Project No. 1900

Sutton Park

Palaeoenvironmental Assessment

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for
Birmingham City Council

BIRMINGHAM ARCHAEO-ENVIRONMENTAL BAE

Sutton Park

Palaeoenvironmental Assessment, 02/2009

TABLE OF CONTENTS

List of Tables

List of Figures

List of Plates

List of Appendices

Sutton Park

Palaeoenvironmental and Archaeological Assessment

SUMMARY

This assessment details the archaeological and palaeoenvironmental work undertaken to date and highlights gaps in the knowledge base and outlines a strategy for further assessment work in Sutton Park. Prehistoric archaeological finds consist of Mesolithic flints, six Bronze Age 'burnt mounds' and a possible timber trackway. The Roman road 'the Rycknield street' also runs through the park. Archaeological investigations of other possible prehistoric features in the park have failed to identify any significant cultural remains. There have been various interventions to elucidate the environmental history of the park with sequences of peat analysed for pollen. The pollen spectra from these deposits suggest that the peats date to the early Holocene, although it seems likely that any later deposits have been destroyed by peat cutting. Since these environmental analyses were undertaken before the widespread availability of (low cost) radiocarbon dating, the sequences lack precise chronological control. Other deposits of palaeoenvironmental potential may be preserved beneath archaeological features such as the Roman road and Medieval deer park boundaries, but the extent or quality of preservation is unknown. Limited borehole excavation has indicated that organic deposits up to 0.90m survive across the park. Further work is required to establish the precise extent of these sediments and their potential to preserve palaeoenvironmental source material.

Sutton Park

Palaeoenvironmental Assessment 02/2009

1. INTRODUCTION

1.1. Background to the project

1.1.1. In [02/2009], Birmingham Archaeo-Environmental was commissioned by Dr Mike Hodder, Birmingham City Archaeologist to carry out a Desk Based Assessment and walkover survey in order to characterise the research knowledge base with respect to the palaeoenvironmental record of Sutton Park, Sutton Coldfield. This project, commission by Birmingham City Council, was an integral part of a larger English Heritage (Historic Environments Commission) funded study that also included the capture of Lidar data and associated ground truthing.

1.1.2. This report outlines the results of the assessment, which has been prepared in accordance with the Institute for Archaeologists Standard and Guidance for Archaeological Desk-Based Assessment (IFA, 2001).

1.1.3. The assessment conformed to a project brief produced by Birmingham City Council (Appendix 1). This report has been prepared based upon information current and available as of [02/2009].

2. LOCATION, GEOLOGY, SOILS AND ECOLOGY

2.1. Site location and Geology

2.1.1. Sutton Park is located north west of Sutton Coldfield and approximately 9km north of Birmingham City Centre (Fig.1). The park lies on a low plateau between 120m and 176m above sea-level (Box and Bramwell, 1998). The Longmoor Brook and Plants Brook rise in the park flowing southwest. The Longmoor Brook has been dammed at its southern end creating the Longmoor Pool, Powell's Pool and Wyndley Pool. The Plants Brook has been dammed to create the Bracebridge Pool, Blackroot Pool and Keeper's Pool. These watercourses occupy valleys incised into the Triassic age Sherwood Sandstone Group (formerly the Bunter Pebble Beds). However, the size and morphology of these valleys is largely inherited from the last Ice Age (the Devensian) when periglacial processes carved out these valleys under cold climatic conditions (Powell *et al*., 2000). The superficial 'drift' sediments covering Sutton Park are also the product of periglacial processes and associated glacial outwash during the last Ice Age and earlier cold stages. The valley floors and sides comprise a mixture of glacial tills (termed boulder clay on early maps), mass movement sediments (termed 'head') and river deposits (Mackney and Burnham, 1964; Powell *et al*., 2000). However, given that some of these artificial pools may have been constructed as early as the 12th Century (Hodder, 1988), they may contain accumulations of sediment relating to the medieval and post-medieval periods.

2.1.2. Sutton Park is protected by a variety of statutory legislation. In 1952, it was notified as a Site of Special Scientific Interest (SSSI); in 1995 as a Registered Park and Garden; in 1997 a National Nature Reserve; and in 2002, the majority of the Park was designated as a Scheduled Ancient Monument following a revision of the 1971 scheduling, which only included the Roman road.

PN: 1900
Sutton Park, Palaeoenviromental and archaeological assessment

Figure 01: Location Map

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2.2. Soils and Modern Ecology

2.2.1. Mackney and Burnham (1964) recognised five different classes of soil in Sutton Park: sandy brown earths; humous-iron podzols; peaty gley soils; organic soils (bog); and sandy groundwater gley soils (Fig. 2). The majority of the park consists of brown earths and humous-iron podzols. The sandy brown earths developed in base-deficient glacial sands and are associated with woodland and grass-heath. The sandy podzols are most often associated with dry heath and occur on the ridges and valley sides. Sandy podsolisation is a common feature visible in the upper sediments exposed in the abandoned gravel pits. Whilst the majority of the soils developed on the sands and gravels have little organic content, there is evidence for extensive areas of organic and peaty soils developed within the lower lying valley floors; these latter soils have clear potential as repositories of palaeoenvironmental data. The extent of these deposits is mapped on Fig. 3.

2.2.2. Historical records regarding the past vegetation of indicate that in AD 1086 the Domesday Book recorded the woodlands at Sutton as being '*two leagues long and one league broad*' (Barlow, 1988). However, whilst this figure broadly correlates to the surviving woodland today, it should be noted that such information could refer to any part of the Manor of Sutton Coldfield, including areas outside of the present park boundaries. It should also be observed that since Sutton Park has probably been the focus of human activity since early prehistory, it should not be regarded as a strictly 'natural environment'. During the groundtruthing survey, Coutts (2009, 6.1) identified circular pits with banks around them, which it was suggested could be the remains of white coal kilns, possibly of post-medieval date.

2.2.3. The vegetation of Sutton Park can be divided into four major types (discussed below) and the extent of these habitats is illustrated in Fig. 4, which is based on survey data collected by the Nature Conservancy Council who created a vegetation map in 1964. An additional guide to the flora of Sutton Park is provided by Readett (1971).

Heathland

2.2.4. Heathland covers approximately half of the park with the majority extending between Longmoor Pool and Streetly Gate (Field and James, 1965). Much of the heathland found at Sutton Park is similar to that found on Cannock Chase (Box and Bramwell, 1998) and can be classified as dry heath and wet heath. Dry heath can be further sub-divided depending on its location and underlying soil type. *Calluna vulgaris* (heather) thrives on the intermediate levels bordering the valleys, particularly the Longmoor Valley (Pritchard and Thompson, 1965) along with *Erica cinerea* (bell heather). *Ulex europaeus* and *Ulex gallii* (gorse) are important components of much of the heathland and are often accompanied by *Betula* (birch). In open areas and on the higher ground *Deschampsia flexuosan* (wavy hair-grass) dominates and a rare plant of the Midlands, *Empetrum nigrum* (crowberry) also grows here (Pritchard and Thompson, 1965) and in greater frequency than on Cannock Chase (Box and Bramwell, 1998). The wet heath is more extensive across the park and is dominated by *Molinia caerulea* (purple moor-grass) particularly in the lower part of the Longmoor Valley and the areas north of Blackroot and Bracebridge Pools. Other plant species include *Pteridium aquilinum* (bracken), *Nardus stricta* (mat grass), *Juncus squarrosus* (heath rush), *Eriophorum angustifolium* (cotton grass) and *Erica tetralix* (cross-leaved heath).

Wetland and fens

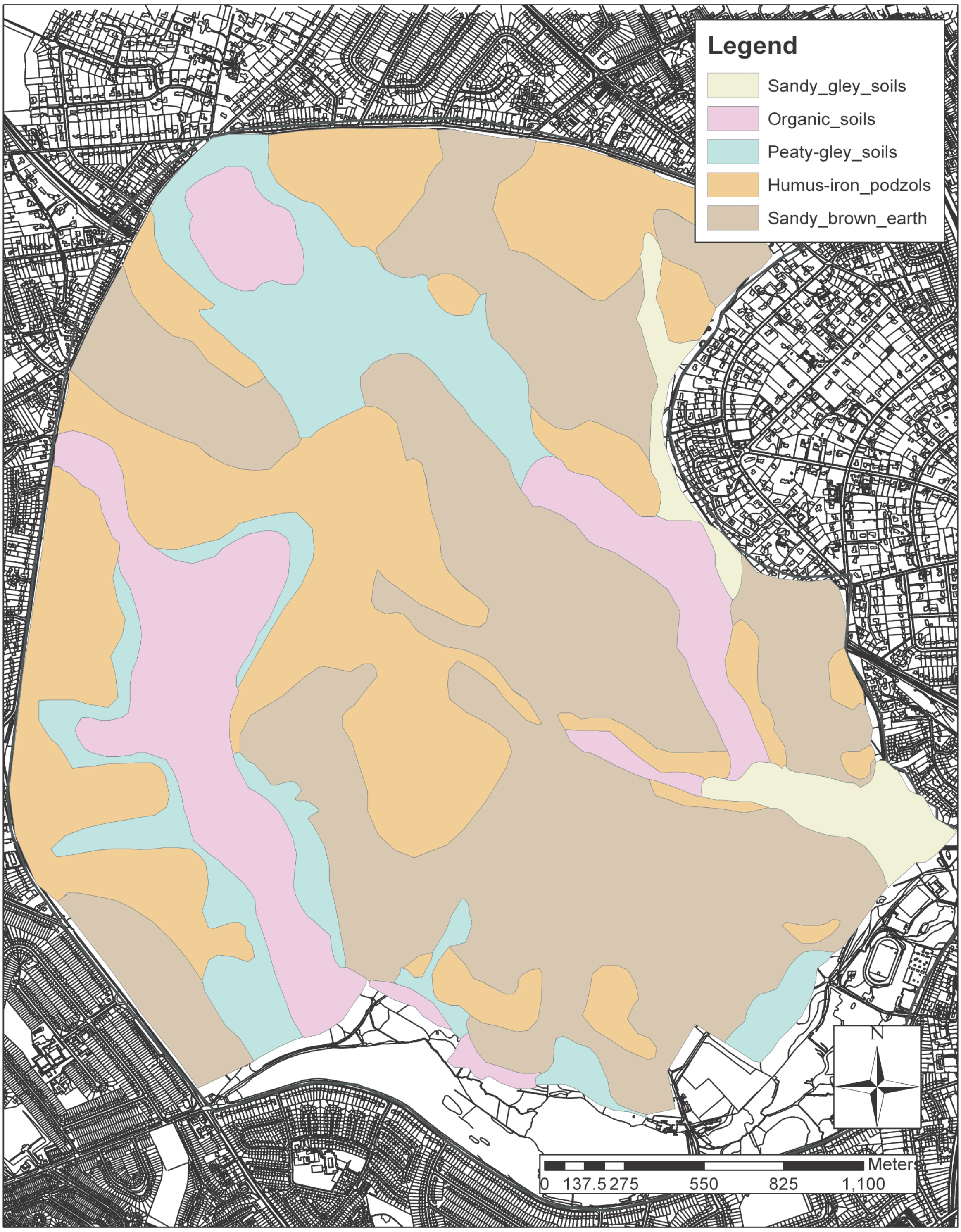
2.2.5. The six pools in the park are Bracebridge, Blackroot, Wyndley, Keepers, Powell's and Longmoor; their locations in comparison with the vegetation of the park are illustrated in Fig. 4. As discussed in section 5.4 these were largely created during the Medieval period ($12^{th}/15^{th}/16^{th}$ Centuries) or post Medieval period (18^{th} century) and hence these sediment traps have the potential to provide environmental evidence for these time periods. The valley floors surrounding Blackroot Pool and Bracebridge Pool, which are situated on the east side of the Park, and Longmoor Pool in the south west have well developed boggy areas and peat bogs associated with them. Peat preserves evidence of past climatic and vegetation change, which can be dated through a variety of techniques, radiocarbon being the most widely used (Charman, 2002). Aquatic and wetland species include Typha angustifolia (lesser reed mace), Typha latifolia (common reed mace), Ranunculus lingua (greaters spearwort), Phragmites (reed grass), Lythrum salicaria (purple loose-strife), Carex rostrata (beaked sedge) and Sphagnum. Successional development between open water communities to fen communities can be seen around many of the pools in the park (Box and Bramwell, 1998). These peat deposits are key target areas with palaeoenvironmental potential and this theme is explored further in Section 6.

Moorland

2.2.6. As discussed above purple moor-grass is extensive across the park often accompanied by *Potentilla erecta* (common tormentil). Other constituents of the grassland include *Dactylis glomerata* (cocksfoot), *Trifolium repens* (white clover), *Lolium perenne* (perennial ryegrass), *Holcus lanatus* (Yorkshire Fog), *Galium saxatitle* (heath bedstraw) and *Cirsium* spp. (thistles).

Woodland

2.2.7. *Quercus* (oak) is the dominant woodland species across the north and east woodlands of the park. The oak trees are the oldest established trees in the park, most being over a hundred years old; generally saplings and young trees are not very abundant (Pritchard and Thompson, 1965). *Betula* (birch) and *Sorbus aucuparia* (rowan) are common components of the woodland along with an *Ilex aquifolia* (holly) understorey. Holly is an unusual component of woodland to the extent that it is seen at Sutton Park, and is not frequently encountered anywhere else in Britain (Field and James, 1965). However, Rackham (1998, 174) notes that holly is a common component of forests and parks on acid soils where it has been cut historically as iron rations for deer and other livestock during the winter. Whilst, this is certainly plausible, there is no documentary evidence for this practice within Sutton Park. However, it certainly raises the possibility of spatially extensive woodland management through strategies such as coppicing. As noted in Section 2.2.2., during the groundtruthing survey, Coutts (2009, 6.1) identified circular pits with banks around them, which it was suggested could be the remains of white coal kilns, possibly of post-medieval date; this may provide supporting evidence for woodland management. On wetter soils around the pools *Alnus* (alder) and *Salix* spp. (willow) thrive. One other main feature of the woodlands of Sutton Park are the plantations of *Pinus sylvestris* (Scots pine) and *Larix* spp. (larch).



PN: 1900
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Figure 02: Soil survey

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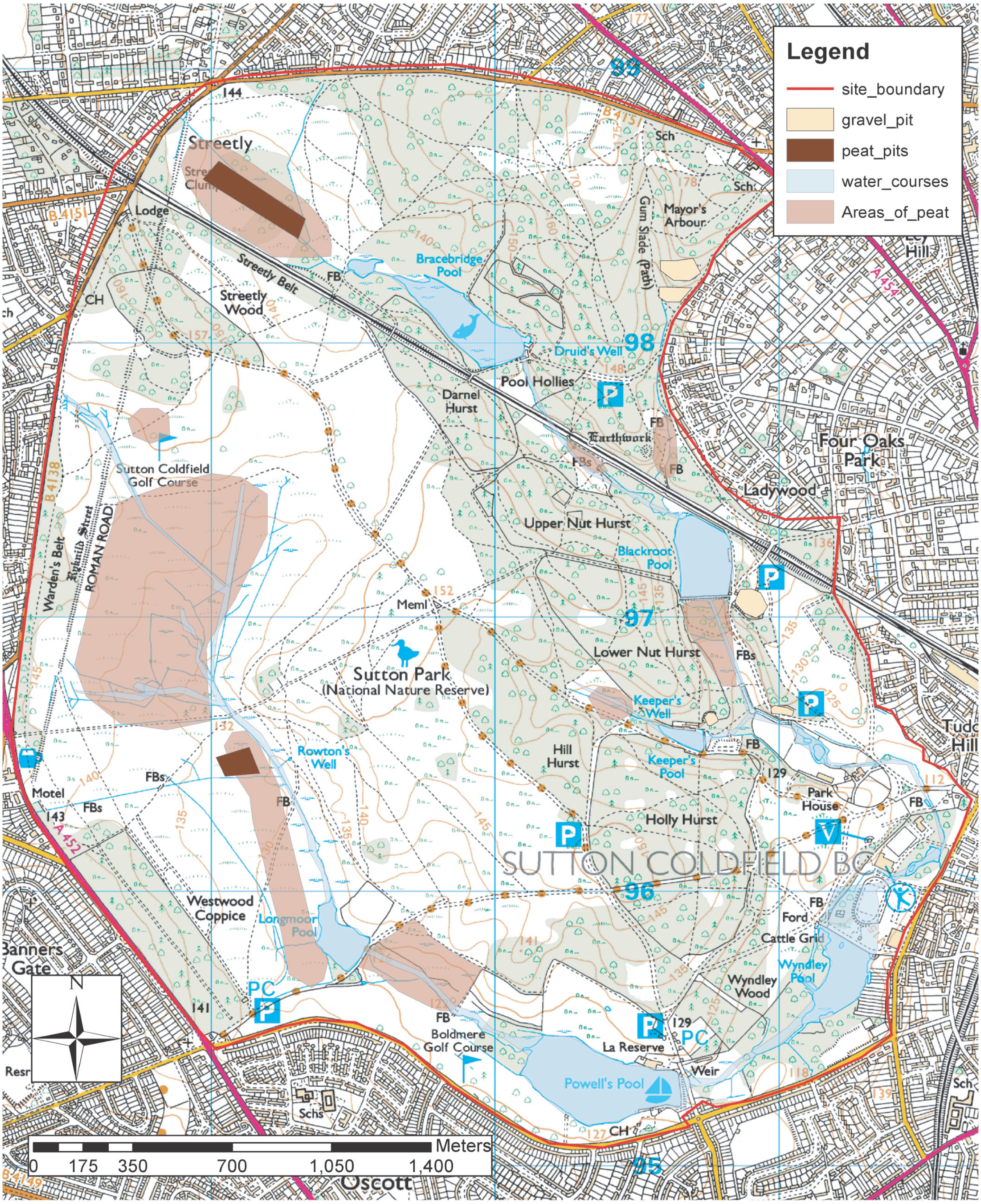

PN: 1900
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Figure 03: Peat Map

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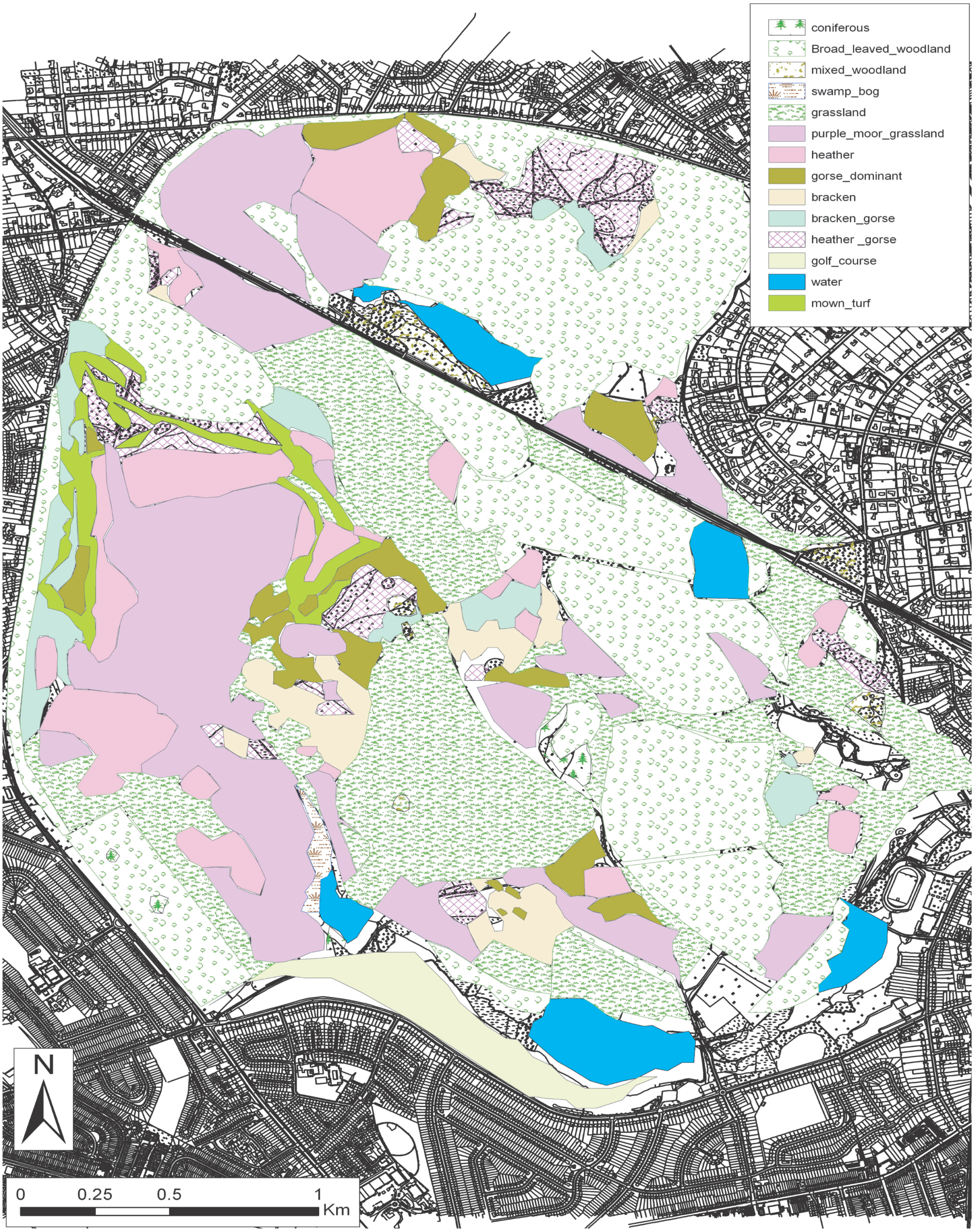
Peat

2.2.8. Peat cutting for fuel took place during the 18th and 19th Centuries. Fig. 2 illustrates the suggested extent of cutting, which is derived from the historic map of the park produced in 1779. However, whilst the evidence for peat cutting is clearly visible in the small tributary draining into the Longmoor Brook to the west of Rowton's Well, there is little visible evidence for former peat cuttings upstream of Bracebridge Pool (see Section 6). However, additional unrecorded evidence for former peat cutting is visible to the south west of Longmoor Pool close to the Westwood Coppice Entrance, as well as upstream of Blackroot Pool (Section 6). Clearly, any evidence of peat extraction will have significant implications for the survival of palaeoenvironmental records, but without further study, the precise impact of peat cutting on the spatial and temporal span of the deposits cannot be assessed with any degree of confidence. Ground truthing of selected archaeological features identified from lidar imagery (Coutts, 2009) suggests a number of possible areas of peat cutting (Site 26, near Bracebridge Pool; Sites 79 and 136, middle Longmoor Valley; and Site 83, upper Longmoor Valley). The period of heavy peat extraction during the 18th and 19th Centuries also coincided with the flourishing sale of timber. An inquiry that was held in 1855 to discuss if the town should be incorporated as a Borough highlighted the fact that oak was the principle (timber) tree in the park (Pritchard and Thompson, 1965). Around this time a number of the woodlands were planted with *Fagus sylvatica* (beech), *Pinus* spp (pine) and *Larix* spp (larch) with the aim of restocking the woods with productive trees (Sutton Park Management Plan 2002, Stefan Bodnar, pers.comm). Semi-natural woodland has been created as a result of human manipulation of the landscape, particularly from coppicing and the development of plantations. As noted by Coutts (2009), there is possible evidence from earthworks for the production of white coal, east of Bracebridge Pool in the vicinity of Pool Hollies (Site 166). Pritchard and Thompson (1965) highlighted that a sum of £3,655 was allocated for drainage of the park during the first half of the nineteenth century. Previous to drainage works, it is likely that more extensive wetlands existed and drainage of these areas will undoubtedly have had an effect on the survival potential of well preserved organic deposits. The impact of drainage on the *in situ* preservation of palaeoenvironmental proxies is unknown.

2.2.9. During the hot summer of 1976, fires swept through the park damaging more than 1,000 acres; with over 100 outbreaks recorded during June and July of that year. Particular damage was caused to the peat deposits in parts of Longmoor Valley (Box and Bramwell, 1998) with heathland and grassland most affected. Earlier reference to fires in 1868 and 1921 is made by Midgley, (1904) and Bloomer (1923) respectively. The fire of 1921 (see also section 5.2.4.) is noted for exposing the remains of *Pinus sylvestris* (Scots Pine). Fires such as these are likely to have impacted on the spatial and temporal survival of organic deposits but as discussed in the context of extraction (section 2.2.8), the precise implications for the peat resource is currently unknown.

2.2.10. Box and Bramwell (1998) compiled data from aerial photographs and the 1964 vegetation survey undertaken by the Nature Conservancy Council to estimate changes in woodland proportions. A large amount of the scrub from the 1989 photographs was *Betula* woodland, which was encroaching on the heathland, mire and grasslands. In 1989 a clearance programme was initiated to protect the sensitive wetlands.



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Sutton Park, Palaeoenviromental and archaeological assessment
Figure 04: Vegetation Map

3. AIMS AND OBJECTIVES

3.1. General aims and objectives

3.1.1. The general aim of this assessment was to summarise and characterise the previous work undertaken and to identify the gaps in the knowledge within the regional research framework developed for the West Midlands (WMRRFA; see for example, Greig, 2007).

3.2. Project-specific aims and objectives

3.2.1. Project-specific aims, as outlined in the project WSI, were as follows:

- To conduct a search of the relevant Historic Environment Record (HER) for Sutton Park and its immediate surroundings, as well as investigation of available published and unpublished archaeological reports and documentary sources.

- To use a geographical information system (GIS) to collate the HER data with a range of other relevant sources of information, including modern and historic mapping, geology/soils maps, information on present vegetation cover (e.g. aerial photography), results of previous palaeoenvironmental investigations, and any other available data such as the results of lidar analysis and associated walkover survey.

- To analyse the collated data and to carry out a palaeoenvironmental assessment of Sutton Park and its immediate surroundings. The GIS would be used to map the extent of deposits likely to contain palaeoenvironmental information.

- To undertake site inspections to investigate the locations identified in the assessment and to develop a subsequent sampling programme.

4. METHODOLOGY

4.1. Documentary research

4.1.1. A search was made of the readily available primary and secondary historical sources held at the Sutton Coldfield Record Office and the libraries of the University of Birmingham. The Birmingham, Staffordshire and Black Country Historic Environment Records (HER), the primary sources for archaeological information for the park, were also consulted. Information was also provided by a Lidar survey of the park and an associated ground truthing exercise, both undertaken as part of the wider, integrated project (section 1.1.1).

4.2. Walkover survey

4.2.1. Subsequent to the completion of initial documentary research as outlined above, a walkover survey of the wetland areas of the park was undertaken in order to assess the topography and current land use. Limited intrusive investigations were carried out as part of this survey (natural bank cleaning and small gauge auger probing).

5. ARCHAEOLOGICAL AND ENVIRONMENTAL CONTEXT

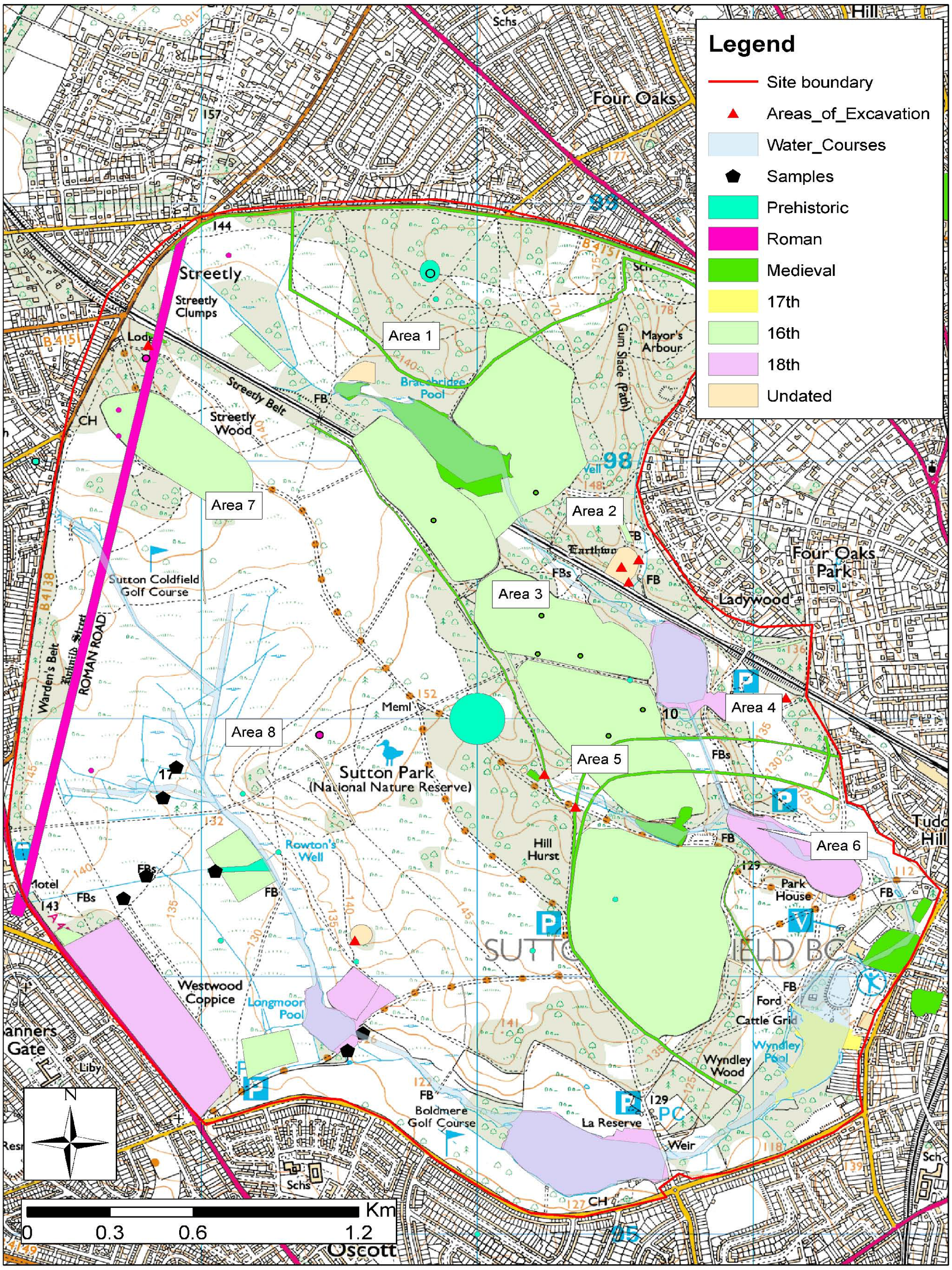
5.1. Introduction

5.1.1. This report represents a summary of the available sources of archaeological and palaeoenvironmental significance. Fig. 5 shows the available HER data colour coded by period along with the excavations that have taken place and environmental samples that have been recovered. The HER data was collected from Birmingham, Staffordshire and the Black Country offices and is shown in Appendix 2.

5.2. The Prehistoric period

5.2.1. The archaeological record of Sutton Park has been summarised by Hooley (1998). The evidence for prehistoric activity consists of flint findspots, burnt mounds, a possible timber trackway and undated earthworks (Appendix 2). Twelve Mesolithic flints (MBM477) were recovered from near Little Bracebridge Pool (SP 4095 2982) and other flints including two scrapers, a blade fragment, a rejuvenation flake and eight flint chips are also reported from the path leading north from the pool. Other flints have been located on Rowton Hill (SP 4091 2967) and from peat cuttings near Longmoor Brook, Rowtons Well and Longmoor Pool. These along with other assemblages collected from the fields during fieldwalking (MBM2444, MBM478, MBM479, MBM480, MBM492) around the park and wider Sutton Coldfield area have produced a corpus of unstudied material (Myers, 2007) that have yet to be considered in their entirety (Hodder 2004, 24).

5.2.2. The most distinctive evidence of prehistoric activity within the West Midlands are the numerous burnt mounds that are located alongside relict and active watercourses. Recently two burnt mounds, one at Langley Brook and one at Collets Brook, were excavated during the construction of the M6 toll road and were dated to the earlier Bronze Age (Stevens, 2008, 457). At Sutton Park six suspected Bronze Age mounds (MBM364) (SP 4098 2987) composed of shattered heated stones with associated pits and possible adjacent hut circles were investigated in 1926 (Bullows, 1926). Somewhat unusually for these monuments they appear to have been located at some distance from a water source (Hodder 2004, 30), but the local geological context indicates that they are located at the junction of permeable and impermeable strata that may result in the localised ponding of water. The excavations of these mounds took place before the advent of radiocarbon dating so these features have no secure chronological control. Recent radiocarbon dating indicates that the burnt mounds of the Birmingham area all appear to date to a fairly narrow time frame in the Middle to Late Bronze Age, 1700-1000 BC (Hodder, 2004, 33). Whilst often associated with troughs and evidently used to heat water, the precise function or functions of these sites remains unclear, with interpretations ranging from cooking to bathing or textile processing (e.g. Barfield and Hodder, 1987; Ó' Drisceoil, 1988).



PN: 1900
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Figure 05: HER Map

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5.2.3. There appears to be some confusion regarding the relationship between human activity and the presence of sub-fossil wood remains in peat deposits near Rowton's Well. Incola, writing in 1762 (reproduced in Midgley, 1904) described the presence of 'fir trees' (? *Pinus*) in the '*vast magazine of peat'* near to the Roman road, the presence of which (some bearing '*marks of the axe'*) he attributed to clearance by the Romans. The inaccurate idea that the Romans were responsible for the presence of sub-fossil wood remains in peat deposits is a common one in antiquarian descriptions of peatlands (e.g. see De la Pryme's [1699], discussion of the [in fact Neolithic] pre-peat tree remains on Hatfield Moors, south Yorkshire).

5.2.4. The exposure of buried wood remains following fires in 1868 (reported in Midgley, 1904) and 1921 (mentioned in Bloomer, 1921) demonstrates the potential of this natural hazard to expose environmental evidence. A possible timber trackway has also been recorded in this area (Plate 1, Hodder 2004, 27 [MBM495]) The date and character of the structure is unknown, although based on Incola's description, Hodder (1988) suggested that it might be a corduroy trackway structure similar to the Neolithic site of the Abbots Way in the Somerset Levels. Hooley (1998) reported that a photograph reproduced by Tansley (1939) purporting to be of a section of this trackway in a peat cutting is of uncertain significance; it may in fact be of a feature recorded in the Somerset Levels (Hodder, pers. comm.). A field visit to this approximate location by the project team failed to identify any surviving archaeological remains.

5.2.5. If the location of the trackway noted in the HER is correct then it appears to be perpendicular to the Longmoor Brook, suggesting that it could have served as a crossing or access to the wetland. This area is also the area of the 'Old Peat Pit' recorded for example by Midgley (1904) and therefore any remains of this archaeological structure would clearly have been destroyed.

5.2.6. However, it is possible that the trackway continues onto the opposite bank and remains of the structure may survive *in situ*. Within this area, thicknesses of peat clearly survive as was demonstrated by the recording and sampling of a peat core undertaken by a final year undergraduate student from Coventry University (1997, Sue Gilroy; supervised by Dr Tim Mighall; see section 5.6).

5.2.7. Little evidence is available for Iron Age activity within the Birmingham area. Walker (1936) described a section through Ryknild Street within the park, which suggests a buried soil and hence palaeolandsurface beneath the Roman road. The soil is described as a 'black peaty sand', which suggests some palaeoenvironmental potential although the samples taken were not analysed. Hodder (pers. comm.) has interpreted the buried soil in one of the sections in Walker (1936) as a podsol and inferred that the Iron Age landscape was dominated by heath and woodland. In 1982, Dr Mike Hodder and Professor Kevin Edwards excavated two soil pits through the Roman road near the Streetly Gate entrance in the vicinity of Streetly Clumps (SP 08869855 and 08909876). Whilst the sections were described and samples for environmental analysis taken, no further work appears to have been undertaken on these samples, though Hodder notes that the analysis from soil samples excavated from under the park's most prominent archaeological remains, the Roman road, has revealed that the Late Iron Age landscape was likely to be dominated by heathland or light woodland (Hodder 2004:47-49). It is interesting to note that between a depth of approximately 0.4-0.6m, reference is made in the two sections to a 'black deposit with rootlets and sand' and 'black organic' material. Comparison of the sections described by Walker (1936) and Hodder and Edwards (field notes from 1982) suggests that this 'organic' horizon is in a comparable stratigraphic position and highlights the possibility that significant palaeolandsurfaces are preserved beneath the Roman road. However, the full potential and extent of these soils is unknown.

5.2.8. A feature identified as an 'Ancient Encampment' earthwork (MBM526) was the focus of a small scale excavation in 1981. This intervention failed to provide any dating evidence or any indication as to the function of the earthwork although it was suggested that the site might represent a settlement with a series of storage pits (Hodder, 1997). If internal features could be shown to exist, these might provide deposits suitable for radiocarbon dating. A subsequent investigation was carried out in 1999 by the University of Birmingham. This included geophysical survey (resistivity and gradiometer) and trial trench and test pit excavation. The excavations indicated the presence of natural strata into which a series of pits had been cut, perhaps associated with quarrying for sand and gravel (Hopkins and Barrett, 1999). The only evidence for the date of these features is the *terminus ante quem* provided by Edwards (1880) whom describes the area as a 'military encampment'.

5.2.9. Another feature named 'the Sutton Park Barrow' (SP 4095 2961) just to the north of Longmoor Pool has proved until the recent past, to be an enigmatic feature. Hodder (1988) described unsubstantiated reports of a 'stone coffin' being exhumed at this location, whilst Hooley (1998) suggested that sediments described as 'artificial' during excavations of this feature in the 19th century (Bracken, 1860) are likely to have been glacial drift. Geophysical investigations (Hopkins and Barrett, 1999) identified various anomalies, but no intrusive work was carried out. More conclusive evidence from excavations by the University of Birmingham in 2001 (Garwood, <u>no summary report</u>), excavated features possibly linked to 20th century military training (see Section 5.5.3)

5.3. The Roman period

5.3.1. The Roman remains in the park are mainly represented by a few findspots and the presence of Ryknield Street (MBM371), which enters the park in the southwest corner and is aligned north-northeast to south-southwest. The Roman road was constructed shortly after the conquest in AD43 between forts at Wall and Metchley. Running for 2km in the west of the park, the road, at the point of its best state of preservation, is some 9m wide and composed of compacted gravel. On either side runs a ditch with associated gravel pits and hollows that provided construction materials (Hodder, 2004, 61). During the excavations of Site 12 of the M6 toll road project, two cemeteries were recorded either side of Ryknield Street (McKinley, 2008). Pollen analysis of a buried soil horizon below the road surface showed a change from an *Alnus* (alder) dominated environment to one that was more open (Scaife, 2008:183). As with the earlier work of Walker (1936) and Hodder and Edwards (1982, unpublished), the work of Scaife hints at the potential for thin, but widespread deposits of organic material to be preserved beneath the road though the precise extent of any such buried soil horizons are unknown.

5.3.2. Several Roman coins dating to the 3rd and 4th centuries (MBM804, MBM1024) have been found near the Roman road, but their exact provenance is a matter of some dispute (Hooley, 1998, 24). There is also mention of a Roman camp but the existence of this has been discounted on account of the earthwork being natural (Hodder, 1977a). There appears little else in the way of more substantial Roman activity in the park.

5.4. The Anglo-Saxon to Medieval period

5.4.1. Sutton Park was formerly part of Sutton Chase, in turn, part of Cannock Forest. Originally, the area would have comprised a variety of habitats (Rackham, 1998) including heathland, woodland, grassland, cultivated land as well as settlement around its edges. Many archaeological features associated with the Chase within the park can be dated back to the 12th century, including a number of substantial earthworks associated with the deer park boundaries (see Hodder, 2004, Fig. 50). In 1528 a charter was granted to enable the Bishop of Exeter to enclose a section of the Chase, allowing the inhabitants to not only graze their animals, but also, '*freely hunt fish and fowl there, with dogs, bows and arrows, and with other engines for deer, stags, hares, foxes and other wild beasts*' (http://www.birmingham.gov.uk/cs/Satellite?c=Page&childpagename=SystemAdmin%FPageLayout&cid=1223092737715&packedargs=website%3DI&pagename=BCC%2FCommon%2FWrapper%2FWrapper&rendermode=1ive); with this charter, Sutton Park in much of its present form came into being. For the next 230 years, local people rigorously protected these rights against landowner encroachment.

5.4.2. The excavation of a trench across the Park II earthwork upstream of the Keeper's Pool by the University of Birmingham in 2001 revealed a potential buried palaeosol beneath the earthwork (identified by Professor Susan Limbrey, University of Birmingham). No record can be found for the further analysis of this feature and therefore its potential is unknown, though it does again demonstrate the potential for buried landsurfaces to be preserved beneath earthworks within the park.

5.4.3. Historical records show that the deer park existed in 1126 (Hodder, 2004, 127) and it is possible that it may have had an Anglo-Saxon origin. Deer parks tended to be created within areas of agriculturally poor land and, in order to maintain livestock control, were established within an enclosed boundary (MBM1623, MBM1624, MBM1625). Therefore, the sandy, pebbly, and acidic nature of soils within Sutton Park (Hodder, 2004, 13), made the site suitable for a deer park. The 12th century boundaries are still visible as above-ground earthworks along Chester Road North, Thornhill Road and Streetly Lane. They would have originally comprised a ditch and bank, with a deer proof fence on top of the bank. Within the park there are further banks and ditches associated with the deer park (www.birmingham.gov.uk). The large boundary ditch is further sub-divided into three smaller areas, which may well have been designed to keep the deer away from damaging the coppiced woodland (Hodder, 1988:174).

5.4.4. The various pools, which are connected by a network of streams and brooks, are considered to be medieval in origin, acting as fishponds (MBM817, MBM2158, MBM2159) for the deer park (Hodder, 2004:122). The pools later became the focus of milling activity with blade, leather, cotton and stone breaking all part of the late medieval to post medieval industry of the park (MBM73, MBM949, MBM1690, MBM 1691, MBM1692).

5.5. The post-medieval to modern period

5.5.1. The Royal Charter of 1528 gave the Park to the people of Sutton Coldfield for animal grazing and as a woodland resource - most of the woods were managed as coppice and each enclosed with a bank and ditch, with a fence or hedge on the bank, to exclude grazing animals (Hodder pers comm). In 1756, an Act of Parliament enabled a local landowner to annexe 48 acres of Sutton Park that adjoined his land, thus changing the shape of the park (for general information on enclosure, see Hodder, 2004, 162). In 1827 an exchange of land also altered the park's boundaries (Hodder 2004, 128). As part of this later agreement, Park Road and a new main entrance were constructed. Another exchange of land in 1937 brought Powell's Pool into the park.

5.5.2. In the 19th century the park became the focus of more formalized recreational activities in the form of two racecourses, a nine-hole golf course, boating, donkey rides, swimming and the construction of refreshment rooms and pleasure gardens. The railway link to Sutton Coldfield, opened in 1879, provided new opportunities for 'day trippers' to enjoy the park. An archaeological watching brief was carried out in

2006 during groundworks along a pipeline to the south of the railway but no archaeological remains were recorded (Charles, 2006).

5.5.3. The park was also commandeered for military training in the 19th Century. This military use continued into the 20th century when camps were built during the First World War for convalescing troops and 'Prisoners of War'. During the Second World War, the park was again utilized for troop training. The testing of heavy military equipment was also carried out and an internment camp for Italians and Germans was built (www.birmingham.gov.uk). Four trenches were excavated in 2001 as part of a student training excavation by the University of Birmingham; these trenches revealed the remnants of military activities within a small circular copse of trees in the southeast of the park (site of the Longmoor Barrow; P. Garwood, pers.comm). There were also trenches over parts of the deer park bank and ditch, which showed the ditches to be shallow, containing only modern bottle glass.

5.6. Previous palaeoenvironmental study

5.6.1. The first published palynological work carried out in the park was by Mackney (1961), but this work mainly concerned recent processes of soil development and podsoilzation. Pollen analysis was carried out to establish the relationship between vegetational succession and processes of soil formation involved, though the location of sampling sites is not specified. The results of the pollen analysis are shown in Fig. 6 and are not especially informative, suggesting that there had been little change in vegetation cover through time. This is surprising given our current knowledge of vegetation development in the Holocene (e.g. Parker *et al.*, 2002) and therefore no conclusions or assertions can be drawn with confidence from this work.

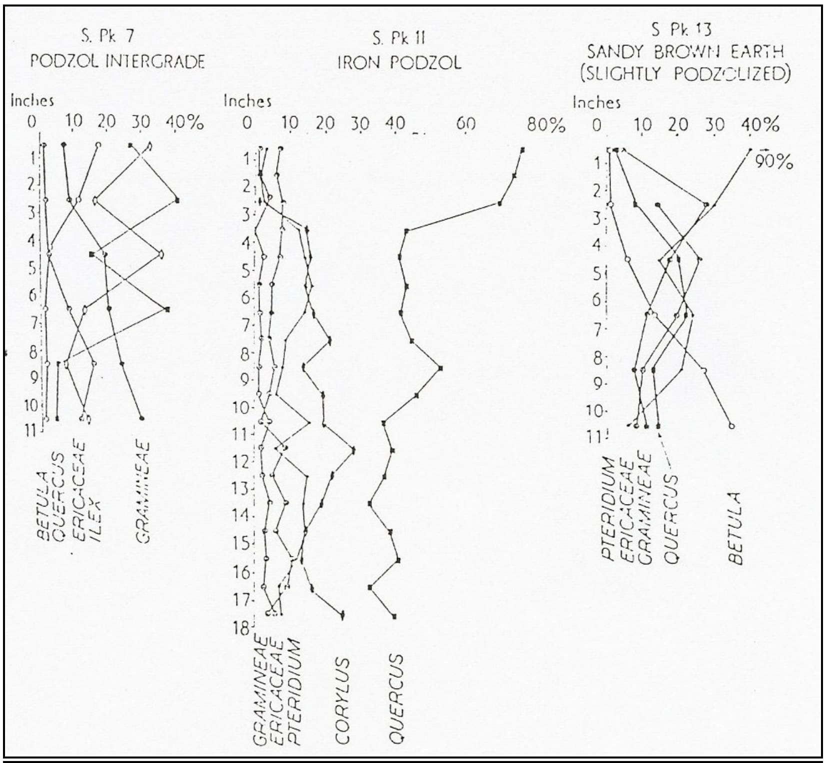


Figure 6: Pollen percentages for selected species encountered in three podzol sequences in Sutton Park. Source:Mackney (1961)

5.6.2. In 1980 Sue Colledge (now University College London) undertook a palaeoenvironmental investigation at Sutton Park whilst studying at the University of Birmingham. A core of unknown stratigraphy was taken from peat deposits in the Longmoor Valley (Fig. 4). A pollen diagram is not available, but Barlow (1988) described the results of these analyses. The pollen was well preserved and abundant in the sample from the 0.50m deep sequence. The main species identified were *Pinus sylvestris* (Scots pine), *Quercus* (oak) *Ulmus* (elm), *Betula* (birch) and *Tilia* (lime). The pollen percentages are shown in Table 1, however it is not stated where in the 0.5m depth sequence these percentages were recorded. As Barlow (1988) suggested, this sequence could date to the early Holocene due to the low amount of *Alnus*, which indicates that the sequence predates the *Alnus* rise. Colledge (1980, cited in Barlow, 1988) assumed that the sequence was pre-Neolithic, probably dating to before 7000 BP. However, whilst the associated pollen spectra indicate that this may seem a plausible date, without radiometric dating, this must remain speculative chronology.

Woodland genera identified from pollen	**Individual pollen count**	**Percentage representation**
Quercus (Oak)	130	21
Tilia (Lime)	120	19
Ulmus (Elm)	120	19
Pinus (Pine)	125	20
Betula (Birch)	112	18
Alnus (Alder)	16	3

Table 1: Pollen results from a 50cm peat sample, Longmoor peat. Source: Colledge (1980), cited in Barlow (1988)

5.6.3. Walker (1936) described a section through the Roman road consisting of 'earth with pebbles' overlying an 'old land surface of black peaty sand'. In 1982, Dr Mike Hodder (now Birmingham C.C.) and Prof. Kevin Edwards (now University of Aberdeen) also excavated soil pits through the Roman road and underlying deposits near Streetly Clumps (Hodder pers. comm.; unpublished field notes). Two sections (SP 0886 9855 and 08909876) are described, each of which has an upper 'dark brown organic' horizon up to 0.10m thick above sandy soil layers (0.30m thick) sealing a 'black organic' deposit some 0.50m thick. Bulk and spot samples were collected from these deposits. Professor Edwards (pers. comm.) has been unable to provide more information regarding the analyses of these samples. The black organic horizons described in both cases would appear to be the buried 'A' horizon of a peaty podzol (typically formed on heathland contexts), evidently pre-dating the construction of the Roman road. The stratigraphic position of the organic horizon recorded by both Walker and Hodder and Edwards is similar and does suggest the potential for buried landsurfaces across the Sutton Park landscape; but in the absence of any assessment, no further comment may be made regarding the palaeoenvironmental potential of such deposits.

5.6.4. In 1997 Sue Gilroy (undergraduate student at Coventry University) sampled deposits approximately 0.9m deep in the Longmoor Valley (SP 09059641) and analysed 16 subsamples for pollen (Dr Tim Mighall pers. comm. - letter to Mike Hodder). The percentage pollen diagram is reproduced in Fig.7. The diagram was zoned into seven local pollen assemblage zones with the prefix SP. The basal zones between 0.90-0.70m (zones SP1-SP3) are dominated by arboreal taxa with high values for *Pinus* (up to 40%) and *Alnus* (up to 50%). Herbs are rare other than Poaceae (wild grasses) and Cyperaceae (sedges), which are represented at up to 15% TLP (Total Land Pollen). The landscape at this time was therefore one of closed woodland, with an alder fen carr growing around the wet fringes of the sampling site and closed canopy mixed woodland with pine, birch, oak and elm on the drier soils. Local conditions would have been slightly more open with grasses and sedges, due to high soil moisture on and around the sampling site. The high values for *Pinus* would indicate that the basal section of the diagram is relatively early Holocene, but post *Alnus* rise (around 7000 BP). Again, this date must remain speculative in the absence of radiocarbon age estimates.

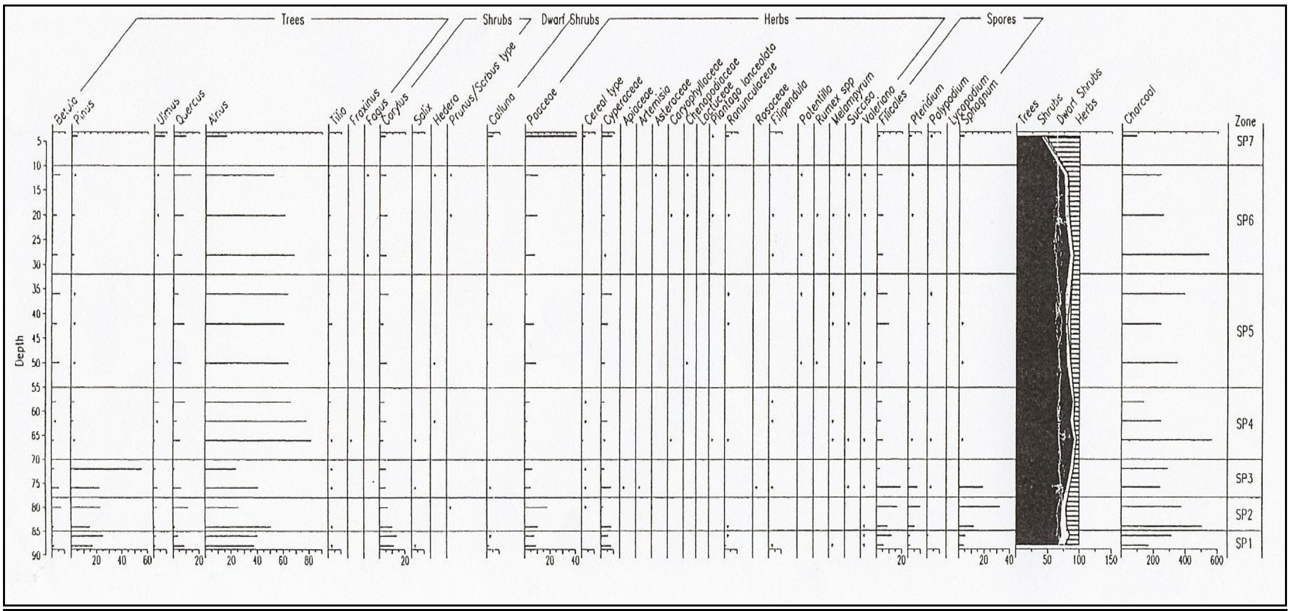


Figure 7: Percentage pollen diagram from Longmoor Peat. Source: Mike Hodder, pers. comm.

5.6.5. The opening of zone SP4 sees a sharp shift in the vegetation with a rapid increase in *Alnus* to values of 80% and a marked decline in *Pinus* to trace values. This could indicate a dramatic clearance phase involving the removal of the pine woodland. However, this is unlikely as there are few changes in 'anthropogenic indicator' pollen taxa, which would suggest the effects of human impact. The most likely explanation is that the environment became wetter as peat accumulation continued and spread across the landscape, creating conditions more favourable for the spread of *Alnus* at the expense of the dryland woodland.

5.6.6. At the top of the diagram herbs predominantly Poaceae and Cyperaceae increase to values over 50%. *Alnus* has declined, but *Quercus* has sustained relatively consistent values throughout the diagram suggesting that it remained an important component of the woodland throughout. The sharp decline in *Alnus* and rapid increase in Poaceae indicates an expansion in open areas on the sampling site. It is likely that the record of Poaceae in this diagram is largely referable to wetland grasses, specifically *Phragmites* (common reed), which is common at Sutton Park today.

5.6.7. There is little unequivocal evidence for the effects of human activity in the diagram. Herbs are generally rare and in low quantities suggesting a closed woodland environment beyond the wetland area. Sporadic occurrences of *Plantago lanceolata* (ribwort plantain) may relate to naturally open, grassy areas in the woodland rather than clearances related to anthropogenic activity. Clear and unequivocal evidence for human impact on the environment would not be anticipated for the early Holocene.

5.6.8. The peat deposits at this location have clearly been truncated by peat cutting (Sections 2.2.8, 2.2.9) or other anthropogenic disturbances such as fires (Section 2.2.10). Whilst no radiocarbon date is available for the top of the pollen diagram, it would appear that the top of the sequence does not extend very far into the mid Holocene. However, given the lack of closely dated palaeovegetational records available for comparison from the immediate area, it is difficult to draw firm conclusions regarding the chronology of this diagram.

5.6.9. In terms of the regional context, perhaps the closest parallels are found in south Staffordshire in the form of the peat deposits around Shenstone and Wall, just to the north of Sutton Park (Leah *et al,* 1998: Godwin and Dickson, in Gould, 1966). The peats around these two areas are generally shallow and degraded and hence palaeoenvironmental records from this region are scarce. In 1958 Shotton and Strachan (cited in Leah *et al.*, 1998) recovered a pollen sequence from a basin mire approximately 13 km north of Wolverhampton. These investigations concluded that organic deposition began shortly before 10,923-10,321 cal. BC (10 670±130 BP, Y-646). Leah *et al*. (1998) commented that no features attributable to human activity are discernible from this early study, which may be regarded as relatively low resolution by modern standards.

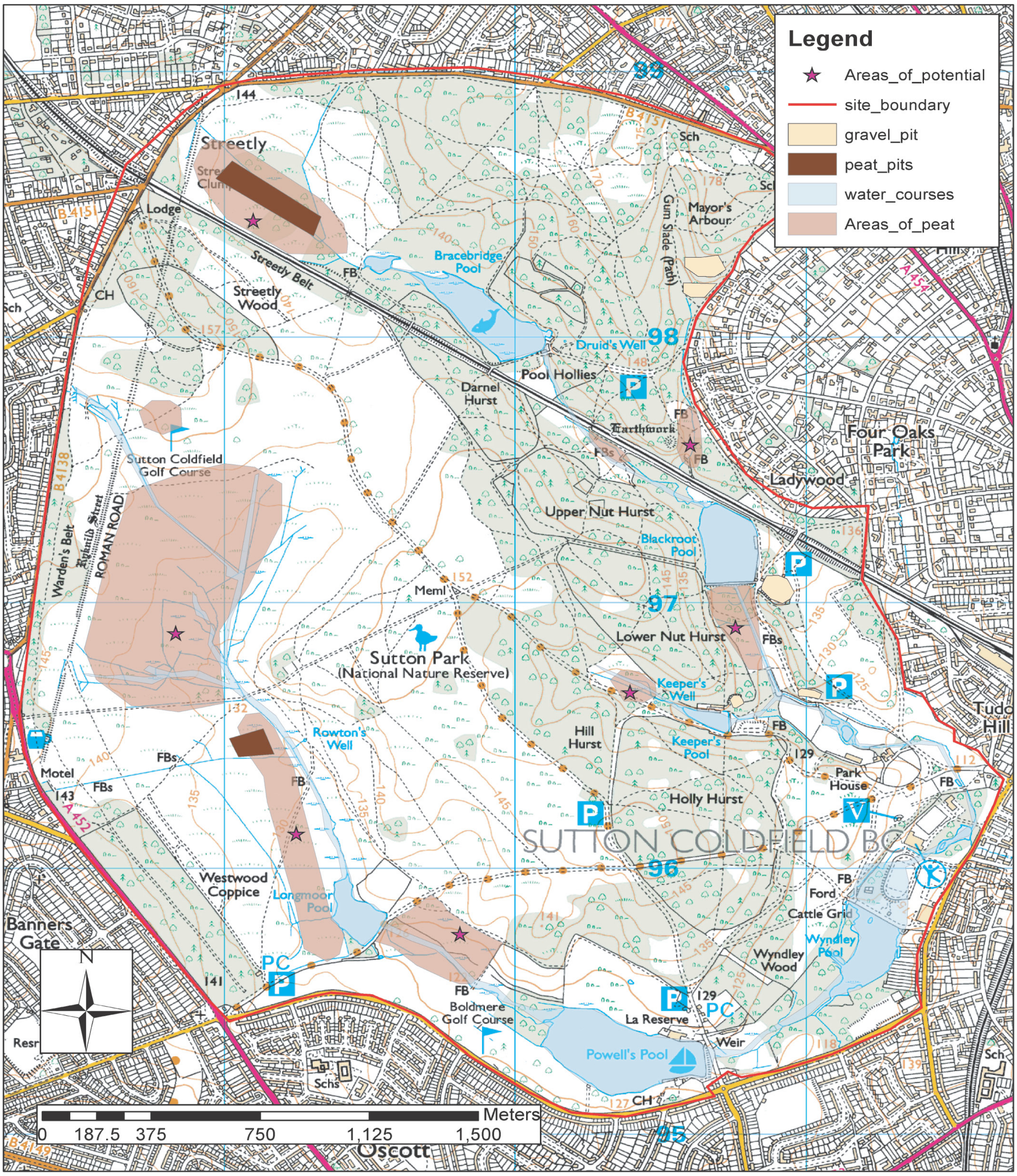
6. WALKOVER SURVEY

6.1.1. A walkover survey of the valleys and other areas of environmental potential was conducted as part of this Desk Based Assessment. This survey did not involve intensive invasive analysis, sediment description and sampling, but comprised inspection of the ground surface, any natural cutbank exposures and limited augering where no natural banks were available.

6.2.1 **Area 1, Bracebridge Pool**

Bracebridge Pool and Little Bracebridge Pool (LBP) are situated in the northwest of the park in the valley of the Plant Brook (Plate 3). Either side of the main pool, the steep valley sides are covered by the woodlands of Pool Hollies and Darnel Hurst, though to the northeast, this woodland is replaced by heathland. During ground truthing of the features identified on the Lidar imagery, Coutts (2009) identified possible earthworks associated with the production of white coal in the vicinity of Pool Hollies (Site 166). The Medieval Park III boundary is encountered on the eastern valley side and in the north-eastern corner; burnt mounds have been recorded on higher ground, their position associated with the junction of permeable and impermeable geological layers causing natural water ponding.

Although the valley sides around the main pool are steep, on the eastern side there are flatter areas, where drainage is impeded and surface vegetation suggests small areas of bog. One notable area is immediately adjacent to the footpath where it is close to the Park III earthwork. Woodland cover comprises Silver Birch with the understorey a mixture of grass, tussock-sedge and *Sphagnum* cushions (Plate 1). At the time of inspection, the ground surface was waterlogged. A single core, C1, taken within the area revealed 0.5m of homogenous peaty silt, well humified with depth.



PN: 1900
Sutton Park, Palaeoenviromental and archaeological assessment

Figure 08: Potential sample sites map

BIRMINGHAM ARCHAEO-ENVIRONMENTAL BAE
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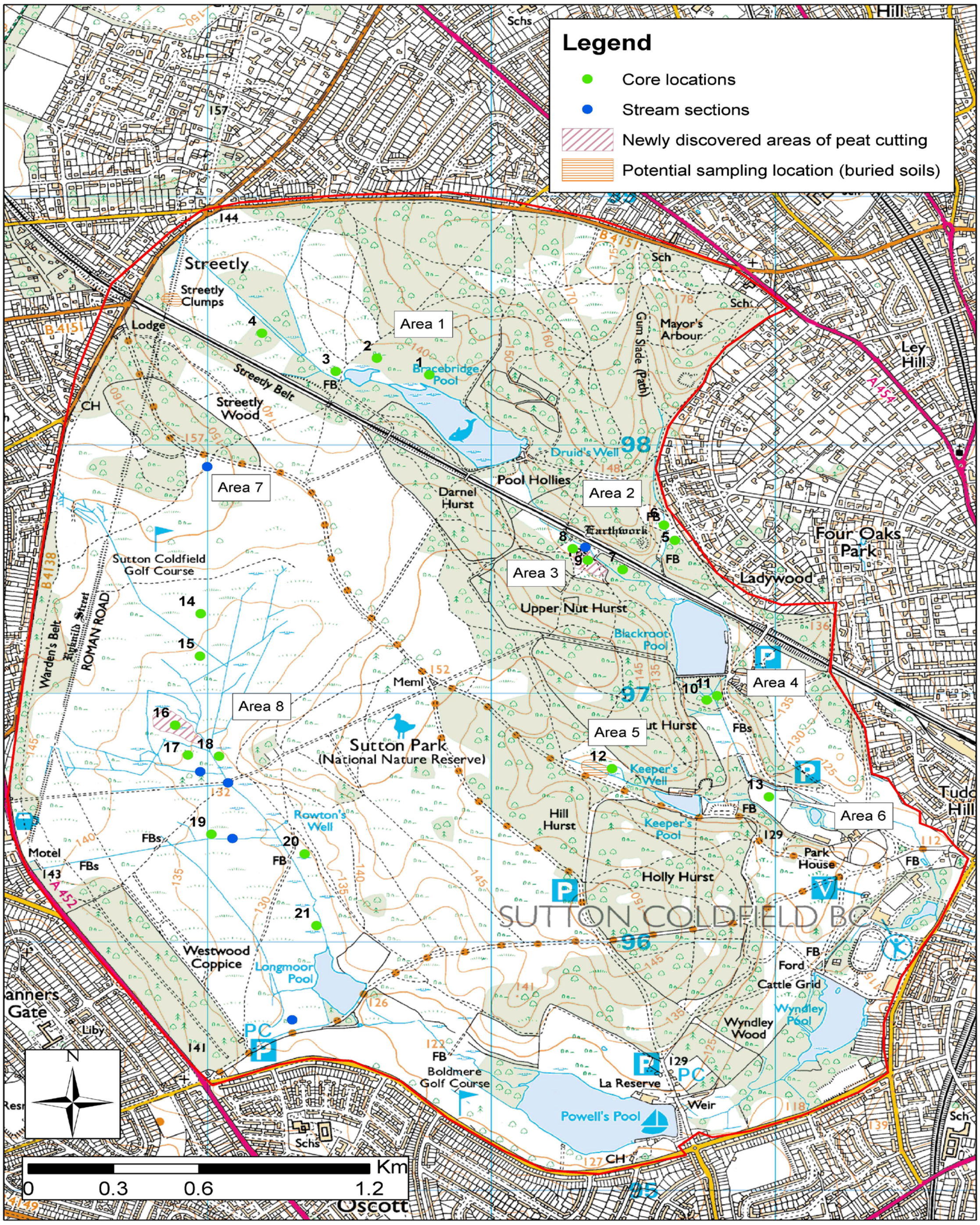

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Sutton Park, Palaeoenviromental and archaeological assessment
Figure 09: Coring Map

BIRMINGHAM ARCHAEO-ENVIRONMENTAL BAE
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Plate 1 Boggy ground west of Bracebridge Pool

During groundtruthing of selected archaeological sites identified from the Lidar imagery, Coutts (2009) noted a series of ditches and hollows (Site 26) adjacent to Bracebridge Pool that provide possible evidence for peat cutting.

Above LBP, dense woodland immediately surrounds the Plant Brook and the area adjacent to the channel can be described as waterlogged and boggy. The western edge of the upper part of this valley has been significantly disrupted by the construction of the railway line and is now marked by a significant, artificial terrace. The affect of the construction of the railway line on local hydrological conditions and drainage is unknown. The contemporary brook is heavily canalized and there is evidence for the recent construction of a number of weirs along it, possibly in an attempt to reduce the amount of coarse grained sediment entering the pools. Within this area, peat pits have previously been identified (see Fig. 8) and although woodland immediately upstream of LBP is dense (comprising alder and silver birch), approximately 100m to the north, it thins substantially to more open areas comprising grassland and Silver Birch (Plate 2). Whilst it is conceivable that this area was once dug for peat, there are no obvious hags or areas of hummocky terrain at the surface. However, several auger cores identified the sediments as between 0.1m and 0.4m thick and highly minerogenic. Within this upper area, the stream channel bifurcated and received a large number of other drains. Perhaps taken together, this evidence might suggest that the area may well have been dug for peat and that it now contains only very recent deposits.

Plate 2: Possible peat cutting area north of Little Bracebridge Pool

Immediately upstream of LBP within the densely wooded valley floor, more substantial deposits of peat up to 0.5m thick are recorded. A core, C2, from within one small glade comprised:

0-0.2m – Red black, moist, well humified peaty silt with visible woody fragments
0.20-0.21m – Buff brown, medium sand layer with small quartzite clasts
0.21-0.43m – Red brown, moist, well humified, silty peat with visible macrofossils.

The presence of the sandy layer (0.20-0.21m) within the peat signifies flood activity during organic sedimentation and it is not know precisely what impact such processes may have had on the integrity of the valley floor peats. This may merit further investigation.

The edges of the modern channel certainly indicate that peat deposits are present, but cleaning back of sections and augering through these deposits suggest that the peat is part of recent in-channel sedimentation and comprises a mix of clays and peats. Therefore, it is recommended that any future recording and sampling in these areas should be undertaken at least 5m back from contemporary channels.

Plate 3: Stream side deposits north of Little Bracebridge Pool

6.2.2. Area 2, Ladywood

This small valley is located immediately adjacent to Ladywood and drains under the railway line into the Blackroot Pool. The lower part of the valley is heavily wooded with birch and alder and the understorey vegetation comprises glades of grass, tussock sedge and marsh marigold. The upper part of the valley, which appears to be the remains of a former dry, periglacially modified valley, is more open and comprises stands of Silver Birch and grassland. The environmental potential of the upper part of this valley is low.

The lower part of the valley adjacent to the stream can be described as waterlogged and boggy and a single core, C6, taken approximately 50m from the road recovered 0.5m of organic sediment:

0-0.2m – Macroscopic plant remains with readily identifiable vegetation, moist.
0.2-0.5m – Red brown silty peat with visible woody remains, moist.

Further towards the hill noted with earthworks on the map (the site of previous Birmingham University excavations), a single core, C7, showed that this boggy area contained notably more minerogenic sediments, around 0.3m thick.

Immediately adjacent to the small stream crossing, an area of damp vegetation was shown to be underlain by 0.3m of sandy, peaty silt.

6.2.3.1. Area 3, Plants Brook upstream of Blackroot Pool

Upstream of Blackroot Pool, the majority of the Plants Brook valley floor is densely wooded comprising a mixture of Alder and Silver Birch. The ground can be described as waterlogged and boggy. However, upstream of the first tunnel access under the railway that leads to Lady Wood, the valley floor opens up and the western area comprises open ground.

A single core, C8, drilled on the valley floor close to the first tunnel access revealed 0.45m of organic sediment. The upper 0.33m was very fibrous and included significant identifiable plant remains, whilst the lower 0.12m comprised a moist, humified, silty peat (Plate 4).

A second core, C9, drilled further towards the contemporary channel recorded 0.7m of silty peat with a notable sand (flood horizon) midway through the unit.

Upstream of these cores, the western bank of the floodplain has little in the way of established woodland, instead comprising a mixture of heather, bilberry, young Silver Birch, Bog Cotton and *Sphagnum*. This area of ground is notably hummocky and appears to have a number of clearly defined edges, possibly indicative of former peat digging (though this is not recorded in previous documentary accounts; Sections 2.2.8., 2.2.9). Coring of several of these *Sphagnum* tussocks revealed between 0.2 and 0.6m of organic sediment, in varying states of humification.

Plate 4: Core of silty peat upstream of Blackroot Pool

Towards the second access tunnel beneath the railway line cleaning of stream bank sections revealed the following general sequence:

0-0.3m – Medium to coarse, poorly sorted, matrix supported gravel, sharp basal contact (upcast from channel?).
0.3-0.58m – Peaty sandy silt, moist. Abundant modern rootlets. Merging basal contact.
0.58-0.83m – Medium to coarse, poorly sorted, matrix supported gravel, very sandy in places with areas of peaty sediment (reworked gravel bedload?).

6.2.3.2. **Area 4, downstream of Blackroot Pool**

Downstream of Blackroot pool but above the Blade Mill pond site, the valley floor widens and is colonized by a mixture of Alder immediately adjacent to the stream and Silver Birch near the valley edges. The understorey vegetation comprises grassy glades with patches of Marsh Marigold and Water Horsetail and the surface can be described as waterlogged and boggy. Immediately upstream of the first bridge crossing, two cores, C10 C11, either side of the floodplain both recorded 0.6m of homogenous silty peat.

6.2.4. **Area 5, upstream of Keeper's Well**

Immediately adjacent to the contemporary channel, this small valley is colonized by Alder and Silver Birch woodland with the understorey vegetation comprising tussocky sedge. The area is notable for the two medieval earthworks of Park I and Park II which cross the valley floor in close proximity to each other. In 2001, the University of Birmingham excavated a small trench across Park II, which revealed a potential palaeosol developed beneath the earthwork (Plate 5).

Plate 5: Trench through deer park bank exposing buried land surface

Whilst no detailed analysis appears to have been undertaken on this former land surface, it does demonstrate the potential for buried soils to be preserved beneath the earthworks across the Park (Section 5.4.2). Immediately opposite Park I, a small glade is visible across the river, which appeared higher and drier than the surrounding area. However, a single auger core, C12, recorded 0.7m of fine grained sediment comprising:

0-0.3m – Stiff, grey brown sandy clay
0.3-0.6m – Moist, red brown silty peat, notably woody in basal 0.3m.

During groundtruthing of possible archaeological features identified from the Lidar imagery, Coutts (2009) noted many small pits in the Hurst Valley (Site 86) that may provide evidence for possible peat extraction.

6.2.5. Area 6, Blade Mill Pond

The Blade Mill Pond is suggested to be one of the only (former) artificial pools in Sutton Park that has not been dredged in living memory. If this is an accurate assertion, the sediments within this feature have the potential to provide a post-medieval record of environmental change for the surrounding area. The present site comprises rough ground, but no areas of deeply ponded water. The vegetation comprises tussock sedge with occasional Alder and the present ground surface can be described as waterlogged and boggy. The random drilling of several cores around the site suggests a variable thickness of sediment ranging from 0.2m to 0.90m (though unbottomed). The least promising sediments comprised stiff, inorganic grey sandy clays. However, one core, C13, (Plate 6) produced a more promising sequence which comprised:

0-0.4m – Grey brown, slighty humic, stiff sandy, pebbly clay, moist.
0.4-0.6m – Buff brown, medium sand, wet.
0.6-0.72m – Red brown silty peat, moist.
0.72-0.73m – Buff brown fine sand, wet.
0.73-0.87m – Red brown peat, moist.

This latter sequence clearly suggests that there have been periods of changing sediment supply, as well as changing rates and patterns of deposition within this basin. Such changes may merit further investigation, especially if linked to analysis of mineral magnetic signatures and sediment geochemistry.

<u>Plate 6</u>: Core through sediments at Nature Reserve Mill Pond; note sand horizons indicative of changing sediment supply.

6.2.6. Area 7, Streetly Wood

Within the boundaries of the course of Sutton Coldfield Golf Club, a small tributary that eventually drains into the Longmoor Valley flows immediately adjacent to the Agger of the Roman Road. Its small floodplain is characterized by dense woodland of Alder, Silver Birch and a single Mountain Ash tree. Streamside sections indicate the presence of black, peaty silt, but coring close to the channel indicates that this is only around 0.1m thick.

6.2.7. Area 8, The Longmoor Valley

Situated along the western edge, this is the largest valley within the Park and is known from previous documentary evidence to contain the most extensive peat deposits. A small misfit stream flows through the contemporary floodplain and the broad, shallow relief of the valley is clearly inherited from the periglacial processes and conditions of the last Ice Age. For ease of discussion, the valley has been divided into two zones: the upper valley; and the middle valley. The lower part of the valley below Longmoor Pool and including Powell's Pool and Wyndley Pool is heavily affected by urban encroachment and therefore excluded from this assessment.

6.2.7.1. The Upper Longmoor Valley

This area is considered to be the part of the valley north of the practice rifle targets. The vegetation surrounding the channel in the southernmost part of this area is covered with dense Alder and Silver Birch and the channel sides comprise blackened material suggestive of peaty sediments. However, cleaning of a natural bank section to the north of the rifle targets revealed the bank to comprise 0.35m of dry, peaty topsoil, becoming silty with depth, resting directly on outwash sands and gravels.

Immediately to the north of this section, the vegetation opened out into scrubland with young Silver Birch, tussock sedge, heather and some *Sphagnum*. The hummocky nature of the area is perhaps suggestive of former peat extraction and drilling of several cores, C14-15 recorded identifiable organic matter, less than 0.5m thick, which perhaps indicates sediment immaturity.

In the northern part of this area, immediately south of the golf course, the valley forms a well defined basin and is relatively open with notable cotton grass and *Sphagnum* across its surface, which was waterlogged and boggy. The drilling of several cores, C16-18 revealed up to 0.75m of moist red black peat with occasional woody fragments (Plate 7). This also appears to be an area of possible peat cutting according to Coutts (2009, Site 83).

Plate 7: Organic sediments preserved in the upper Longmoor Valley

6.2.7.2. The Middle Longmoor Valley

This area is considered to be the part of the valley south of the practice targets as far as the access road to the Westwood Coppice Entrance. This part of the valley is open and the majority of the area is covered by low heathland vegetation with occasional stands of relatively young Silver Birch. Where wetter areas are present (particularly around the northern edge of Longmoor Pool), *Sphagnum* cushions, tussocky sedge and bulrushes are present.

A drainage ditch running east-west across the valley adjacent to the footpath along the northern edge shows a thin deposit of peaty topsoil, but this is less than 0.5m thick. Flecks of charcoal within this thin material suggest evidence of burning, but this is probably relatively recent (Section 2.2.10).

The eastern side of the middle valley is dissected by a number of periglacial dry valleys and a notable river terrace is apparent 2-5m above the contemporary channel. This feature is notable since it is covered by boggy ground and contains peaty sediments, locally up to 0.5m thick. The age of this intermediate terrace is unknown though it is probably of early-Mid Holocene date.

A major ditch, draining the western side of the middle valley is notable since it contains up to 0.8m of silty peat, although towards the main channel, the small tributary has been enlarged through historical peat cutting (Section 2.2.8, 2.2.9). The thickest part of this sequence was sampled by researchers from both the Universities of Birmingham (Section 5.6.2) and Coventry (Section 5.6.4). A single core, C19, drilled within the area by the present investigators recorded 0.8m of moist, homogenous silty peat with occasional woody fragments and evidence of charcoal inclusions near its base.

Exposures of sediments perhaps suggestive of peat accumulation are evident within the modern channel banks around the culvert and stream crossing at the northern end of the middle valley (i.e. east of the practice targets). However, cleaning back of the bank section immediately downstream of the crossing indicated that the sediment comprised approximately 0.6m of humic clay with notable sandy horizons indicative of higher energy flood events (Plate 8).

Plate 8: Stream bank sediments in middle Longmoor Valley note; sandy horizons indicative of sediment mixing

Immediately north of Longmoor Pool, stands of bulrushes suggest waterlogged conditions, but several auger cores, C21, within this area suggested less than 0.2m of sediment is present, much of which is highly minerogenic.

In addition to the cutting of peat in the tributary valley (Section 2.2.8, 2.2.9), significant evidence for peat cutting is readily apparent to the west of the Longmoor Pool, immediately adjacent to car park of the Westwood Coppice Entrance. Several peat hags are clearly visible as well as an access road for the removal of peat (Plate 9).

Plate 9: Area of peat cutting at the southern end of the middle Longmoor Valley
Groundtruthing of potential archaeological sites identified from Lidar imagery in the middle Longmoor Valley has identified a number of areas of potential peat cutting (Site 79; Site 136) as well as two potential burnt mounds (Site 117).

6.2.8. **Other Areas of Environmental Interest**

In addition to the valley floodplains, which also contain archaeological earthworks, two other remnants of the archaeological record deserve consideration in terms of their environmental potential.

6.2.8.1. **The Roman Road**

The well preserved *agger* of the Roman road is a significant archaeological monument along the western edge of the park. As with other earthworks such as the deer park boundaries (Sections 5.4.2; 6.2.4), there is the potential for palaeosols indicative of former land surfaces to be preserved beneath this monument. This has been demonstrated by earlier archaeological investigations by both Walker (1936) and Hodder and Edwards (1982; unpublished fieldnotes) and is reported in Sections 5.3.1. and 5.6.3. No exposures are currently available in the *agger*.

6.2.8.2. **Abandoned Gravel Pits**

As described in Section 2, the Park is underlain by outwash sands and gravels, which in the past have provided a source of aggregate for local construction. The two most significant abandoned gravel pit exposures are located at the eastern side of the park adjacent to Keeper's Pool and close to Park House. Whilst degraded, the upper parts of these exposures show evidence for cryoturbation and podsolization. Although these cryoturbation features are the result of periglacial activity and hence were formed during the last Ice Age, the podsolization may have occurred either during the Ice Age or more recently. Since these sediments were deposited as outwash during cold glacial conditions when vegetation cover was sparse, the potential for finding organic sediments within them is relatively low.

Plate 10 Abandoned gravel pit exposures immediately north of Keeper's Pool.

7. LIDAR

7.1. As part of this project, access has been provided to both colour aerial photography of the park and the output digital terrain model (DTM) generated by a recent Lidar survey. The Lidar survey was commissioned by Birmingham City Council and funded by English Heritage as an integral component of this project, though undertaken by other contractors (Unit for Landscape Modelling, Cambridge University). In addition, a third integral component of this project was ground truthing to inspect archaeological features identified and mapped from Lidar imagery; again this component was undertaken by a separate archaeological contractor (Warwickshire Museum Field Services; Coutts, 2009) though the results have been made available for this assessment and incorporated into the body of the report relating to the walkover survey (Section 6) as appropriate. The high resolution surface models that Lidar surveys provide are now commonly used by heritage and environmental specialists to identify and map a range of archaeological features such as earthworks (Bewley et al., 2005), as well as natural landforms such as palaeochannels and kettle holes that are capable of acting as sediment traps for environmentally significant sediments (Challis, 2006; Challis et al., 2008; Howard et al., 2008).

The Application of LIDAR to Sutton Park, and Environmental Geoprospection

7.2. Systematic analysis of the DTM created from the Lidar data together with the colour aerial photography appears to show little in the way visible features that will be of interest from an environmental perspective. For example, in the Longmoor Valley,where the most significant environmental deposits are recorded, no additional features have been recorded to those noted during the walkover survey (Fig. 10).

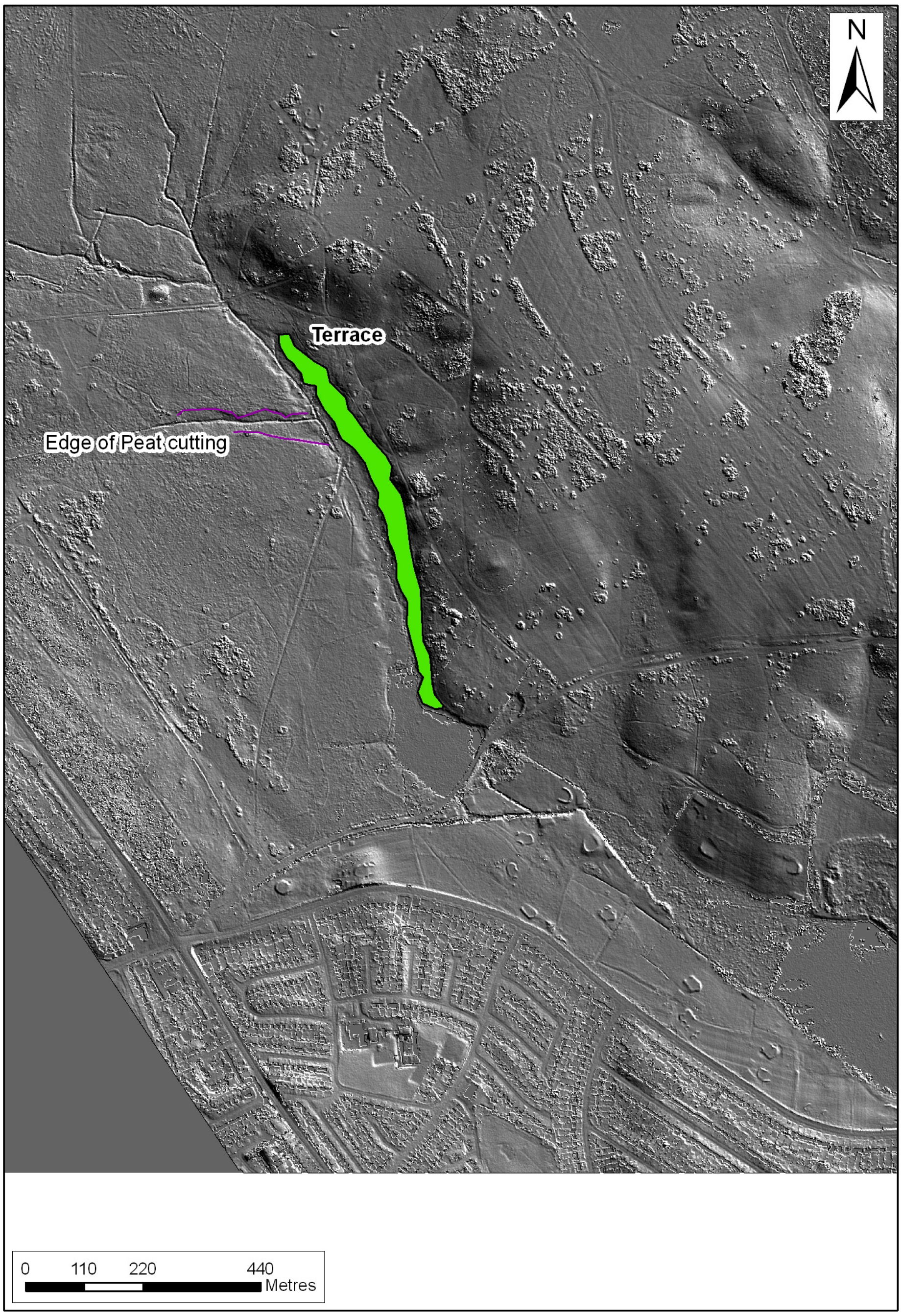


Figure 10. Lidar in the vicinity of the Longmoor Valley recording a former area of peat cutting as well as the terrace, which flanks the contemporary stream channel.

7.3 Along the Plants Brook, upstream of Blackroot Pool, a similar situation is found where only features noted during walkover survey were again recorded. However, significantly, this does include corroboration of peat cutting within this area (Fig. 11; see Section 6.2.3.1).

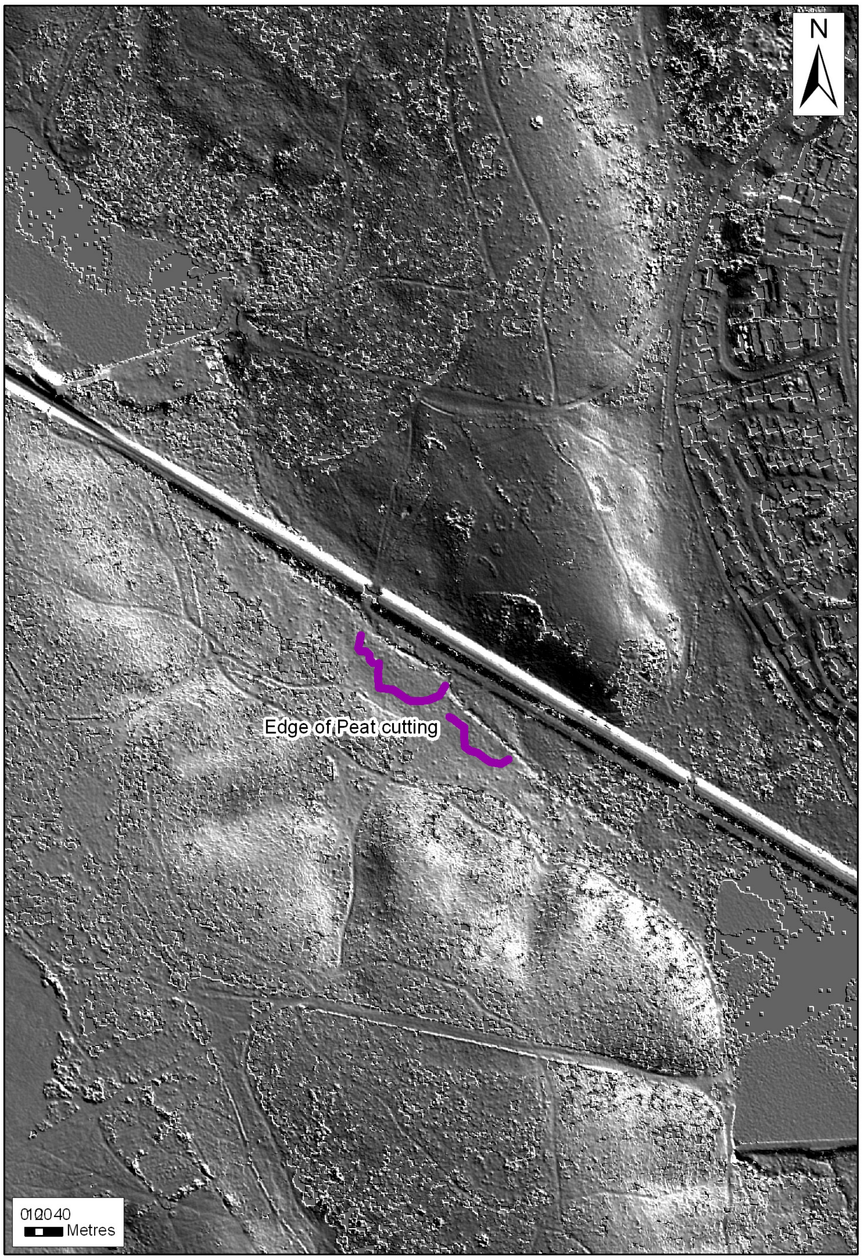


Figure 11. Evidence for peat cutting is recorded along the Planters Book upstream of Blackroot Pool.

7.4 However, other areas where potential peat digging is suggested to have taken place, for example to the north of Little Bracebridge Pool, show little evidence on the Lidar DTM (Fig. 12).

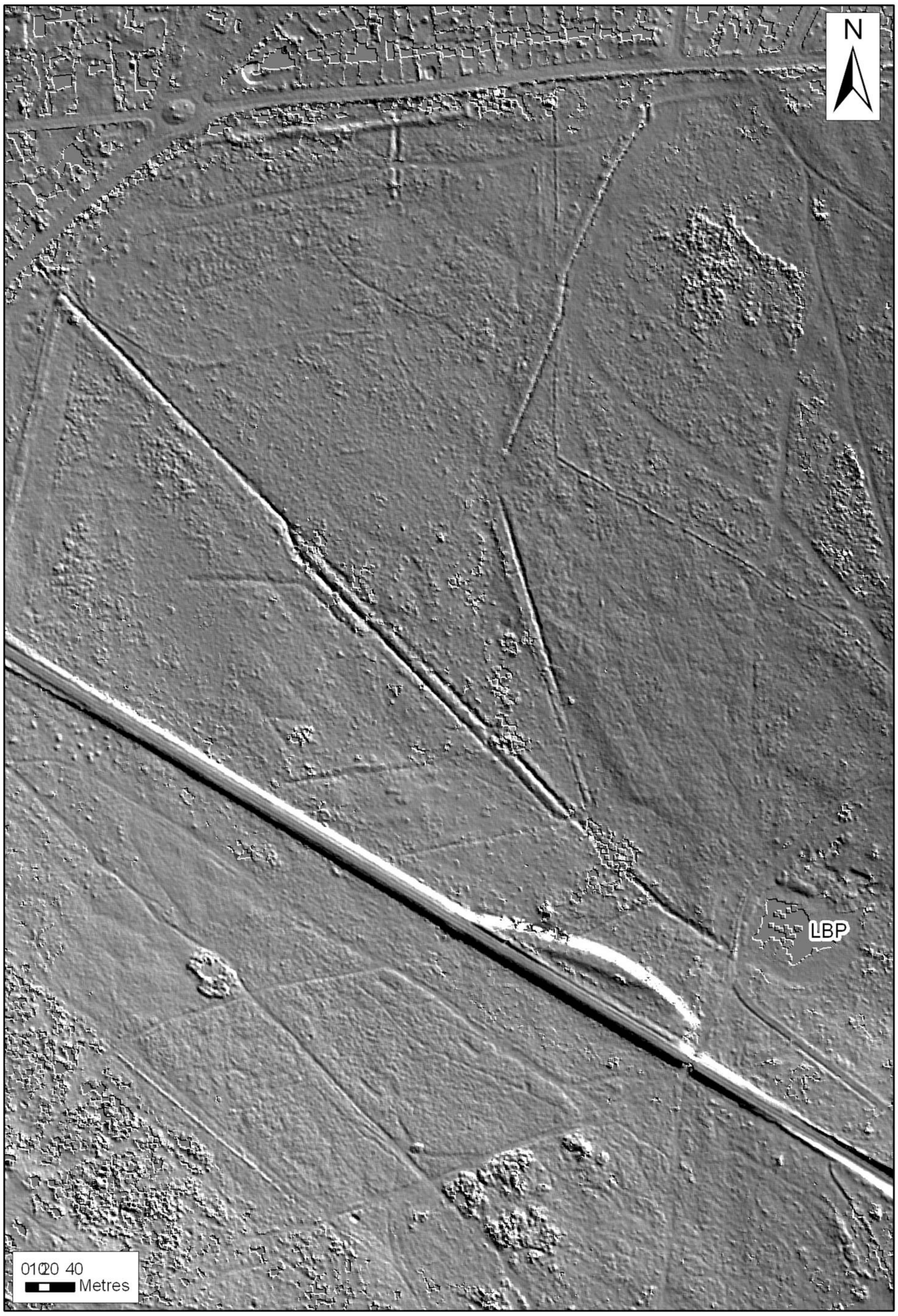
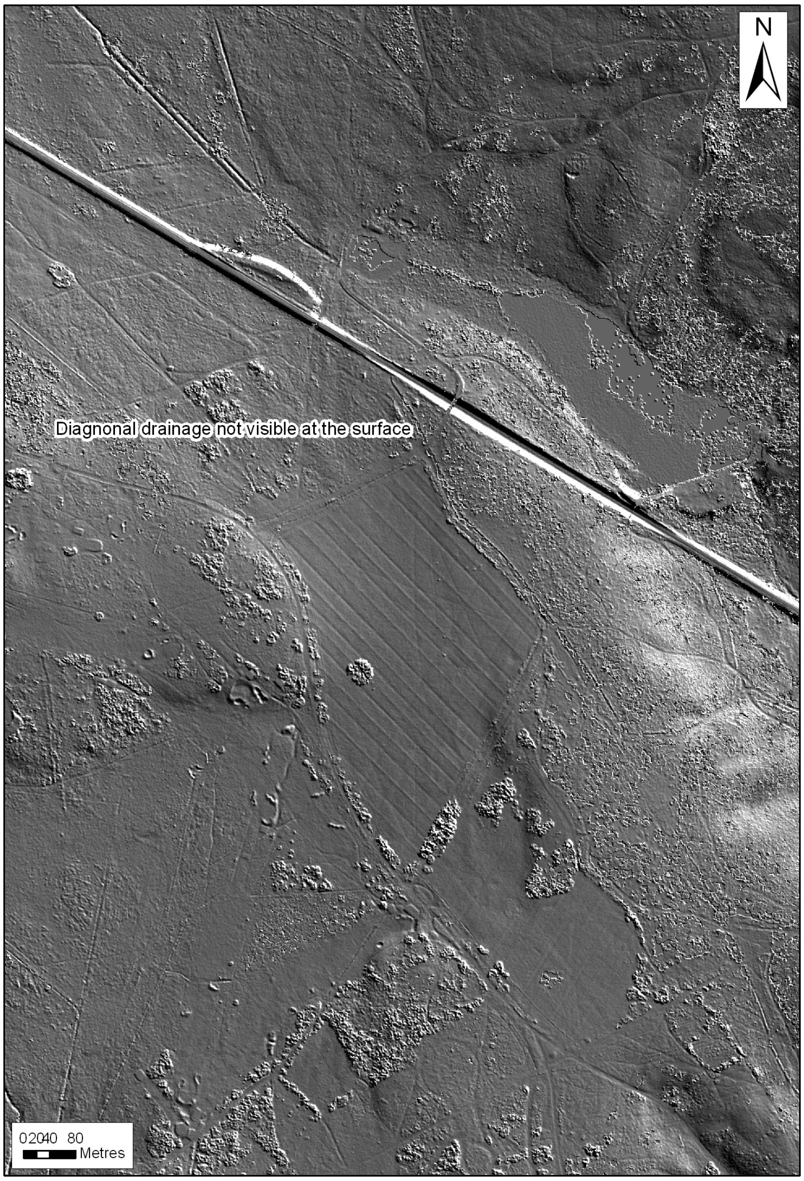


Figure 12. An area of potential peat cutting to the north of Little Bracebridge Pool (LBP) does not appear evident on the Lidar DTM.

7.5 Therefore, from an environmental perspective it appears that the Lidar DTM is of limited use for identifying deeper areas of peat or other organic rich sediment bodies. Environmentally, perhaps the greatest value of the Lidar imagery is for the identification and mapping of drainage grips and other drainage channels, many of which are not visible in the contemporary landscape (Fig. 13). Whilst such an exercise is beyond the scope of this current project, such mapping of these anthropogenic features would help provide a greater understanding of the preservation potential of the surviving peats through a first assessment of local hydrological conditions.



<u>Figure 13.</u> Intensive drainage of the park south of Streetly Wood

7.6 In comparison to other wetland environments where Lidar has been used, the results from Sutton Park may well appear disappointing in terms of the number of features identified. However, this can be explained by two variables:

- Firstly, and most importantly, the wetlands of Sutton Park are low energy alluvial systems that have developed through the vertical accretion of minerogenic and organic sediments (Howard and Macklin 1999; Charman, 2002). This results in the blanketing and smoothing of surface relief and hence the masking of landforms such as palaeochannels.

- Secondly, the area is covered by a generous blanket of heather, whose density prevents the penetration and scatter of the Lidar signal to the ground surface. Hence areas of contrasting relief are again masked. This problem is well recognized and documented by forestry managers who use Lidar as a tool for land management (Crow, 2008)

8. DISCUSSION AND IMPLICATIONS

8.1. Palaeoenvironmental potential of Sutton Park

8.1.1. Walkover survey of Sutton Park indicates that the maximum thickness of peat that survives in the park is around 1m, though the deposits are more commonly between 0.5m and 0.75m thick. The majority of the organic rich deposits greater than 0.5m thick appear well humified and moist, with little evidence for desiccation. Deposits over 0.5m thick are recorded in: Area 1 (West of Bracebridge Pool); Area 2 (Gumslade Valley); Area 3 (upstream and downstream of Blackroot Pool); Area 4 (upstream of Keeper’s Well); Area 5 (Park House Mill Pond); and Area 7 (Upper and Middle Longmoor Valley).

8.1.2. The thickest sequences of peat were recorded in: Area 3 (upstream of Blackroot Pool, 0.7m); Area 4 (upstream of Keeper’s Well, 0.7m); Area 7 (Upper Longmoor Valley 0.7m; Middle Longmoor Valley, 0.8m).

8.1.3. Area 4 (Streetly Wood) was poorly preserved and merits no further consideration.

8.1.4. Peat cutting has clearly been a significant activity in parts of the park and this will undoubtedly affect the potential of these organic sediments at some locations to provide, long, undisturbed records of environmental change. Clear evidence of peat cutting can be seen in Area 7 (the Middle Longmoor Valley) and there is field evidence to suggest that this activity may also have affected the Upper Longmoor Valley. Historic map evidence suggests that Area 1 (upstream of LBP) may also have been an area of former digging, although there is little evidence on the ground surface to suggest this. A potential newly identified area of peat cutting has been recorded upstream of Area 3 (Blackroot Pool) though this does need further investigation. Groundtruthing of potential archaeological sites identified from Lidar imagery (Coutts, 2009) also indicates possible peat extraction in many of these areas, as well as some additional localities.

8.1.5. Blackened, organic looking deposits immediately adjacent to stream channels are misleading and are largely reworked by post-depositional fluvial processes. They therefore have low environmental potential and any future sampling should be at least 3m away from any channel banks.

8.1.6. Higher energy flood deposits (intra-peat sands) were also recorded in Area 1 (UBP), Area 5 (the Nature Reserve Mill Pond). The role of these events in eroding and truncating peat deposits is unknown, but merits further investigation, especially in terms of investigation of changing environmental conditions, rates and delivery of sediments to the valley floor.

8.1.7. The pollen diagrams (5.6.2 and 5.6.4) and the other more limited palaeoenvironmental work described above suggest that the thicker areas of peat within Sutton Park have good but largely untapped potential for palaeoenvironmental analyses. It is clear that *Pinus sylvestris* was dominant on the free-draining sands and gravels of the park prior to the spread of peat and the expansion of wetter conditions suitable for *Alnus.* The reports of the preservation of probable sub-fossil remains of this tree (see above 5.2.4) suggests that these remains dated to the early Holocene and were preserved following the spread of peat.

8.1.8. On the basis of analysis that has been undertaken, it is clear that areas of peat probably dating to the early Holocene survive in the Longmoor Valley. It can be concluded that the deposits in the Longmoor Valley probably represent floodplain peats, which accumulated adjacent to the Longmoor Brook in response to paludification of the basal drift deposits. It seems likely that peat deposits in other parts of the park are related to similar processes.

8.1.9. Away from the Longmoor Valley, other organic deposits exist that have the potential to provide 'snapshots' of vegetation change and environmental history. Organic deposits that are in close proximity to earthworks and other anthropogenic features (e.g. Areas 1 and 4, adjacent to deer park earthworks) have the potential to provide some correlation between archaeological and palaeoenvironmental records.

8.1.10. Previous small excavations through both the Roman road and deer park banks indicate that palaeosols indicative of buried landsurfaces are present. No detailed work appears to have been undertaken on samples taken from these soils, but they have the potential to provide evidence for local vegetation patterns (via pollen analysis). Soil micromorphology may provide additional information regarding microscale pedological processes.

8.1.11. The Blade Mill Pond appears to contain a variable thickness of sediments, but in the thickest areas, has the potential (if not previously dredged) to provide a detailed history of medieval / post-medieval land use and environments. The potential for linking biological records (i.e. pollen etc) with geochemical and mineral magnetic studies may be high within this area although the degree of biological activity on the floor of ponds such as these may be quite high with subsequent implications for the preservation of continuous deposits.

8.1.12. None of the palaeoenvironmental work carried out to date has been supported by radiocarbon dating. Thus, the chronology of sediment accumulation and associated vegetation history remains speculative. It is essential that any future work is undertaken within the framework of a well resourced radiometric dating programme to avoid issues of floating chronologies. It should be recognized that at certain points in the radiocarbon curve, the precision and accuracy of radiocarbon dating become problematic. It may therefore be worth exploring other methods of dating control in certain instances (e.g. $Lead^{210}$).

8.1.13. Whilst pollen preservation and concentration in the deposits analysed to date is apparently good, the potential of the sediments to preserve other proxy data such as plant macrofossils and coleoptera (beetles) is unknown. References to the preservation of sub-fossil wood in the peat deposits illustrate the potential for the survival of this material. Pine seems to have been the dominant species recorded but if oak were preserved, there is the potential to develop dendrochronological studies within the park.

8.1.14. The impact of peat cutting, drainage and burning on the precise state of the deposits preserved *in situ* is unknown, nor is the potential for long term survival of palaeoenvironmental material under the current management regime.

8.1.15. Whilst most palaeoenvironmental work has concentrated on the Longmoor Valley, areas of potential have been identified in other valleys (Fig. 8). There is also the possibility that isolated pockets of topogenous peat survive in some locations.

8.1.16. Small 'misfit' channels, which feed the medieval pools may be the remnants of a earlier fluvial system within the park. These channels and pools might be overlying older deeper channels, which have yet to be identified or mapped. Such deposits may preserve palaeoenvironmental and archaeological material.

8.1.17. In terms of the relationship between the palaeoenvironmental and archaeological records, the presence of Mesolithic flints and the survival of early Holocene organic deposits indicate that further study of the palaeoenvironmental record would permit the investigation of the context of early human activity.

8.1.18. Lidar has limited application in Sutton Park for the identification of environmentally significant deposits.

9. RECOMMENDATIONS

9.1.1. It is recommended that a detailed coring survey is carried out to investigate and accurately map the extent and depth of surviving peat deposits in the park. This should focus on areas of known potential specifically the Longmoor Valley, but should also investigate other possible targets as identified in the walkover survey.

9.1.2. These targets will be decided through discussion with the City Archaeologist and Regional Science Advisor for English Heritage using information gained as part of this tripartite integrated project.

9.1.3. Whilst the precise field methodology needs to be developed through discussions with key managers, it is suggested that a reconnaissance stratigraphic survey is undertaken using a hand operated gouge corer to assess the depth and extent of peat preservation at the agreed sites. These exploratory investigations should comprise transects at an agreed sample interval (e.g. 10-20m). Sediment depth and stratigraphy should be recorded and all core locations surveyed three dimensionally. These data should then be incorporated into the project GIS.

9.1.4. Following this reconnaissance survey, sample site locations should be selected based upon criteria including the depth and quality of the deposits. Cores for assessment should then be recovered from these locations using a 'Russian' corer. If local conditions permit, test pits should be excavated to allow the collection of bulk samples for assessment of beetle and macroscopic plant remains.

9.1.5. Sub-samples from the cores should then be assessed for palaeoenvironmental proxies including pollen and if sufficient material can be recovered, beetle and plant macrofossils.

9.1.6. A programme of 'range finder' radiocarbon dating should be commissioned to accompany palaeoenvironmental assessment in order to establish chronological control. Through discussion with potential funding bodies, consideration should also be given to the application of additional dating techniques (e.g. Optically Stimulated Luminescence, $Lead^{210}$).

9.1.7. Earthworks of both Roman and Medieval date have been shown by previous interventions to overly palaeolandsurfaces and soil horizons. These soils have the potential to provide information on vegetation and other environmental conditions through the analysis of pollen and soil micromorphology. It is unknown how extensive these former landsurfaces are or their state of preservation. If further analysis of these features is deemed appropriate, re-sampling at known localities would be the most effective approach. Re-excavation of previously exposed deposits should not affect the quality or integrity of previously undisturbed sediments at those localities.

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10.1. On-line sources

www.birmingham.gov.uk
West Midlands Regional Research Framework for Archaeology (http://www.arch-ant.bham.ac.uk/wmrrfa/)

10.2. Map Resources

1779 Plan and admeasurement of Sutton Park in the parish of Sutton Coldfield and counties of Warwick and Stafford taken in the Year 1779.

Accompanied by a pamphlet entitled "proposals By Way of A Plan For Inclosing Park, Commons & Wastes, Within The Parish of Sutton -Coldfield, in the County of Warwick, Drawn up at the Request of some of the Proprietors and humbly submitted to the Consideration and Correction of A.L.L.1778."

Reference number 964607; shelved at QSH 97 SUT and QSH 27.1, Local Studies, Sutton Coldfield Library, Birmingham.

APPENDIX 1: Project Brief

BIRMINGHAM CITY COUNCIL
DEVELOPMENT DIRECTORATE

Sutton Park Palaeoenvironmental Assessment: part of English Heritage HEEP project 5661
Brief for preparation of costed project design

Background

Sutton Park (centre 40941 29703) is located on the northern side of the Birmingham conurbation. It is a publicly owned open space in recreational use and is surrounded by built-up areas, mainly residential, on all sides. Much of it is a scheduled ancient monument (SM 30085) and it is included in the Register of Historic Parks and Gardens. In addition, the national importance of its ecology and natural environment is recognised by its designations as a Site of Special Scientific Interest and a National Nature Reserve.

A pilot Heritage Partnership Agreement is being drawn up for Sutton Park, reflecting the good survival, extent and complexity of its historic environment and the challenges of managing this resource. The HPA runs in parallel with and contributes to a new management plan, integrating management of the historic and natural environment.

Sutton Park contains many well-preserved archaeological remains, surviving as earthworks, ranging in date from prehistoric to post-medieval. They include prehistoric burnt mounds, a Roman road, medieval deer park boundaries, woodbanks, military targets and practice trenches, and a racecourse. All of the known archaeological features visible as earthworks are recorded in Birmingham City Council's Sites and Monuments Record. Sutton Park also contains peat deposits in stream valley floors and buried soils under earthworks. These are known to include extensive peat deposits in the floor of the Longmoor Valley on the western side of the Park; peat deposits in other stream valleys which have been observed but whose extent is unknown; and buried soils under a Roman road and medieval banks subdividing a deer park. These deposits are likely to contain data on past vegetation change in Sutton Park itself, where the data can be related to the visible archaeological remains, and on the surrounding area. Small-scale sampling of the valley peats and buried soils has demonstrated their potential but the extent of the deposits has not been mapped nor has a sampling strategy been devised. Visible archaeological remains show how the existing vegetation patterns are the result of historic land use, in particular as a deer park in the medieval period. The proposed palaeoenvironmental assessment project will emphasise the close relationship between archaeology and ecology.

Aims and objectives

The overall aim is to understand past human management and exploitation of the landscape of Sutton Park and its vicinity using a combination of sources and to ensure integrated and complementary management of the historic and natural environments. The specific aims of the proposed assessment project are to collate and analyse existing information on past land use in Sutton Park and its immediate surroundings; to map the extent of deposits likely to contain palaeo-environmental data; and to devise a robust and coherent strategy for an intrusive sampling programme which would be implemented as one of the objectives of future projects.

The proposed project will consist of a desk-based assessment, undertaken in accordance with the Standard and Guidance of the Institute of Field Archaeologists, to collate and analyse existing information on past land use (including cultivation, grazing, woodland management, peat cutting) in Sutton Park and its immediate surroundings, from archaeological, written documentary, cartographic and illustrative sources, and to locate deposits likely to contain palaeo-environmental data. Site inspections will be undertaken to verify the survival and extent of deposits at locations identified in the desk-based assessment, refine mapping and identify sampling locations. A strategy for a subsequent sampling programme will be put forward.

The palaeoenvironmental assessment is part of a broader project which also includes capture and analysis of Lidar data and ground recording.

Stages of work

1. A search of the Birmingham, Walsall and Staffordshire Sites and Monuments/Historic Environment Records for Sutton Park and its immediate surroundings; published archaeological reports and grey literature; published and unpublished documentary sources relating to present vegetation, geology and soils and past land use, and previous palaeo-environmental work; modern and historic maps; geological and soil survey maps; and historic illustrations.
2. Collation and analysis of this data.
3. Production of a written report and catalogue of sources.
4. Capture of map-based data as layers in Mapinfo format.

1 5. INSPECTION OF DEPOSITS IDENTIFIED IN DESK-BASED RESEARCH (VALLEY-BOTTOM PEATS AND BURIED SOILS UNDER EARTHWORKS)

2 6. REFINEMENT OF MAPPING;

3 7. IDENTIFICATION OF SAMPLING LOCATIONS.

4 8. CAPTURE OF MAP-BASED DATA AS LAYERS IN MAPINFO FORMAT;

9. Production of descriptive and map-based sampling strategy, including proposed sampling methodology and sampling strategy, on basis of desk-based assessment and site inspections.

5

Note: the Palaeoenvironmental assessment does not include intrusive sampling, but future work is likely to include sampling valley peats buried surfaces under earthworks for palaeoenvironmental data and analysis and dating of the data and deposits.

Staffing

It is anticipated that the Palaeoenvironmental Assessment will be undertaken by a team consisting of: an environmental archaeologist able to interpret published and field evidence and to create a sampling strategy; an archaeologist or environmental archaeologist able to undertake desk-based assessments; and an archaeologist able to capture and manipulate data in GIS format.

Standards

The Palaeoenvironmental Assessment must be undertaken in accordance with the Code Of Conduct, Standards and Guidelines of the Institute for Archaeologists and in accordance with English Heritage's Centre for Archaeology Guidelines: Environmental Archaeology.

Programme

It is anticipated that the Palaeoenvironmental Assessment would be undertaken in early 2009.

Project design

The project design must be in accordance with the format described in MoRPHE and must include a task list identifying tasks, products, staff and time allocation, and costing identifying staff day rates, non-staff costs and overheads.

The following will be provided by Birmingham City Council:

6 ORDNANCE SURVEY MASTERMAP TILES

7 HISTORIC OS MAPPING

Information from Birmingham Sites and Monuments Record (but not from other SMRs/HERs) and general archaeological information and advice (Mike Hodder)
Assistance and advice on library sources (Marian Baxter, Local Studies, Sutton Coldfield Library)
Ecological information (Stefan Bodnar, Parks and Nature Conservation)
Transport within Sutton Park for site inspections, if required (Danny Squire, Sutton Park)

BIRMINGHAM CITY COUNCIL
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APPENDIX 2: HER NUMBERS