Archaeological Field Unit

An Archaeological Evaluation of Land Adjacent to Duxford Mill, Duxford. Late Mesolithic / Early Neolithic Activity on the Floodplain of the River Cam

Duncan Schlee and Ben Robinson

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Cambridgeshire County Council

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SUMMARY

An evaluation excavation was undertaken by the Archaeological Field Unit of Cambridgeshire County Council (AFU) from 30/11/94 to 19/12/94 on behalf of the National Rivers Authority (NRA) prior to the construction of a proposed bypass relief channel on land adjacent to Duxford Mill, Cambridgeshire (TL 482 461). Seven trenches were machine excavated along the length of the proposed route. The trenches exposed deposits associated with the floodplain and a paleochannel of the River Cam. Beneath the ploughsoil were two alluvial deposits overlying a layer of peat through which a number of water channels were cut. While no distinct archaeological features were encountered, two compact chalky deposits may have been intentionally lain. In addition, an in-situ scatter of worked flint waste flakes dated to the Mesolithic or early Neolithic period was recovered from the top of the peat layer at the edge of the river channel. The peat layer was removed in places to ensure there were no archaeological features sealed beneath it. None were found.

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1. INTRODUCTION

This report presents a discussion of the results of an archaeological evaluation carried out by the Archaeological Field Unit of Cambridgeshire County Council (AFU) during December 1994 on land adjacent to Duxford Mill, Duxford, Cambridgeshire (Figure 1). The evaluation was carried out in advance of the National Rivers Authority's (NRA) construction of a 'bypass relief channel'. The relief channel has been designed to prevent flooding in the area by avoiding constrictions to the flow of the river associated with the mill. It is intended to be 7m in width, excavated to a depth of c 1.5 m and will follow a slightly meandering south-west to north-east course of c 430 m across a loop in the river Cam (Figure 1). The evaluation was undertaken in order to assess the impact of the scheme on the archaeology of the subject site, and was carried out at the request of the County Archaeological Office (CAO) and commissioned by the NRA.

The subject site lies on the alluviated 1st/2nd gravel terraces of the Cam's shallow valley, which snakes through the gently undulating (middle) chalk landscape of south Cambridgeshire. Duxford lies between two known branches of the prehistoric Icknield Way. The branch passing to the north crosses the Cam at Whittlesford Bridge, at which point a bridge has existed since at least the 13th century (Wright 1978, 202). The other passes through Ickleton to the south and is linked to the northern branch by a route preserved by Duxford's Moorfield Road and Chapel Street. The 'Walden Way' (as this route was once known to the south of Duxford) fords the Cam to the west of Hinxton. Taylor compares Duxford's south-west to north-east St Peter's Street with the medieval ford approaches of Whittlesford and Ickleton (Taylor 1973, 225-225). If this street was indeed a ford approach, and not merely a lane across the open fields west of Duxford, the projected line of St Peter's Street suggests that there was another ford just to the south of site. Duxford's name does not suggest an important early ford here (the 'ford' postfix is a late addition replacing 'worth' or 'enclosure': Reaney 1943, 92), though of this course does not rule out the possibility of either major or minor crossing points here.

There were three mills in Duxford in 1086 (Rumble 1981, 15,2; 20,1). A mill belonging to the Knights Templar is known to have stood by the Cam to the west of Temple Farm, close to the subject site, in the early 14th century (Wright 1978, 212). The existing Duxford Mill building, on the west side of the Cam, dates to the early 19th century and was joined later in the century by a bone mill (ibid, 212). The course of the Cam adjacent to the site as we see it today may, therefore, have a history of canalisation and diversion spanning the last millennium.

A moated site to the south-east of St Peter's church and another to the north-west of Duxford Mill suggest that the medieval settlement focus shrank back from the Cam during the post-medieval period. In 1823 the only houses on the east side of Duxford, towards the Cam, were Temple Farm and Duxford Mill (Wright 1978, 201). The east side of the Cam, on which the subject site falls, has remained free of development, except for the construction of the railway during the 19th century (which forms the eastern boundary of the subject site) and a gravel extraction pit just to the east of the track, depicted as overgrown in 1886 (County Records Office Ordnance Survey).

The subject site appears as sparsely wooded pasture in 1886 marked 'liable to flood' (ibid) which accounts for the lack of development there. Most of the trees cluster on the river bank, or the edges of meandering drains. A line of trees running roughly east-west from just south of Temple Farm, across the southern part of the line of the proposed by-pass channel may indicate a former field boundary.

The configuration of this area was changed drastically in the late 1980 s when field drains were laid north-south across the southern part of the subject site and ditches were in-filled, notably the north-south meandering drain which bisects the route of the by-pass channel (erroneously shown as still extant on the Ordnance Survey underlay to figure 1). This created the present large reversed 'D'- shaped field, bordered to the north and west by the river Cam and to the east by the railway track.

Taylor (1973, 177) has identified a system of Wessex-type water meadows, dating to the 17th or 18th century, in the fields bordering the Cam between Hinxton and Duxford. The remains of the characteristic channelled ridges of such a system were not apparent in the subject site on the ground, nor in the air photograph assessment of its environs (Cox 1994), though it is possible that the ditches shown on the 1886 map form the remnants of a less formal system.

Recent archaeological work at Hinxton Quarry, across the railway tracks to the east of the subject site, has demonstrated the considerable archaeological potential of the Cam gravel terraces (Wait 1991, Damant & Mitchell 1992, Evans 1993); a potential which was not fully represented by previously recorded stray finds and air-photography. A high density 'background' scatter of worked flint was encountered in the ploughsoil across the site, within which a later Neolithic focus was identified. With the exception of a barrow (now ploughed out) which had become the focus for later Bronze Age tool production, no associated below-ground features were apparent (Evans 1993, 7). The barrow yielded cremated remains.

The southern-most ditched boundary (cropmark) of the Romano-British field system terminates at the barrow ditch showing that it had been preserved as an upstanding feature during the Roman period. A single sunken feature building, (early to mid Saxon) and Late Saxon ditched boundaries extend the continuity of historic activity on the quarry site further, and again provide the first evidence of an hitherto unrepresented presence. The current programme of work in this area has located a late Iron Age cremation cemetery and settlement enclosures (Alexander pers. comm.).

2. OBJECTIVES

The considerable potential of this part of the Cam valley, as indicated at Hinxton Quarry, recent work at Hinxton Hall (Spoerry 1994) and at Duxford (Evans 1991) necessitated a close look at the subject site prior to the excavation of the bypass channel. The alluvial silts anticipated in the area hold the potential to seal and protect episodes of archaeological activity and thus perhaps to provide a better preserved context than for the dry, plough-degraded sites investigated further away from the river. Furthermore, the existence of

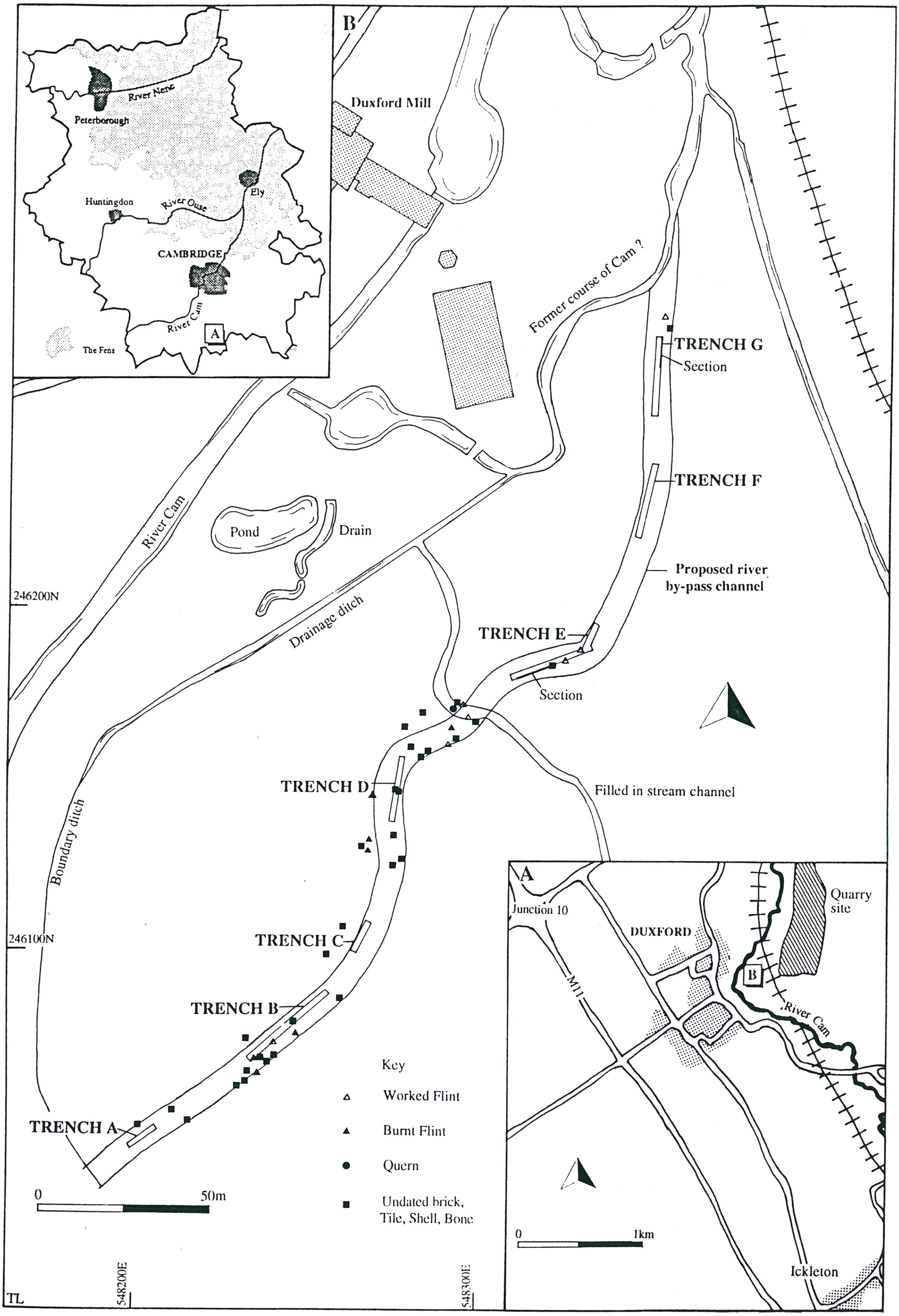

Figure 1 Site and Trench Location Plan

palaeochannels retaining environmental evidence provide an opportunity to establish the historic character of the river and the immediate river environs, and thus its role within the historic landscapes being investigated on the slightly higher ground of its gravel terraces and the surrounding chalk downland.

The objectives of the evaluation were then to establish the archaeological potential of the route of the proposed bypass channel by identifying the remains therein. Although not specifically required by the County Archaeology Office's Brief (Butler 1994) the desirability of establishing the possible contextual links between this site and the Hinxton Quarry site, and of identifying methods to enable the cross-comparison (statistically based if possible) of results was given precedence. Only in this way could the importance of the subject area and its status as a subject for conservation and research be adequately determined.

3. RESULTS

3.1 Aerial Photograph Assessment

This was carried out in advance of fieldwork and sought to establish areas of archaeological potential based on existing photographic evidence. The results are discussed fully in Cox 1994, not included as an appendix to this report, but available as part of the site archive. The assessment failed to identify specific archaeological features within the subject site, though it confirmed the great potential of the area generally and reiterated the possibility of encountering remains masked by alluvial deposits. It was noted that the projected line of a ditched boundary of the Hinxton Quarry Romano-British settlement complex would pass through northern part of the subject site.

3.2 Rapid Surface Scan

Despite the confirmed presence of thick alluvial silts (see below) over part of the site, the examination of the ploughsoil was regarded as potentially productive, and fieldwork was carried out in order to establish whether recent ploughing had bitten into or entirely removed archaeological features or old land surfaces. Four transects of 2.5m width were examined along an available 350m length of the channel corridor. Continuous artefact collection was employed (rather than in collection units) with finds plotted by 'total station' exactly where recovered.

The artefact distribution, unsurprisingly, reveals a bias of material towards areas of subsoil disturbance, namely the area in which field drains were dug (well into natural gravels) during the 1980s and where a now buried ditch might have been periodically cleaned or re-cut. Though very little material was recovered, (and that which was is more representative of buried remains in the southern part of the site rather than the north), it can be seen that worked and burnt flints, and undated brick and tile predominate. The only Romano-British find was of a fragment of "Puddingstone" quern.

3.3 Trial Trenching

A borehole commissioned by the NRA in the vicinity of the bypass channel close to the Cam revealed that below the ploughsoil, at a depth of 0.40m, there were two layers of peat alluvium overlying natural chalk at a depth of 1.20m. There were no indications of a buried palaeosol (old land surface). Anticipating that the stratigraphy could change across the site and that such a surface might exist elsewhere, and at any point in the stratigraphic sequence, machining was designed to be carried out in two stages. It was intended that the first stage would be taken to the level at which features or a surface was identified; the second would be excavated to the level of the river terrace gravel surface after the examination and sampling of features at the higher level had been carried out. A series of seven single bucket width (1.8m) trenches (A-G) with a combined length of 145m (Figure 1), were machine excavated using a JCB with a toothless ditching bucket.

Trench G was the first trench opened. It was decided to machine down to the top of the upper peat layer as this was the level at which a possible feature was identified. With the exception of Trench E the other trenches were eventually machined down to the top of the gravel terrace (in most cases flinty gravels mixed with peat). After initial machining it was deemed necessary to extended some of the trenches in order to clarify the stratigraphic sequence in some of the sections and to ensure that there were no archaeological features below the top of presumed natural geology. The mixed flint cobble and peat layer was scanned for artefacts and then removed to expose clean sand and gravel.

Only those trenches in which significant stratigraphy was encountered were recorded systematically. Sections and plans were drawn at a scale of 1:20, with individual layers recorded using standard AFU context sheets. Elsewhere, when the stratigraphic sequence was repeated, only rough notes and sketch sections were made. A trench by trench description of the results follows.

3.4 Trench A

Trench A differs from the other trenches in that the underlying natural geology does not consist of flint cobbles or gravels. Instead, at the north-eastern extreme of the trench at a depth of 0.80m from the ground surface there is a gradual horizontal change from clean fine compact gravel and sand to compact pale sand. This in turn gradually changes to a dirty mid-grey silty sand. At this point the natural changes to dense chalk and begins to slope down to the south-west, towards the present day course of the River Cam, to a depth of 1.0m (24.45 AOD). Directly above the natural geology is a layer of peat containing reasonably well preserved mammal bones including a probable sheep mandible at the interface of the peat with the natural chalk. To the south-west, where the underlying geology slopes down, the peat is 0.40m thick. Above this peat layer there appear to be two depositional events. First, a channel beyond the north-eastern end of the trench has truncated the peat layer on the channel edge to a minimum of 0.05m thick. As the channel shifted location, a layer of loose sand and silt was deposited on the edge of the channel. This layer also yielded mammal bones. This was then covered by another layer of peat. To the south-west, a second channel appears to have truncated these layers, followed by deposition of a layer of laminated sand and silt, another episode of peat deposition, and finally another layer of silty clay, all within the channel. Above this is the modern ploughsoil which probably incorporates the two episodes of alluviation that occur elsewhere on the site.

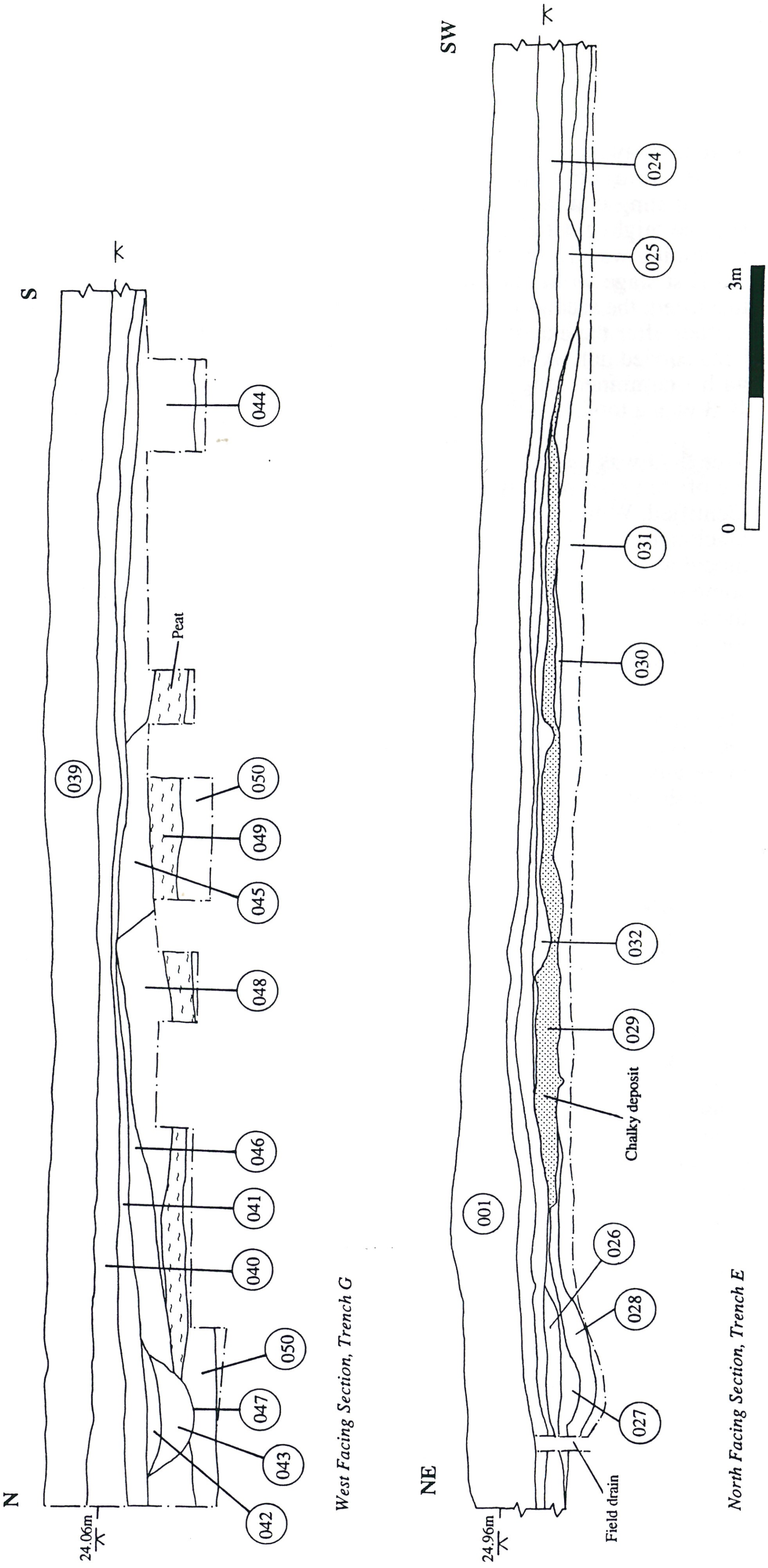

Figure 2 *Sections through Trenches E and G*

3.5 Trench B

Trench B also shows evidence of shifting water channels. The underlying geology in this trench is of coarse flint gravel and cobbles mixed with sand. As in Trench A, the natural geology is directly overlain by a peat deposit 0.40m thick. This deposit is undisturbed at the north-east end of the trench but becomes progressively more mixed to the south-west. This disturbance occurs on the edge of a channel cutting through the peat. The fill of the channel consists of a complex series of deposits of flint gravels, gravels mixed with redeposited peat, and laminations of sand, peat, and silt. These represent various periods of fast flowing water that have washed gravels and scoured out peat down towards the river. Two abraded flakes of worked flint (late Mesolithic/ early Neolithic) were recovered from the base of this channel. At the top of this sequence is an irregular apparently waterlain deposit of silt and chalk fragments. Further south-west, towards the centre of the channel, these deposits are themselves truncated by flint cobbles loosely mixed with scoured-out peat in what appears to be a single depositional event. As in Trench A, the deposits within the channel are all sealed by a layer of peat immediately below the ploughsoil.

3.6 Trench C

Below the ploughsoil a 0.10m remnant of alluvium survives. This seals 0.20m of peat, from which several fragments of large mammal bones were recovered. The peat overlies flint pebbles and gravels mixed with loose sandy fibrous peat 0.15 m thick. This was removed to reveal the mixed sand and gravels of the river terrace. It was assumed that the mixed peat and pebbles mark the top of 'natural' with the overlying peat having worked down into the top 0.15m of the terrace gravels. Apart from the change from a peat to a sandy matrix, there did not appear to be an actual horizon within the gravels.

3.7 Trench D

The stratigraphy in Trench D is the same as that encountered in Trench C although the majority of the alluvium overlying the peat had been ploughed out.

3.8 Trench E

The stratigraphic sequence in Trench E is significantly different to that seen elsewhere on the site. Beneath the ploughsoil and the two layers of alluvium, the peat layer is again present. In the middle of the trench this peat lies directly above the flint cobbles and gravels (as occurs in Trenches C and D). At either end of the trench however, there are two separate layers of compact fine chalk fragments or nodules mixed with organic silt or denuded chalk, sandwiched within the peat (Figure 2). Stratigraphically, the peat is continuous and equivalent to the peat elsewhere, although where the chalk is present, the peat is much darker and more compact. It is however unclear whether the presence of these chalky layers is due to natural or human agencies. The compaction of these layers, the uncertainty of their source, and the lack of evidence for their mode of deposition (such as natural channels visible in section) all suggest a possible man-made origin. On the other hand, their irregular appearance in plan and section, and their being sandwiched between the peat, suggest a natural process is more likely. In addition there are doubts as to their possible function and the functional integrity of using crushed chalk as a surface in a wet environment when there is so much gravel around as an alternative.

Immediately to the east of the south-western chalk layer is a linear feature running approximately north-south. Although ditch-like in appearance it is unlikely that this is a man-made feature since it appears to be sealed by the peat layer and would make an ineffective ditch. Instead it appears to be natural feature, such as a small channel, cut into the top of the gravel layer. Although it is tempting to associate the linear feature with the chalky layers, since the chalk seals the peat layer within the linear feature, it must be later. A series of spot samples and a column sample were taken in the hope that pollen analysis might help clarify the period (by presence or absence of certain species) in which these events occurred. Several well preserved worked flints dated to the late Mesolithic/early Neolithic period were recovered from the top of the gravel below the peat, suggesting that at some stage before the peat formation the gravels were exposed and utilised as a source of flint. A few very abraded fragments of Romano-British pottery were recovered from the lower, grey alluvium **025**.

3.9 Trench F

Most of Trench F contains similar stratigraphy to that encountered in trenches C and D. At its northern end however, the stratigraphy deepens and becomes more complex where the edge of a channel appears to have cut through the peat (Figure 2). Although there is no clear edge to the channel, within the channel zone the alluvium survives to a depth of up to 0.20m. This seals a layer of fine peaty silt with a rubbery texture prone to vertical fissuring (up to 0.40m thick) which gradually becomes more peaty (and less rubbery) away from the channel edge. Beneath this is a layer of finely laminated sand and peat, apparently extending southwards beyond the edge of the channel. This would appear to represent a phase of periodic inundation at the edge of an earlier stage of the channel formation. This in turn overlies a layer of compact golden brown sand and a layer of compact organic silt, the earliest deposits in the channel. Beneath these deposits lies the flint and gravel that occurs directly beneath the peat layer to the north of the channel. A few possible struck flints were recovered from the mixed gravel and peat **038** directly beneath the peat.

3.10 Trench G

Trench G is the northernmost trench in the assessment area and the character of the deposits suggests that the former edge of the present river was encountered. Beneath the ploughsoil the two layers of alluvium are present, getting gradually thicker to the north (away from the river). Beneath the alluvium, is a 0.40m thick layer of blocky peat with a rubbery texture, prone to vertical fissuring. Since during machining a piece of worked flint was recovered from the top of the peat and a possible cut feature seen in plan, machining was ceased at this level so that sondages could be hand dug. For most of the length of the trench this peaty layer appears to be disturbed or redeposited, with blocks of peat mixed with silts and clay. It is presumed that this represents either the unstable peat at the edge of a channel, or else lumps of peat within the channel washed down towards the river.

At the northern edge of the trench a later phase of the channel cuts through this peat. In its latest phase the channel was only 1.0m wide and 0.35m deep, filled with peaty silts and sand (Figure 2). Prior to this the channel appears to have been wider, with a 4.0m stretch visible within Trench G. A series of pollen spot samples were taken through the various stages of deposition in this channel. 18m to the south a vertical division was visible in the peat layer to the right of which the peat is undisturbed. This appears to be the edge of the channel. A number of pollen spot samples and a monolith sample were taken through this undisturbed peat. Beneath the peat layer there is a layer of sand with numerous thin peat laminations within it, representing periodic inundations and brief periods of peat growth. A one meter long strip was hand excavated on either side of this interface. The undisturbed peat was found to contain numerous well preserved flint waste flakes, dispersed within the top 10 to 15 cms, which have been provisionally dated to the late Mesolithic/Neolithic periods. Two fragments of large mammal bone were also recovered from the peat. A similar amount of the disturbed peat was also excavated and a single Romano-British pot sherd was recovered, supporting the probability that this is indeed the fill of a gradually in-filled channel.

3.11 **The Lithic Assemblage** by T. Reynolds

Assemblage Composition.

A total of 64 lithics have been recovered; all are of flint, and two are from the ploughsoil. The total assemblage is small, taken from a total of seven contexts. One context (**054** in Trench G) yielded forty-six pieces or 71% of the total. Only this context is large enough to be described on its own. The next richest collection, **031**, has only eight pieces. The entire assemblage could be produced in less than an hours knapping and so the lithic industry of the site cannot be regarded as intensive. The total weight of the collection is 348 grammes. The whole assemblage is distributed as follows:

Context No.	Trench	No. of Flints	Weight	% total flint.*
001	-	2	11g	3.16
021	-	2	5g	1.44
030/031	-	1	6g	1.72
031	E	8	11g	3.16
038	F	3	31g	8.91
052/054	G	2	37g	10.6
54	G	46	247g	70.9

* This is based on number of pieces, not weight.

Typological Analysis.

Typologically, the assemblage is not particularly distinct. It lacks any type fossils or formal tools, and is comprised mostly of knapping debris in the form of chips, flakes, shatter fragments, and cores, much of which was burnt. Two burin spalls were identified, from contexts **031** and **054**. Both would imply the presence of burins on the site originally, but the actual tools are lacking.

Technological Analysis.

Knapping was undertaken by direct percussion using hard hammers. A total of two informal cores were recovered, from context **054**. Both are single platform cores for the production of blades, bladelets and small flakes and are generally small (< 7cms). Core edges were maintained by abrasion and flaking to retain the flaking angle.

The most common product of knapping was flakes, which comprise 70% of whole blanks and 75% of broken blanks. Bladelets are the next most common blank form, comprising 21.6% of whole blanks and 37.5% of broken blanks. Blades are rare, being absent from whole blanks and forming 6.25% of the broken blanks. A total of six shatter pieces were recovered, this is neither particularly small or large in an assemblage this size. In categorising pieces, flake-blades and chips were classified as flakes. The assemblage comprises the following composition of blanks:

Blank Composition.

	Whole Blanks	Broken Blanks
Blades	0	1
Bladelets	8	6

Technologically, the blank production employed would fit most appropriately in a late Mesolithic/ early Neolithic context.

Raw Materials

The flint used for knapping derives from gravel sources, the nearest and most likely source being the river terrace gravels which line the river valley as it runs through the chalk. The gravel flint being used seems to have been of relatively small size, pieces with a maximum dimension greater than 10cm are absent. No fresh chalky cortex was observed on any of the pieces and some external surfaces had been patinated prior to knapping.

Condition.

Edge conditions are generally fresh, with little sign of movement due to water action or soil movement. A number of half-moon snaps do occur on three pieces, indicating the effects of either trampling or soil pressure on the edges of the affected pieces, but these are not common. Some edge damage and utilisation is evident on artefact edges, this includes pieces not formally identified as tools.

Gloss is present on one piece, the glossing taking the form of patches distributed irregularly over both dorsal and ventral surfaces. This may be interpreted as the result of point contact with other stones in a waterlogged environment and not due to functional factors.

Patination states vary and may preclude the effective sampling of assemblages for microscopic use-wear analysis. Macroscopic wear traces (edge notching and microflaking) are visible but worthy of further study only if larger samples are available. The assemblage lacks significant evidence for plough damage.

Conjoining was attempted within the sample from **054**. It is likely that this sample represents a single knapping episode, as the two cores are of the same material and condition and the struck pieces also resemble the core material. Two possible conjoining pieces were identified within a five minute period; further conjoining is possible and may prove informative.

Interpretation.

The assemblage recovered is small. Some pieces are in markedly different condition and may be the product of hill wash, i.e. they are residual. The material from context **054**, however, appears to have a technological and structural integrity suggestive of primary association. The material may be *in situ* or deposited by discard as a unit. The material would best be interpreted as representing a single knapping event exploiting a single piece of locally available raw material, for the production of bladelets and small flakes. This may be a sample of a larger settlement site but the lack of other evidence, of tool types and of greater disturbance to the collected material suggests this is the result of a small specialised work party of hunter-gatherers stopping for a short duration and retooling by a river channel.

The presence of burnt lithics would indicate that a hearth was present in the knapping area, a not uncommon prehistoric phenomenon. The overall number and small size of burnt pieces does not suggest they are the product of pot boiling activity, or the treatment of flint to produce temper/grog for pot making.

The nature of the knapping products could fit either a late Mesolithic or an early Neolithic date. The former is favoured because of the presence of burin spalls which are more common in the Mesolithic.

Potential For Analysis.

Excavated prehistoric flint assemblages are rare in the Duxford area and problems exist in the grouping of assemblages for chronological purposes. Surface occurrences are, however, relatively common (Evans 1993). This flint assemblage could provide important background data to apply to the study of surface occurrences, should the sample size be increased by further work.

When combined with contextual data, analysis of the lithic assemblage will provide important behavioural information for the interpretation of the site and conversely, may assist with the interpretation of the nature of the contexts themselves.

Conjoining and functional analysis as well as use-wear studies could permit the identification of knapping patterns on the site and the subsequent use of the flint assemblage on the site. This will permit certain behavioural interpretations of the site function and allow comparison with evidence from elsewhere in Duxford and Hinxton. Refitting and use-wear may also provide information on post-depositional processes affecting the site and its stratigraphy.

In order to develop the above potential for analysis, consideration in future excavation and recovery techniques is required. Three dimensional recording, including information on orientation would be the best approach to adopt but is expensive. Plotting to the nearest metre and using spits within each metre would be an acceptable alternative. The priorities of excavation must be decided by the site director but **the potential for analysis of the flint is dependent upon future work providing larger samples.** Burnt flint has potential for thermoluminesence dating and any lumps larger than 150 grammes should be rapidly placed into a light proof bag and a 2Kg sample of the surrounding soil collected. Exposure of possible dating material to daylight should be avoided as far as possible. It must be emphasised that if the assemblage is not to be supplemented by further collections, it is very small and has little potential for further research.

3.12 **The Pollen Assessment** by Steve Boreham

Four samples were selected for study from those provided. 1cm of each sample was processed for pollen using standard chemical technique (HCI, NaOH, sieve, HF, acetolysis). The residues were mounted in silicone fluid and counted at X400 using a binocular microscope. It is usual to count a minimum of 300 land pollen and spores for each sample. However, in this case the pollen proved to be difficult and time consuming to count. During the interpretation of these pollen spectra it must be born in mind that the minimum statistically significant main sum was not achieved for any of the samples.

The lower compact peat **030** (figure 2) was dominated by fern spores (Filicales), with significant proportions of pine and grass pollen. It is likely that this assemblage reflects post-depositional oxidation of the peat, resulting in an over-representation of resistant types. However, the weak signal from the surviving pollen suggests deposition in a flood-plain environment, with more distant thermophilous woodland including lime and hazel. The "mysterious" chalk layer **029** contained no identifiable pollen. It may be that this layer was laid down very quickly, or that any pollen it contained has since been removed by oxidation. The upper compact peat **032** exhibited an even more extreme over-representation of fern spores than sample **030**. Again a weak signal from thermophilous woodland with oak, lime, and hazel can be identified together with some flood-plain or aquatic elements. The overlying alluvium **025** contained a much more complete pollen assemblage than the other samples, despite comprising more than 40% fern spores. There is again evidence of thermophilous woodland, accompanied by a relatively diverse herb assemblage, suggesting flood-plain or damp meadow conditions.

The three samples yielding pollen spectra can all be interpreted in a similar way, bearing in mind the over-representation of fern spores and other resistant types through differential oxidation. The pollen signal is largely from local sources such as aquatic and flood-plain vegetation, with a component derived from thermophilous woodland which would have occupied drier ground within the hydrological catchment. It is rather difficult to date these samples because of the taphonomy, weathering and counting problems described previously. However, it is clear that they belong to a period of thermophilous (lime-oak) woodland cover within the Flandrian (Holocene). Comparison with local pollen diagrams suggests this period to be in the range of 3000 - 7000 radiocarbon years b.p. within the Sub-boreal and Atlantic periods and spanning the Mesolithic-Neolithic boundary.

4. DISCUSSION

The subject site lies on the (? undifferentiated) terrace gravels of the river Cam. The area became marshy, possibly coinciding with the amelioration of climate and stabilised vegetational conditions of the later Mesolithic, but was later subject to at least two distinct extensive episodes of alluviation. Worked flint of later Mesolithic date or slightly later was found in the mixed interface between peat and river gravels and the overlying peat closer towards the palaeochannel of the Cam.

The deposition of the silty alluvium marks the end of the peat growth across the floodplain and perhaps derives from extensive clearance and agriculture in the vicinity of the Cam. Abraded potsherds of Roman date were recovered from the lower horizon. This suggest that alluviation was occurring in the Roman period but it is not clear when the alluviation first started. The lack of definite later Neolithic and Bronze Age lithics across the subject site may suggest that it remained too wet for the types of activity that occurred nearby at Hinxton Quarry during these periods. This does not of course rule out the possibility that the area was exploited for fishing / hunting or seasonal grazing, none of which need leave much cultural debris. A Romano-British presence was represented only by residual pot sherds (and a small fragment of quern). The postulated docks (Evans 1994) or any other riverside industrial activity connected with the settlement at Hinxton Quarry was not located in this area. The pollen from the lower alluvium horizon confirms the areas status as a floodplain or damp meadow.

A series of south-north running channels cut across the flood plain here to join with the main course of the Cam both during and after the formation of peat. These channels appear both to have shifted location at various stages in the depositional history of the site, and to have changed in character. Sluggish, silt-filled rivulets have been identified, as well as faster moving episodes in which flint cobbles mixed with what is presumably peat scoured out along the route have been washed down towards the river. A pot sherd dated to the Roman period was recovered from within one of the channels in Trench G, suggesting it was open at a relatively late date. The meandering ditch bisecting the subject site and in-filled in the 1980s, may have originated as such a channel only to have become formalised later and maintained as a boundary.

The present course of the Cam between Temple Farm and Duxford Mill is clearly artificial, its straightness contrasting with the meandering course of the river to the north and south. The construction of the medieval mill (or mills), and associated straightening of the Cam appears to have left the old course stranded. A remnant survives as a narrow ditch in the north-west corner of the site, and was probably preserved in the line of a ditch extant in the late 19th century (County Records Office 1886 OS).

Trench G may have therefore encountered the edge of the former channel of the Cam. Proximity to the flow of the river is indicated by the laminations of sand and thin peaty sediment continuing to below the depth of excavation in the west end of the trench, but becoming shallower and eventually disappearing at the east end. Similarly, Trench A encountered a natural geology sloping down towards the present course of the river to the south of Temple Farm.

No marked possible buried soil horizons were observed anywhere within the stratigraphy. Whilst these are not always apparent to the naked eye (requiring micromorphological analysis for proper identification) and their absence would not necessarily indicate that the peat formation and alluviation episodes were entirely continuous, it must suggest that any periods of dryness or stabilisation here were not long-lived. The presence of an *in situ* late Mesolithic/ early Neolithic group of worked flint within the peat at the edge of the paleochannel **054**, probably representing the discard of a single knapping event, is more suggestive of a hunting expedition into a resource-rich riverside marsh rather than settlement. The presence of worked and burnt flint elsewhere across the site indicate that this was not an isolated event, though the extent of this exploitation cannot be discerned from the sample recovered during the evaluation. As Reynolds observes (3.11), the entire recovered assemblage could have been produced in less than an hour.

This activity clearly brings the origins of the chalk spreads into question once again and raises the possibility that they were laid as artificial 'islands' in the mire, on which, for example, the re-tooling suggested by the discarded waste flakes could have been carried out. The presence of burnt flint in the assemblage is consistent with the tool production occurring around a hearth, however no traces of burning were observed on the exposed portions of the chalk spreads, Indeed, no cultural debris whatsoever, was found in association with the chalk spreads (although **029** seals a deposit which contained worked flint). On balance it seems probable that they are some form of natural deposition, possibly the result of a flash flood or solifluction.

4.1 The Significance of the Prehistoric Activity at Duxford Mill

Prior to the development-led archaeological work of the last five years, the Mesolithic and Neolithic of this part of the Cam valley (for the purposes of this discussion, extending from the Shelfords to Great Chesterford) was represented only by a few isolated stray finds (such as SMR 04790, 04108, 04109, 04087). Much of this reported material consists of the most easily identifiable components of lithic assemblages (arrowheads, axes) and cannot be deemed properly representative of activity here. The two SMR references to Mesolithic finds in the area are similarly vague. SMR 04086 refers to the recovery of a core from the general area of Duxford. SMR 04102 refers to a scatter (in the original SMR card, but not on the latest SMR entry) of Neolithic worked flint with an unqualified and unquantified Mesolithic component at Whittlesford Bridge.

Recent sampling strategies have begun to better characterise early Neolithic and later activity in the area (Evans 1991; Evans 1993; Spoerry 1994). With the exception of possible evidence for an early Neolithic 'open caste' flint mine near Duxford airfield (Evans 1991), however, investigated ploughsoil scatters have not yet been found in association with contemporary negative features or intact buried soil horizons.

Such surface scatters have been subjected to continual natural and cultural attrition since the destruction of their primary contexts (whether cut features or soil horizons) and only represent their initial deposition as modified by a series of inter-related transformations. Whilst the effect of recent activity such as ploughing can be partially modelled (by assessing likely horizontal displacement of artefacts and likely destruction of the more delicate components of an assemblage) the effects of earlier transformations are increasingly difficult to gauge. Interpretations of ploughsoil scatters therefore often lack the controls provided by associated *in situ* scatters.

The small assemblage from context **054** at Duxford Mill was deposited in an environment whose contemporary and subsequent condition has preserved its current integrity. The assemblage survived in a condition very similar to that it possessed on the day it was discarded by its producer over six thousand years ago at the edge of a river channel.

The lithics collected from across the subject site, though a small group, derived from an area of minimal subsoil disturbance, and from a very few hand dug contexts. Rather than indicating lack of activity, this material supports the probability of encountering scatters throughout the peat across the site (and much less importantly as residual material from the later channels traversing the subject site). Clearly, areas of disturbance caused by later channel formation and drainage works limit the archaeological potential of large parts of the route of the by-pass channel.

Despite the riverside location and nearly two meter depth below ground level to which trenches were excavated (to a maximum depth of 23.18 AOD), no permanently waterlogged deposits were encountered. Animal bone, in a good state of preservation, was found throughout the peat, but no wood was noted. Whether the oxidation of the peat indicated by the pollen assemblage occurred in antiquity or is more recent in origin (a measure of the success of the recent drainage scheme?) is difficult to say, but was concluded that further pollen analysis would be unlikely to yield better results due to the oxidised nature of the peat and alluvium and the pollen from the catchment area being swamped by the pollen from local sources (Boreham pers. comm.). Nevertheless, useful information was provided by the surviving pollen and there remains the possibility of encountering less oxidised deposits. There have been few detailed studies of river valley peats in the region; work has tended to focus on the fenland peats, and the investigation of changing river channel systems throughout the Flandrian period has been identified as a research priority for the region (Murphy 1994, 3.3.2).

Similarly, the transitional period between the Mesolithic/early Neolithic and later Neolithic, from transient hunter-gather groups to more settled farming communities, is one which is not well understood. The examination of this period is one which will rely heavily on the integration of cultural and environmental evidence. Sites such as Duxford Mill are amongst the few in the south Cambridgeshire chalk land which offer the potential to do just this.

In summary, the subject site may not be a late Mesolithic 'Starr Carr' but nevertheless has captured important cultural information from an interesting and obscure period. In addition it may be able to provide an environmental context for the archaeological activity noted on the adjacent dryland sites at Hinxton Quarry, information not captured on the sites themselves.

4.2 The Impact of the Proposed Development

The excavation of the river bypass channel will remove deposits retaining *in situ* late Mesolithic or early Neolithic flint artefacts, important and (so far) unique survivors in the local and regional landscape. The effect of the channel in promoting the further desiccation of the peat deposits and alluvium, which still retain some environmental data, is unknown.

The failure to identify a specific target for sample excavation until very late in the field evaluation (only flint identified as residual was observed before encountering the assemblage in **054**) has led to the recovery of an artefactual sample, which though broadly characterising the archaeology of the subject area, has little potential for further analysis. It is essential that any proposed further mitigation steps are designed so as recover analytically viable assemblages.

It is suggested that this is based on the excavation of evenly distribute test pits (ideally extending beyond the limits of the bypass channel where necessary to define scatter limits). The only way of ensuring the correct identification and recovery of scatter units is via hand excavation in controlled spits employing 3-dimensional recording (3.11). Bulk sieving should be employed to recover faunal remains and the smaller components of the lithic scatters. Sub-samples should be taken for flotation to recover associated macro-botanical remains. The deposits and artefacts lend themselves to techniques, such as palaeomagnetism dating, C14 dating, and thermoluminensce dating, which will provide good chronological controls.

The continuous section provided by the excavation of the river by-pass channel will enable the mapping of shifting channels cutting the floodplain.

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APPENDIX A

CONTEXT LIST

Cxt	Description	Nature	Above	Below
001	layer	Mid yellow brown ploughsoil	All	---
002	layer	Lower alluvium. light olive brown	003	001
003	layer	10YR 3/2 Very dark greyish brown peat	008	002
004	layer	10YR 4/1 Dark grey sandy silt	005	008
005	layer	2.5YR 7/4 Pale yellow loose fine sand	007	004
006	layer	5Y 5/1 Grey sandy silt with peat inclusions	007	008
007	layer	10YR 2.5/1 Reddish black peat	009	004
008	layer	2.5YR 7/4 loose pale yellow sand	004	003
009	layer	N4 very dark grey compact sand	---	007
010	layer	Mid yellow brown ploughsoil	012	---
011	layer	Black peat.	014	010
012	layer	Black peat	022	010
013	layer	Black peat	022	010
014	layer	Compact white chalk	017	011
015	layer	Blue grey clay	012	014
016	layer	Loose peat mixed with coarse gravel	013	015
017	layer	Black peat	022	014
018	layer	Loose black peat	019	012
019	layer	Loose black peat	020	018
020	layer	charcoal grey peaty sand	021	019
021	layer	Yellow sand	---	020
022	layer	Flint cobbles and gravel with peat	021	013
023	layer	Flint cobbles and gravel with peat	019	011
024	layer	7.5YR reddish brown clayey silt	025	001
025	layer	N/5 gley clay	026	024
026	layer	5Y 2.5/1 Black sandy peat	027	025
027	layer	5Y 4/1 dark grey sand and gravel	028	026
028	layer	10R 2.5/1 reddish black peat with gravel	---	027
029	layer	N7 light grey firm crushed chalk	030	032
030	layer	5Y2.5/1 black peat	031	029
031	layer	N4 dark grey peaty sand with gravel	---	030
032	layer	N3 very dark grey peat	029	025
033	layer	Orange brown silty clay alluvium	035	032
034	layer	Black peat	036	035
035	layer	Mid grey black peaty silt	034	033
036	layer	Very dark brown peat	037	034
037	layer	Grey brown sandy silt	038	036
038	layer	Yellow brown sand and flint cobbles	038	034
039	layer	same as 001. Ploughsoil	040	---
040	layer	7.5YR 6/4 light brown clay silt	041	039
041	layer	Gley N5 silty clay alluvium	042	040
042	layer	Mid grey brown peaty alluvium	043	041
043	layer	Mid grey peaty sandy clay	047	042
044	layer	Mid-dark grey brown peaty clay	045	041
045	layer	Mid-dark grey brown silty peat	048	044
046	layer	Mid grey clay mixed with peat lumps	048	047
047	channel cut	concave sides and base. Stream channel	046	043
048	layer	Mid grey brown clay and peat	049	046
049	layer	mid-dark brown silty fibrous peat	050	048
050	layer	Mid-light grey sand with peat laminations	---	049
051	channel cut	Vertical channel edge cut through peat	054	053
052	layer	5Y 6/4 pale olive clay alluvium	053	001
053	layer	2.5Y 4/1 dark grey silty clay alluvium	051	052
054	layer	10 YR 2/2 very dark brown peat	---	051
055		not used		
056	layer	peat layer Tr C		
057	layer	Same as 051		
058	layer	Same as 052		
059	layer	Same as 053		
060	layer	Same as 054		

APPENDIX B

Pollen Counts from DUXDM 94

Sample	**1/030**	**19/029**	**2/032**	**3/025**
Betula	3.97		2.33	2.97
Pinus	17.46		5.58	2.48
Ulmus			0.47	
Quercus			0.47	0.50
Tilia	1.59		1.40	0.50
Alnus	0.79		0.47	
Fraxinus				1.00
Corylus	1.59	no	1.40	2.48
Salix	1.00	pollen		0.50
Gramineae	15.08		9.30	23.27
Cyperaceae			0.93	1.98
Comp. Tub.				2.97
Comp. Lig.	0.79			4.46
Filipendula	0.79			1.00
Labiateae	0.79			
Leguminosae				0.50
Plantago lanceolata				1.00
Ranunculus type				0.50
Rumex				0.50
Thalictrum				1.00
Urtica			0.47	
Filicales	7.62		75.81	40.59
Diphasiastrum	1.59			6.93
Polypodium				1.00
Pteridium	0.79		1.40	3.96
Sphagnum			1.83	0.49
Nuphar			0.46	
Sparganium	0.79		1.37	1.46
Sum trees and shrubs	32.54		12.10	10.40
Sum herbs	17.46		10. 70	37. 13
sum lower plants	50.00		77. 20	52. 47
Main sum	126		215	202
Total concentration of grains/cm^3	47372		32509	32299

N.B: All figures are expressed as percentages except main sum and total concentration. Sphagnum and aquatics are excluded from the main sum.

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