter 7).

2. There is considerable scope for the further development of these MIS-scale geochronological frameworks through the recent advances in optically stimulated luminescence (OSL) and amino-acid dating techniques (Toms 2003; Collins 2003). The application of the OSL dating to the Broom sediments (Chapter 3) suggested a MIS-scale geochronology of stages-8/7 for the middle beds/upper gravels sedimentary sequence (the lower gravels have not been dated due to lack of access).

3. It is proposed that higher resolution geochronological frameworks may also be developed. These are based upon Lateglacial analogues (Chapter 2), which suggest a strong link between fluvial activity (e.g. erosion, sedimentation) and phases of climatic change and/or transition. Although it is clear that the specific duration of these fluvial activity episodes cannot be estimated (Lateglacial analogues involve too many variables and OSL dating is not sufficiently precise), current geomorphological research suggests periods of a few hundred (or at the very most a few thousand) years. The sedimentary units deposited during these individual fluvial activity episodes therefore provide a higher resolution geochronological context from which to explore patterns in their archaeological content (although see comments in point 4 below with regard to the vertical derivation of artefacts). These higher resolution contexts effectively float within the broader framework of the MI (marine isotope) stages, since current OSL precision does not permit their exact ageing, while the tendency for partial erosion of the sequences does not allow individual sediments to be mapped against sub-MIS climatic fluctuations (this approach is also hindered by the complexity of fluvial system response to climatic change and the role of system thresholds).

4. Refining the geochronological precision associated with the sedimentary units does not resolve the issue of artefact re-working and the potential for artefacts in secondary contexts to be considerably older than their associated sediments. New models have therefore been proposed for assessing the degree of temporal derivation undergone by re-worked artefacts (Chapter 7). These models are based on:

    a. The chronological position of the encasing sediments within the glacial/interglacial cycle (e.g. preserved, fine-grained sediments laid down at the beginning of an interglacial are likely to contain artefacts derived from the contemporary floodplain, while coarse-grained sediments deposited at the end of a glacial are more likely to include artefacts re-worked from the old floodplain (the next highest terrace level).
    b. The stratigraphic position of the artefacts within the sediments (e.g. artefacts from the base of the sedimentary unit are more likely to have been derived from older, eroded sediments, while artefacts from higher up in the unit are more likely to be broadly contemporary with those sediments).
    c. The condition of the artefacts, with heavily abraded artefacts more likely to have undergone multiple re-working episodes, potentially from higher terrace deposits into

lower sedimentary units.

d. The geomorphology of the river system and its impact upon the potential for vertical re-working through erosion (e.g. the variations in river terrace preservation on Cretaceous chalk and Tertiary clay bedrocks, or the differences in erosion potential between the upland and lowland stretches of the same river).

Temporal estimates of the degree of vertical derivation are based on orders on magnitude (10^n), reflecting the complexity of the processes and the limitations of current understanding. These models are currently theoretical and require further testing through field observations (see also Section 5 below). Nonetheless, they highlight the potential for assessing the temporal derivation of secondary context assemblages, refining the levels of geochronological precision associated with the data, and mapping data sets against research questions at different temporal scales.

5. The issue of temporal re-working also highlights the processes of spatial re-working (the fluvial transportation of artefacts downstream), which may result in the creation of spatial palimpsests in the archaeological record. New models have therefore been proposed for assessing the degree of spatial derivation undergone by re-worked artefacts (Chapters 5 and 7):

   a. The condition of the artefacts. These data form the principle basis of the models, since they are available from all archived artefact collections (although the data has rarely been recorded) while a comprehensive 3-dimensional archive of the fluvial landscape is rarely (if ever) available for the Middle Pleistocene. As with the temporal re-working models, heavily abraded artefacts are more likely to have undergone greater downstream distances of fluvial re-working.
   b. Experimental archaeology. Laboratory (Chambers in prep) and field-based (Hosfield & Chambers 2002a, 2003, 2004) experimental archaeology has provided a range of data relevant to the nature of artefact transport including the *état physique* of transported artefacts, spatial patterning in transported materials, and the generally stochastic nature of the transport process. These data have highlighted the importance of the artefacts' physical condition data as the best indicator of transport distances.
   c. The geomorphology of the river system and its impact upon the potential for spatial re-working. As with the temporal re-working models, variations in river type (e.g. upland/lowland) and fluvial behaviour (e.g. terrace preservation and migration tendency in response to bedrock type) impact upon the potential for relatively minor or more extensive phases of spatial derivation.

The spatial estimates of the degree of lateral derivation are based on orders of magnitude (10^n), reflecting the complexity of the processes, the difficulty of modelling long-distance transport and the limitations of current knowledge. These models are grounded in experimental data and observations on archaeological assemblages, but still require further development and testing. However, they represent a significant step forward in the assessment of the spatial derivation of secondary context assemblages, providing a refinement of the levels of spatial precision associated with the data, and supporting the mapping of data sets against research questions at different spatial scales.

6. The spatio-temporal models have provided a new framework for the analysis of secondary context archaeological data sets (Chapter 7). The proposed framework outlines the different analytical scales in time and space (9 are defined within the current models described here) which can be applied to the investigation of these data. The analytical scales range from on- to off-site (in the spatial sphere) and from individual millennia to tens of millennia (in the temporal sphere). These different analytical scales manipulate the data (essentially derived, stone-tool assemblages) to explore a range of processes and behavioural adaptations, including colonisation trends, population patterning (at different temporal scales), and tool-making (including typological variability, technological strategies, and raw material exploitation). Some of these approaches have been demonstrated elsewhere over the last few years (e.g. White & Schreve 2000; Ashton &

Lewis 2002), but the strength of the frameworks proposed here is in their formalisation of the spatio-temporal structures and the potential for operating at different scales and linking the different strands of investigation.

7. Investigation of the biological data that occurs within archaeological secondary contexts has highlighted the potential spatio-temporal discrepancies between the different types of biological data and the derived stone tool assemblages. Although biological data can provide extremely high resolution palaeoenvironmental reconstructions on the basis of highly-responsive micro-species (e.g. non-marine molluscs, and coleoptera), it cannot be assumed that the secondary context artefacts relate to these environments. In other words, these environments cannot be *inhabited* with either hominids or their artefacts. In the case of more tolerant, less responsive organisms (large mammals are a classical example), the palaeoenvironmental reconstructions are of a lower resolution. As with the higher-resolution reconstructions, it cannot be *demonstrated* that hominids and their artefacts were present within these environments (unless butchery evidence was identified on the faunal biofacts). However, these low resolution reconstructions are proposed to operate at a comparable magnitude to the derived, secondary context archaeology, and this scalar similarity supports the drawing of broad comparisons between these time-averaged data-sets. Finally it is stressed that biological data sets have clear archaeological applications even where they cannot be directly related to archaeological material, since these materials have a well-demonstrated value as biostratigraphical markers.

8. The value of the secondary context archaeological resource is not dependent upon comprehensive documentation of the data-sets (e.g. logging of the sedimentary sequence and the stratigraphic provenance of stone tools and/or biological data). Although secondary context archaeological assemblages with excellent documentation do exist (e.g. Broom, due to the work of C.E. Bean (Reid Moir 1936; Shakesby & Stephens 1984; Green 1988; Chapter 4), and Swanscombe (Smith & Dewey 1913, 1914; Conway *et al.* 1996)), in many cases available documentation is either limited (e.g. Dunbridge (Dale 1912a, 1918; Bridgland & Harding 1993; Harding 1998) or virtually non-existent (e.g. the majority of the secondary context sites of Southampton (Evans 1872; Dale 1896; Roe 1968a)). A key advantage of the analytical framework proposed here (point 6 above) is that all types of data (documented and undocumented) from archaeological secondary contexts can be analysed, at the relevant spatio-temporal scale or scales. For example, artefacts provenanced to an overall terrace level can be explored in terms of technology or population size at the MIS-cycle scale, while material that is documented to individual sedimentary units can be explored at both the course MIS-cycle scale and at the level of shorter-term, higher resolution fluvial/climatic/temporal events.

The above discussion has highlighted the range of data that are available from archaeological secondary contexts: artefactual (stone tools), biological, and sedimentary. These data types are prioritised in the following section, but it is important to stress that the presence of stone tools is not required for secondary contexts to have clear *archaeological potential*. This is an important distinction, since it is concerned with the perceived boundaries between Palaeolithic archaeology and Quaternary science. It is proposed here that these boundaries are essentially artificial, and are unhelpful to the continuing development of Palaeolithic archaeological research. They key point is that in many cases, stone tools are not recovered from secondary contexts (e.g. fluvial deposits) that date to the overall hominid occupation of Britain during the Palaeolithic, but those sediments are still capable of yielding a range of valuable information:

- Fine-grained sediments for optically stimulated luminescence dating, resulting in the development of absolutely-dated local and regional geochronological sequences.
- Molluscs for amino-acid dating, contributing absolute dates to the development of local and regional geochronological sequences.
- Macro- and micro-fauna for the reconstruction of Pleistocene palaeoenvironments.
- Macro- and micro-fauna for the development of faunal biostratigraphies.

- Sedimentary evidence of fluvial activity rates, erosive contacts in the depositional sequence, and landsurface development.

These data are critical in the development of wider geochronological frameworks (e.g. within which to interpret archaeology recovered from different locations in the same drainage system), improving current palaeoenvironmental understanding (e.g. against which to explore variability in hominids' behavioural repertoire), and advancing knowledge with respect to fluvial activity and its documentation within the sedimentary archive (e.g. critical to the interpretation of stone tool assemblages recovered from fluvial secondary contexts). Against this definition, an ordinal classification for the frequency of different data types associated with the secondary context archaeological resource is proposed:

1. The sedimentary archive: these deposits are the working definition of an archaeological secondary context within this project. Even in cases where aggregates extraction occurred during the 19th and/or 20th centuries (sometimes resulting in the recovery of stone tool collections), remnants of the sedimentary sequence are often available for re-investigation (e.g. Shakesby & Stephens 1984; Bridgland & Harding 1987; Bridgland 1994).
2. Biological data: the frequency of these data vary with respect to the different types (e.g. large mammal remains are more common than rodent bones for example, reflecting extraction techniques, sampling strategies and the robusticity of the material itself) and the local soil and sediments conditions.
3. Lithic artefacts: although biological data are susceptible to destruction through soil and sediment chemistry (Chapter 6), data from Bridgland (1994; Table 57) indicates that in the case of the Thames valley, palaeoenvironmental data was recovered more frequently than lithic artefacts from a total of 37 Quaternary sites (measured on a simple presence/absence basis). It is also noted that in many instances, artefacts are recovered from numerous exposures of a continuous sedimentary unit, resulting in several 'findspots' or 'sites' being recorded from a single secondary context (Hosfield 1999).

This ordering was based upon data from the Pleistocene Thames (Bridgland 1994). The presence/absence of the two data types (stone tools and biological data — fluvial sediments are inevitably present at all of the sites) at each of 31 sites was documented (Table 57, Table 58 & Table 52). The 31 sites cover a wide range of geographical localities (Figure 227) and this minimises (without wholly removing) the effects of localised preservational biases with respect to the biological data (see also Chapter 6 for further discussion of this issue). Sites dated prior to 500,000 kya BP were excluded, as this period is generally considered to pre-date the first hominid occupation of Britain during the Middle Pleistocene (Gamble 1999; Wymer 1999).

Data Type	Present	Absent
Biological	23	8
Stone tools	13	18

Table 57: occurrence of biological data types in 39 Thames Quaternary sites (after Bridgland 1994)

Overall, the key point is that the secondary context archaeological resource is of considerable value, due to the breadth of its spatio-temporal coverage and the unique long-term perspective that it provides. With data ranging from sedimentary (geochronological dating, deposition and assemblage formation processes), to artefactual (hominid behaviour [stone tools] and the palaeoenvironmental context [biological]), this is a unique archaeological resource. The key question therefore concerns how this resource is managed within the potentially conflicting demands of industry and archaeology.

Site	Sediment types	Biological data	Stone tools
Sugworth Road Cutting	Gravels, sands, silts & clays	YES	NO
Long Hanborough Gravel Pit	Gravels (incl. silt & sand lenses)	YES	NO
Wolvercote Channel	Gravels, sandy-gravels, silty-clays & peats	YES	YES
Stanton Harcourt Gravel Pit	Gravels, sands, silts & organic sediments	YES	YES
Magdalen Grove	Gravels & silty-sands	YES	NO
Westmill Quarry	Tills, gravels & sands	YES	NO
Moor Hill Quarry	Till, gravels & glacio-lacustrine sediments	NO	NO
Ugley Park Quarry	Till, gravels & sands	NO	NO
Highlands Farm Pit	Gravels	YES	YES
Hampstead Marshall Gravel Pit	Gravels	NO	YES
Cannoncourt Farm Pit	Gravels & sands	YES	YES
Fern House Gravel Pit	Gravels	YES	NO
Brimpton Gravel Pit	Gravels, sands, silts & organic muds	YES	NO
Hornchurch Railway Cutting	Till & gravels	NO	NO
Wansunt Pit, Dartford Heath	Gravels, silts & clays	YES	YES
Swanscombe (Barnfield Pit)	Gravels, sands & loams	YES	YES
Purfleet (Bluelands, Greenlands, ESSO & Botany Pits)	Gravels, brickearths & coombe deposits	YES	YES
Globe Pit, Little Thurrock	Gravels & brickearths	YES	YES
Lion Pit, Tramway Cutting (West Thurrock)	Gravels, sands, silts & silty-clays	YES	YES
Aveley, Sandy Lane Quarry	Sands, silty-clays & peaty-clays	YES	NO
Northfleet (Ebbsfleet Valley): Baker's Hole Complex	Gravels & fine-grained sediments	YES	YES
Wivenhoe Gravel Pit	Gravels & organic silty-clays	YES	NO
St. Osyth Gravel Pit	Ice-sheet outwash sediments & gravels	NO	NO
Holland-on-Sea Cliff	Ice-sheet outwash sediments & gravels	NO	NO
Clacton	Gravels, sands & clays (channel-fill sediments)	YES	YES
Cudmore Grove, East Mersea	Gravels & channel-fill estuarine sediments	YES	NO
Southminster, Goldsands Road	Sandy-gravels, sands & clayey-sands	NO	NO
Maldon Railway Cutting	Tills, gravels & sandy-silts	NO	YES
East Mersea Restaurant Site	Gravels, sandy-silts & clay-silts	YES	NO
East Mersea Hippopotamus Site	Gravel & silts (incl. sand & gravel stringers)	YES	NO
Great Totham (Lofts Farm Pit)	Gravels, silts & organic clays	YES	NO

Table 58: presence/absence of biological and artefact data types for 31 Quaternary sites from the Thames (after Bridgland 1994)

4. PRIORITISING EVIDENCE?

Prioritising the various categories of data associated with archaeological secondary contexts is a far from straightforward task. The main difficulties stem from the range of different organisations and interest groups linked to the secondary context archaeology/aggregates resource. These are defined here as follows (in no order of importance):

- Academic archaeologists.
- Amateur archaeologists.
- Professional archaeologists (involved in the implementation of PPG16 legislation), employed (directly or indirectly) by local government and/or professional archaeological units (e.g. Wessex Archaeology, Cotswold Archaeological Trust).
- The aggregates industry.

From an academic perspective, the recovery of lithic artefacts from archaeological secondary contexts is not inevitably assigned the highest priority. For example, our re-investigation of the Broom Lower Palaeolithic site (Chapters 3 and 4) was principally concerned with exploring the influence of chert raw material on Lower Palaeolithic technology and evidence for Levallois technique (through a study of the extant artefact collection) and assessing the age of the archaeological sequences (through OSL sampling of the sequence). These types of re-investigations of Palaeolithic secondary contexts have been widespread over the last few decades (e.g. Ashton *et al.* 1992, 1998; Bridgland & Harding 1987; Schreve *et al.* 2002; Shakesby & Stephens 1984; Wenban-Smith 1990, 1992) and in many cases the prime emphasis was not necessarily placed upon the recovery of new artefacts. These priorities will inevitably vary in response to levels of existing knowledge concerning the Palaeolithic archaeological presence within the local region. For example, in 'blank' areas priority may well be placed on the identification (if possible) of a Palaeolithic heritage through the recovery of the first stone tools from that region or type of landscape (e.g. Scott-Jackson 1992, 2000). In areas with large, but poorly contextualised, extant collections (as at Broom), the focus may move away from the recovery of more artefacts and towards other priorities such as dating and sediment mapping (see above). However, these goals tend to be dictated by research interests and agendas (see also Section 5 below), and integration with management policies and field practice is typically not straightforward.

Amateur archaeologists have traditionally highlighted the recovery of stone tools as a key goal in the investigation of archaeological secondary contexts (e.g. MacRae 1988, 1990, 1991, 1999; Hardaker & MacRae 2000; Hardaker 2001). This reflects a well-established tradition amongst amateur (and professional) archaeologists, with the scouring of gravel pit sites for bifaces and other stone tools dating back to the second half of the 19th century (e.g. Read 1885; see Roe 1981 for a fuller review). The focus upon the recovery of artefacts reflects a combination of factors, including the low-technology requirements of this type of fieldwork, the archaeological discipline's traditional concern with artefacts, and the lack of requirement for any formal qualifications or training (although it should be stressed that many so-called 'amateur' archaeologists are better artefact-finders than many of their professional colleagues). It is also emphasised that many of these fieldworkers (e.g. R.J. MacRae and T. Hardaker) had and have established excellent working relationships with quarry managers and staff (perhaps partly because the aggregates industry perceives a reduced threat of major disruption due to long-term archaeological excavations as a result of their activities), facilitating their regular access to these sites. However, it is proposed that modern health and safety at work legislation will increasingly result in the restriction of access for amateurs to working aggregates sites. Specifically this may result from the recent introduction of a number of safety passport training schemes (recently reviewed by the Health and Safety Executive (2003a, 2003b)). Although the long-term implications of these schemes for archaeologists working on aggregates sites are not yet fully understood, it is conceivable that programmes such as the Client/ Contractor National Safety Group's (CCNSG) Safety Passport Scheme (http://www.safetydomain.co.uk/ccnsg/) may deter amateur archaeologists both by their financial cost (£100) and limited duration (the safety passport is valid for three years). Finally, it is noted that amateur fieldwork and its resulting collections are often not integrated into current research frameworks, and it can perhaps be suggested that this activity is 'collection for collections sake', although there are still instances where amateur observation has resulted in discoveries of significance (e.g. the work of R.J. MacRae and

Terry Hardaker in highlighting the Palaeolithic quartzite artefact record of the Upper Thames valley region).

The professional archaeological perspective is rather more difficult to classify, not least because it is clear that there is considerable regional variation (Wilkinson pers. comm.; see Section 5) within the watching brief frameworks developed and implemented as part of the PPG16 process. Since a guiding principle of PPG16 is the avoidance of the needless destruction of *archaeological remains* (see Section 5 below for further details), the key issue concerns *what* is perceived as archaeological remains for the Palaeolithic period, when dealing with archaeological secondary contexts. This issue was introduced above and is discussed in further detail below (Section 5), but examples of recent watching brief activity in Hampshire (Harding 1998; Cotswold Archaeological Trust 2000) indicate that the recovery of stone tool artefacts from working aggregate extraction sites (whether from exposed sections or reject heaps) is seen in the professional archaeological sector as the primary indicator of Palaeolithic archaeology. The Squabb Wood project design also places emphasis upon the instigation of emergency excavations should *in situ* archaeology be identified (Cotswold Archaeological Trust 2000: 1–2), suggesting again that artefacts are seen as the primary indicator of an archaeological secondary context and are therefore the main focus on any monitoring activity. It is noted that artefact recovery is often combined with mapping and litho-stratigraphical logging of exposed sections (e.g. Harding 1998; Cotswold Archaeological Trust 2000). This combination of activities occurred at sites with large, extant collections (e.g. Dunbridge (Harding 1998)) and at sites with no recorded archaeology (e.g. Squabb Wood (Cotswold Archaeological Trust 2000). However, in the latter case it is not always clear whether the mapping and logging of geological sequences is undertaken as an end in itself, or *in case* artefacts are subsequently found (in the case of Dunbridge the geological mapping and logging was undertaken to provide contexts for the extant collections and the contemporary artefact discoveries). Overall, it is clear that the primary focus is on the identification of Palaeolithic archaeology, as defined by stone tool artefacts. A key issue for further discussion is therefore whether this definition requires modification.

From the perspective of the aggregates industry, the key concern is with the amount of time spent on site by archaeologists, and how this can be minimised to reduce disruption to the extraction process. This is a wholly understandable position and must be fundamental to any proposed alterations to current management practice (as should the recognition that a very large proportion of archaeological knowledge with respect to the Palaeolithic period has come courtesy of the aggregates industry over the last 150 years). Finally, it should also be recognised that any changes in the definition of Palaeolithic archaeology (e.g. reducing the emphasis upon stone tools and mammoth bones and focusing upon sediments, chronological frameworks and micro-fauna) may also severely reduce the saleability of archaeology to the aggregates industry as a publications relations resource.

It is therefore clear that there are conflicting views as to which elements of the record are of the highest priority when it comes to archaeological secondary contexts. A provisional ordering of the data is outlined below, based on the research issues raised as part of this project and the perspectives of the secondary context archaeological resource outlined above:

- Artefacts (stone tools): these data are the critical component of archaeological secondary contexts. Irrespective of whether the sphere is academic research (e.g. population modelling and investigating technological practice (Chapter 7)), or archaeology and planning (e.g. recording the presence of artefacts during aggregates extraction), stone tools remain the key component. However, it is stressed that artefacts are not required in order to define an archaeological secondary context (see below). It is also clear that in the historical collection of stone tools from archaeological secondary contexts bifaces have been prioritised, as a result of sampling bias (issues include collection practice, ease of recognition and perceived value) and taphonomic factors associated with fluvial transport. The relative value of bifaces (core tools) and flake material (both flake tools and débitage) is a complex issue. In 'blank' areas all artefacts are important, as they indicate a Palaeolithic presence. In areas with a well-documented Palaeolithic heritage however, bifaces can be argued to be of greater value since they provide a range of robust mechanisms for comparison (e.g. technological features such as butt and tip working and edge profiles). Flakes have often been perceived as evidence for minimally derived knapping debris, but recent experiments (Hosfield & Chambers 2004; Chapter 5) have indicated that flake material is capable of surviving fluvial transport. It is also suggested that it is not only the large, thick flakes (e.g. handaxe roughing out flakes) that are capable of surviving transport (*c.f.* Harding 1998: 75), but that more fragile material (e.g. handaxe thinning flakes) are also capable of surviving a transportation episode. Nonetheless, in cases where large quantities of flake material were recovered, then its implications for a probable local source should be seriously assessed.

- Sedimentary (geological context): it is stressed that Palaeolithic artefacts are of limited value without geoarchaeological context. Investigation of the sedimentary context provides a wide range of valuable data:

    - The sedimentary archive of fluvial activity enables the testing of extant models of terrace formation, both in response to long-term climatic cycles (e.g. Bridgland 2000) and short-term climatic fluctuations (e.g. Vandenberghe 2002). These models are fundamental to our wider understanding of the secondary context archaeological resource (Chapter 7), and it is emphasised that the fluvial sedimentary archive is a secondary context of clear archaeological value, *irrespective* of whether individual exposures contain artefacts or not.
    - Geochronologies, based both upon terrace sequences (e.g. Bridgland 1994) and the increasing application of absolute dating techniques to suitable sediments (e.g. the use of optically stimulated luminescence to fine-grained sands) and their biological content (e.g. the testing of amino-acid ratios from shell remains). These geochronologies provide a critical temporal context for our interpretation and understanding of the secondary context archaeological resource, at local, regional, national and international scales. As above therefore, it is stressed that datable sediments form a secondary context of clear archaeological value, *irrespective* of the presence or absence of artefacts.
    - Assemblage taphonomy can be partially explored through the structure of individual sedimentary units (alongside the physical evidence for artefacts), which can indicate depositional conditions and the degree of material re-working (e.g. through the presence/absence of erratics). Although assemblage taphonomy is reliant on the presence of an assemblage, it highlights the importance of not simply the artefacts themselves but also their spatio-temporal origins and its implications for understanding prehistoric behaviour.

- Biological (palaeoenvironmental data): although biological data has clear archaeological importance (e.g. for palaeoenvironmental reconstructions, modelling subsistence strategies, or developing biostratigraphical frameworks), it is problematic when dealing with archaeological secondary contexts and stone tool assemblages. These problems stem from the contrasts between the spatio-temporal frameworks of the biological and archaeological data (e.g. between derived bifaces in coarse-grained gravels and molluscs with fine-grained sediment lenses occurring within with gravels — see Chapter 6), which make it currently impossible to map the data against each other. This problem is most notable when dealing with species that are highly sensitive and responsive to climatic and/or environmental change (e.g. beetles and molluscs), but it is also relevant to less responsive species (e.g. large herding fauna). Overall, the biological data can be cautiously employed in a number of different spheres:

    - Developing biostratigraphical/chronological frameworks. This has been successfully undertaken by Schreve (2001a, 2001b) with large mammal fauna, but is potentially problematic with secondary context data due to the problems of re-working and vertical derivation of specific species from older to younger terraces. Recovered shell materials can also be applied to the development of amino acid-based chronological frameworks.
    - Modelling subsistence strategies. This is dependent upon the identification of processing evidence (e.g. cut-marks, bone smashing or cracking) and is again limited by the difficulty of associating faunal and lithic material from derived contexts. Nonetheless, such evidence is still important evidence of hominid activity, albeit at rather generic levels.

- Building palaeoenvironmental reconstructions. These data are valuable for developing general understanding of Pleistocene environments, and can be considered in terms of their *potential* impact upon hominid behaviour. However, and as highlighted above, it is impossible to explicitly populate these reconstructed environments with hominids or their artefacts, when we are dealing with derived data from archaeological secondary contexts. This is true with respect both to fine resolution reconstructions (e.g. based on short-lived beetle assemblages) and to coarse, time-averaged (e.g. based on derived animal bones from large, herd species), although in the case of the latter it is at least possible to acknowledge the similar magnitude of the derived and time-averaged biological and lithic data.

Based upon these priorities it is therefore fundamental to consider current policy with respect to the management, protection and recording of the secondary context archaeological record.

5 MANAGEMENT, PROTECTION & RECORDING — CURRENT PRACTICE

5.1 The Field Evaluation of Palaeolithic Archaeology

As outlined above, Palaeolithic archaeology cannot readily be accurately evaluated by desktop means, or by the utilisation of non-invasive techniques such as geophysical survey. Evaluation of Palaeolithic archaeology requires ground truthing data, which is generally only possible once excavation has commenced and the over-lying Holocene deposits removed. This situation occurs most frequently during mineral extraction, when overlying deposits are stripped prior to the removal of the Pleistocene sands and gravels which may themselves contain Palaeolithic archaeology.

Mineral extraction planning applications explicitly have to consider the threat they pose to archaeological remains, acknowledging that:

"Mineral exploration and working may damage or destroy irreplaceable sites, structures and remains of archaeological interest that are of importance to the national heritage. The industry should, wherever practical, ensure the physical preservation of important archaeological or historical remains or features, and MPAs (Mineral Planning Authority), when determining applications for extraction, should have regard to the desirability of preserving historic buildings and landscapes, conservation areas, ancient monuments and their settings…identifying as early as possible the likely presence and importance of any archaeological sites liable to be affected by the proposed development"

(DoE 1989: paragraph 76)

Later prehistoric and historic archaeology are most likely to be uncovered during the stripping of overburden from the underlying sands and gravels. As such, archaeological surveys and test pitting can be undertaken prior to the commencement of mineral extraction. Should significant remains be uncovered, then it is relatively easy (though not necessarily popular) to manage the logistical practicalities of their preservation and/or detailed excavation. In contrast, while the potential of sediments to contain Palaeolithic archaeology may be evaluated in relation to known occurrences in adjacent locations, the extent of any Palaeolithic archaeology can only be demonstrated during the mineral extraction phase. This places Palaeolithic archaeology in a rather unique position; mitigation for its preservation cannot be made prior to the commencement of activities that could lead to its potential destruction. English Heritage recommends that where desk-based assessments prove inadequate, Palaeolithic archaeology is best safeguarded during the extraction process by "limited field evaluations conducted by suitably qualified archaeologists" (English Heritage 1998: 4).

Though strategies vary from county to county (Wilkinson pers. comm.), as a result of differing Pleistocene sedimentary records and research histories (e.g. indicated by the current focus upon raised beach sediments in West Sussex, presumably in response to the Boxgrove discoveries), such field evaluations typically take the form of 'watching briefs'. These watching briefs are emplaced in response to threats to archaeology posed by development and are recommended either as part of the planning process and/or development plan policies, or as part of an Environmental Impact Assessment conducted prior to mineral extraction. In accordance with the Institute of Field Archaeologists (IFA) *Standard and Guidance* document (IFA 2001), a watching brief is defined as:

"A formal program of observation and investigation conducted during any operation carried out for non-archaeological reasons…where there is a possibility that archaeological deposits may be disturbed or destroyed"

(IFA 2001: 2)

The IFA *Standard and Guidance* document describes watching briefs as being of dual purpose, providing both the opportunity to identify the need for more intensive archaeological investigations to be undertaken, but also enabling the detailed recording of archaeological deposits. It is stipulated that watching briefs should:

"allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works…to provide an opportunity, if needed, for the archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief are not sufficient to support treatment to a satisfactory and proper standard"

(IFA 2001: 2)

The IFA watching brief guidelines are not period specific, and as such cannot provide a step-by-step policy appropriate for all archaeological remains in all depositional scenarios. Instead the guidelines focus on stressing the importance of agreeing and formalising activities and contingencies between the archaeologist and the commissioning body in the form of a detailed project design.

The practicalities of watching brief investigations will vary enormously depending both on the archaeology being assessed and the nature of the development threat. In the case of secondary context Palaeolithic archaeology the threat of destruction is total, as the sediments in which it occurs are in the process of being extracted. Therefore the 'preservation by record' component of the watching brief strategy is of extreme significance.

5.2 Watching Brief Strategies

In one form or another, secondary context Palaeolithic sites have a long history of subjection to formal and informal watching briefs. During the late 19th and early 20th centuries many gravel pits were active, the result of urban expansion and industrialisation (Roe 1981; Hosfield 1999; Ashton & Lewis 2002). These gravels were primarily extracted manually, and many workers came to recognise the stone tools (especially the bifaces) that could be contained within these gravels. Local antiquarians and amateur archaeologists (such as C.E. Bean at Broom — Chapters 3 & 4) became increasingly interested in these artefacts, often paying the quarry labourers for their finds. Such collectors were primarily interested only in acquiring artefacts, and the degree of interest shown in the stone tools' provenance (their depositional contexts) varied enormously between collectors, although it could be quite extensive as the records of C.E. Bean demonstrate (Chapter 4; Green 1988). Activities such as these led to the amassing of large collections of artefacts, but typically with only limited contextual data.

In more recent times these collecting activities have both continued (e.g. MacRae 1988, 1990, 1991, 1999; Hardaker & MacRae 2000; Hardaker 2001) and have become incorporated within formal watching brief strategies. These have developed since PPG16 as professional archaeological contractors have tendered for projects initiated by County Archaeologists in response to planning/mineral extraction applications. In comparison to the amateur collecting of the earlier periods, far more attention is now paid to the geological contexts exposed during active mineral extraction and to the identification of palaeoenvironmental evidence. However, the prime emphasis is still placed upon the recovery of lithic artefacts. Two recent watching briefs (Dunbridge and Squabb Wood) are presented as case studies below to illustrate these issues. These practices and the very different results they produced are presented and evaluated against the archaeological value review detailed in Section 3.

5.3 Dunbridge

The Dunbridge gravel pits lie to the west of the river Test, immediately below its confluence with the tributary river Dun. These gravels were extensively worked during the first quarter of the 20th century. Artefact collections were made by William Dale (1912a, 1912b, 1918), a local Southampton-based antiquarian. Roe (1968a: 96) listed 1021 artefacts, including 953 bifaces (93.3%), 14 roughouts, 3 cores, 16 retouched flakes, 24 unretouched flakes, 8 miscellaneous pieces, and 3 Levallois flakes, making Dunbridge the most prolific Palaeolithic site in Hampshire. A more comprehensive review of the archaeology recovered from the Dunbridge site can be found in Chapter 4.

In addition to collecting artefacts, Dale (1912a) described the geology of the Dunbridge gravels as comprising of up to 7m of gravel, overlying the clays and sands of the Woolwich and Reading Beds. Dale (1918) suggested that artefacts of different physical conditions originated from different stratigraphic levels in the gravel, proposing that the sharp, white implements from the upper deposit were of a later character than those from the lower beds. The sub-division of the gravel deposit was based on colour: a lower, dark red gravel, a middle yellow-brown gravel and an upper white gravel, and Dale (1912a) suggested that the gravel of two periods were present. He subsequently modified this interpretation (Dale 1918), arguing for an upper, paler deposit that was separated from a lower, darker aggradation by an iron pan horizon. These observations suggest the possibility that different Lower Palaeolithic industries exist in stratigraphic superposition at Dunbridge.

These geological observations and the extensive collection of Palaeolithic artefacts recovered from the site, indicate the potential fulfilment of two of the eleven national significance criteria that have been outlined by English Heritage.

In 1987 Halls Aggregates (South Coast Limited) applied for planning permission to extract hoggin (an aggregates industry term given to a mixture of clays, sands and gravels) from the lands adjacent to the former gravel pits at Kimbridge Farm, Dunbridge (SU 321255). Due to the known Palaeolithic evidence from the adjacent deposits, the Hampshire County Archaeological Officer was not in favour of the application being granted. However, the timing of the extraction application coincided with Governmental pressure to meet growing national demands for aggregates. After a lengthy planning enquiry, including test pit evaluations of the potential for *in situ* preservation within the Dunbridge gravels, permission to extract was granted. In response to archaeological concerns a Section 52 agreement was reached which allows the gravel extraction to be archaeologically monitored by watching brief. The watching brief monitoring was initially undertaken as two half day visits to the extraction site every month. This structure was modified in 1997 to a single half day visit per month, as extraction at the site became focused upon the exploitation of Tertiary pebble beds, which are not of Palaeolithic significance (Harding 1998). Since 1998, extraction of Pleistocene gravel has been limited, due to a focus of extraction activity upon Tertiary pebbles and sands, and the frequency of watching brief visits has declined (Harding pers. comm.). Overall, the purpose of the watching brief was twofold, both to record the geological sequences as the aggregates were extracted and to search for additional implements:

"Routine visits included the processing plant and the pit. The hoggin at Dunbridge has a clay matrix and artefacts are much easier to identify on the reject heap after material has been washed. This has the disadvantage that implements cannot be provenanced to specific areas of the pit, especially as material is routinely stockpiled, often for long periods of time, before it's washed…Periodically the pit face is planned and the face profile drawn at scale to construct a composite record of the gravel. Areas of extraction are plotted routinely to note progress in the rates of quarrying."

(Harding 1998: 73)

The interim geological results of the Dunbridge watching brief were published by Bridgland & Harding (1993). The presence of between 1m and 5m of well-bedded sand and gravel, overlying the surface of the Reading Beds at approximately 42–44m OD, was demonstrated. The top 2m of the gravel shows marked cryoturbation and bleaching, accounting for the 'white' gravel described in earlier reports (e.g. Dale 1912a; 1918). The cyroturbated gravel is demarcated by a cemented iron/manganese horizon, which can be traced across the pit. The entirety of the exposed gravel (the cyroturbated gravel and the underlying well bedded gravel) is interpreted as representing a single terrace deposit of the Test (Bridgland & Harding 1993; Harding 1998). The origins of the underlying lower terrace identified in mechanically excavated test pits during the planning enquiry could not be determined (*ibid.)*, due to the lack of exposures.

Subsequent visits, undertaken as part of the continuing watching brief, have shown the composition of the gravel to be consistent across the pit, though a noticeable thinning towards the southwest occurs along the lines of 'deeps' in the Reading Beds. In some areas the Reading Beds are overlain by less than one metre of cyroturbated gravel, or outcrop directly at the surface. Well-bedded gravel and remnants of the manganese horizon are only visible in the west of the pit. These features have been interpreted as suggestive that the current extraction is approaching the edge of the terrace, though the underlying terrace identified during the planning enquiry evaluation has still not yet been reached (Harding 1998).

In terms of artefact recovery, the current watching brief at Dunbridge has certainly proved productive; 123 visits have led to the recovery of 163 artefacts (Harding 1998). Of these *c.* 72% (n=116) were recovered during examination of the reject pile, an area where oversized cobbles are temporarily stored prior to their crushing down into smaller, commercially viable, aggregate. Harding (1998) attributes the proportionally high recovery of artefacts from the reject heap to the washing processes employed by the pit to clean the gravel. Of the 47 artefacts recovered from within the pit, the majority were found as rain-washed (and therefore visible) pieces within talus slopes at the base of the advancing extraction face, or within the retained bunds of unexcavated hoggin. Therefore only a very small proportion of the recovered artefacts can be linked in any meaningful manner to their specific depositional or spatial context origin within the pit.

Table 59 describes the typology of the artefacts recovered from Dunbridge during the current watching brief. Comparison with Roe's (1981) assessment of the Dunbridge assemblage as dominated by bifaces, the watching brief assemblage is markedly different in character. Unretouched flake material (débitage) is the most common artefact form recovered. This flake dominance can be argued to be more representative of the true character of archaeology preserved within secondary contexts; the biface dominance in the extant record more accurately reflecting historical collection biases rather than a genuine dominance (see Hosfield 1999). The biface component of the assemblages consists of roughly equal quantities of pointed and ovate forms (Harding 1998). The current assemblage includes pieces of potential chronological significance; a Levallois blade core and the butt of a *bout coupé* biface have been recovered, but are unprovenanced within the pit leading to uncertainties about their origins. Harding notes their physical condition and suggests that:

"Both the handaxe fragment and the core are lightly stained and slightly rolled and probably come from within the bleached fluvial gravel"

(Harding 1998: 75)

However, this interpretation should be viewed cautiously as the distinctive ferruginous staining typical of gravel deposits can be quickly bleached away by exposure to sunlight.

Artefact Type	**Numbers Recovered**
Biface	43
Core	12
Scraper	3
Flake	102
Miscellaneous	3
TOTAL	**163**

Table 59: Typology of artefacts recovered during watching brief activities at Dunbridge (after Harding 1998: Table 11.1)

In summary, the watching brief at Dunbridge has provided a clearer picture of the site's geology (Bridgland & Harding 1993), increased the proportions of non-bifacial artefacts within the extant assemblage, and documented a continued Palaeolithic archaeological presence that *appears* to occur throughout the lateral and vertical extents of the terrace gravels under extraction. Sadly, this archaeology cannot be provenanced within the pit, and therefore provides only limited data relating to the distribution of artefacts through the deposit and the potential occurrences of any concentrations of artefacts remain unknown. Geological questions also remain as Harding (1998) acknowledges:

"It is also not yet possible to relate the deposits and the material on a regional basis."

(Harding 1998: 76)

The establishment of such relationships on both a regional and national basis should be of prime importance, and would be greatly enhanced by the development of an independent chronological framework, such as may be provided by chronometric dating techniques such as optically stimulated luminescence (OSL).

5.4 Squabb Wood

The site of Squabb Wood lies on a Middle Pleistocene terrace of the River Test, north of Romsey, Hampshire. The River Test was a major northbank tributary of the Pleistocene Solent River, and many Palaeolithic artefacts have been recovered in the terrace deposits elsewhere around Romsey (e.g. Chivers Gravel Pit (also known as Cupernham Pit and Abbotswood), Belbin's Pit, and Test Road Gravel Pit (Wessex Archaeology 1993a)). Of particular significance is the site of Dunbridge (see above), where a long history of antiquarian activity has recently been supplemented by the systematic artefact collection and section logging undertaken during an archaeological watching brief (Bridgland & Harding 1993; Harding 1998). Hampshire County Council granted permission for aggregates to be extracted from Squabb Wood and though the gravels at the site are in a higher (older) terrace than those of the implementiferous deposits at Dunbridge, archaeological mitigations were emplaced:

"In light of the potential for similar remains being encountered during the present extraction of somewhat older strata an archaeological watching brief, backed up by limited archaeological excavation (should artefacts/strata be found which are deemed by the project team and county archaeologists to be of high importance), is considered the best form of archaeological mitigation."

(Cotswold Archaeological Trust 2000: 1)

As at Dunbridge, the aims of the watching brief were twofold: the identification of any Palaeolithic archaeology present but also the preservation by record of the geological strata, which at Squabb Wood were to be extracted through an advancing face technique removing the entire gravel stratigraphy in a single phase:

"The objectives of the watching brief component of the project are to identify zones of stratigraphy which contain Palaeolithic artefacts, to recover those artefacts under controlled archaeological conditions and to characterise the geological stratigraphy in terms of environment of deposition".

(Cotswold Archaeological Trust 2000: 1)

The identification of artefacts that were deemed to be *in situ* would trigger sample excavations to document the spatial relationships of the artefacts and to obtain environmental and chronometric dating samples. Visits to the site documented stratigraphy through section logging, and searches were made of exposed faces and reject heaps for Palaeolithic artefacts:

"During these visits the visible deposits will be logged, sketched and photographed, and a search made of exposed faces and discard piles for Palaeolithic artefacts…exposed sections will be logged to standard geological criteria…related to Ordnance Datum…Photo mosaics will be used…to construct 'type' sections, which will then be used in conjunction with the geological descriptions to develop a facies model for the development of the stratigraphy. Where artefacts are noted they will be related to 'Bed numbers'…while artefacts recovered from the discard pile will be provenanced as closely as possible through consultation with the quarry manager and digger drivers."

(Cotswold Archaeological Trust 2000: 1–2)

The frequency of visits to the site is determined by the speed of extraction and variability of the stratigraphy, though a minimum of one visit per month has been maintained. The Squabb Wood watching brief is undertaken under the direction of Neil Holbrook, Archaeological Director of Cotswold Archaeological Trust, with day-to-day activities undertaken by a team of appropriate personnel managed by Dr Keith Wilkinson (King Alfred's College, Winchester). Between 22nd April 2002 and 28th August 2002 regular visits to Squabb Wood (8 in total) were undertaken by the authors (Dr Hosfield and Ms Chambers). The irregularity of the visits reflected pauses in aggregates extraction and the localised extraction of underlying bedrock sands. During each visit the progress of gravel excavations was logged, and extant faces were sketched, logged, and photographed. Whilst section recording, attention was paid to the potential presence of artefacts, however despite this vigilance, none were recovered during the logging of 12 sections. A characteristic depositional sequence at Squabb Wood is included (Table 60). In general, the sediments were dominated by medium, matrix-supported gravels, with smaller amounts of fine gravels, and localised lenses of sands, silts and clays. The medium gravels were predominantly massively bedded, although there was a suggestion of increased horizontal bedding at depth. Within individual sections, small lenses of fine-grained sands were identified which, while containing no discernable archaeological remains, would have provided the opportunity for chronometric dating to be undertaken.

In addition to scouring the exposed faces for Palaeolithic artefacts, during each visit a trip was made to the discard pile to search for artefacts. Approximately 33–50 % of each visit was spent in this manner, though no artefacts were recovered. However, even had artefacts been recovered from the discard pile they would have been extremely difficult to provenance, as in addition to the standard difficulties of provenancing such recovered artefacts to within a single pit, gravel extracted at Squab Wood is not sorted on site but at a shared washing and sorting facility at the nearby Ridge site. Thus any artefacts recovered from this communal discard pile could only tenuously be attributed to Squabb Wood deposits. This type of problem has also recently become an issue for the Dunbridge site, where the washing plant now processes Tertiary gravels from Dunbridge, which masks the river gravels when they are mixed, and also washes stocks imported from another pit — making it impossible to be certain where any implements have come from (Harding pers. comm.).

The watching brief at Squabb Wood has not produced any Palaeolithic artefacts, however a much clearer understanding of the depositional environments that prevailed during the deposition of this terrace of the River Test has emerged. The current absence of artefacts should also not be interpreted as incontrovertible evidence for an absence of stone tools throughout the deposits, considering the small percentage of material it is feasible to examine in the course of a watching brief. Even if this is the case, the importance of negative evidence in the understanding of regional sequences should be emphasised.

5.5 Watching briefs — measuring success?

Comparisons of the results of the watching brief activities conducted at Dunbridge and Squabb Wood may initially suggest that the Dunbridge deposits were far more 'worthy' of archaeological mitigation than those at Squabb Wood. The Dunbridge watching brief has produced a comparative abundance of artefacts, facilitating the recognition that flake material can occur in substantial quantities within secondary contexts and confirming the density of the Palaeolithic remains within the Dunbridge gravels; the Squabb Wood watching brief, though conducted in a very similar manner, has failed to produce any Palaeolithic artefacts. Does this mean that the investigations at Squabb Wood have therefore failed? An archaeological watching brief is not about the simple collection of 'archaeology' (e.g. bifaces and flakes) as they become exposed. The IFA *Standard and Guidance* document describes watching briefs as both providing the opportunity to identify the need for more intensive archaeological investigations to be undertaken (e.g. the identification of *in situ* artefacts) but also for the *detailed recording of archaeological deposits*.

Site: Squabb Wood				**Log No.**: 11							**Section No.**: 11			**Date**: 05/08/02	**Recorder**: JCC & RTH
Metres above Base	**Thickness**	**Bed Number**	**Lithology**	**Texture**							**Sedimentary Structures**	**Palaeocurrents**	**Fossils**	**Colour**	**Notes**
				Clay/Silt	**Sand**			**Gravel**							
					F	**M**	**C**	**F**	**M**	**C**					
2.98 -2.71	0.27	10	-						✓		-	-	-	Mixed	Massively disturbed medium gravel. Mixed colour. Sharp irregular contact.
2.71 -2.63	0.08	9	-					✓			-	-	-	7.5YR 4/6	Fine matrix-supported gravel. Well sorted with no grading or imbrication. Sharp regular contact.
2.63 -2.56	0.07	8	-			✓					-	-	-	No sample	Laterally discrete medium sand. Sharp irregular contact.
2.56 -1.62	0.94	7	-						✓		-	-	-	7.5YR 4/3	Medium matrix-supported gravel. Massively bedded. Moderately sorted with no grading or imbrication. Sharp irregular contact.
1.62 -1.18	0.44	6	-			✓					-	-	-	7.5YR 4/6	Medium sand with fine clast component (*c.* 1–2% by volume of exposure). Includes inclined lenses (laminations?) of very fine gravel. Lenses 0.5 cm thick and dip of 38°E. Sharp irregular contact.
1.18 -1.16	0.02	5	-					✓			-	-	-	No sample	Thin bed of very fine clast-supported gravel. Very well sorted with no grading or imbrication. Bed inclined at 22°E. Sharp irregular contact.
1.16 -0.97	0.19	4	-			✓					-	-	-	5YR 4/6	Medium sand with increased fine clast component (*c.* 5–10% by volume). Sharp irregular contact.
0.97 -0.65	0.32	3	-						✓		-	-	-	5YR 4/4	Medium matrix-supported gravel. Moderately sorted with no grading or imbrication. Sharp irregular contact.
0.65 -0.59	0.06	2	-				✓				-	-	-	7.5YR 3/4	Laterally discrete coarse sand. Sharp irregular contact.
0.59 -0.00	0.59	1	-						✓		-	-	-	7.5YR 4/4	Medium matrix-supported gravel. Moderately sorted with no grading or imbrication. Suggestions of horizontal bedding towards base of bed (at base of section).

Table 60: Lithostratigraphic log data (section 11, Squabb Wood)

Palaeolithic archaeology is unique, concerned not only with the reconstruction of hominid behaviour through the artefactual remains they left behind, but also reconstructing the *vastly different* world and period in which the artefacts were produced; this allows us to assess the hominids' abilities to deal with repeatedly changing climatic conditions and available resources during the Pleistocene. These factors can only be assessed by consideration not only of the *sensu stricto* archaeological remains (stone tools, cut marked animal bones) but also a wider *sensu lato* interpretation of Palaeolithic archaeology which can incorporate not only artefactual remains but also lines of evidence that lead to improved chronological frameworks, palaeoenvironmental reconstructions and an understanding of depositional context. This *sensu lato* approach is as important (if not more so) for secondary context sites as it is for those of primary context, given the dynamic physical processes associated with the formation of archaeological secondary contexts. Since the artefacts that comprise Palaeolithic archaeology cannot be divorced from the Pleistocene sediments in which they occur, it is suggested here that the sedimentary analyses of secondary context sites currently under extraction are of at least equal importance to the recovery of artefacts. Such geological analyses provide understanding of the depositional regimes responsible for river terrace formation. This understanding is fundamental for an appreciation of the conditions that fluvially incorporated artefacts would have been subjected to, and provides the basis for off-site models. Advances in the application of optically stimulated luminescence (OSL) dating to fine-grained sands of Pleistocene age provide a means with which to absolutely date the terrace deposits in which suitable sediments can be identified. Therefore detailed sedimentary facies analyses not only aide the development of robust depositional models, they can also provide the opportunity to develop the geochronological frameworks so long absent in the British Palaeolithic record.

The watching briefs at both Dunbridge and Squabb Wood have furthered the understanding of geological and depositional contexts within the Pleistocene River Test. At Dunbridge these depositional environments can be populated with artefacts which are direct (albeit fluvially modified) evidence of hominid activity. At Squabb Wood, no direct evidence of hominid activity has been recovered, suggesting a less intensive presence or an absence of hominids in the region immediately prior to and during the deposition of this terrace. For the modelling of hominid colonisation and demography in Britain periods of absence are as significant as periods of presence, and in this respect the Squabb Wood negative evidence provides positive data. Within both sequences material suitable for OSL dating has been identified, although not utilised: this is a critical area of investigation that needs to be expanded within watching brief strategies in future. In conclusion, we propose that the watching brief investigations at Dunbridge and at Squabb Wood have been of equal import and significance.

This review of current watching brief strategies has suggested that their construction and implementation for aggregate extraction sites are unjustifiably biased towards artefact recovery, and over-emphasise the importance and value of stone tools alone. This practice can seriously inhibit the range of significant data which should be salvaged from these fluvial sequences prior to their destruction. The following section therefore proposes new recommendations for future watching brief strategies with respect to aggregates extraction sites, and seeks to accommodate and integrate the needs of research archaeology, archaeological resource management and the aggregates industry. It also examines the past and future role of the amateur collector.

6. FUTURE STRATEGIES

Based on the above review of current watching brief practices and this project's re-assessment of the value of the secondary context archaeological resource, a series of recommendations for the future implementation of watching brief strategies are proposed below. The importance of these recommendations is evident in the current danger posed to the secondary context archaeological resource by national aggregates extraction (after peaking at 300 million tonnes per year in 1989 it is currently estimated at 210 million tonnes per year by the Quarry Products Association (QPA) (http://www.qpa.org/profile.htm)), despite the recent proposal by government to reduce this demand by developing sustainable aggregates supply. Despite the recent claims by the British Aggregates Association (BAA) that the aggregates levy is severely damaging the UK industry (http://www.british-aggregates.com/pr14.htm) it seems likely that extraction activity will continue for the foreseeable future and will continue to pose a threat to the archaeological resource (however see comments below with regard to the archaeological opportunities for access to Palaeolithic/Quaternary materials that the aggregates industry has, and continues to, provide).

It is emphasised of course that the following recommendations are intended for watching brief monitoring of terrestrial aggregates extraction sites, once aggregates extraction has begun. They are not intended for application during the topsoil stripping phase of extraction, for which there are well-established approaches that address the distinctive requirements of Holocene archaeology. With respect to the geographical distribution of aggregate sites and the potential age of the sediments, the following caveats are stressed:

- Watching brief activity should not be restricted or even biased towards aggregates sites in the south of England, beyond the impact of Pleistocene glaciations (Figure 1). Although these areas have produced a far richer Palaeolithic record (Wymer 1999), there is no reason why glacially-modified sediments in the northern regions should not contain either some or all of the following: re-worked artefacts, re-worked biological evidence, geochronological data, and stratigraphic sequences (e.g. as at High Lodge (Ashton *et al.* 1992)). The implementation of watching brief strategies in the northern regions therefore reduces the potential for reiterating the current southern bias in the archaeological record, and will also improve current knowledge of the presence (or absence) of Palaeolithic archaeology and Pleistocene environments in northern England.
- Watching brief activity should not be restricted or biased towards aggregate sites whose sediments are *believed* to post-date the first hominin occupation of Britain. This is both because the age of this first occupation remains controversial, with the widely accepted date of *c.* 500,000 (based primarily on Boxgrove (Roberts & Parfitt 1998)) being increasingly challenged by new, earlier finds from the Norfolk coast (Rose *et al.* 2001). However, bias towards later sites also ignores the valuable geochronological and sedimentological evidence that such sites yield, and which are significant for our understanding of landscape evolution and palaeoclimatic trends (e.g. Bridgland 1994). The implementation of watching brief strategies on early Middle Pleistocene and (where available) Early Pleistocene sites therefore reduces the potential for simply reinforcing current models of the Palaeolithic occupation of Britain.

Our recommendations for modified watching brief strategies are as follows:

- Focus upon the potential for geochronological dating of the sediments, principally through the application of the optically stimulated luminescence (OSL) dating to fine sand sediments (Chapter 3 and this project's accompanying Centre for Archaeology dating report (Toms *et al.* in prep.)). These data are fundamental for the development of geochronological models of Pleistocene fluvial sequences and the secondary context archaeological record. Although this is currently being implemented in research projects (e.g. Hosfield & Chambers 2002b; Toms 2003; Hosfield *et al.* in prep; Wenban-Smith pers. comm.), it has not yet been widely incorporated into watching brief strategies. Recent research into optical dating techniques (e.g. Hütt *et al.* 1988; Prescott & Hutton 1994; Markey *et al.* 1997; Murray & Roberts 1997; Roberts *et al.* 1999; Murray & Wintle 2000; Adamiec & Aitken 1998; Toms 2002, 2003; Bailey in press) has indicated that the OSL technique can date older sediments than previously demonstrated, and that it has considerable potential as a geochronological tool with respect to Middle Pleistocene fluvial sediments. Although OSL dating has primarily been employed as a research tool, we recommend its incorporation within watching brief strategies as standard due to the totally destructive nature of aggregates extraction. Exposure during extraction provides the single opportunity for the dating of these sediments, and if OSL sampling is not implemented during extraction then both the opportunity and the sediments will be irretrievably lost. It is recognised that the incorporation of OSL sampling with watching brief strategies has a number of implications for working practice:
    - Flexible working relationships between watching brief staff (archaeologists) and the OSL specialists: specifically the availability of OSL personnel to undertake sampling in response to

the short-term availability of suitable sediments. Although archaeological staff could be trained to take OSL samples on-site, the requirement for specialist sampling equipment may limit such an approach.

- Flexible working relationships between aggregates industry personnel and watching brief staff. Identification of OSL-suitable sediments can be conducted by watching brief staff during infrequent site visits, but we recommend that during the interim periods, industry staff could identify suitable and accessible sediments and notify watching brief staff. This formal structure of notification is obviously a significant variation on extant industry/archaeology relationships, where the informing of archaeologists has often been dependent on individual aggregates industry employees. It is stressed that the implementation of this structure would not result in greater disruption (see below), and that should result in fewer, less frequent, and shorter watching brief visits being made by archaeological staff.
- Changing perceptions of watching brief activity. This emphasis upon scientific dating of sediments should help to alter the perceptions (both amongst the industry and amongst archaeologists) of watching briefs as being an extension of the amateur collecting activities of the 19th and 20th centuries. These changing perceptions are important for the acceptance by the aggregates industry of new watching brief strategies, and are related to the need to see Palaeolithic archaeology as Quaternary science rather than as an ever-expanding collection of stone tools. These changing strategies are also vital for integration of resource management data into current research strategies, which are increasingly fundamentally different from those of the 19th and (most of the) 20th centuries.
- Frequency of site visits and disruption of the aggregates industry. It is recognised that the industry's key concern would remain the degree of disruption caused by archaeological watching briefs and their associated costs. It is proposed that this element of the watching brief strategy would require a small number of visits, either as part of a pre-arranged schedule or in response to notification from industry staff. This reflects the cost of sample processing, the speed of sample collection, and the need to balance the 'ideal' of number of dating samples against the disruption factor. It is impossible to recommend a specific figure, and numbers of visits and samples would vary by site in response to the specifics of the sedimentary sequence, and the presence of other important data (e.g. biological or artefactual). It is stressed however that single samples would not be acceptable, and Toms (pers. comm.) recommends the following generic guidelines:
  - When dealing with a sand unit (not a lens) that is traceable across multiple exposures or sections within an aggregates site, two dating samples from the top and bottom of the unit are sufficient.
  - When dealing with discrete sand lenses and addressing the question of whether they are contemporary or chronologically distinct, single dating samples should be taken from multiple sand lenses, to a minimum of three in total.

- Focus upon the importance of fluvial sedimentary sequences. While the recording of geological sequences is a well-established element of current watching brief strategy (e.g. Cotswold Archaeological Trust 2000), we recommend that increased emphasis is placed on issues of formation processes within fluvial sedimentary sequences. Examples would include evidence of landsurface development (indicative of significant breaks in fluvial activity), different sedimentary contacts (e.g. sharp contacts can indicate evidence of major phases of erosive activity), 3 and 4-dimensional variability in sedimentary units, and the general character of the sediments (e.g. sorting, grading, imbrication and bedding structures). This type of field data is vital for the testing of new taphonomic models of secondary context assemblages (e.g. Chapters 5 & 7), which is critical for wider understanding and interpretation of stone tool data sets. Such sedimentary data operates both at a specific level (e.g. on sites from which derived artefacts have been recovered) and as generic data to contribute towards broader understanding of fluvial sedimentation processes.

- Focus upon the importance of biological data, ranging from large mammalian fauna (potentially re-worked) to small, *in situ* vertebrates, invertebrates and molluscs. While their recording and sampling is a well-established element of current watching brief practice, it is stressed that the importance of these data is not in their capacity for providing reconstructed palaeo-environments into which artefacts and hominids can be placed. As discussed in chapter 6, these data cannot be directly linked to derived artefacts because of scalar contrasts. Instead, the importance of these data is in their ability to:

- Illustrate examples of the types of fluvial palaeoenvironments that existed at different points during the Pleistocene.
- Form the basis of biostratigraphic frameworks, such as developed by Schreve (2001a, 2001b) for mammals, Keen (1990, 2001) and Preece (2001) for molluscs; and Coope (2001) for coleoptera.

These data are therefore important irrespective of whether lithic archaeology has been (or is being) recovered from the sediments exposed at a particular site.

- Frequency of visits. While this is still partially dependent upon the speed of extraction, these recommendations follow current practice (e.g. Harding 1998; Cotswold Archaeological Trust 2000) and suggest between 1–2 visits per month during periods of extraction. It is stressed that unless there was an industry-employed archaeologist permanently on site, the probabilities of missing evidence are high. Since either a permanent presence or very regular visits are impractical (due to logistics and finance), these limitations in the watching brief approach must be accepted by the archaeological community. As with current practice, the regularity of visits should be flexible and can be altered in response to information supplied by the industry. However, the danger with this approach is that it increases cost to the industry and therefore has the potential to alienate them. We therefore recommend that while a relatively high frequency of visits should be maintained, the focus of watching brief activities while on site requires modification. It is proposed that emphasis should be placed upon extensive searches for:

    - OSL-suitable sediments (see above).
    - Generic sedimentary sequences.
    - Distinctive or unique (within individual sites) sedimentary units (e.g. palaeo-channel fills).
    - *In situ* (not primary context but recovered from sections and not on reject heaps) artefacts (lithic and biological).

    By reducing the focus upon time-intensive searches for artefacts (e.g. both in exposed sections and upon reject heaps), it is proposed that time spent on-site during individual visits can be reduced. This would also be achieved through the use of digital data-capture devices during the watching briefs (e.g. digital cameras, palm-tops and GPS survey equipment). Overall, this watching brief recommendation stresses frequent, rapid surveys of aggregate sites, limited sampling and recording programmes with respect to OSL dating and lithostratigraphic logging of generic sequences, and specific sampling only *if* unique sequences or artefacts are identified.

The watching brief recommendations outlined above are intended as starting points for discussion, and not as rigid policy guidelines. However, they are all informed by a central principle: namely, that the Palaeolithic archaeology of secondary contexts must move beyond the dots on maps approach that is typified by Roe (1968a), and which has also characterised more recent research (e.g. Wessex Archaeology 1993a, 1993b, 1994, 1996a, 1996b, 1996c, 1997; Wymer 1999). It is acknowledged that The Southern Rivers Palaeolithic Project, the Welsh Lower Palaeolithic Survey and The English Rivers Palaeolithic Survey (both summarised In Wymer 1999) had to adopt that type of approach, since there was a considerable body of diverse information that required synthesis. However, now that this base-line has been established, it is vital for the subject to move forward in its interpretation of the data. It is also clear that for interpretation to move beyond typological approaches (e.g. Roe 1981), it is necessary to consider the full range of available contextual information from archaeological secondary contexts (sedimentary, geochronological, and biological).

PPG16 would seem to have provided a mechanism for Palaeolithic archaeology to make this change, since it offered an opportunity for inclusive sampling of secondary contexts. Yet despite the fact that PPG16 and other mechanisms for archaeological intervention stress the preservation either *in situ* or by record of archaeological information that would otherwise be lost, current watching brief practice in aggregates extraction sites is resulting in the unnecessary loss of archaeologically valuable information. While it is recognised that some data will always be lost (due if nothing else to the frequency of visits), we propose that data categories such as sediment samples for OSL dating are being lost due to a combination of:

- Lack of awareness of the importance and potential of these data.
- An over-emphasis in current watching brief strategy upon the recovery of stone tool artefacts. Although the importance of finding new stone tools varies between sites and deposits with large extant collections and those that are currently 'blank', it is stressed that in all cases, stone tools that are collected with no contextual information are of limited value. There is no more eloquent expression of this than the thousands of stone tools that have languished, under-studied, in the basements and storerooms of British museums for decades.

Therefore, the underlying principle of these recommendations is that we need to recognise that Palaeolithic archaeology is about more than artefacts, even when we are dealing with secondary contexts. This realisation has been broadly accepted by academic archaeologists (e.g. White & Schreve 2000; Wenban-Smith *et al.* 2000; Ashton & Lewis 2002), but it is now essential that this message reaches government organisations, professional archaeological units, local government archaeologists and planning departments, and the aggregates industry. This need reflects a situation in which academic archaeologists rarely have the opportunity to share their more widely defined concept of Palaeolithic studies with those involved in the processes of managing and recording the secondary context heritage as it is exposed and then destroyed. Dissemination of this message can be achieved through informal outreach (e.g. seminars and workshops) but may also require new documentation that both stresses the value of the secondary context archaeological resource and highlights new approaches for its effective management.

6.1 Balancing Research Interests, Management Concerns & Industrial Priorities

The majority of the above discussion has reflected research priorities as perceived by academic archaeologists. With specific reference to the new research frameworks highlighted in this project (Chapter 7), the above recommendations seek to highlight the importance of absolute dating (providing the geochronological context for the derived archaeology), sedimentary sequences (providing the spatio-temporal context for modelling derived assemblage origins), and biological data (providing the wider palaeo-environmental context).

However, following the PPG16 legislation, professional archaeology (used here as a generic term to cover local government archaeologists engaged in the implementation of planning process legislation and commercial archaeological organisations) is inevitably primarily concerned with whether archaeology is at threat, in the face of any types of proposed development. Their solution has typically been preservation by record, and this has been the overwhelming response with respect to aggregates extraction sites. Yet, with respect to Palaeolithic archaeology, it cannot be known whether there is archaeology present prior to the beginning of the extraction. Once extraction has begun, the principle concern has been to avoid the loss of stone tools to the aggregate processing sites through site visits, section checking and reject heap searching. The finding or non-finding of stone tools demonstrates archaeological presence or absence, and this appears to be the primary goal of watching brief activity. However, because of the dichotomy between concern for whether archaeology is at risk, and the inability to know prior to extraction, there also tends to be measures set in place for emergency excavation if *in situ* archaeology is located (e.g. as at Lynford (Boismier *et al.* 2003)).

The problem is that archaeological residues such as Lynford are identified only once very few decades. There is therefore actually relatively little preservation by record, and rather more searching (often unsuccessfully) for artefacts and waiting for the jackpot *in situ* archaeology. This strikes us as a flawed and unhelpful approach, as not only is valuable secondary context data lost (see below), but also the approach places a strain on relations with the aggregates industry who are left to feel that each watching brief is a minefield of potentially long-term interventions. There is therefore an urgent need for a paradigm shift in what is perceived as Palaeolithic archaeology. As we have argued throughout this chapter, Palaeolithic archaeology (we prefer Quaternary Studies as a less loaded term) includes sediments, biology, and stone tools. Under this definition, during aggregates extraction there can be extensive preservation by record (e.g. dating sampling and lithostratigraphic logging), while still searching for *in situ* archaeological material. There needs to be a redress of the balance between *in situ* and secondary context archaeology, especially when the search for *in situ* archaeology results in the loss of secondary context data due to the destructive nature of the extraction process.

It is recognised that the need to demonstrate a Palaeolithic presence through lithic artefacts will inevitably be more important in 'blank' areas of the country, since the finding of a single stone tools will be significant. However, even in these areas, focus should equally be given to sediment dating and geological recording since these data may well indicate the reasons for the absence of stone tools (or indeed suggest that further stone tool searching is justified). Overall, in these 'blank' areas a balanced watching brief approach is important, since it avoids false reinforcement of existing patterns and improves Quaternary knowledge. However, in areas with rich, well documented artefact assemblages, it is now necessary to downplay the significance of recovering additional stone tools, and emphasise the importance of preserving geological data by record, prior to its destruction.

We propose that the gap between professional archaeology and academic research is narrower than commonly perceived. There is little value in the selective preservation of specific data categories from the past (e.g. artefacts over sediments), since such an approach results in the construction of limited archaeologies. The purpose of preservation, whether by record or as *in situ* remains, must be to improve knowledge about the past. It is therefore possible to link research and management through the common objectives of achieving greater understanding of the Palaeolithic period (Figure 242). However, the gap between professional archaeology and academic research still exists to a degree, because of the financial considerations — these are addressed below.

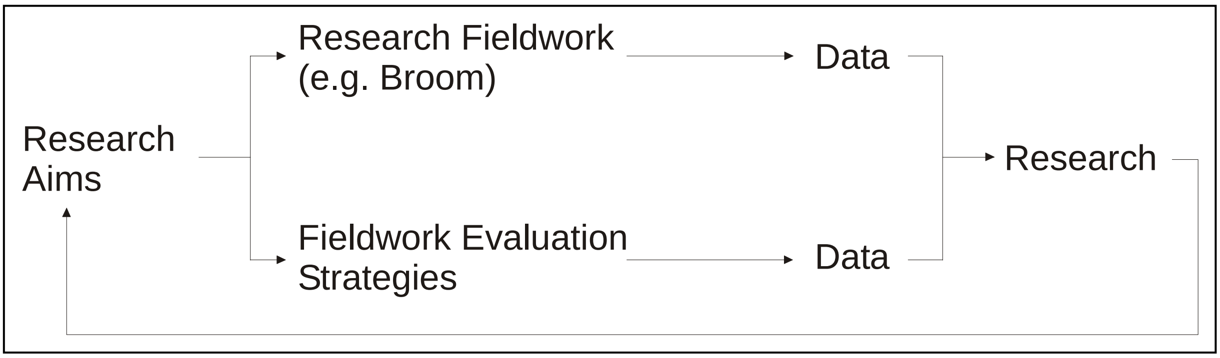

Figure 242: Academic research, fieldwork and field evaluations

The impact of the aggregates industry upon archaeological remains is twofold: firstly, the threat to Holocene archaeology that can be destroyed during the stripping of overburden from quarry sites prior to aggregates extraction; and secondly, the threat to Palaeolithic archaeology contained with the aggregates. The industry must therefore fund an archaeological evaluation prior to the removal of the overburden, and then fund a watching brief conduced throughout the period of aggregates extraction. It is therefore advantageous for professional archaeology to develop watching brief strategies that limit the time spent on site by archaeologists and the resulting disruption of the industrial processes. In light of this, the proposals highlighted above for non-selective preservation by record must also incorporate a time-saving element. We propose that this is achieved by markedly reducing the time spent searching for artefacts on reject heaps, and by recognising that sediment sampling and recording procedures must be streamlined and avoid unnecessary duplication of data. This was illustrated by work undertaken by the authors at the

Squabb Wood site, where only three of the 12 lithostratigraphic logs recorded documented markedly different sedimentary sequences. The downsizing of artefact searching on reject heaps is also supported by the fact that there is an increasing trend for gravel processing at central sites, to which material from multiple pits is brought. Under these circumstances, provenancing of artefacts to individual sites is impossible, and the time and money spent on the activity is therefore considered unjustifiable.

The above comments are in no way intended to marginalise the huge contributions made by amateur collectors over the past 150 years to the British Palaeolithic record. However, it is clear that with recent changes in industrial practice, in particular the advent of stricter health and safety at work policies and the spectre of litigation, opportunities for the access of amateur collectors to active quarry sites have been markedly reduced, and will continue to be so. The discovery of artefacts in 'blank' areas or the recovery of atypical specimens (e.g. the quartzite discoveries of R.J. MacRae in the upper Thames (MacRae 1988) are of clear value to Palaeolithic research. However, in well-documented areas (e.g. sites or deposits from which large numbers of artefacts have already been recovered) we suggest that the collection of additional, unprovenanced artefacts does not substantially contribute to the wider understanding of the archaeology. Moreover, this type of collection activity also contributes to the perception that Palaeolithic archaeology is primarily concerned with finding stone tools. As we have argued above, this is not an accurate reflection and complicates relationships with the aggregates industry and with local government archaeologists who may be specialists in the archaeology of later periods.

It is obvious that neither this document nor a hundred others like it will ever stop the activities of amateur collectors — moreover such an outcome would certainly not be our intention. However, we feel that it is important to stress the following:

1. There is a considerable (and arguably increasing) gap between the activities of the amateur collectors and the work of professional and academic Palaeolithic archaeologists. This gap is evident in research focus, fieldwork methodology, resources, and logistical support.
2. The size of this gap needs to be emphasised to the aggregates industry, in order to reduce resistance to the types of proposals suggested here for future changes in watching brief practice. In other words, Palaeolithic archaeology needs to lose its 'amateur collectors and gentleman antiquarians' image and stress its status as an integrated branch of Quaternary Science.
3. However, amateur collectors can be educated with respect to current research frameworks and the place of non-artefact data within these. This could be undertaken through local and regional seminars, distribution of educational materials (e.g. web-based resources, pamphlets), and the television/radio media. We argue that those collectors currently in contact with the professional and/or academic archaeological worlds would be amenable to this type of education. Through these types of outreach schemes collectors could become aware (where they are not already) of non-artefact data (e.g. sediments for dating etc) and bring it to the attention of local and regional archaeological contacts — who are properly equipped to deal with these data.

Overall, it is stressed that this document is not attempting to eradicate amateur collecting, but it is trying to integrate it within modern research frameworks and the current and future practices of Palaeolithic archaeology.

In conclusion, it is proposed that there is a clear need for changes in the practice of archaeological watching briefs with respect to Palaeolithic secondary contexts. These changes reflect new research frameworks and the need to avoid the irretrievable loss of valuable data. Implementation of these changes is a challenge and will require informed discussion between academic and professional archaeologists, and the aggregates industry. We hope that some of the issues raised here may provide a valuable starting place.

7. CONCLUSIONS

This chapter has sought to assess current practice in the management of the secondary context archaeological resource, and propose generic recommendations for the future management of that resource. This is obviously with respect to continued PPG16-driven monitoring (watching briefs) of industrial extraction at aggregates sites which may contain sedimentary and/or artefactual evidence of archaeological interest. This assessment was therefore primarily concerned with:

- The relative value of the secondary context archaeological resource, both as a whole and with respect to the different categories of new evidence (artefactual, biological, sedimentary, and dating samples) that can be potentially recovered from secondary context sediments.
- Prioritisation of the different categories of evidence occurring within the secondary context archaeological resource, with respect to management strategies, logistics and archaeological requirements (both academic and commercial).
- A review of current watching brief practise on aggregate sites, based on an examination of strategy documents produced by professional archaeological units.
- The recommendation of generic and specific strategies for the future management, protection and recording of the aggregate resource. These recommendations will focus upon the potential impact for the aggregates industry (financial and logistical), the relative value of the different components of the geoarchaeological record, strategy efficiency (in terms of time and geoarchaeological data output), and the potential for the training of aggregates industry employees in the recognition of different sedimentary facies.

7.1 Value of the secondary context archaeological resource

It is argued that the secondary context archaeological record has clear value with respect to the investigation of hominid behaviour during the Palaeolithic. This value stems from the unique spatio-temporal scales of the data, which are exploited by the new interpretive frameworks and models developed as part of this project (Chapter 7). These frameworks are dependent upon geochronological and process-driven geoarchaeological models, and emphasis was therefore not confined to the stone tool component of secondary context data. The value assessment therefore also highlighted the contextual geoarchaeological data from archaeological secondary contexts, with particular focus upon sedimentary facies modelling, geochronological frameworks and biological evidence.

7.2 Prioritisation of the secondary context archaeological resource

It is clear that prioritising the different categories of secondary context data (e.g. stone tools, biological data, and sedimentary sequences) is a highly contextual activity. It is dependent both upon the location of the secondary contexts (e.g. in 'blank' archaeological regions, the highest priority will inevitably be attached to the recovery of stone tools — or the continued demonstration of their absence) and upon the interest group making the definition. For example, academic archaeologists may stress sediments and dating samples (reflecting regional research frameworks and issues of Quaternary Science), while local government archaeologists may be primarily concerned with the incontrovertible demonstration of Palaeolithic archaeology through the recovery of stone tools.

This discussion highlighted the importance of a widely-acceptance definition of Palaeolithic archaeology — as artefact-driven archaeology or as Quaternary Science for whom the local demonstration of hominid presence through stone tools is not a necessity. In other words, when dealing with remote time periods, low density populations, and large regions, it must be acknowledged that i) artefacts will not be found everywhere; and ii) chronological, biological and sedimentological evidence is vital to our understanding of the Pleistocene world within which hominids lived and stone tools were manufactured. These are archaeological data.

Ultimately, stone tools are the building blocks of Palaeolithic archaeology — they are the commonest physical residue to hominid behaviour. However, it is vital to recognise that these data are currently vastly over-represented in the extant archives from the Pleistocene period, and exist in an interpretive vacuum due to the paucity of contextual evidence. Therefore, when prioritising categories of evidence with respect to future management and practice, we have to consider that in many cases the current need for contextual evidence is far greater than the need for further assemblages of unprovenanced stone tools.

7.3 Current watching brief practice

Reviews of watching brief practice indicated that it was highly variable. In some cases (e.g. at Squabb Wood (Cotswold Archaeological Trust 2000)), project designs indicated a general awareness of the scope of the secondary context resource and the methodologies required for the preservation by record of those data. In other cases however (e.g. at Dunbridge (Harding 1998)) the projects were characterised by an over-emphasis on the search for artefacts, both provenanced and unprovenanced, potentially at the expense of other data. In many cases, the impression was given that the secondary context was being recorded almost as a side-effect of watching for *in situ* archaeology. We argue that the secondary context should be recorded as an archaeology in its own right. This shift of emphasis could also have the added benefit of indicating to the aggregates industry that watching briefs are not instigated with the primary goal of uncovering the next Boxgrove or Lynford — and therefore causing lengthy disruption to industrial production.

It is therefore apparent that fundamental education is required across the board with respect to the types of evidence that may be encountered within archaeological secondary contexts, their potential value to Quaternary research, and the methodologies and techniques which maximise the value of these data. The nature of this education is discussed below.

7.4 Recommendations for future practice

In light of the opportunities that the aggregates industry presents for Palaeolithic archaeology it is emphasised that any new strategy recommendations need to be mutually beneficial wherever possible, minimising disruption to the industry and maximising Quaternary data return. This is primarily achieved by downsizing the time spent in searching for artefacts, especially from reject heaps where provenancing data is extremely limited. These recommendations stress the importance of OSL-suitable sediments, generic sedimentary sequences, distinctive or unique sedimentary units, and lithic and biological artefacts recovered from recorded sections.

Time spent on site can also be reduced through the use of new recording techniques (e.g. GPS, digital photography) and small-scale sampling strategies (e.g. with respect to the documentation of generic sedimentary sequences). It is also proposed that the establishment of notification procedures between industry and archaeology could reduce the frequency of visits, on a demand-response principle. Obviously this relies upon education and trust, but we see it as one of the few ways out of the current impasse between archaeology and the aggregates industry.

In conclusion, this module has sought to stress the importance of all categories of data from archaeological secondary contexts. This has been guided by the underlying principle that Palaeolithic archaeology is about more than stone artefacts, and can be more profitably perceived of as Quaternary Science. Under this principle we can begin to reduce the continual loss of significant evidence, and set in place mechanisms that will support the meaningful interpretation of the extant artefact record, rather than simply adding to it.