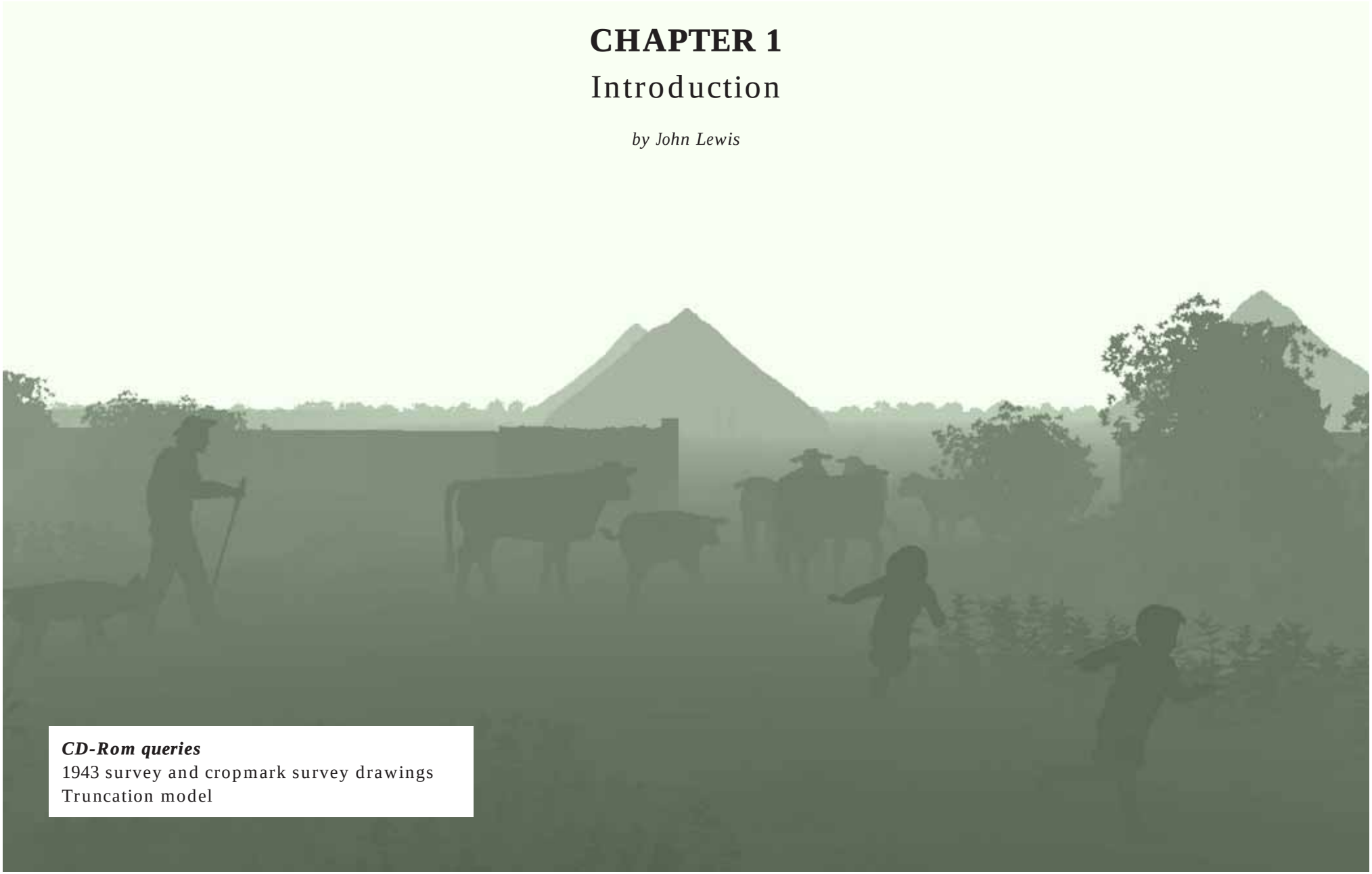
CHAPTER 1
Introduction

by John Lewis



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Truncation model

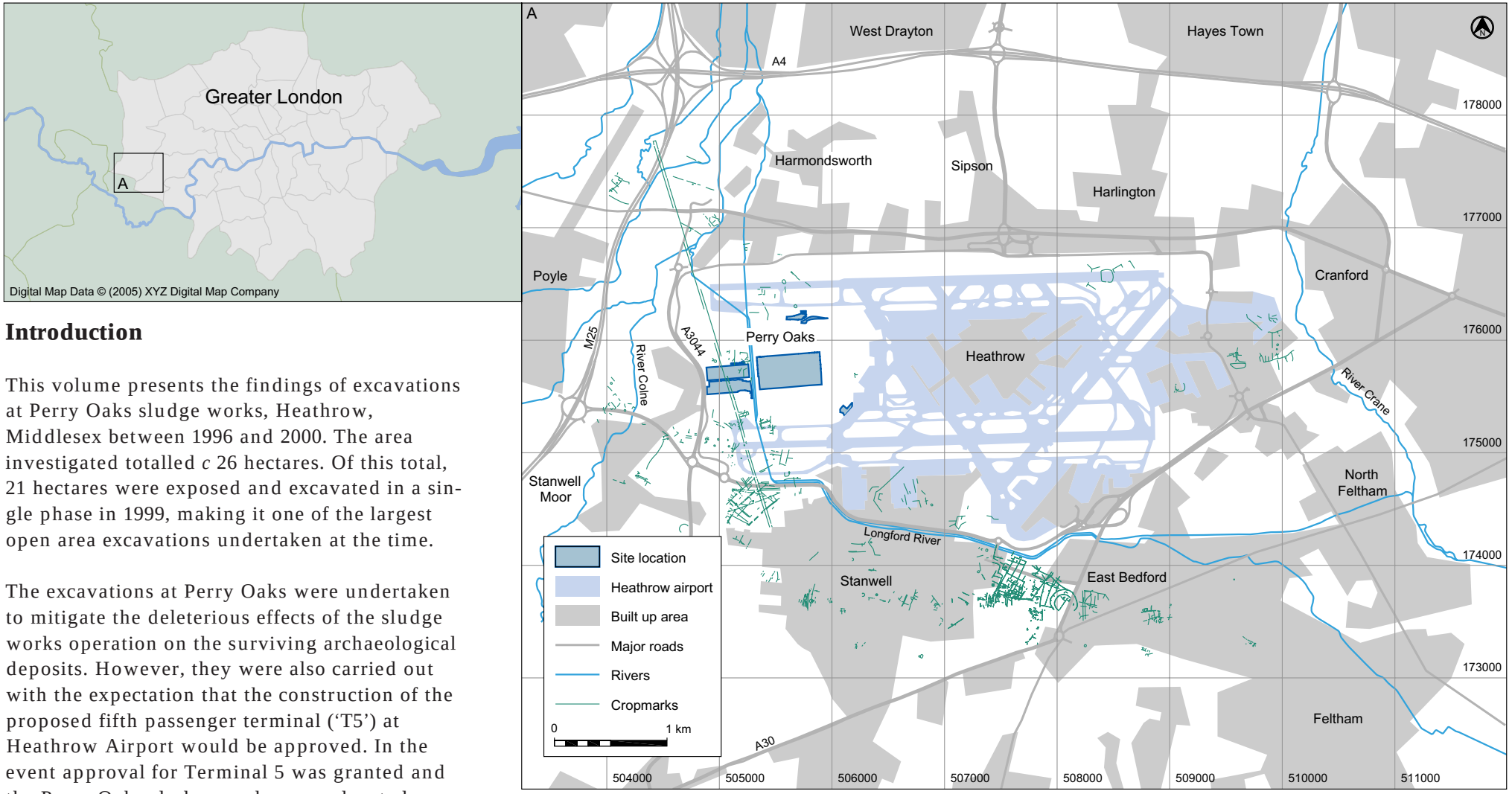

Figure 1.1: Site location

Introduction

This volume presents the findings of excavations at Perry Oaks sludge works, Heathrow, Middlesex between 1996 and 2000. The area investigated totalled *c* 26 hectares. Of this total, 21 hectares were exposed and excavated in a single phase in 1999, making it one of the largest open area excavations undertaken at the time.

The excavations at Perry Oaks were undertaken to mitigate the deleterious effects of the sludge works operation on the surviving archaeological deposits. However, they were also carried out with the expectation that the construction of the proposed fifth passenger terminal ('T5') at Heathrow Airport would be approved. In the event approval for Terminal 5 was granted and the Perry Oaks sludge works was relocated. Archaeological mitigation associated with the construction programme took place from 2002 onwards, and the results of those excavations will be integrated with the data contained in this volume, to be presented in Volume 2 of this series.

The main excavations outlined in this volume were carried out by Framework Archaeology, a joint venture agreement between Oxford Archaeology (OA) and Wessex Archaeology (WA) to provide archaeological services to BAA. The results of archaeological investigations by other organisations on the site have also been incorporated where appropriate (see below).

Figure 1.2: Aerial photograph of Heathrow Airport showing outlines of main excavation areas at Perry Oaks (© BAA)

Structure of Chapter 1

The results of the Perry Oaks excavations are presented in the form of a historical narrative, which is ordered chronologically but which seeks to explore a number of main historical themes and processes.

This introductory chapter seeks to guide the reader through the main body of the report by outlining the following key areas:

- Site location
- Geology and topography
- Modern land-use
- The archaeological background to the area
- The nature of the challenge and the solution
- Academic aim and approach
- Application: the recording system and data presentation
- Publication: scope, concept, presentation and archive
- Structure of the historical narrative and how the themes will be explored

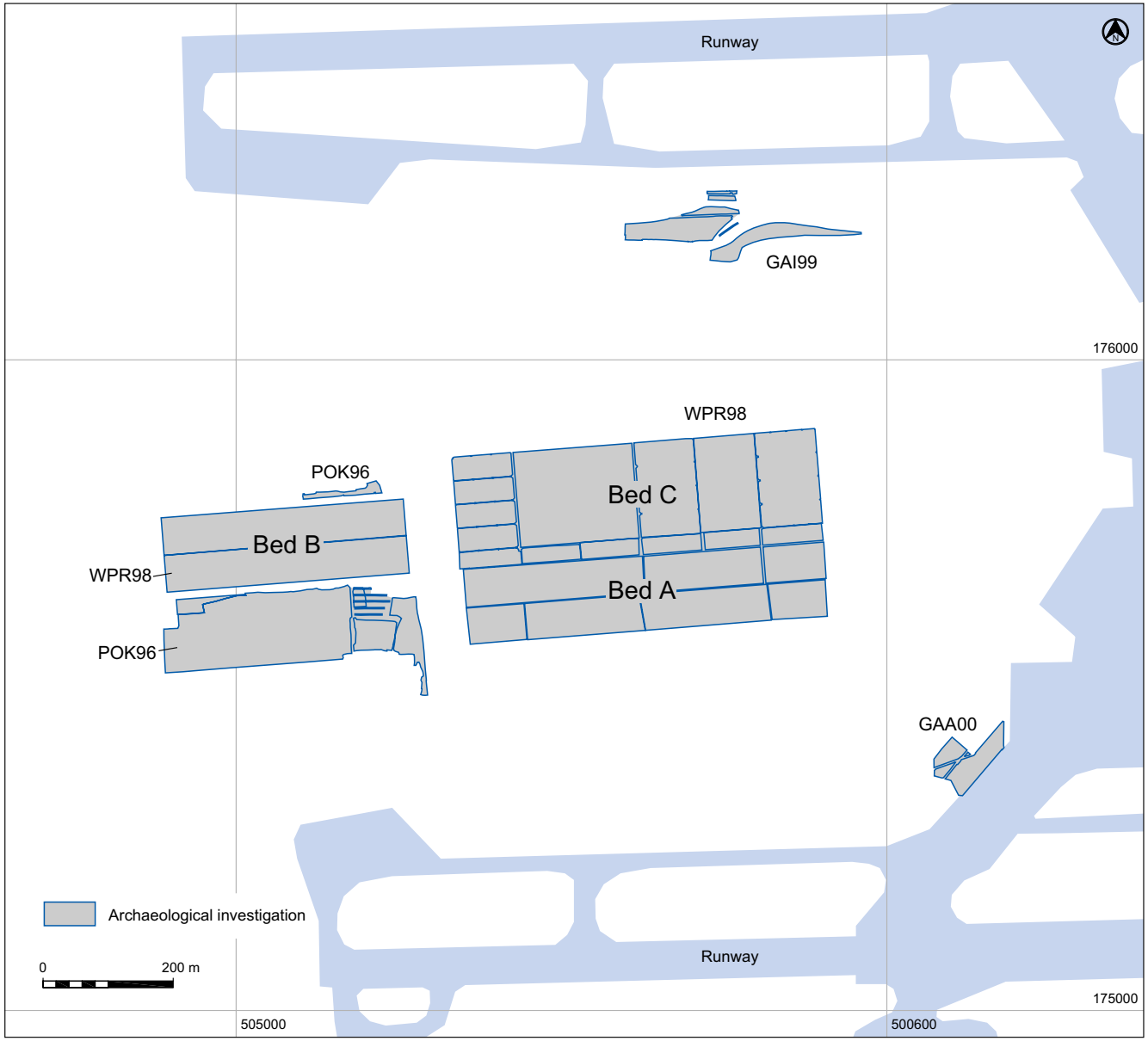

Figure 1.3: Archaeological investigations at Perry Oaks

Site location (Figs 1.1–1.3)

Perry Oaks sludge works was located on the eastern edge of the Colne Valley (TQ 055 756), bounded to the north, south and east by Heathrow Airport and to the west by the A3044 and the Western Perimeter Road (Figs 1.1 and 1.2). The sludge works covered an area of *c* 91 ha, of which the central drying bed area, comprising Beds A, B and C, occupied *c* 21 ha (Fig. 1.3). These drying beds were excavated by Framework Archaeology in 1999 (Greater London site code WPR98). Previous excavations in 1996 of sludge stockpile areas by the Museum of London Archaeological Service (MoLAS) comprised an additional *c* 5 ha (site code POK96). Two smaller excavations were undertaken by Framework Archaeology within Heathrow Airport at Northern Taxiway (GAI99) and Grass Area 21 (GAA00) (Fig. 1.3; for more information see below).

Geology and topography (Fig. 1.4)

The Perry Oaks sludge works was situated on Taplow Gravel capped by the Langley Silt Complex ('brickearth'). The Taplow Gravel forms one of the sequence of gravel terraces created during the Pleistocene by the movement of the River Thames.

Throughout this report the area of Hounslow Heath now occupied by Heathrow Airport is referred to as the 'Heathrow Terrace'. We have used this term to describe the block of landscape

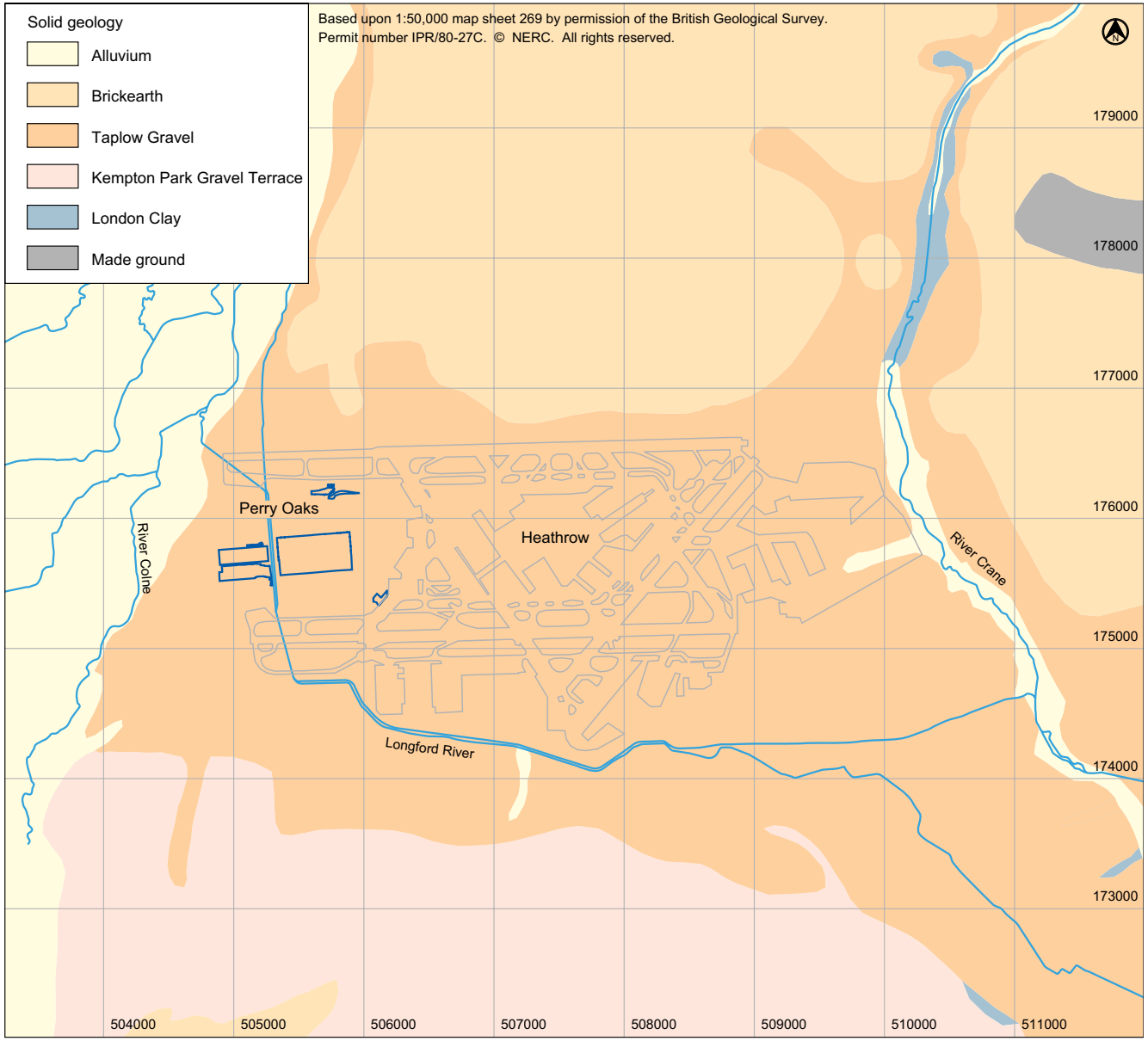

Figure 1.4: Geology of the Heathrow area

which is defined by the River Colne in the west and the River Crane in the east (Fig. 1.4). To the north, the Heathrow Terrace is defined by the junction of the Taplow and Lynch Hill Terraces, and to the south the junction of the Taplow with the Kempton Park Terrace. These geological boundaries appear on the ground as breaks in slope, sometimes almost imperceptible, sometimes quite marked. However, in the past their topographic effect would have been much more noticeable than today.

The Perry Oaks area lies immediately to the east of the River Colne floodplain at an altitude rising from *c* 21 m OD in the west to *c* 23.5 m OD in the east (Fig. 1.5). It is thus a broadly flat landscape with a very gentle upward slope from west to east. In addition, the 23 m contour can be seen to 'swing' away to the south-east, and we will show in Chapter 3, on the 2nd millennium BC agricultural landscape, how the field ditches and hedgerows also follow this change in topography.

Throughout the remainder of this volume we will make repeated reference to the flatness of the landscape. This flatness has shaped the 20th-century history of the area; it was one of the reasons for siting the sludge works at Perry Oaks, and of course for the subsequent construction of Heathrow Airport. Prior to any modern changes, however, the topography of the landscape was more varied, with slight rises and lower lying areas (such as palaeochannels), which would undoubtedly have held significant topographical importance (see below). Human modification of the landscape from the 4th millennium BC has utilised these variations, usually to enhance them. Most importantly, almost any human endeavour that resulted in the raising of a mound, bank or other earthwork or timber structure would most likely have made a distinctive impression on this landscape.

Topography prior to the construction of the sludge works in the 1930s and the airport in the 1940s (Fig. 1.5)

In 1943 the Air Ministry undertook a levels survey of the Heathrow area prior to the construction of the airport (Fig. 1.5). The survey covered an area of 20 square kilometres of Hounslow Heath and survey readings were made every 20 feet producing a total of 23,763 points. Framework Archaeology digitised the original survey data and produced a computer-generated model, which also included survey data from the engineering drawings for the sludge works in the 1930s.

For the purposes of this report we have assumed that the 1943 ground surface would have equated with the prehistoric and Romano-British ground surface. Agriculture will, of course, have eroded some parts of the landscape, and colluviation and alluviation will have deposited material in others. Nonetheless, this model has provided the essential topographical framework within which we can consider the architectural modifications made by people since the 4th millennium BC. It also allowed the construction of the Truncation Model described below.

The Truncation Model (Fig. 1.6)

The Truncation Model consists of a contour and wire mesh drawing of the difference in heights between the pre-sludge works ground surface (derived from the 1943 Air Ministry Survey and the Perry Oaks sludge works engineering drawings described above) and the top of the gravel surface following archaeological stripping and survey. This was achieved by using the 'residuals' function in the Surfer computer program to subtract the OD heights in the 1933–43 grid file from those in the modern day grid file to produce a third grid file which could be contoured. The degree of truncation was then calibrated by examining the impact of truncation on archaeological survival in POK96. It was apparent during excavation, from archive aerial photographs and documentary research, that the eastern part of POK96 had undergone substantial terracing and truncation. The truncation model allowed the depth of disturbance to be quantified, and its effect on archaeological features to be assessed.

The truncation model proved to be a very valuable tool during excavation and post-excavation analysis since it could be used to assess the validity of artefact distributions, and to determine if the absence of features in a particular area can be attributed to the effects of the construction of the sludge works.

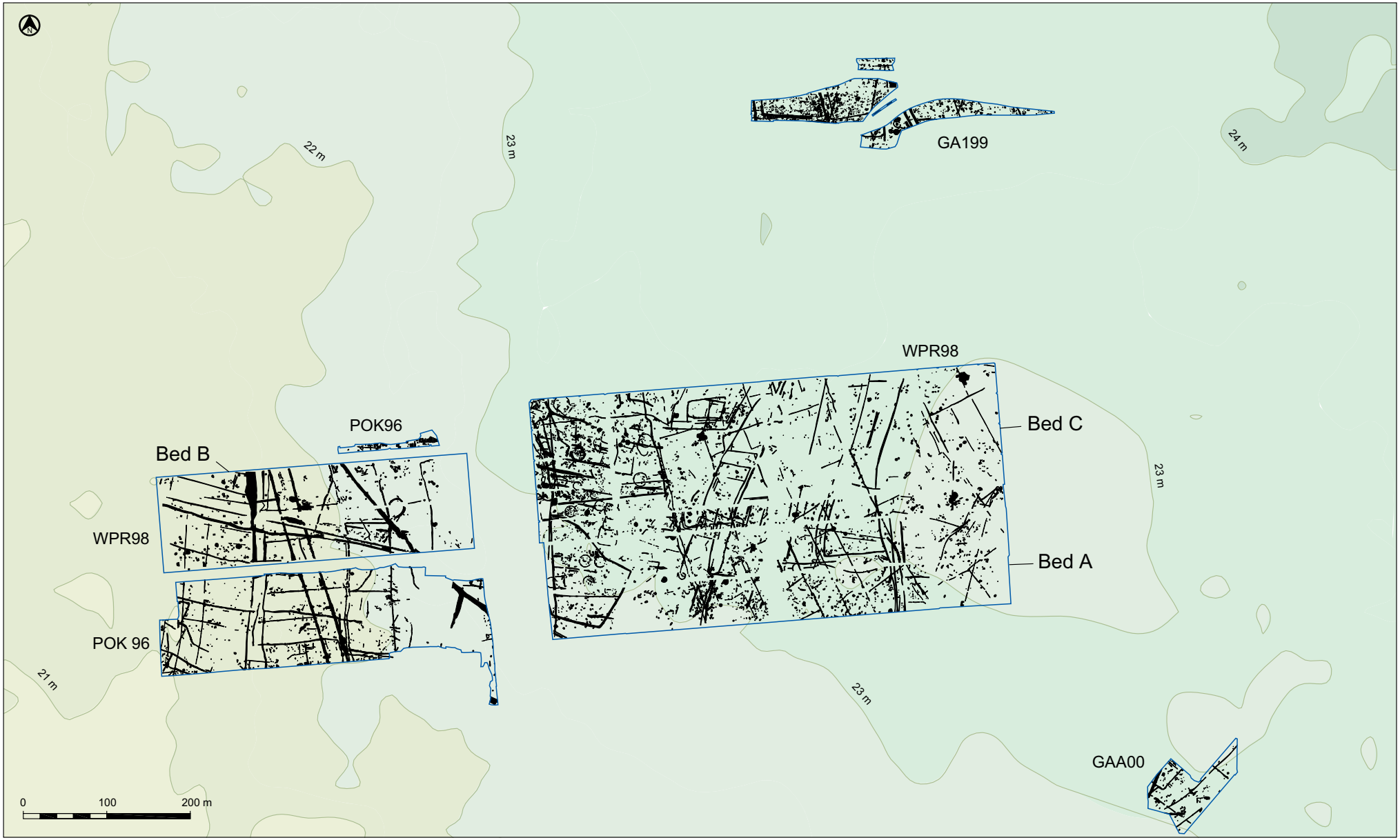

Figure 1.5: 1943 topography of Heathrow

Figure 1.6: The truncation model

Plate 1.1: Aerial photo of Perry Oaks sludge works drying beds looking east with Heathrow airport in the background (© BAA)

Modern land-use

Perry Oaks sludge disposal works was built as one element of the West Middlesex Main Drainage Scheme. This scheme was conceived following the First World War, at a time when West Middlesex was developing rapidly in both industry and population. The Scheme was devised in 1928 by John D Watson, past President of the Institution of Civil Engineers, in order to replace 27 sewerage works operated by 22 local authorities.

John D Watson reported fully on the construction of the Perry Oaks works in 1937, and this was followed by a further report on the first 10 years of operation by Townend (1947). These reports—and the Thames Water Utilities Ltd engineering drawings—proved invaluable in both recording the history of the development of the works and also in assessing their impact on the surviving archaeological deposits.

The principal purification works was built at Mogden, near Isleworth. This contained all of the facilities for dealing with disintegrating and screening the sewerage as well as tanks for the primary digestion and sedimentation of the sludge. It was considered that there was inadequate space for sludge air-drying at the Mogden Works and that a more thinly populated area would be preferable for this process. Thus, primary treatment and digestion were located at Mogden and the resulting sludge was pumped the seven miles to Perry Oaks in a liquid state, where 10 secondary digestion tanks and 50 acres of drying beds (increased to 72 acres in 1939; Townend 1947, 384) were laid out. At Perry Oaks the liquid portion was separated off and pumped back for final treatment at Mogden. Initially, it was proposed to tip the resultant 'cake' at Perry Oaks, but in 1940 the decision was taken to sell the 'cake' to farmers as fertiliser (Townend 1947, 384), a practice which continues to this day. The following extract from Watson's 1937 paper is reproduced here as it illustrates the rural isolation of the Heathrow area prior to the Second World War, and the transformations that have occurred since that conflict.

Plate 1.2: Photograph looking south-east across Beds A and C at Perry Oaks

Isolation from existing dwelling-houses and unlikelihood of building development taking place in the immediate vicinity recommended the Perry Oaks site for sludge-disposal, although the low cost of the land (about one-sixth the price per acre of the Mogden land) was an important factor. Although only 7 miles from Mogden, it is no less than 3 miles from the nearest railway station. The nearest habitable dwelling is an isolated farm 700 yards from the drying beds; the nearest building-development lies on the Bath road, more than ½ mile to the north of the site.

The whole complex of drying beds, sludge digestion tanks and sewers will not be described here; instead we will concentrate on the drying beds, for almost all of the Perry Oaks WPR98 excavations were undertaken in areas occupied by these structures (Plate 1.1). The POK96 excavations were carried out in an area which had been earmarked for conversion to drying beds, but which in the event was used for temporary storage of sludge 'cake' and earthmoving.

The main area of the WPR98 excavations consisted of drying beds A and C (see Fig. 1.3 above and Plate 1.2). These formed one of the original areas of the sludge works and were used for the air-drying and conversion of sludge to 'cake' to be resold as fertiliser. Watson described the construction of the beds thus:

…. the excavation was reduced to a minimum by grouping the beds at four different levels, the highest being 18 inches above the lowest. Turf and topsoil were stripped off 6 inches deep, even where filling was required. Excavation was computed at 68,000 cubic yards, and refilling at 3,500 cubic yards, exclusive of excavation for drainage-pipes and wall-footings. General excavation was carried out by scrapers drawn by tractors, and spoil was used to make embankments around the site.

The beds are underdrained with 3-inch porous concrete pipes, laid in herring-bone pattern at about 12-foot 6-inch centres, connecting to a main open-jointed stoneware pipe. This pipe runs parallel to a division-wall, and picks up the porous pipes from two beds.

(Watson 1937)

This construction method led to some areas being more deeply 'cut' than others, in order to provide a level fall across the site; this can be seen in the truncation model described later. The concrete walls dividing the drying beds and cells effectively destroyed any archaeological deposits and the underdraining concrete pipes also had a localised impact on archaeological features.

Under the initial scheme, dried sludge had been tipped on land lying between the Duke of Northumberland's River and the Longford River, which then flowed in a NW-SE direction (across WPR98 bed B and POK96). As part of the modifications of the late 1940s / early 1950s, the latter river was diverted to run parallel to the former, allowing more land to be annexed for further sludge tips and to allow the construction of additional sludge lagoons. The realigned rivers traversed the site contained within concrete troughs, probably to keep the river water separate as the rivers crossed the area enclosed by the puddle wall. This 'Twin Rivers' area only became available for excavation during the construction of Terminal 5, and is included in Volume 2. However, in 1999, this area represented a major break in the continuity of the archaeological investigations between POK96 and bed B in the west, and beds C and A in the east.

The archaeological background to the area

The Perry Oaks excavations were undertaken in a landscape that had been archaeologically investigated for over 50 years. Figure 1.7 shows the scale and extent of these investigations. Most excavations were undertaken by MoLAS (or its predecessors) from the late 1970s onwards, ahead of gravel extraction and other commercial development (MoLAS forthcoming).

Located a few kilometres to the south-west of Perry Oaks, the Yeoveny Lodge Neolithic Causewayed enclosure was partially excavated prior to destruction through gravel extraction in the early 1960s (Robertson Mackay 1987). In the early 1980s the Surrey Archaeological Unit excavated a length of the Stanwell cursus, the 2nd millennium BC field system and Saxon features to the south of Perry Oaks (O'Connell 1990). In the 1990s Wessex Archaeology excavated large multi-period sites to the north of Heathrow at Prospect Park (Andrews 1996) and Imperial College Sports Ground (Crockett 2002; Wessex Archaeology 2004).

Within the airport itself, Canham undertook limited excavations in advance of the western extension of the northern runway in 1969 (Canham 1978), and Grimes excavated the famous Heathrow Romano-Celtic style 'temple' situated within an Iron Age enclosed settlement (Caesar's Camp), whilst the airport was being built in 1944 (Grimes and Close-Brooks 1993). This latter report also provided additional information on the archaeological and historical background of the area, demonstrating the destructive effects of arable agriculture in a relatively short space of time on standing earthworks (ibid., 306–307).

More general synthesis and discussion has also been published (eg Cotton, Mills and Clegg 1986), whilst the prehistoric archaeology of West London features in a recent assessment of the archaeology of Greater London (MoLAS 2000).

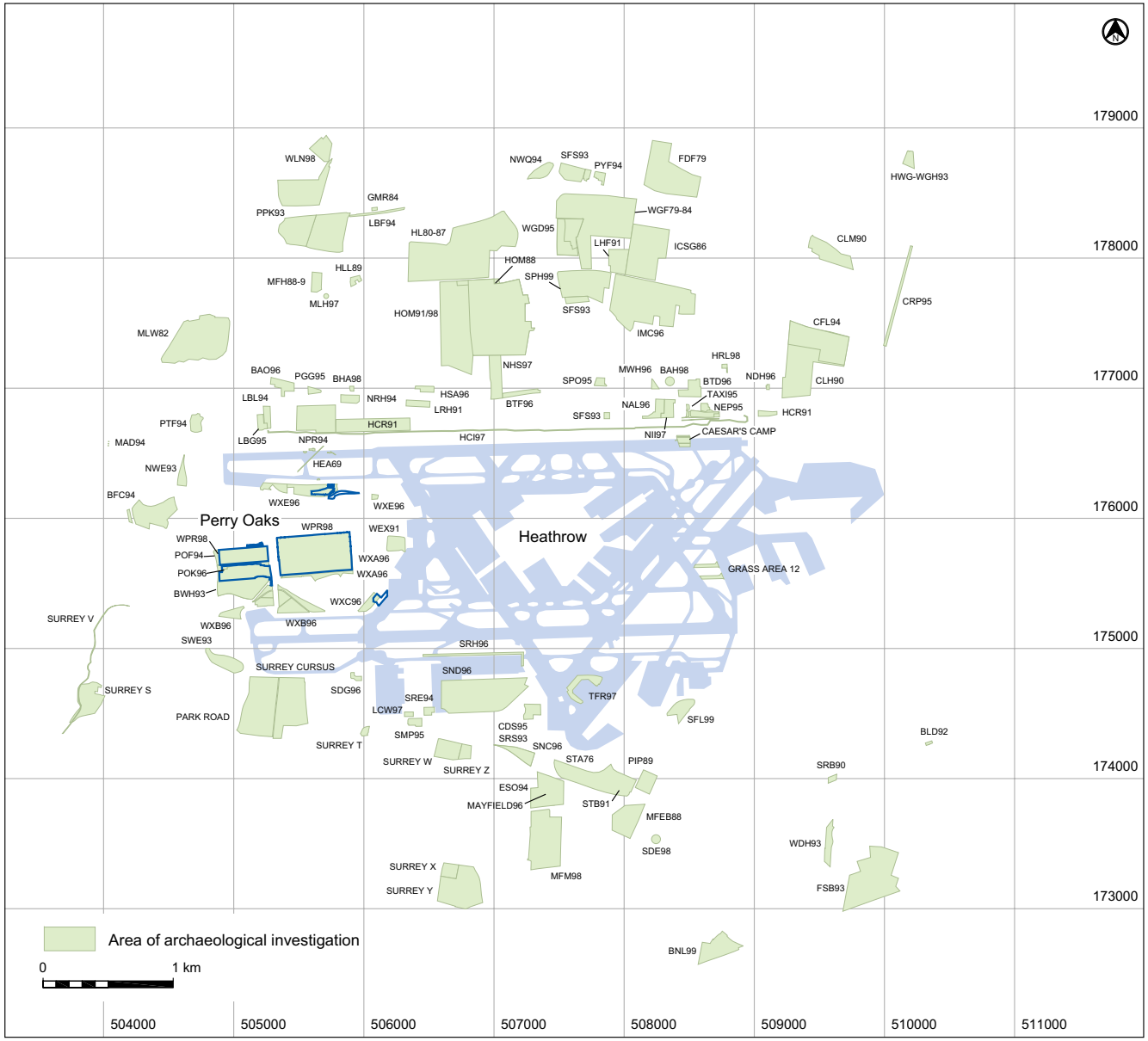

Figure 1.7: Extent of all known archaeological investigations at Heathrow

Summary of the Heathrow archaeological landscape prior to the Perry Oaks excavation

At the outset of the project, a chronological series of past landscapes was identified (based on Andrews and Barrett 1998). These comprised the following:

Hunter-gatherer communities and early agricultural practices (300,000–4000 BC)

Hand axes and other lithic tools of Lower Palaeolithic date were deposited amongst the Thames terrace gravels, but those located within the Taplow terrace, upon which Perry Oaks is located, have been acknowledged as being rolled and reworked from the higher Lynch Hill terrace (Gibbard 1985). The same has been suggested for artefacts within the Colney Street gravels of the River Colne (ibid., 131). Since this material is derived and redeposited, it did not feature as a research priority.

The surface of the Taplow gravels was occupied from the late Lower Palaeolithic (300,000 BC) onwards. Antiquarian observation and fieldwork over the last 100 years suggest that much of this material lies buried beneath the Langley Silt (Brickearth) deposit capping the Taplow gravels. At Perry Oaks, the sludge works had severely truncated this thin capping, and thus this early period did not feature as a research priority.

Late Glacial and Mesolithic occupation (from 9000–4000 BC) across the terrace would have taken the form of lithic and bone scatters, which were deposited on the contemporary land surface. Again, the severe truncation at Perry Oaks had removed all *in situ* traces of these remains. There was no opportunity for studying occupation of the landscape to the same level of detail as that of the Colne floodplain (Lacaille 1963). However, diagnostic lithics of this period did survive in tree throws and a handful of contemporary pits, as well as residing in later features.

Early agricultural and ritual practices (4000–2000 BC)

The construction of the first monuments in the Heathrow and West London landscape can be dated to the Neolithic period. These consist of linear cursus monuments (such as the Stanwell example described in this volume) as well as smaller circular or sub-circular enclosures. Notably absent are earthen long-barrows of the early 4th millennium BC. Along the Thames to the west of Heathrow lay a series of larger causewayed enclosures (eg at Yeoveny Lodge Staines and Dorney) of the 4th millennium BC, while the large double ditched enclosure to the east of Perry Oaks at Mayfield Farm may also date to this period.

The construction of small circular enclosures continued in the 3rd millennium BC, although the characteristic features of this period (middle and late Neolithic) in the area are pits containing either Peterborough Ware or Grooved Ware pottery. Overall, the emergence and chronological development of the monumental landscape at this time is far from clear.

Agricultural intensification and the rituals of reproduction (2000–100 BC)

During the 2nd millennium BC the monumental landscape of the preceding millennia was transformed into one of fields, settlements and trackways. Exactly when, why and how this took place remains uncertain, as is the extent of this agricultural landscape. Conspicuously absent from West London were many aspects of the late Neolithic / early Bronze Age material and monumental package: round barrows, burials and Beaker pottery. From *c* 1500 BC onwards, cemeteries with middle Bronze Age Deverel Rimbury pottery had been recorded (Barrett 1973), and together with the succeeding Post-Deverel Rimbury pottery of the late Bronze Age, was clearly associated with field and settlement systems. Relatively little is known about the early Iron Age in the region, although by the middle of the 1st millennium BC, middle Iron Age settlements comprising roundhouses, pits and four-post structures were spread across the landscape. The Heathrow 'temple' (Grimes and Close-Brooks 1993) was tentatively dated to the middle or late Iron Age, although the function of this structure remains far from certain (Black 1986, 203; Smith 2001, 64).

Rural landscapes and urban hinterlands (100 BC–AD 1700)

The transition from late Iron Age tribal society to post–conquest Roman province remains poorly understood in this region. The Romano-British landscape was characterised by small farmsteads consisting of enclosures, field boundaries and

(probably) earth and timber buildings, which served the markets at roadside towns such as Staines and possibly Brentford, and of course the capital, Londinium. A growing number of such Roman rural farmsteads have been excavated along the Thames gravel terraces in recent years, and yet there is a notable lack of villas or other high status sites. There are indications that the landscape of the 3rd and 4th centuries AD underwent some form of reorganisation, which might reflect changes observed within the urban centres of Staines and Londinium.

The archaeology of the early and middle Saxon periods consisted of isolated or small concentrations of sunken-featured buildings. Sometimes these were located away from medieval and present-day villages and in other cases they were found close to villages such as Harmondsworth. These medieval villages presumably developed from their Saxon predecessors. A number of hamlets and villages were dotted across Hounslow Heath, which began to be enclosed in the 18th century. Finally, some of these settlements, such as Heathrow itself, were destroyed by the construction of the airport in 1944.

This briefly sketches the state of knowledge of the West London landscape prior to the MoLAS excavations at Perry Oaks in 1996. The Perry Oaks excavations thus had the potential to make a tremendous contribution to our knowledge of the history of human occupation within the Heathrow landscape, and of the middle Thames region in general. However, the scale of the project presented a number of challenges, that had to be addressed before undertaking any excavation, and these will be discussed in the following section.

The nature of the challenge and the solution

The excavations at Perry Oaks provided a number of important challenges. Evaluations undertaken by MoLAS on behalf of BAA during the early 1990s in support of the Terminal 5 planning application demonstrated that all elements of the Heathrow ancient landscapes described above survived to varying degrees within the confines of the sludge works (BAA Series reports). Subsequent excavations by MoLAS of the 5 hectares to the south of drying bed B (Site Code POK96; see Fig. 1.3) confirmed these results and served to refine the research philosophy and approach. It was clear from the POK96 excavations that archaeological deposits, though truncated, probably remained beneath the drying beds of the active sludge works and were thus threatened by the daily workings of the drying beds.

Framework Archaeology was appointed by BAA in 1998 to undertake all archaeological mitigation for the Terminal 5 project. Throughout the project Framework Archaeology worked in partnership with BAA's Archaeological Consultant, Gill Andrews, and BAA's Academic Advisor, Professor John Barrett. Gill Andrews and John Barrett prepared the initial T5 Research Design (Andrews and Barrett 1998) which was subsequently developed by John Barrett (see below).

One of the first tasks was to excavate and record the archaeological remains that were being destroyed by the daily workings of the sludge works. This would entail stripping and excavating a very large open area within an operating sludge works, which itself posed problems with regard to Health and Safety. However, were the proposal to build Terminal 5 to be approved, the archive and results of the Perry Oaks excavations (and those undertaken by MoLAS) would have to fit seamlessly into the rest of the landscape exposed during these subsequent excavations. The huge extent of the area that might ultimately be exposed demanded that all the archaeological features be surveyed digitally. Large quantities of written and graphical records, as well as artefactual and environmental material, were likely to be produced. The only practical way to manage this data was to adopt a database system, linked to digital plans via a Geographical Information system (GIS). By adopting a GIS approach, and by processing and assessing as much of the finds and environmental data as possible on site, the data could be used to inform the excavation strategy.

The process of historical inquiry that was demanded by the academic philosophy at the heart of the project (see below) could now be pursued through an iterative excavation and interpretative process. At the same time, the opportunity was taken to design a recording system focussed on those processes of excavation and interpretation. The GIS and database were then designed around the recording system.

Academic aim and approach *by John Barrett*

Various research designs have been prepared with the aim of providing guidance for British archaeological work. The most recent examples have operated within period-specific remits at either a regional or a national level and have tended to specify research issues in terms of particular categories of material, or with reference to particular period-specific research questions.

By contrast the T5 Research Design, was developed at a more 'generic' level of analysis. It established an approach towards the archaeology of all periods that was intended to be applied with reference to the resource model for the T5 development area and with reference to our current understanding of the archaeology of the Middle Thames Valley.

Principles

The aim of the T5 archaeological programme has been to move beyond the recovery and description of archaeological remains as they are distributed across the landscape and to arrive at an understanding of the history of human inhabitation. The archaeology of inhabitation demands more than the recording of the traces of human activity and the history of inhabitation involves more than tracing the changing organisation of activities in a landscape. Inhabitation concerns the practical ways in which people established their presence in the material, social and political conditions of their day.

To establish a presence involves having the power, common to all human agency, to move and act in the world according to available opportunities and constraints, where such actions express knowledge of various levels of technical proficiency, social adequacy and moral authority. The archaeology of inhabitation is therefore an investigation of the various ways the human presence was established in and contributed towards maintaining or transforming the material and social conditions of history. It is an investigation of the material, moral and political contexts of human diversity.

This understanding of history is therefore not a matter of simply tracing changes in material forms (be they cultural or 'environmental') as expressed by phased sequences of material, nor is it a matter of noting that people in the past 'did things differently'. Rather, it concerns the ways lives were shaped in terms of social and political realities. These realities created different identities by virtue of varying access to resources and to modes of authority. Historical change arose as these differences were negotiated or were otherwise transformed by human practices, and by virtue of the cumulative changes in material conditions.

Human practice necessarily occupies areas of time and space. Spaces are 'opened up' by the activities that people carry out within them, and attempts can be made to define them in material terms by such things as enclosures, pathways and focal markers. Spaces and times may be appropriated and allocated to people and resources.

Application

Current excavation procedures normally treat the recovered material as data that represent historical processes. This means that field technicians record evidence that is destined for future interpretation. Our approach treats the materials excavated as components of the material conditions of history. It therefore treats excavation as primarily the investigation of history, rather than a preliminary stage in facilitating future interpretation. This places a clear interpretative responsibility with the excavators, and it ensures that the production of a coherent and empirically validated site narrative remains the fundamental objective of the excavation programme.

Inhabitation may be regarded as the creation of human realities with reference to certain material conditions. Consequently the interpretative emphasis must be placed upon the ways people brought social conditions into existence through their performance of different practices.

Two concepts frame our inquiry. These are defined as *structural conditions*, which concern the ways in which the existing material conditions operated upon the lives of the landscape's inhabitants in any one period, and *structuring principles*, which describe the organisation and interrelationship of the practical performances by which the various schemes of political and cultural order were reproduced.

Structural Conditions

Structural Conditions identify the ways in which the occupation of time and space was partly circumscribed and partly guided by existing material conditions, including the various structures in their different stages of decay that had been built into the landscape by previous generations. It is possible to identify these major structural components at various levels of generality or detail as excavation and interpretation progresses. These components will be labelled as *entities.*

The definition of *entities* enables the isolation of major architectural components through and around which lives were performed, and significant deposits and residues associated with these activities accumulated. Talking about *entities* enables us to trace the ways the physical conditions of the world were modified. *Entities* will map out, for example, the ways in which different places were linked and thus different movements may have been choreographed, the way activities may be framed by various forms of architecture, and the dominant points of reference, both monumental and topographic, that were negotiated in the occupation of the landscape.

Each generation lives within its own archaeology of standing buildings, of ruins, and of a managed landscape of high antiquity. Understanding something of the structural modifications undertaken in any period should inform an understanding of the ways by which this archaeology of the past was accommodated in the contemporary landscape and thus the ways in which that archaeology was utilised, remembered or eradicated.

Structuring Principles

By emphasising the active ways in which social life is created we can identify four broad *spaces* which facilitated that activity. These spaces were inhabited with reference to those material conditions that are represented by the excavated evidence (the structural conditions). Analysis is directed at the ways these spaces were designed and the ways in which they interrelated. The four spaces are:

Routine. These were the spaces of every day activities. They were built by acting out commonly held, if conflicting, values for often mundane and routine purposes. These activities expressed the realities of life that were taken for granted.

Explicit order. These spaces brought into being explicit statements and claims to authority, political power and the demonstration of various kinds of supernatural, or indeed natural, orders that were presumed to govern the wider order of the world. Where routine knowledge is likely to have been taken for granted, these spaces evoked a more explicit form of knowledge.

Inscription and control. These were the spaces by which resources (material resources, forms of knowledge and people) were defined by others and could be acted upon. These spaces were made in the operation of power over the lives and material conditions of others.

Exclusion, marginality and resistance. These are the spaces that may have lain beyond dominant political authority. They may have been the routines that rarely expressed their own identities, or the spaces in which arose attempts to challenge or avoid the normality of routines and the control of dominant authority.

- Each of the different kinds of space outlined above are always related through performance.

- Routine practices must involve action on and control of resources, operate against the background of explicit forms of political and religious order, and contain alternatives within them.

- Explicit order always makes sense by reference to routine experience, supports power wielded over some portion of the world, and may ignore, seek to silence or capture those actions that question its validity.

The inscription and control of resources is achieved by an effective authority, imposes itself upon the routines of life, and its boundaries partly define the spaces of alternatives and resistance.

The hidden and marginal spaces of the world contain their own routines, may express alternative views of order and seek to avoid forms of dominant control. In other words none of the performances defined here occupied spaces that did not require mediation, negotiation or confrontation with other regions of social

performance. The material entities that are identified in fieldwork formed part of the technology by which these social dramas operated, and history is driven by such processes.

The different ways in which these practices brought these spaces together is what defines the character of different historical periods, and can be summarised in Figure 1.8.

Application: the recording system and data presentation

The Framework Archaeology recording system and fieldwork methodology have been developed to apply the academic approach outlined above. The field procedures and database structure have been described previously (Framework Archaeology 1999a; 2002) and are documented in the *Framework Archaeology Field Manual*. This section will summarise the definitions of the key concepts employed in excavation and post-excavation analysis, demonstrate how those concepts are used in the analytical process, and briefly describe the final product in terms of published output.

Definitions

The following section defines the key concepts of *context, intervention, deposit, stratigraphic group, feature, entity* and *interpretative group* as used in the Framework Archaeology Database.

Context

The *context* is traditionally the primary unit of recording in British archaeology and the usual means by which artefacts and ecofacts are located to their site of recovery. Contexts are primarily sub-divided into cuts and deposits but also operate as a means of tracking all stratigraphic units on site. A context can be a stratigraphic unit or stratigraphic event, but the practice of excavation means that a context may represent a sub-division of a stratigraphic unit or event. For example, two excavators might excavate the same deposit in two different locations, assigning different context numbers to the deposit. This produces the need for the *stratigraphic group*. Within the Framework Archaeology recording system the value list for the context type therefore also includes SG (stratigraphic group), IG (interpretative group), and Void (context number not used).

Intervention

An *intervention* binds groups of contexts together. It is usually a cut or layer (taken here to include masonry and structural timbers) and it may contain other contexts, for example the fills of a cut. In the case of a cut, the intervention will normally consist of at least two contexts, one for

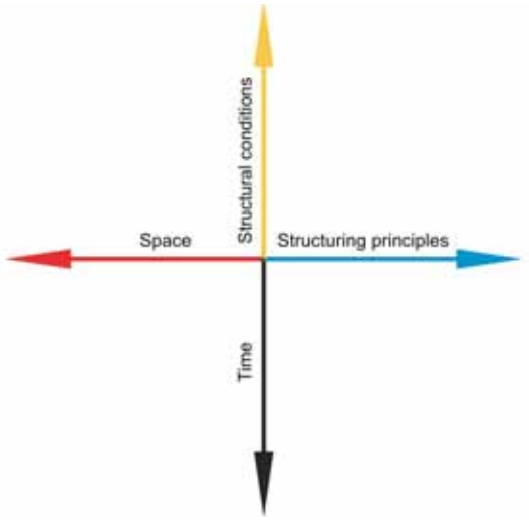

Figure 1.8: Diagram showing relationship between Structural Conditions and Structuring Principles

the cut and one discernible fill. The intervention must exist on the digital site plan and must represent an area of archaeological investigation. This is usually excavation but may on occasion be the result of a non-invasive recording method. The intervention is the primary method for producing artefact distribution plots within the Geographical Information System (GIS) and is the main method of displaying archaeological deposits three-dimensionally.

Deposit

The *deposit* is defined as a matrix that might contain finds or samples. Any context that might have produced a find or a sample, regardless of whether any were found or taken, is classified as a deposit. Each deposit is assigned to an intervention.

Stratigraphic Group

The *stratigraphic group* provides a means of describing the structure of the site. It is used to link equivalent contexts exposed in separate interventions within the same feature. For example, a stratigraphic group would be used to link together the separate context numbers given to the cut of a ditch in each of the interventions excavated, provided that it can be demonstrated to a reasonable level of confidence that they are stratigraphically equivalent. The same process would be applied to all fills within the ditch.

Feature

A *feature* is defined as one or more interventions that represent the remains of a past activity. It represents something that existed in the past, such as a ditch or a pit, which has been rediscovered through the process of archaeological investigation. The feature is defined through one or more interventions. It always consists of a stratigraphic group cut or a stratigraphic group layer and may contain other stratigraphic groups.

Entity

The *entity* is the basic tool of structural synthesis, a means of linking a group of related features together. For example, a number of postholes might form a structure or a number of ditches an enclosure. This can be employed at an extremely detailed or a very broad level (eg an entity linking all the features making up a Bronze Age field system might contain hundreds of ditches). By definition, the entity includes all deposits within the assigned features. Not all features need belong to an entity, whereas some features may be assigned to more than one entity, depending on the analytical perspective.

Interpretative group

- To sub-divide entities into phases of time, which are defined as representing the construction of the entity, the use or disuse of the entity or the demolition of the entity. The distinction between disuse and demolition of the entity is defined by the visibility of the

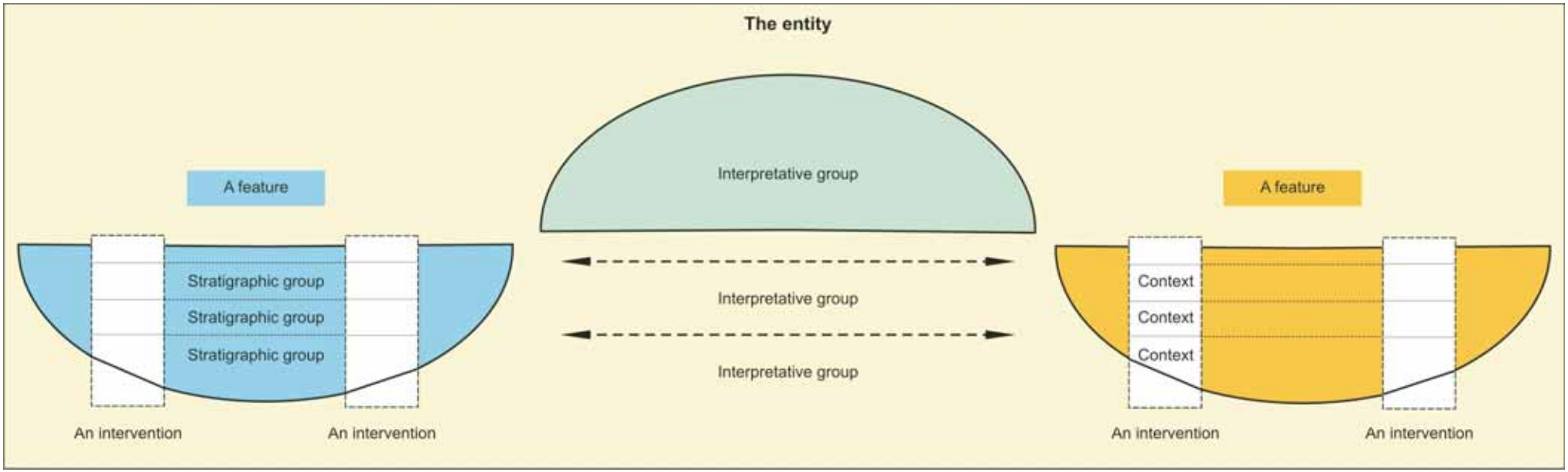

Figure 1.9: Modelling archaeological deposits

entity in the landscape. Disuse indicates that the entity was no longer used but still visible. Demolition indicates that the entity was no longer used and no longer visible in the landscape.

- To provide a method of linking deposits by a means unrelated to entities. An example would be the analysis of a landscape, which no longer exists as features, such as a Neolithic landscape where all features have been removed by later activity. Only Neolithic finds re-deposited within later features would indicate the existence of such a landscape.

The decision to define interpretative groups within an entity depends on the perceived degree of analysis required. Not all entities will be sub-divided into interpretative group time-slices. The diagram in Figure 1.9 shows how the Stanwell Cursus would be represented by *contexts, stratigraphic groups* and *interpretative groups* and as an *entity*. These elements can be used to model change through time and space, as demonstrated by the diagram (Fig. 1.8) showing *structuring principles* and *structural conditions*.

Information technology implementation

A computer system was installed on-site consisting of databases for matching up the records of features excavated, initial object identifications and the environmental samples with the plans of excavated and unexcavated archaeological features.

The purpose of the system was to allow cross-referencing of the recovered records and materials to produce initial phase plans and distribution plots of artefacts and samples which could be used to inform the excavation process.

Fieldwork procedures

The aim of the fieldwork programme was the creation of narratives of inhabitation, and those narratives were then further refined by off-site analysis. Interpretation at this level was the responsibility of the excavating team, rather than it being deferred to a post-excavation stage of analysis. Monuments, soils, organic and inorganic residues were therefore examined in the field in order to establish the changing form of the landscape, the processes operating across that landscape and the history of the landscape inhabitation. The development of *landscape generic* to *landscape specific* sampling, and the analytical shift between *structural conditions* and *structuring principles* were designed to facilitate the development of this line of analysis.

The issues raised as structuring principles are not derived from the material itself but from an inquiry into the way human life was ordered by occupying that material. For example, the inhabitants of an Iron Age settlement established and extended that settlement within the remnants of an ancient landscape, some worked the land, food was prepared, material needs were satisfied unequally, rubbish was deposited, the dead were given funerals, gods and spirits were

Plate 1.3: Site tour looking south-east with project team standing within middle Iron Age penannular gully 3 in WPR98 Bed C

acknowledged. Generally expressed they may be, but these issues impinge directly upon our understanding of the archaeological resource.

The above analytical sequence is one of increasing generalisation through which it will be possible to relate the archaeology of specific practices to more general historical themes and thus to a wider level of regional analysis for both the Middle Thames Valley and for southern Britain. In contrast, the excavation programme will, of necessity, have to move from the general to the particular, by initially assigning deposits to the chronological model proposed in the Research Design before interrogating those deposits to understand the operation of the structural principles through which the landscape was occupied.

Practical application

The excavation (Greater London Site Code WPR98) was undertaken in two phases. Phase 1 consisted of Thames Water Utilities Ltd (TWUL) removing any remaining dried sludge 'cake' from the drying beds and then any remaining overburden being removed by 360 degree tracked excavators under archaeological supervision. The archaeological features which were soon exposed were then digitally surveyed using electronic distance measurers (EDMs) to produce a digital map of the archaeological deposits. This was undertaken from October 1998 to February 1999, often under dreadful weather conditions. Heavy rainfall led to widespread flooding which required the use of pumps, and the archaeological team worked extremely hard under adverse conditions. This phase of the project clearly demonstrated that archaeological deposits had survived the construction and operation of the drying beds, but that survival was variable.

The excavation itself commenced in March 1999 and continued with a total team of *c* 60 individuals until the end of September 1999 (Plate 1.3). A small team was retained to finish data processing and limited excavation until Christmas 1999. To achieve the levels of analytical resolution demanded during the excavation, two main stages of investigation were identified, Landscape Generic and Landscape Specific. The main elements of these two stages were as follows:

Landscape Generic

- To characterise the overall nature of the archaeological resource and to understand the processes of its formation;
- To define in plan all archaeological features;
- To establish the character of those features in terms of cuts, soil matrices and interfaces;
- To recover across the site a sample of organic and inorganic material residues in order to understand site formation processes;
- To establish in outline a dated sequence of structures and thus to define changes in landscape organisation over time;
- To establish, within that dated sequence, the priorities for the investigation of a landscape specific archaeology of inhabitation.

The digital survey following the removal of overburden fully or partially met some of the above aims. Confidence in the interpretation of some features prior to excavation (eg the cursus monument and house circles) was more developed than for example, interpretation of linear ditches as field systems or enclosures. Our knowledge of these features was in turn more advanced than others such as pits and isolated postholes, about which little was known. The purpose of the Landscape Generic phase was both to build on our present interpretation and add to our knowledge of other landscape elements, and it thus addresses the need to understand the *Structural Conditions.*

In order to manage the excavation programme the Landscape Generic investigations were sub-divided into two stages: LG1 and LG2. The information recovered at each stage was used to inform subsequent interpretations and guided decisions on future excavation strategy. This staged approach facilitated a fluid and dynamic approach towards the management of the excavation and ensured that critical feedback and the construction of a narrative of human inhabitation was achieved within the constraints of the programme. Within these two stages therefore, excavation, analysis and interpretation was an on-going process in which objectives and the means of achieving them were the subject of constant critical review. This approach also had the advantage of allowing appropriate account to be taken of the varying levels of confidence in interpretation with which we started (see above).

LG1 was principally concerned with the following:

- dating and characterising a sample of the main types of features (eg linears, circular structures etc.);
- establishing a basic chronology and relative stratigraphy of the above features;
- assessing the quantities and analytical value of the artefactual and environmental material from these features.

The information gathered from LG1 sampling was analysed during excavation and the results determined the approach to the next stage (LG2).

LG2 was principally concerned with:

- determining the stratigraphic relationships between the excavated features to refine the chronological development of the landscape;

- increasing the sample size of excavated features in response to trends in spatial patterning of finds, environmental evidence and trends in constructional technique of linears etc.

In practice, LG1 interventions were located away from the junction of two features so that relatively uncontaminated finds and environmental samples could be obtained. LG2 interventions were located at the intersection of features to determine stratigraphic relationships. In addition, some LG2 interventions were located to clarify questions raised by LG1 interventions or to obtain more meaningful finds assemblages.

Constant re-assessment of data retrieved during LG1 and 2 allowed the appropriate sample size for investigation of unexcavated elements of LG1 to be determined. For instance, if LG1 determined that a meaningful sample excavation size for roundhouses was 50%, then the remaining unexcavated samples would be excavated to this size.

Following LG1 and LG2 the main elements of the stratigraphic groups were built (see Recording System above). Completion of the Landscape Generic phase provided the following:

- an understanding of the formation processes which led to the archaeological features and deposits which exist;

- a broad understanding of the structural conditions existing in successive landscapes;

- a baseline for future comparisons between human occupation of the different landscapes.

Landscape Specific

A series of period divisions in the history of landscape inhabitation was already defined in terms of the dominant traditions by which those landscapes were inhabited (see Previous work above). On-site analysis interrogated this model of chronological development, moving between the details of human inhabitation at a site-specific level of analysis and at the more general regional level.

In practice, the results of the Landscape Generic phase of work produced a number of research focussed tasks which were communicated in a Project Design Update Note in September 1999 (Framework Archaeology 1999b) whilst excavation was continuing.

It is important to note that none of the individual elements described below, or the processes that were used, are in themselves new. The basic level of recording remained the context, and these were grouped to form features and deposits, which in turn formed entities. Finds and environmental processing and assessment and analysis were undertaken in standard ways. The difference lay in where these tasks were positioned within the excavation and analytical sequence. For instance, Stratigraphic Groups (SGs) were produced at the end of the Landscape Generic (LG) phase of excavation: indeed, the construction of satisfactory SGs was a major test of whether enough data had been gathered during LG excavations. The creation of SGs allowed the excavators to interpret the construction, use and decay of features and deposits rather than disconnected contexts, and to consider how these operated in relation to contemporary and ancient landscapes. This was the beginning of the process that addressed the analysis of structuring principles and structural conditions (see above).

The requirement to address this level of interpretation during excavation, using finds and environmental data processed on site, facilitated the construction of the historical narrative in the field. The emerging narrative then acted as a source of inquiry for the Landscape Specific (LS) investigations, which may or may not have modified the initial interpretations. Excavation thus returned to the process that almost all archaeologists would agree it should be: a process of investigation of the past driven by questions and inquiry which demand observation, thought and interpretation, rather than attempting to achieve an arbitrary percentage sample across different features and deposits.

This system required site excavators and supervisors to engage with many elements such as grouping contexts and assessing dating evidence that has over the past 20 years tended to be deferred to the post-excavation phase of a project. It is our experience that one of the results of this deferral has been to narrow the skills base in British field archaeology, since field excavators usually have limited experience of post-excavation analysis. This project provided extensive training in this (and many other skills such as object identification and dating) in an attempt to raise excavators' interpretations from the context and intervention level to the feature, entity and landscape level. The results are contained in the interpretative text for the features and deposits and can be viewed through the Freeviewer software accompanying this volume (see below). The content is variable in clarity of thought and expression, but provides a much richer record than most archives: we feel it is still useful to be able to have the excavator tell us what a feature actually is, rather than trying to work this out from the convoluted 'context speak' we normally encounter.

By the end of the Perry Oaks excavations, a digital archive consisting of contexts grouped into features and deposits was available. The artefactual assemblages were quantified and dated and the environmental samples had mostly been processed and assessed for potential. In most respects the dataset was at a stage which most projects achieve after the post-excavation assessment phase, as defined by the Management of Archaeological Projects (English Heritage 1991). Nonetheless, a period following the excavation was required to enter a backlog of records into the database and to check through the digital archive for digitising, stratigraphic and dating errors. The archive was then used to refine the narrative and proposals for analysis and publication were presented in the Project Design Update Note 2 (Framework Archaeology 2000).

Post-excavation analytical procedures

The analytical phase of the project comprised specialist analysis of the artefactual assemblages and environmental samples, in conjunction with the stratigraphic evidence through the medium of the GIS, a process that took several years. Could this process be shortened? Is it possible to come off site with all this detailed analysis complete? In theory yes; however a number of practical factors prevent this.

Firstly, some forms of detailed analysis such as palynology simply take a long time, especially with a large project and numerous samples. Pottery fabric and form analysis is best undertaken once the whole excavated assemblage is available, not whilst more material is being recovered. Samples for radiocarbon dates (as with samples for environmental disciplines) need to be carefully selected and prioritised in the light of the full data set if cost-effectiveness is to be maintained.

Secondly, the structure of British archaeology is such that finds and environmental specialists with years of experience are simply not able to move and work on a single site for months or years at a time. They are based in offices or laboratories with extensive existing commitments. However, the publication of the narrative in this volume is dependant on this work, and until those skills can somehow be returned to the field then a lengthy post-excavation programme will remain.

Publication: scope, concept, presentation and archive

Scope of the work within this volume

This volume encompasses or draws upon the results of a number of different phases of archaeological investigation at Perry Oaks, as presented below.

- Several archaeological evaluations were undertaken by the Museum of London Archaeological Service (MoLAS) (BAA/902, /903, /905) in support of the Terminal 5 Public Inquiry in the early 1990s.

- Two aerial photographic surveys were commissioned by MoLAS and produced by English Heritage (RCHME 1995; 1997), showing the Stanwell Cursus, small circular Neolithic and/or Bronze Age monuments, and field systems dating from the 2nd millennium BC to the medieval period.

- In 1996, an excavation (Greater London site code POK96) was undertaken by MoLAS

Book	Freeviewer	Digital archive
Historical narrative with key supporting analysis and data. Discussion is based at the Entity and Feature/Deposit (Stratigraphic Group) level	Selected digital plans, sections and photographs. Landscape phasing and finds/environmental distributions and queries. Data is presented and described at the Entity, Feature/ Deposit (Stratigraphic Group) level. Contains context level data for each feature, but not descriptions	Full digital archive: all plans, sections, photographs, survey data. Data is presented at Entity, Feature/ Deposit (Stratigraphic Group) and Context level. Full Stratigraphic Group and context descriptions. All finds and environmental data. All specialist reports.
Increasing detail and complexity →		

Table 1.1: Levels of data in each stage of dissemination within the Perry Oaks Volume

(Andrews *et al.* 1998). This was located immediately to the south of Drying Bed B (Fig. 1.3) in order to mitigate the effects of the movement and stockpiling of processed sludge 'cake' by mechanical excavators, which was causing gradual truncation and loss of archaeological deposits (as demonstrated in the truncation model, see above).

- In 1998, Framework Archaeology was commissioned by Thames Water Utilities Ltd (TWUL) and BAA to mitigate the effects of the clearance of Drying Beds B, C and A, covering an area of *c* 21 hectares (Greater London site code WPR98). Excavations took place in 1999 and 2000.

- During 1999 Heathrow Airport Limited (HAL) commissioned Framework Archaeology to undertake further archaeological mitigation in advance of the construction of a new Northern Taxiway at Grass Area 6 (Greater London Site Code GA199) and remote aircraft stands at Grass Area 21 (Greater London Site Code GAA00). Both areas, which lay within the perimeters of the airport, had been the subject of previous archaeological evaluations by MoLAS: WXE96 at Grass Area 6 and WXC96 at Grass Area 21 (BAA/905). Both evaluations had indicated the presence of archaeological remains, predominantly dating to the middle of the 2nd millennium BC. The Framework Archaeology excavations took place over a period from October 1999 until May 2000.

As far as possible, the field archives and finds data from all the MoLAS evaluations and excavations above (particularly POK96) have been digitised and incorporated within the Framework Archaeology GIS and database system.

With the approval of the application to construct Terminal 5, Framework Archaeology began further mitigation ahead of that project in March 2002. The data from those excavations (Greater London site codes PSH02, TEC05 and LONGFORD) has been integrated with the datasets used here, and will be presented in Volume 2.

Publication concept, presentation and archive

This volume serves to develop the historical narrative and explore the major themes of landscape inhabitation. It has proved experimental in that it has explored the many issues of how to write a historical narrative, but at the same time present archaeological data. We cannot stress enough how difficult a process this has been. Writing an engaging historical narrative, which talks about the choices faced by people at different points in the past, what decisions they made and how that shaped their futures is a difficult enough task for historians. However, as archaeologists we need to build this narrative on a considered analysis of our excavated data. The presentation of the results of this analysis was problematic. Early drafts of this volume concentrated on historical processes and agency and high level theoretical synthesis of human occupation of the landscape. However, these early drafts proved unconvincing: enough data has to be presented within the narrative to provide examples to illustrate the historical points being discussed and to give the reader confidence in our conclusions, or at least provide a starting point for the reader to challenge those conclusions. Conversely, if too much data is presented, the narrative becomes disjointed and one returns to the format of more

traditional publications, which tend above all to be descriptive catalogues of artefacts and stratigraphic sequences. Put simply, we have a tension between two main readerships. Firstly, those who wish to read about the history of human inhabitation of the landscape and are content with a historical narrative supported by detailed example. Secondly, there are those who want to 'know what pottery they found there' (Mercer 2002, 363); that is archaeologists who wish to use the data in their own researches, or are simply content with descriptions of how many monuments and trackways were excavated, their dating and finds assemblages. Our ideal, of course, would be to produce a publication that would satisfy both these groups and allow people to move from narrative to data and back again with ease.

Our solutions are not perfect, but we have been aided greatly by having all our data available in digital format. This has allowed us to distribute a distilled version of our data by creating the Freeviewer software. This is a GIS viewer, which allows the reader to view and interrogate a much larger dataset than would be possible with a normal publication. Should one want more detail than the Freeviewer can provide, then the full digital archive will be deposited with the Archaeology Data Service (ADS), and the physical archive with the Museum of London once the Terminal 5 excavation and publication programme is complete.

This approach seeks to provide a historical narrative backed by key analysis and data, but also provides a structured path into increasingly more complex data via the Freeviewer and the full digital archive. Table 1.1 shows the levels of data in each of these stages.

Structure of the historical narrative and how the themes will be explored

This section summarises how the results of the pursuit of the academic philosophy in the field has been presented in this volume.

The main part of this volume is divided into three sections (Chapters 2–4), which progress chronologically from the Mesolithic period in the 10th millennium BC to the end of the Romano-British period at the start of the 5th century AD.

Chapter 2, Hunter-gatherers and first farmers: the Mesolithic wildwood to the end of the monumental landscape of the Neolithic (10,000 BC–1700 BC)

This chapter outlines our chronological evidence before considering some of the historical processes through time. We will consider the significance of a handful of pits excavated by hunter-gatherers in the 7th millennium BC at a location on the edge of the Colne floodplain. In the 4th millennium BC a timber post–built structure was constructed a few metres south of these pits. In the late 4th millennium BC, the landscape was transformed by the construction of the C1 Stanwell Cursus, one of the great monuments of Neolithic Britain. This event, shortly after forest clearance associated with the 'elm decline', was followed by the construction of a second cursus (the C2 Cursus) and a small horseshoe-shaped enclosure. In the space of a few centuries or less, people had transformed the landscape from one defined by memories of ancient locations to one defined by the architecture of earthen banks and ditches. We will go on to suggest how people lived within this new world during the early part of the 3rd millennium BC. However, by the latter half of the millennium, new monuments and practices of artefact deposition signal a change in the way people lived in the landscape. By 1700 BC this change was to lead to the replacement of a system that apportioned land and resources through ceremony to one of physical demarcation: the first land tenure and field divisions.

Chapter 3, The emergence of the agricultural landscape from the early-middle Bronze Age to the end of the early Iron Age (c 1700 BC– 400 BC)

We will suggest a time and origin of the first land tenure boundaries that divided the Heathrow landscape in the first half of the 2nd millennium BC. We will show how settlements became archaeologically visible, how the landholdings developed into a landscape of small and large fields traversed by double-ditched trackways. This landscape supported a mixed arable/pastoral agricultural economy, supplemented by resources from the innumerable hedgerows which divided the fields. However, we will also show that during the middle of the 2nd millennium BC, people maintained links with the past

and the overtly ceremonial world of monuments of the 3rd millennium BC through ceremonies resulting in particular artefacts being deposited in the base of waterholes. From the late 2nd millennium we will see how the pattern of small settlements scattered across the landscape changed to one of fewer and larger settlements. We can also see this change being reflected in different patterns of artefact deposition at the base of waterholes.

Little specific evidence was recovered for early Iron Age activity during the Perry Oaks excavations, but we shall see how major elements of the Bronze Age agricultural landscape appear to have persisted well into this period. Waterholes appear to have retained their status as places of offering for generations of farmers during the late Bronze Age/early Iron Age whilst hedgerows were maintained and ancient trackways respected.

Chapter 4, Development of the agricultural landscape from the middle Iron Age to the end of the Romano-British farmstead (c 400 BC–5th century AD)

This chapter deals with the period following the early Iron Age, after the abandonment of the small, dispersed settlements occupied by the Bronze Age inhabitants. We shall suggest that the Perry Oaks landscape came under the control of new cultural and economic influences and designs, culminating in a gradual transformation which saw the emergence in the middle Iron Age of a nucleated settlement of roundhouses. This in turn became a focal point for continuing occupation and ceremony through into the early Roman period. However, we will show that the Perry Oaks landscape of the later Roman period largely overwrote the previous land divisions, focussing outwards and away from the ancient local community. This was perhaps produced by upheaval within the regional and imperial Roman administration during the 3rd century AD. We will demonstrate how some fossilisation of this late Roman landscape can be traced in the medieval ridge and furrow and the alignment of a post-medieval trackway that survive at Perry Oaks, although by this time the site appears to have reverted to localised rural inhabitation and agricultural regime.

Running through all three chapters are two main historical themes:

- The strategies used to decide access to land and resources and how these changed through time;

- How these strategies were intertwined with the tensions between individuals, families and communities, and how these dynamics changed through time.

The description of the archaeological remains will be considered in terms of these historical themes and used as examples of change or continuity in these processes. For example, we will examine how the construction of the Stanwell Cursus was undertaken by, and cemented the creation of, a community composed of kin-groups. For the next 1500 years the community apportioned access to land and resources to support the constituent kin-groups. We will show how this system weakened until just prior to 1700 BC, when the kin-groups came to the fore by physically apportioning land and resources through major landscape divisions. However by 1000 BC, the kin-groups had once more become unified into a community which lived in a single settlement and had pooled the resources of the individual landholdings into a larger landscape block.