PALAEOLITHIC RESEARCH FRAMEWORK FOR THE BRISTOL AVON BASIN

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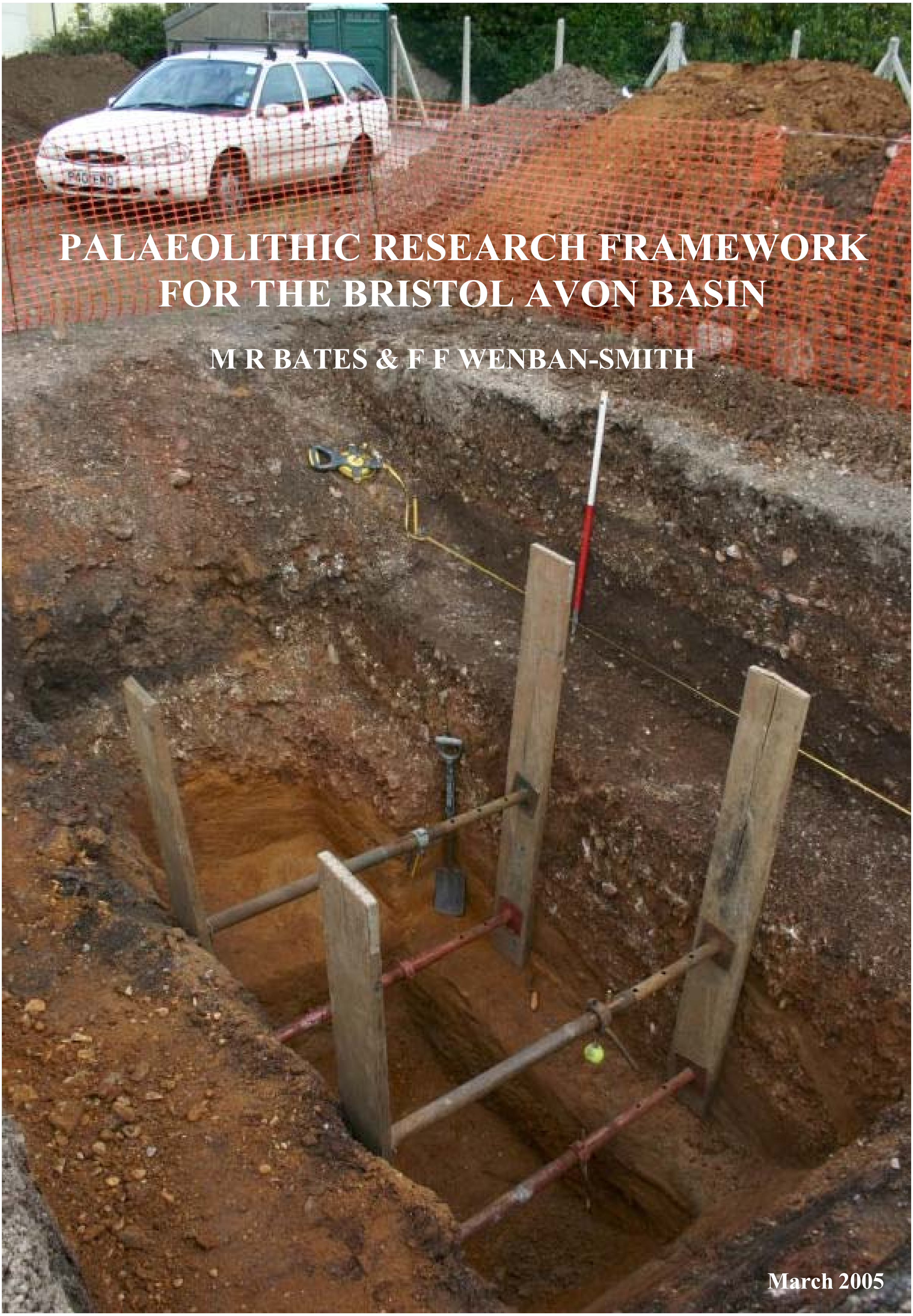

March 2005

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SUMMARY

This document was commissioned by the City Archaeologist, Bristol City Council to review the Palaeolithic archaeological potential of the Bristol Avon region. This report describes the main features of both the Palaeolithic archaeological resource for the region and the Pleistocene record that contextualises this resource.

Key points to emerge from the review are:

Pleistocene geology

- **Surviving Pleistocene deposits are unevenly distributed throughout the system**

- **Deposits in two areas — around Bath and Shirehampton — are already proven to contain significant archaeological and biological remains. Other areas, not yet identified, are also likely to contain similar evidence**

- **Faunal remains are relatively common in the Bath region but are also known from other areas such as Shirehampton and Sutton Benger**

- **Dating is poorly understood but most deposits probably date to different parts of the Middle Pleistocene, between 500,000 and 125,000 BP, corresponding with the Lower and Middle Palaeolithic**

- **Additional work remains to be undertaken to determine the precise number of fluvial aggradations and terraces**

- **Slope deposits and Head are also present and may include buried landsurfaces of Late Pleistocene age, corresponding with the late Middle and Upper Palaeolithic**

Palaeolithic archaeology

- **Artefacts exhibit considerable variation in the raw material used in tool production, with significant use of non-flint lithologies**

- **One major finds ‘hot spot’ has been identified in Terrace 2 gravels at Shirehampton, representing intensive activity in the Lower/Middle Palaeolithic**

- **Finds from other areas — such as Kelston and above the Hanham Gorge — also indicate the presence of Lower/Middle Palaeolithic activity in other parts of the region. Further investigation of surviving deposits across the region is likely to produce more widespread evidence for Palaeolithic activity, even where no remains have yet been found**

- **There is a predominance of handaxes in the collections, but flake-tool and Levallois technology are present where more extensive collections exist from certain locations, particularly Shirehampton**

- **There is a curious absence of artefacts from the Bath area despite the major degree of investigation of the fossil and other biological remains in the Pleistocene deposits of the area; it remains to be demonstrated whether this is a real feature of the record or a case of collecting bias**

- **None of the sites from which Palaeolithic material has come is well dated**

While present knowledge is restricted due to limited previous investigations, the Palaeolithic and fossil remains that have been found demonstrate that considerable potential exists for Palaeolithic study in the Bristol Avon region. Besides potential for developing an improved understanding of the regional Palaeolithic record, there is also potential to contribute to addressing a number of key national research objectives, as outlined by English Heritage in *Exploring our Past* (1991) and in the more recent national Palaeolithic Research Framework (English Heritage/Prehistoric Society 1999).
A framework is outlined by which the Palaeolithic potential of the region can be investigated through mitigation of any impacts caused by development, supported by description of suitable methods of investigation, and the relation of any mitigating works to national/regional research objectives. A number of suggestions are also made for specific projects that could be carried out to develop understanding of the overall Palaeolithic/Pleistocene chronological and stratigraphic framework in the region, to provide a baseline characterisation of the resource and a context for the Palaeolithic remains already known, and yet to be discovered, from the region.

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All photographs and illustrations are by the authors except where otherwise credited.

1. INTRODUCTION

1.1 Project background

This project was commissioned by the Bristol City Archaeologist in July 2004. The impetus for the study was initiated by work in the Shirehampton district of Bristol in 2003 when a site of potential Palaeolithic importance was investigated by the Avon Archaeological Unit. During the course of investigation Terra Nova Ltd. was called upon to provide specialist services to the archaeological unit in Palaeolithic archaeology and Pleistocene geology and environments. Despite the absence of sequences of Palaeolithic or Pleistocene significance a report was prepared on the Palaeolithic archaeological potential of the region (Bates, 2003). This report highlights some of the key issues relating to the Palaeolithic archaeology of the area and draws attention to the relatively poorly understood sequences and lack of recent investigation in the region.

Following consideration of the report and its distribution via the Bristol City Council web pages (www.bristol-city.gov.uk/archaeology) a meeting was held in November 2003 to progress work and understanding of the Palaeolithic resources in the wider Avon region. An outcome of this meeting was the desire to provide additional information on the Palaeolithic and Pleistocene potential of the river system in the Bath/Bristol region. This report provides that detailed overview.

1.2 The Pleistocene

The initial Palaeolithic occupation and subsequent settlement of Britain has taken place against the backdrop of the Quaternary period, characterised by the onset and recurrence of a series of alternating cold–warm/glacial–interglacial climatic cycles (Lowe and Walker 1997). Over 60 cycles have been identified during the last 1.8 million years, corresponding with fluctuations in proportions of the Oxygen isotopes O^{16} and O^{18} in deep-sea sediment sequences. These marine isotope stages (MIS) have been numbered by counting back from the present-day interglacial or Holocene period (MI Stage 1), with (usually) interglacials having odd numbers and glacials even numbers, and dated by a combination of radiometric dating and tuning to the astronomical timescale of orbital variations, which have been a fundamental causative agent of the Quaternary climatic fluctuations. The Quaternary is divided into two epochs – the Holocene and the Pleistocene – where the Holocene represents the present-day interglacial and the Pleistocene represents the remainder of the Quaternary that is divided into Early, Middle and Late parts (Table 1). The Middle and Late Pleistocene are of most relevance to British Palaeolithic archaeology, with the first occupation of Britain occurring *circa* 700,000 BP in the Middle Pleistocene, and continuing thereafter, albeit with occasional gaps.

Middle and Late Pleistocene climatic oscillations were sufficiently marked to have a major impact on sea level and terrestrial sedimentation regimes. In the colder periods ice sheets grew across much of the country, and arboreal forests disappeared, to be replaced by steppe or tundra. Sea levels dropped across the globe due to the amount of water locked up as ice, exposing wide areas offshore as dry land, and enhancing river channel downcutting. In the warmer periods sea levels rose as ice melted, river channels tended to be stable and prone to silting up and the development of alluvial floodplains (Gibbard and Lewin 2002), and forests regenerated. The range of faunal species inhabiting Britain changed in association with these climatic and environmental changes, with both evolution of species *in situ* to adapt to these changes and local extinction/recolonisation of species in response to changing environmental conditions.

Britain has been particularly sensitive to these changes, being i) situated at a latitude that has allowed the growth of ice sheets in cold periods and the development of temperate forests in warm periods, and ii) periodically isolated as an island by rising sea levels and then rejoined to the continent when sea level falls (White and Shreeve 2000). This has led to different climatic stages having reasonably distinctive sets of associated fauna and flora. These both reflect in general terms the climate and environment, and may also identify in specific terms the MI Stage represented. The study of such evidence — such as large mammals, small vertebrates, molluscs, ostracods, insects and pollen — is an integral part of Pleistocene, and Palaeolithic, research for its role in dating early hominid occupation and recreating the associated palaeo-environment.

The evidence from different MI Stages is contained in terrestrial deposits formed during the stage. In contrast to the deep-sea bed, where there has been continuous sedimentation, terrestrial deposition only occurs in specific, limited parts of the landscape. It is also takes place as a series of short-lived depositional events such as land-slips or river-floods interrupted by long periods of stability and erosion. Thus the terrestrial record is relatively piecemeal, and the challenge for both Pleistocene and Palaeolithic investigation is to integrate the terrestrial evidence into the global MIS framework, based on relatively few direct stratigraphic relationships, and making maximum use of biological evidence and inferences about the sequence of deposition in major systems such as river valleys (Bridgland et al. 2004).

Present understanding is summarised in Table 1. The current interglacial began *circa* 10,000 BP (years before present) and it is generally agreed that MI Stages 2–5d, dating from *circa* 10,000–115,000 BP cover the last glaciation (Devensian), and that Stage 5e, dating from *circa* 115,000–125,000 BP, correlates with the short-lived peak warmth of the last interglacial (Ipswichian). Beyond that disagreement increases, although many British workers feel confident in accepting that MI Stage 12, which ended abruptly *circa* 425,000 BP, correlates with the major British Anglian glaciation when ice-sheets reached as far south as the northern outskirts of London (Bridgland 1994).

It is also important to remember that the MI Stage framework only reflects major climatic trends. Within each MI Stage there were also numerous climatic oscillations, represented by maybe only a few centimetres within sediment cores 10–20 metres long, that have not been recognised as distinct numbered stages. These still potentially correspond to a few thousand years of climatic change, with potential for associated changes in environment and sedimentary deposition. Some of the larger diversions have been recognised as distinct sub-stages with the MIS framework (such as Stage 5e), but many have not, and their presence has the potential to confound overly simplistic correlations of isolated terrestrial sequences with peaks or troughs on the continuous marine record. Colder diversions within predominantly warm stages are known as stadials, and warmer diversions within cold stages as interstadials.

1.3 The Palaeolithic

The Palaeolithic covers the time span from the initial colonisation of Britain in the Middle Pleistocene, possibly as long ago as 700,000 years ago (Wymer 2003), to the end of the Late Pleistocene, corresponding with the end of the last ice age *circa* 10,000 years ago. Thus the Palaeolithic period occupies almost 700,000 years, and includes at least eight major glacial–interglacial cycles (Table 1), accompanied by dramatic changes in climate, landscape and environmental resources. At the cold peak of glacial periods, ice-sheets 100s of metres thick would have covered most of Britain, reaching on occasion as far south as London, and the country must have been uninhabitable. At the warm peak of interglacials, mollusc species that now inhabit the Nile were abundant in British rivers, and fauna such as hippopotamus and forest elephant were common in the landscape. For the majority of the time, however, the climate would have been somewhere between these extremes.

After the formation of the Channel probably some time in the later Middle Pleistocene (Gibbard 1995) human access to Britain was only possible during periods of cold climate when sea levels were lower and consequently early hominids were only periodically present in Britain (White and Schreeve 2000), which was at the northern margin of the inhabited world. The archaeological evidence of the period mostly comprises flint tools, and the waste flakes left from their manufacture. These are very robust and resistant to decay, and, once made and discarded, persist in the landscape, eventually becoming buried or transported by sedimentary processes related to climatic change and landscape evolution. Other forms of evidence include faunal dietary remains of large animals, sometimes cut-marked reflecting the stripping of flesh for food or broken open for marrow extraction and, very rarely, wooden artefacts. These forms of evidence are, however, more vulnerable to decay, and it is only very rarely that burial conditions were suitable for their preservation through to the present day. Hominid skeletal remains have also been found on occasion although, again, these are very rare and require exceptional conditions for their preservation.

The British Palaeolithic has been divided into three broad, chronologically successive stages — Lower, Middle and Upper — based primarily on changing types of stone tool (Table 2). This framework was developed in the 19th century, before any knowledge of the types of human ancestor associated with the evidence of each period, and without much knowledge of the timescale. This tripartite division has nonetheless broadly stood the test of time, proving both to reflect a general chronological succession across Britain and northwest Europe, and to correspond with the evolution of different ancestral human species.

Evidence of very early occupation of Britain has recently been discovered on the Norfolk coast at Pakefield (Wymer 2003), dating to possibly as old as MIS 17, *circa* 700,000 BP. The evidence consists of very simple cores and flakes, and was presumably made by a form of *Homo erectus/ergaster*, known to be present in Central/Eastern Europe from over 1,000,000 BP. Following this, at present, isolated occurrence of very early hominid presence, there are a number of sites dating from MIS 13, *circa* 500,000 BP associated with the later western European *Homo heidelbergensis*, particularly at Boxgrove in Sussex, where an extensive area of undisturbed evidence is associated with abundant faunal remains and palaeo-environmental indicators (Roberts and Parfitt 1999). It is worth noting here that the impact of the Anglian glacial advance in MI Stage 12 has had considerable impact on the geographical structure of the landscape associated with these early hominid sites in Britain. Major re-modelling of the major drainage basins such as the Thames (Gibbard 1985) and the creation of the Severn and Fen basins (Rose, 1994) have resulted in the destruction of much of the landscape associated with the earliest phases of human activity (Wymer 2001) while elsewhere, e.g. central East Anglia, the evidence remains deeply buried by the till deposits associated with the Anglian ice advance (e.g. Lewis 1998).

From the Anglian onwards Palaeolithic occupation becomes more frequent in Britain, although probably not continuous. There was gradual evolution of an Archaic hominid lineage from *Homo heidelbergensis* into Neanderthals (*Homo neanderthalensis*) during the period from 500,000 BP up to the middle of the last glaciation (*circa* 35,000 BP). Very broadly speaking, the Lower Palaeolithic is associated with early Archaics and handaxe manufacture (Acheulian), and the Middle Palaeolithic with the development of Neanderthals and increasingly sophisticated flake-tool based lithic technology (Levalloisian and Mousterian), alongside one distinctive form of handaxe, the *bout coupé*. It has, however, become clear with improved dating of several key sites, as well as the recent discovery of the Pakefield site, that the definition and distinction of Lower and Middle Palaeolithic are less clear-cut than was originally thought.

The Lower Palaeolithic embraces a variety of lithic technologies besides handaxe manufacture. At Pakefield, there is not a hint of handaxe manufacture, and the lithic industry consists entirely of small flint cores and flakes. Following this, most early sites are dominated by the manufacture of handaxes, although usually alongside a small component of core/flake production. However, there are also a number of contemporary early sites without handaxe manufacture that can be included as Lower Palaeolithic — particularly the manifestations of crude cores, flakes and notched flake-tools that occur at several sites in Kent and East Anglia and are labelled as Clactonian. It is also uncertain to what extent the manufacture of handaxes persisted alongside the uptake of "Middle Palaeolithic" Levalloisian and Mousterian technology, whether different human groups were involved, and whether a transition from Lower to Middle Palaeolithic took place contemporaneously across the whole of Britain. Handaxes are scarce, but present, at most of the few Levalloisian sites known in Britain. These may be derived from earlier deposits, or contemporary with the Levalloisian material. The problem is that our understanding of the Lower and Middle Palaeolithic archaeological record is restricted by:

- Poor provenance of most finds
- Difficulty of dating deposits of this age
- Uncertainties over the extent of earlier derived material in assemblages

After 35,000 BP, Neanderthals were suddenly replaced in Britain and northwest Europe by anatomically modern humans (*Homo sapiens sapiens*), who are associated with the later, Upper part of the Palaeolithic. The Upper Palaeolithic is also characterised by cultural changes such as the development of bone and antler tools and the representation of images of animals painted on cave walls or as small antler or bone carvings. The suddenness of this change and the physiological differences between Neanderthals and modern humans, as well as recent DNA studies, suggest that modern humans did not evolve from Neanderthals, but evolved elsewhere, probably in Africa or western Asia *circa* 125,000 BP, before colonising other parts of the world.

In contrast to the Lower and Middle Palaeolithic periods, the relatively recent age of the Upper Palaeolithic, and the fact that, at least in Britain, the period is within the range of radiocarbon dating, means that our understanding of the period is good. It is clear that, at least in Britain, there is a well-defined and clear break between the Middle and the Upper Palaeolithic. Upper Palaeolithic evidence is very sparse in Britain. The climate was in the second half of a major glacial episode, and human presence was probably limited to occasional parties venturing to the edge of their habitable range. Some material has been recovered from deposits accumulated in cave sites on the Welsh coast, in Devon, in Herefordshire and in the Peak District dating to the milder climatic

phase before the Last Glacial Maximum of *circa* 20,000–15,000 BP (Barton and Collcutt 1986).
There was no human presence in Britain during the Last Glacial Maximum, and recolonisation did not take place until a short phase of climatic amelioration (Windermere Interstadial) from *circa* 13,000 to 12,000 BP towards the end of the last ice age. Again, the majority of the evidence comes from cave deposits. This short-lived episode of Upper Palaeolithic settlement/recolonisation, characterised by a blade-based technology with distinctive backed points — Creswell, Cheddar and Penknife points — was brought to an end by a renewed climatic deterioration (Loch Lomond re-advance), marking the final stage of the last glaciation. After this climate improved at the onset of the Holocene, and Britain was recolonised again, by people with a characteristic Long Blade technology, which rapidly developed into Mesolithic.

2 STUDY REGION: THE BRISTOL AVON BASIN

The river Avon (Figure 1) drains parts of Gloucestershire, Wiltshire and Somerset as well as the City and County of Bristol. Today the river rises on the dip slope of the Middle Jurassic limestone in the southern Cotswolds near Chipping Sodbury. The river then runs east and subsequently south through Wiltshire before turning through Bradford-on-Avon. Upstream of Bath Pleistocene sediments have been noted to occur as a series of remnants of fluvial sediments resting on either side of the river where the river is excavated into the Jurassic sediments between Bradford-on-Avon and Malmesbury. From Bath the river follows a generally north west trending route across Lower Jurassic rocks to a gorge at Hanham that has been cut into Pennant sandstone (Kellaway and Welch 1993). The river subsequently flows westwards across the soft, low lying Triassic rocks in central Bristol before entering a second gorge at Clifton that is cut into the Carboniferous Limestone. Today the river is confluent with the Severn at Avonmouth and is tidal as far as St. Anne's.
The influence of the two major gorges at Hanham and Clifton has a considerable impact on the operation of the river and effectively divides the river into a series of river stretches (Table 3) where floodplains exist on either side of the river separated by reaches of the river within the gorges that have no floodplain associated with the river. The presence of the gorges makes correlation between individual sectors of the river difficult if not impossible without independent means of correlation.

3 PLEISTOCENE GEOLOGY

3.1 Overview

The river Avon has been shown to contain a rich variety of sites containing Pleistocene sediments some of which contain faunal, floral and archaeological remains (Davies and Fry 1929; Lacaille 1954, Wessex Archaeology 1994; Campbell *et al*. 1998).
The Pleistocene development of the Avon system is considered to have its origin as a superimposed river developed on a former Triassic age landscape (Barton *et al*. 2002). During the Pleistocene lowered sea levels probably resulted in the stripping of much of the Triassic cover to reveal the underlying Carboniferous limestone. Local glaciation at the western end of the system occurred during the (?)Middle Pleistocene

(Kellaway and Welch 1993; Campbell *et al*. 1998) when glacial deposits consisting of poorly sorted sand and gravel were deposited in the vicinity of Clevedon.

Fluvial sediments, deposited by the Avon during the Pleistocene, are well known between Bathampton and the coast and previous authors to work in the area include Oriel (1904), Davies and Fry (1929), Palmer (1931), Lacaille (1954), Chandler *et al*. (1976) and Kellaway and Welch (1993). The most recent overview of the nature of the sequences have been produced by Campbell *et al*. (1999) who considered the distribution of the sediments associated with the river and identified three distinct members within the Avon Valley Formation (Table 3). This tripartite system has been applied to the entire valley system despite the difficulties encountered in tracing deposits between different sections of the valley through the gorges at Clifton and Hanham. The three-fold subdivision of sequences can also be traced in the work of other authors such as Davies and Fry (1929) and the British Geological Survey (1965). Furthermore Davies and Fry (1929) indicate that fluvial gravels also rest on the plateau surfaces adjacent to the main valley.

Unfortunately because of the presence of the deep gorges at Clifton and Hanham it is impossible to trace these deposits as continuous spreads along the course of the river. Consequently correlation of the sediments is difficult. Kellaway and Welch (1993), following Chandler *et al.* (1976), suggest that the three groups of sediments may be broadly correlated with the Ipswichian, Middle Devensian and Late Devensian periods. However, this scheme is difficult to equate with the deposits of the Severn (Maddy 1999). Furthermore the acceptance of such as scheme would not easily fit the models currently accepted to be responsible for fluvial sand and gravel aggradation and terracing (e.g. as considered by Bridgland 1996, 2000; Maddy 1997). It should however be noted that the presence of 2 bedrock gorge sections are likely to impact on such conventional models.

The most recently published information on the area (Campbell *et al*., 1998, 1999) would indicate that the sediments lying between the mouth of the Avon and Bathampton can all be accommodated within the Avon Formation (Campbell *et al*. 1999) (Tables 3 and 4). This consists of fluvial gravels and other related sediments that have been grouped into a series of morphological terraces with three individual members identified as the:

1. ***Ham Green Member.*** The stratotype for this member is at Ham Green (ST 539768) where 3-4 metres of gravel with a surface elevation about 30 metres above the present valley base (Hunt 1998a). These deposits are compared with those known to have contained large mammal remains in the basal gravels at the Victoria Pit, Twerton (Winwood 1889; Davies and Fry 1929) as well as sands containing interglacial or interstadial mollusc from beneath gravels in the railway cutting at Twerton (Winwood 1875). Campbell *et al* (1999) suggest correlation with MIS 12.

2. ***Stidham Member***. The stratotype of this Member is at Stidham Farm, Saltford (ST 674 684) where the gravels comprise 2 metres of trough cross-bedded gravels with a coarse basal lag containing animal bones including mammoth (Moore, 1870, Woodward 1876, Davies and Fry 1929; Hunt 1998b). The surface of the gravels lie at about 12 metres above the modern river. A possible correlation of MIS 8 is suggested by Campbell *et al* (1999).

3. ***Bathampton Member.*** The stratotype for this Member is at Hampton Rocks Railway cutting (ST 778 667) where up to 3 metres of trough cross-bedded gravels are noted to contain a cold stage mollusc fauna (Weston 1850, Woodward 1876; Hunt 1998c). The gravels are overlain by an interglacial soil and coversands (Hunt 1990). The sediments lie about 3 metres above the modern floodplain. The presence of the interglacial soil indicates a minimum age of MIS 6 for the underlying gravels of the Bathampton Member.

The weakness of this tripartite sequence is that it does not take into consideration the influence of the gorges and the difficulties of correlating between different sectors of the river as separated by the gorges. Consequently it is felt that the stratigraphy and age of the gravels of the Avon are at present poorly understood. All authors would agree that the sediments ascribed to the Avon Formation all post-date the major glaciation of the area (perhaps occurring during MIS 16, Campbell *et al*. 1998, 1999) but despite attempts to date the sediments no clear inferences can presently be made. Most significantly because of urban sprawl many of the supposedly rich fossil sites are no longer visible and recent observations have been restricted to key views in pipe/foundation trenches, cemeteries etc. Because of these difficulties and the major palaeogeographical changes associated with glaciation of the Midlands during MIS 12 it is very difficult to reconstruct the local palaeogeographies of the region and the relationship between the Avon drainage patterns and those of the ancestral Thames and Severn rivers (Figure 2) (see Maddy 1997 for discussion).

Elsewhere within the Bristol region other types of sediments exist that are likely to correlate with the sequences associated with the fluvial deposits. For example marine/estuarine sediments have been described at Kennpier (Gilbertson and Hawkins 1978; Hunt 1981; Hunt 1998d), Kenn Church (Gilbertson and Hawkins 1978; Hunt 1998e) and Weston-in-Gordano (ApSimon and Donovan 1956; Hunt 1998f) while terrestrial and freshwater deposits occur at Yew Tree Farm (Gilbertson and Hawkins 1978; Hunt 1981, 1998g). Currently the age of these deposits remains somewhat problematic and they are difficult to relate to the fluvial deposits.

As a consequence of the study a number of key sites of importance to the understanding of the Pleistocene geology and landscape evolution have been identified within the study region. These are summarised in Table 5.

3.2 Headwaters, north of Malmesbury

Little evidence exists within the region of Malmesbury for fluvial deposition in the headwaters of the Avon system. This is unsurprising as fluvial deposition, terrace formation and the preservation of such deposits are unlikely high within the headwaters of a major drainage basin. Cave (1977) has reported on the Pleistocene sediments of the area but little useful information pertains to issues directed towards the Palaeolithic resource of the area.

Davies and Fry (1929) note that a number of sections exhibited fine limestone gravels around Brokenborough and on the Sherston Road about a mile west of Malmesbury. Here the gravel was nearly 4 feet thick and caps low tracts of rising ground above the river.

3.3 Upper Avon, from Malmesbury to Bradford-on-Avon

At least two distinct terraces exist in this stretch of the Avon. The associated deposits are extensive, relatively well-mapped and overlie impermeable Oxford Clay bedrock. Most extensively preserved are deposits associated with Terrace 1 that form extensive spreads around Melksham, Chippenham and Sutton Benger. Terrace 2 shows a considerably reduced distribution but occurs around Melksham. The presence of the clay bedrock may be of significance when considering the preservation potential of the sediments as the impermeable nature of the clay should enhance likelihood of preservation of floral remains. Faunal remains are already known to be present in Terrace 1 at the Pyramid Pit, Sutton Benger while a fossil skull of an ox was noted to have been found by Henry Woods in 1839 (Davies and Fry 1929).

Occasional spreads of material classified by the BGS alluvial cone material (e.g. at Middle Lodge Farm, NGR ST 93000 71000). In part these deposits appear to rest on the surface of the Terrace 1 deposits and are consequently likely to post-date the deposition of this terrace in certain locations. However, it remains possible that the core of these fans may be considerably older than the margins of the fans and consequently pre-date Terrace 1.

3.4 Upper Middle Avon, Bradford-on-Avon to Bathampton

Hardly any Pleistocene deposits have been mapped in this area. There is a small patch of T1 gravel at the southern end of the stretch, and a couple of patches of Head gravel (which may nonetheless overlie fluvial terrace remnants) at several places beside the river course, for instance under the Roman Villa at Holcombe. The majority of the valley flanks are covered by undifferentiated landslip deposits, which may mask more extensive Pleistocene fluvial deposits. For example at Freshford solifluction deposits have been found overlying a thin gravel body Moore 1870; Woodward 1876; Winwood 1889a) that contained a fauna with *Elephas primigenius* tusk and teeth, *Rhinoceros tichorinus, Equus caballus, Bison europoeus, Cervus tarandus* and *Ovibos moschatus.*

It is likely that the landslip deposits are complex and as yet poorly understood however, Chandler *et al*. (1976) have considered the patterns of landslips in the Bath area within the Jurassic strata and were able to demonstrate that some slides occurred during the late Pleistocene (e.g. at Horsecombe Vale, NGR ST 75300 62000) where late glacial molluscs were located in association with buried soils in the head deposits (Figure 3). Elsewhere they argue that landslides may have occurred earlier in the Devensian. The evidence presented by Chandler *et al.* clearly suggests that a number of different types of material exists in association with the landslips and illustrate this at Horsecombe Vale (Figure 3) where both a basal limestone head and an overlying clay-rich head occurs.

3.5 Bathampton–Keynsham (entrance of Hanham Gorge)

This is one of the most important reaches of the river system for the preservation of sequences of Pleistocene sediments (Plate 1). Typically three terraces have been mapped within the area by the British Geological Survey (1965). The main sites are illustrated in Figure 4.

Although a number of important sites occur within the region (Table 5) the distribution of mapped terraces and sediments is relatively restricted (BGS, 1965) with narrow ribbons of Terrace 1 and 2 restricted to patches along the valley margins and occasional patches of higher elevation material ascribed to Terrace 3, e.g. at Twerton. Elsewhere clear morphological terraces (Plate 2).

The highest patches of terrace gravel within the area occur at Twerton in the old Victoria Gravel quarry where deposits lie at approximately 45 metres O.D. (27 metres above the modern alluvium) (Winwood 1889b; Palmer 1931) (Figure 5). The deposits present consist of some 3 metres of horizontally bedded gravels overlain by clay and sand beds below head (Chandler *et al*. 1976). The faunal assemblage consists of *Mammuthus primigenius* (Mammoth), *Palaeoloxodon antiquus* (straight-tusked elephant), *Equus caballus* (horse), *Coelodonta antiquitatis* (Woolly rhinoceros), *Sus scrofa* (pig), *Cervus elephas* (red deer) and *Bision priscus* (bison) (Palmer 1931). This fauna is indicative of cool, perhaps late interglacial, conditions. Similar deposits including fauna and molluscs were also recorded from Terrace 3 at the nearby Moorfield cutting (Winwood 1875) (Plate 3). According to Campbell *et al* (1999) these deposits may be ascribed to MIS 12.

Terrace 2 has also produced faunal remains at Hampton Rock (Hunt 1998d), Newton St. Loe (Owen 1846; Dawkins 1866; Moore 1870; Woodward 1876; Winwood 1889; Hunt 1998b), Lambridge (Woodward 1876; Winwood 1889a), the Bellott Road Pit, Twerton (Palmer 1931) and at Larkhall (Moore 1870; Winwood 1889a; Palmer 1931). At Larkhall (Plate 4) molluscs as well as the remains of *Elephas primigenius* (*Mammuthus primigenius*), *Elephas antiquus* tusk and teeth, *Rhinoceros tichorinus*, reindeer, bison and horse have also been found. Campbell *et al* (1999) have suggested a possible correlation with MIS 8 for these deposits.

Terrace 1 has been investigated at Hampton Rocks Railway cutting (ST 778 667) where up to 3 metres of trough cross-bedded gravels are noted to contain a cold stage mollusc fauna (Weston 1850, Woodward 1876; Hunt 1998c). The gravels are overlain by an interglacial soil and coversands (Hunt 1990). The sediments lie about 3 metres above the modern floodplain. Here the presence of the interglacial soil indicates a minimum age of MIS 6 for the underlying gravels of the Bathampton Member.

Elsewhere faunal material has been reported from the vicinity of the Royal Crescent (Woodward 1876) where there appears to be no evidence for the presence of Pleistocene deposits according to the BGS map.

3.6 Bristol, Keynsham to Clifton

The plateau above Hanham Gorge contains thin spreads of gravel that are currently mapped as soliflucted Head gravels, but which were originally mapped as fluvial terrace remnants, relating to courses of the Avon prior to downcutting into the Hanham Gorge. Given the thinness of the gravel bodies, and their angular and clay-rich nature (Fry 1955, 124) it is likely that these gravel bodies are mostly the soliflucted remnants of fluvial deposits, although undisturbed fluvial deposits may be preserved in isolated pockets under the Head deposits. Although these spreads occur over a wide height range and probably relate to more than one original terrace, the subsequent derivation of material means that surface finds cannot now be reliably attributed to a particular terrace.

Fluvial sediments associated with terraces within the Bristol basin area are rare. Occasional patches mapped as Terrace 1 are present (e.g. 359400 172350) whilst more extensive areas of Terrace 1 are mapped in a tributary valley extending south west towards Long Ashton and Cambridge Batch.

Occasional patches of head gravel are also present above Clifton gorge on the south side of the river.
At present the age of any of these deposits cannot be determined.

3.7 Shirehampton, Clifton to Severn

This sector of the river (Plates 5 and 6) preserves sediments ascribed to both Terraces 1 and 2 (Figure 6). Extensive spreads of Terrace 2 exist at Shirehampton, Chapel Pill Farm and Ham Green while Terrace 1 occurs on the lower slopes at Shirehampton. Head deposits occur at the mouth of the Avon where it enters the floodplain of the Severn. Although not known for the presence of faunal material in recent years one of the earliest published references to the Pleistocene sequences of the area report the discovery of large molars of an elephant in the diluvial gravel (Rutter 1829). Unfortunately the location and context of discovery of these finds are unknown.
Known as an area rich in handaxe finds the description of sequences in the area are often linked to these Palaeolithic discoveries. For example at Shirehampton Lacaille (1954) describes sediments beneath Terrace 2 (with surface elevations of *circa* 30 metres O.D.) consisting of bedded sands and gravels up to 10 feet thick. On the south bank he recorded similar sequences at Chapel Pill Farm. Some of the observations from the Shirehampton area were assembled into a cross section through the Terrace and the underlying sediments by ApSimon and Boon (1959) and their illustration is presented here (Figure 7).
Recent archaeological investigations at the Health Centre (ST 53100 76900) revealed the presence of bedded gravels below solifluction deposits (Wessex Archaeology 2004). Most recently (October 2004) an archaeological evaluation conducted by the Avon Archaeological Unit at the site of Twyford House has revealed a sequences of bedded sands and gravels beneath solifluction deposits containing molluscan remains (Plates 7 and 8).
Campbell *et al* (1999) suggest correlation of the Terrace 2 deposits with MIS 12 although this is based on correlations made with Terrace 3 upstream at Twerton.

3.8 Severn, Avonmouth–Weston-in-Gordano

The oldest deposits within this region are sands and gravels preserved in a depression or channel at Court Hill (NGR ST 43650 72250) that are of probable glacial origin (Kellaway and Welch 1993; Hunt 1998h). Another sequence of probable glacial sediments are located at Portishead Down (NGR ST 45000 75100), however, the difference in gravel content between these two sequences suggest that they belong to different phases of glaciation.
Terrace 1 deposits are mapped extensively around Sheepway and Portbury. Davies and Fry (1929) note that while sections through these deposits are rare 4 foot of gravel has been noted during cable laying between 1927 and 1929 in the area. Terrace 1 deposits at Sheepway were noted by Fry (1955) to consist of a thin covering of sandy loam containing chert, flint and quartzite pebbles. Hawkins (1968) draws attention to the fact that these gravels appear to occupy similar elevations to those discovered at Weston-in-Gordano (see below). Two sub-alluvium gravel bodies at different elevations are also noted by Hawkins (1968) suggesting a more complex sequence of events are recorded in the downstream elements of the Avon.
An important sequence of marine and terrestrial deposits were discovered by ApSimon and Donovan (1956) at Weston-in-Gordano where a sequence of deposits

consisting of sand and gravels beneath head deposits were noted. Hunt (1998i) has demonstrated that the sediments contain molluscs as well as pollen and the faunal remains indicate a marine to terrestrial trend in the deposits. Hunt (1998i) ascribes these deposits to MIS 7. Raised beach deposits (of the 50-foot beach) have been noted (Palmer 1931) just below the Pier Hotel.

3.9 High level gravels of the Avon system

High level gravels have been reported from some areas of the Avon catchment, particularly around Bathampton Down and Kingsdown and some authors (Oriel 1904; Hawkins and Kellaway 1971) have ascribed these deposits to an early stage of fluvial history. Other examples are provided by Davies and Fry (1929).

4 PALAEOLITHIC ARCHAEOLOGY

4.1 Overview

4.1.1 Sources and quantification

This review of the Palaeolithic of the region is based on a synthesis of published material, primarily the Southern Rivers Project survey (Wessex Archaeology 1994) supported by Sites and Monuments Record data for the Bristol region and a number of other papers (Davies and Fry 1929; Lacaille 1954; Fry 1955; Brown 1956; Roe 1974). In total 39 sites are known in the Bristol Avon region with Lower/Middle Palaeolithic finds, which include almost 300 handaxes. The region has been divided for this review into seven stretches, from the headwaters northwest of Malmesbury to the river mouth at Portishead (Section 3). Finds from each stretch are discussed below, and summarised by depositional context (Table 6).

Present understanding of the Palaeolithic in the region is based on handaxe finds. The majority of sites comprise handaxe find-spots, although other types of lithic artefact have also been collected and attributed to the Palaeolithic when found alongside handaxes. Handaxes are quite distinct and can reliably be attributed to the Lower/Middle Palaeolithic, whereas flakes and cores are more ambiguous as to period. Almost all finds have been recovered from the surface of ploughed fields, and so any flakes, cores and flake-tools could also have come from later prehistoric periods, such as Mesolithic, Neolithic or Bronze Age. Thus other manifestations of the Palaeolithic such as flake-tools and flake/core technologies, such as Clactonian, Mousterian and Levalloisian remain relatively invisible, if ever present.

4.1.2 Distribution and depositional context

Finds are scarce in the middle and upper parts of the Avon, from Bristol eastward, despite extensive tracts of Pleistocene fluvial terrace deposits in places. Finds are, however, abundant in patches of terrace gravel on both banks of the river at Shirehampton to the west of Bristol. Finds are also present in small patches of gravel west of Shirehampton and on Portishead Down, although the date and origin of these deposits is still uncertain.

The majority of finds are from fluvial terrace deposits of sand and gravel, or from colluvial/solifluction deposits mapped as Head. These latter in many cases most likely include material derived from terrace deposits, and also may overlie unrecognised remnants of terrace deposit. There are also a number of finds not related to mapped Pleistocene deposits, generally from high ground above the river valley. These are probably from residual deposits of plateau or high terrace gravel that are too small to feature on geological mapping, although they may alternatively have been imported to where they were found by later human action — the two handaxe finds at Solsbury Hill may be related to the hillfort that tops the hill, and it has been suggested that the handaxe find at Hilperton (Stretch 2, Upper Avon) may have been a collector's throw-out.

The great majority of material in the survey (90%) comes from Terrace 2 sites at Shirehampton, and in particular Chapel Pill Farm. This probably reflects increased collecting activity in the area, and increased examination of exposures created by building work. It is probable that the apparent absence of finds in other parts of the region is due to a relative lack of investigation, and a systematic investigation of exposures of deposits in the Middle and Upper Avon stretches would produce substantial quantities of material.

Another relevant factor may be the use of a variety of non-flint raw materials for Palaeolithic artefacts (Section 4.1.4). Artefacts made of materials such as sandstone, quartzite and chert would (a) be less easily found in gravel deposits than flint artefacts, (b) be less easily distinguished from natural gravel due to being more rapidly abraded during incorporation in fluvial gravels and (c) probably not have been sought by collectors. Subsequent research in the region should pay particular attention to identifying the range of non-flint raw materials potentially usable for stone tools, considering the likely impact of Pleistocene depositional processes upon these materials and seeking artefacts made of them (Section 5.3).

4.1.3 Period and cultural tradition

As has been discussed in Section 3, nowhere along the Avon has a formation of more than three terraces been identified within any particular stretch of the river. In fact only two separate terraces have been identified along most stretches, although there are hints of higher level unmapped deposits in places. Due to the peculiarities of the Avon basin, with a series of constricting gorges separating different stretches of the river, a more extended terrace sequence, such as in the Thames Valley, has not developed. This means (a) that individual terraces may regularly have been reworked without the usual downcutting, and may contain channelling of different periods and (b) that it is problematic correlating terraces between different river stretches.

Palaeolithic remains are present in Terrace 2 in the Shirehampton stretch, and in Terrace 1 in the Upper Avon, Shirehampton and Severn stretches. Due to the above-mentioned problems, we presently have little clear idea of how old these terrace deposits are however, it is likely that they date to the later parts of the Middle Pleistocene (Table 4). Many of the finds on which present knowledge is based are, however, in fresh condition, indicating a minimal history of derivation and that they are probably contemporary with the deposit in which they are found. It is likely that they are no older than the Anglian glaciation (MI Stage 12), since small patches of glacial till in the region indicate local glaciation at some point, which would have scoured away previous terrace remnants, and must have been either the Anglian or a subsequent glaciation, since maximum ice-sheet expansion took place in the Anglian.

Other Palaeolithic find-spots have occurred in high-level residual or plateau gravel contexts, or Head deposits, about which we have even less idea of date than for the terrace deposits. Overall, finding some means of dating and correlating the Pleistocene deposits along different stretches of the Avon (and also in its major tributaries such as the Frome and Biss) is a priority for Palaeolithic archaeology of the region (Sections 5.2 and 5.3).

As mentioned above, present understanding of the Palaeolithic of the region is very much based on the recovery of handaxes. These are typically present in the Lower and Middle Palaeolithic of Britain, from the pre-Anglian interglacial (MIS 13, *circa* 500,000 BP) through to at least MIS 7, *circa* 200,000 BP. The prevalence and recovery of handaxes from at least some locations indicates presence in the region in this broad period. Unfortunately it is not possible to use the shape of the handaxes to pin down more precisely the date and period of occupation. It is clear from other studies that handaxe-shape is very varied through the Palaeolithic, and as yet we do not have any clear-cut rules relating shape to period, bar the exclusive presence of assemblages dominated by flat-butted, rounded tip *bout coupé* forms in the later Devensian, in MIS 3, *circa* 65,000–40,000 BP.

There is a great variety of handaxe forms and sizes in the material from the Avon region. Based on published material, the most common form seems to be sub-cordates of medium size, with a blunt point formed by quite convex sides, and with a thick partially worked butt. A number of smaller forms are more triangular than this, with a sharper point and unworked butt. A number are also more cordate, with a more fully worked butt. There seem to be no, or very few, true ovates. Generally, the handaxes that have been found in the region to-date are not as large or finely made as many from the more prolific regions of south-east England such as the Thames Valley, Solent Basin and East Anglia. This does not necessarily indicate a contrast in lithic industrial traditions. Raw material could have been an important factor in this expressed typological variation, since few handaxes from the region are made of flint. Most are made of chert, and other materials used include indurated sandstone and quartzite (Section 4.1.4).

It is not possible to say without a more detailed study whether there is any patterning in handaxe shape in the region, possibly related to terrace level, raw material or river stretch. Carrying out an investigation of this, to characterise the resource in more detail would be a useful part of developing a coherent Palaeolithic research framework for the Avon region (Section 5.3).

There is very little information on non-handaxe material. Artefacts other than handaxes cannot reliably be attributed to the Palaeolithic when found as surface finds, which are the basis of our present understanding. A few apparently-worked flakes have been found from several sites, and interpreted as flake-tools. However, for such material, it is hard to distinguish deliberate working from post-depositional abrasion and most of these may well be merely abraded waste debitage. Uniquely, the collections from Chapel Pill Farm, on Terrace 2 of the Avon at Shirehampton, include substantial quantities of cores and flakes (Lacaille 1954, 18). These are mostly technologically undiagnostic, and may have come from either early stages of handaxe reduction or non-handaxe simple flake/core reduction, which is often carried out alongside handaxe manufacture.

There is, however, also a convincing manifestation of Levalloisian prepared core technique in the material from Chapel Pill Farm. Several cores seem to have been deliberately shaped to facilitate removal of a single large flake from one face, and there are also several complementary flakes in the collection, showing signs of radial working and core preparation on their dorsal surface. Similar material is also present in the collection from the Cemetery site in the same terrace at Shirehampton, but on the opposite side of the river. Levalloisian material is only reported from these two sites. This is, however, the most intensely collected location in the Avon region. Similar levels of collecting at other locations in the region might produce a greater variety of material than the ubiquitous handaxe. Levalloisian technology first appears in England early in the Middle Palaeolithic, probably late in MIS 8 *circa* 250,000 BP although there may be some earlier manifestations, and does not appear to have been used at the few *bout coupé* sites that are dated to after the peak last interglacial (MIS 5e, *circa* 125,000 BP). Therefore the Levalloisian evidence in the Bristol region probably reflects early Neanderthal occupation in the period MIS 8 to MIS 6. No *bout coupé* handaxe finds are known from the region, but the finds from Wales (Coygan Cave), Wiltshire (Fisherton), Somerset (Cheddon Fitzpaine, Pitminster and West Quantoxhead) and Dorset (Bournemouth and Sherbourne) suggest that there was a late Neanderthal population in southwestern England in the later Devensian.

Only two Upper Palaeolithic find-spots are present in the study region, both surface finds in the South Gloucestershire region. One of them (SMR ref. 4522) is a trapezoidally retouched blade segment from Bury Hillfort, Winterbourne (NGR ST 652 791). The recovery of other later prehistoric lithic material including a stone mace-head from the surface of the site casts some doubt as to whether this is truly an Upper Palaeolithic piece, or whether of later prehistoric date. The other (SMR ref. 4767) is a backed blade from Freezing Hill, Cold Ashton (NGR ST 721 715), from high ground on the northern side of the Bathampton–Keynsham stretch of the Avon. This is slightly more convincing, although not definitive, evidence of occupation in the region in the Upper Palaeolithic. Despite this lack of evidence, the quantity of Upper Palaeolithic remains from nearby areas such as Wales (Gower Caves), Herefordshire (Wye Valley) and Devon (Torquay and Torbryan Valley) indicates that there would have been Upper Palaeolithic presence in the Bristol Avon region. This is most likely to be preserved in cave or rockshelter sites, if any can be found in the Bristol Avon or its tributaries. There may also be occasional open-air situations where unusual circumstances have led to the deposition and burial of Upper Palaeolithic material, possibly within alluvial floodplains.

4.1.4 Raw material

Only a few of the finds from the region are made of flint. The majority of finds are made of pale brown or golden ("honey-coloured") chert. Other materials reported include indurated sandstone and quartzite. Those made of flint would have stood out from the chert-rich gravels that predominate in the region, making them easier to spot and recover. Although flint is present in Pleistocene deposits in the region, the nearest outcrop of fresh nodular flint from Chalk is at Westbury, at the southeast edge of the Avon Basin. The majority of flint raw material in deposits along the route of the Avon Valley would have been derived as the product of fluvial, solifluction or glacial transport. Thus flint raw material would have been scarce, degraded by frost action and rolling, and pieces of size and quality suitable for handaxe manufacture would have been rare.

Little work has been done investigating the range of non-flint raw materials suitable for lithic manufacture, and the restrictions the nature of these materials might impose on refinement and typological form. Artefacts made of at least three other materials — chert, sandstone and quartzite — are reported in the literature (see especially Lacaille 1954, 12–13). Given the varied geological bedrock of the Avon basin, it is possible that a considerable number of lithological types might be potentially usable for lithic technology. These are unlikely to flake as nicely as flint, and may also be found as raw material of restricted size and shape that would constrain the size and typological outcome of any handaxes made. Some work has been done investigating non-flint raw material in the Upper Thames Valley (MacRae and Moloney 1988), and some knapping experiments with Bunter quartzite have indicated the restrictions this material imposes (Moloney *et al.* 1988). Flakes made from knapping bunter quartzite are also much less recognisable than those made from flint, lacking many of the key features for recognition such as conchoidal ripples and a point of percussion.

Some knapping work has also been carried out on Greensand Chert from the Axe Valley (Wenban-Smith, unpublished). This material, which does not necessarily have similar properties to the chert raw material used in the Bristol region, can flake very nicely, although there is a wide variety of knapping quality between individual pieces. However, its generally coarse grain makes it prone to knapping errors such as step fractures, and much less resistant to post-depositional degradation. Artefacts made of it would therefore quickly become rolled and battered, and appear less refined when found than when made.

Therefore it is unsurprising that the known handaxes from the Avon region do not approach the size and refinement of those from the flint-rich Chalklands of the southeast. A significant area for further work would be a systematic survey of the range of clast lithology of terrace deposits in the Avon region, the potential of different lithologies as raw material for stone artefact manufacture and the potential for raw material sourcing studies to investigate Palaeolithic mobility. These research avenues should be supported by consideration of the recognisability of waste debitage and of how Pleistocene depositional and post-depositional processes might affect this recognisability. Finally, armed with this knowledge, one could commence a programme of investigation that would ultimately lead to a fuller understanding of Palaeolithic presence in the region (Section 5.3).

4.2 Headwaters, north of Malmesbury

There is only one Palaeolithic find-spot in this stretch of the Avon. A fragment of a chert handaxe was found at Brook Farm, Hankerton. This area is at the watershed between the headwaters of the Thames basin and the Avon/Severn basins. No fluvial terrace deposits are mapped at the find-spot location, although small patches may be present. Terrace sequences would, however, be poorly differentiated and developed so far upstream in a river system. It is most likely that the find is derived from a degraded terrace remnant.

4.3 Upper Avon, from Malmesbury to Bradford-on-Avon

There are only two Palaeolithic find-spots in this stretch of the Avon, despite the extensive spreads of Pleistocene terrace deposits. The first of these, which is a pointed handaxe from Terrace 1 deposits at the Pyramid Pit, Sutton Benger, is of particular significance due to the abundant associated presence of mammalian remains, including horse, wolf and elephant. If the elephant identification is correct, and the remains are not mammoth, then this would date the deposits to at least as old as MIS 6, and most likely MIS 8 or before.

The other find from this stretch is a cordate handaxe from the Rectory garden at Hilperton. No Pleistocene deposits are mapped at this location. The site is, however, near extensive spreads of Head deposits, and above stretches of Terrace 1 deposits.

The scarcity of Palaeolithic finds may well be due to a lack of investigation, rather than reflecting a genuine lack of Palaeolithic remains. Despite the lack of finds to-date, this is a promising area for further investigation. Secondly, the southern part of the area, southeast of Hilperton, is the nearest area within the Bristol Avon region to a source of fresh Chalk nodular flint, at the edge of the Wiltshire Downs near Westbury. The area north of Westbury contains extensive spreads of, probably flint-rich, Head deposits that extend towards the Avon via the Semington Brook basin. These deposits, and the Chalk exposures to their southeast, would probably have been an important destination in the Palaeolithic landscape. Although most finds from within the Head deposits would have a complex derivational provenance, there might be zones of relatively undisturbed material. A very similar location on the Hampshire Downs has produced the significant undisturbed Palaeolithic site of Red Barns in Hampshire, which was contained under unmapped Head deposits at a location mapped as Chalk bedrock (Wenban-Smith *et al.* 2000). The calcareous environment of deposition would also enhance the likelihood of preservation of biological evidence, particularly molluscs and faunal remains.

4.4 Upper Middle Avon, Bradford-on-Avon to Bathampton

There is only a single Palaeolithic find-spot from this short northward stretch of the Avon Valley. The single artefact from this stretch is a handaxe from a ploughed field surface on high ground at Farleigh Down. According to Davies and Fry (1929, 164) pockets of flint-rich Plateau Gravel at least 3 feet thick outcrop on the surface here. The handaxe is almost certainly a residual find associated with one of these pockets, which may contain further evidence. Although dating and provenance from a residual context such as this is problematic, one can be confident that spatial disturbance has been minimal, so the location of the find does indicate Palaeolithic presence. Further work could investigate the presence/prevalence of handaxe-making evidence in these Plateau Gravel pockets, as well as the balance between manufacturing debitage and finished tools, which would contribute to understanding tool-transport and mobility at this period.

4.5 Bathampton–Keynsham (entrance of Hanham Gorge)

There are only two Palaeolithic find-spots along this stretch of the river. At one of these (Little Solsbury Hill) two handaxes were found as surface finds on the slope beneath the hill, which is capped by a late prehistoric hillfort. No Pleistocene deposits are mapped. The handaxes may originate from a pocket of residual Plateau Gravel, as at Farleigh Down, or may have been brought there, either in Palaeolithic or later times.

The other find-spot is at the Manor Farm, Kelston. This is a relatively prolific site on a patch of Terrace 2 gravel at *circa* 45 metres OD. Six handaxes from the site are in the collections of the Bristol City Museum and the University Spelaeological Society Museum. Twelve artefacts, no doubt including many of the same handaxes, were recorded resulting from a phase of field-surface collecting in 1930 (Fry 1955, 121–123). All artefacts were made of Greensand Chert, and all bar one were in fresh condition. The handaxes illustrated by Fry (*ibid.*) are generally thick-butted sub-cordate forms, with some butts trimmed around the base to form a blunt, crudely convex basal edge.

The gravel terrace from which these finds were made outcrops at several other locations downstream of Manor Farm, and there are wide spreads (a) on the left bank of the Avon east of Keynsham, and (b) on the right bank in the sharp bend north of Keynsham. However, no finds are known from these more extensive spreads. It is unknown whether this absence is due to a lack of investigation, or a genuine absence of Palaeolithic remains. There are no obvious differences between the outcrops or their geomorphological situation which would favour one particular patch for presence of Palaeolithic remains. Establishing whether this apparent patterning is real or not is a necessary part of investigating the Palaeolithic of the region.

4.6 Bristol, Keynsham to Clifton

There are five Palaeolithic find-spots in this stretch of the river, four of them clustered on the Tennant Sandstone plateau above the southwest bank of the Hanham Gorge, to the east of Bristol, and one isolated find-spot at Henleaze Junior School, in the northern part of Bristol.

The thin gravel spreads above the Hanham Gorge are relatively rich in Palaeolithic remains. Surface-collecting from ploughsoil northeast of Brislington House led to the recovery of over 20 Palaeolithic artefacts in 1930, presumably mostly handaxes, of which five (three handaxes and two retouched flakes) are still extant in the collection of the Bristol University Spelaeological Society Museum. A number of other handaxes and worked flakes were also found during building work at the St. Anne's Park Housing Estate, as well as a single handaxe from a ploughed field-surface beside the main A4175 at the entrance to Hanham Gorge. All of the Brislington House artefacts were made of Greensand Chert. The material of the other is unknown, prior to examination, although the finely flaked handaxe from St. Anne’s Park illustrated by Davies and Fry (1929, 168, Figure 2.5) is probably from flint, based on the description of the “skin of the nodule”. Typologically, the handaxes are predominantly pointed and sub-cordate. Generally the butts are thick and unworked or crudely worked, although the finely flaked handaxe from St. Anne's Park mentioned above has the butt well-thinned by flaking from one face.

4.7 Shirehampton, Clifton to Severn

In contrast to other stretches of the Avon, there are numerous (n=21) find-spots along this short stretch, which contains 90% of the Palaeolithic finds in the region. Almost all these find-spots are from a restricted area of terrace deposits at the confluence of the river Avon with Severn Estuary, particularly from a patch of Terrace 2 deposits on the north bank at Shirehampton, and a patch on the south bank (Chapel Pill Farm and Ham Green). Over half of the find-spots (Table 6) are associated with mapped patches of fluvial terrace 1 or 2, and the remainder are from colluvial/solifluction deposits that are most likely derived from these nearby fluvial terraces. Eight sites are specifically associated with the higher Terrace 2, including the prolific site of Chapel Pill Farm, and three sites with the lower Terrace 1. It is, however, possible that material associated with Terrace 1 has been derived from Terrace 2. It should also be pointed out that, although Chapel Pill Farm is currently mapped as a fluvial terrace, Lacaille (1954) considered it a soliflucted Head deposit — this merits further investigation (Section 5.2) in light of the significant quantities of material recovered from the site. In summary, the great majority of the Palaeolithic material comes from Terrace 2, with artefact-rich deposits on both north and south banks of the Avon, although there is some uncertainty over the chrono-stratigraphic integrity of the collection.

Typologically, the artefacts are dominated by small pointed and sub-cordate handaxes, with thick partly worked butts. There is also a component of Levalloisian core/flake technology, with single flakes being removed from one face of a prepared core. A range of raw materials have been used for artefact manufacture, including chert, flint, sandstone and quartzite. Restrictions on the size and knapping quality of available pieces of raw material may have been a major factor in the typological and technological characteristics of the collection, and this needs to be taken into account when making comparisons with other areas where, for instance in the Middle Thames Valley, good quality flint was much more abundant.

The condition of artefacts is varied. Many are in fresh condition, suggesting a minimum of depositional and post-depositional disturbance. Some, however, are in more abraded condition, reflecting a history of disturbance and, possibly, derivation.

4.8 Severn, Avonmouth–Portishead

There are seven find-spots in this small area. Three of these are associated with Terrace 1 in the Sheepway/Portbury district. One of them (River Kenn, south of Clevedon) is associated with the Burtle Beds — which are likely of Pleistocene fluvial origin, and may be equivalent to Terrace 1. And the remaining three are associated with the outcrop of Portishead Beds on the side of the Severn Estuary between Clevedon and Portishead.

The patch of Terrace 1 gravel at Sheepway produced a reasonably large collection of six handaxes as surface-finds from a single episode of fieldwalking in 1931 (Fry 1955). These are, as for other stretches of the river, generally pointed and sub-cordate with thick unworked or partly worked butts. The collection was of varied condition, with some fresh and unabraded, and others moderately or very abraded. The more abraded specimens may have been derived from nearby Terrace 2 deposits. Recovery of more finds *in situ* from within the Terrace 1 outcrop may help develop knowledge of any whether there are any contrasts between material from Terraces 1 and 2.

The relatively large number of finds from the Sheepway gravel patches, which presently outcrop from the Severn Estuary alluvium, may have been derived from upstream, or may represent Palaeolithic activity at that spot. This could have been associated with exploitation of the now-submerged Severn Estuary area, which, when exposed, would no doubt have been a significant plain suitable for large mammal grazing.

Finally, there are three finds, two of them handaxes from the surface of the outcropping strip of Portishead Beds flanking the Severn between Clevedon and Portishead. No Pleistocene deposits are presently mapped in this area, bar a tiny patch of “Sand and Gravel of Uncertain Age” capping Portishead Down, close to one of the handaxe find-spots. This is most likely a residual Plateau Gravel. There may also be degraded remnants on the northwest-facing slope of Portishead Down of Severn terrace deposits, or material derived from them. Without examining the artefacts it is not possible to speculate further on their likely origin and derivational history. The quantity of finds is, however, high for an area without Pleistocene deposits, and the area would merit an investigative survey (Section 5.2).

5 RESEARCH FRAMEWORK

5.1 National Palaeolithic research framework

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

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

5.1.1 Research themes and priorities

While regularly under review, and subject to changing emphasis in light of new discoveries and research directions, a comprehensive list of core national research themes and priorities (NR) comprises:

NR 1 Documentation and dating of regional sequences of material cultural change

NR 2 Dating artefact-bearing deposits within regional, national and international Quaternary frameworks

NR 3 Behaviour of Archaic (pre-anatomically modern) hominids (a) at specific sites, (b) across the wider landscape

NR 4 Behaviour of anatomically modern hominids (a) at specific sites, (b) across the wider landscape

NR 5 Extent of contrasts in Archaic and anatomically modern human behaviour and adaptations, and in fundamental cognitive capacities

NR 6 Patterns of colonisation, settlement and abandonment through the Pleistocene

NR 7 The climatic and environmental context of Archaic settlement, and the relationship between climate/environment and colonisation

NR 8 The history of isolation/connection between Britain and the continental mainland, and the relationship/implications for Palaeolithic settlement and cultural development/expression

NR 9 Improved documentation and understanding of hominid physiological evolution

NR 10 Investigation of the relationship between evolutionary, behavioural and material cultural change

NR 11 Social organisation, behaviour and belief systems

5.1.2 The resource

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

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

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

- Date the sedimentary context of any archaeological evidence, both through chronometric means such as Uranium series (for mammal bones) or Amino acid dating (for molluscs) and by biostratigraphic comparison (particularly for mammalian assemblages)

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

Even at Middle and Late Pleistocene sites where direct archaeological evidence is absent, the study of any biological evidence has a major contribution to make to Palaeolithic research. As mapping and lithostratigraphic correlations of depositional units become more detailed in an area, accurate dating of even a few key units can provide foundations to tie in the whole sequence, and its contained archaeological horizons, with the wider national and international frameworks. This dating will most likely be achieved from the study of biological evidence — pollen, large vertebrates, molluscs or small vertebrates — from archaeologically sterile Pleistocene deposits.

Thus a central aspect of the Palaeolithic archaeological agenda in any region has to be the discovery and study of such deposits.
In summary, the following key points can be made concerning how national Palaeolithic research goals can be addressed:

- The main evidence is lithic artefacts and dietary faunal remains

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

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

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

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

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

- Geological evidence to form litho-stratigraphic frameworks

5.2 Palaeolithic research priorities in the Bristol Avon basin

Within the context of overall national research priorities, a number of key themes and priorities can be identified as particularly relevant in the Bristol Avon region (Table 7), leading to some specific landscape zone objectives (Section 5.2.2). Some of these are taken forward as proposals for strategic projects (Section 5.3)

5.2.1 Key regional themes and priorities (R)

R 1 — Quaternary framework
A fundamental necessity for Palaeolithic work in the region is developing an improved understanding of the Quaternary deposits of the region, in particular:

- Mapping of their distribution

- Investigation of origin and formation processes

- Dating of major sediment bodies in each stretch of the Avon and its tributaries

- Correlation between deposits from different stretches of the Avon and tributaries

The fluvial deposits of the region — that have produced the bulk of the Palaeolithic archaeological evidence — are known to contain mammalian remains at a number of locations, although this has never been exploited for dating and correlation. There is also the possibility of recovery of other biological evidence such as molluscs, and the application of absolute chronometric techniques such as OSL dating (Section 5.3). Many finds have also come from areas where Pleistocene deposits are not mapped, or where it is uncertain whether they are of residual, fluvial or solifluction origin. Resolving this uncertainty is necessary for assessing the depositional history and stratigraphic integrity of any archaeological material, which is itself a necessary pre-requisite for considering the history of cultural development and settlement (see below).

R 2 — Cultural framework and settlement history

Although there is a reasonable amount of Palaeolithic material from the region, it is (a) mostly surface finds, and (b) disproportionately dominated by finds from the mouth of the Avon at Shirehampton and Chapel Pill Farm. Even where finds are associated with mapped patches of terrace deposits, we are uncertain whether they originate from fluvial sediments or are from overlying derived solifluction sediments. Even if we were confident that they originated from the fluvial sediments, we would have little idea of their date (RT 1 — Quaternary framework). Thus we really are at square one in the Bristol region for this area of Palaeolithic research, and building up understanding of the basic typological and technological character of the Palaeolithic archaeological record through time needs to be a key theme for research in the Bristol region, before moving on to other priorities such as behaviour and social organisation. This can be addressed through increased collection of material *in situ* from exposures of gravel, and even targeted excavation at known sites — which needs to combine investigation of the geological context of finds with recovery of archaeological material. Under PPG 16 archaeological evaluation before determination of Planning applications can identify where there will be an impact on Pleistocene deposits and archaeological conditions attached to a consent provide the means for more detailed investigation of archaeological material (Section 6), where there is impact upon Pleistocene deposits. Particular opportunities for investigation arise from aggregate extraction that (a) impacts upon large areas of fluvial terrace deposit and (b) creates substantial exposures for study.

R 3 — Landscape context and settlement distribution

The Bristol region contains a very diverse bedrock landscape, with concomitant potentialities/constraints for Palaeolithic exploitation. At the heart of the region is the drainage pattern of the Avon and its tributaries, leading out to the plain of the Severn Estuary. Besides being water sources, these waterways would be distinctive for their associated terrace spreads (with raw material for tool manufacture) and their impact on game and plant resource availability. On higher ground above the main drainage arteries, varied bedrock geology may have affected raw material and bio-resource availability. At its southern margin there is Chalk downland with abundant fresh Chalk flint, and substantial spreads of Head deposits spreading northwestward into the Bristol Avon basin. A major theme in study of the Palaeolithic in the Bristol region should be attempting to understand how occupation and activities were distributed and organised within this landscape. The complex and diverse bedrock landscape of the region, and the unusually wide range of raw-materials available for tool manufacture

(RT 4 — Raw material), make it a particularly suitable region for addressing these issues.
It is unclear whether our present pattern of Palaeolithic find-spot distribution and artefact concentration bears any relation to the archaeological reality, or is merely a result of accidents of investigation and exposure. This can be addressed by a two-pronged approach combining (a) attempted normalisation of the present distribution through analysis of intensity of collector activity and ground disturbance and (b) implementation of a systematic programme of investigation of all deposits (Sections 5.3 and 6).

R 4 — Raw material and mobility
The Bristol region is notable for the variety of raw material employed in the manufacture of Palaeolithic artefacts. This creates both problems and opportunities. Current understanding of the British Palaeolithic is probably disproportionately dominated by collection and analysis of flint artefacts from southeastern England, although an attempt has been made to redress this in the Upper/Middle Thames (MacRae and Moloney 1988). In the Bristol region, the recognition and recovery of artefacts has probably been hindered by the less easy recognisability and greater vulnerability to abrasion of non-flint artefacts. Furthermore the knapping properties and nodule size of some of the raw material used may have limited the quality of artefacts produced, further reducing their ease of recognition.
However, this lithological variety makes the Bristol region of potential national significance for the opportunity provided to investigate the mobility of Palaeolithic people around the landscape. If an understanding can be developed of the full range of lithologies used for tool manufacture, and their availability and distribution in the landscape, then the organisation of Palaeolithic tool manufacture and transport can be tracked through the present distribution of artefacts with distinctive lithologies — far more so than in other regions with ubiquitous Chalk flint (Section 5.3).

R 5 —Mammalian and biological evidence
A number of sites in the region have produced mammalian remains, although most of the records are from the 19th and early 20th centuries. Only one site has been reported (the Pyramid Sand and Gravel Pit at Sutton Benger) in the headwater area in association with lithic artefacts. Biological evidence is known from a few sites in the region (Table 5), however, it has not yet been properly studied for its potential contribution to dating and reconstruction of Quaternary climate and environment. Identification and study of sites with Pleistocene mammalian and other biological evidence should be a research priority throughout the Bristol region, and the study of such sites has a significant contribution to make to the fundamental task of constructing a chrono-stratigraphic framework for the Palaeolithic archaeology of the region, whether or not artefacts are actually present at a specific site (Section 5.1.2).

R 6 —Undisturbed living surfaces
Although this document has emphasised the importance and potential contribution of artefacts from more disturbed contexts such as fluvial gravel deposits, the complementary importance of undisturbed sites should not be overlooked (Section 5.1.2), both of Lower/Middle and Upper Palaeolithic age. No such sites are presently known in the Bristol Avon region. Discovery and excavation of these sites, besides providing direct behavioural evidence, can help provide a framework of

typological/technological change to reinforce that derived from analysis of material from more disturbed contexts.
Some thought should be given to modeling where such sites are most likely to occur. Fine-grained alluvial or intertidal zone lagoonal deposits are generally regarded as the most promising source for Lower and Middle Palaeolithic sites, and have produced undisturbed evidence at a number of locations (eg. Swanscombe and Boxgrove). However, colluvial deposits may also bury evidence with minimum disturbance (eg. Red Barns, Hampshire and Harnham, Wiltshire). Another factor to bear in mind is that lenses of deposit with undisturbed remains may be present within large sediment bodies of much coarser grained material, laid down under high energy conditions and not thought of as a source of undisturbed landsurfaces (eg. Lynford, Norfolk).
For Late Middle and Upper Palaeolithic sites, fine-grained lenses within fluvial deposits are also a possibility. There may also be caves and rock-shelters in areas of suitable bedrock terrain, as well as open-air location where evidence has accumulated in short-lived depressions in the landscape, and then been buried by aeolian or colluvial processes.

5.2.2 Landscape zone objectives

Following from the key regional research themes and priorities, a number of specific objectives for further research can be identified in the different areas of the Bristol region (Table 8). This is, of course, not an exclusive list, but a starting point based on current knowledge, within the context of overall national and regional priorities, which are applicable in all the landscape zones.

5.3 Strategic projects

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

- Improving the ability to curate the archaeological heritage in the Bristol Avon region

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

- Addressing national and regional research priorities

Palaeolithic/Pleistocene resource characterisation and Pleistocene chrono-stratigraphy

The project would entail a combination of: examination of all known artefacts from the region in museum collections, geological data collection/modelling and new fieldwork. The geological data collection and modelling would collate all available information on the Pleistocene deposits of the region, leading to improved understanding of their nature and distribution. The fieldwork would be targeted at key deposits in the region to try and date them by OSL and/or biostratigraphic means, leading to improved correlation and dating of deposits (a) with each other in different stretches of the Avon basin and (b) with the wider national and international Pleistocene MIS framework. Once this framework had been developed the analysis of the artefacts would lead to construction of a new framework of cultural change and settlement history. It will then be possible to explore how it compares and contrasts with the pictures in other regions such as the Thames Valley and the Solent River Basin, where studies of this nature have already been carried out and where our understanding is relatively good. The project would also lead to identification of key areas of potential for Palaeolithic archaeological remains.

Predictive Palaeolithic/Pleistocene GIS model

Building on the results of the suggested framework project above, a desirable aspiration for improving management of the Palaeolithic archaeological resource in the Bristol region would be a 3D GIS model of the Pleistocene lithostratigraphy, with additional layers and drop-down menus concerning previous Palaeolithic finds, depositional interpretation and assessment of potential. A pilot project developing a similar model along these lines has recently been carried out by Kent and Essex County Councils for a restricted region of the Thames Estuary, working with a range of specialist and the British Geological Survey. While the pilot scheme highlighted a number of practical problems with developing such a model, the end-product did give an indication of the potential of such an approach.

Systematic fieldwalking of Pleistocene terrace exposures

Most of our current understanding of the Palaeolithic of the region comes from surface finds from ploughed fields. However this knowledge results from the unstructured research activities of a few individuals, mostly many decades ago. A few areas have been intensively searched on a regular basis, a few on a one-off basis but most have not been searched at all, particularly the extensive terrace spreads in the Middle and Upper Avon. The region is primarily agricultural with a significant quantity of arable fields that may regularly be available for fieldwalking. A project could be developed that applies a systematic and controlled fieldwalking survey of Pleistocene deposits through the Avon region. This may (a) pick up entirely new significant concentrations/sites (for instance the major new Wiltshire site of Harnham was found following identification of a concentration of handaxe finds in a ploughed field) and (b) would lead to a more balanced view of the distribution of Palaeolithic remains and settlement across the region. Such a project would need to be informed by awareness of the use of non-flint raw materials and identification of non-flint artefacts (below).

Lithology, raw material sourcing and use of non-flint raw material

The Bristol region is notable for the diversity of bedrock geology and raw material suitable for lithic artefact manufacture. Museum collections from the region include artefacts made of at least four materials — flint, chert, sandstone and quartzite. There needs to be a more systematic investigation of the full range of lithologies in the region that are available as raw material for artefact manufacture. This needs to be complemented by an experimental analysis of how well these respond to knapping, leading to an understanding of which ones may have been used, and any implications for recognising artefacts from different raw materials. Once this basic work has been done, it will be possible to start building more complete collections of artefacts in the region, with less danger of failing to recognise artefacts from a range of non-flint raw materials. The final element of this basic platform is developing a model of the distribution and availability of different raw materials. Where distribution/availability is restricted, it will be possible to gain an insight into tool transport and mobility across the landscape.

Research excavation programme
There are a number of sites, for instance Chapel Pill and Farleigh Down, where we are already aware that Palaeolithic remains are present, but we lack information on their context and provenance. These would benefit from excavations and a machine-dug test pit programme aimed at (a) providing more controlled information on artefact context, presence, density and intra-site distribution, (b) better understanding of the nature, sequence and extent of Pleistocene deposits at the site, and (c) application of dating studies such OSL to date the deposits.

5.4 Dissemination, education and community involvement

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

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

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

- Wider reporting of even small finds/projects in local media
- Visits to schools with artefacts and fossils to give short talks
- Teacher packs with visual resources and information summaries
- Public access open-days to sites
- Collaboration with museums over exhibitions and web resources

- Web-sites
- Production/distribution of leaflets, posters and CDs
- Public lectures, knapping demonstrations, artefact identification sessions

All of these have been applied in a number of recent projects [*Palaeolithic Archaeology of the Sussex/Hampshire Coastal Corridor* (Bates *et al.* 2004), *Stopes Palaeolithic Project* (Wenban-Smith 2004b) and excavation in the Ebbsfleet Valley, Kent, in advance of the Channel Tunnel Rail Link]. Experience has shown that the most successful activities/approaches are those which are well-publicised, and which are timetabled and located so as to be easily accessible to the widest target audience. This has been most successfully achieved through liaison and collaboration with bodies such as museums and education departments who already have the infrastructure and expertise in place. Furthermore, it is advantageous if there is the maximum possible crossover and integration between different approaches.

Specific recommendations for action

- Contact with Portable Antiquities Officer, training in lithics identification and development/application of a standardised proforma for recording lithic finds

- Increased emphasis in development control work for reporting requirements concerning public/community dissemination

- Increased emphasis in reporting objectives for larger strategic and development control projects of public/popular dissemination and museum/education liaison

- A specific strategic project whose prime objective is promoting understanding and appreciation of the Palaeolithic in the wider community

6 DEVELOPMENT CONTROL: A STRATEGY FOR THE PALAEOLITHIC RESOURCE

6.1 Development control and Palaeolithic archaeology

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

- The nature of the Palaeolithic resource

- Palaeolithic research priorities (both national and regional)

- Appropriate methods of investigation to realise the potential of the resource

The Palaeolithic poses particular problems since, unlike all other archaeological periods, there is no direct evidence of human activity other than artefacts themselves. These are contained within natural geological deposits, rather than man-made features and structures that form the conventional archaeological resource. It has in the past often been easy, therefore, for those in the curatorial environment to focus on artefacts from undisturbed occupation surfaces as the only type of Palaeolithic evidence worthy of mitigation, and disregard the evidence from a wide range of other contexts.

This document has set out to emphasise that, alongside undisturbed remains, the significant Palaeolithic resource also embraces disturbed/transported artefacts, as well as faunal remains, palaeo-environmental evidence and artefactually sterile deposits (Section 6.2). All these types of evidence contribute to addressing national and regional research priorities (Sections 5.1 and 5.2). Even though the importance of a patch of Pleistocene river gravel may be less immediately apparent than a well-defined Roman villa, both have their role to play in studying the respective periods, and both are worthy of appropriate evaluation and mitigation under PPG 16.

It is not, however, possible to provide a recipe book of methods for each and every situation. The Palaeolithic resource is too diverse. Rather, the purpose of this section is to provide for reference a baseline statement of the nature and diversity of the significant Palaeolithic resource, and to outline a coherent strategy for the curatorial community to oversee the collaboration of all involved in development and archaeology — regional authority curators, developers, archaeological consultants, commercial archaeological contractors, Palaeolithic/Quaternary specialists, geotechnical engineers and building contractors — to approach the recognition, evaluation and mitigation of Palaeolithic remains within the context of the current curatorial environment.

6.2 The Palaeolithic resource

6.2.1 Pleistocene deposits

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

The core resource for the Palaeolithic is, therefore, all Pleistocene deposits. All of these are not necessarily significant, but all have the potential to be so. The types of deposit likely to be present in the Bristol region are summarised in Table 9. It is then necessary to consider, for any preserved patch of Pleistocene deposits, what Palaeolithic remains are present, and what is the potential information available for addressing Palaeolithic research priorities.

6.2.2 Palaeolithic remains and relevant information

The most widely recognised type of Palaeolithic remains are lithic artefacts. Handaxes are the most commonly found and easily recognised type of lithic artefact, but the earliest lithic technology embraces simple core and flake strategies and attention should also be paid to their recognition. However, lithic artefacts are just one of a wide range of evidence that is relevant to Palaeolithic research. This can be divided into three main categories: human activity, biological/palaeoenvironmental evidence and intrinsic sedimentological data (Table 10).

Human activity

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

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

Finally, there is the question of the earliest evidence of fire. On the continent and the Middle East, there is reliable evidence for the controlled use of fire for at least the last 100,000 years, ie. coincident with the occupation of northwestern Europe by the Neanderthals in the last Ice Age. However there is little evidence of this period in Britain, and no evidence of the use of fire before the Upper Palaeolithic. Claims are regularly made for use of fire earlier than this but these are without exception highly problematic. There is no doubt that natural fires were a regular occurrence through the Pleistocene, probably often caused by lightning strikes. The evidence of these fires is preserved in deposits of the time, in the form of burnt out tree stumps, spreads of charcoal and then reworked charcoal fragments that enter fluvial sedimentary systems. There has never been any evidence that reliably links any of this evidence, which regularly crops up on Palaeolithic sites, with human control of fire. Nonetheless, one should still recognise the possibility of more satisfactory evidence occurring at some point.

Biological/palaeo-environmental

One of the key categories of evidence for researching the Palaeolithic is biological/palaeo-environmental evidence. This is often large mammalian, small vertebrate or molluscan, but there is a wide range of other evidence that may be present (Table 10). This may be present at the same sites as artefactual remains, either in the same horizon or in stratigraphically related horizons. Or it may be present at sites where direct evidence is absent. In all these cases, the evidence has the same value and potential for Palaeolithic research, and should be recognised as significant. It can help in dating the deposit, and providing information of the local climate and environment at any particular time. Such information is essential if we are to carry out core research objectives such as dating sites, constructing a framework of cultural change and development, and understanding human activity and behaviour in its environmental and landscape context

Intrinsic sedimentological

Besides artefactual and environmental evidence, there is a range of other information associated with Pleistocene deposits that is relevant to Palaeolithic research objectives (Table 10). Information on their height above OD, their three-dimensional geometry, their position in the landscape and their sedimentary characteristics are all integral to interpreting their origin and date. Other factors such as the range of lithologies represented in the solid clasts, heavy mineral signatures and the occurrence of sand bodies suitable for OSL dating also have a role to play.

6.2.3 Disturbance and integrity

The burial and preservation of Palaeolithic remains is dependent upon where they have been deposited in the landscape, and which depositional processes have acted upon that part of the landscape. A wide range of processes are possible (Table 9), ranging from total dispersal by glacial action, solifluction or high energy fluvial torrents, to gentle burial by fine-grained aeolian, colluvial or alluvial processes, leaving evidence essentially undisturbed. Thus Palaeolithic remains, and lithic artefacts in particular which are relatively indestructible, have the potential to be preserved and recognisable, although usually showing signs of wear-and-tear, after substantial transport and disturbance. It is also possible that they may have been acted upon by multiple events, tens of thousands of years apart, as the landscape was continually resculpted through the climatic upheavals of the Pleistocene.

Consequently, understanding and interpretation of Palaeolithic remains is heavily dependent upon interpretation of the depositional and post-depositional processes that have affected them between their original deposition and their present context. As has been discussed in Section 5.1.2, evidence from both disturbed and undisturbed sites has a role to play in addressing Palaeolithic research priorities. What is most important is, therefore, not necessarily to identify a lack of disturbance, but to be confident about the degree of disturbance. This knowledge then underpins the spatial/chronological scale at which the evidence can be interpreted.

The range of Pleistocene depositional groups that are likely to be present in the Bristol region are summarised in Table 9, which also shows how disturbed any contained Palaeolithic remains are likely to be. This table demonstrates that many types of deposit have the potential to contain material of various degrees of spatial disturbance and chronological integrity. Assessing the type/s of Pleistocene deposit present, spatial disturbance and chronological integrity must be a key aspect of field evaluation, and one usually requiring specialist input.

6.2.4 Significance

English Heritage (1998) have published eleven criteria, any of which are deemed sufficient to identify a Palaeolithic site as of national importance (Table 11).

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

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

Finally, significant knowledge — that contributes to both national and regional research priorities — can also be acquired, not only from single sites with high quality evidence, but also from repeated observations at sites with evidence that is in itself of little apparent potential. The incremental accumulation of information from, for instance, a single mapped fluvial terrace can lead, over time, to a reliable picture of the density, distribution and nature of Palaeolithic remains. This can not be achieved other than through a coherent strategy of investigation that recognises this from the outset, and sets in place a standardised methodology that leads to systematic small-scale data gathering exercises at every impact occasion. A single event may involve excavation of a couple of test pits, sieving of eight 100 litre gravel samples and recovery of no evidence (Sections 6.3.5 and 6.3.6). This in itself fails to provide sufficient information to make a more general summary of the Palaeolithic remains in a body of gravel that may cover several hundred hectares. However, once this exercise has been repeated a hundred times over a period of maybe 20 years, *then* we will actually begin to learn something that can make a major contribution to core national and regional research objectives.

An important corollary is to recognise the significance of finding no Palaeolithic artefacts. When investigating patterns of human colonisation and settlement, identifying the absence of human presence at particular periods is just as important as identifying presence. Thus, as discussed above (Section 6.2), it is necessary to focus upon Pleistocene deposits as the core resource for Palaeolithic investigation, and then one relevant fact for a body of sediment is the presence/prevalence of artefacts — a result of “no artefacts” would be just as significant an observation as “many pointed handaxes”. The significance and potential of this data is tied in with the degree of spatial disturbance and chronological integrity of a deposit, which is why assessing this is such an important aspect of evaluation (Section 6.2.3).

6.3 Proposals for action

6.3.1 Strategy

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

6.3.2 Curatorial awareness

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

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

6.3.3 Baseline resource characterisation

The core resource for Palaeolithic archaeology is Pleistocene deposits. An essential tool in managing the impact of development upon the Palaeolithic heritage is the best possible understanding of the nature and distribution of this resource and of Palaeolithic remains already known to have been recovered. Sites and Monuments Records contain a certain amount of information of this type, and, for Palaeolithic remains, the *Southern Rivers Palaeolithic Project* has provided a useful survey of known find-spots. However this information still needs specialist input, and Pleistocene geological knowledge, to make maximum use of it to consider the potential of specific development plans to impact upon Palaeolithic remains. A particular problem is the coarse nature of Pleistocene geological mapping, with facies variations within major formations unmapped, and with many potentially significant geological outcrops unmapped. Furthermore, a great deal of significant geological information recovered from geo-technical ground investigations remains unassimilated into models of Pleistocene lithostratigraphy.

A useful step to address this problem would be development of a GIS model for the Pleistocene geology and Palaeolithic archaeology of the region. This should incorporate all available lithostratigraphic data and find-spot data, and highlight areas of predicted sediment preservation, and hence possible Palaeolithic significance. The model should be constructed so, like SMR records, it can grow organically as new data becomes available. Steps should be taken to create a structure of information flow that ensures that relevant Pleistocene lithostratigraphic information gathered by the myriad geo-technical investigations carried out in advance of development feed into this model.

6.3.4 Desk-based assessment

From previous experience outside the Bristol region, we are not confident that DBAs always correctly identify the potential Palaeolithic impact of developments or infrastructural projects. The scope and accuracy of DBAs are clearly heavily dependent upon initial baseline resource characterisation (Section 6.3.3). They are also affected by (a) access and availability of the best possible information and (b) use made of this information.

A GIS model could be developed in the future to integrate information about the Palaeolithic resource. In the present, the *Southern Rivers Palaeolithic Project* report and British Geological Survey mapping are the two key sources of information. To be most effective, there has to be full access to, or obligatory consultation of, this baseline information by all who are involved in preparing initial DBAs, and not just local authority curators.

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

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

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

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

6.3.5 Evaluation

It is necessary, in areas where there is potential for Pleistocene deposits and Palaeolithic remains, that special methods are applied to investigating their presence and potential. Identification of such areas depends in the first place on the quality of the baseline resource characterisation and the DBA. In these areas deeper test pits need to be dug. A detailed proforma method statement for Palaeolithic evaluation test pits is given in Appendix 1. A key aspect of this is the application of standardised sedimentological recording (Appendix 2) and volume controlled sieving.

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

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

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

6.3.6 Mitigation

If Palaeolithic remains are present, it is advisable to take specialist advice on their potential and suitable methods for further study or mitigation of any impact. As discussed above (Section 6.2.4) significant contributions to Palaeolithic knowledge can be gained from both one-off studies of single high quality sites and the incremental long term accumulation of relevant data from sites that in themselves are of very little significance, and possibly lacking in evident remains altogether. The best example of this is fluvial terrace deposits. Although it is in fact uncertain (and a subject of current research) how long a time period is represented by their deposition, material within such deposits is generally thought to be datable to the level of the marine isotope stage, ie. a period of *circa* 30,000 years. Far from being the disaster that some used to the more precise dating of later periods might think, these deposits thus represent relatively tightly defined time capsules within a period of 600,000 or 700,000 years of possible Palaeolithic occupation. There is a lot of knowledge to be gained from large-scale and long term sampling of such terrace deposits, leading to a full picture of the nature and prevalence of any contained Palaeolithic archaeological remains. This can easily be achieved through accumulated evaluation and mitigation test pit investigations. Urbanised regions, where they overlie Pleistocene terraces, are particularly suitable for development of such a programme, since there is likely to be regular development scattered over the terrace, and works such as foundations or services trenches will provide regular opportunities for sampling.

6.3.7 Complementary projects

A number of projects have been identified (Section 5.3) that could usefully be taken forward to improve the ability of regional curators to manage the Palaeolithic resource and at the same time increase our understanding of the Palaeolithic. Two of these seem particularly timely:

- Baseline resource characterisation, Pleistocene mapping and chronostratigraphic framework

- Predictive GIS model of Palaeolithic/Pleistocene resource

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TABLES

Table 1. Quaternary epochs and the Marine Isotope Stage framework

Epoch	*Age (Years BP)*	*MI Stage*	*Traditional Stage (Britain)*	*Climate*
Holocene	Present-10,000	1	Flandrian	Warm – full interglacial.
Late Pleistocene	25,000	2	Devensian	Mainly cold; coldest in MI Stage 2 when Britain depopulated and maximum advance of Devensian ice sheets; occasional short-lived periods of relative warmth ("interstadials"), and more prolonged warmth in MI Stage 3.
	50,000	3		
	70,000	4		
	110,000	5a-d		
	125,000	5e	Ipswichian	Warm – full interglacial.
Middle Pleistocene	190,000	6	Wolstonian complex	Alternating periods of cold and warmth; it has recently been recognised that this period includes more than one glacial–interglacial cycle; changes in faunal evolution and assemblage associations through the period help distinguish its different stages.
	240,000	7		
	300,000	8		
	340,000	9		
	380,000	10		
	425,000	11	Hoxnian	Warm – full interglacial.
	480,000	12	Anglian	Cold – maximum extent southward of glacial ice in Britain; may incorporate interstadials that have been confused with Cromerian complex interglacials.
	620,000	13-16	Cromerian complex and Beestonian glaciation	Cycles of cold and warmth; still poorly understood due to obliteration of sediments by subsequent events.
	780,000	17-19		
Early Pleistocene	1,800,000	20-64		Cycles of cool and warm, but generally not sufficiently cold for glaciation in Britain.

Table 2. Palaeolithic period in Britain

Archaeological Period	*Human Species*	*Lithic artefacts and other cultural material*	*MI Stage*	*Date (years BP)*	*Geological period*
Upper Palaeolithic	Anatomically modern *Homo sapiens sapiens*	Dominance of blade technology and standardised tools made on blade blanks Development of personal adornment, cave art, bone/antler points and needles	2–3	10,000-35,000	Late Pleistocene
Middle Palaeolithic	Early pre-Neanderthals initially, evolving into *Homo neanderthalensis* after MI Stage 5e	Continuation of handaxes, but growth of more standardised flake and blade production techniques (Levalloisian and Mousterian) Development of a wider range of more standardised flake-tools, and towards the end, the development of *bout coupé* handaxes	3–5e	35,000–125,000	
			5e–8	125,000–240,000	Middle Pleistocene (later part of)
Lower Palaeolithic	Archaic Homo – *Homo* cf *heidelbergensis* initially, evolving towards *Homo neanderthalensis*	Handaxe dominated, unstandardised flake core production techniques and simple unstandardised flake-tools Occasional industries without handaxes, based on large flake blanks made by unstandardised core-reduction techniques	8–13	240,000–500,000	
	?? *Homo erectus/ergaster*	Very simple core and flake industries – one site on Norfolk coast at Pakefield	14–19	500,000–780,000	Middle Pleistocene (early part of)

Table 3. Identified Pleistocene deposits in the Bristol Region

West of Avon Gorge[1]	*Central Bristol*	*East of Hanham Gorge*[2]	*Avon Valley Formation*[3]
10-foot terrace 50-foot terrace* 100-foot terrace*	Floodplain terrace	Floodplain (No.1) terrace Saltford (No.2) terrace Twerton (No.3) terrace	Bathampton Member Stidham Member Ham Green Member

[1] Based on Kellaway and Welch 1993

[2] Based on Chandler et al. 1976

[3] Based on Campbell et al. 1999

* see Figure 6

Table 4. Stratigraphical correlation of deposits in the Bristol region

** as argued by Hunt 1998d/1998g. However David Keen, pers. comm. (October 2004) has suggested on the basis of the molluscan faunas that these sites are more likely to date to the later parts of the Middle Pleistocene.*

MI Stage	*Age (ka BP)*	*Avon (fluvial)*	*Avon (glacial)*	*North-west Somerset*	
1	10				Holocene
2	24				
3	59				Devensian
4	71				
5a–d	116				
5e	128	Bathampton palaeosol		Middle Hope (raised beach)	Ipswichian
6	186	Bathampton Member Newton St. Loe			
7	245			Kenn Church (sands and gravels) Weston-in-Gordano (sands and silts)	
8	303	Stidham Member			
9	339				
10					
11	423				Hoxnian
12	478	Ham Green Member			Anglian
13					Cromerian
14					
15				*? Kenn Pier (estuarine sediments** *? Yew Tree Farm (channel fill)**	
16			Bath University (glacigenic sediments)	*? Kenn Pier diamictons** *? Yew Tree Farm (glacigenic gravels)* *Nightingale Valley (glacigenic sediments)**	

Table 5. Key Pleistocene sites in the study area. * *Elephas primigenius* now known as *Mammuthus primigenius* (Mammoth)

Site	Grid Reference	Stratigraphy	Stratigraphic Association	Fauna	Age Ascription	References
2 – Upper Avon, Malmesbury to Bradford-on-Avon						
Pyramid Sand and Gravel Co. Pit, Sutton Benger	ST 9550 7830	Gravel	Terrace 1	Horse, wolf and elephant		Arkell 1944 Roe 1968 Anon 1980
Melksham		Gravel		Bison remains?		Davies and Fry 1929
3 – Upper Middle Avon, Bradford-on-Avon to Bathampton						
Freshford		Solifluction deposits over thin gravel		*Elephas primigenius* tusk and teeth*, *Rhinoceros tichorinus*, *Equus caballus*, *Bison europoeus*, *Cervus tarandus*, *Ovibos moschatus*		Moore 1870 Woodward 1876 Winwood 1889a
Horsecombe Vale	ST 7530 6200	Solifluction deposits			Late MIS 2	Chandler et al. 1976
4 – Bathampton to Keynsham						
Hampton Rocks Cutting	ST 7780 6670	Solifluction deposits and palaeosol over thin gravel body	Terrace 2 (Lower Terrace)	Fragmentary mammal remains, cold stage mollusc fauna	MIS 6 with soil in MIS 5e	Hunt 1998d
Larkhall, Bath	c.ST 7630 6640	Solifluction deposits over gravel	Terrace 2	Molluscs, *Elephas primigenius** and *Elephas antiquus* tusk and teeth, *Rhinoceros tichorinus*, reindeer, bison, horse		Moore 1870 Winwood 1889a Palmer 1931
South Royal Crescent, Bath	c.ST 7450 6540	Solifluction deposits over gravel		Fragments of mammal remains		Woodward 1876

Newton St. Loe	ST 7130 6555	Thin gravel	Chalky Head overlying Terrace 2?	Elephant (*Elephas primigenius*[*] tusk and teeth) and horse remains	MIS 6	Owen 1846 Dawkins 1866 Moore 1870 Woodward 1876 Winwood 1889 Hunt 1998b
Lambridge	c.ST 7660 6670	Gravel	Terrace 2	Elephant tusk, *Rhinoceros tichorinus*		Woodward 1876 Winwood 1889a
Moorfield Cutting, Twerton	c.ST 7370 6410	Gravel	Terrace 3	*Elephas primigenius*[*] molar, *Bos* sp., deer horn. Molluscs also present		Winwood 1875
Victoria Gravel Pit, Twerton	c.ST 7365 6410	Interbedded sands and gravels	Terrace 3	*Elephas primigenius*[*] bones and tusks, *Elephas antiquus*, *Rhinoceros tichorinus* molar, *Bos* sp. Teeth, horse bones, pig and deer		Winwood 1889b Palmer 1931
Bellott Road Pit, Twerton	c.ST 7330 6470	Solifluction deposits overlying gravel	Terrace 2	Mammalian remains noted		Palmer 1931
Locksbrook, Bath	c.ST 7300 6500			Lion, Irish deer, reindeer, *Bos primigenius*, bison, horse, woolly rhinoceros, mammoth		Palmer 1931
Hartlip, Bath				Lion, horse, woolly rhinoceros and mammoth		Davies and Fry 1929
6 – Shirehampton, Clifton–Severn						
Ham Green	ST 5390 7680	Solifluction deposits over gravel	Terrace 2		MIS 10-12	Davies and Fry 1929 Hunt 1998a
Stidham (or Steedham Farm)	ST 6740 6840	Silt over gravel	Terrace 2	Mammoth remains	MIS 8	Moore 1870 Woodward 1876 Winwood 1889 Davies and Fry 1939 Palmer 1931 Hunt 1998c

Shirehampton Cemetery	ST 5290 7690	Gravel beneath clay	Terrace 2			Davies and Fry 1929
West Camp, High Street/The Ridge, Shirehampton	c.ST 5300 7700	Bedded sands and gravels	Terrace 2			ApSimon and Boon 1959
Shirehampton Health Centre	ST 5310 7690	Bedded gravels beneath solifluction deposits	Terrace 2			Wessex Archaeology 2004
Twyford House, Shirehampton	ST 5290 7700	Bedded sands and gravels beneath solifluction deposits	Terrace 2	Molluscs		Bates *et al*. in prep.

Table 6. Palaeolithic finds by river stretch and depositional context

Avon area	*Deposit type*	*Sites*	*H-A*	*F-T*	*C*	*Deb*	*Lev*	*Notes*
1. Headwaters	Residual?	1	1	-	-	-	-	
2. Upper Avon	Fluvial T1	1	1	-	-	-	-	Fluvial deposits with faunal remains
	Residual	1	1	-	-	-	-	
3. Upper Middle Avon	Residual?	1	1	-	-	-	-	
4. Bath – Keynsham	Residual?	1	2	-	-	-	-	
	Fluvial T?	1	6	-	-	-	-	
5. Bristol	Coll./sol.	4	12	2	-	-	-	
	Residual	1	1	-	-	-	-	
6. Shirehampton	Fluvial T2	8	238	42	49	301	5	Almost all Chapel Pill Farm Two sites with Levallois – one of them Chapel Pill Farm, the other Shirehampton Cemetery
	Fluvial T1	3	2	1	-	-	-	
	Fluvial T?	2	8	1	1	-	-	Uncertain which terrace, probably a mixture of T2 and T1
	Coll./sol.	8	9	3	2	5	-	Probably mostly derived from T2 and T1
7. Severn	Fluvial T1	2	9	-	-	-	-	
	Coll./sol.	1	-	-	-	1	-	Probably derived from T1
	Burtle Beds	1	1	-	-	-	-	Possibly equivalent to T1
	Residual?	3	2	-	1	-	-	Overlying Portishead Beds – possibly remnant of Severn terrace, colluvial/solifluction deposits derived from degraded Severn terrace or residual Plateau Gravel deposit capping high ground
Total		**39**	**294**	**49**	**53**	**307**	**5**	Majority of material from Chapel Pill Farm Levallois sites are only in T2, Shirehampton

Table 7. Bristol region key research themes/priorities

Number	*Theme*
R1	Quaternary framework
R2	Cultural framework and settlement history
R3	Landscape context and settlement distribution
R4	Raw material and mobility
R5	Mammalian and biological evidence
R6	Undisturbed living surfaces

Table 8. Landscape zone research objectives

Landscape zone	*Research objectives*
Headwaters, north of Malmesbury	• Identification of any terrace remnants and attribution to Thames, Severn or Bristol systems • Identification of undisturbed material in hilltop residual deposits
Upper Avon, from Malmesbury to Bradford-on-Avon	• Investigation of Pyramid Sand and Gravel Pit at Sutton Benger • Investigation of major spreads of terrace deposits between Lacock, Melksham and Trowbridge • Investigation of major spreads of Head deposit northwest of Wiltshire Downs
Upper Middle Avon, Bradford-on-Avon to Bathampton	• Investigation of material in residue Plateau Gravel sites such as Farleigh Down
Bathampton–Keynsham (entrance of Hanham Gorge)	• Investigation of terrace deposits at Manor Farm, Kelston and large patch on left bank, opposite Bitton
Bristol, Keynsham to Clifton	• Investigation of spreads mapped as Head on Pennant Sandstone above left bank of Hanham Gorge
Shirehampton, Clifton to Severn	• Investigation at Chapel Pill Farm – nature of Pleistocene deposits, context of artefacts and provenance of collection
Severn, Avonmouth to Portishead	• Investigation of Pleistocene deposits at Portishead Down – residual Plateau Gravel, High Terrace, other terrace remnants • Investigation of Sheepway terrace remnant – whether Severn or Avon, and prevalence/condition/derivational history of any archaeological remains contained • Investigation of Burtle Beds

Table 9. Classes of Pleistocene deposit

General class	*Context*	*Spatial disturbance* [1]	*Chronological integrity* [2]	*Prevalence/location in Bristol Avon*
Glacigenic	Tills	Major	Poor	Rare/western end of system
Fluvio-glacial	Outwash sands/gravels	Major	Poor	Rare/western end of system
Fluvial	Gravel	Minor to major	Moderate to poor	Intermittent throughout system
	Sands	Minimal to minor	High to moderate	Intermittent throughout system
	Alluvial floodplain	None to minor	High	Intermittent throughout system
Aeolian	Loess	None	High	None known
	Dunes	None to moderate	High to moderate	None known
Lacustrine	Clays, silts	None to minor	High	None known
	Peats	None to minor	High	None known
Coastal marine	Storm beach	None to moderate	Moderate to poor	Rare/western end of system
	Scree, rockfalls	None to moderate	Poor to high	Rare/western end of system
	Intertidal sands/silts	None to moderate	High	None known
Estuarine	Intertidal sands/silts	None to moderate	High	None known
	Peats	None to minor	High	None known
Colluvial	Solifluction gravels	Minor to major	Moderate to poor	Intermittent throughout system
	Slopewash	None to major	High to poor	Intermittent throughout system
Cave/rockshelter deposits	Occupational debris	None to minor	High	None known
	Scree, rockfalls	None to moderate	High to poor	None known
	Cave earth	None to minor	High to moderate	None known
	Mass-movement infill	Minor to major	Moderate to poor	None known
Residual deposits	Plateau gravels	None to minimal	Poor	Intermittent throughout eastern/central parts of system
	Clay-with-flints	None to minimal	Poor	None known
Buried land surfaces	Soils	None to minor	High	None known

[1] Five classes of spatial disturbance, in increasing order – None, minimal, minor, moderate, major

[2] Three classes of chronological integrity, in decreasing order – High, moderate, poor

Table 10. Palaeolithic remains and relevant information

Category	*Range*	*Examples/Comments*
Human activities/artefacts	Lithic artefacts	Flaked stone tools and debitage, percussors
	Wooden artefacts	Spears, tool-hafts
	Bone/antler artefacts	Percussors, handaxes (known from Italy from elephants bone)
	Cut-marked faunal remains	
	Decorated/carved objects	Generally Upper Palaeolithic, but not out of the question for Lower/Middle Palaeolithic
	Cave art	Upper Palaeolithic only
	Manuports	Unused raw material
	Features, structures	Hearths, stone pavements, pits
	Fire	Charcoal concentrations in association with hearths
Biological/palaeo-environmental	Large vertebrates	Mammals (rhino, elephant, lion, deer, horse, carnivores, etc., birds)
	Small vertebrates	Mammals (bats, mice, voles, lemmings etc.), fish, reptiles, birds, amphibians
	Plant macro-fossils	
	Pollen and diatoms	
	Molluscs	
	Insects	
	Ostracods and foraminifera	
Intrinsic sedimentological	3D location	Geometry, morphology, landscape context
	Sediment description	
	Sedimentary structures	Bedding, faulting, post-depositional distortion
	Sand bodies	Potential for OSL dating
	Clast lithology	
	Heavy mineral content	

Table 11. English Heritage criteria for Palaeolithic importance (adapted from English Heritage 1991; English Heritage/Prehistoric Society 1999)

Criterion	*Notes*
- Any human bone is present	The only Lower/Middle Palaeolithic remains from Britain are: - one partial skull (occipital region) from Swanscombe (Kent) - two incisors and a shin bone (two individuals) from Boxgrove (Sussex) - molar tooth from Pontnewydd (Wales)
- Palaeolithic remains in primary undisturbed context	There are about a dozen British sites with undisturbed Palaeolithic remains. Less than half have been both faunal and lithic remains, and have had areas of more than a few square metres excavated (cf. Wenban-Smith 2004a)
- Remains from a period or geographic area where evidence is rare or previously unknown	
- Organic artefacts	The only organic artefacts known form Britain from the Lower/Middle Palaeolithic are a wooden spear-point from Clacton and bone and antler percussors from Boxgrove
- Well-preserved associated biological/palaeo-environmental evidence	These are important on two counts: - They may provide direct behavioural/dietary information - They provide environmental/climatic/biostratigraphic data
- Evidence of lifestyle	Can include cut-marked faunal remains, particular topographic situation, artefacts when interpreted in light of their context/distribution
- Remains from different stratigraphic horizons	
- Artistic evidence	Can include decorated or carved objects and rock-art. Not presently known before the Upper Palaeolithic, although should not be ruled out as a possibility for earlier periods
- Evidence of hearths or structures	No evidence in Britain before the Upper Palaeolithic, but might be expected for the Middle Palaeolithic
- Site can be related to exploitation of a particular resource	For instance raw material source, cave/rock-shelter, lake
- Artefacts are abundant	No absolute guidelines on how abundance should be assessed. Needs to be considered together with level of investigation. If investigation is limited, even low numbers of artefacts may indicate abundance

FIGURES

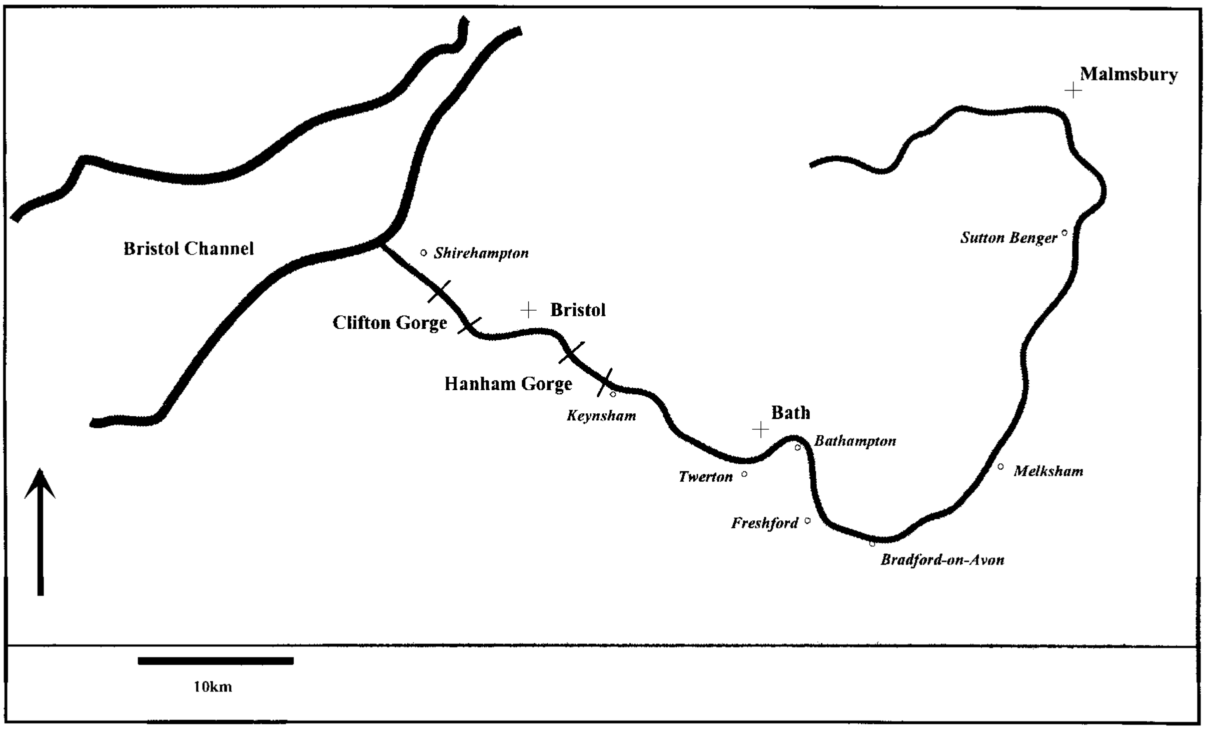


Figure 1. Site location plan showing main sites discussed in text.

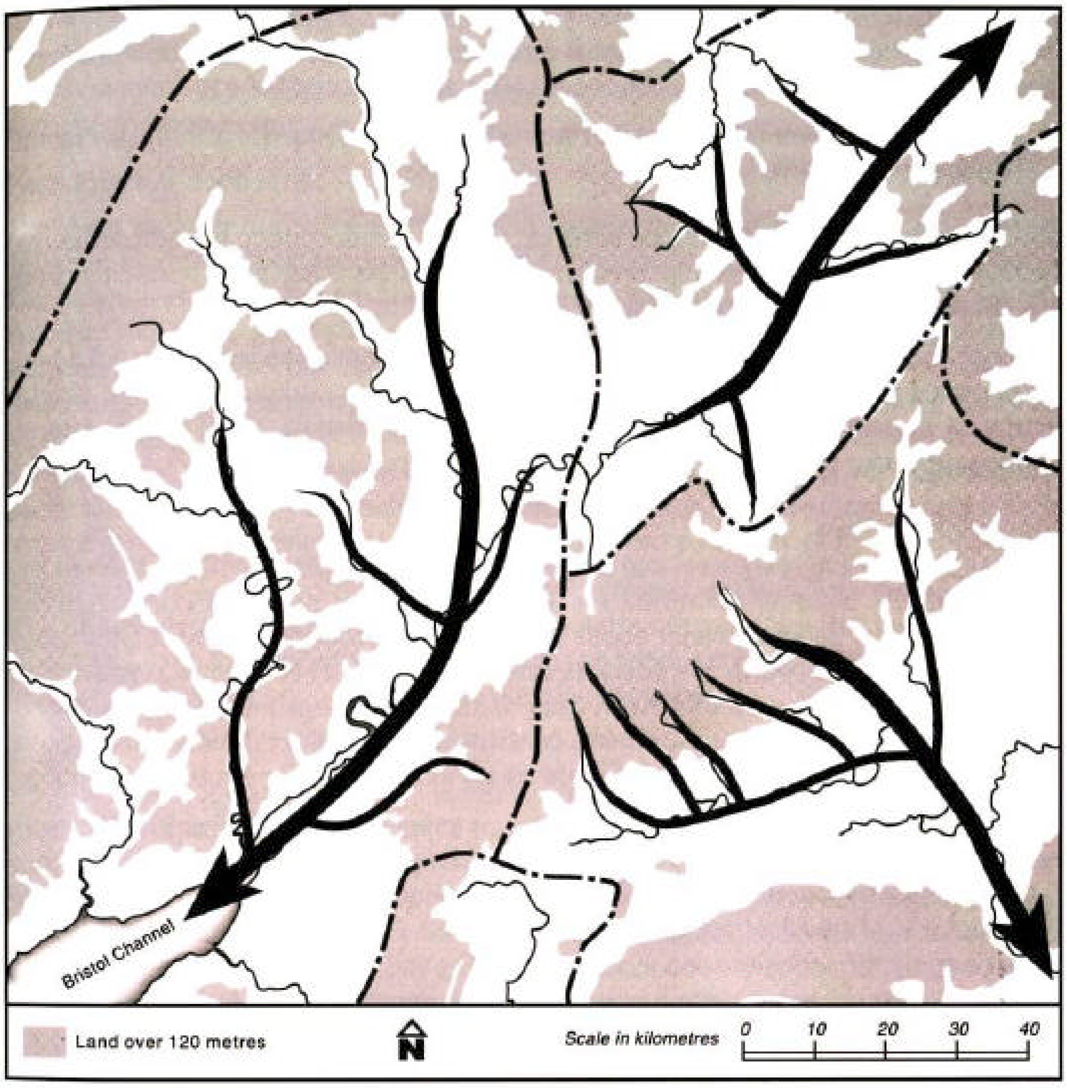


Figure 2. Reconstructed palaeogeography in the West Midlands and the Marches prior to the Anglian glaciation (based on Maddy, 1997).

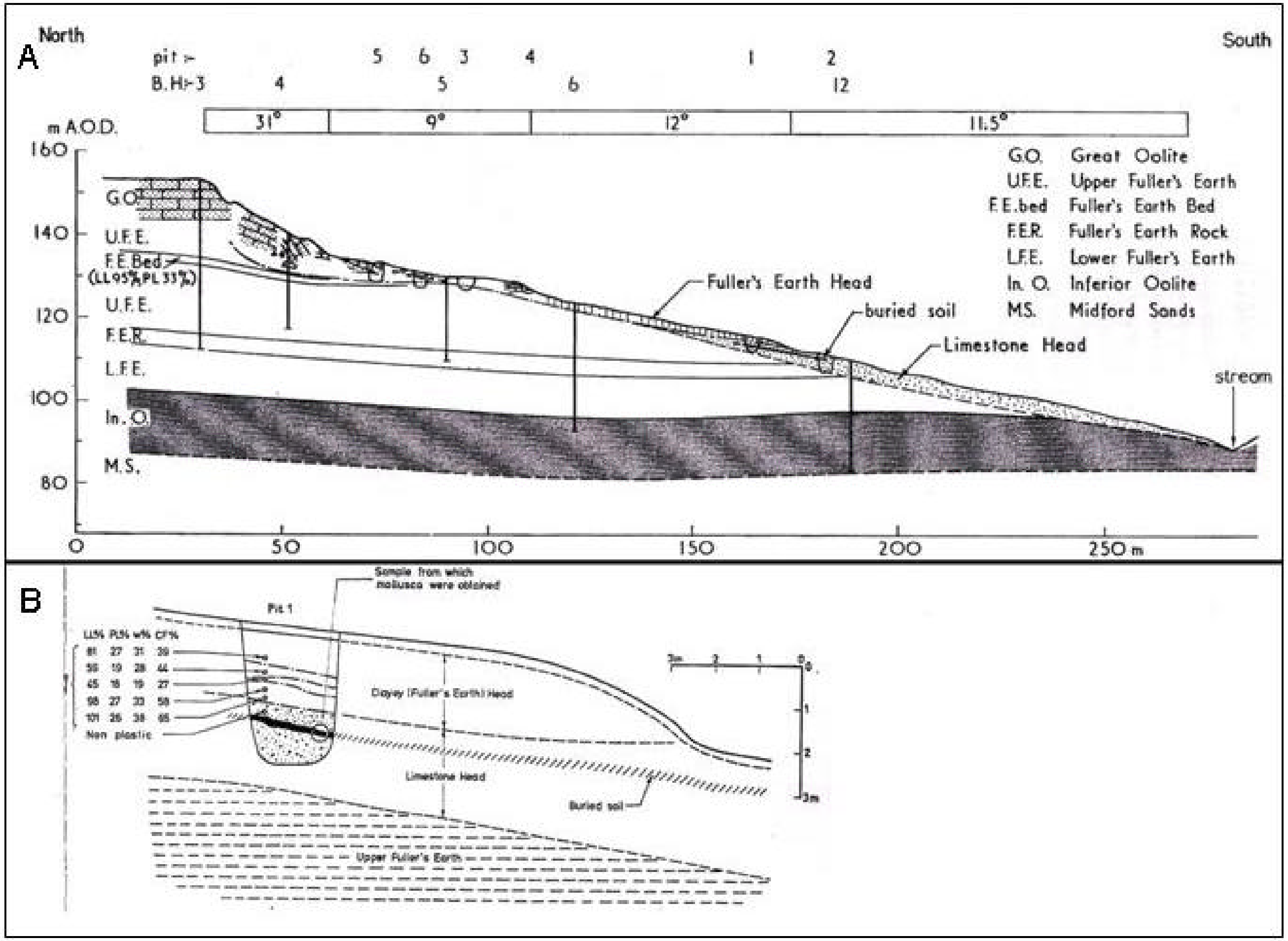


Figure 3. A: Horsecombe Vale transect showing main sediment units. B: detailed cross section of Pit 1 containing late glacial molluscs. Based on Chandler *et al.* 1976.

Figure 4. Main sites discussed in text within the Bath region.

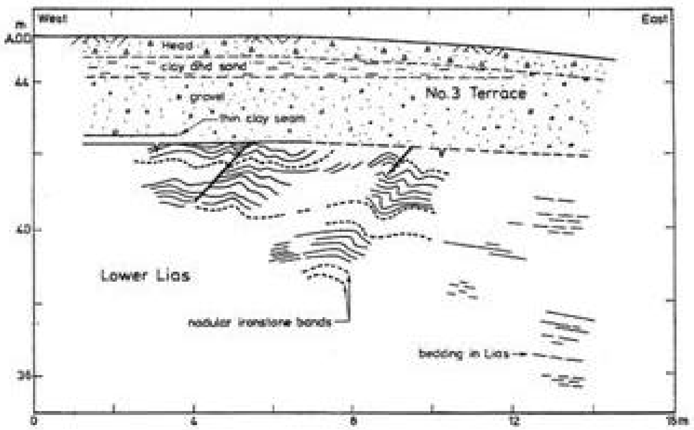
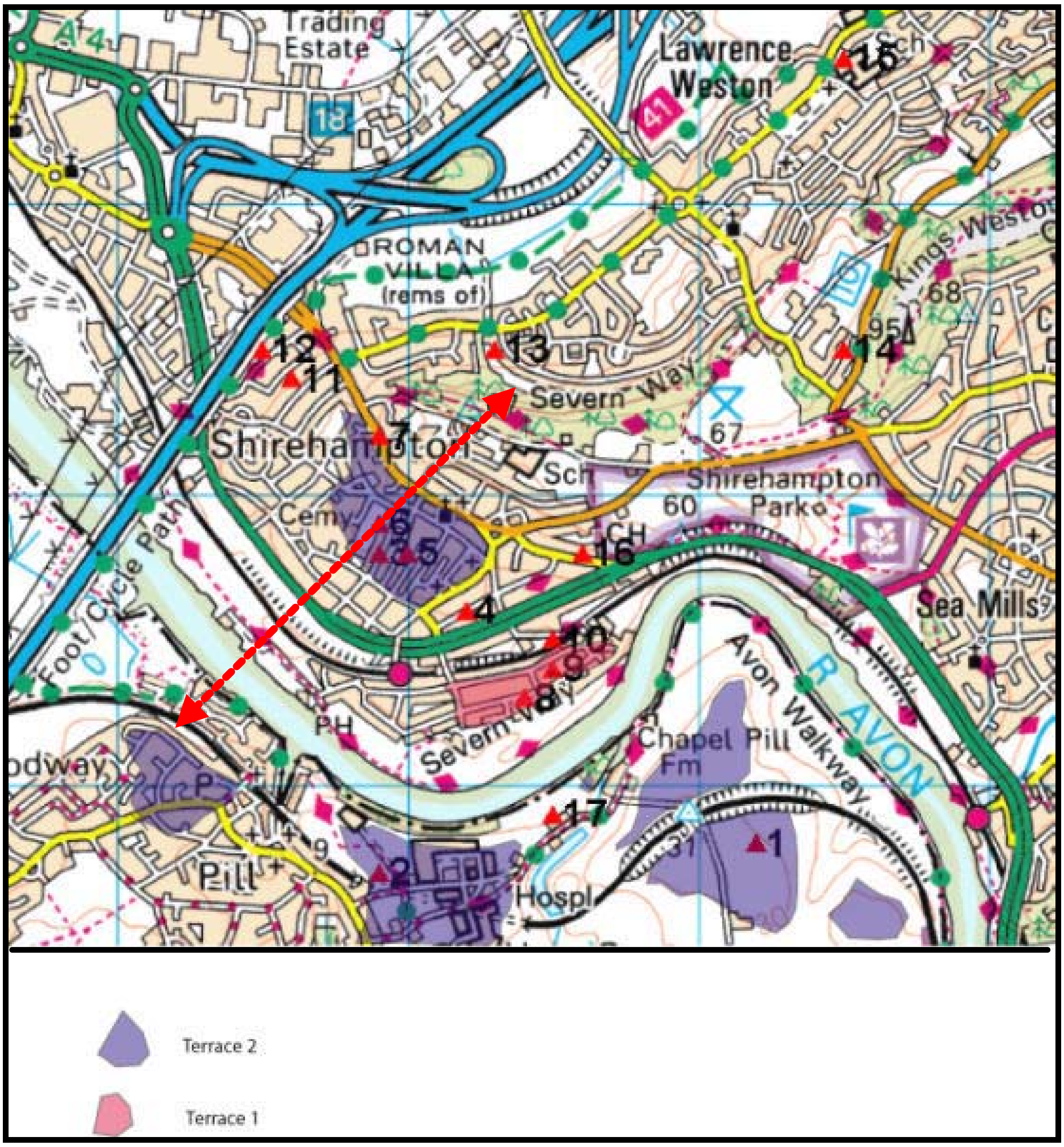


Figure 5. Section at Victoria Pit, Twerton, Bath. 1948. From Chandler *et al*. (1976).



1	Chapel Pill Farm	10	Portway
2	Ham Green Farm	11	Meadow Grove
3	Station Hill	12	West Town Lane
4	Station Road	13	Lawrence Weston
5	Walton Road	14	Kings Weston Park
6	Shirehampton Cemetery	15	Lawrence Weston
7	Old Barrow Hill	16	Grove Leaze
8	Myrtle Hall	17	Ham Green
9	Cotswold Estate		

Figure 6. Main sites discussed in text within the Shirehampton/Chapel Pill area. Red dotted line shows the approximate location of transverse section shown in Figure 5A.

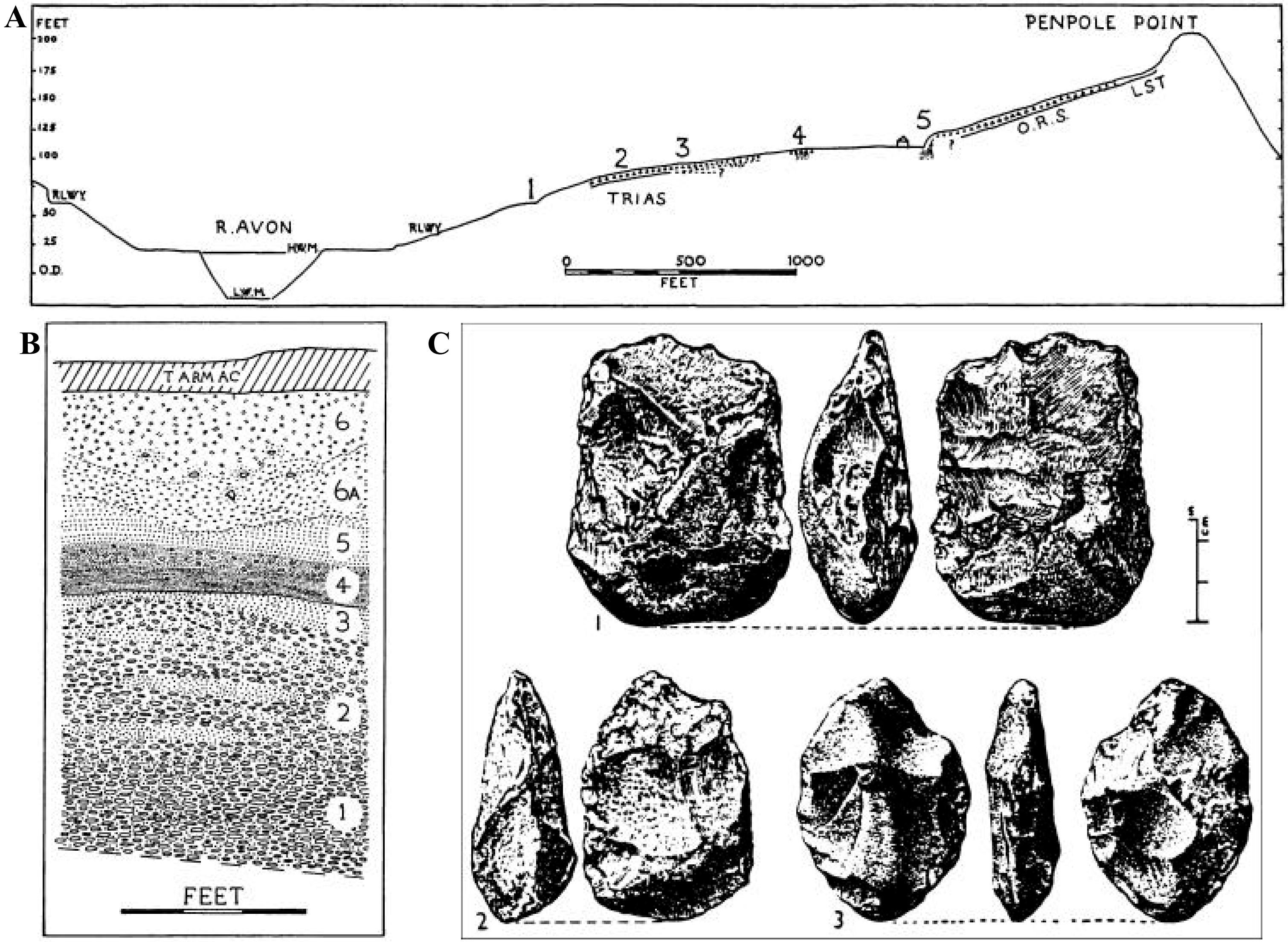


Figure 7. A: Transverse section of Avon Terrace 2 at Shirehampton (the 100-foot terrace) (from ApSimon and Boon, 1959). 1: Portway A4; 2: Burnham Road; 3: Walton Road and allotments; 4: Shirehampton Burial Ground; 5: High Street and West Camp Site. Stipples: stratified fluvial sediments; triangles: Head; ORS: Old Red Sandstone; LST: Limestone Shales; Trias: Keuper Marl etc. **B**: West Camp, Shirehampton sketch section from manhole cutting (ApSimon and Boon, 1959). **C**: Palaeolithic implements from the Shirehampton area (Lacaille, 1954). 1: Cleaver made on chert from Grove Leaze; 2: chert handaxe from Station Road; 3: chert handaxe in heavily rolled condition.

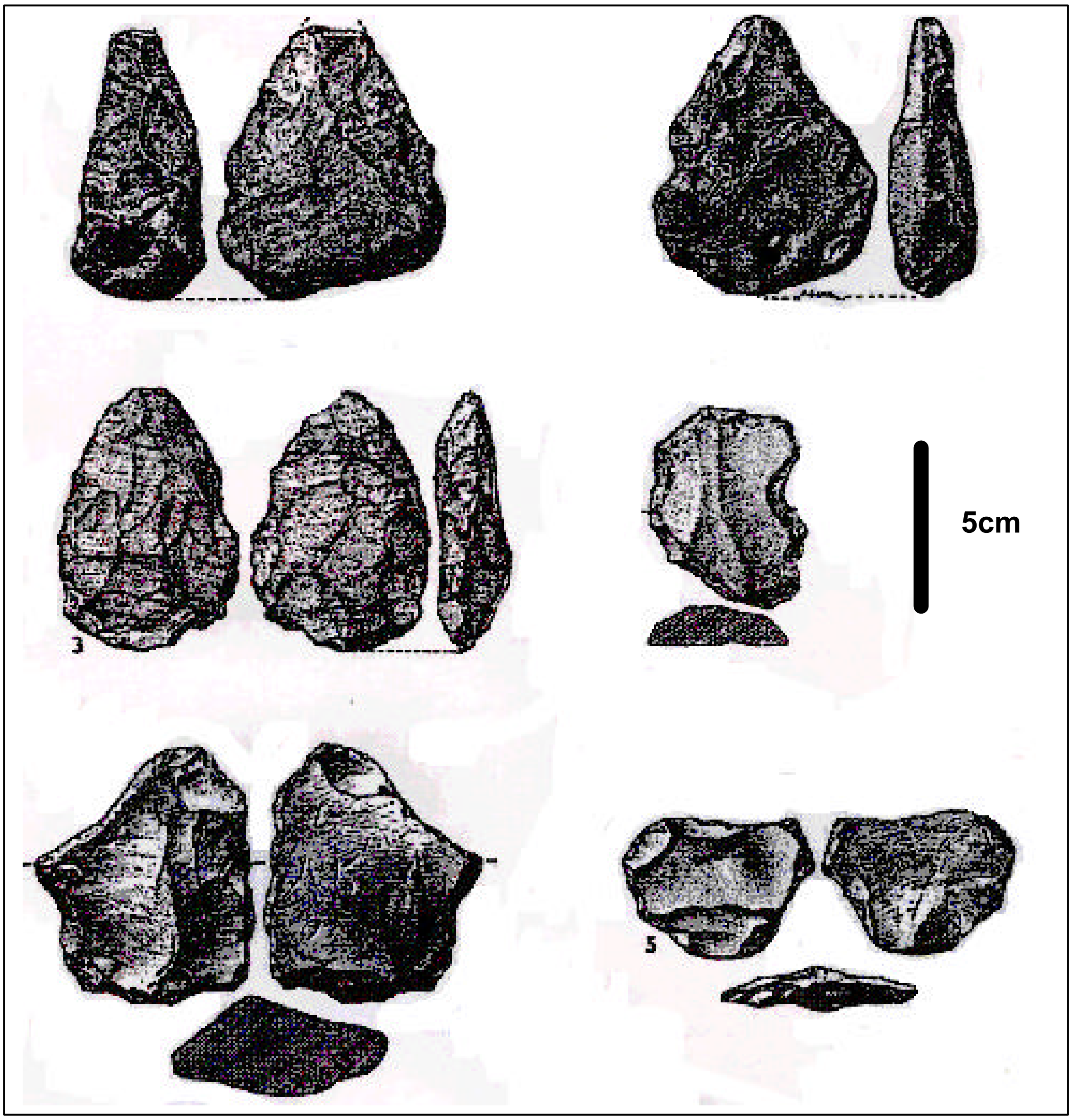


Figure 8. Palaeolithic artefacts from Chapel Pill Farm, Abbots Leigh (after Lacaille, 1954). 1: Triangular handaxe of brown sandstone; 2: chert handaxe; 3: ovate handaxe made of sandstone; 4 and 5 rolled flint flakes; 6: rolled chert flake.

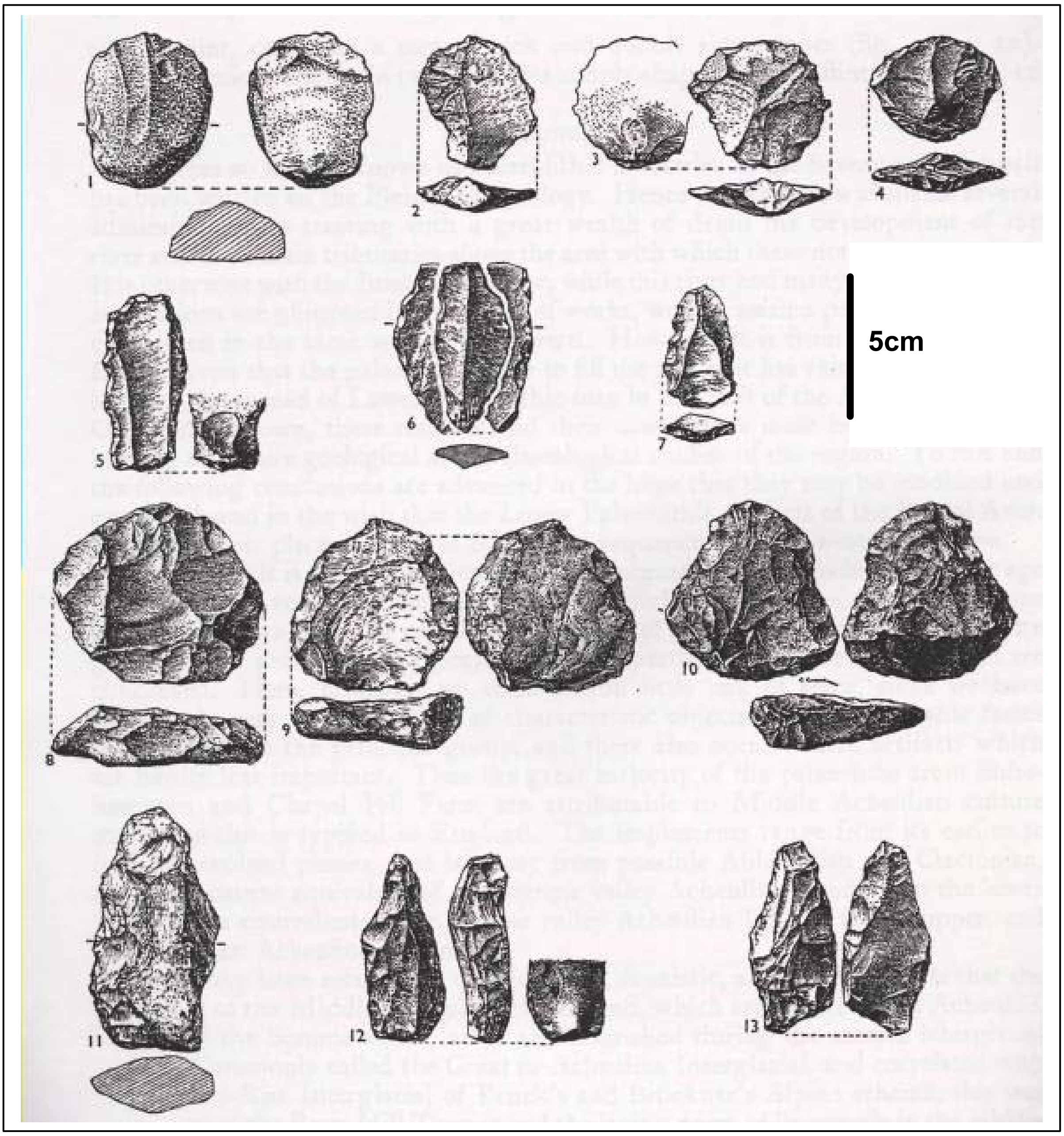


Figure 9. A collection of Palaeolithic artefacts from Chapel Pill Farm, Abbots Leigh (after Lacaille, 1954). 1-4, 6: flakes; 5 and 7: blades; 8 and 9: cores; 10: handaxe; 11-13: compound tools.

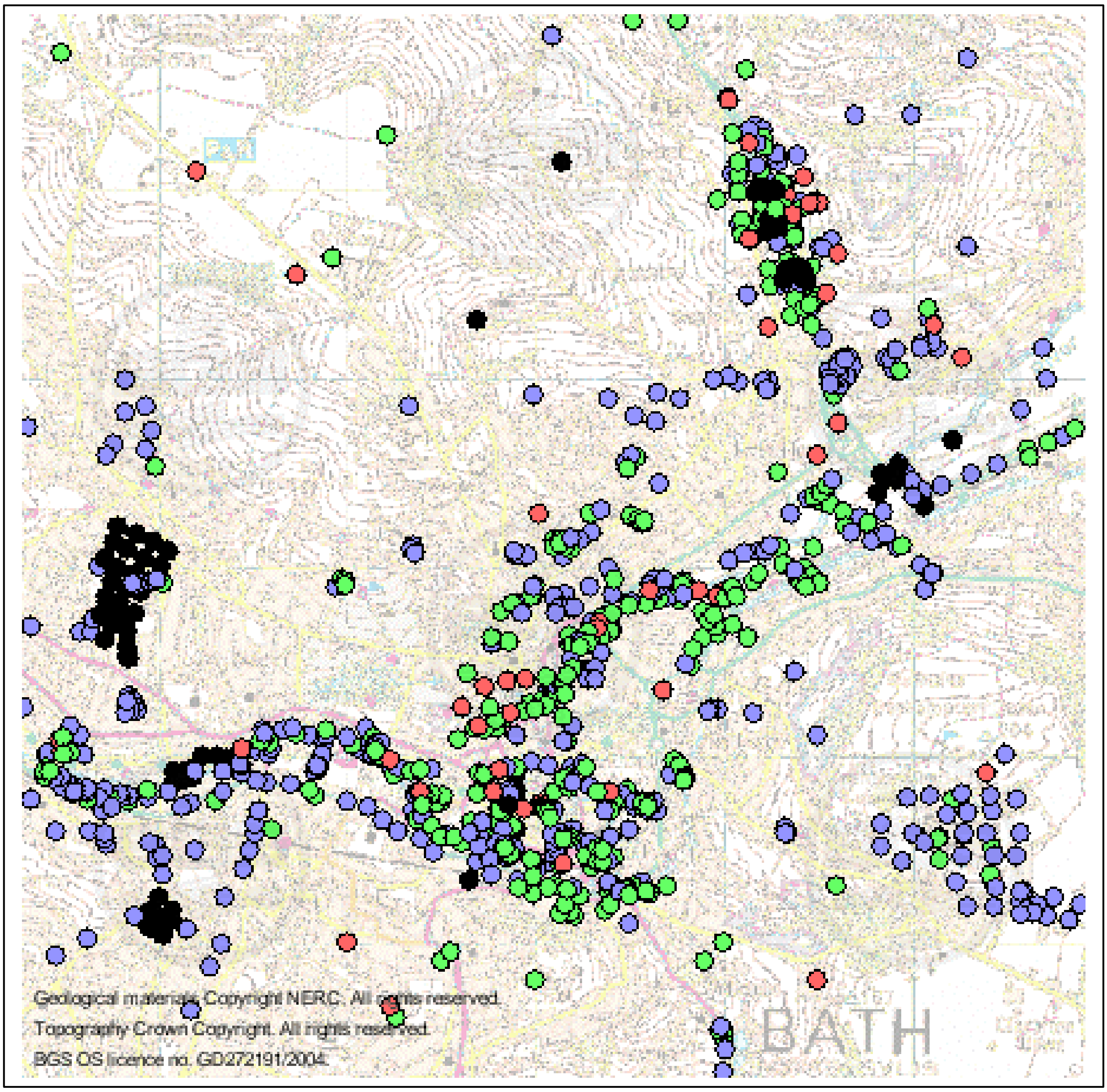


Figure 10. Distribution of borehole records held in British Geological Survey GeoIndex for the area of Bath town centre and environs.

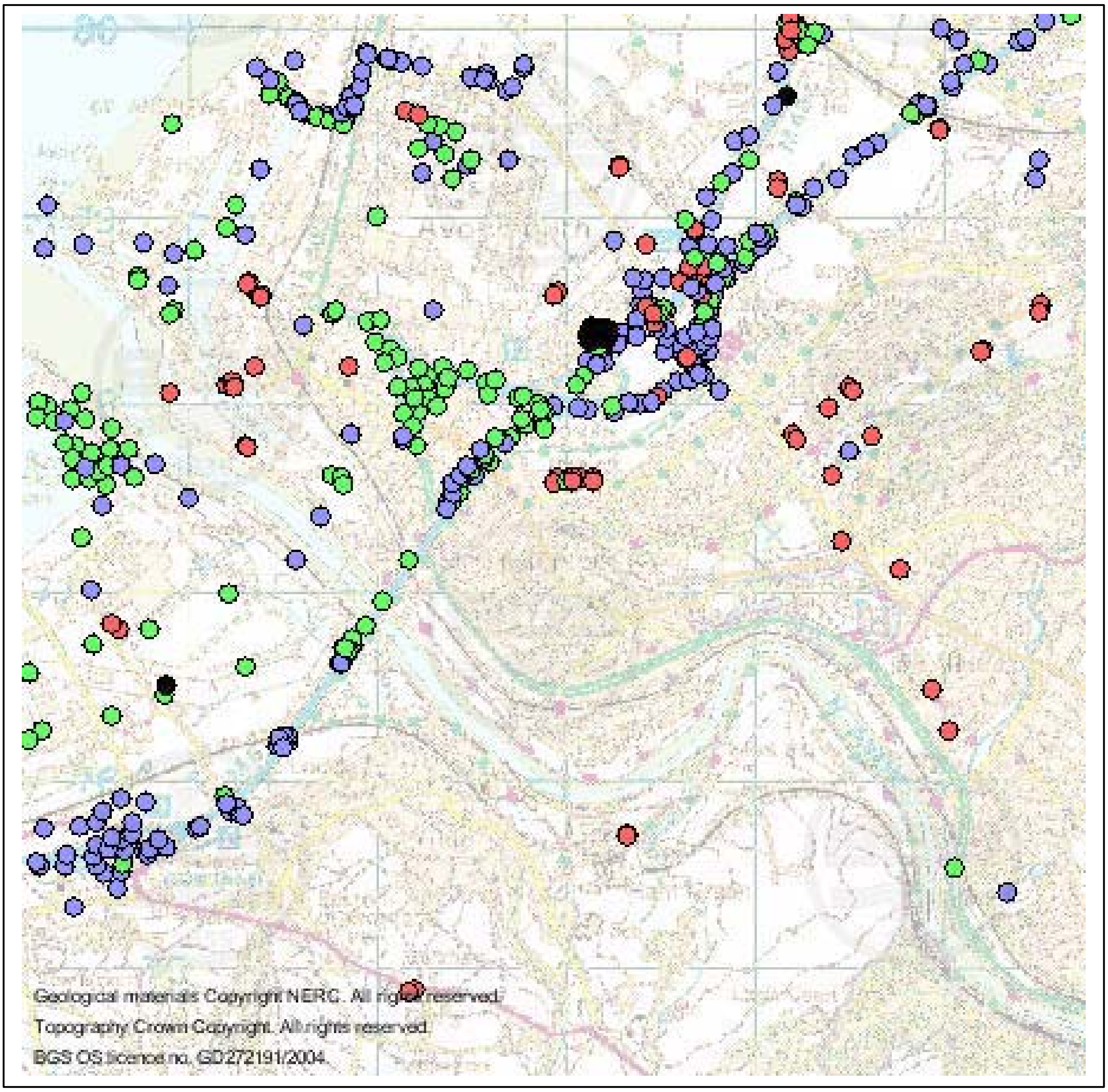


Figure 11. Distribution of borehole records held in British Geological Survey GeoIndex for the Shirehampton area.

PLATES

Plate 1. General view of Bath urban area

Plate 2. Unmapped terrace surface downstream

Plate 3. Former Somerset and Dorset Railway cutting (now a linear park) at Twerton. This cutting exposed gravels containing animal bones.

Plate 4. Possible former quarry site in Larkhall area, Bath (now a municipal park).

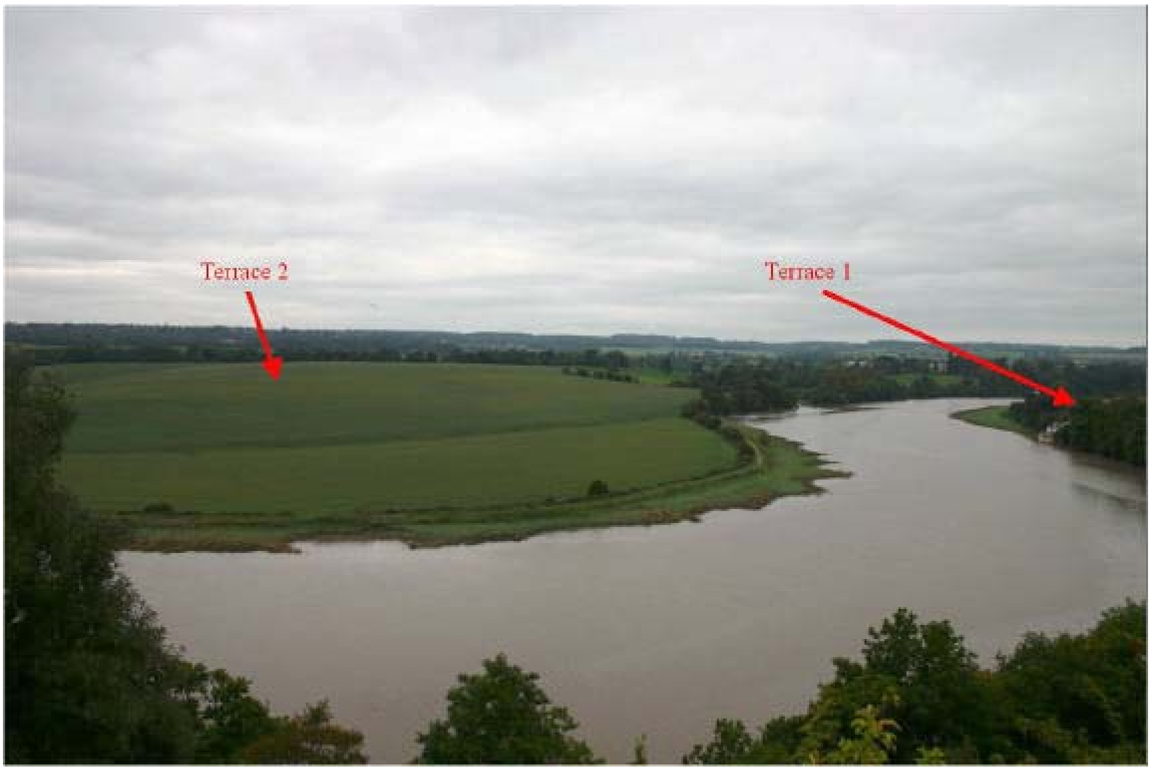


Plate 5. Chapel Pill Farm area and south side of the River Avon.

Plate 6. View towards Clifton Gorge showing area of Terrace 2 deposits on south side of the River Avon at Chapel Pill Farm.

Plate 7. Excavations at Twyford House, Shirehampton into Terrace 2 deposits. Note shoring methods and access to sequence at base of trench.

Plate 8. Detailed view of sediments beneath Terrace 2 in Shirehampton, showing basal gravely sands overlain by mollusc rich sands and towards the top, cold climate solifluction deposits.

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