Settling the Ebbsfleet Valley

High Speed 1 Excavations at Springhead and Northfleet, Kent
The Late Iron Age, Roman, Saxon, and Medieval Landscape

Volume 1: The Sites

By Phil Andrews, Edward Biddulph, Alan Hardy, and Richard Brown

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Oxford Wessex Archaeology

2011

This book is the first of a series of monographs by Oxford Wessex Archaeology (OWA)

978-0-9545970-3-0

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Published by Oxford Wessex Archaeology,
a joint venture between Oxford Archaeology and Wessex Archaeology

Oxford Archaeology, Janus House, Osney Mead, Oxford OX2 0ES, Registered Charity No. 285627
Wessex Archaeology, Portway House, Old Sarum Park, Salisbury SP4 6EB, Registered Charity No. 287786

Designed and typeset by Kenneth Lymer, Wessex Archaeology
Cover illustration by Thomas A Goskar
Printed and bound by Cambrian Printers, Aberystwyth

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Acknowledgements

Rail Link Engineering's (RLE) in-house archaeology team which, for Springhead and Northfleet, comprised Helen Glass, Jay Carver, Steve Haynes, and Brigitte Buss, project-managed all aspects of the work on behalf of High Speed 1 Ltd (formerly CTRL (UK) Ltd, formerly Union Railways (North) Ltd). Oxford and Wessex Archaeology would like to acknowledge and thank them individually and collectively for their constant assistance and support throughout all phases of the programme of archaeological work. They are further acknowledged for agreeing to the incorporation of results of the contiguous, non-HS1 Springhead Nursery excavation into this publication.

Thanks are also extended to the Section 2 RLE design and construction teams, the Hochtief/ Norwest Holst joint venture (principal contractors at Springhead), and John Jones Ltd who undertook the bulk earth-moving during construction works. With their co-operation from the outset, the archaeological fieldwork was a model in construction and archaeology working together.

The entire archaeology programme has been monitored by archaeologists from Kent County Council and English Heritage and, in particular, thanks go to John Williams, Lis Dyson, Peter Kendall, and Dominique de Moulins for providing us with a constant source of knowledge and advice. Their involvement in the decision to incorporate the non-HS1 work into this publication is also gratefully acknowledged.

The joint venture was overseen by the chief executives of Wessex and Oxford Archaeology, Sue Davies and David Jennings, together with Clive Burrows and Simon Palmer. The Framework management team is composed of John Dillon and Bob Williams.

The long and complex programme of fieldwork at Springhead was managed for Wessex Archaeology by Mick Rawlings, to whom especial thanks are due. The dedication and professionalism of all the archaeologists who worked at Springhead as part of the site team is gratefully acknowledged, particularly those who withstood the wettest winter on record in 2000–1. Phil Andrews directed work on both the Sanctuary site and the Roadside settlement, with Mike Trevarthen acting as Project Officer on the latter. Amongst those who deserve special mention are Barry Hennessy, Hilary Valler, Neil Fitzpatrick, Steve Thompson, and Nick Cooke who supervised various elements of the two principal excavations. Barry Hennessy, in particular, was present from the start (in September 2000) to the finish (in March 2003) of the main fieldwork programme and his practical problem-solving and total reliability was a source of constant re-assurance. Andrew Crockett oversaw the site set-up in 2000, the commencement of machine stripping and, with Mike Dinwiddy, the initial metal-detecting survey. Rob De'Athe, John Martin, and Barry Hennessy undertook various parts of the watching briefs at Springhead as well as in the surrounding area in 2002–3. Several of the site staff were present for substantial periods of the fieldwork and deserve mention, in particular Andrew Armstrong along with Emma Davidson and Howard Brown, as well as Rebecca Fitzpatrick, Claire Gannon, Richard Kelleher, Nick Plunkett, Gareth Thomas, and the late Gary Wickenden.

That such a substantial assemblage of metalwork was recovered from Springhead is due entirely to Roger Richards who was present on the project from start to finish and whose metal detecting skills vastly increased the recovery of artefacts, particularly from topsoil and subsoil contexts and from the area of the springs. He also identified the presence of several Saxon graves which otherwise were not visible and, most importantly, pinpointed numerous objects allowing their controlled excavation, thereby pre-empting their illicit removal by nighthawks, a constant problem in this part of Kent. Members of the Gravesend metal detector club are also thanked for their involvement in the initial metal detector survey of the Sanctuary site.

Tim Clegg (formerly Oakes Construction Ltd) was of key importance in the smooth running of the fieldwork at Springhead, arranging provision of a wide variety of plant and materials when and wherever they were needed, not least of which was a tank of diesel for the project vehicle during the 2000 fuel crisis. His good humour and interest in the archaeology ensured a happy working relationship. Tim Raven, of the many machine drivers who worked so diligently at Springhead, was involved in most phases of investigation; his precision made our work so much easier.

Malcolm Davies kindly made available the results of his work at the walled cemetery at Springhead in advance of publication and undertook the geophysical survey that revealed the route of the Late Iron Age 'processional way' prior to excavation. Dana Goodburn Brown undertook consolidation of the wall plaster in the temple at Springhead roadside settlement, now preserved *in situ* following the implementation of a scheme for conservation and reburial devised by Brigitte Buss of RLE. Mike Allen, Rob Scaife, Richard Macphail, and Alex Prior are thanked for advice on the sampling strategy for some of the sedimentary sequences. Wessex Archaeology is also grateful to members of MoLSS (Museum of London Specialist Services) and English Heritage's scientific dating team for advising on the potential for magnetic dating of various features, and Richard Brown and colleagues at Oxford Archaeology who kept the Springhead team informed of developments at the Northfleet Villa site during the course of excavations there.

Also of key importance was the Elliot family, proprietors of Springhead Nursery, which, unusually,

has been in the same family for almost a century. They have a great interest in the history and archaeology of the local area and were unstinting in their support of the work, despite the disruptions caused to their business by the various archaeological evaluations and excavations. Ann and Neil Elliot, Wally, Val, and Peter went out of their way to provide access, facilities, and information about the recent history of this part of the Ebbsfleet Valley, and this all contributed to a uniquely enjoyable experience. It is pleasing to record that Springhead Nursery is once again flourishing following completion of rail construction works (as it did after the demise of the watercress industry there in the 1930s) and we wish it well for the next century.

Excavations at Northfleet Villa were managed by Stuart Foreman and Richard Brown. Throughout the excavation phase Project Officer Paul Murray oversaw the supervisory staff and assisted in organising the considerable day-to-day logistics. He subsequently remained on site, supervising an extensive and complex watching brief over a period of several months.

On-site production of digital mapping was carried out by Laura Hindmarsh, environmental processing by Richard James, and finds management by Claire Rawlings and Rob Radford. Supervisors on the villa site were Emily Glass, John Payne, Simon Greenslade, Emma Noyce, Gerry Thacker, and Mike Sims. Geoarchaeological investigations were supervised by Elizabeth Stafford with the benefit of advice from Martin Bates (University of Wales, Lampeter).

The main excavation phase at Northfleet Villa required a large team over a nine month period and it is not possible in this publication to name all of the participating technicians and assistant supervisors who worked so hard to complete recording work ahead of construction. Following the discovery of the Saxon mill, many of the site staff worked seven days a week to record and lift the structure ahead of an imperative construction deadline. The 'mill team' – Iain Williamson, Simon Pickstone, Simon Sworn, Stuart Milby, and Neil Wigfield – deserve particular mention for that effort. Dana Goodburn Brown (AMTEC) provided much conservation advice as well as designing the lifting frames for the mill chutes. Peter Stephenson (Civil Engineer) undertook the temporary works design for an earth dam, required to prevent the site flooding during excavation of the mill. On site specialist recording and interpretation of the waterlogged wood was provided by Damian Goodburn (MoLSS). Moulinologist Martin Watts helpfully visited the site several times during the excavation and on-site dendrochronological advice was provided by Ian Tyers (Sheffield University). Mechanical plant and preparation of the site compound were undertaken by Daly Plant Hire and essential security cover during the excavation was provided by Charter Security.

The lengthy and equally complex programme of post-excavation work for Springhead and Northfleet, beginning in 2005 and undertaken by the Oxford Wessex Archaeology Joint Venture, was managed by Andrew Crockett of Wessex Archaeology. Edward Biddulph undertook the day to day management of the post-excavation work for Northfleet. It is appropriate here at the outset to warmly thank all of the specialists and illustrators who have made contributions to the publication of the work at Springhead and Northfleet and these are listed individually on the title page. The post-excavation team would like to specifically highlight and acknowledge the following contributions.

The co-ordination of much of the programme of finds assessment and analysis for Springhead and Northfleet was undertaken by Lorraine Mepham and Leigh Allen. The processing, recording, packing, and storage of the very large finds assemblages from Springhead were overseen by Angi Britten and Talla Hopper, and much of the X-radiography was undertaken by Angi Britten. It is thanks to their diligence that very few problems were encountered by specialists during subsequent assessment and analysis. Investigative cleaning and conservation of many of the metal finds was carried out by Kelly Abbott, Helen Wilmott, and Louisa Burden at the Wiltshire Conservation Centre, Chippenham (formerly Salisbury), and the team are very grateful to them all for their work on this material.

Edward Biddulph is grateful to Daniel Stansbie for helping to record the Northfleet Roman pottery assemblage, in particular the pottery from the Western Roman Complex. Jo Mills would like to thank Brenda Dickinson, Geoffrey Dannell, Samantha Hopkins, and especially Joanna Bird for their forbearance, encouragement, and advice during the course of recording the samian assemblage and writing the report. Joanna Bird identified most of the East Gaulish and less common wares and provided many references, Geoff Dannell identified the South Gaulish ovolos and some of the decorated sherds, and Brenda Dickinson kindly assisted in the identification of many of the potters' stamps. Dr Philip Kenrick is thanked for commenting on the possible Arrentine potter's stamp. Any mistakes within the text or catalogues are the author's alone. Karen Wicks at AFESS undertook the analysis of glues and residues on the Romano-British pottery.

Damian Goodburn would like to record that, without the help of site and supervisorial staff from Oxford Archaeology, much of the woodworking study would have been impossible. Thanks are also due to archaeological volunteer J Minkin who assisted in the detailed recording off-site and first discovered the unique compass drawing on the Saxon mill chute from Northfleet. During the post-excavation study all the following have provided useful information, discussion and help in retrieving archive information: Alan Hardy, Edward Biddulph, and Martin Watts, but none is responsible for any errors that might remain in this study. The study has also drawn on the tree-ring analysis by Ian Tyers, and drew on species identification work by Catherine Barnett. Martin Watts is extremely grateful to the following for their help with the interpretation and understanding of the Ebbsfleet mill and for supplying

reference material: Damian Goodburn, Alan Hardy, Michael Harverson, Jeff Hawksley, Michael Lewis, Thomas McErlean, Colin Rynne, Bob Spain, Alan Stoyel, and Sue Watts.

Jörn Schuster would like to thank Justine Bayley, David Dungworth, and Roger Wilkes for instruction in the use of the XRF-spectrometer at Fort Cumberland and help in the interpretation of the results, as well as other useful discussions about the metal objects from Springhead and Northfleet. Advice on individual objects was also kindly provided by Barry Ager, Colin Andrews, Birte Brugmann, Emma Durham, Tony Firth, Grace P Jones, Martin Henig, Ralph Jackson, Ernst Künzl, Sean McGrail, Frank Pemberton, Martin Schönfelder, Mechthild Schulze-Dörrlamm, Egon Wamers, Martin Welch, and Sally Worrell. Special thanks go to Andrew Fitzpatrick for many discussions and his help in obtaining essential literature, to Jens Neuberger for linking all the components for the recording of the assemblage in a highly useable database, and to Elina Brook for the diligence with which she carried out the initial recording, including photography, of the objects for the database.

Nick Cooke is indebted to Richard Reece for reading and commenting on an earlier draft of the report on the Roman coins. Ruth Shaffrey acknowledges Kevin Haywood for helping with some of the stone identifications. Leigh Allen is grateful to Ian Riddler for identification of the antler spearhead from Northfleet.

The programme of environmental assessment and analysis for Springhead was co-ordinated by Catherine Barnett and for Northfleet by Liz Stafford. The flotation of the Springhead bulk soil samples was mainly carried out by Hayley Clark, with much of the general organisation of the various environmental samples undertaken by Sarah Wyles, who also sorted and assessed the flots. Chris Stevens is grateful to Richard Naisby and Rachel Ballantyne for discussion of the use of spelt wheat in malting. Catherine Barnett would like to acknowledge Laura Catlin for her assistance with the waterlogged wood. Sarah Wyles thanks Mike Allen for checking the snail identifications and Elina Brook for data entry of the marine shell. Richard Macphail is grateful to Liz Stafford for her information and collaboration with the micromorphology project. The skipper (fish) remains were identified by Wim van Neer of the Royal Belgian Institute of Natural Sciences.

The post-excavation team are particularly grateful to Rob Goller, principal illustrator for the project, for gathering together and ordering the very large number of figures and plates and ensuring consistency in their style and quality. The illustrations for Springhead were produced by Rob Goller and Elizabeth James, with the pottery drawings by Nick Griffiths, Rob Read, and Rachael Seager Smith. The Northfleet illustrations are by Lucy Martin, Sophie Lamb, Peter Lorimer, Rosalyn Lorimer, Sarah Lucas, and Georgina Slater. The Springhead site drawings are based on the digital site and interpretative plans prepared by Simon Skittrell, who also undertook the unenviable task of checking all the site records and preparing the datasets for Springhead. Andrew Crockett would also like to personally thank Simon for his administrative support during the post-excavation programme. Tom Goskar created the sanctuary reconstruction and Paul Cripps assisted in terrain modelling for Springhead. The Springhead finds were photographed for publication by Elaine Wakefield, who also took some of the site photographs, the remainder taken by various members of the team. The aerial photograph of the Ebbsfleet valley is published here with the kind permission of Peter Wood of Hawkeye Aerial Cameras.

Numerous people have discussed various aspects of the Springhead site, amongst which Andrew Fitzpatrick, David Keys, and Martin Millett deserve particular mention, with other information provided by Victor Smith, himself an earlier excavator at the site with the Springhead Excavation Group and the Gravesend Historical Society. The results of more recent and on-going evaluations and excavations in areas adjacent to the HS1 have kindly been made available by Paul Chadwick (CgMs Consulting) and Richard Greatorex, Catriona Gibson, Angela Batt, and Mike Dinwiddy of Wessex Archaeology.

Alex Smith assembled and edited the four volumes comprising this publication and the post-excavation team are particularly grateful to him for undertaking this substantial task. Paul Booth and Ian Riddler are also thanked for acting as readers for the late Iron Age/Romano-British and Saxon elements respectively. Their knowledge of Kent in these periods has resulted in a number of improvements being made to the draft texts.

Last but not least tribute should be paid to Bill Penn and Sid Harker, whose dedicated efforts in earlier, sometimes more difficult times, brought Springhead to national attention and provided an important basis for further research and investigation.

Abstract

The Ebbsfleet Valley in north-west Kent is just 2.5 km long, with Springhead at its head and Northfleet near its confluence with the Thames. The Channel Tunnel Rail Link (CTRL), now High Speed 1 (HS1) follows the narrow, relatively steep-sided valley for the whole of its short length, passing through the richest and best preserved archaeological landscape encountered on the entire High Speed 1 project. The valley contains sites of several periods which are of national, if not international importance, and construction of the HS1 provided a unique opportunity to undertake large-scale investigations of some of these. This report presents the late Iron Age, Romano-British, Saxon, and later discoveries, with the Palaeolithic–Bronze Age remains to be published separately in the *Prehistoric Ebbsfleet* volume.

Late Iron Age activity, assigned to the first half of the 1st century AD, concentrated on the springs at the head of the valley and appears to have been associated with a ritual landscape. The most enigmatic feature was probably a 'processional way', which extended almost 500 m from the river edge to a point high on the slope overlooking the springs. From here, the Iron Age community could witness religious ceremonies conducted in and around the water. What such ceremonies may have involved is not known, but almost 70 coins, possibly votive offerings, were found in this area.

The Roman Conquest saw significant changes to the landscape of the Ebbsfleet Valley, with the establishment of a 'small town' or roadside settlement at Springhead (*Vagniacis*) and a richly furnished villa downstream at Northfleet. Roman settlement at Springhead began at an early date, reflecting both the site's strategic location where Watling Street crossed the head of the Ebbsfleet, and its accessibility by river traffic from the Thames. A large ditched enclosure may have been built as a temporary supply base and a road linked this with the river.

Possibly as a continuation of the religious significance the Iron Age people attached to the springs, Springhead developed into an almost unique religious centre within Roman Britain, probably attracting pilgrims from throughout the Empire. In addition to temples previously recorded, a major mid-2nd century AD sanctuary complex has been discovered, focused on the springs and enclosed by a ditch. At its centre was a temple with at least two other buildings and a ritual shaft belonging to the complex. Although it is impossible to know precisely what the rituals involved, large numbers of coins and brooches, possibly representing offerings, were recovered from the river bed. Furthermore, miniature bronze body parts found in earlier excavations, representing the location of ailments that required curing, suggest that Springhead was an important healing centre.

The largest and most impressive building found during the recent excavations was another temple, close to Watling Street, built at the end of the 2nd century and although partly demolished, may have remained in use until the late 4th or early 5th centuries, long after most of the settlement had been abandoned. A range of timber buildings, some circular, others rectangular, was revealed within properties lining Watling Street and along a branch road that ran to the north-west in the general direction of the Roman villa at Northfleet. A shrine lay at the street junction and nearby buildings included an aisled barn, a blacksmith's forge, a bakery, and what might have been a brewing complex adjacent to the river. There were also kilns for drying crops and a variety of ovens used for baking. The buildings and substantial quantities of associated finds, particularly pottery, metalwork, and animal bone, as well as the environmental evidence (primarily charred plant remains) provide important evidence of the nature and environment of this roadside settlement which catered for not only its inhabitants but also for passing travellers and pilgrims.

Three small cemeteries were recorded on the edge of Springhead in addition to the major Pepper Hill cemetery, containing almost 600 burials, excavated during an earlier phase of HS1 work, and there was also an opportunity to re-investigate a small part of an important walled cemetery. Further, at least 50 neonates or infants were found throughout the settlement, representing an exceptional number of such burials.

The HS1 work at Northfleet allowed the most extensive investigation yet to be undertaken on the villa site. This exposed not only a large part of the villa complex, including the waterfront, but also much of the agricultural landscape surrounding it. Although the main house could not be re-examined a number of finds suggest that the villa estate accommodated members of Springhead's elite.

A detached bath-house was built after AD 160. The structure took a simple form initially but more rooms were added over the years and, in its final form in the first half of the 3rd century, two sets of cold baths and hot rooms were provided, suggesting perhaps that men and women were segregated.

The villa was also a working farm. A timber barn, the earliest of three and erected shortly after AD 70, was surrounded by clay- and wood-lined tanks, some connected to pipes and drains, and containing large quantities of germinated spelt wheat. This evidence points to malting, for brewing, on an industrial scale and, in the middle of the 3rd century, a substantial malting oven was built which probably continued in use until the villa was abandoned around 380.

Sunken-featured buildings belonging to possibly three separate Saxon settlements, starting in the late 5th

century and continuing until the early 8th, were found at various places along the Ebbsfleet Valley between Springhead and Northfleet, with a Visigothic brooch unique to the UK indicating an unusual Continental link, if not a foreign settler.

At the head of the valley, on the high ground on its eastern side, were two inhumation cemeteries, contemporary with the latest of the settlements and dated to the 7th–early 8th centuries. One contained just ten burials and was possibly a separate family plot associated with the other cemetery which contained at least 26 burials; subsequent non-HS1 excavation has revealed a total of 147 graves forming this cemetery. A rare discovery in west Kent, these 'Final Phase' cemeteries included several weapons burials and two graves containing disc brooches.

Just downstream from the ruined villa, in an area that by the 7th century was getting wetter and less attractive for settlement, were the remains of an extremely well-preserved tidal mill. Dendrochronological dating indicates a likely construction date of 692, making the mill, with a horizontal water wheel, the earliest of its kind yet recorded in the country and an exceptionally important discovery. The study of the preserved timbers, in particular, has added substantially to our knowledge of Saxon woodworking techniques in this period.

Such technology, involving considerable skill and experience, would require commensurate wealth to commission and build, and it is likely that either the Church or one of the Saxon kings (or perhaps even both working together) were responsible. One of the great early kings of Kent – Wihtred – came to the throne in 691, and Archbishop Berhtwald was appointed in 693, making them likely candidates in this enterprise. The mill is likely to have fallen into dis-use within just two or three decades, because of rising water levels and silting of the mill pond, and the various parts of it that could be retrieved were then removed.

There were only limited remains of late Saxon, medieval, and post-medieval settlement in the Ebbsfleet Valley, although the springs are likely to have continued to provide an important source of fresh water. In the middle of the 19th century Springhead was the site of the earliest commercially grown watercress in the country and pleasure gardens were developed on either side of the river, prior to the growth of the chalk quarrying industry which transformed the character of the valley.

Zusammenfassung

Das Ebbsfleet Tal in Nordwest Kent ist nur 2,5 km lang, an seiner Quelle liegt Springhead und Northfleet an der Mündung in die Themse. Die Trasse der Hochgeschwindigkeits-Bahnverbindung unter dem Ärmelkanal (CTRL) verläuft entlang der gesamten Länge des engen, relativ steilen Tals, dem archäologisch reichsten und besterhaltenen Abschnitt des ganzen „High Speed 1" Projekts. In dem Tal befinden sich Fundplätze verschiedener Perioden, die von nationaler, wenn nicht gar internationaler Bedeutung sind. Der Bau der CTRL-Trasse bot die einzigartige Möglichkeit, diese im Rahmen von großmaßstäbigen Ausgrabungen zu untersuchen. Mit diesem Bericht werden die Ergebnisse der späteisenzeitlichen, romano-britischen, angelsächsischen und jüngeren Phasen vorgelegt. Die paläolithischen bis bronzezeitlichen Funde und Befunde werden in dem Band „Prehistoric Ebbsfleet" veröffentlicht.

Späteisenzeitliche Aktivitäten, die in die erste Hälfte des 1. Jhs. n. Chr. datieren und im Bereich der Quellen am Beginn des Tals konzentriert sind, scheinen mit einer rituellen Landschaft in Verbidnung zu bringen zu sein. Der eigenartigste Befund war wahrscheinlich ein „Prozessionsweg", der sich über 500 m vom Flußufer zu einer hoch am Hang gelegenen Stelle erstreckte, von der aus die Quellen zu sehen sind. Von hier aus konnten Angehörige der eisenzeitlichen Gemeinschaft religiöse Zeremonien verfolgen, die im Wasser und darum herum zelebriert wurden. Welche Handlungen im Verlaufe solcher Zeremonien vollzogen wurden, ist nicht bekannt, aber es wurden in diesem Bereich fast 70 Münzen gefunden, bei denen es sich vielleicht um Votivgaben handelt.

Nach der römischen Eroberung fanden bedeutende Veränderungen in der Landschaft des Ebbsfleet Tals statt, darunter die Gründung einer „kleinen Stadt" oder Straßensiedlung in Springhead (*Vagniacis*) und einer reich ausgestatteten Villa flußabwärts in Northfleet. Die römische Besiedlung Springheads begann früh, was sowohl auf dessen strategische Lage am Kreuzungspunkt der Watling Street mit dem Quellbereich des Ebbsfleet-Flusses als auch mit seiner günstigen Anbindung an den Flußverkehr über die Themse zusammenhängt. Eine von großen Gräben eingefaßte Einfriedung wurde möglicherweise als eine kurzzeitige Versorgungsbasis errichtet, diese war über eine Straße mit dem Fluß verbunden.

Möglicherweise in Fortführung der religiösen Bedeutung, die die eisenzeitliche Bevölkerung den Quellen beimaß, entwickelte sich Springhead zu einem nahezu einizgartigen religiösen Zentrum innerhalb des römischen Britannien und zog wahrscheinlich Pilger aus dem gesamten Römischen Reich an. Zusätzlich zu den bereits in früheren Untersuchungen dokumentierten

Tempeln wurde ein bedeutender Kultkomplex des mittleren 2. Jhs. n. Chr. entdeckt, der sich auf den Bereich der Quellen konzentrierte und von einem Graben umschlossen war. In seinem Zentrum befand sich ein Tempel, und mindestens zwei weitere Bauten und ein Kultschacht gehörten ebenfalls zu dem Komplex. Obschon es sich nicht genau sagen läßt, welche Handlungen im Rahmen der Rituale vorgenommen wurden, konnten doch große Menge an Münzen und Fibeln aus dem ehemaligen Flußbett geborgen werden, bei denen es sich wohl um Votivgaben handelt. In früheren Untersuchungen gefundene bronzene Miniaturkörperteile, die die einer Heilung bedürftigen Stellen repräsentieren, legen darüber hinaus nahe, dass Springhead ein bedeutendes Heilzentrum war.

Das größte und beeindruckendste, während der jüngsten Ausgrabungen gefundene Gebäude war ein weiterer Tempel, der gegen Ende des 2. Jhs. in unmittelbarer Nähe zur Watling Street errichtet wurde, und obwohl teilweise abgebrochen, wurde er möglicherweise bis in das späte 4. oder frühe 5. Jh hinein weitergenutzt, lange nach Aufgabe weiter Teile der Siedlung. Eine Reihe von Holzbauten, einige mit rundem, andere mit rechteckigem Grundriß, konnten in den Parzellen untersucht werden, die entlang der Watling Street und einer nach Nordwesen in Richtung auf die römische Villa in Northfleet verlaufenden Abzweigungen lagen. An der Straßenkreuzung stand ein Schrein, und zu weiteren Gebäuden in dessen Umgebung gehörten eine mehrschiffige Scheune, eine Schmiede, eine Bäckerei und ein möglicher Brauereikomplex in der Nähe des Flussufers. Weiterhin fanden sich mehrere Getreidedarren und eine Vielzahl verschiedener, wahrscheinlich zum Backen genutzter Öfen. Die Gebäude und die beträchtliche Menge an Kleinfunden, vor allem Gefäßkeramik, Metallfunde und Tierknochen, aber auch die paläobotanischen Reste (hauptsächlich verkohlte Pflanzenreste), erlauben wichtige Einblicke zu Charakter und Umwelt dieser Straßensiedlung, die neben der Versorgung ihrer eigenen Bevölkerung auch für Durchreisende und Pilger zu sorgen hatte. Drei kleine Bestattungsplätze fanden sich am Rande Springheads, zusätzlich zu dem großen Gräberfeld von Pepper Hill mit annähernd 600 Bestattungen, das in einer früheren Phase des CTRL-Projekts ausgegraben wurden. Außerdem ergab sich die Möglichkeit zur erneuten Untersuchung eines kleinen Teils von einem wichtigen, ummauerten Friedhof. Darüber hinaus sind wenigstens 50 Neugeborene oder Kleinkinder im gesamten Siedlungsbereich gefunden worden, was eine außergewöhnlich hohe Anzahl derartiger Bestattungen darstellt.

Im Zuge der Arbeiten am CTRL-Projekt in Northfleet konnten die bislang umfangreichsten Untersuchungen an der dortigen Villa durchgeführt werden. So konnten nicht nur große Teile der Villa, einschließlich der Kaianlagen, sondern auch ausgedehnte Bereiche der landwirtschaftlich genutzen Umgebung freigelegt werden. Obwohl das Hauptgebäude nicht erneut untersucht werden konnte, legen doch einige Kleinfunde nahe, dass der Gutshof Angehörige von Springheads Elite beherbergt hat.

Ein einzeln stehendes Badehaus wurde nach 160 n. Chr. errichtet. Anfänglich von einfacher Form, wurden im Laufe der Jahre weitere Räume angefügt, und in der letzten Bauphase (in der ersten Hälfte des 3. Jhs.) waren schließlich jeweils zwei Kalt- und zwei Warmbäder vorhanden, was vielleicht als Hinweis auf eine Trennung der Bereiche für Männer und Frauen zu deuten ist.

Die Villa hatte auch eine Funktion als landwirtschaftlicher Betrieb. Eine kurz nach 70 n. Chr. errichtete Holzscheune, das frühste von drei aufeinander folgenden Gebäuden, war von mit Ton und Holz ausgekleideten Becken umgeben, von denen einige an Wasserleitungen und Abflüße angeschlossen waren und die große Mengen gekeimten Dinkels enthielten. Letzteres läßt auf die Herstellung von Malz zum Brauen schließen, und zwar in industriellem Maßstab. In der Mitte des 3. Jhs. wurde dann eine Malzdarre errichtet, die bis zur Aufgabe der Villa um 380 n. Chr. in Benutzung blieb.

An mehreren Stellen entlang des Ebbsfleet Tals zwischen Springhead und Northfleet wurden Grubenhäuser gefunden, die möglicherweise zu drei verschiedenen angelsächsischen Siedlungen des Zeitraums zwischen dem späten 5. und frühen 8. Jh. gehören. Eine bislang in Großbritannien einzigartige Fibel westgotischen Typs deutet eine ungewöhnliche Verbindung mit dem Kontinent, wenn nicht gar einen fremden Siedler an.

Am Anfang des Tals, auf den höher gelegenen Flächen der Ostseite, fanden sich zwei Körpergräberfelder, die ungefähr zeitgleich mit der spätesten Siedlung waren und ins 7. und frühe 8. Jh. datieren. Das eine enthielt nur zehn Bestattungen und war möglicherweise das Bestattungsareal einer Familie, das zu dem anderen Gräberfeld mit 26 Bestattungen gehörte. Nachfolgende Ausgrabungen, die nicht im Rahmen der CTRL-Arbeiten erfolgten, haben ergeben, dass dieses Gräberfeld insgesamt 147 Gräber umfasste. Diese Gräberfelder der sogenannten „Final Phase“, die im westlichen Kent selten sind, enthielten mehrere Waffengräber sowie zwei mit Scheibenfibeln ausgestattete Gräber.

Etwas flußabwärts der verfallenen Villa lagen die Überreste einer ausgesprochen gut erhaltenen, gezeitenabhängigen Wassermühle in einem Bereich, der spätestens ab dem 7. Jh. vernäßt und für Siedlungstätigkeit wenig geeignet war. Nach Ausweis dendrochronologischer Datierungen wurde die Mühle, die ein horizontales Wasserrad besaß, wahrscheinlich im Jahre 692 errichtet. Als bislang älteste in Großbritannien ausgegrabene Wassermühle ist die Mühle ein außergewöhnlich wichtiger Fund. Insbesondere die Analysen der erhaltenen Bauhölzer haben wesentliche, neue Erkenntnisse angelsächsischer Holzbearbeitungstechniken dieses Zeitraums erbracht.

Derartige Techniken, deren Ausführung beachtliche Kenntnisse und Erfahrung bezeugen, erforderten ein entsprechendes Vermögen des Auftraggebers und Bauherrn, und es ist daher wahrscheinlich, dass entweder die Kirche oder einer der angelsächsischen Könige (oder vielleicht sogar beide in Zusammenarbeit) für den Bau verantwortlich waren. Einer der bedeutendsten frühen Könige von Kent – Wihtred – kam 691 auf den Thron, und Erzbischof Berhtwald wurde 693 ernannt, womit beide als mögliche Bauherren in Frage kommen. Die Mühle wurde wahrscheinlich schon nach zwei oder drei Jahrzehnten wegen des steigenden Wasserspiegels und dem Versanden des Mühlteichs aufgegeben, und verschiedene noch nutzbare Bauteile wurden abgebaut.

Es fanden sich nur geringe Hinweise auf spät-angelsächsische, mittelalterliche und frühneuzeitliche Besiedlung, jedoch blieben die Quellen wahrscheinlich weiterhin für die Trinkwassergewinnung von Bedeutung. Um die Mitte des 19. Jhs. war Springhead das erste kommerzielle Anbaugebiet für Brunnenkresse in Großbritannien, und Lustgärten wurden zu beiden Seiten des Flusses angelegt, bevor dann der Charakter des Tals durch die Ausdehnung des Kalkabbaus verändert wurde.

Übersetzung: Jörn Schuster

Résumé

La vallée de l'Ebbsfleet dans le nord-ouest du Kent ne mesure que 2,5 km, Springhead se trouve à sa source et Northfleet près de son confluent avec la Tamise. La liaison ferroviaire rapide avec le tunnel sous la Manche (CTRL) suit la vallée étroite aux versants assez escarpés sur la totalité de son bref parcours, traversant le paysage archéologique le plus riche et le mieux préservé qu'on ait rencontré sur tout le projet de ligne à grande vitesse. La vallée recèle des sites de plusieurs périodes qui sont d'importance nationale, voire internationale et la construction de cette ligne a fourni une occasion unique d'entreprendre, sur certains d'entre eux, des recherches sur une très grande échelle. Ce rapport présente les découvertes de l'âge du fer final, de la période romano-britannique et saxonne et d'autres plus récentes, les vestiges du paléolithique – âge du bronze feront l'objet d'une publication séparée dans le volume sur la préhistoire d'Ebbsfleet.

L'industrie de l'âge du fer final, attribuée à la première moitié du I^{er} siècle ap. J.-C., se concentrait sur les sources, à la tête de la vallée et semble avoir été associée à un paysage rituel. Le vestige le plus énigmatique était probablement une voie processionnelle qui s'étendait sur presque 500 m du bord de la rivière à un point en hauteur sur la pente qui domine les sources. De là, la communauté de l'âge du fer pouvait observer les cérémonies religieuses conduites dans et autour de l'eau. Nous ne savons pas ce qu'impliquaient ces cérémonies mais presque 70 pièces de monnaie, peut-être des offrandes votives ont été trouvées dans la zone.

La conquête romaine a vu le paysage de la vallée d'Ebbsfleet changer radicalement, avec l'établissement d'une 'petite ville' ou d'une occupation de bord de route à Springhead (*Vagniacis*) et d'une villa richement meublée en aval, à Northfleet. L'occupation romaine de Springhead commença très tôt, reflétant à la fois la situation stratégique du site où Watling Street traversait la tête d'Ebbsfleet et son accès facile par voie fluviale à partir de la Tamise. Il se peut qu'un grand enclos avec fossé ait été construit comme base de ravitaillement temporaire et qu'une route l'ait relié à la rivière. Peut-être en prolongement de la signification religieuse que les peuples de l'âge du fer accordaient aux sources, Springhead s'est développé en un centre religieux quasi unique dans la Grande-Bretagne romaine, attirant probablement des pélerins de tout l'empire. En plus des temples répertoriés antérieurement, on a découvert un complexe sanctuaire majeur du milieu du II^{ème} siècle ap.J.-C., qui se concentrait sur les sources et était entouré d'un fossé. Au centre se trouvaient un temple et au moins deux autres bâtiments ainsi qu'un puits rituel appartenant également au complexe. Bien qu'on ne puisse savoir précisément ce qu'impliquaient ces rituels, de grands nombres de pièces de monnaies et de broches représentant peut-être des offrandes, ont été retirées du lit de la rivière. De plus, des miniatures de parties de corps en bronze trouvées au cours de fouilles antérieures et qui représentaient le site de maux nécessitant des soins donnent à penser que Springhead était un important centre de guérison.

Le plus grand et le plus impressionnant bâtiment découvert pendant les récentes fouilles était un autre temple, à proximité de Watling Street, construit à la fin du II^{ème} siècle et bien que partiellement démoli, il est peut-être resté en usage jusqu'à la fin du IV^{ème} ou au début du V^{ème} siècle, longtemps après l'abandon de la plus grande partie du site. Une série de bâtiments en bois, certains circulaires, d'autres rectangulaires, ont été mis au jour à l'intérieur des propriétés qui bordaient Watling Street et le long d'une route secondaire qui se dirigeait vers le nord-ouest- en gros dans la direction de la villa romaine de Northfleet. Un autel se trouvait au carrefour et les bâtiments aux alentours comprenaient une grange à bas-côtés, une forge de forgeron, un fournil et ce qui aurait pu être un complexe de brasserie et

divers fours utilisés pour la cuisson. Les bâtiments et des quantités conséquentes de trouvailles associées, en particulier de la poterie, de la métallurgie et des ossements d'animaux, ainsi que des témoignages environnementaux (essentiellement des restes de plantes calcinés) apportent d'importants indices sur la nature et l'environnement de cette occupation de bord de route qui satisfaisait aux besoins, non seulement de ses habitants mais encore des voyageurs de passage et des pélerins. On a répertorié trois petits cimetières en bordure de Springhead en plus du grand cimetière de Pepper Hill, contenant 600 sépultures, fouillé au cours d'une phase antérieure des travaux de la ligne à grande vitesse, et nous avons aussi eu l'opportunité de ré-examiner une petite partie d'un important cimetière entouré d'un mur. Plus loin, au moins 50 nouveaux-nés ou nourrissons, ont été trouvés ça et là sur le site, ce qui représentait un nombre exceptionnel de sépultures de ce type.

Les travaux de la ligne à grande vitesse à Northfleet ont permis les fouilles les plus extensives jamais entreprises sur le site de la villa. Celles-ci ont exposé non seulement une grande partie du complexe de la villa, y compris le bord de l'eau, mais aussi beaucoup du paysage agricole qui l'entourait. Bien qu'on n'ait pas pu ré-examiner la maison principale, un certain nombre de trouvailles donne à penser que le domaine de la villa abritait des membres de l'élite de Springhead.

Des thermes indépendants furent construits après 160 ap.J.-C. La structure avait au départ adopté une forme simple mais au fil des ans on ajouta d'autres pièces, et dans sa forme finale dans la première moitié du III^{ème} siècle, elle comprenait deux ensembles de bains froids et de chambres chaudes, ce qui donne à penser que peut-être hommes et femmes étaient séparés.

La villa était également une ferme en activité. Une grange en bois, la plus ancienne de trois et érigée peu après 70 ap.J.-C., était entourée de cuves doublées d'argile et de bois, certaines reliées par des tuyaux et des canalisations et contenant une vaste quantité d'épeautre germé. Ce détail suggère la production de malt, pour la brasserie, sur une échelle industrielle, et au milieu du III^{ème} siècle, on a bâti un substantiel four à malt qui resta probablement en usage jusqu'à l'abandon de la villa vers 380.

Des bâtiments aux fondations enterrées appartenant probablement à trois occupations saxonnes séparées commençant à la fin du V^{ème} siècle et continuant jusqu'au début du VIII^{ème}, furent trouvés à divers endroits le long de la vallée d'Ebbsfleet entre Springhead et Northfleet, avec une broche wisigoth unique au Royaume-Uni, témoignage d'un lien inhabituel avec le continent, si non un colon étranger.

A la tête de la vallée, sur les terres en hauteur de son versant est, se trouvaient deux cimetières à inhumations, contemporains de la dernière des occupations et datés du VII^{ème} ou au début du VIII^{ème} siècle. L'un ne contenait que 10 sépultures et était peut-être une concession familiale séparée, associée à l'autre cimetière qui contenait au moins 26 sépultures ; des fouilles postérieures, sans rapport avec la ligne à grande vitesse, ont révélé qu'un total de 147 tombes formait ce cimetière. Une découverte rarissime dans l'ouest du Kent, ces cimetières dits de 'phase finale' comprenaient plusieurs sépultures à armes et deux tombes contenaient des broches à disques.

Juste en aval de la villa en ruines,dans une zone qui, venu le VIIème siècle, était devenue plus humide et moins attrayante pour une occupation, se trouvaient les vestiges d'un moulin à marée extrèmement bien préservé. Une datation dendrochronologique indique qu'il avait probablement été construit en 692, ce qui fait de ce moulin à roue à eau horizontale, le plus ancien de ce type jamais répertorié dans ce pays et une découverte d'une importance exceptionnelle. L'étude des bois préservés, en particulier, a beaucoup apporté à notre connaissance des techniques de travail du bois saxonnes de cette période.

Commanditer et construire un tel ouvrage, nécessitant des compétences et une expérience considérables, aurait requis une immense fortune, et il est probable qu'ou bien l'église ou un des rois saxons (ou peut-être les deux ensemble) en soit responsable. L'un des premiers grands roi du Kent – Wihtred - accéda au trône en 691, et l'archevêque Berhtwald fut nommé en 693, ce qui fait d'eux de probables candidats pour cette entreprise. Le moulin a probablement cessé d'être utilisé en l'espace de seulement deux ou trois décennies à cause de la montée du niveau de l'eau et de l'envasement du réservoir, et les diverses pièces qui pouvaient être récupérées le furent à ce moment-là.

Il n'y avait que peu de vestiges d'occupations saxonne tardive, moyen-âgeuse ou post-moyennageuse dans la vallée d'Ebbsfleet, bien que les sources aient probablement continué à fournir une importante source d'eau fraiche. Au milieu du XIX^{ème} siècle Springhead fut le premier site de production commerciale de cresson du pays et on aménagea des jardins d'agrément de chaque côté de la rivière, avant que la croissance de l'industrie d'extraction de la craie ne vint transformer le caractère de la vallée.

Traduction: Annie Pritchard

Chapter 1
Introduction

by Paul Booth and Phil Andrews

This volume presents reports on the discoveries ranging in date from the late Iron Age to the medieval period arising from archaeological investigations undertaken in the Ebbsfleet valley at Springhead and Northfleet near Gravesend, Kent, in connection with engineering works for Section 2 of the Channel Tunnel Rail Link (CTRL), now High Speed 1 (HS1). The reports have been prepared by the Oxford Wessex Archaeology Joint Venture (hereafter referred to as OWA Joint Venture) in conjunction with Rail Link Engineering (RLE) for Union Railways (North) Limited.

Project Background

The High Speed 1 is a new high-speed railway linking London mainline railway stations to the Channel Tunnel. Section 1 of the HS1 passes through Kent, connecting the tunnel portal at Folkestone to Pepper Hill near Gravesend, whilst Section 2 runs from Pepper Hill to London St Pancras, crossing under the Thames at Swanscombe and then through Essex and East London (Fig 1.1).

The massive engineering and construction project has necessitated a major programme of archaeological works, one of the largest ever undertaken in Britain. Desk-based assessment (URL 1994) was followed by an extensive programme of evaluations comprising field walking, trial trenching, test pitting and borehole investigation, largely undertaken between 1994 and 1997. These investigations were to assess the impact of the route on archaeological resources, with the aim of mitigating the impact of construction on this finite resource. Where archaeological sites could not be avoided or preserved *in situ* excavations were undertaken in advance of construction.

The principal archaeological work for Section 1 of HS1 took place in 1998–2001 (see further below), while that for Section 2, commissioned by Union Railways (North) Limited (URN), took place between September 2000 and March 2003. The work formed part of an extensive programme of archaeological investigation carried out in advance of and during the construction of the HS1. Construction work relating to Section 2 in the Ebbsfleet Valley includes the HS1 itself, a connecting line to the existing North Kent Line, the Ebbsfleet International Station and station access roads (Fig 1.1).

Oxford Archaeology (OA) undertook detailed archaeological excavation and a watching brief on land towards the north end of the Ebbsfleet Valley, south of Northfleet, centred on URN Grid 41418 54195 (NGR 561413 174196). Wessex Archaeology (WA) undertook detailed archaeological excavation, strip, map sample excavation, evaluation and a watching brief on various sites around the south end of the Ebbsfleet Valley (Springhead), centred on URN Grid 41800 52700 (NGR 561800 172750) (see Fig 1.3). All this work was undertaken as part of CTRL Minor Works Contract URN-000-ARC-200.

Excavations within the Ebbsfleet Valley have not drawn to a close with the completion of the HS1 programme of work in 2003. Following this, further, sometimes extensive investigations have taken place within various parts of the valley and adjacent areas in advance of infrastructure works, housing and commercial development, and these are scheduled to continue for several years to come (Fig 1.2). Some of these investigations have been concerned with the Palaeolithic and other early prehistoric remains for which the area is well-known, but there have also been further important discoveries of late Iron Age, Roman, and Saxon date. Reference is made to these at appropriate places within this volume and the results will be the subject of future publications. However, it is important to note that none of these subsequent discoveries will, as far as is known, necessitate any major revision to what is presented in this volume.

Principal Study

This report concerns the Principal Study defined as 'Springhead and Northfleet', one of two Principal Studies examining the archaeology of the Ebbsfleet Valley; the other, 'Prehistoric Ebbsfleet', focuses on Palaeolithic, Mesolithic, Neolithic, Bronze Age, and earlier Iron Age activity within the valley. This is the subject of a separate report. The Springhead and Northfleet study concentrates on the Roman and later activity within the valley, also taking into account the late prehistoric origins of the Roman occupation of the area. There is inevitably a degree of overlap between the 'Prehistoric Ebbsfleet' and 'Springhead and Northfleet' Principal Studies, particularly with reference to Springhead itself (ARC SPH00). However, the most

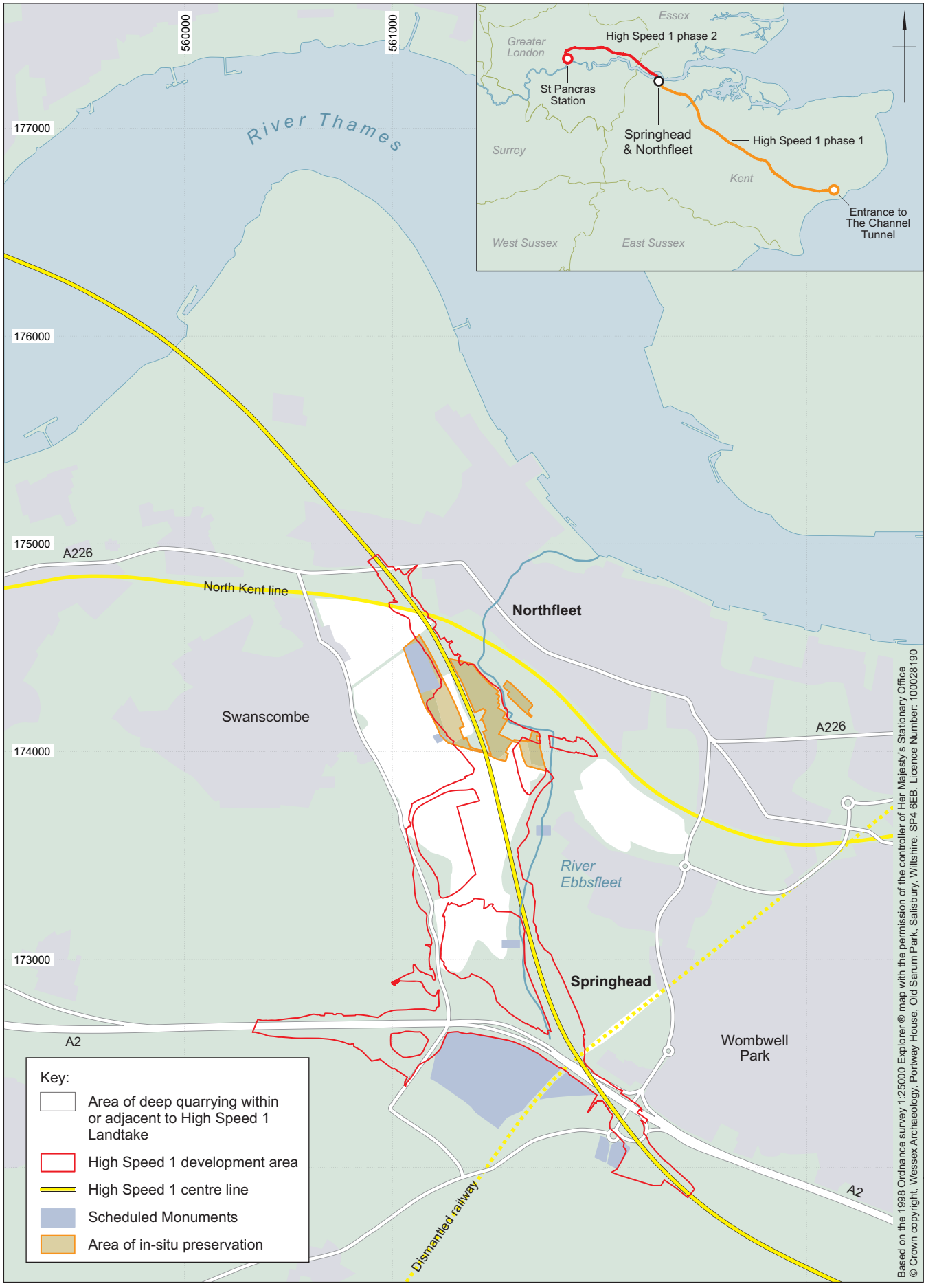

Figure 1.1 HS1 Sections 1 and 2, and map of the Ebbsfleet Valley and surrounding area showing HS1 development area at Springhead and Northfleet

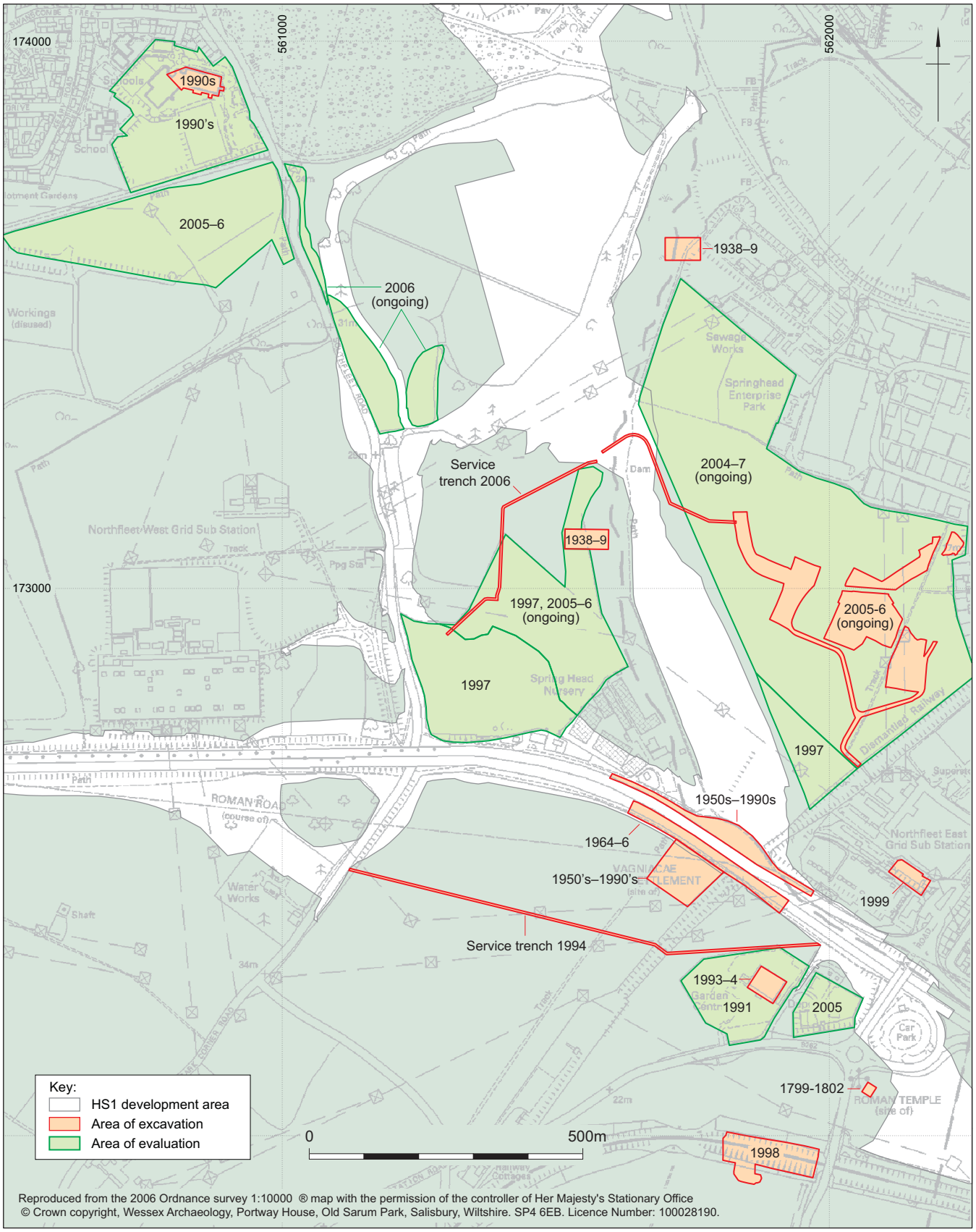

Figure 1.2 Map of Springhead and surrounding area showing non-HS1 Section 2 archaeological investigations

important later prehistoric remains, especially the late Iron Age activity of apparently ritual or ceremonial nature in the vicinity of the Ebbsfleet spring itself, an area which subsequently developed into the centre of the Roman temple and sanctuary complex at *Vagniacis*, are outside the period covered by the Prehistoric Ebbsfleet study so the overlap is not great. The present study involves data from three major excavations, as well as minor excavations, several evaluations and various recording exercises, borehole surveys and watching briefs (Table 1.1) carried out as part of the HS1 Section 2 works within the Ebbsfleet valley (Figs 1.3). The study is based on an updated project design agreed in 2006 (OWA 2006).

The principal discoveries relating to Springhead and Northfleet comprise late prehistoric, Roman, and Saxon features at Springhead (URN 2003a; site code: ARC SPH00), Roman features at Springhead Nursery (URN 2003b; site code: ARC SHN02), and late prehistoric, Roman, and Saxon features at Ebbsfleet (URN 2003c; 2003d; site code: ARC EBB01). Of particular note is the evidence for a sanctuary complex within the Roman settlement at Springhead (*Vagniacis*) and the discovery of a middle Saxon watermill on the Ebbsfleet, immediately adjacent to the Northfleet villa. A small excavation also occurred on the site of a high status walled Roman cemetery south-east of Springhead (ARC WCY02), previously investigated between 1799 and 1802 (see Chapter 2). The more limited evidence from the other, smaller sites has been summarised in several interim reports (URN 2002a; 2003e; 2004a; unpublished).

In addition to the sites noted above, this report considers the results from the HS1 Section 1 excavations at Pepper Hill Roman cemetery (Waterloo Connection), associated with the Roman settlement of *Vagniacis*, and also the rural settlement remains at West of Northumberland Bottom to the east of Springhead. Both sites formed part of the HS1 Section 1 programme of post-excavation analysis (ADS 2006; Booth *et al* forthcoming). The report also presents the results of non-HS1 archaeological works in the immediate vicinity at Springhead Nursery (site code WA 51724), contiguous with and undertaken concurrently with the HS1 Springhead Nursery excavation (WA 2004), and archaeological works associated with a pipeline through the walled Roman cemetery south-east of Springhead (site code WA 52379; URN 2004b; see above; Fig 1.3). Finally, the results of earlier (as well as on-going) non-HS1 investigations and excavations undertaken by a variety of groups at both Springhead and Ebbsfleet Roman villa, including work on the South Thameside Development Route 4 (STDR4), will be considered. Table 1.2 presents a concordance of the periods represented at the principal sites investigated.

Geology and Topography

The Ebbsfleet is a small stream which rises at Springhead (at *c* 5.50 m aOD) and flows north to join the Thames at Northfleet, a distance of approximately 3 km (Pl 1.1). The Thames channel is cut into chalk bedrock, with Pleistocene deposits, known as the Boyn Hill gravels, or more properly the Orsett Heath gravel unit, which forms its southern bank. The Ebbsfleet Valley, which exhibits variable topography, cuts transversely through these deposits and into the underlying Chalk bedrock, and is filled with a complex sequence of Pleistocene deposits, which thus post-date the Orsett Heath gravel unit. The Pleistocene deposits fall into two main categories: water-lain deposits (fluvial silts); and colluvial and solifluction deposits. The Holocene valley of the Ebbsfleet is filled with a complex sequence of alluvial, colluvial, fluvial, and estuarine deposits. Either side of this at Springhead Thanet Sands and brickearth deposits overlie Upper Chalk.

The setting of Springhead was a major factor in the establishment and function of the Roman and earlier settlement. The eastern side of the valley at Springhead rises steeply to a plateau which falls very gently away to the north-east. The ground surface within this part of the site descends from a maximum of *c* 30 m above Ordnance Datum (aOD hereafter) on the crest of the slope to a minimum of *c* 5.5 m aOD in the base of the valley around the now dried-up springs that formerly fed the river. On the western side of the Ebbsfleet valley the ground rises continuously, but much more gently, to a height of *c* 15 m aOD on the edge of the Roman town.

Some 2 km to the north, the villa at Northfleet occupied a slightly sloping location on the much less prominent west (left) bank of Ebbsfleet, at the point where, in recent times at least, the river turned

Table 1.1 Springhead and Northfleet associated fieldwork events

Event name	*Event code*	*Type*	*Dates*	*Easting*	*Northing*
Springhead Roman Town	ARC SPH00	EX	Sept 00–Sept 02	561800	172750
Ebbsfleet Sports Ground	ARC ESG00	EV	19.03.01–25.05.01	561413	174196
Ebbsfleet Valley Watching Brief	ARC 342W02	WB	19.10.01 onwards	561628	174164
Ebbsfleet Valley Detailed Mitigation	ARC EBB01	EX	19.10.01–07.03.03	561628	174164
Ebbsfleet River Crossing	ARC ERC01	EX	23.10.01–20.12.01	561600	173050
Springhead Nursery	ARC SHN02	EX	Feb 02–March 03	561650	172750
Park Corner Road	ARC PCR02	EV	25.04.02–23.05.02	561000	172600
Pepper Hill Tunnel	ARC PHT02	EV	26.04.02	562000	172300
Walled Cemetery	ARC WCY02	EX	23.05.02–28.05.02	562200	172100
South of A2	ARC SAT02	EV	29.05.02	561700	172500
West of Springhead Nursery	ARC WSN02	EV	06.06.02–10.06.02	561450	172850
342 Watching Brief East	ARC 342E02	WB	01.07.02–31.08.03	561454	172639
Pepper Hill Café	ARC PHC02	EV	25.07.02	562100	172200

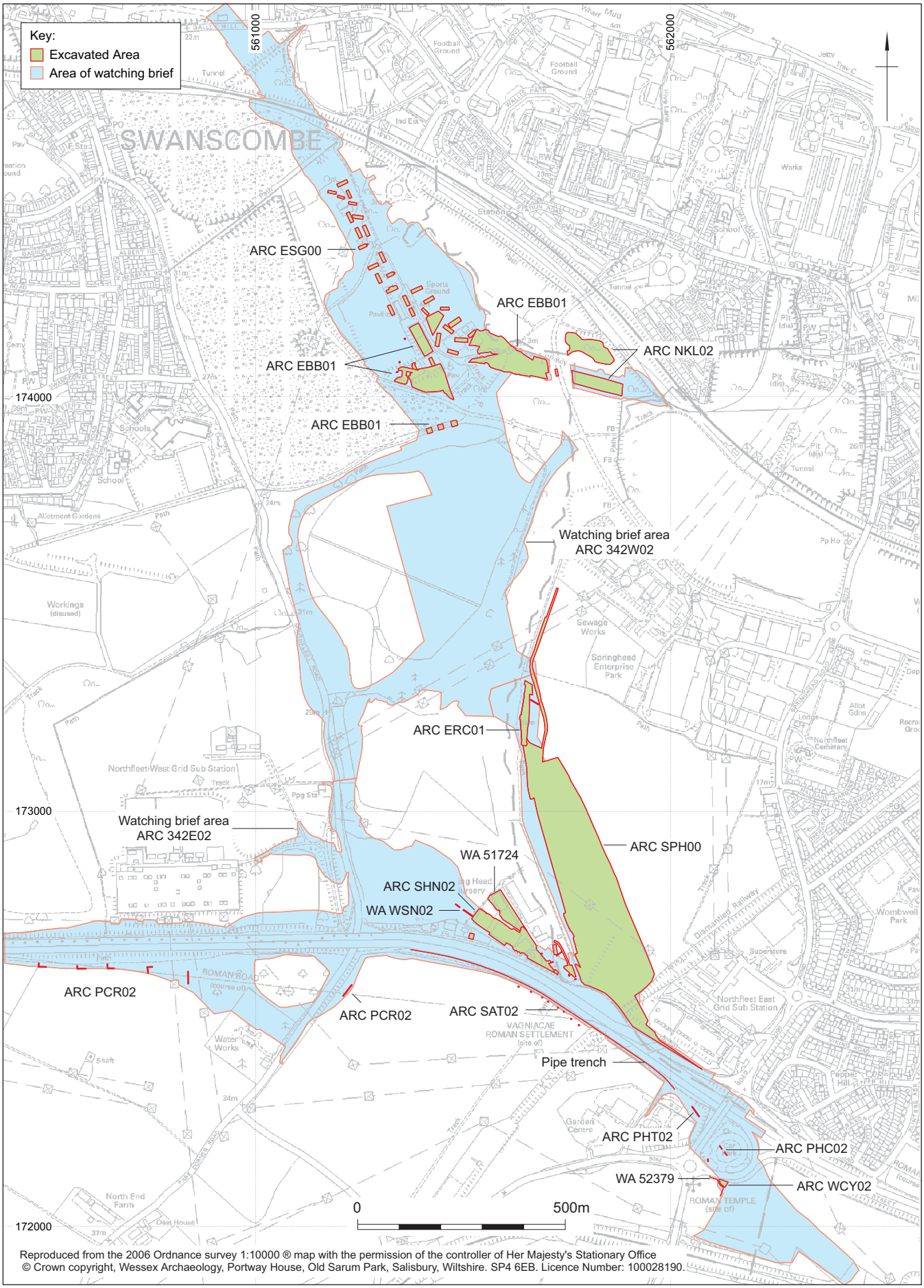

Figure 1.3 Map of the Ebbsfleet Valley showing HS1 and non-HS1 archaeological investigations (with site codes)

Table 1.2 Springhead and Northfleet: concordance of principal sites, by site code / name and periods

Period	Pre-LIA	LIA	ERB	MRB	LRB	E / MS	LS	Med	P-med / Mod
Springhead									
ARC SPH00 (sanctuary site)	✓	✓	✓	✓	✓	✓	✓	✓	✓
ARC ERC01 (Ebbsfleet River crossing)	✓		✓						
ARC SHN02 (roadside settlement)			✓	✓	✓			✓	
ARC WCY02 (walled cemetery)				✓					
ARC 342E02 (watching brief)			✓	✓	✓	✓		✓	✓
WA 51724 (part of roadside settlement)			✓	✓	✓			✓	
Northfleet									
ARC ESG00 (sports ground)	✓	✓	✓	✓	✓	✓			
ARC EBB01 (villa/mill site; western complex wetlands)	✓	✓	✓	✓	✓	✓		✓	✓
ARC NKL02 (North Kent Line)	(✓)								
ARC 342W02 (watching brief)	(✓)								

(✓) – Sedimentary sequences only

sharply westwards from its prevailing south–north course, fronting the villa site, before resuming a more northerly line.

A significant part of the valley has been quarried for chalk since the 19th century and many of the extraction areas have been land-filled (see Figs 1.1 and 1.2). The de-watering of these quarries has resulted in drying up of the springs. The Ebbsfleet itself has been reduced over much of its length to little more than a small stream with, in places, relatively extensive areas of reed beds.

Evaluation

The extensive archaeological evaluation undertaken at Springhead in 1997 as part of the HS1 project (ARC SPH95) covered the three principal sites subject to subsequent excavation (ARC SPH00, ARC ERC01, and ARC SHN02; see Fig 1.3) and revealed archaeological features extending over 4–5 hectares of the evaluated area (URL 1997a). A substantial assemblage of Roman pottery was recovered as well as a significant quantity of crop processing debris.

Within the area of ARC SPH00 and ARC ERC01, on the east bank of the Ebbsfleet, only slight evidence for prehistoric activity was encountered and the majority of features were of early Roman date (1st–2nd century AD). These were concentrated towards the valley floor and comprised enclosure and boundary ditches, wall footings, post-holes, pits, and various spreads and deposits interpreted as probably representing floor or yard surfaces, occupation deposits, and middens. In places, on the steeply sloping valley sides and on the higher ground to the east, the features and deposits lay very close to the surface and had suffered from natural erosion or been truncated by ploughing. However, in the floor of the valley they were sealed by up to 4 m of colluvium and were consequently well-preserved.

Within the area of ARC SHN02, on the west bank of the Ebbsfleet, evaluation could only be achieved by test-pitting within the operating Springhead Nursery. The test-pits demonstrated that some stratified deposits survived at fairly shallow depth, and included pits along with chalk and gravel surfaces perhaps representing floors and yards. These surfaces lay within the immediate vicinity of a Roman road discovered earlier (V Smith 1997) which ran north-west to south-east through the site. Evaluation trenching in the field to the north-west of Springhead Nursery evaluation revealed a continuation of the road, with associated settlement petering out towards the edge of the settlement.

No evidence for Saxon or medieval activity was found, the only post-Roman archaeological features comprising several 'dwarf walls' associated with the 19th century watercress beds at the head of the Ebbsfleet.

The Ebbsfleet Valley north of Springhead was also evaluated in 1997 as part of the HS1 project (ARC EFT97) and this work included investigation of the area of the Northfleet villa (URL 1997b). The evaluation demonstrated that Roman archaeological horizons containing artefacts and with good organic preservation survived at considerable depth close to the stream course. Archaeological features and deposits of Roman date were inevitably uncovered in the vicinity of the villa.

Plate 1.1 The Ebbsfleet Valley with Springhead Nursery and the A2 bottom left, ARC SPH00 bottom right, Swanscombe and the River Thames in background. Looking north. Reproduced by permission of Hawkeye Elevated Photography (© 2001 Hawkeye Photography)

The location of the TAG (Thameside Archaeological Group) trenches was plotted and the exposed wall elevations recorded. Trenches also revealed a number of cut features close to the stone buildings, which were later confirmed as pits and boundary ditches.

Further evaluation was undertaken in 2000 (ARC ESG00; Fig 1.3). This centred on the Ebbsfleet Sports Ground, but extended across the valley, encompassing four broad topographical zones: the north valley side, the south valley side, the valley bottom and the gravel spur (URN 2002b).

Ten trenches along the north valley side revealed a sequence of deposits, which commenced beyond the topsoil with Holocene colluvium, followed by Pleistocene colluvium and solifluction deposits. No features were encountered, but Neolithic or Bronze Age artefacts were recovered from the Holocene colluvium. The nine trenches excavated along the south valley side uncovered a similar sequence, though occasionally topsoil overlay made ground, which in turn sealed Holocene colluvium. A number of archaeological features were encountered. One trench revealed a cremation burial of Roman date, while a group of Roman ditches and beamslots and abundant building material in another provided evidence for occupation.

The valley bottom was characterised by colluvial deposits – which thickened substantially towards the HS1 mainline cutting – and peat. Possible Bronze Age features, a cobbled surface, and a collapsed woven roundwood structure, were recorded, along with

evidence for the location of channels of the Ebbsfleet active in antiquity. A Roman gully and revetment were also identified.

Eight trenches were excavated across the Gravel Spur. One was located over the bath-house complex of the Northfleet villa, and the remains of rooms and features associated with the hot rooms at the eastern end of the bath-house were encountered. Another trench uncovered walls belonging to the eastern range of the villa buildings, while part of the western range, a tank or cistern, a well, and the courtyard surface were seen elsewhere. Neolithic or Bronze Age features were excavated in trenches located at the eastern end of the gravel spur. These included part of a ring ditch encountered later in the main excavation.

Archaeological Background

Previous archaeological discoveries in the Ebbsfleet Valley include material ranging in date from the Palaeolithic to the medieval period (see 'Prehistoric Ebbsfleet' Principal Study for detail of the Pleistocene and Holocene prehistoric archaeology). Prehistoric settlement patterns are not well documented in the immediate vicinity. However, the site at Springhead lies close to two early Neolithic 'Ebbsfleet Ware' sites excavated either side of the river in the 1930s, which recorded spreads of pottery and burnt flint as well as peat deposits (Burchall and Piggott 1939; see also Sieveking 1960). Excavations at this time also discovered important deposits of struck flint, recorded as two successive 'floors', and both thought to be of Mesolithic date, though an Upper Palaeolithic origin for some of the material was considered possible (Burchell 1938).

Evidence for later prehistoric activity in the Springhead area has increased considerably as a result of HS1 and other recent work. A double ditched round barrow at Whitehill Road, south-west of Springhead, was apparently of two phases, the later of which was assigned to the early Bronze Age (Bull 2006a), while a later Bronze Age settlement was revealed 3 km east of Springhead in Gravesend (Mudd 1994). Such settlement evidence is relatively rare in the area (Williams 2003, 224), but Iron Age settlement and other features have been identified in some numbers east of Springhead in HS1 Section 1 works at West of Northumberland Bottom (Askew 2006) and in more recent work immediately adjacent to this on the line of the new A2 route (T Allen pers comm). The early and middle Iron Age features do not appear to have been particularly concentrated in defined areas of settlement, but by the late Iron Age a number of such foci are known, with settlement and activity areas defined by enclosures and other ditches, for example barely 500 m south of Springhead at South of Station Road (Bull 2006a) and at several sites to the south-east, the nearest East of Downs Road, just over 1 km from Springhead in the HS1 Section 1 Northumberland Bottom watching brief complex.

There are sporadic references to Springhead as a Roman site as early as the 18th century, and the discovery of a possible Roman milestone was subsequently reported by Hasted (1797–1801). Shortly after, in 1799–1802, following discoveries made during ploughing, the Reverend Rashleigh, rector of Southfleet, excavated the central part of the walled cemetery which lay just beyond the south-east limit of the Roman settlement (Rashleigh 1808a; 1808b; see also Davies 2001). From that time on various finds were made, particularly during the creation of the watercress beds at Springhead beginning in 1805, and some of these are summarised by Dunkin (1848). Parchmarks of buildings, presumably in the fields to the south of the springs, were also noted from at least as early as 1845. Further discoveries were occasionally made in the latter half of the 19th and the first half of the 20th century (Jessup 1928; Wheeler 1930), but it was not until 1950 that systematic excavation began, much of it as a research project, but at other times in response to development threats, most notably the construction of a new, southern carriageway to the A2 in 1964–6 (Fig 1.2). Prior to 1985 virtually all of this work was undertaken by members of the Gravesend Historical Society with the addition, in 1964–6, of the Kent Archaeological Rescue Unit (KARU), and this programme of work, spread over 35 years, laid the foundations of our modern understanding of Springhead.

Discoveries made at Springhead during the excavations of the 1950s and '60s by William Penn provided increasing evidence for late Iron Age activity at the site. This work revealed sequences of boundary ditches, enclosures, and post-holes beneath the Roman settlement, but their significance was only realised rather later (Harker 1980, 288; French 1984), with the confirmation of their late Iron Age date and thus of their potential importance as precursors of the later Roman temple complex. The importance of the latter was already clearly demonstrated as a result of Penn's work and the religious significance of the location both before and after the Conquest may also be suggested by the name *Vagniacis*. This occurs in the *Antonine Itinerary*, and, deriving from British roots, is taken to mean 'the estate of, by, or at the marshy place' (Rivet and Smith 1979, 485).

The existence of a fairly short-lived Roman military phase (supply base or fort) of the Conquest period has been suggested, somewhat tentatively, by a number of writers (eg, Penn 1965; Detsicas 1983, 60–2; V Smith 2004, 4–5), but remains unsubstantiated in detail. In view of the evidence for the importance of the religious aspect of Springhead both before and after the Conquest, any such short-term military activity is unlikely to have had a significant impact on the development of the temple complex and associated settlement. The possible military enclosure ditch

pre-dated the construction of Watling Street, the main Roman road from Canterbury to London. This was an early road of considerable strategic importance, but its configuration at Springhead is curious and the dog-leg alignments suggest that the road was already taking account of important features here, though it is of course possible that some of these alignments relate to later adjustments of the road system as the settlement evolved.

On the evidence of the 1950s and '60's excavations (Penn 1957 *et seq*) development of Springhead was well underway by the late 1st century. The results of these individual excavations were presented in some detail, but were not well-synthesised at the time. Brief summaries were produced by Harker (1980) and Burnham and Wacher (1990, 192–8), while Detsicas, making use of his detailed understanding of the pottery evidence, presented a more critical survey in his book on the Cantiaci (1983, 60–76). All these summaries concentrate on the importance of Springhead as a religious centre, an importance underlined by the recent work, but see this in the context of a larger settlement, perhaps better considered as a roadside or nucleated settlement rather than a small town, which expanded to cover an area of *c* 12 ha around the head of the Ebbsfleet and either side of Watling Street. The focal area of this complex, as defined by Penn's work, is a Scheduled Ancient Monument (SAM KE 158). (It should be noted that Penn, Harker, and Detsicas all used different schemes of numbering for the various buildings. Burnham and Wacher follow Penn's numbering of the 'temples' up to 5, but assign the number 7 to Penn's Temple VI/gatehouse and the number 6 to the temple west of 'Temple III' not numbered by Penn but given as Temple VII by Harker (1980, 286 – it is, however, building B20 on Harker's plan). Penn's original numbering scheme for the 'temples' is retained here (perversely, Detsicas (1983, 72) describes Penn's Temples I and II as Temples II and III respectively); other numbering schemes are defined by the name of their originator where necessary.)

Prior to this work the significance of the spring head area itself was unclear, and the principal religious focus was defined as the group of temples and other structures lying within an enclosure on the south side of Watling Street. At least seven temples or other religious structures – Detsicas (1983, 67) counts three, maybe four, temples and A Smith (2001, 101) perhaps as many as six temples/shrines, two of which he considers as 'substantial' (*ibid*, 106) – have been excavated within the central precinct. These were constructed at various intervals between the later 1st century and the early 3rd century. Other features within the precinct included a possible water retaining feature ('Temple III'; Penn 1960, 117; *cf* Detsicas 1983, 70–2) and a freestanding column, perhaps of Jupiter type (Penn 1958; 87, 95, 108–10; 1967, 111, 113, and 123; Blagg 1979, 229). It is unclear if the precinct was completely surrounded by a stone wall, the best evidence for which is confined to the north-east corner of the temple area (Detsicas 1983, 67–8). Watling Street ran along the north side of the precinct and further roads, the so-called 'temenos road east' and '*temenos* road west' seem to have defined these sides, in which case they suggest that the precinct was of triangular or trapezoidal plan. The projected lines of these roads could have met beneath the present railway embankment, before following a rather irregular route southwards (see below). Other minor lanes, most set approximately at right-angles to the line of Watling Street, provided access to other parts of the settlement, while a north-westerly continuation of the line of Watling Street from the point at which this road resumed a westerly alignment in the direction of Dartford and London was identified at Springhead Nurseries in 1992 (V Smith 1997). Penn's excavations examined parts of about a dozen structures outside the temple precinct, including a small bath-house to the north and buildings variously interpreted as shops, workshops and a possible bakery, this last to the west of the temple precinct (Penn 1957) but interpreted by Detsicas (1983, 75–6) as originally a granary, subsequently reused. Kilns and ovens were identified at a number of locations, and suggest the production of tile (*ibid*, 65) and probably also pottery (*ibid*, 65; Jessup 1928, 339–40) as well as domestic activities.

There was clearly a wide range of small-scale industrial and other activity within the wider settlement. A sample of this was seen during examination of a cable trench through the southern part of Springhead in 1994, which produced evidence *inter alia* for iron working and crop processing (Boyle and Early 1998, 26–7, 37). Infant burials also occurred in this part of the site (*ibid*, 33–4), but were more scattered than those encountered within the temple precinct (eg, Penn 1964, 176). Other burials are known, including a number from an area described as 'at the east end of Wingfield Bank', just east of Springhead, revealed during construction work on the A2 in 1921–2 (Jessup 1928, 338–9). The map (fig 15) in *VCH* (1932, vol. 3, 90) makes it clear that these burials were broadly in a roadside location alongside Watling Street. Only just south of here was a walled cemetery excavated in 1799–1802 (Rashleigh 1808a; 1808b; Jessup 1959, 14, 29–30), containing at least eight burials. The cremated remains of two individuals were contained in glass vessels placed in a stone sarcophagus originally intended for a child. Two unburnt bodies were buried in lead coffins placed in a stone tomb. Accompanying grave goods included gold bracelets, a gold ring and pendant, highly decorated shoes, and samian pottery. The cemetery was an early 3rd century construction (Walker 1990, 57), though it appeared to contain individuals buried elsewhere in the 2nd century and subsequently re-buried (Davies 2001, 164–5).

The vicinity of the minor road running south from Springhead was also used for burials. A small enclosed group of seven graves – three cremation and four inhumation burials – lay on the east side of the road at the Garden Centre site (Philp and Chenery 1997, 8–12).

All the cremation burials (each accompanied by five pottery vessels) and one of the inhumations appear to date to AD 70–100 and may represent a single family plot. The contents of one cremation grave had been deposited in a wooden box, while two of the inhumation burials had been made in wooden coffins, with one of them additionally accompanied by a wooden box. Only *c* 300 m further south, at Pepper Hill, a major cemetery lay on the western side of the same road (Biddulph 2006c). Almost totally revealed within HS1 Section 1 works, this cemetery comprised 349 inhumation burials, 145 cremation burials, and a further 66 features including pyre sites and possible cenotaph locations, all within a tightly constrained area defined by gullies on the western side. Seven of the cremation burials were of bustum type. The cemetery was in use from soon after the Roman Conquest (at the latest) until perhaps the early 4th century, but the great majority of dated burials were assigned to the 1st–2nd centuries.

The apparent decline in burial activity at Pepper Hill in the late Roman period is consistent with other evidence from elsewhere within the settlement. The majority of the evidence for construction seems to be of 2nd century date, although in some cases this may be only a *terminus post quem* for construction that could have been rather later. Some buildings, including several of the temples, seem to have remained in use into the 4th century; reconstruction of Temple I, for example, may have taken place as late as the end of the 3rd century (Penn 1959, 9–10; A Smith 2001, 101). Davies (2001, 163) takes the view that after the last quarter of the 3rd century 'There is ... no secure evidence of continued temple usage…', but equally points out that the area has been heavily disturbed by various post-Roman activities. It is presumably as a result of these that, while 4th century material is present in some quantities, very little of it is well stratified. The coin list from Springhead, for example, extends to the very end of the Roman period (eg, a Victoria Auggg issue from the 'Bakery' site (Penn 1957, 77) and further examples of the same type from the temple precinct (Penn 1960, 133)). This evidence is supported by that of a number of late hoards, including one of *c* AD 375 (Penn 1962, 119; Robertson 2000, no 1419), one terminating with issues of Magnus Maximus, *c* AD 388 (Archer 1979, 57; Carson 1965; Penn 1967, 116; Robertson 2000, no. 1472) and one terminating with issues of Honorius (Robertson 2000, no. 1552). A further Honorian hoard (Brickstock 1989; Robertson 2000, no. 1542A), described as from 'Gravesend Watling Street' seems almost certain to be from Springhead or its immediate vicinity. These hoards do not necessarily demonstrate the existence of a thriving late Roman community in Springhead, but they suggest more than just casual activity.

Contemporary evidence from the surrounding countryside is contradictory in nature. The late Iron Age settlements noted above developed into the early Roman period but at South of Station Road and East of Downs Road had apparently ceased to be occupied by the later 2nd century. East of the latter site, at West of Wrotham Road, the early Roman settlement may have survived a little later, but evidence of any activity later than the mid 3rd century is extremely slight. Closer to Springhead, however, the site at Hazell's Road was one of very few HS1 rural sites to have originated in the middle Roman period (perhaps in the late 2nd century) and then to have continued in use through the 3rd and 4th centuries. There was no direct evidence of domestic occupation, but a substantial crop drying oven was built alongside a trackway which seems to have been intensively used at this time. The crop dryer incorporated reused building material which suggests derivation from a building with a heated room and perhaps with a vaulted roof. If not brought from Springhead, only just over 1 km distant to the west, this material is likely to have come from a substantial building, perhaps of villa type, close to the HS1 line just east of Springhead. The incorporation of this material in the crop dryer might suggest a change and perhaps decline in fortunes of the source site.

The only villa certainly known in the vicinity of Springhead lies 2 km to the north at Northfleet. The Northfleet Roman villa was first excavated during 1909–11 by W H Steadman after Roman remains were exposed in the side of a tramway cutting. Two wells, a lime kiln, and the remains of a substantial building or buildings were recorded (Steadman 1913). Steadman's plan of the main structure(s) suggests two north–south aligned wings, one at each end of either an east–west range or (perhaps less likely) an east–west wall with subsidiary structures attached. A second building lying some 20 yards to the south of the main buildings had been partly destroyed by quarrying and was only examined superficially, though Steadman (*ibid*, 14) states that it had been 'thoroughly ransacked for building material'. The site was partly re-examined from 1977–1984 by a local archaeological society, the Thameside Archaeological Group (TAG). The society's attentions focused to some extent on the villa's eastern range, but mainly on a bath-house immediately to its north, not apparently examined by Steadman. Several short reports of the society's work have appeared in the Kent Archaeological Review between 1978 and 1984.

A few other Roman features are known from the area. An inhumation grave, covered with tiles in a gable-shaped configuration, a relatively rare form in Britain (Philpott 1991, 66 records 'at least a dozen') was uncovered in 1955 1.5 km north of Springhead (P Williams 1956). This was *c* 700 m west of the Northfleet villa site, probably far enough removed not to be related to it. Further Roman remains as well as Saxon deposits had also been recorded earlier in the face of the 'Blue Lake' quarry pit, approximately 700 m south-east of the villa. Their exact location remains unknown, but they are recorded as being on 'the right side of the entrance into the main chalk quarry located to the north-east of the Northfleet sewage works' (Burchell and Brailsford 1948). Saxon activity was further in evidence within the vicinity of the villa building in the 1997

evaluation, which produced pottery sherds from nearby colluvial deposits (URL 1997b).

Evidence for post-Roman settlement in the region has historically been provided by cemetery-related finds. At Northfleet, at least 26 burials probably belonging to a single, mixed-rite cemetery were encountered at various times between 1847 and 1901, especially during the construction of the railway in 1847–8. (Richardson 2005, vol. 2, 59–60, site 198). At Betsham, just over 1 km to the south of Springhead, an inhumation burial accompanied by a spearhead and a green glass bowl was found in 1928 (Richardson 2005, vol. 2, 74, site 244).

At Springhead itself, a disc brooch with incised and punched decoration was recorded in 1848 (Dunkin 1848, pl xl), a copper alloy Kentish square-headed brooch, dated to the first half of the 6th century, was found during earthmoving in 1984 (French 1984). To the west, a concentration of early Saxon burial sites along the more elevated land of the Darenth Valley clearly indicates its attraction to incomers (Welch 2007, 196). Yet, while settlement can be inferred from the cemeteries, the density and focus of it has been difficult to clarify – at least with any certainty, without the opportunities provided by large scale excavation.

With the exception of new discoveries in the excavations reported here, there is litle evidence for activity within or immediately surrounding Springhead or along the Ebbsfleet Valley south of Northfleet until the late 11th and 12th centuries when a small settlement known as *Wenifalle* developed on the higher ground at the south-east end of the Ebbsfleet valley (Hardy and Bell 2001), which may well have had a late Saxon precursor nearby (see Chap 5). This had shrunk or shifted by the beginning of the 13th century, and the next recorded activity was in the 19th century when an important watercress industry was established (Eve 1998). This continued until the 1930s when the springs dried up as a result of pumping operations further downstream.

Structure of this Publication

This publication presents the results of many years of analysis of huge data sets derived from archaeological investigations at Springhead and Northfleet, in the Ebbsfleet Valley. The scale and importance of the project has necessitated publication in four separate volumes, detailed as follows:

Volume 1: Presents an introduction to the project, a general account of the archaeological features within the context of site development, and a discussion of the character, environment, economy and chronology of the sites in relation to local and regional landscapes and settlement patterns. This includes the late Iron Age and Roman settlement and religious complex at Springhead (Chaps 2 and 4), the Roman villa at Northfleet (Chaps 3 and 4), the early Saxon settlements and cemeteries and later medieval activity at both sites (Chap 5) and the Northfleet middle Saxon Mill (Chap 6).

Volume 2: Presents detailed specialist reports and illustrations on the late Iron Age and Roman finds from Springhead and Northfleet.

Volume 3: Presents detailed specialist reports on the late Iron Age and Roman human bone, faunal remains and environmental remains from Springhead and Northfleet.

Volume 4: Presents detailed specialist reports on all finds, human bones, faunal remains and environmental remains from the Saxon and medieval periods at Springhead and Northfleet.

In addition to these printed volumes, additional data is available via the website http://owarch.co.uk/hs1/springhead-northfleet/.

Chapter 2
Springhead Religious Complex

by Phil Andrews

Springhead, near Gravesend, lies at the southern end of Section 2 of the HS1, close to its junction with Section 1 at Pepperhill (see Chap 1; Fig 1.1). Related engineering works at Springhead included the construction of a cutting to carry the new high-speed railway between the tunnel under the A2 and the bridge over the Ebbsfleet River, and a major new road intersection on the A2 to provide access to the international station at Ebbsfleet. Together, these works cut a swathe across the head of the Ebbsfleet Valley and through the site of the Roman town at Springhead.

The HS1 excavations at Springhead fell into two principal and distinct parts (Fig 2.1). The most extensive area investigated (ARC SPH00 – the Sanctuary site, together with ARC ERC01, the Ebbsfleet River crossing site) lay on the steeply sloping east side of the Ebbsfleet valley (see below) and revealed a long sequence of activity, focused around the springs, beginning in the late Upper Palaeolithic and including the Roman Sanctuary complex and an Anglo-Saxon cemetery. The smaller area on the west side of the valley (ARC SHN02 – the Roadside settlement) exposed a relatively large part of the Roman settlement, including a temple, but few features or finds of earlier or later date. Elsewhere, a number of smaller excavations, evaluations and a watching brief were undertaken (see Fig 1.3), but the majority revealed relatively little and in most cases served only to confirm some of the results of the more extensive investigations (ARC PCR02; ARC PHC02; ARC PHT02; ARC SAT02; ARC WSN02). The exceptions were the limited work on the Roman walled cemetery (ARC WCY02) on the south-eastern edge of Springhead and the observations made during the installation of a storm water drain on the south side of the A2 (part of ARC 342E02), which clarified several details of the layout of the settlement.

The site at Springhead occupies an extensive area of variable topography at the southern end of the Ebbsfleet Valley (Fig 2.2; Pl 2.1), the river – now little more than a stream – flowing northwards to join the Thames approximately 3 km distant. The eastern side of the valley at Springhead (ARC SPH00) is dominated by a steep 'cliff' with a slightly concave profile towards the bottom of the valley where the slope begins to level out. At the top of the slope the ground forms what, in effect, is a plateau which falls very gently away to the north-east. The ground surface within this part of the site descends from a maximum of *c* 30 m aOD on the crest of the slope to a minimum of *c* 5.5 m aOD in the base of the valley around the now dried-up springs (reputedly eight in number) that formerly fed the river. The archaeological sequence was particularly complex and well-preserved in this area, no doubt a reflection of the presence of the springs and the fact that the deposits had been buried by up to 4.5 m of colluvium. The most substantial accumulations of colluvium have been assigned to the middle–late Bronze Age and medieval–post-medieval periods respectively, presumably reflecting phases of increased agricultural activity on the slope above. On the western side of the Ebbsfleet valley (ARC SHN02) the ground rises much more gently to a height of *c* 15 m aOD.

Late Iron Age Ritual Site

The HS1 excavations at Springhead uncovered a very small number of Neolithic deposits (all on ARC ERC01) and a more varied range of middle–late Bronze Age features (Pl 2.2), the latter reflecting both settlement (pits, field system ditches, and burnt mounds) and burial (two ring-ditches) within the Ebbsfleet Valley. No remains of early or middle Iron Age date were identified, though parts of a more extensive late Iron Age landscape were revealed. Subsequent, extensive evaluation and excavation on the east side of the valley (outside of the HS1 land-take) have revealed further elements of a middle – late Bronze Age field system and a small late Iron Age enclosure, but nothing of early or middle Iron Age date and only a very few Roman features.

Late Iron Age features were largely confined to the excavations at the south end of the Ebbsfleet Valley at Springhead, specifically ARC SPH00 (Fig 2.3), although earlier excavations have demonstrated that late Iron Age remains underlie the major Roman temple complex on the south side of the A2. The nature of the latter is difficult to interpret within the confines of the small areas exposed, but ditches, pits, and gullies are probably indicative of settlement (French 1984), however a votive function has been considered possible (Harker 1980, 288). The late Iron Age features identified at ARC SPH00 seem not to have been part of this possible settlement, though it is likely that they were broadly contemporary, and it is suggested that they formed part of a wider, ritual landscape.

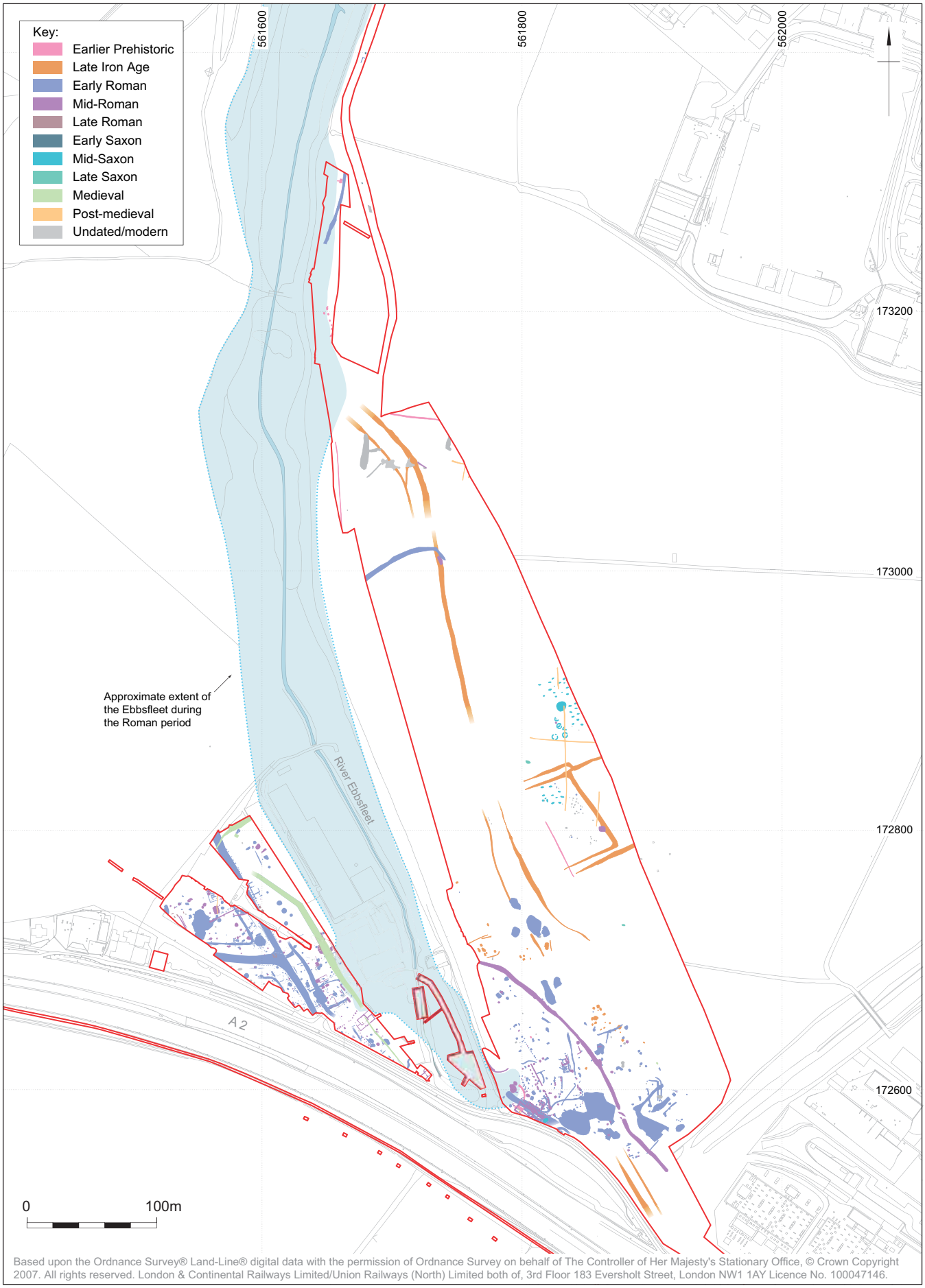

Figure 2.1 Plan of all excavated features at Springhead

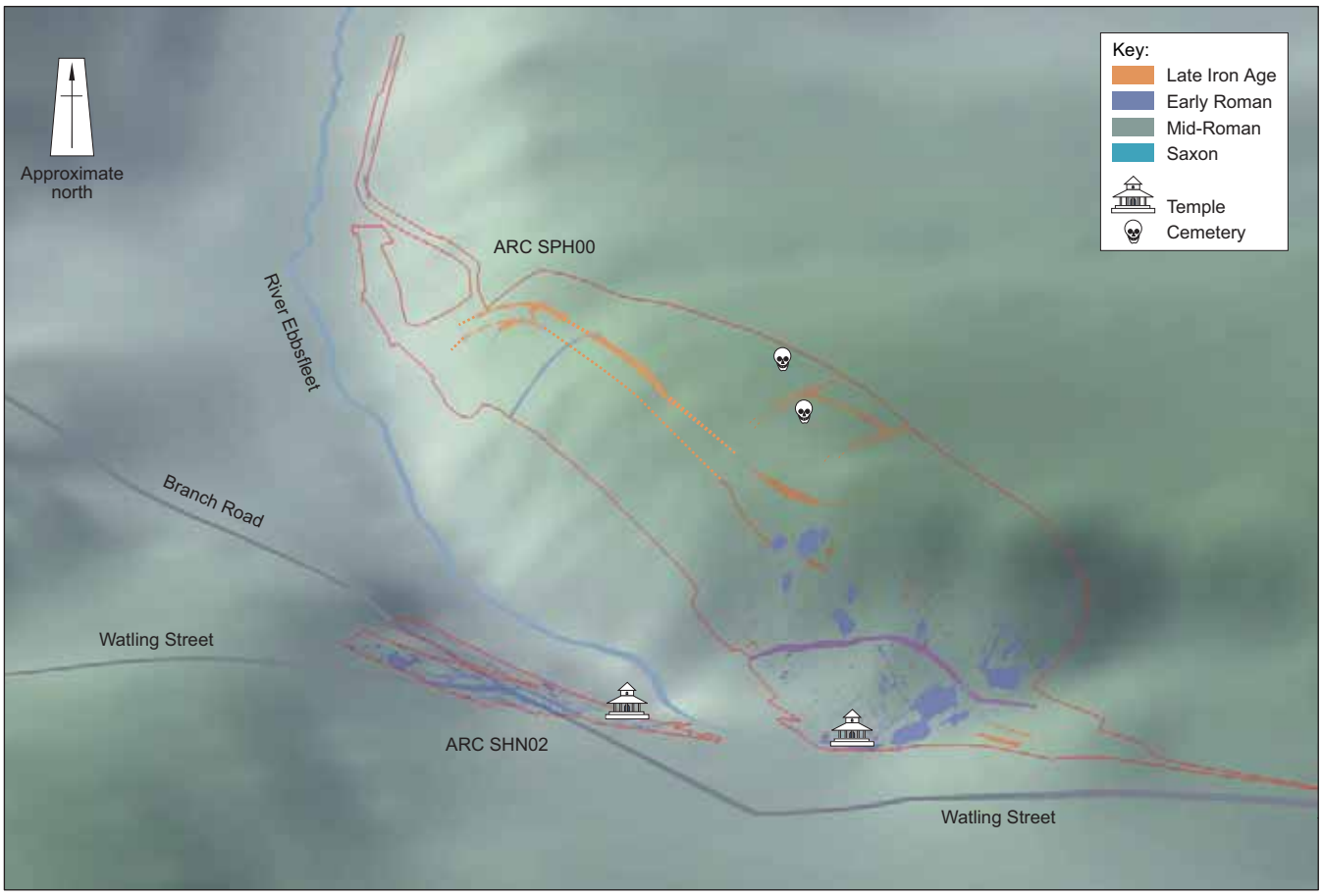

Figure 2.2 Topographic model of Springhead with archaeological features superimposed

Plate 2.1 Area of dried-up springs under excavation (ARC SPH00); the A2 and the Scheduled Area containing the main Roman temple complex lie beyond. Looking south-west from just above 'Viewing platform' 400044

Features have been assigned to the late Iron Age largely on the basis of pottery evidence, stratigraphic relationships where these could be established, spatial associations and, to a lesser extent, coins and other finds. Some uncertainties remain, and close dating of the pottery is not possible, but the general absence of any clearly Roman pottery (which was abundant on this site) from the lower, middle and most of the upper fills of these features is taken as another indicator of their late pre-Roman Iron Age date. All appear to belong to the first half of the 1st century AD.

Processional Way

Perhaps the most significant and certainly the most extensive feature is what has been interpreted as a processional or ceremonial way (400010; Figs 2.3 and 2.4), which may have determined the location and layout of other features belonging to this period. This comprised two parallel ditches (300022, 300053, and 2923 to the east, and 300023, 300024, and 300054 to the west), approximately 15 m apart, which extended over a distance of some 450 m along the east side of the valley (Fig 2.3). These ditches led up from a small embayment on the edge of the river downstream and terminated at a point high up on the slope to the south where the springs and the whole of the surrounding area to the west come into view (see Fig 2.2). Towards this

Plate 2.2 Removing metalling on early Roman road 300017; exposing middle Bronze Age hearth and associated boiling pit below (ARC SPH00). Looking north-west

end the gap between the ditches widened to 20 m, and then further to approximately 35 m at the termini where the eastern ditch (300022) diverged forming a flared opening. Although there had been considerable erosion in this area (largely a result of medieval and later ploughing), it is thought likely that the surviving arrangement and extent of the ditches closely reflects the original layout, though it was not possible to establish whether any associated banks were internal or external. At the northern end, the precise relationship between the two ditches (300053 and 300054) and the embayment was not seen within the deep colluvial deposits exposed along the edge of the excavation in this area.

Of particular interest in terms of the proposed function of these ditches is that they ran close to but not along the crest of the slope, and thus had been dug on quite steeply sloping rather than level ground (see Fig 2.2). This might rule out the possibility of them having been a droveway, for example, as might their general location and alignment within the Ebbsfleet Valley, which together is not suggestive of stock control.

The larger ditch (300022, 300053, and 2923), on the upslope side, was traced for virtually its entire length, although controlled soil stripping was not possible in two areas because of the presence of overhead power lines, and here the ditch could not always be clearly defined in plan. There was a widening in part of the ditch towards the southern end (300022), possibly because there had been less erosion in this area, but at least three phases of intercutting ditches with varying profiles were recorded and perhaps this stretch was originally both wider and deeper than those immediately to the north and south. In this respect, it might be relevant to note that just to the north of this wider part a line of three late Iron Age pits (3003, 3010, and 3027) had been cut through the infilled ditch, perhaps reinforcing or re-establishing this boundary in this area (see below). The recorded sections across the widest part of ditch 300022 show the individual ditches ranging from 1.30 m to 3.0 m in width and 0.40–1.0 m deep, with open U-shaped profiles, sometimes with flat bases (Fig 2.4, section 7022). The recuts all appear to be of late Iron Age date, but some 300 m to the north there is evidence that this part of the ditch (300053) was partly re-dug (or at least still open) in the early Roman period. Here the size and profile of the ditch was quite different, unlikely to be simply a reflection of the gentler slope of the valley side in this area, which had been subject to considerably less erosion, though this part of the ditch was dug through chalk rather than Thanet Sands. The recorded sections show a ditch 4 m wide and 1 m deep with vertical or near-vertical sides, a flat bottom and some evidence for recutting (Fig 2.4, section 7019). Pottery was recovered from the top fill (2065) only, but this included material which possibly extends into the late 1st century AD. Sections through ditch 2923, lying between 300022 to the south and 300053 to the north, show this part to be approximately 3 m wide, 0.70 m deep and with an open U-shaped profile. It contained a single homogeneous fill and there was no evidence for recutting.

The smaller ditch (300023, 300024, and 300054) on the downslope side had suffered particularly from the effects of erosion and the central part had been entirely removed. Towards the southern end was a further gap, of approximately 25 m, but its non-continuation here seems not to have been a result of erosion as the ditches either side (300023 and 300024), though not deep, were well-defined with fairly steeply sloping sides. It might not be a coincidence that late Iron Age pit group 400015 partly enclosed by a shallow gully lay directly downslope of this gap. Ditches 300023, 300024, and 300054 varied in width from 1.0 m to 1.75 m, were up to 0.30 m deep and had U-shaped profiles with no obvious evidence for recutting (Fig 2.4, section 7021). Only one ditch (300024) contained pottery, comprising a few sherds of late Iron Age or very early Roman material, and the possibility that this part had been recut is considered below.

Ditch 2011 (300055) which lay at an angle between ditches 300053 and 300054 at the north end of the processional way was a relatively small, straight, shallow feature. It produced no finds and whether it formed part of the processional way arrangements is uncertain. However, it did not extend either side of the ditches and on this basis is considered most likely to have been associated with them, despite its odd angle, perhaps representing a fence or gate of some sort. Alternatively, it may have been mid-Roman, contemporary with a similar feature which lay to the east.

The line of three pits (300025) cutting the larger of the two processional way ditches has been noted above. These pits lay approximately 20 m apart, the largest (3010) to the south and the smallest (3003) to the north (Fig 2.3). Pit 3010 was sub-oval in plan measuring 4.0 m by 3.0 m, 1.5 m deep with near vertical sides and a fairly flat bottom. Pit 3027 was broadly similar, but slightly smaller and oval in plan measuring 3.5 m by 2.0 m and 1.1 m deep (Fig 2.4, sections 7016 and 7023). Pit 3003 was much smaller than the other two, measuring 1.0 m by 0.60 m and only 0.10 m deep. The

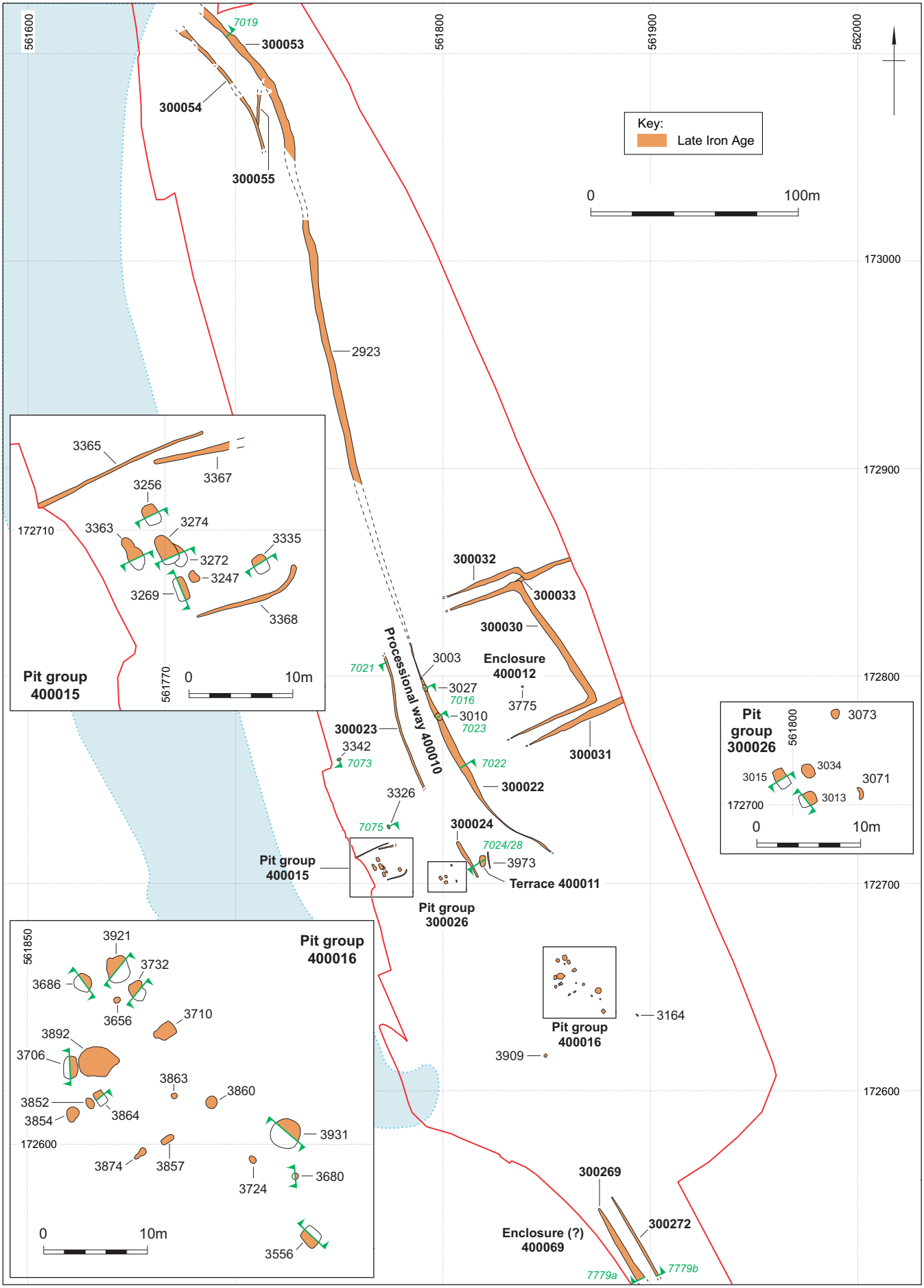

Figure 2.3 Late Iron Age features (ARC SPH00)

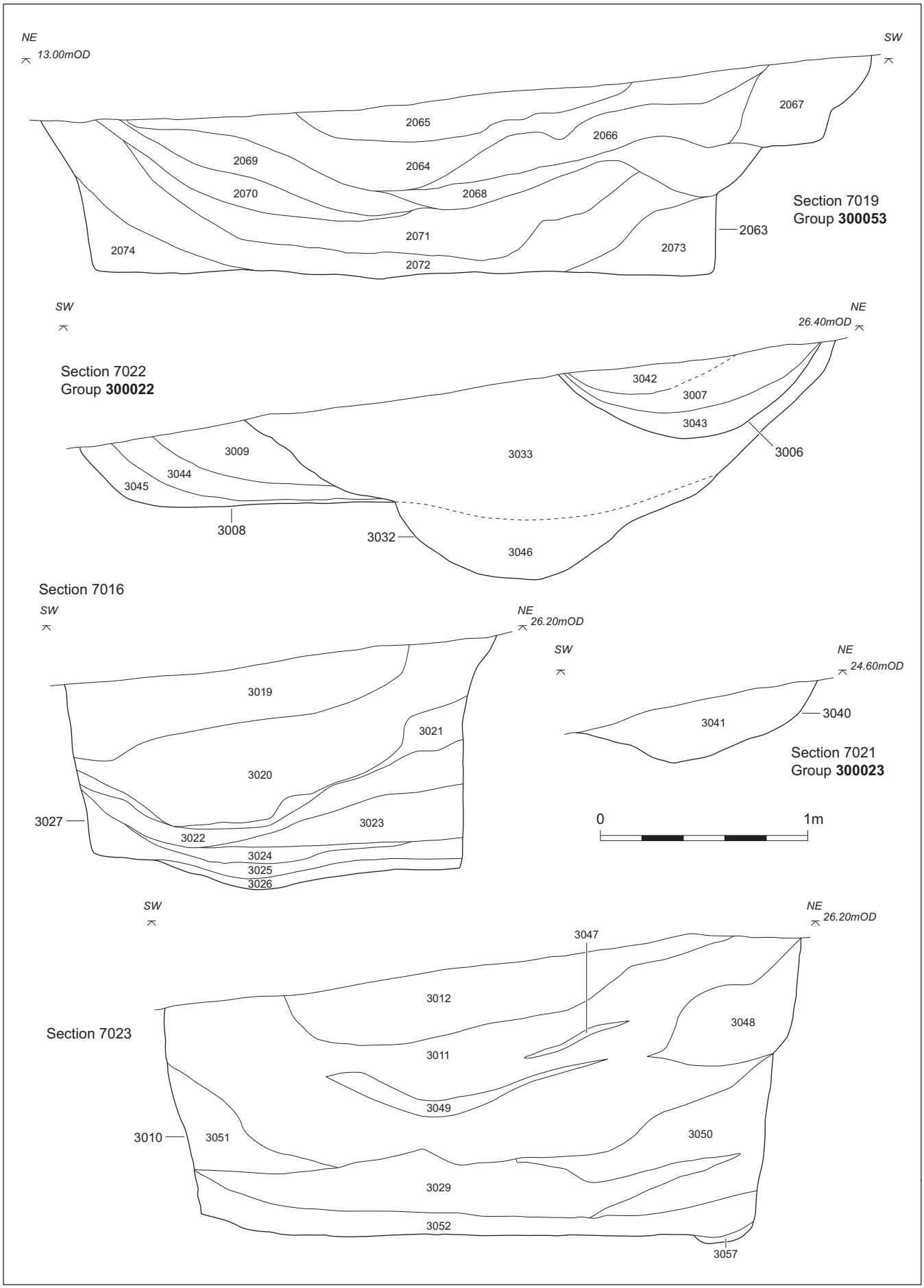

Figure 2.4 Sections through late Iron Age processional way 400010 and pits

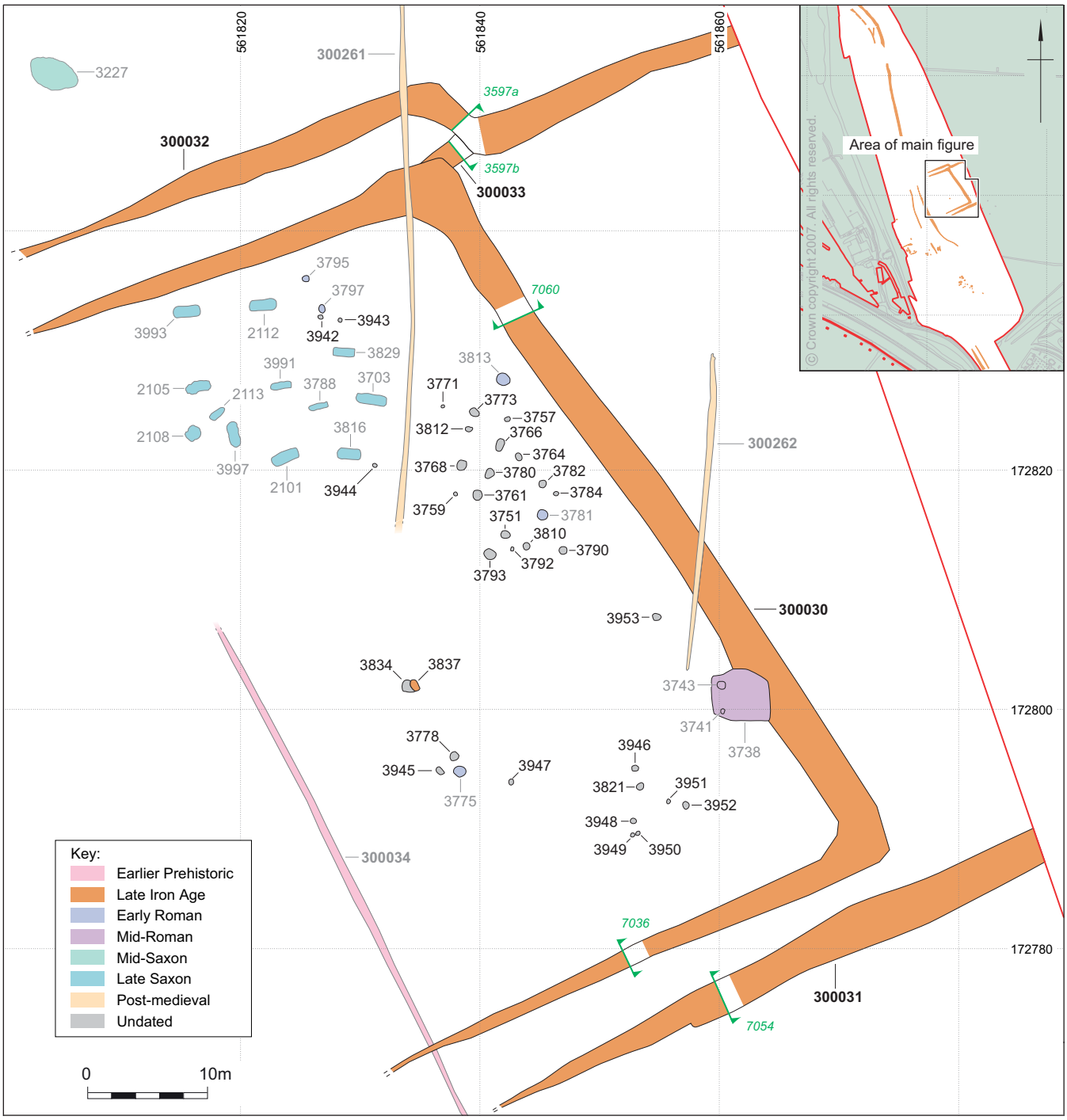

Figure 2.5 Late Iron Age enclosure 400012 and later features

sequence of fills in the two larger pits was also similar, the lower fills largely deriving from collapse of the pit sides and the middle and upper fills containing greater quantities of finds. The uppermost surviving fills of all three pits were almost identical and very distinctive in that they were very dark grey/black in colour, quite unlike the fills of any of the other features in the immediate vicinity. Furthermore, there were notable concentrations of pottery in the top fills of the two larger pits, the majority late Iron Age, though the top fill of pit 3027 did contain some early Roman sherds assigned a mid-1st century date. Roman pottery, as well as coins and some metalwork, also came from the uppermost, very dark fill in the eastern arm of late Iron Age enclosure ditch 300030 approximately 50 m to the north-east (see below), and it is possible that these later deposits were broadly contemporaneous and derived from a similar source, though the finds in the ditch also included much mid- and late as well as early Roman material. The source of the late Iron Age cultural material deposited in the pits is unclear, and there is no certain evidence for contemporaneous structures. However, there are several possibilities: erosion may have removed structural evidence, some of the undated post-holes within the large enclosure to the east (see below) might conceivably represent the remains of such structures, or the material may have been brought from further away and deposited in the pits. The last

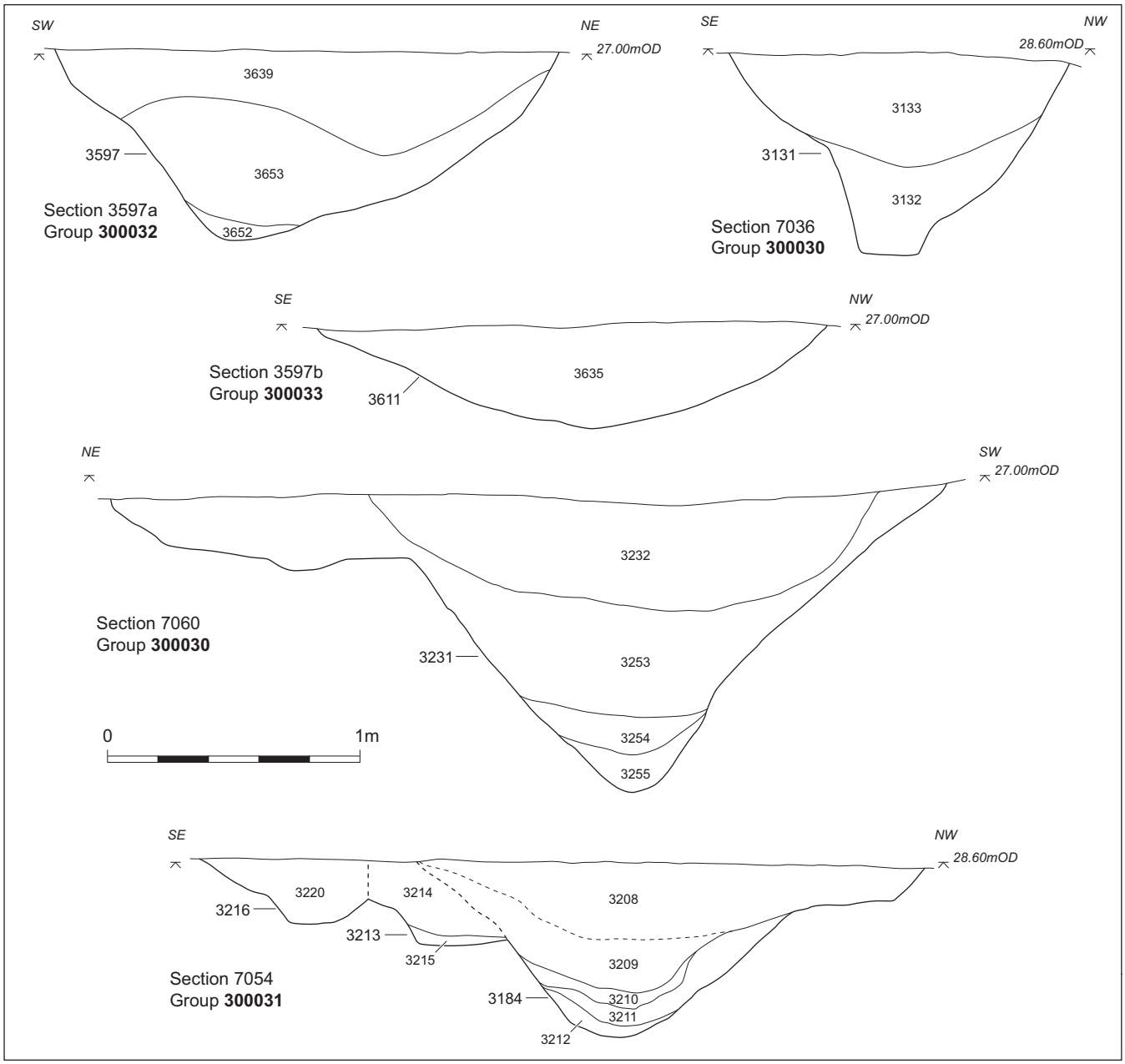

Figure 2.6 Sections through enclosure 400012

explanation is perhaps least likely in that none of the material showed any obvious evidence for structured deposition, which has been observed in some other late Iron Age features on the site.

Enclosures

Enclosure 400012

A large enclosure (400012) of three or more phases lay at 90° to the east of the processional way, just beyond the top of the slope on ground which then sloped very gently down to the east (Fig 2.5). It is possible that this enclosure extended as far as the eastern ditch (300022) of the processional way and was contemporary with it. However, any such junction had been removed by subsequent erosion along the crest of the slope, and both arms of the enclosure ditch became shallower to the west before finally petering out some 20 m short of the processional way. It might be noted that the eastern ditch (3000022) of the processional way survived well in this area, implying either that this was originally substantially deeper or that the enclosure ditch was relatively shallow at these points. Subsequent excavation in 2007 has clarified the extent of enclosure 400012 to the east (see below).

The central, earlier part of the enclosure (300030, comprising ditches 3131, 3223, 3231) as it survived measured approximately 65 m north–south by 40 m east–west (Fig 2.5); if it did originally extend as far west as the processional way then it would have measured approximately 65 m square. Ditch 300030 varied in profile along its length, from U-shaped to V-shaped, and was up to 2.5 m wide and 1.2 m deep (Fig 2.6, sections 7036 and 7060). The southern arm (3131) was smaller, possibly having suffered a greater degree of erosion, and

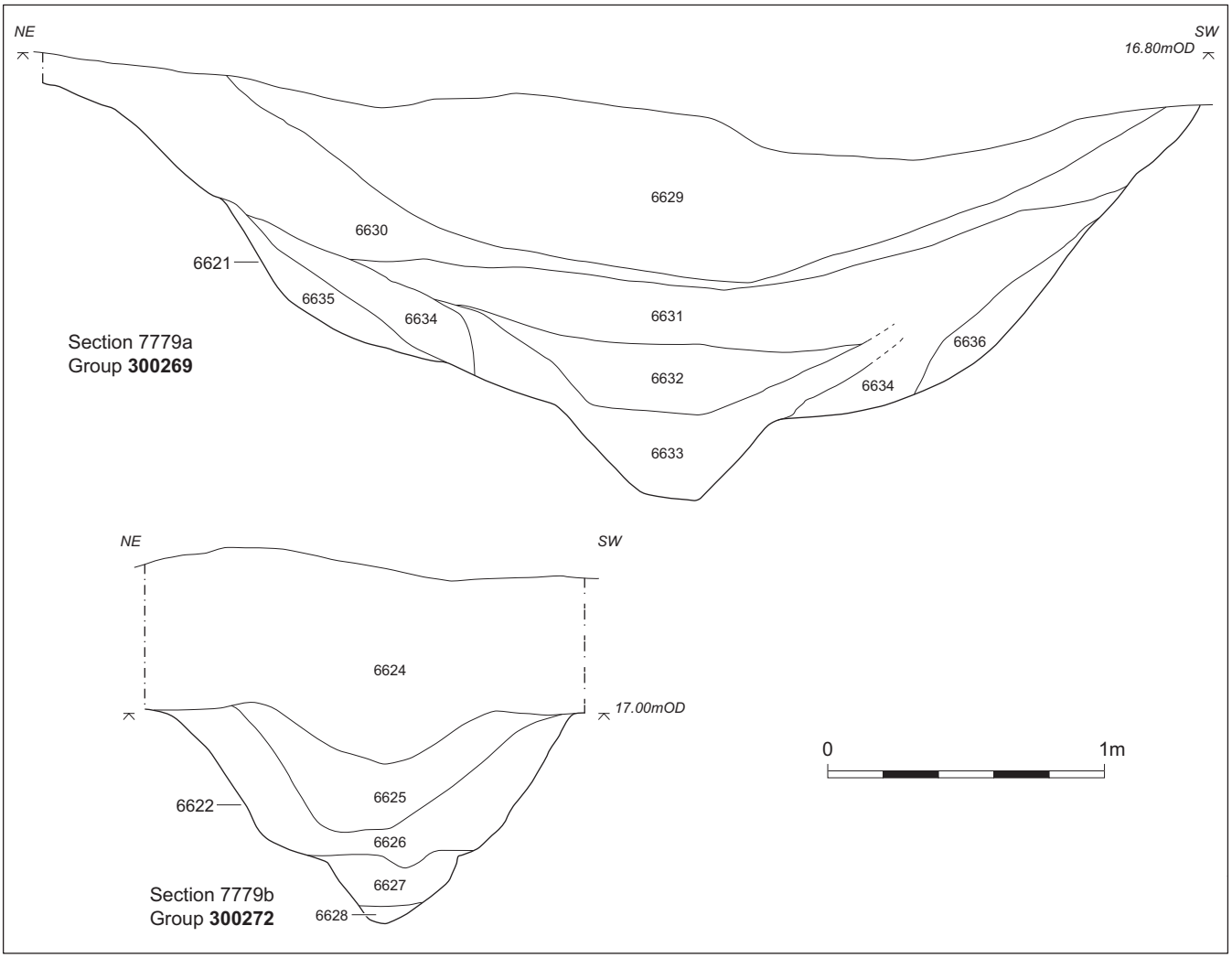

Figure 2.7 Sections through enclosure 400069

there was some evidence from the profile that it had been recut, as was the case also for ditch 3231.

Enclosure 400012 was subsequently extended to the north-east, beyond the limit of excavation, by ditch 3611 (300033), a shallow ditch which continued the line of the northernmost ditch (Fig 2.6, section 3597b), and by a new ditch, 3224 (300031), which lay 2 m to the south of the earlier southern ditch. Ditch 300031 appears to have been recut on two occasions, both the earlier phases (3213 and 3216) being relatively small and shallow, with the final phase (3184) somewhat larger with a width of approximately 2 m and a depth of 0.60 m (Fig 2.6, section 7054).

Ditch 3597 (300032) to the north appears to represent the final modification to the enclosure, though it could have been contemporary with ditch 3184 (300031) to the south. It lay 4 m to the north of ditch 3231 (300030) and ran parallel to it as far as the corner of the enclosure where it dog-legged and then followed the line of ditch 3611 (300033) to the east, completely removing all trace of the earlier ditch in this area. Ditch 3597 (300032) was 2 m wide and 0.75 m deep with an open U-shaped profile and no evidence for re-cutting (Fig 2.6, section 3597a). Subsequent excavation in 2007, to the east of the HS1 site, has shown that this phase of the enclosure extended for approximately 60 m east of ditch 3231 (300030) and enclosed a sub-square area, with a further, smaller enclosure subsequently added to the east of this.

The various phases of enclosure ditches contained sequences of similar, generally homogeneous fills probably resulting from natural silting. There was no evidence that any had been deliberately backfilled and it was not clear from the fills whether the associated banks were internal or external to the ditches. However, the distribution of virtually all of the internal features enclosed by ditch 300030, all but one of them undated or later, does suggest the presence of an internal bank in this case at least.

Relatively few finds were recovered from any of the ditches, with most producing small quantities of late Iron Age pottery. However, the uppermost fill (3255/3755/3996) in the east arm (ditch 3231) of enclosure ditch 300030 was noticeably darker and contained a relatively large quantity of Roman pottery and metalwork, probably representing later accumulation or deposition in the largely infilled ditch. The finds from the ditch span a broad chronological range, the pottery assigned an early and mid-Roman date, with the coins extending into the late Roman

Plate 2.3 Late Iron Age 'terrace' 400011 (ARC SPH00). Looking south

period and including a noteworthy concentration of 4th century issues (see below). As has been noted above, the top fills in the three pits cutting the eastern ditch of the processional way were very similar to that in this ditch, perhaps part of a once more extensive spread, though the latest pottery from the pits has been assigned to the mid-1st century AD with no later material.

Thirty-seven post-holes or small pits, most within three or possibly four concentrations, were recorded within the eastern half of the interior of enclosure 400012 (Fig 2.5), though others to the west may have been completely removed by erosion. Diameters ranged from 0.25–0.90 m and depths up to 0.30 m. No patterns could be discerned amongst the individual groups of features, the largest concentration comprising 19 examples of varying size, and it is difficult to put forward any structural interpretation. It might be relevant that this part of the site was particularly exposed, subject at times to very strong winds, making it less likely perhaps that there was any permanent settlement in this location. It is also uncertain if these features were contemporary with the late Iron Age enclosure or with a later, Roman phase of re-use. The vast majority produced no finds but one (3837), probably a small pit, contained a potin, and a few sherds of early Roman pottery came from five other pits and post-holes (3775, 3781, 3795, 3797, 3813) in various parts of the enclosure. On balance it might appear that features of both periods were present.

The three pits (300025) which cut through the infilled eastern ditch of the processional way have been noted above, and it may be no coincidence that they lay within the projected westward extent of the enclosure (see Fig 2.3), possibly marking its western limit, though it cannot be demonstrated that the use of the two was contemporary. Nevertheless, even though the ditches may have been largely infilled it is likely that at least part of the associated banks would still have been visible at this time.

Enclosure 400069

Parts of what may have been a second large enclosure (400069) lay on the rising ground approximately 80 m to the south-east of the springs at the head of the valley (see Fig 2.3). Only the north-east side of this putative enclosure lay within the excavation area, the remainder extending beneath the A2 and an adjacent slip road. The north-east side of the enclosure was defined by two parallel ditches, 300269 and 300272, which lay approximately 8 m apart and were traced for a distance of 40 m as far as the southern edge of the excavation. Both ditches narrowed and terminated at their northern ends and it was clear that there were no ditches on the north-west side of the enclosure which appears to have been open, facing towards the springs. There is a possibility that the ditches defined the north end of a trackway entering the area from the south, rather than part of an enclosure, but this is considered a less likely interpretation.

Ditch 300269 was considerably the larger of the two, measuring a maximum of approximately 4 m wide, 1.5 m deep with an open V-shaped profile (Fig 2.7, ditch 6621). A step near the bottom may indicate an episode of cleaning out or recutting. The smaller ditch, 300272, was only 1.50 m wide and 0.75 m deep, but had a similar, stepped profile (Fig 2.7, ditch 6622). The lower and middle parts of ditch 300269 contained a sequence of fills largely reflecting natural infilling and were devoid of finds. However, the upper part of the ditch (layer 6629) was quite different and contained large quantities of pottery and animal bone, and it appears that these deposits represent deliberate infilling and levelling of the ditch, for which a date in the first half of the 1st century is indicated.

Despite the evidence for the deliberate infilling of ditch 300269, there is an indication that some element of enclosure 400069 was still extant in the Roman period, sufficient to influence the layout of Roman enclosing ditch 400017 at its south-east end (see below), and it seems most likely that a surviving bank associated with ditch 300269 was the cause of this.

The function of possible enclosure 400069 remains uncertain, particularly as so little of its extent and interior have been exposed, and the situation is confused further by other discoveries in the vicinity. Elements of what has been interpreted as parts of an early enclosure at the head of the Ebbsfleet have been identified in previous excavations, but the ditch (or ditches) have been dated to the early Roman period and suggested to have had some military connection (eg, Penn 1965; Detsicas 1983, 60–2). The existence of an early Roman enclosure remains a possibility, particularly as although on the same alignment the location does not correspond with the late Iron Age ditches belonging to enclosure 400069, and this is discussed further below.

Of possible relevance to the function of enclosure 400069 is the molluscan evidence from ditch 300269, for the assemblage indicates very shady conditions (see Wyles and Barnett, Vol 3 Chap 3). This is not what might have been anticipated in this otherwise quite exposed location, and is quite different to assemblages from Roman features in this part of the site which indicate open conditions. Perhaps it might reflect the presence of trees in this area, within the enclosure itself, and on this

very slight evidence some form of ritual function might be suggested, in keeping with the nature of the later, mid-Roman use of the east side of the Ebbsfleet Valley in this area.

'Terrace'

Terrace 400011 lay a little above the most steeply sloping part of the valley side and overlooked the springs (see Fig 2.3). It was situated close to the southern terminus of ditch 3000024, just within the end of the processional way, though it was probably later and perhaps post-dated the latter's use. The function of terrace 400011 remains uncertain.

The major element comprised feature 3053 which was somewhat irregular in plan and might be fairly accurately described as a sunken terrace (Fig 2.8; Pl 2.3). It was cut into the slope, had a flat base, and was approximately 6.75 m in length and a maximum of 3.20 m wide (Fig 2.9). There was a lip at the front and it was approximately 1 m deep at the back, which was steeply sloping. A shallow gully, 3973, 7.5 m long and dug a metre or so to the rear (Fig 2.3), was probably created to divert rainwater away from the terrace. No features were found in the base of sunken terrace 3053, but it seems probable that the back was revetted or protected in some way as it appeared not to have suffered from erosion. The general absence of any associated stake- or post-holes, apart from one (3084) in the centre at the front, makes reconstruction difficult, but there was evidence that there had been a turf wall either forming the revetment at the back or part of a wall immediately to the rear of the terrace. Elements of such a turf revetment or wall were recorded in the infill (in layer 3261/3262), apparently having collapsed into the abandoned terrace (Fig 2.9), and this identification has been confirmed by environmental analysis (see Vol 3 Chaps 3 and 4).

No basal fill underlying layers 3261/3262 was identified and pottery recovered from layer 3261 is of mid-1st century AD date. Of the principal fills above this, 3086 was a substantial, homogeneous deposit of material probably washed into the terrace following abandonment, and overlying this was a darker deposit (3054) which contained a large assemblage of pottery assigned to the third quarter of the 1st century. A gully (3055) cutting the upper fill at the rear of the terrace contained pottery of mid-1st century date, though the function of this is unclear and no associated features were identified. Overall, a probable construction date for terrace 400011 at the very end of the late Iron Age is indicated, with disuse and infilling taking place at the beginning of the early Roman period.

Feature 3062, perhaps a terrace similar to 3053, lay approximately 2 m downslope to the east (see Fig 2.9). This was at least 3 m long, 1.5 m wide and a maximum of 0.75 m deep, though in this case there was no lip along the edge at the front. Terrace 3062 appeared to be cut by processional way ditch 3065 (300024), but the single fill (3064) of 3062 produced a moderate assemblage of pottery assigned to the third quarter of the

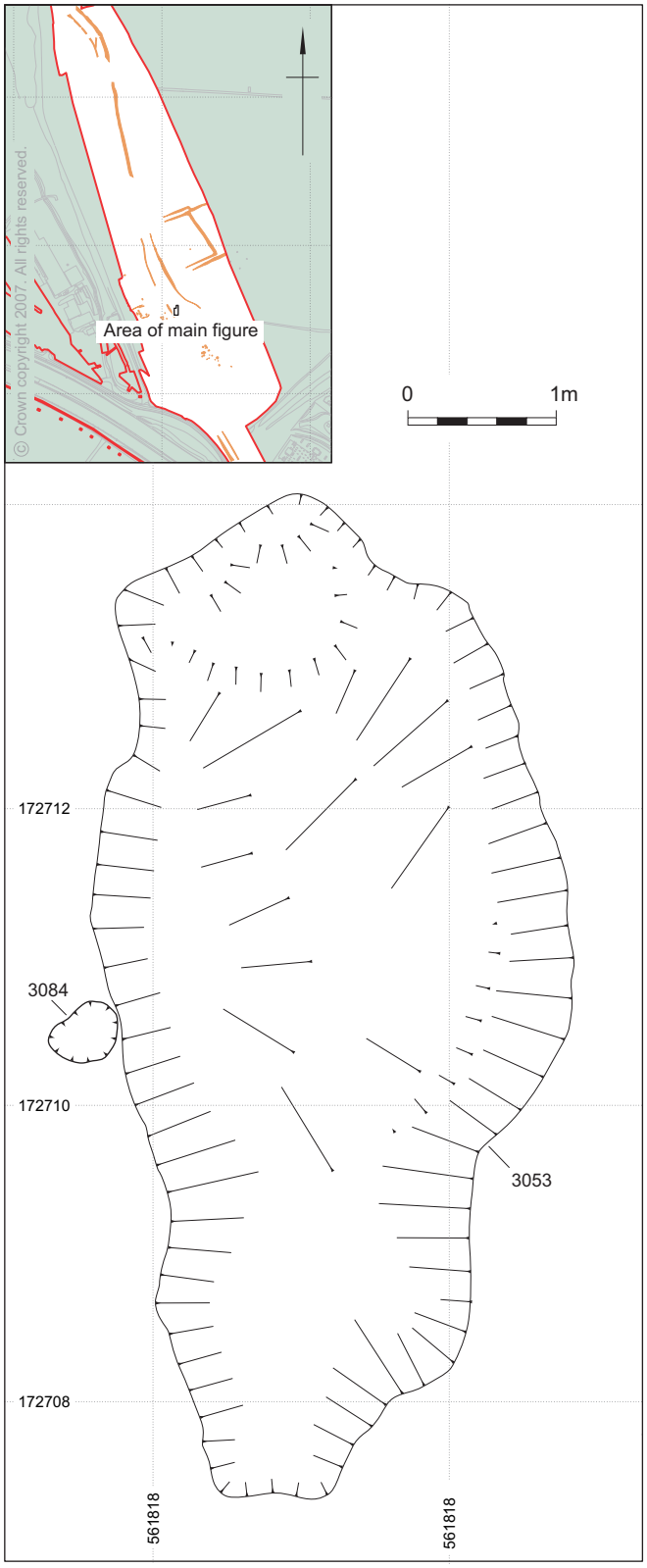

Figure 2.8 Plan of late Iron Age 'terrace' 400011

1st century AD, similar in date to that from the infill of terrace 3053. This raises the possibility that either this part of the processional way (300024) was later than the remainder or that it had been recut at a relatively late date, if the recorded relationship between terrace 3062 and ditch 3053 is correct.

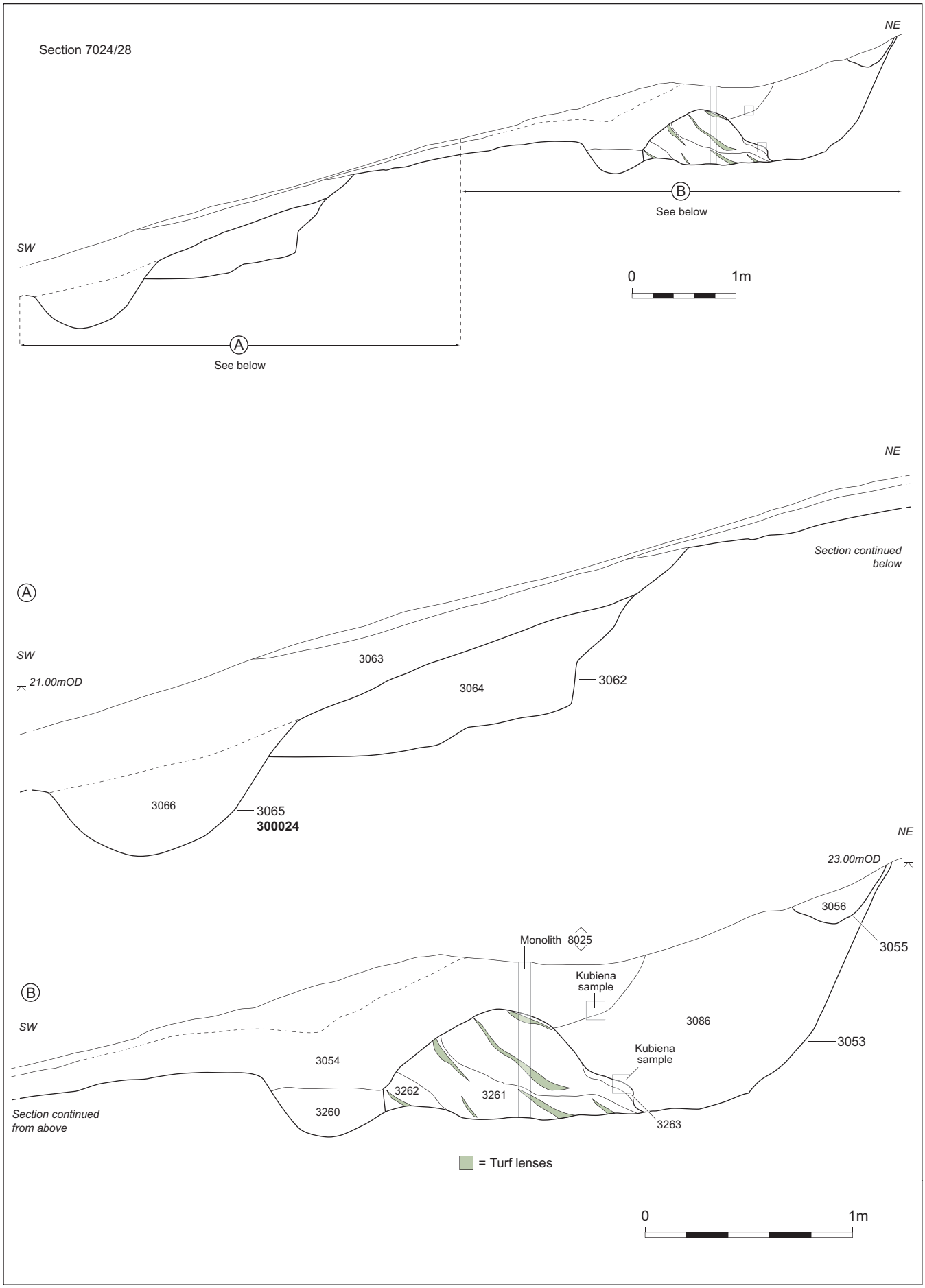

Figure 2.9 Section through 'terrace' 400011 and processional way ditch 300024

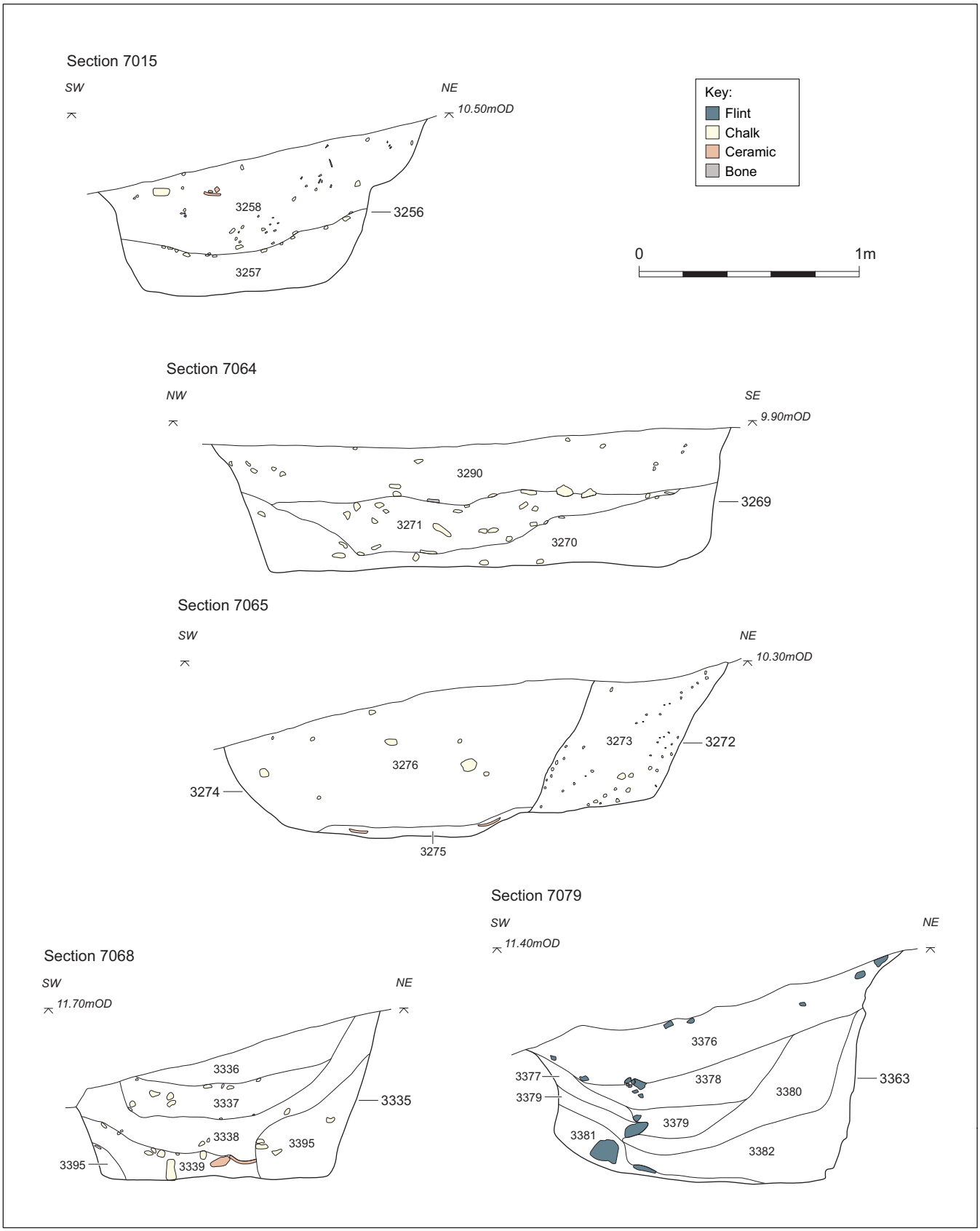

Figure 2.10 Sections through pits in pit group 400015

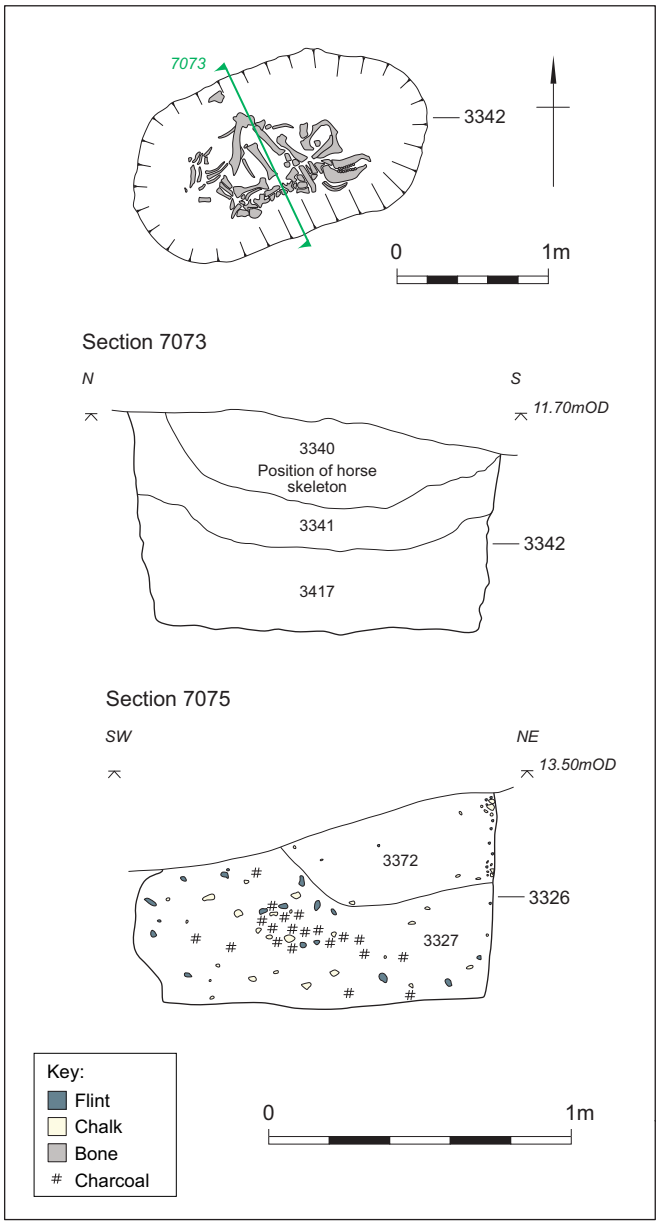

Figure 2.11 Sections through pits 3342 and 3326

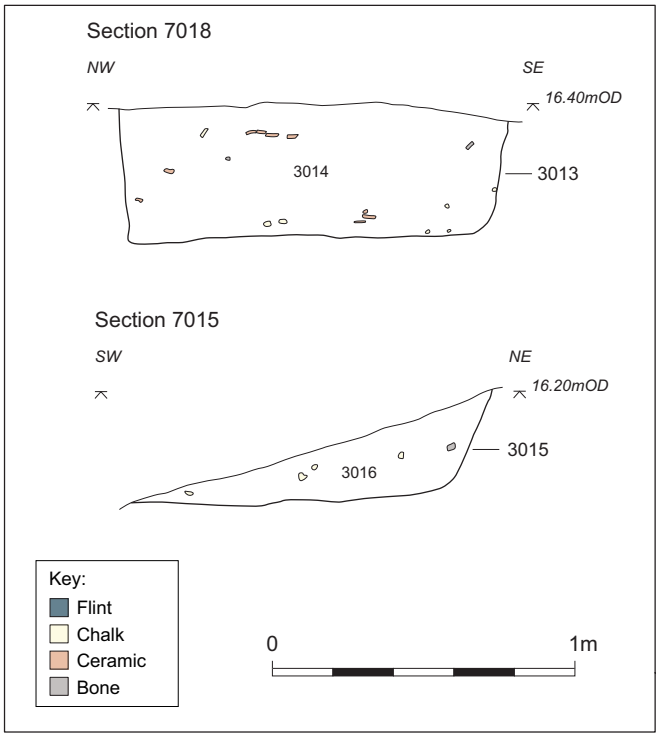

Figure 2.12 Sections through pits 3013 and 3015 (Pit group 300126)

Plate 2.4 Late Iron Age pit 3680 (pit group 400016) with pottery deposit (ARC SPH00). Looking east

Pit groups

Three groups of small pits, along with at least two outliers, lay on the steepest part of the slope (see Fig 2.3). One group was contained within a small enclosure (400015), with an unenclosed cluster (300026) a short distance to the south-east. Another unenclosed but larger group (400016) lay a further 75 m to the south-east. At least two of the pits assigned to groups 400015 and 400016 contained assemblages of pottery and animal bone which are interpreted as 'structured deposits' and one of the outliers contained a horse burial.

Enclosure/pit group 400015 comprised as many as seven pits within a small, probably rectangular enclosure located towards the base of the slope approximately 100 m north of the springs (see Fig 2.3). The surviving enclosure, defined by shallow, slightly curving gullies (3365 and 3368) on the north and south sides, measured approximately 17.5 m square, but the east side had suffered some loss through later channel erosion. A further gully (3367) on the north side could have been a later addition, but may be unrelated to the enclosure. There was no evidence either from the form or the fills of the gullies to indicate whether or not they once held fences or screens. Three pits (3256, 3269, and 3274) lay in a line across the centre of the enclosure and the largest of these, 3274, measuring approximately 3.0 m by 1.75 m and 0.70 m deep, cut an earlier pit (3272) (Fig 2.10, sections 7015, 7064, and 7065). Two pits (3335 and 3363) of similar size (Fig 2.10, sections 7068 and 7079), one smaller pit (3247) and a short slot or gully (3369; not shown on plan) also lay within the enclosure and are thought likely to have been broadly contemporary with it. Only slot 3369 did not produce any late Iron Age pottery, while four pits (3269, 3274, 3335, and 3363) and gully 3365 also contained a few early Roman sherds in their upper fills. Pit 3256 is perhaps most noteworthy in terms of finds as it

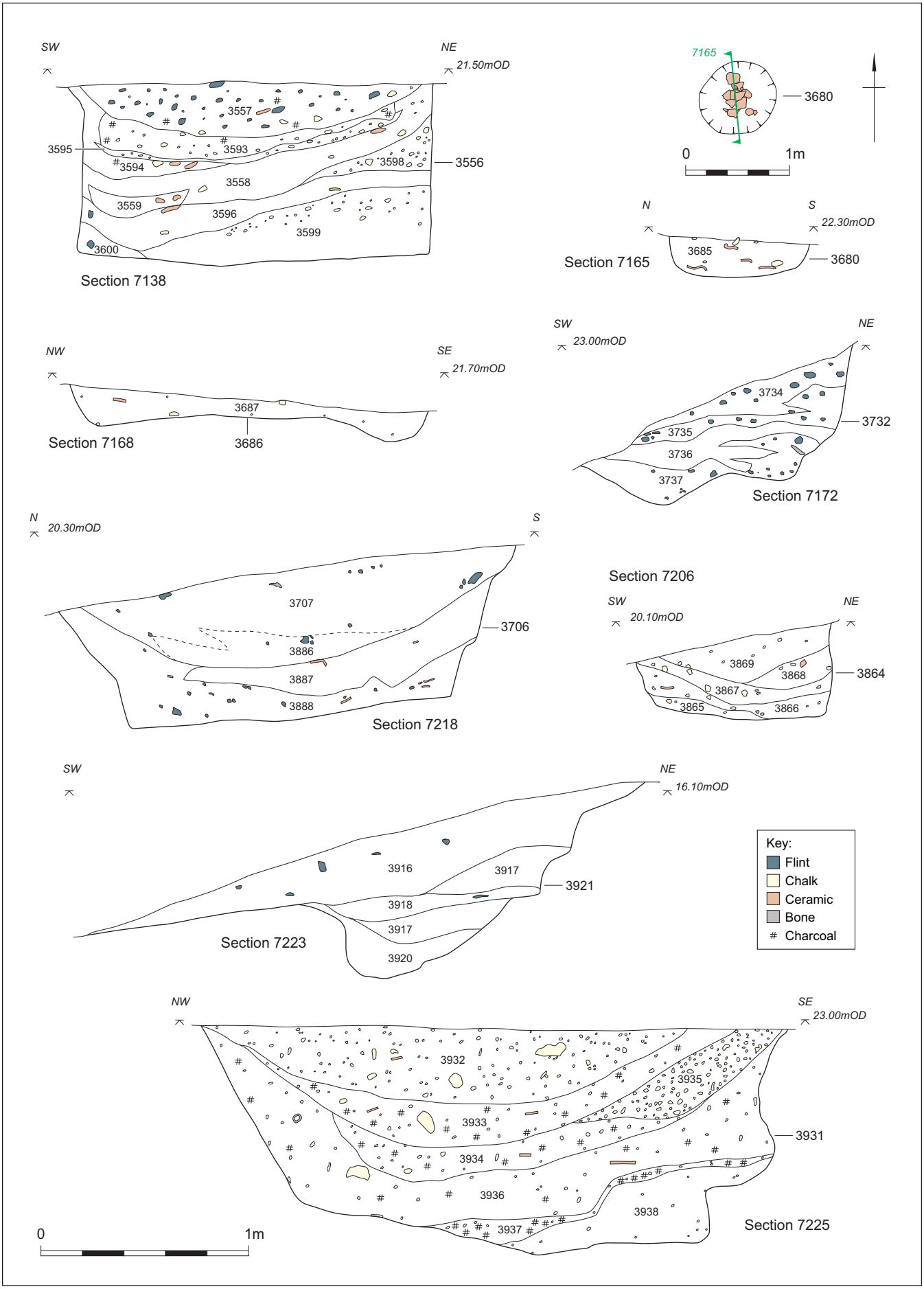

Figure 2.13 Sections through pits in pit group 400016

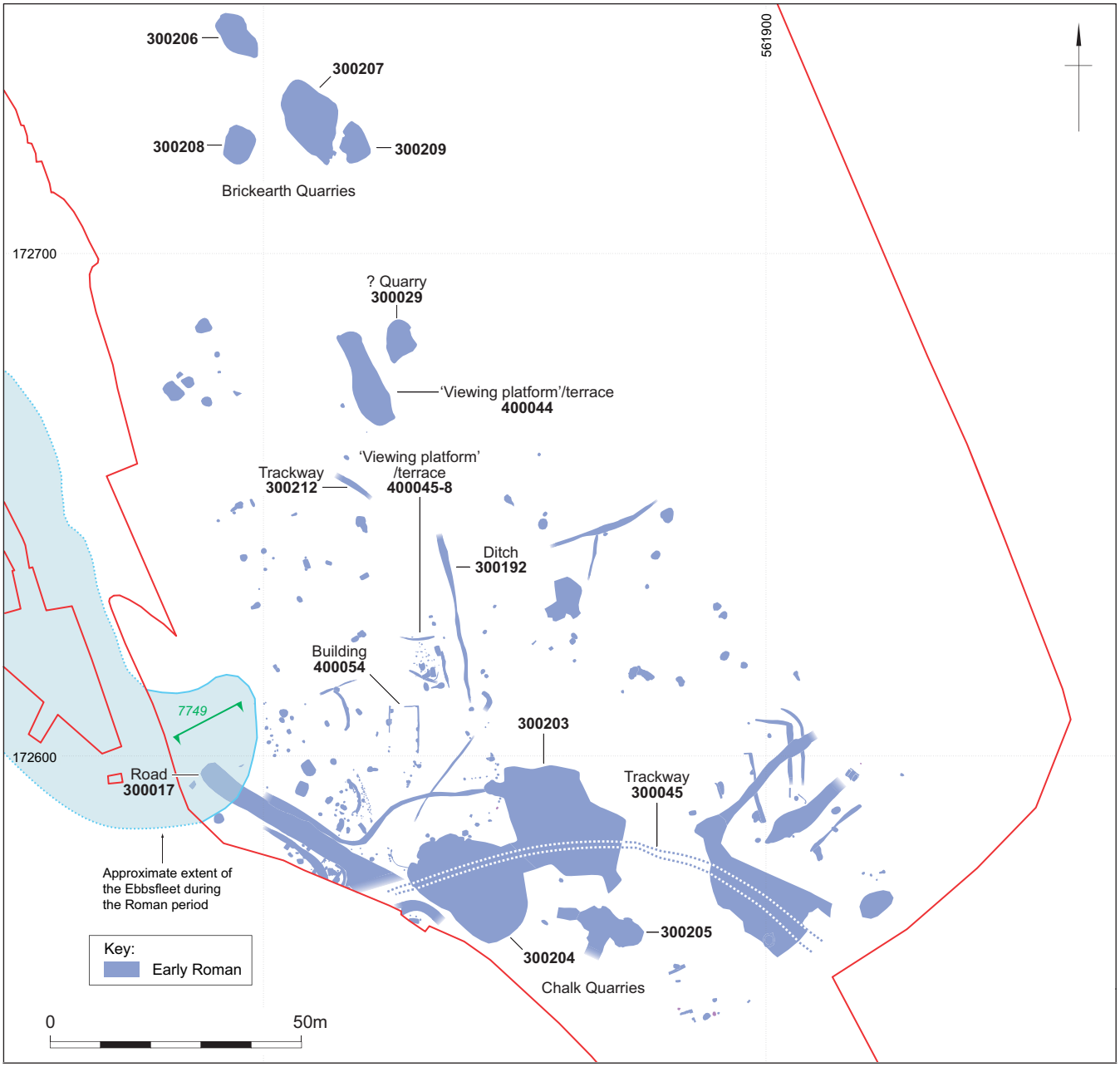

Figure 2.14 Early Roman activity in the vicinity of the springs (ARC SPH00)

contained large parts of two vessels, both assigned to the first half of the 1st century AD, apparently placed at the interface between the lower (3257) and upper (3258) fills.

Less than 10 m to the north of enclosure 400015 lay a further, sub-rectangular pit (3326), and 45 m to the north of this was a slightly larger oval pit (3342) measuring approximately 2 m by 1 m and 0.75 m deep (see Fig 2.3). Pit 3342 was an apparently isolated feature which had a horse burial at the base of the uppermost fill (3340), perhaps representing a closing deposit of some form (Fig 2.11). Pottery from these two pits indicates a mid-1st century date and, like virtually all of the material from the three pit groups, is probably pre- rather than post-Conquest.

Unenclosed pit cluster 300026, higher up the slope and 15 m to the south-east of enclosure 400015, comprised three relatively shallow pits (3013, 3015, and 3034) and a possible three-throw hole (3071), all of which contained late Iron Age pottery (Figs 2.3 and 2.12). A short distance to the north of these were the remains of a probable hearth (3073), also of late Iron Age date, and possibly associated with the nearby pits.

The greatest concentration of pits and associated features, 400016, fell within an area measuring approximately 30 m by 25 m (Figs 2.3 and 2.13; Pl 2.4). These pits were unenclosed and lay some 60 m to the south-east of pit cluster 300026. As many as 23 pits may belong to this group, most assigned on the basis of the late Iron Age pottery they contained, although four (3706, 3732, 3864, and 3931; Fig 2.13, sections 7172, 7206, 7218 and 7225) also contained early Roman sherds in their upper fills, in the case of pit 3931 probably derived from a later gully which cut it. There were two further pits, containing only late Iron Age pottery, which may represent outliers to this group,

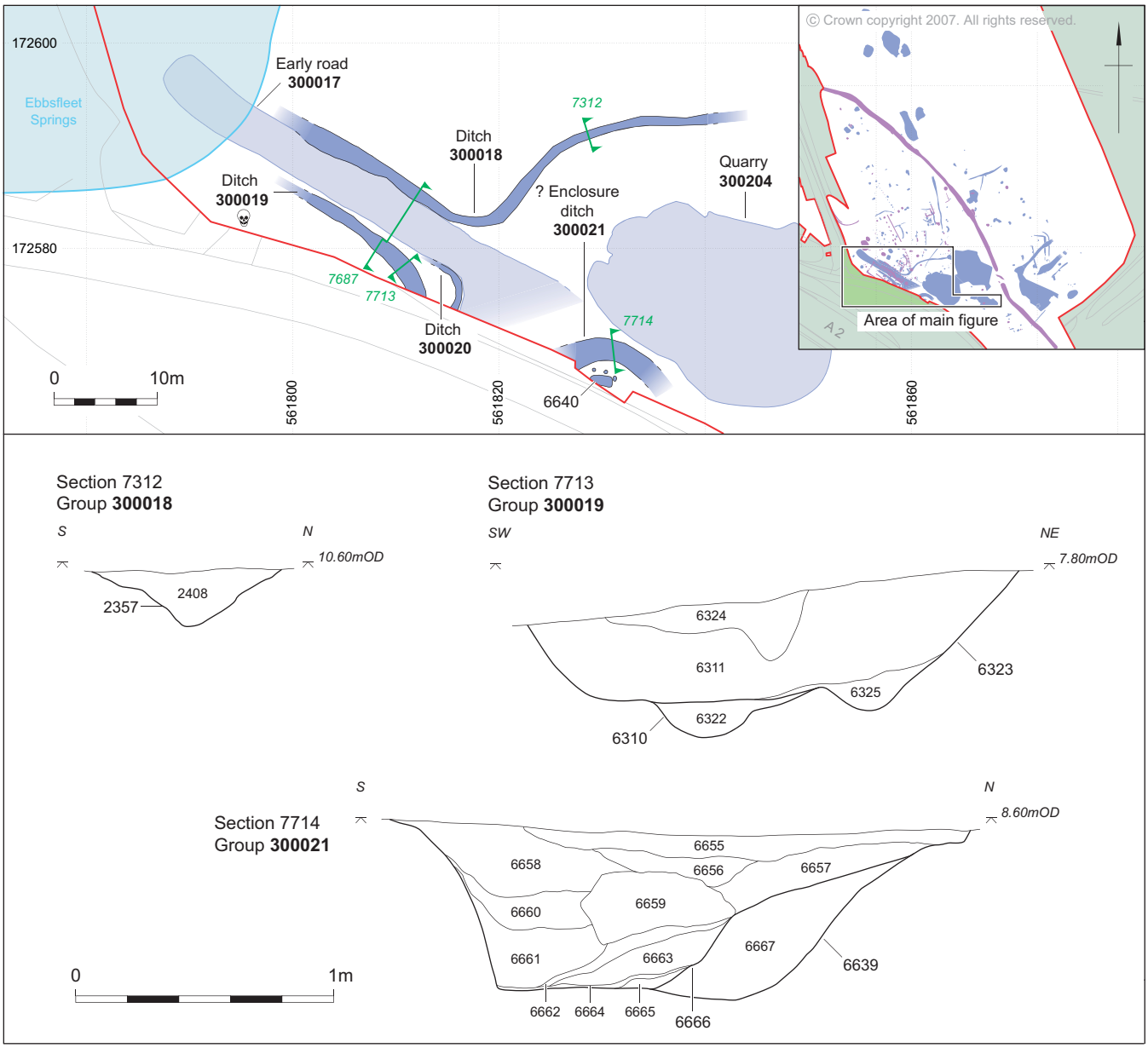

Figure 2.15 Early Roman road 300017 and associated ditches

pit 3164 a short distance to the south-east and pit 3909 rather further to the south-west. The main group of features included at least one possible post-hole (3860) and several shallow features that were little more than scoops, some of which had suffered subsequent tree root disturbance. The pits were of a variety of shapes and sizes, ranging from the smallest (3852) which was sub-oval measuring 1.20 m by 0.70 m and 0.10 m deep, to the largest (3931) which was sub-circular, approximately 2.75 m in diameter and just over 1 m deep (Fig 2.13, section 7225). In addition to the late Iron Age features, there were two post-holes (3666 and 3875) containing early Roman pottery and at least a further two undated post-holes (3656 and 3863, and possibly also 3662 and 3664; none shown on plan). All of these post-holes may be Roman, and there were several Roman features in the vicinity, but a late Iron Age date cannot be ruled out. No obvious patterning was distinguished amongst this group of pits, scoops, and post-holes but pit 3680, a relatively small feature, was of particular interest as it contained parts of a minimum of six vessels that might be considered to represent structured deposition (Fig 2.13, section 7165; Pl 2.4).

Activity around the springs

The springs have been dry since the late 1930s when dewatering of the large, now backfilled chalk quarry downstream to the west of the Ebbsfleet led to a significant lowering of the water table in this area. The number and precise locations of individual springs at the head of the valley remains unknown, partly because the entire area around the springs was not available for excavation and partly because this area had been affected to some extent by a process of upstream 'migration' of the springs which has resulted in erosion of parts of the spring head itself. Indeed, it is possible that the number as well as the location of individual springs changed over time. Furthermore, there had been some deliberate modification of this area during the earliest period of Roman activity, prior to construction

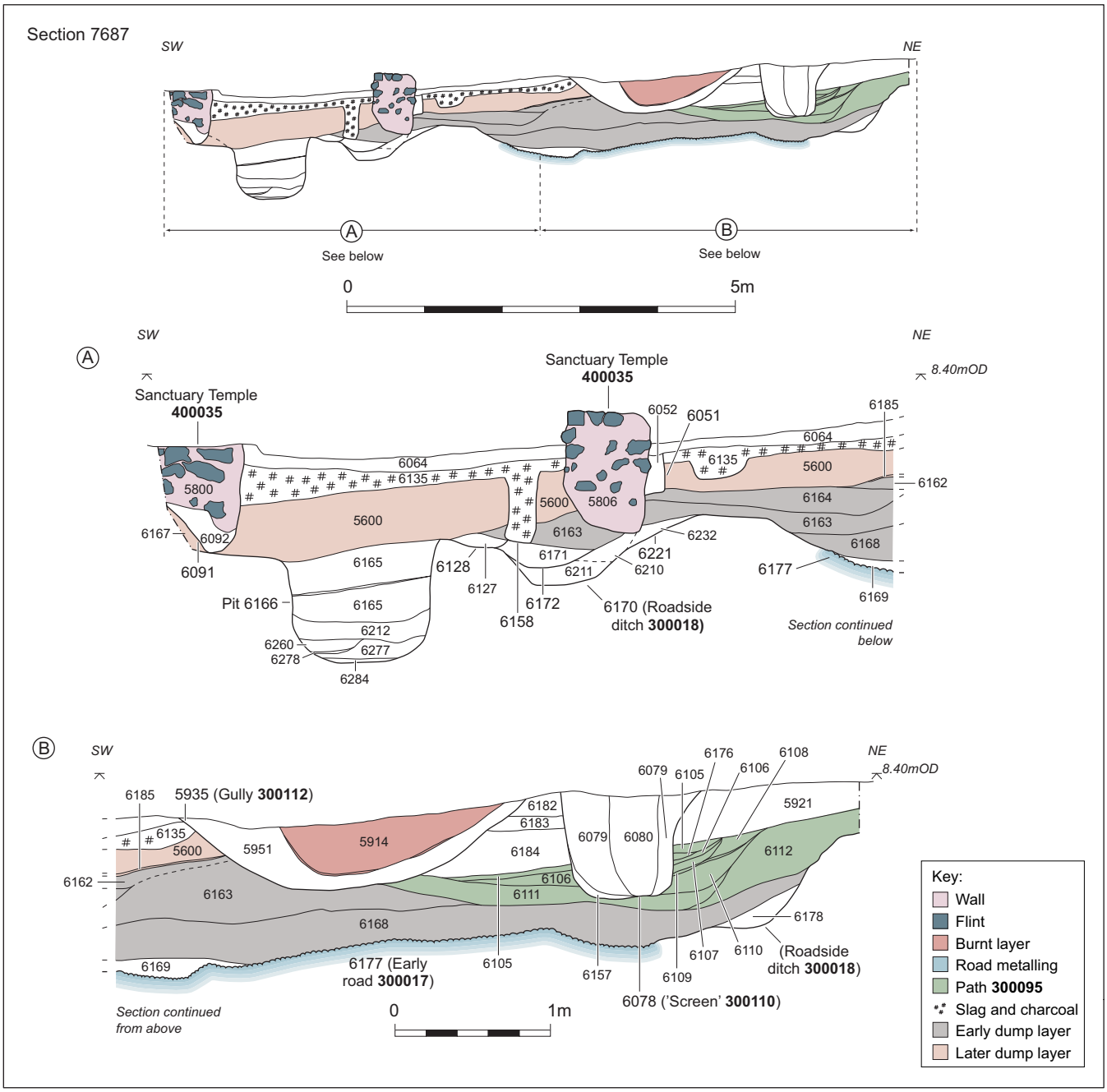

Figure 2.16 Section through road 300017 and later features

of the Sanctuary complex in the 2nd century (see below). Nevertheless, the approximate extent of what would have been a large, shallow pool of water at the head of the valley, fed by the springs and then flowing into the Ebbsfleet, can be gauged from what is known of its Roman limits. These indicate an expanse of water 20–25 m wide at this point, increasing to probably 50–60 m within a distance of 100 m or so downstream (see Fig 2.3). The water cannot have been deep, although the evidence from the Roman waterfront areas suggests that it was probably navigable by shallow draught boats, and the presence of watercress beds here in the 19th and 20th centuries indicates a reasonably strong flow of fresh water.

Though it is likely that the springs and this pool of shallow water formed a focus to the activity, no features incontrovertibly of late Iron Age date have been found in the immediate vicinity. The two Bronze Age barrows recorded at the head of the Ebbsfleet would by this time have been buried under colluvium of probable middle–late Bronze Age/early Iron Age date and it is clear that the 'migration' of the springs had led to the partial erosion of at least one of them. It is possible that at least one more barrow could have lain to the west, outside the excavated area, perhaps not completely buried by colluvium but, overall, it appears that the area immediately surrounding the springs was open ground, apparently devoid of archaeological features, and perhaps covered with grass or scrubby vegetation. The apparent lack of late Iron Age features and the absence of any identifiable horizons of this date has meant that it has not been possible to characterise the vegetation.

The lack of features in the vicinity of the springs is not echoed in the distribution of finds, in particular metalwork and especially coins (see Holman and Cooke, and Schuster, Vol 2, Chaps 2 and 3).

Early Roman Activity in the Eastern Ebbsfleet Valley (ARC SPH00)

Probably the earliest Roman features on the entire site, including ARC SHN02, were a road extending south-eastwards from the head of the springs, the associated roadside ditches and one corner of what may have been an enclosure (Fig 2.14). These features may date to as early as the mid 1st century AD, whereas various pits, ovens and burials are for the most part slightly later, probably belonging to the end of the third or the fourth quarter of the 1st century. In addition, there were two sequences of timber structures which overlapped with each other chronologically, both sequences commencing sometime in the final quarter of the 1st century and continuing well into the first half of the 2nd. The archaeological deposits were particularly deep and well-preserved in a large part of this area, sealed by thick layers of colluvium, with a complex sequence which extended from the late Upper Palaeolithic through to the Anglo-Saxon period.

Early Road and Enclosure

Road 300017

An overall length of approximately 50 m of this early road was uncovered, extending an estimated 8 m or so into the shallow water at the head of the (now dry) Ebbsfleet and running up a gentle slope to the south-east towards ditch 300021, the north-west corner of what is interpreted as a possible enclosure (Figs 2.15–16). The road was constructed within a shallow, linear hollow (see Fig 2.16) which had been cut through a sequence of colluvial deposits of probable middle–late Bronze Age date, thickest immediately around the springs, in order to create an even gradient (Pl 2.5). The central burial within an underlying middle Bronze Age barrow had been almost entirely truncated in the process of cutting through these colluvial deposits (see Fig 2.19 below), and the top of an adjacent middle Bronze Age burnt mound was also exposed, the latter incorporated within the Roman metalled road surface subsequently laid down. Only a single phase of metalled surface was identified (Fig 2.16, layer 6177), except perhaps where the road extended into the Ebbsfleet, and there was no obvious evidence for any repairs having been made to the road, which appeared in good condition with only slight traces of wear. Surface 6177, comprising well-sorted, generally small gravel, was approximately 4 m wide, clearly defined for most of its length, but fading out to the south-east in the vicinity of enclosure ditch 300021. However, at this end there was convincing evidence that the road turned through 90° and continued to the south-west, beyond the limit of excavation, perhaps running along the north-west (and possibly also the north-east) side of the postulated enclosure.

Plate 2.5 Early Roman road 300017 running from centre left to bottom right; section through channel fills in foreground, with middle Bronze Age ring-ditch and earlier deposits at base of sequence (ARC SPH00). Looking south-east

Road 300017 was flanked by a pair of ditches, 300018 immediately to the north and 300019 to the south, both recut on at least one occasion (Fig 2.15). Ditch 300020 represents a second re-cut of ditch 300019, encroaching well beyond the edge of the road and creating a sharper bend where it turned to the south-west. Ditch 300018 on the north side mirrored this arrangement, but there was no evidence here for a metalled surface extending to the north-east, and it seems probable that the layout of this ditch was designed to intercept rainwater run-off from the valley side and channel it away from the road and into the Ebbsfleet. The eastern end of this ditch was cut by quarry 300203 (see Fig 2.14) and to the north-west both ditches petered out a few metres short of the edge of the Ebbsfleet.

Only a small quantity of undiagnostic pottery was recovered from the road surface, while material from the roadside ditches provides a broad late 1st–early 2nd century AD date for their infilling. However, more

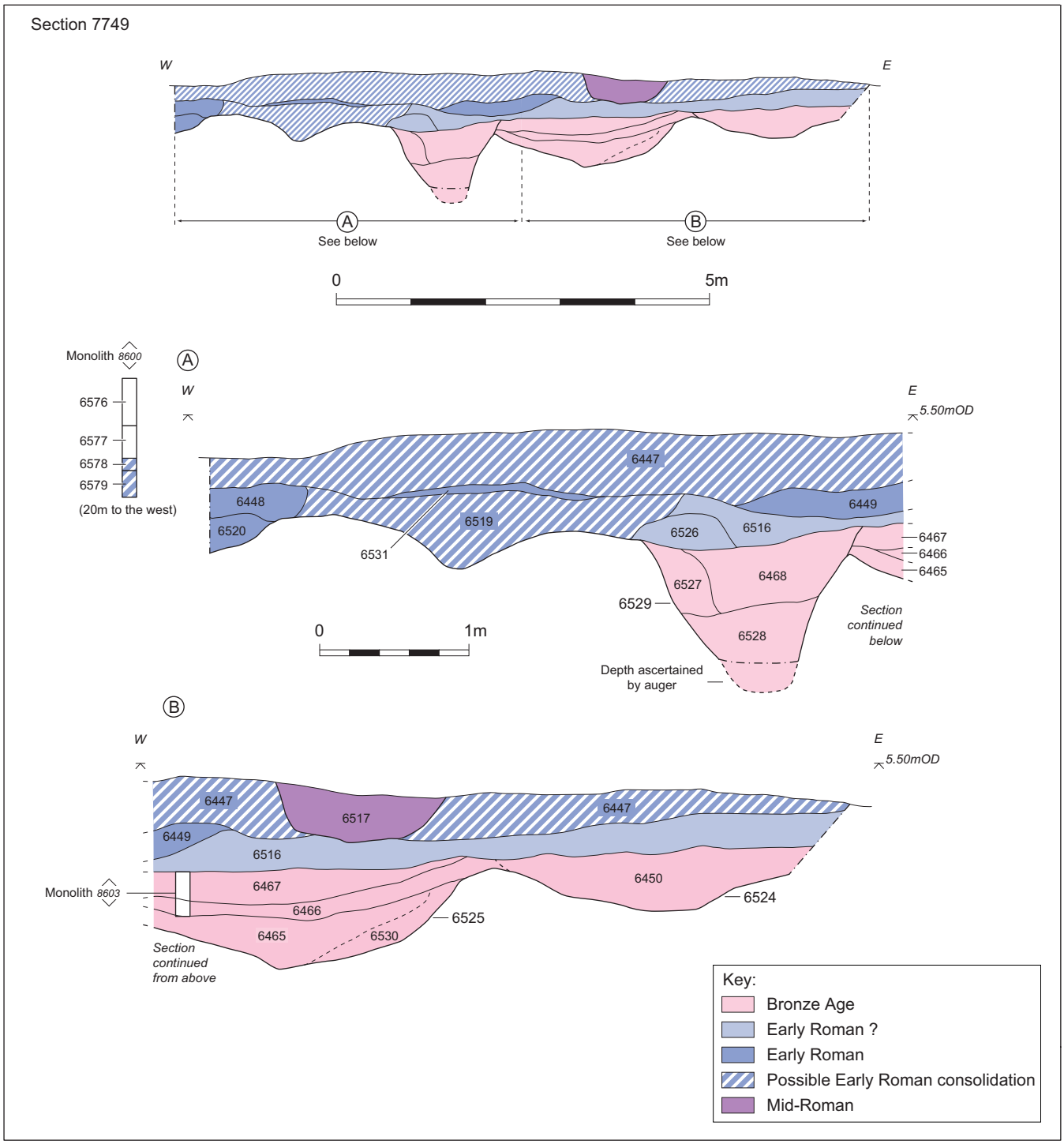

Figure 2.17 Section 7749 through Roman riverbed and underlying prehistoric features

closely dated and stratigraphically later features indicate that the road had gone out of use and the ditches infilled before the end of the 1st century.

As part of this early phase of activity at the head of the Ebbsfleet it appears that the riverbed itself may have been partially cleared in the vicinity of the springs, whilst further downstream there is some evidence to suggest that in places the banks may have been cut back in the Roman period (see Barnett and Stafford, Vol 3, Chap 3). Excavation in the now dried up bed at the head of the river revealed several late Bronze Age pits, their upper parts removed as a result of erosion caused by the springs gradually sapping their way south-eastwards up the valley bottom. This process had also removed the north-western half of one of the middle Bronze Age barrows which had been constructed here. Overlying the Bronze Age pits was a sequence of Roman deposits which included several hard-packed layers of gravel (eg, 6447 and 6519), in one place almost 0.7 m thick, forming a relatively level surface at *c* 5.40 m aOD (Fig 2.17). It is considered unlikely that such a gravel surface could have accumulated as a result of natural processes and it is more probable that it formed part of a quite extensive consolidation layer within the bed of the Ebbsfleet. Where the metalling on early road 300017 extended onto this consolidation layer it was not always

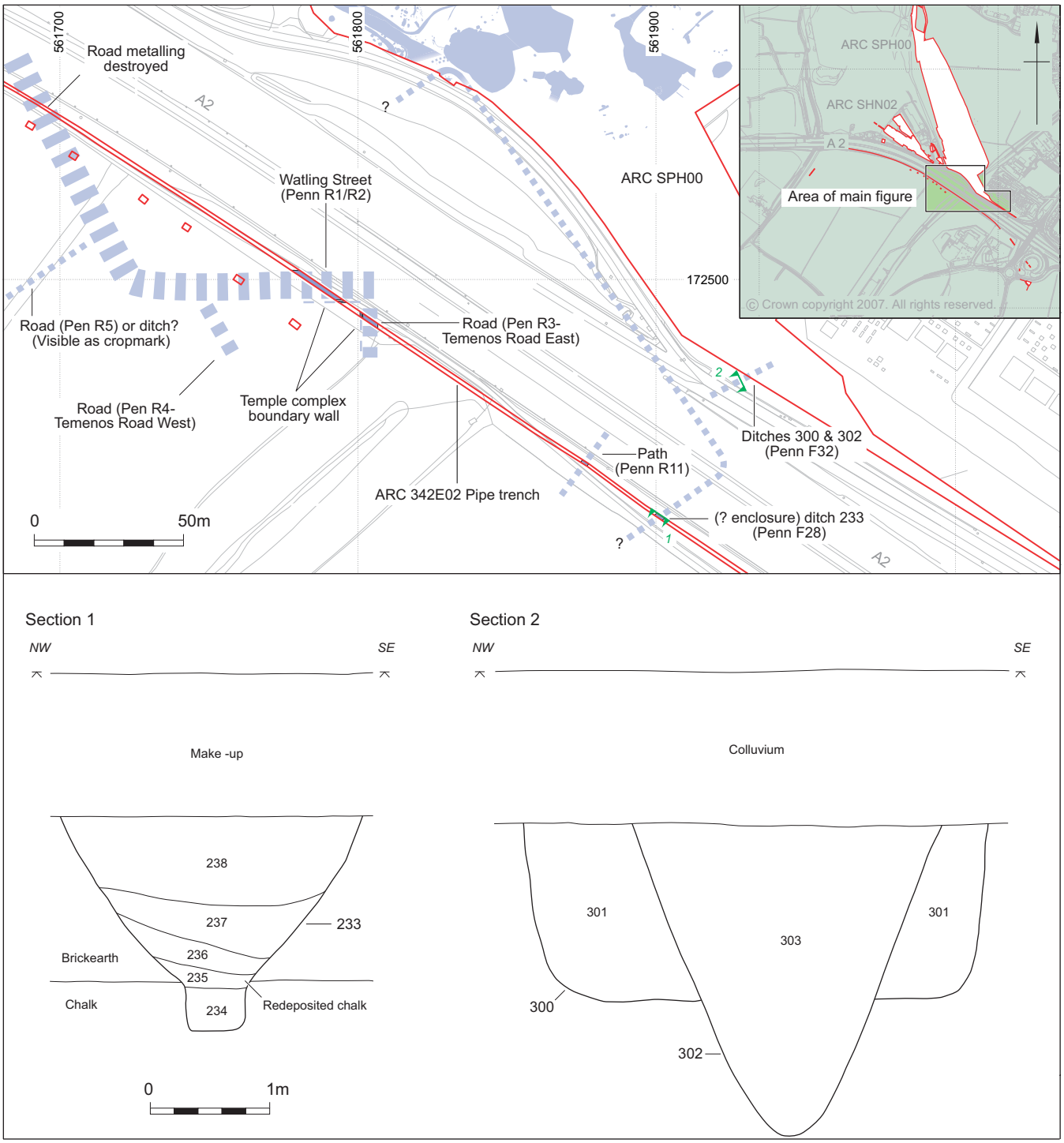

Figure 2.18 Projected extent of Early Roman enclosure at the head of the Ebbsfleet and other major features

easy to distinguish between the two, and the road metalling had clearly suffered from some degree of erosion both through use and as a result of water action. Here, at the head of the valley, the river is likely to have been shallow, perhaps no more than 0.50 m or so deep, but actively flowing, fed by water welling to the surface at the springs.

Enclosure ditch 300021

A short length of curving, possibly right-angled ditch was exposed on the southern edge of the site, continuing beyond the limit of excavation to the south-east and truncated by a modern road cutting to the south-west (Fig 2.15). Ditch 300021 had been re-cut and was a maximum of 2 m wide but only 0.75 m deep, with steeply sloping sides and a flat base. The metalling on early road 300017 did not extend this far and the precise relationship between the two could not be established in an area where no stratified deposits survived. This was also the case for chalk quarry 300204 which lay immediately to the north, perhaps dug in the area between ditch 300021 and roadside ditch 300018, though it could be argued that the quarry was established earlier and that the two ditches avoided it. However, the fill of the earliest cut (6639) of ditch 300021 contained mid–late 1st century AD pottery,

whilst pottery from the re-cut (6666) appears to be early 2nd century at the latest and, on balance, the quarrying is thought to have been a slightly later development.

Three post-holes and sub-rectangular pit 6640 lay within the angle formed by ditch 300021, the post-holes undated but the pit containing late 1st–early 2nd century pottery. Possibly all of these features were contemporary with the ditch, though this remains uncertain, as does their function.

It is tentatively suggested that ditch 300021 may have been the northern corner of an early enclosure, further elements of which were identified during previous work at Springhead (where they are recorded as 'military' ditches), with some additional evidence (ditch 233) coming from the HS1 watching brief during the laying of a drain on the south side of the A2 (see Fig 2.18). If the various recorded ditch sections were part of the same feature, then this would provide an estimated north-west to south-east length of 160 m for the postulated enclosure, the eastern corner (its form uncertain) apparently crossed by Watling Street and now lying beneath the A2; the north-east to south-west dimension remains unknown. It should be noted, however, that the other recorded ditch elements all appear to be V-shaped with steeply sloping sides and an ankle-breaker in the base, with an overall width of approximately 2.5 m and a depth of 1.75 m, substantially deeper and quite different to the profile of ditch 300021. Perhaps they were not all part of the same feature, and it is possible that none was part of an enclosure, but they all appear to have been associated with a phase of early, 1st century activity at the head of the Ebbsfleet. Unfortunately, the few sherds of pottery recovered from ditch 233 in the watching brief are chronologically undiagnostic and the material from the ditches investigated in the earlier work appears to have been lost (French 1984).

The matter is further complicated by as many as three other ditches which have been recorded at various times in the south-eastern part of the Roman settlement, one small feature interpreted as possibly an outer ditch to the postulated enclosure, and two more substantial ditches extending north-eastwards from close to the presumed eastern corner of the enclosure. The latter ditches were recorded in an embankment section during the HS1 watching brief and broadly confirm earlier observations in this area (Penn 1965, 116–7), comprising one large U-shaped ditch (300), 3.85 m wide, 1.50 m deep, with a flat bottom, cut by a substantial V-shaped ditch (302), 2.60 m wide and 2.60 m deep (Fig 2.18). The small quantity of Roman pottery from ditch 300 is undiagnostic, whereas material from the basal fill of ditch 302 has been assigned a mid-Roman date.

In addition to these ditches, excavations in the 1980s to the south of the A2, revealed almost 50 m of another early ditch (D9) running WSW to ENE, not quite parallel with the projected southern side of the enclosure but appearing to align approximately with the corner formed by ditch 300021 near the head of the Ebbsfleet 120 m or so to the east (Fig 2.18). The ditch was larger than 300021, of rather irregular profile and continued beneath Watling Street. The possibility has been suggested that it was part of a pre-Roman enclosure (which included some of the other ditch sections excavated earlier), perhaps an Iron Age sanctuary, backfilled prior to the construction of Watling Street in the mid-1st century AD (Harker 1980, 286; French 1984).

The existence or otherwise of an early enclosure at the head of the Ebbsfleet remains unproven, though the accumulating evidence is persuasive in its favour, and how the other ditches, particularly 300 and 302, as well as D9, related to the layout and sequence is not easily resolved. There is now only extremely limited opportunity for further excavation north of the A2 in this area, though the scheduled areas to the south may allow the matter of the postulated early enclosure to be investigated. Of primary importance is confirmation of its layout, its suggested early Roman date and its function. Possibilities for the latter have at various times included a marching camp, a Claudian fort and a construction camp (for Watling Street).

Early Roman Features in the Vicinity of the Road

Various features lay in the immediate vicinity of early road 300017 (Fig 2.19) and are likely to have been contemporary with or have immediately post-dated its use. One group to the south included a relatively large number of burials (six) with others probably lying beyond the limit of excavation. To the north of the road lay three further burials, two ovens, and several pits, some of these features probably associated with the earliest of a sequence of three clay-floored structures (400039).

All but one of the datable features to the south of the road have been assigned to the late 1st century AD on ceramic grounds, the exception (hearth 6313) containing material possibly extending into the 2nd century. There were four neonate burials, perhaps amongst the earliest features in this group, two in shallow graves (6124 and 6128) cutting the outer edge of roadside ditch 300019, one (6130) within the fill of the ditch, and another (6100) from a layer (6101) close to the water's edge which contained early 2nd century pottery. No grave cuts were distinguished for either of the two latter burials. To the north of the roadside ditch were two further graves (6345 and 6607/6608) which lay within a metre of each other, both cutting the edge of the road and both containing pottery vessels assigned a date range of AD 65/70–85. Because they cut the road it might be suggested that these two graves belonged slightly later in the sequence of early features, though the stratigraphic evidence was equivocal.

Grave 6345 (Fig 2.20; Pl 2.6) was approximately sub-rectangular, measuring 1.0 m by 0.80 m and 0.25 m deep, and contained the cremated remains of an adult female aged *c* 25–35 years, apparently placed in a box or casket of which the lock plate and several other elements

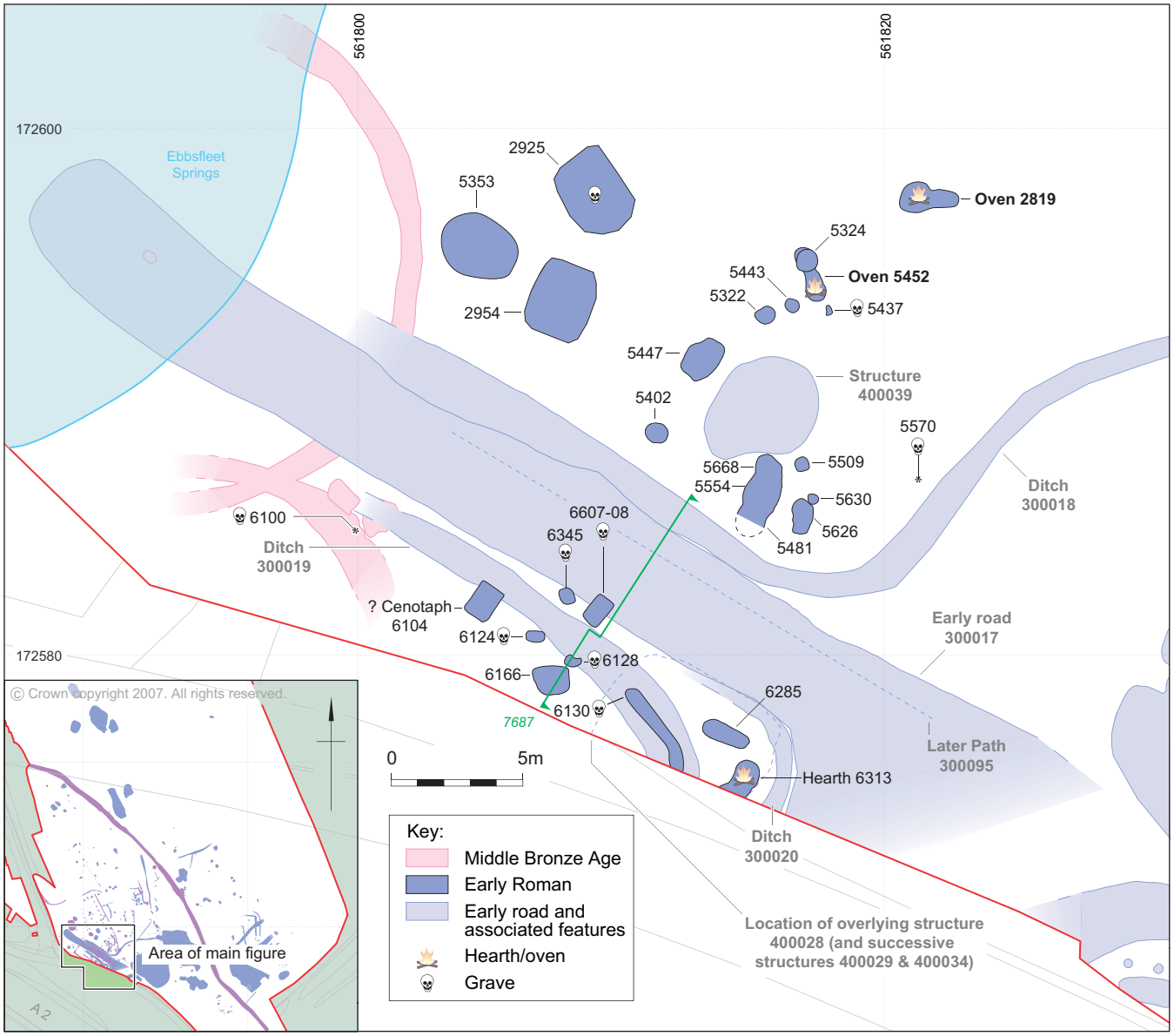

Figure 2.19 Features associated with early Roman road 300017

survived. There were four pottery vessels, a flagon placed on top of a dish and a jar on top of a bowl, all of which probably lay outside the box or casket. Pyre and possible grave goods were represented by the remains of a chatelaine or suspension chain and animal bone (see below), and charcoal from the burial included honeysuckle and clematis.

Grave 6607/6608 (Fig 2.20) was sub-rectangular, measuring 2.25 m by 1.55 m and 0.30 m deep, and contained the skull, a clavicle, and the upper parts of both humeri of an infant aged *c* 6–9 months. The nature of this grave was unusual, with two distinctive sequences of fills at either end of the grave, and a rather curious disposition of human bone and coffin nails. The larger part (6608) showed clear evidence for a coffin, 0.6 m wide and at least 1 m in length, represented by coffin stain 6610 and four nails at the south-western end. A dish had been placed at this end, between the coffin and the edge of the grave. However, there was no human bone present and the north-west end of the coffin had been removed by cut 6607, which appears to have disturbed a flagon placed between the coffin and the north-west edge of the grave. Cut 6607 did not extend any deeper than cut 6608 and its edges matched precisely those of 6608 at this end of the grave. Cut 6607 was filled with a homogeneous soil, markedly darker than that in 6608, and contained the infant remains, centrally placed at this end of the grave in a position that they might be expected in a normal burial, but perhaps disarticulated. There were also four coffin nails, though the arrangement of these was rather odd, with the heads of three facing inwards, the reverse of what would be expected. One possible explanation for these various features is that the grave was re-opened relatively soon after the burial had been made (but after the coffin had rotted), the body removed, and part of it subsequently re-interred. This does not, however, fully explain the complete absence of surviving bone from within the coffin.

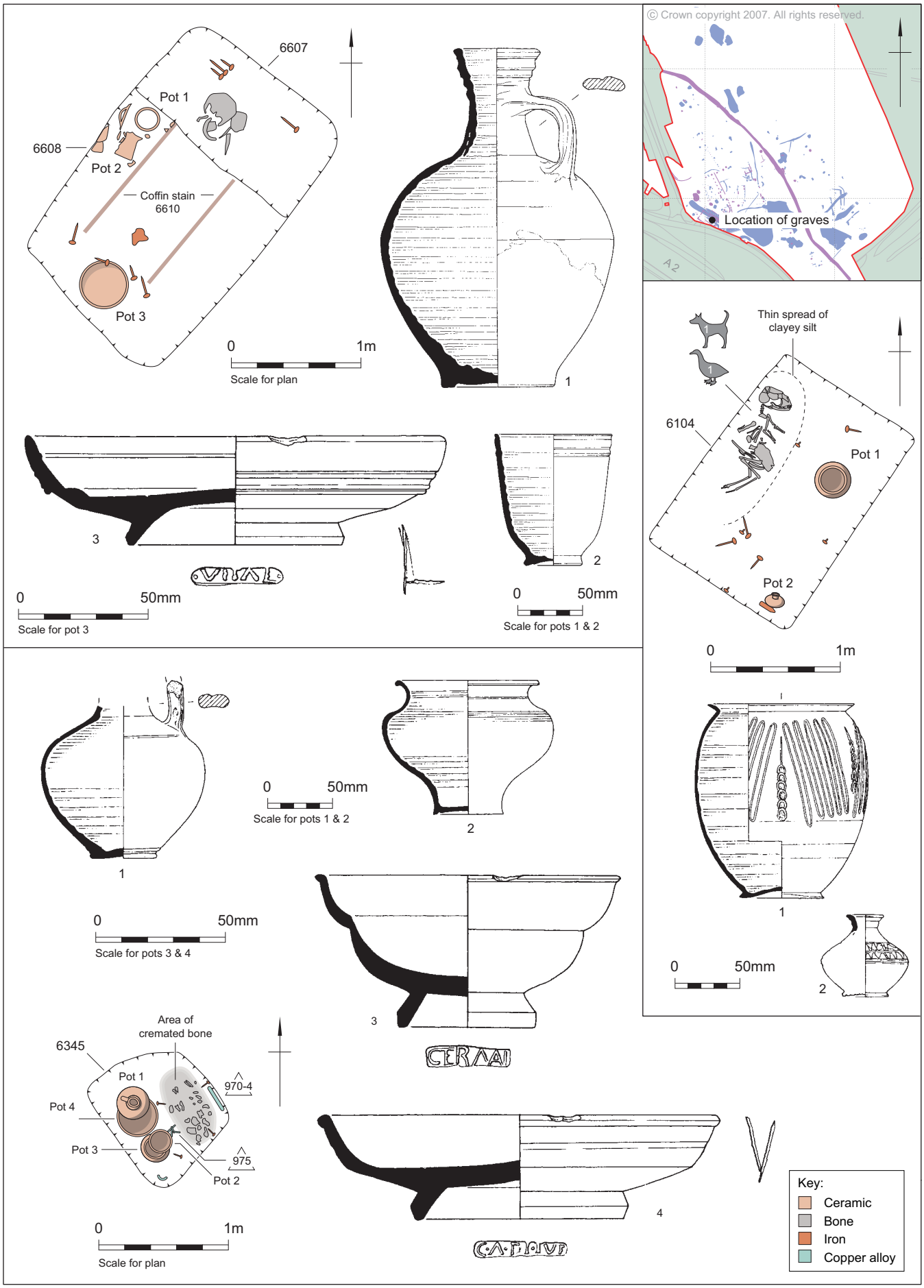

Figure 2.20 Plan of graves 6345 and 6607/8 and cenotaph 6104

In addition to the two neonate burials (6124 and 6128) cutting the outer edge of roadside ditch 300019 was another feature (6104), interpreted as a probable cenotaph (Pl 2.7). Pit 6104 was rectangular, measuring 1.80 m by 1.35 m and 0.85 m deep, and had vertical sides and a flat base (Fig 2.20). No human bone was recovered from this feature, but a dog and a chicken had been placed on the base against the north-west edge, a small pot in the south corner, and a Central Gaulish colour-coated hairpin beaker towards the north. Nothing of interest was recovered from sieving the contents of this beaker which has a suggested date range of AD 65/70–80. Four iron tacks, four larger nails, and a fragment of strip in the south-eastern half of the pit hint at the presence of a box in this area, although no evidence for such was discerned within the fill of the pit.

Pit 6166 lay a few metres to the south-east of pit/cenotaph 6104, was of broadly similar size, and has been assigned a late 1st century date. It contained a relatively complex sequence of fills (see Fig 2.16 above) and in one of the basal layers (6277) were sherds representing almost an entire large jar. This showed evidence for extensive burning, probably a result of its use as a pot oven, though it is clear that the sherds were re-deposited and the pot oven itself must have been set up elsewhere. Hearth 6313, further south-east again, overlay the edge of the metalling on road 300017 and was set within the angle formed by the final phase of roadside ditch (300020) where the road turned to the south. Perhaps contemporary with hearth 6313 was slot 6285, possibly a structural feature which may have been part of a shelter associated with the hearth.

All of the features to the north of the road, like those to the south, can probably be assigned to the later part of the 1st century AD, though again it is likely that not all were contemporaneous. The 'tailing out' of the surviving stratigraphy towards the north and the west of this group of features meant that it was not always possible to establish their relationships to the structural sequence with certainty. As noted above, it is probable that some were associated with the earliest of a sequence of three circular or sub-circular, clay-floored structures (400039) which occupied a shallow terrace in this area; others were perhaps associated with its immediate successor, both of which are described further below.

The three neonate burials were dispersed, two in shallow graves (5437 and 5570) and one in pit 2925. The two ovens, one keyhole-shaped (2819) and one dumb-bell shaped (5452) lay close to each other, oven 2819 with a mid–late 1st century date perhaps pre-dating oven 5452. The latter was cut by pit 5324, one of a cluster of small pits to the north of structure 400039, with a similar cluster to the south. A group of three larger, sub-rectangular pits (2925, 2954, and 5353) further to the north-west were all probably dug in the 1st century but contained pottery which indicated that infilling continued into the early 2nd century. Of these, pit 5353 had been affected by the subsidence of a dene hole and included some mid-2nd century pottery in the upper fills. All of these pits contained kitchen and butchery waste and pit 2954 the nearly complete skeleton of an adult sheep.

Plate 2.6 Early Roman box burial 6345 (ARC SPH00). Looking west

Plate 2.7 Early Roman cenotaph 6104; hairpin beaker and dog skeleton exposed (ARC SPH00). Looking west

Circular Structures to the North of the Early Road

Structure 400039

This was the earliest in the sequence of structures to the north of the road and was also the smallest (Fig 2.21). It was set in a shallow terrace cut into the ground which sloped gently up to the north-east, and partly overlay a spread of material (5256) which included pottery assigned to the early 2nd century at the latest.

Structure 400039 was represented by a sub-circular clay floor (5472) measuring approximately 5 m by 4 m, with generally well-defined edges but no structural features evident around the periphery. However, two shallow pits or post-holes (5583 and 5615), 3.20 m apart, might indicate the locations of internal roof supports. As many as three hearths were identified, 5579 and 5589 being the most substantial and fairly centrally placed, with 5613 to the south-west towards the edge of the floor. Whether or not all three hearths were contemporaneous could not be established. The floor was sealed in places by a chalky deposit (5304), perhaps a later floor surface, which in turn was covered by a

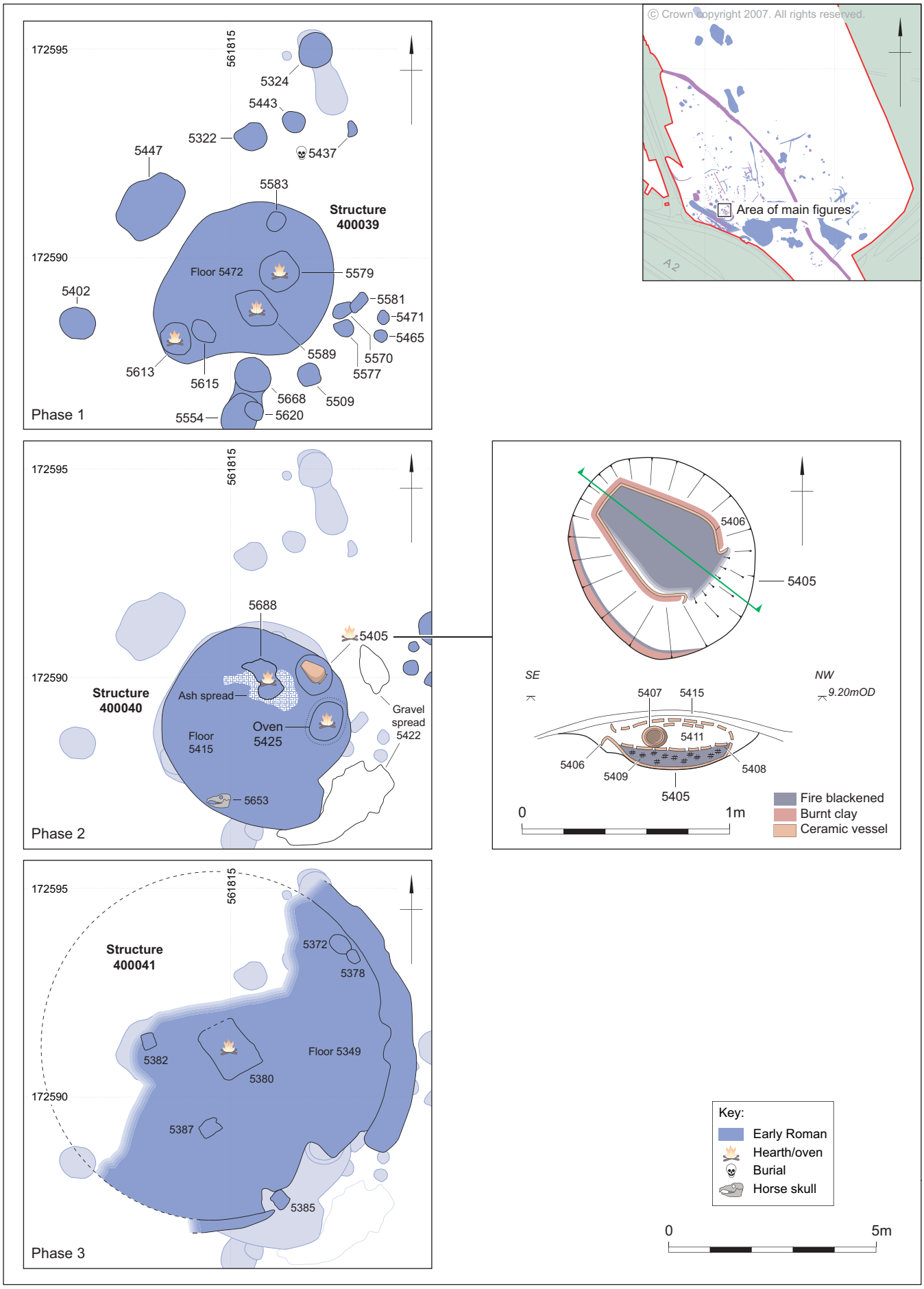

Figure 2.21 Circular structures (400039–41) to the north of the early road

spread (5414) containing late 1st century pottery. The location of the entrance was unclear, though the south-east side is perhaps most likely, based on the position in the subsequent structures. Post-holes 5509 and 5577 could have been associated with a doorway but this is uncertain, and a cluster of other post-holes immediately to the north do not make things clearer. The absence of post- or stake-holes around the perimeter of the surviving floor of this and the subsequent structures suggests that the walls may have been of cob or carried on ground beams which have left no trace, though this would be surprising given the exceptionally good survival of stratified deposits in this area.

Structure 400040

This directly overlay structure 400039 but was slightly larger and more circular, with maximum dimensions of 4.75 m by 4.5 m (Pl 2.8). Clay floor 5415, like its predecessor, was well-defined, but again there were no stake- or post-holes around the perimeter and in this case no possible internal structural features were identified. In the north-east quadrant of the structure were a hearth and two ovens, the latter both at the edge of the floor and sealed by a clay spread representing a re-surfacing of this part of the floor. Oven 5425 appears to have been constructed as an integral part of floor 5415 and was oval, approximately 0.1 m deep, with vertical clay-lined sides (forming the base of a dome) and a flat base, the latter fairly heavily burnt (an attempt to obtain a TRM date from this failed, presumably because it had subsided, though there was no obvious evidence for this). Following disuse, the clay dome was demolished and some of this material used to backfill and level the oven. Immediately to the north lay pot oven 5405, possibly contemporary with oven 5425, and the most complex of all the pot ovens excavated. A possibly complete storage jar (5406) had been placed on its side in a shallow, clay-lined hollow which showed evidence of burning *in situ*, with possibly more than one phase of use represented. The lower part of jar 5406 was filled with a charcoal-rich deposit on top of which was a spread of apparently carefully-laid potsherds (5408) from a different vessel. Whether these sherds were associated with the use of the pot oven is unclear, but lying on its side immediately above them was a complete small pot (5407), presumably placed in the pot oven after it went out of use. Overlying this pot were the collapsed or perhaps crushed remains of the upper half of jar 5406, sealed by the re-surfacing of floor 5415. Hearth 5688 nearby probably post-dated the two ovens and comprised a somewhat irregular burnt area and an associated spread of ash. On the edge of the floor on the opposite side of the structure to the hearth and ovens was a horse's skull (5653), placed vertically and perhaps resting against the wall of the structure. Partly covering this skull and the floor was a build-up of material (eg, 5400 and 5404) containing almost entirely late 1st–early 2nd century pottery, perhaps debris which accumulated during the use of the structure.

Plate 2.8 Early Roman clay-floored structure 400040, with hearths and remains of pot oven 5405 bottom left (2 m scale) (ARC SPH00). Looking south

Plate 2.9 Remains of early/mid-Roman clay-floored structure 400041 and fence lines 300166/7/9 within sanctuary complex (ARC SPH00) (2 m scales). Looking south-west

Outside to the north-west were the disturbed remains of possibly two superimposed pot ovens (5367 – not illustrated) while to south-east, perhaps around the entrance to the structure, were remnants of a gravel spread (5422) overlying an earlier cobbled surface (5423) and likely to have been an associated yard or path.

Structure 400041

This overlay structure 400040 and was the third and largest in the sequence, but had suffered some damage, particularly on the west side where it had been exposed to later erosion (Pl 2.9). From what remained of clay floor 5349, a diameter of approximately 8.5 m is estimated. A shallow gully survived around most of the east side, with a gap to the south-east probably indicating an entrance. The gully may have been a drip gully or served a structural purpose, with post-hole 5385 perhaps part of the entrance. The absence of other external post- or stake-holes was again apparent, though several internal examples may have provided support for a roof. In the centre of floor 5349 was hearth 5380, the only hearth or oven within the two-thirds or so of the

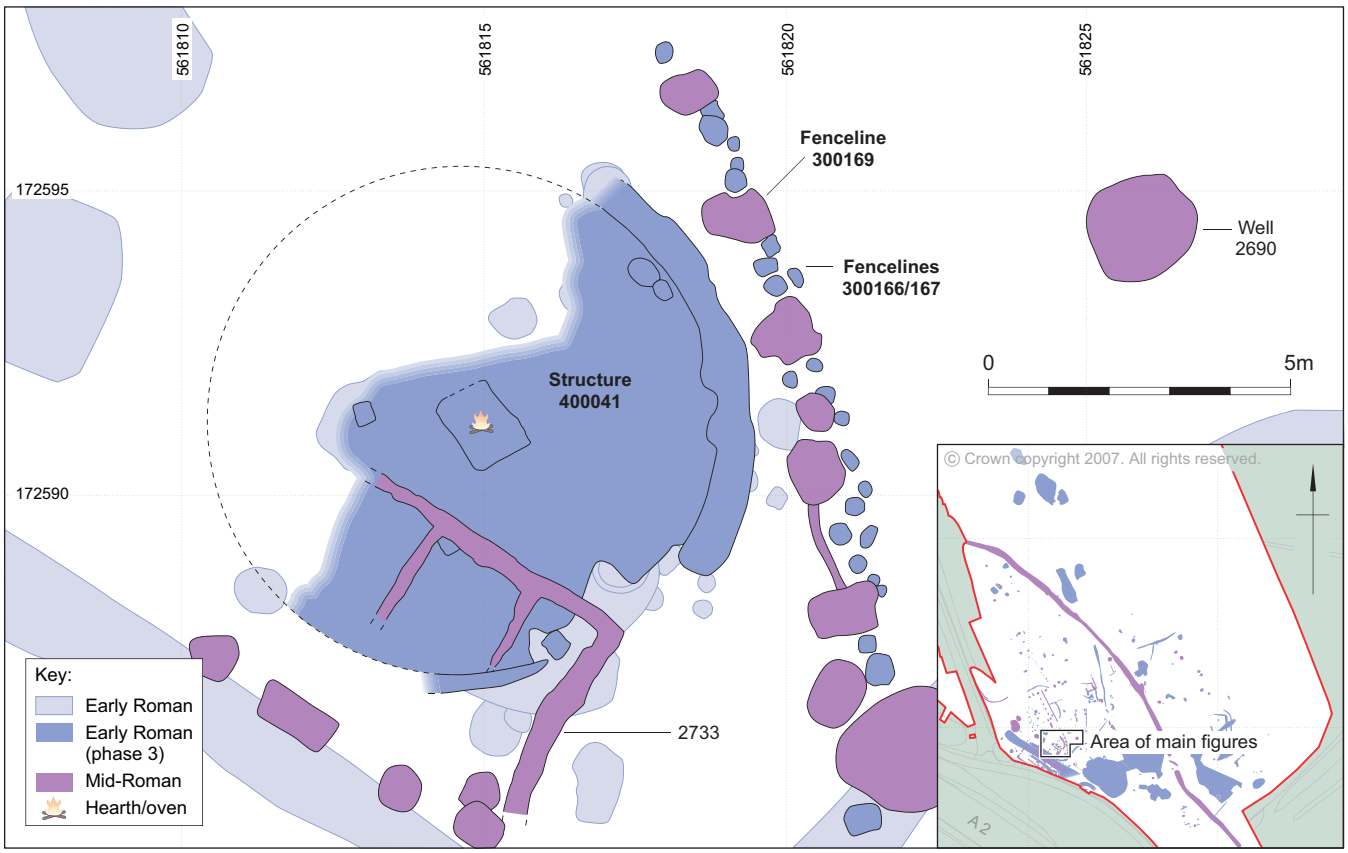

Figure 2.22 Circular structure 400041 and associated fence line

Plate 2.10 Early Roman road 300017, overlain by dumped deposits, with clay-floored structure 400028 in background (ARC SPH00). Looking south

structure which survived. Outside, close to and around part of the east side, were two phases (300166/300167) of fence line, approximately 15 m in length, which followed a slightly curvilinear alignment and were represented by a series of closely-spaced post-holes (see Fig 2.22 and Pl 2.9). This boundary, perhaps a screen, may have been of some significance for it was replaced by a similar, possibly more substantial fence in the same position when the Sanctuary complex was subsequently established on this part of the site (see below).

Overlying floor 5349 and continuing immediately outside the structure were spreads of burnt material, mostly charcoal-rich with small quantities of fired clay but no recognisable daub, possibly derived from the destruction of 400041. Although it is difficult to be certain, pottery recovered from these deposits might suggest that destruction took place around the middle of the 2nd century and thus the use of structure 400041 may have overlapped for a short period with the use of the Sanctuary complex.

Of the three circular structures, 400041 appears on the basis of size most likely to have been a domestic building, though the function of this and its predecessors remain uncertain. They show some similarities with the circular structures in property 11 at the road junction on ARC SHN02, and are of broadly the same date, but the function of these is also unclear. It is salutary to note that in both sequences, and also in that to the south of early road 300017 (see below), the paucity of structural

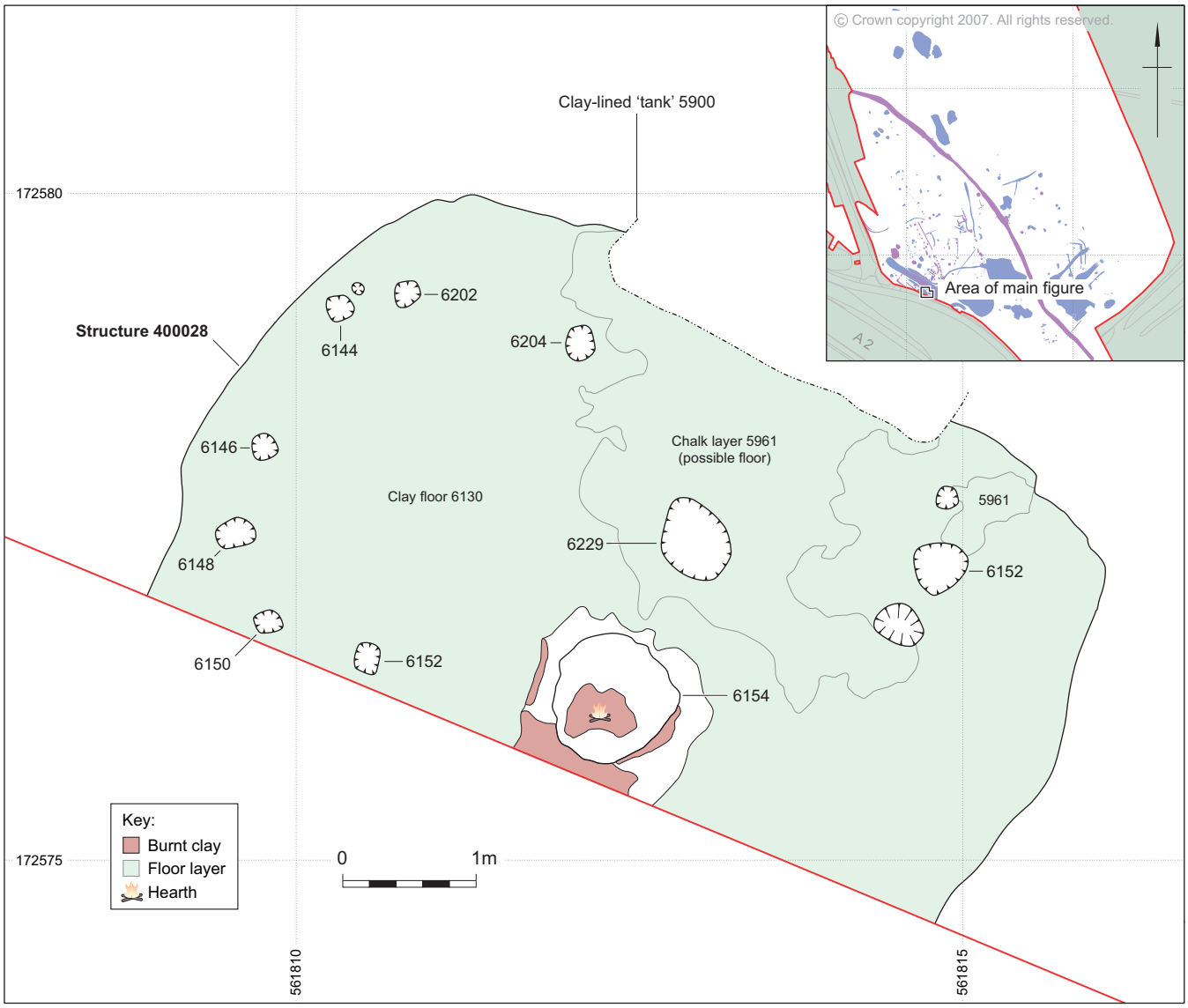

Figure 2.23 Plan of structure 400028

features means that little or no evidence of them would have survived had not the floors and associated hearths and ovens been present. It is probable that early road 300017 had been abandoned and the linear hollow it occupied partly backfilled by the time structure 400040 was built, though some of the early ovens (ie, 5452) and pits (eg, 2925 and 2954) in this area may have been associated with its use, while the structural sequence to the south of the road (see below) is likely to have overlapped with part of the sequence to the north, perhaps beginning slightly later and finishing a little earlier.

Structures to the South of the Early Road

These lay within 25 m or so of the springs at the head of the Ebbsfleet, and it is clear that the road had been abandoned and partly infilled by the time the first of the three structures which occupied this area was built (Figs 2.19 and 2.23–5). The earliest structure overlay the road where it turned to the south and also extended across parts of the associated ditches in this area, now obscured by a series of dumped layers.

These dumped layers, which were probably deposited in fairly rapid succession, were uniformly dark and generally homogeneous and, because of this, it was in places difficult to distinguish them individually. They contained relatively large quantities of finds, particularly pottery and animal bone, and it appears that the material reflects domestic waste imported from elsewhere in the settlement for the specific purpose of infilling the linear hollow occupied by the early road in the area adjacent to the springs. The layers were almost a metre thick close to the Ebbsfleet but petered out 35 m or so to the south-east. For convenience, a phase of early dumping (eg, 6163, 6164, 6168) has been distinguished from a later phase (eg, 5600, see Fig 2.16 above), the former containing almost exclusively mid–late 1st century pottery, the latter containing some early 2nd century material, particularly in the vicinity of the springs where there were no structures or other early features and the dumping appears to have continued for somewhat longer.

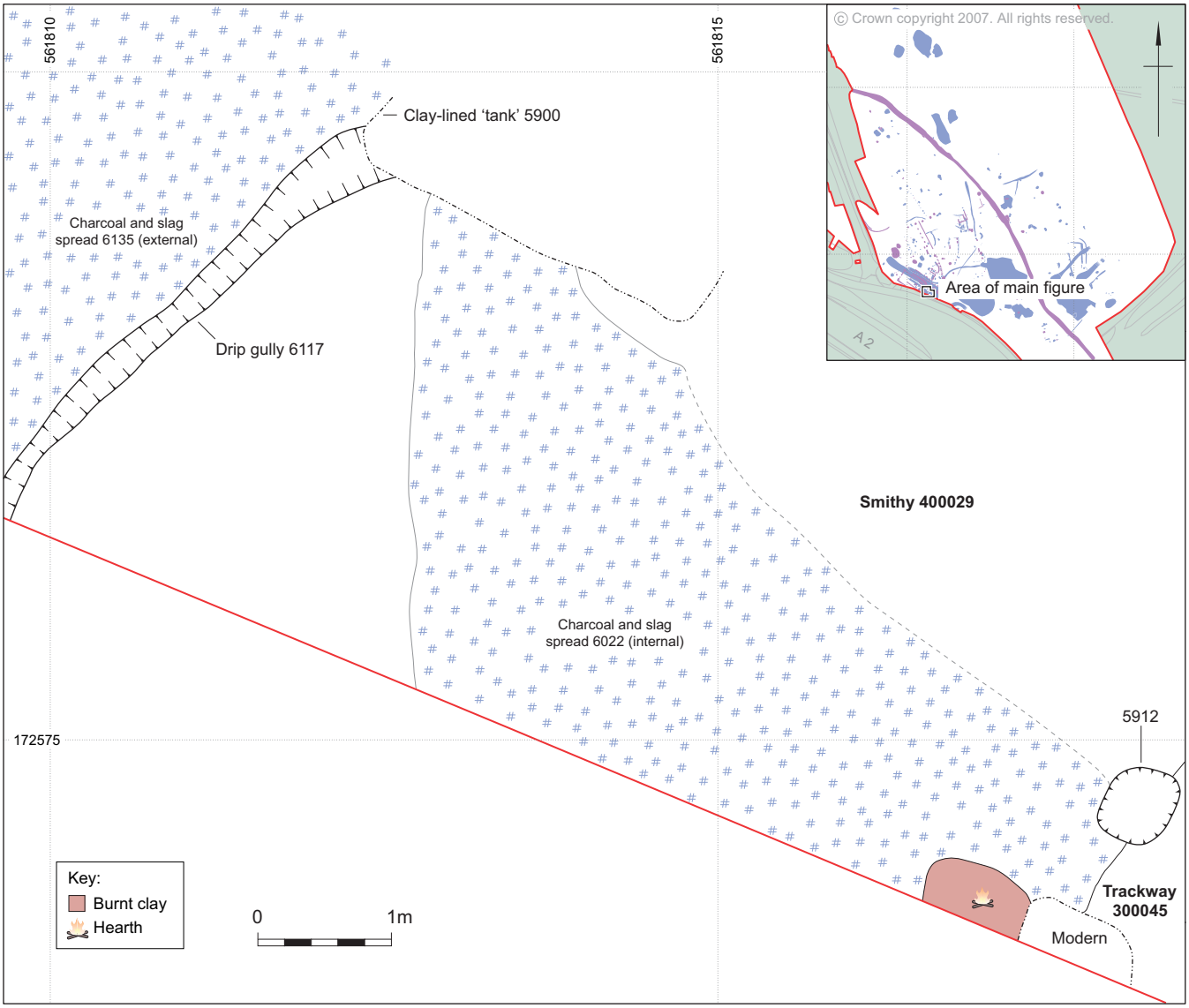

Figure 2.24 Plan of smithy 400029

Structure 400028

This was the earliest of the structures and probably around half of it was exposed, the remainder laying to the south beyond the limit of excavation (Fig 2.23; Pl 2.10). Sufficient was revealed, however, to show that it was sub-square or sub-rectangular in plan, with slightly bowed sides and rounded corners. It measured approximately 6.5 m by at least 4 m, with a floor made largely of clay (6130) but partly of chalk (5961), and a hearth (6154, of two phases) near the centre. Part of the north-east edge of the floor had been removed by a later feature but it was clear that, as in the circular structures to the north of the road, there were no post-holes or stake-holes around the edge, which was sharply defined by the extent of the floor. There were, however, a scatter of such features and a small pit (6229) inside, though no patterns could be discerned and it seems unlikely that these held posts supporting the roof. No external features or surfaces were identified and it appears that structure 400028 was built on the gently sloping, probably as yet unconsolidated deposits used to infill the early road. Access from the east may have been afforded by trackway 300045 (see Fig 2.14 above), only a few metres away and possibly in existence by this time.

Close dating of individual elements of the structural sequence is difficult, particularly as pottery from all of them appears to span broadly the late 1st and early 2nd centuries, but it seems likely that structure 400028 should be assigned to the last quarter of the 1st century AD. Certainly, the deposits sealing the floor seem primarily to belong to the late 1st century, though some may be of 2nd century date. The function of this structure, however, remains uncertain, but there is nothing to indicate that it was anything other than domestic.

Structure 400029

Relatively little of this structure survived, and it extended beyond the limit of excavation to the south (Fig 2.24), but it appears to have been rectangular in plan and has been interpreted as a smithy.

It was 8 m long and at least 4 m wide, aligned north-west to south-east on the same orientation as structure 400028 which preceded it, and lay at 90° to trackway

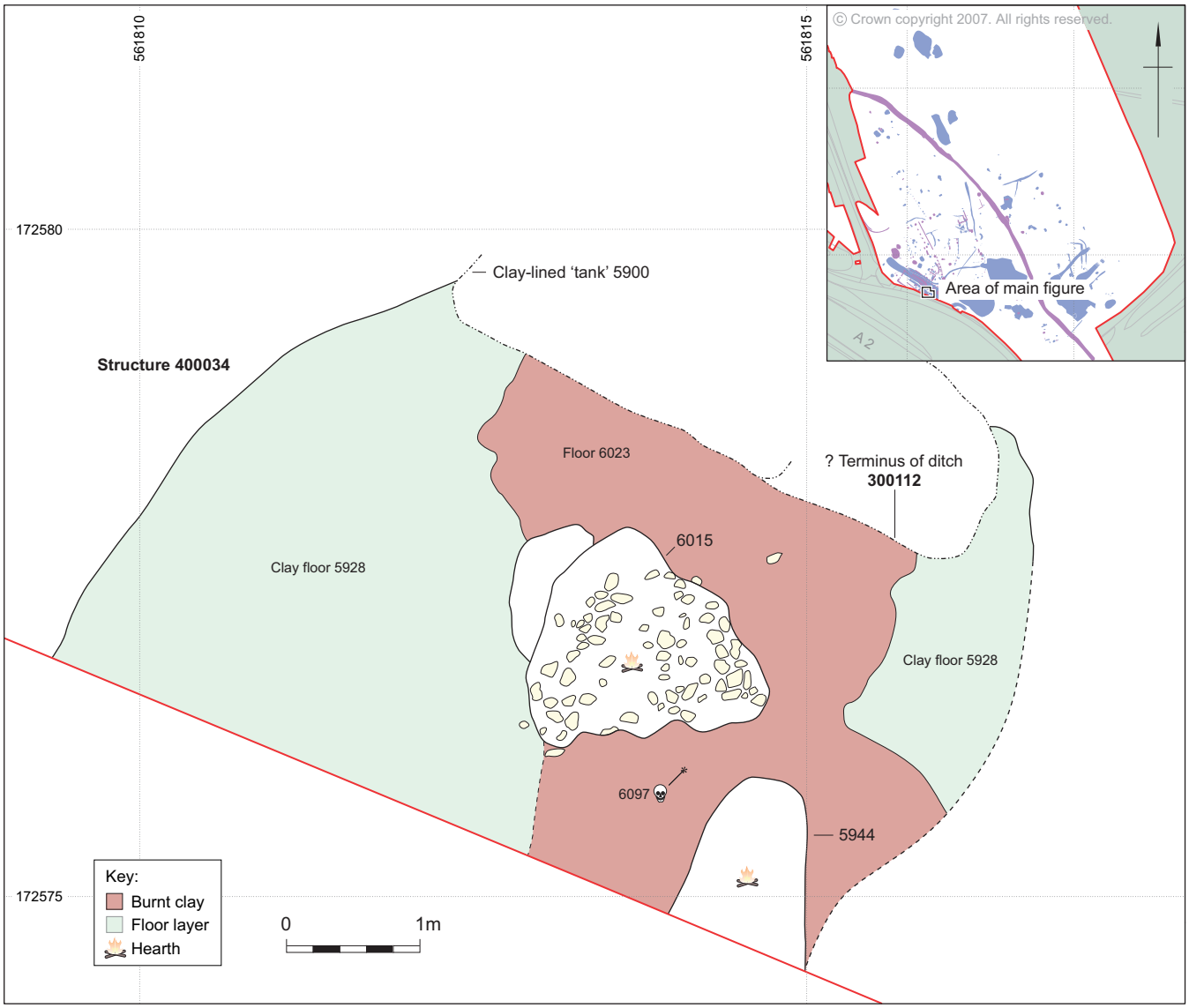

Figure 2.25 Plan of structure 400034

300045 which formed the boundary on the south-east side. A substantial post-hole (5912) marked the north-east corner and cut the edge of trackway 300045, indicating that the latter was probably in existence before structure 400029 was built. The north-west side of the structure appeared to be marked by a drip gully (6117), but there were no surviving structural features along the north-east side, the approximate extent of which was defined by the edge of a spread of iron smithing slag and charcoal (6022), probably representing the remains of a build up of debris within the structure. This spread did not extend as far as gully 6117 and may have been truncated in this area, and the only internal feature was a rather insubstantial hearth at the south-east end. Immediately to the north-west of the structure was a further spread of charcoal and smithing slag (6135), dumped on the gently sloping ground nearer the river. Adjacent to this spread and extending along the north-east side of structure 400029, perhaps linking trackway 300045 with the head of the Ebbsfleet, was a path (300095, seen in section, Fig 2.16; see also Fig 2.19). This was 2–3 m wide, ran in a shallow linear hollow and showed evidence for sporadic and rather patchy metalling.

Although no certain metalworking features were identified, the distribution of iron smithing slag suggests that this derived from structure 400029 rather than having been dumped there from elsewhere. The overall quantity of slag was not large (*c* 10.4 kg), though other debris may have lay outside the excavation area and some was perhaps disturbed and redeposited by later activity, but it did include six complete and a further 13 fragments of smithing hearth bottoms.

As noted above, close dating of this structural sequence is somewhat problematic, but pottery from contexts associated with structure 400029 suggest that it was built around the end of the 1st century and that it continued in use into the beginning of the 2nd.

Structure 400034

This occupied much the same area as structure 400028, the earliest in the sequence, and appeared to be broadly similar in layout. Its exact shape, however, was less clear and the south-east edge had suffered later damage, such

that it is not certain whether the structure was originally sub-circular or sub-rectangular in plan (Fig 2.25). There is no evidence that it served as a smithy, the interpretation suggested for its immediate predecessor, structure 400029.

The surviving extent of structure 400034 was defined by clay floor 5928 which measured at least 6.5 m by 4.5 m, but there were no associated structural features, either internal or external. In what may have been a near-central location was hearth 6015, with another hearth (5944) to the south-east, though it is unclear if this was in contemporaneous use. Immediately outside to the south-east was trackway 300045 which continued in use from earlier, as may path 300095 to the north-west (see above), with either circular structure 400040 or 400041 (see Fig 2.21) standing a few metres to the north of this path.

A substantial area of the floor around the two hearths in structure 400034 had been burnt, and this was overlain by what may have been a destruction deposit (6023), one of several burnt layers in this part of the structure which are likely to reflect its demise and abandonment prior to construction of the Sanctuary complex over this part of the site. None of these burnt layers contained any recognisable fragments of daub, and there must be some doubt as to whether the walls of this structure were constructed of wattle and daub since at least some diagnostic pieces would be expected to have survived subsequent levelling and clearance. Although it was not certain, a neonate (6097) found in the area between hearths 5928 and 6015 appears to have buried within destruction deposit 6023.

Structure 400034 should probably be assigned a construction date in the early 2nd century on the basis of the dating suggested for the preceding structures in this sequence, and there is nothing in the pottery recovered which might indicate otherwise, with its destruction occurring in the decades nearer the middle of the 2nd century.

Other Early Roman Features

In addition to the early road extending south-eastwards from the head of the springs and the associated or immediately surrounding features (see above), there were several other groups of early Roman features, not all necessarily related or contemporary, in various parts of the ARC SPH00 site.

Trackways 300045 and 300212

An overall length of approximately 100 m of trackway 300045 was exposed, running down slope from the southern edge of the site in a north-westerly direction towards the springs, but veering to the west before reaching the head of the Ebbsfleet (see Fig 2.14). Trackway 300045 was not a primary feature in the Roman landscape, for it ran through quarry pits 300203 and 300204, parts of which may still have been in use, and also across the top of the, by now abandoned, early road which extended south-eastwards from the springs (Figs 2.26 and 2.28; see below). However, trackway 300045 appears to have been long-lived and its course was respected by a gap left in later (mid-Roman) enclosing ditch 400017 (see below). It was most probably established in the final quarter of the 1st century and remained in use throughout the 2nd century and possibly beyond.

Towards the southern, higher end a relatively complex sequence survived within what had developed as a substantial hollow-way (Figs 2.26–7). Here there appeared to be two converging hollow-ways, probably separate phases of the same trackway rather than different trackways, one perhaps temporarily replacing the other when it became too muddy. The hollow-way on the lower south-west side was the earlier, up to 0.9 m deep with the lowest metalling (2285) almost 7 m wide. Two further metallings (2281/2282 and 2275/2276/2277) were identified in this part of the hollow-way, the uppermost bedded on a foundation of chalk (2278) but surviving more patchily. The hollow-way on the higher, north-east side was approximately 1 m deep and there was a single metalling (2280) just over 4 m wide in the base. This metalling probably post-dated the earliest two metallings in the hollow-way to the south-west, but pre-dated the latest. The sequence here appears to be entirely of early Roman date, but what may have been a ditch (2126) on the south side associated with a later phase of the trackway's use contained mid-Roman pottery.

The trackway survived less well further to the north-west as a result of slope erosion, with a single hollow-way present where it passed through a gap in enclosing ditch 400017 (see Fig 2.26). Remnants of a single metalling were present here, with what was probably a spread of gravel from this extending across into the upper part of 'ritual shaft' 2856. Where the trackway crossed partly-infilled chalk quarries 300203 and 300204 a shallow hollow-way with sporadic metallings was identified, but nothing of the trackway survived directly to the west of these quarries. However, a sequence of several metallings did survive on the south-western edge of the site where the trackway continued at an oblique angle across the earlier Roman road leading up from the springs, the metallings being preserved within the shallow linear hollow occupied by the road (see Fig 2.28). The sequence of three early Roman structures (400028, 400029, and 400034) described above (see Fig 2.19 for location) lay immediately to the north-west of the trackway in this area and the later two at least were contemporary with its use, as was the Sanctuary complex which followed (see below). It is even possible that some vestige of trackway 300045 was still visible in this area in the 6th or 7th century when an early Saxon sunken-featured building (5809) was built adjacent to it on the north-west side (see Chap 5).

The location and longevity of trackway 300045, coupled with the fact that its course was respected by rather than blocked by mid-Roman enclosing ditch 400017, suggests that it was a route of some importance.

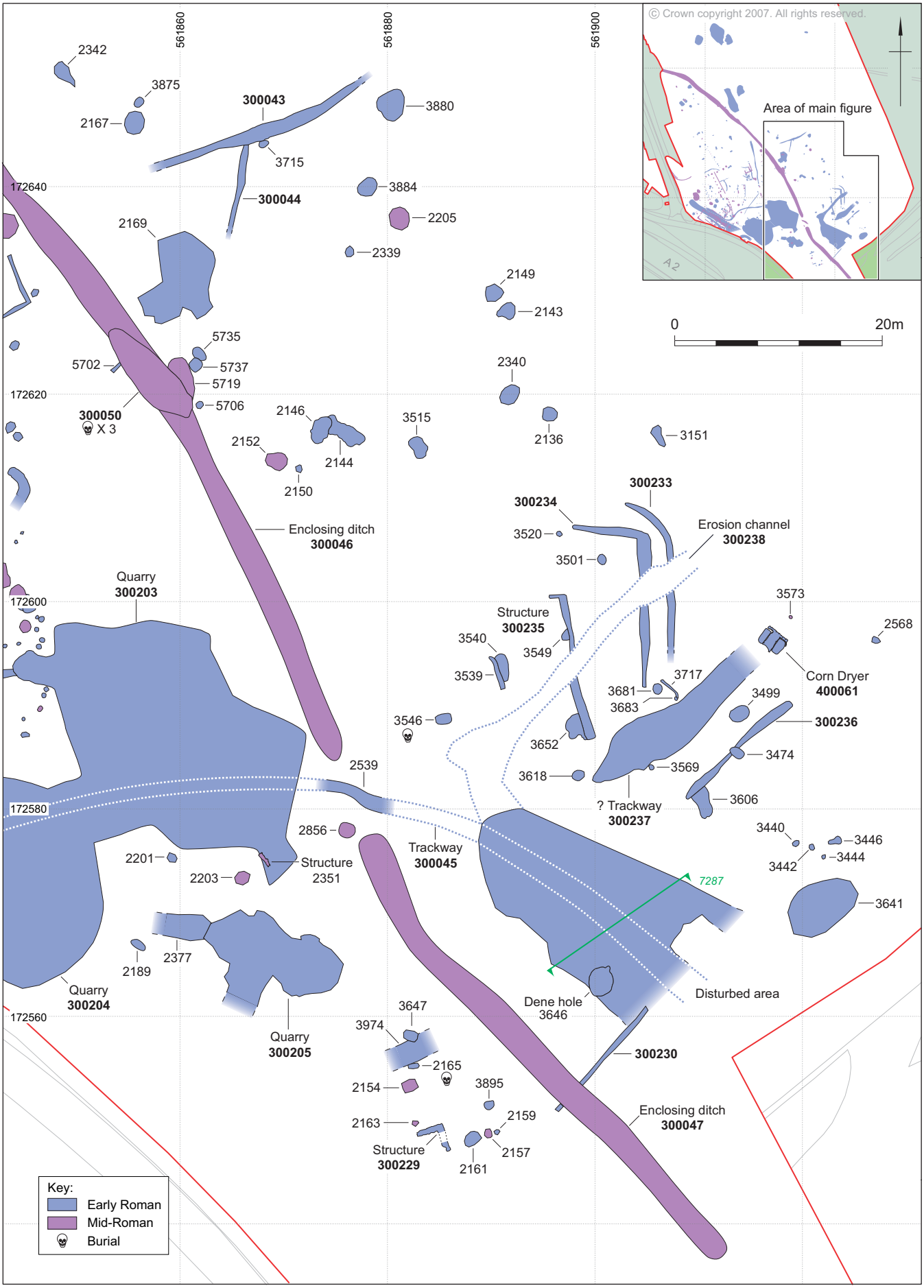

Figure 2.26 Early Roman features at the south end of the site

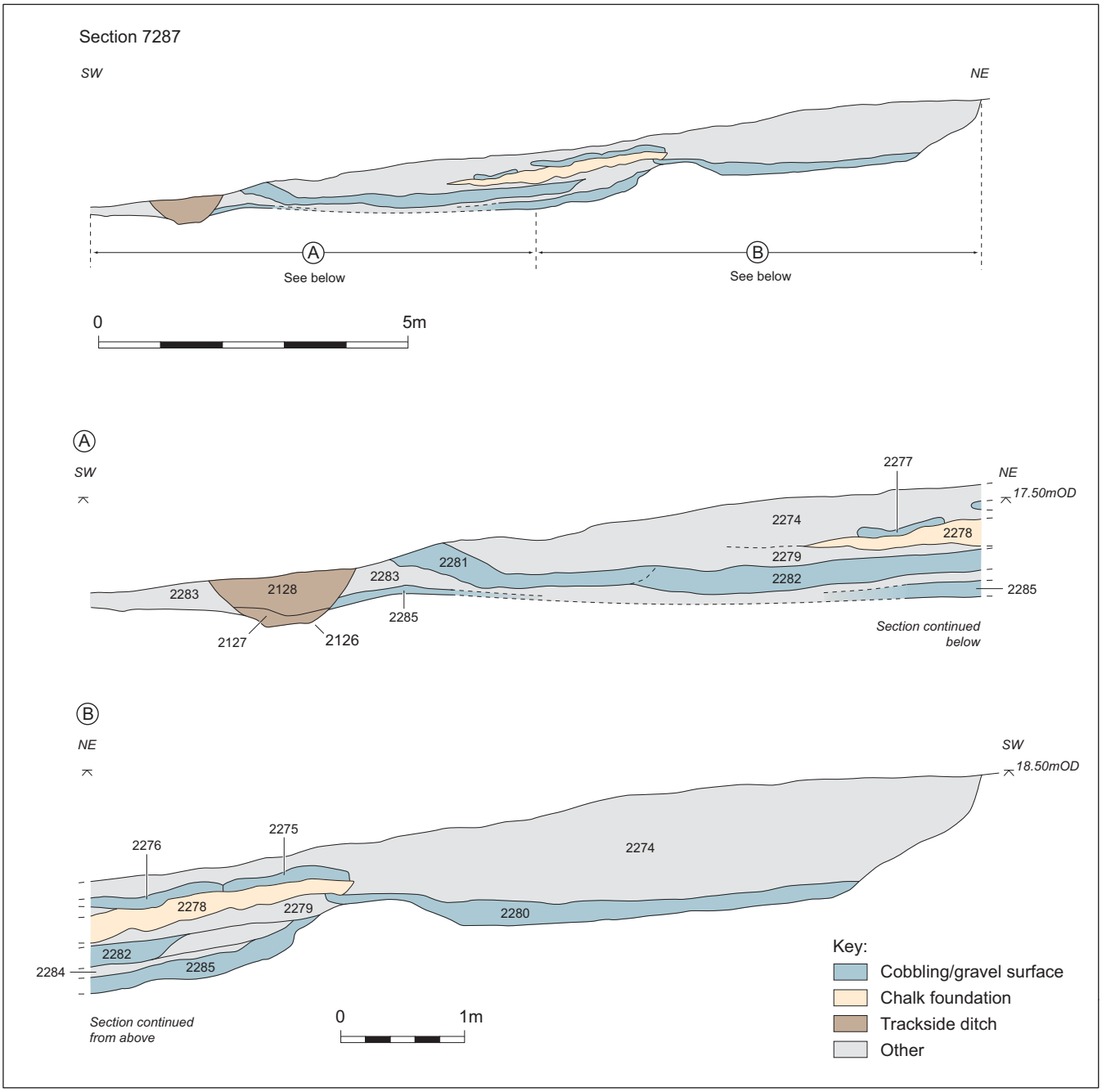

Figure 2.27 Section through trackway 300045

It appears to have provided access to the rear of the mid-Roman Sanctuary complex from the higher ground to the south-east, perhaps from an as yet undiscovered settlement in this area, and may have continued to the south-west as far as Watling Street.

A small part of a second trackway (300212) lay on the valley side 75 m to the north-west of trackway 300045 (see Fig 2.28), but there is no evidence to indicate that the two were associated. Trackway 300212 may have originated in the early Roman period, though a slightly later date is perhaps more likely as its course appears to have followed that of mid-Roman enclosing ditch 400017, rather than the reverse. This trackway had suffered from a considerable degree of erosion and only a little over 6 m of the metallings survived, lying within a shallow hollow way which ran south-east to north-west, at 90° to the slope. Trackway 300212 was up to 1.5 m wide and several wheel ruts (0.80–1.0 m apart) cut the edges of the single surviving metalled surface which was overlain by deposits containing a few sherds of mid-Roman pottery in an otherwise early Roman assemblage. How long trackway 300212 remained in use is uncertain, as is its purpose, though it probably ran down to the edge of the Ebbsfleet to the north-west, perhaps from the area occupied by 'Viewing platform' 400045.

Quarries

Two clusters of quarry pits were identified (Figs 2.14, 2.26, and 2.28), one group on the lower ground at the

head of the valley dug to obtain chalk where it was exposed at the surface, with a second group on the valley side dug for the extraction of 'brickearth' (Thanet Sands) (Fig 2.14). Although it is probable that both groups of quarries were established at around the same time, it cannot be demonstrated that their periods of use coincided. Because of their substantial size, the quarries were investigated through a combination of machine trenching and limited hand excavation.

The chalk quarries comprised two large intercutting complexes (300203 and 300204) with a smaller complex (300205) a short distance to the south-east (Fig 2.26). All have been assigned an early Roman date, though they may have remained in use until well into the 2nd century. Quarry 300203 measured approximately 30 m by 18 m and quarry 300204 approximately 25 m by 18 m. Both were a little over 1 m deep with fairly flat bottoms, though their irregular plan and varying profiles of the sides makes it clear that they were dug as a part of a series of probably short-lived operations. They were infilled over a prolonged period, partly with domestic refuse, with the upper fills containing mid-Roman pottery and coin assemblages which extended into the late 4th century. However, it might be significant that the fills in the north-west part of quarry 300204 were entirely of 1st century date, indicating the early infilling of this part of the complex close to the springs.

Quarry 300203 cut the east end of roadside ditch 300018 (Fig 2.28) and in a few places it appears that the quarries may have avoided earlier features, though the evidence is equivocal. Early Roman ditch 300021, possibly the corner of an enclosure (see above), to the south of quarry 300204, may have respected the latter or vice versa (see Fig 2.28 and 2.15), and a feature on the north-west side, though certainly avoided by the quarry, may have been a dene hole (not illustrated). However, both quarries had a few features dug into the top of them, including several small, shallow pits (not illustrated) in the north-west part of quarry 300204, and the remnants of a structure represented by the chalk foundations for a wall (2351) overlay the south-east extremity of quarry 300203 (see Fig 2.26). Furthermore, trackway 300045 running downslope from the east continued across the top of both quarries, with remnants of a metalled surface surviving within a shallow hollow-way where it crossed quarry 300204.

Quarry 300205 comprised a smaller and more irregular complex of intercutting pits, measuring a maximum of 15 m by 10 m, though of similar depth to 300203 and 300204 (Fig 2.26). No features cut or were cut by quarry 300205, though a neonate (2223) had been buried in the top of its fill.

The four 'brickearth' quarries (300206, 300207, 300208, and 300209) lay close together within an area of approximately 40 m by 30 m (see Fig 2.14 above), on a steeply sloping part of the hillside, just within the south-eastern end of the late Iron Age 'processional way'. The ditches of the latter had probably fully silted by this time and quarry 300206 cut the end of part of ditch 300024. Only the largest of the quarries (300207) was subject to detailed excavation and quarry 300208 was recorded in plan only. Quarry 300207 measured approximately 18 m by 11 m and was up to 1.5 m deep with a fairly level bottom. The small assemblage of pottery recovered from this, like that from the chalk quarries, comprised largely early Roman material with some mid-Roman pottery from the upper fills. However, unlike the chalk quarries, the brickearth quarries seem largely to have become infilled as a result of natural silting rather than through deliberate infilling, though this can probably be explained by their peripheral location and the steeply sloping nature of this part of the site.

Another rather irregular feature (300029) on the slope approximately 30 m to the south-east may also have been 'brickearth' quarry (Fig 2.14). This measured a maximum of 8 m by 6 m and was approximately 1 m deep. However, unlike the other quarries this contained a markedly darker fill and produced a relatively large assemblage of pottery, most of mid–late 1st century date with some, from the upper fill, continuing into the 2nd century. A mid-1st century date for this feature is therefore likely, though the quantity of pottery it contained is less easily explained; perhaps this reflects its proximity to the settlement and use for rubbish disposal.

Features in the south corner

A small group of features, including the fragmentary remains of a building, was exposed on the gently sloping ground in this area, to the south of trackway 300045. It is likely that most of the features were contemporaneous and of early Roman date, with some evidence to suggest that activity may have continued into the mid-Roman period (see Fig 2.26)

Structure 300229 was represented by parts of two wall foundations, each approximately 0.5 m wide and of crushed chalk, which formed the north corner of a building, perhaps with a doorway in the north-east wall. The size of this building is unknown and no internal features survived, but it appears that it was oriented north-west to south-east. Its function also remains unclear, but there is nothing which indicates that it was anything other than domestic.

Features possibly associated with structure 300229 included several shallow pits and a grave (2165) containing a neonate burial. Three of these pits, however, contained small quantities of mid-Roman pottery. A short length of broad, shallow gully (3974) to the north-west was perhaps part of a plot or property boundary, as may have been gully 300230 to the north-east. On the south-western edge of trackway 300045 was feature 3646, possibly a well though more likely – on the basis of its location and fill – to have been a dene hole. This had been revetted with flints around the top and contained a generally homogeneous, uncompacted fill (with some voids) which extended to a depth of at least 4 m. Pottery recovered ranged from early to mid-Roman in date, with several early–mid-Saxon sherds in the upper fill.

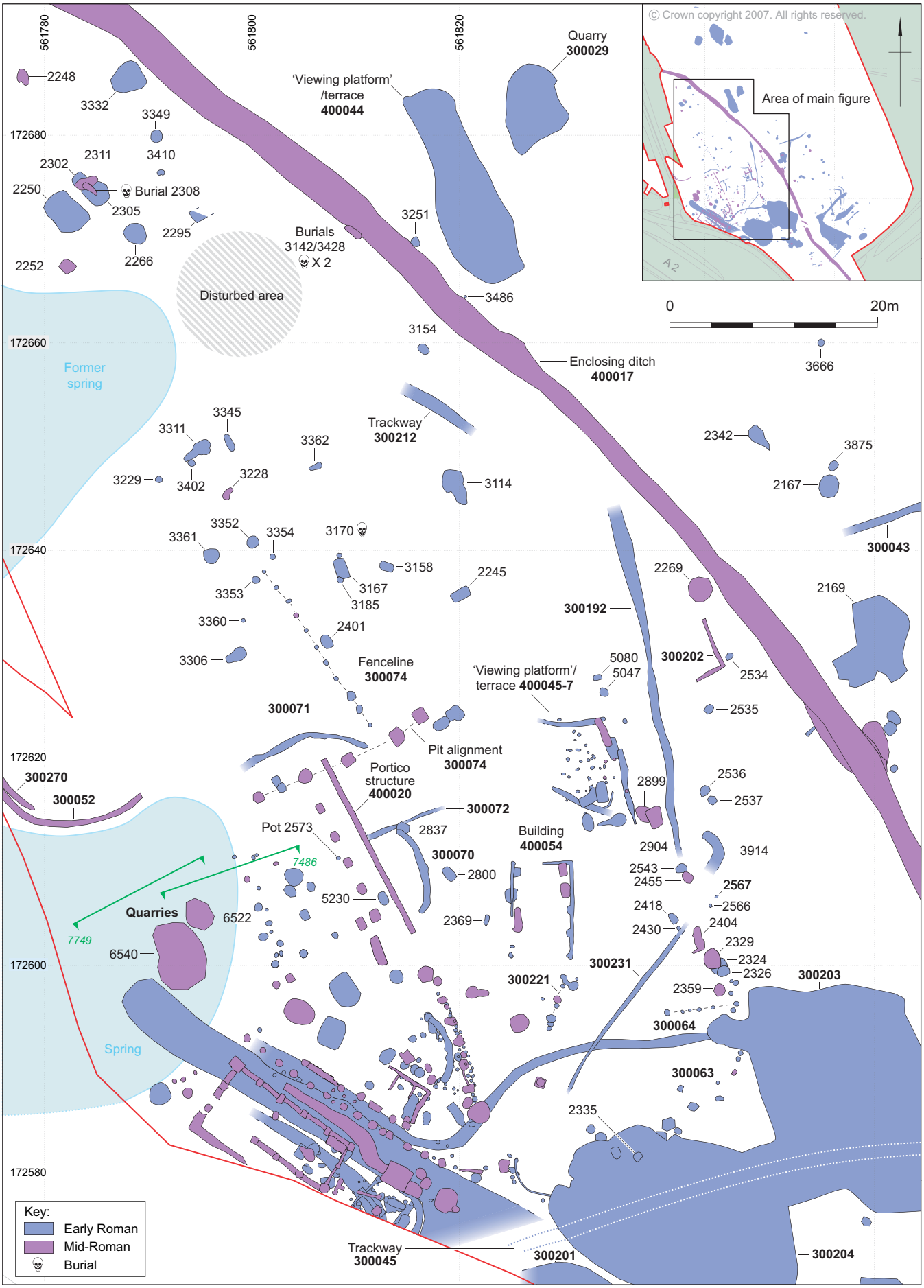

Figure 2.28 Early Roman features at the north end of the site

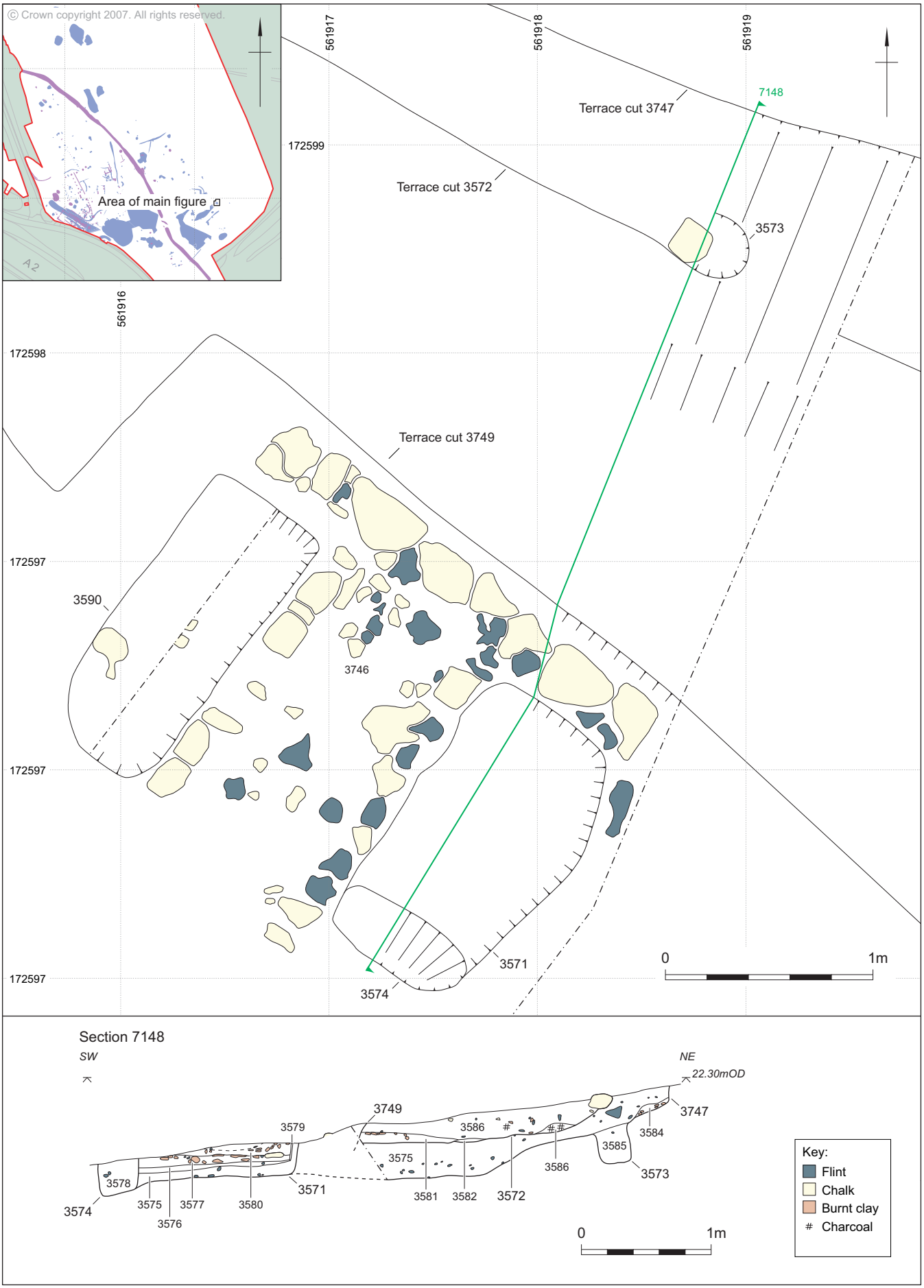

Figure 2.29 Crop dryer 400061

Features in the south-east corner

A further group of broadly contemporaneous features lay on the gently sloping ground above and to the north of trackway 300045 (see Fig 2.26). All of these features probably belonged to the same complex which is likely to have originated in the 1st century and continued in use into the mid-Roman period, but probably not much beyond the middle of the 2nd century. The focus of these features is suggested to have been a timber structure, represented by a narrow slot (300235) approximately 14 m long, 0.5 m wide and up to 0.3 m deep, with a short return at the north end. However, there were no post- or plank-impressions in the base, no post-ghosts were identified in the fill, and there appeared to be no other associated structural features. The nature of this putative structure remains uncertain though it is suggested to have been an ancillary structure, possibly a shelter rather than something more substantial, open to the west. Approximately 6 m upslope from slot 300235 were two shallow gullies, 300234 which was L-shaped in plan and 300233 which was more curvilinear, both unlikely to have been structural and more probably drainage gullies to divert rainwater run-off away from the rear of structure 300235. Several, small shallow pits lay in the vicinity of structure 300235, including 3546 which contained a notable concentration of finds and a neonate burial.

To the east and slightly upslope of structure 300235 was a crop dryer (400061), set in a shallow terrace (3749) which appears to have been the latest of a sequence of three cuts (Fig 2.29). No remains of any earlier crop dryers were seen in terraces 3747 and 3572, both of which may have silted up fairly rapidly after they were dug, and it was clear that crop dryer 400061 had suffered some degree of erosion. It comprised a pair of shallow, sub-rectangular pits separated by the T-shaped footings of flint and chalk, one course high, which formed the base for the superstructure. There were slight traces of scorching on the sides of the pits and the fills produced moderate assemblages of charred grain. Analysis identified mostly free-threshing wheat, generally believed to have been largely absent during the late Iron Age and Roman periods, and thus its occurrence here is unusual. Crop dryer 400061 was the only feature assigned to the Iron Age or Roman period at Springhead that contained such an assemblage, but given its location, form, and the large quantity of associated Roman pottery (and complete absence of any Saxon material) a post-Roman date appears unlikely.

Extending downslope for 20 m to the south-west of crop dryer 400061 was a shallow, wide, irregular gully (300237), possibly an unmetalled path or trackway which appeared to respect structure 300235 and provided access to the crop dryer (Fig 2.26). Erosion had scoured this trackway, and feature 300238 to the north-west was certainly a natural erosion channel which post-dated structure 300235. To the south-east was a gully (300236) which is likely to have marked a boundary of some sort, with a scatter of post-holes and a large pit or dene hole (3641) beyond.

To the north-west of structure 300235 was a scatter of small pits, all but two of early Roman date, with gully 300043 perhaps forming a boundary to the area associated with the structure. Overall, however, the extent of any properties is unclear and it is perhaps unlikely that these were formally defined in this area of variable, but generally steeply-sloping topography.

Features to the north-west

Further to the north-west of the two groups of features described above was a scatter of pits, at least one structure, and two relatively substantial terraces which are interpreted here as possible viewing or feasting platforms (see Fig 2.28). These features clustered around the springs on the middle and lower parts of the eastern side of the valley but the relationships between them are often not clear and whether, for example, all were broadly contemporary cannot be established.

Pit groups

The most northerly group comprised eight pits (2250, 2266, 2295, 2302, 2305, 3332, 3349, and 3410) which lay close together and were of a variety of shapes and sizes, with no specific functions apparent. Pit 2250, however, was shallow and markedly sub-rectangular, measuring approximately 4.25 by 3.0 m and 0.15 m deep with a flat base, and this may have been a sunken-featured structure of some kind, though there were no associated post- or stake-holes. Pit 3332 was also large and relatively shallow but more irregular in plan than pit 2250. Pit 2252, probably a dene hole, may also have been part of this group though it contained mid-Roman pottery in the excavated upper fill. Two other pits (2248 and 2311) contained mid-Roman pottery, and pit 2311 was itself cut by grave 2308 (Fig 2.30).

An apparent gap of approximately 20 m between the northern pit group and a further cluster to the south may be partly explained by there having been some modern disturbance in this area, perhaps quarrying, and also by the existence of what appears to have been an earlier but – by the Roman period – dry spring (see Fig 2.28). This former spring was infilled with colluvial deposits, and perhaps survived as an area of lower lying, softer ground. A machine trench cut through this area showed the edge of the valley to slope steeply at this point, with up to a metre or more of undated colluvial deposits in the base overlain by a layer containing a moderately high concentration of burnt flint and charcoal (2528). Charred plant remains from the latter layer include spelt and indicate a Roman date for this deposit, which possibly incorporated colluvially reworked burnt flint and charcoal derived from one of the middle Bronze Age 'boiling mounds' which lay in the vicinity of the springs. However, a Roman date cannot be ruled out for this material. An upper sequence of colluvial deposits, up to at least 2 m thick, contained some Roman pottery but it was unclear if this had been redeposited and the sequence may span the Roman and medieval periods, the majority perhaps of medieval date.

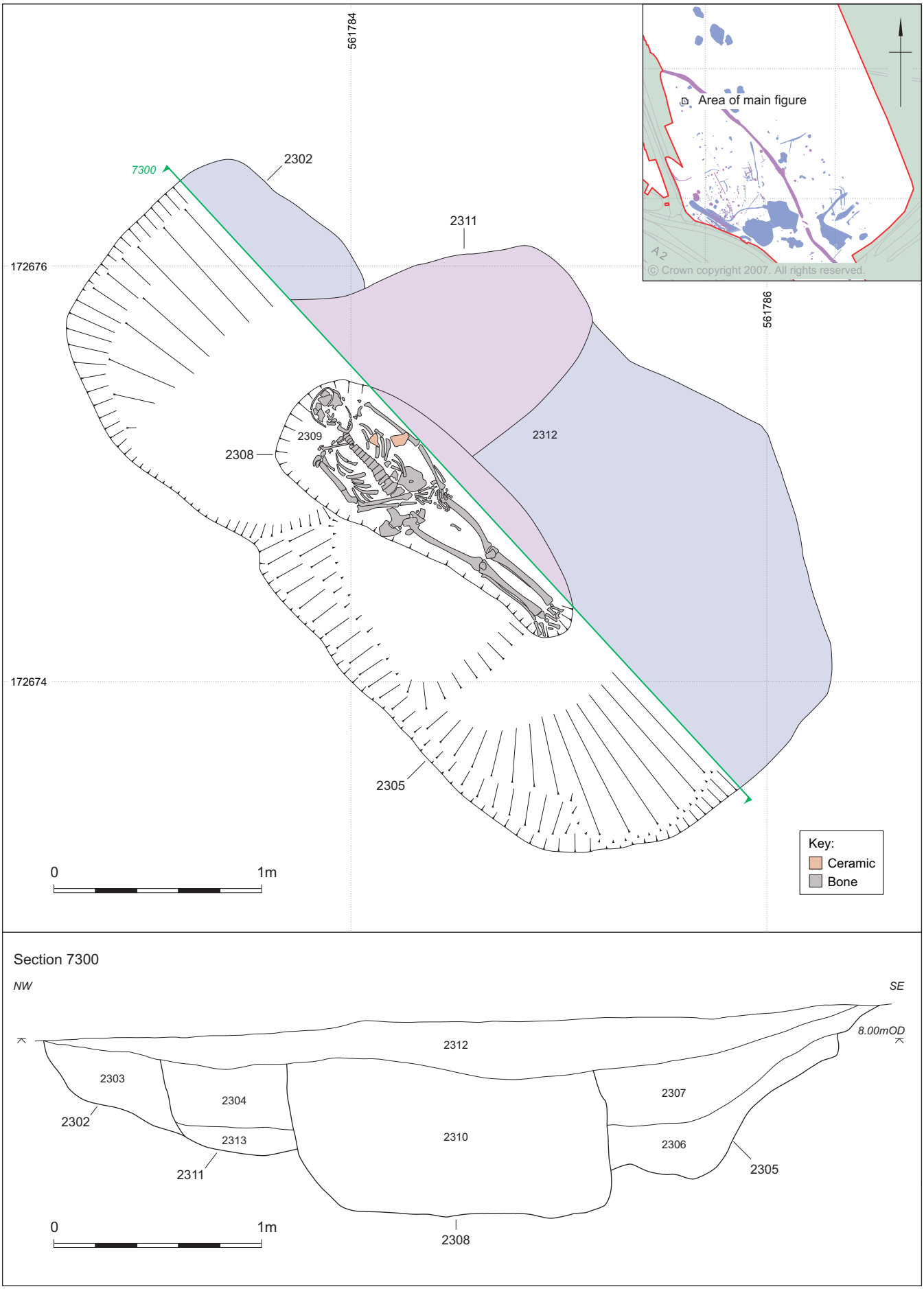

Figure 2.30 Plan of pits 2302, 2305, 2311, and mid-Roman burial 2308

Plate 2.11 Base of early Roman 'Viewing platform' 400045 (2 m scales). Looking south

The loose cluster of features to the south of the infilled spring included pits with a range of shapes and sizes, though there were none as large as pits 2250 and 3332 to the north. As many as 18 pits have been assigned to this group with an outlier (3154) to the north; another pit (3228) was the only mid-Roman feature in this group. The smallest of the features (3185, 3229, 3354, and 3360) may have been large post-holes rather than pits, but these were scattered and showed no coherent pattern. As with the group of pits to the north, it is unclear if any of the pits had particular functions other than rubbish disposal, and it also unclear from where precisely this rubbish was originating. Other than the two 'Viewing platforms', no structures were identified in the immediate vicinity, though trackway 300212 may have afforded access to this area from the south-east, and it might be significant that pits 2245 and 3114, two of the closest to it, were the most substantial of this group and both contained relatively large finds assemblages.

Also amongst this group of features were the remains of a shallow grave (3170) which contained a neonate burial (3172) accompanied by a small, inverted pot. The majority of the grave had been destroyed by pit 3167, but it was clear from what survived that the pot had been placed to the left of the skull.

'Viewing platforms'/terraces 400044 and 400045

'Viewing platform'/terrace 400044 was the northern-most of two broadly similar features, both of which appear to have originated very early in the Roman period and which lay approximately 30 m apart on the moderate to steeply sloping valley side overlooking the springs at the head of the Ebbsfleet (see Fig 2.28). Both were terraced into the slope and the associated features, particularly in the case of 'Viewing platform' 400045, as well as their location, suggests that they may not have been house platforms or agricultural terraces but had some other less prosaic function.

'Viewing platform' 400044 (Fig 2.31) faced south-west and was roughly sub-rectangular in plan, with a maximum length of approximately 20 m and a width of between 3 m and 5 m. It had a steeply sloping or, in places, stepped rear edge on the up-slope side, with a flat base at *c* 16.50 m aOD, which continued through to the front of the terrace on the down-slope side (Fig 2.32). The overall plan was somewhat irregular in that there were two apparently separate but contemporaneous components, comprising a small semi-circular element (3192) at the north-west end (Fig 2.33) separated by a ridge of natural from the larger, sub-rectangular element at the south-east end. No associated structural features were identified and there was no evidence that any parts of the rear had been revetted. However, the sides and base were generally well-preserved suggesting that they had been covered or protected in some way from erosion.

In the base of the south-eastern part of 400044 was a substantial oven or crop dryer (300172) which appears to have been an original feature within the 'Viewing platform'. This was 5 m long and comprised a stoke-hole, flue, and chamber, though nothing of the superstructure survived. Pottery from the earliest fills in oven 300172 indicates a period of use in the second half of the 1st century AD. Part of a large storage vessel was set in the ground 2 m to the north and a hearth (3251) lay on the slope 3 m to the south-west, both possibly contemporary with oven 300172. No 'floor deposits' were identified in the base of 400044, though a spread of dark soil (3250) of early Roman date, extending downslope and sealing hearth 3251 probably derived from its use. Oven 300172 was sealed by a relatively thick colluvial deposit (2140) incorporating mid-Roman pottery and this in turn was covered by a thin spread (2139) containing pottery of late 2nd, possibly early 3rd century date and a moderate amount of small fragments of burnt daub, the source of which is unclear. Part of a neonate was recovered from layer 3420 (a component of 2140), probably representing an *in situ* burial within this deposit, though no grave was recognised during excavation. A few redeposited neonate bones also came from two later layers, possibly derived from the same burial in 3420, though they may be the remains of subsequent burials disturbed by erosion.

The northern part of 'Viewing platform' 400045 (Figs 2.28 and 2.34; Pl 2.11) had been almost entirely removed as a result of erosion caused by a modern trackway which extended up the hillside in this area, but it was clear from what remained that it was larger and considerably more complex than 400044. For this reason, three numbers (400045–7) have been assigned to the different phases of use/disuse, with 400045 allocated to the original cut. The full north–south extent of 'Viewing platform' 400045 is probably indicated by a shallow ditch (300192) which survived over a length of almost 35 m (see Fig 2.28), this ditch probably representing a drainage feature dug to divert rain water run-off away from the rear of 400045.

Ditch 300192 lay approximately 1.5 m to the rear of 400045, along the top edge of which was a somewhat irregular 'wall' of flint cobbles (5325; see Fig 2.35). Only a single course of cobbles survived, extending over a distance of 10 m or so, with a maximum width of

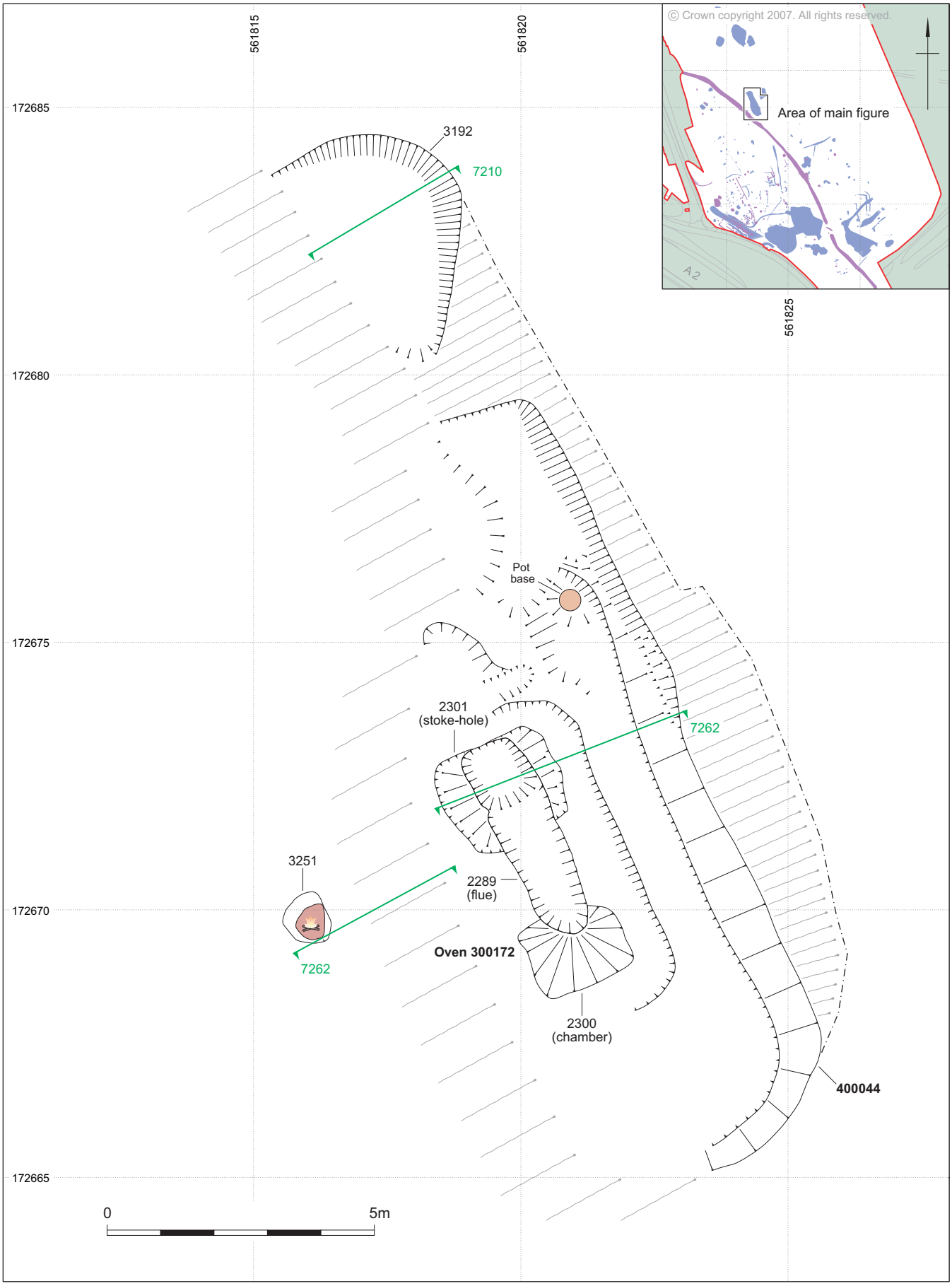

Figure 2.31 Early Roman 'Viewing platform'/terrace 400044

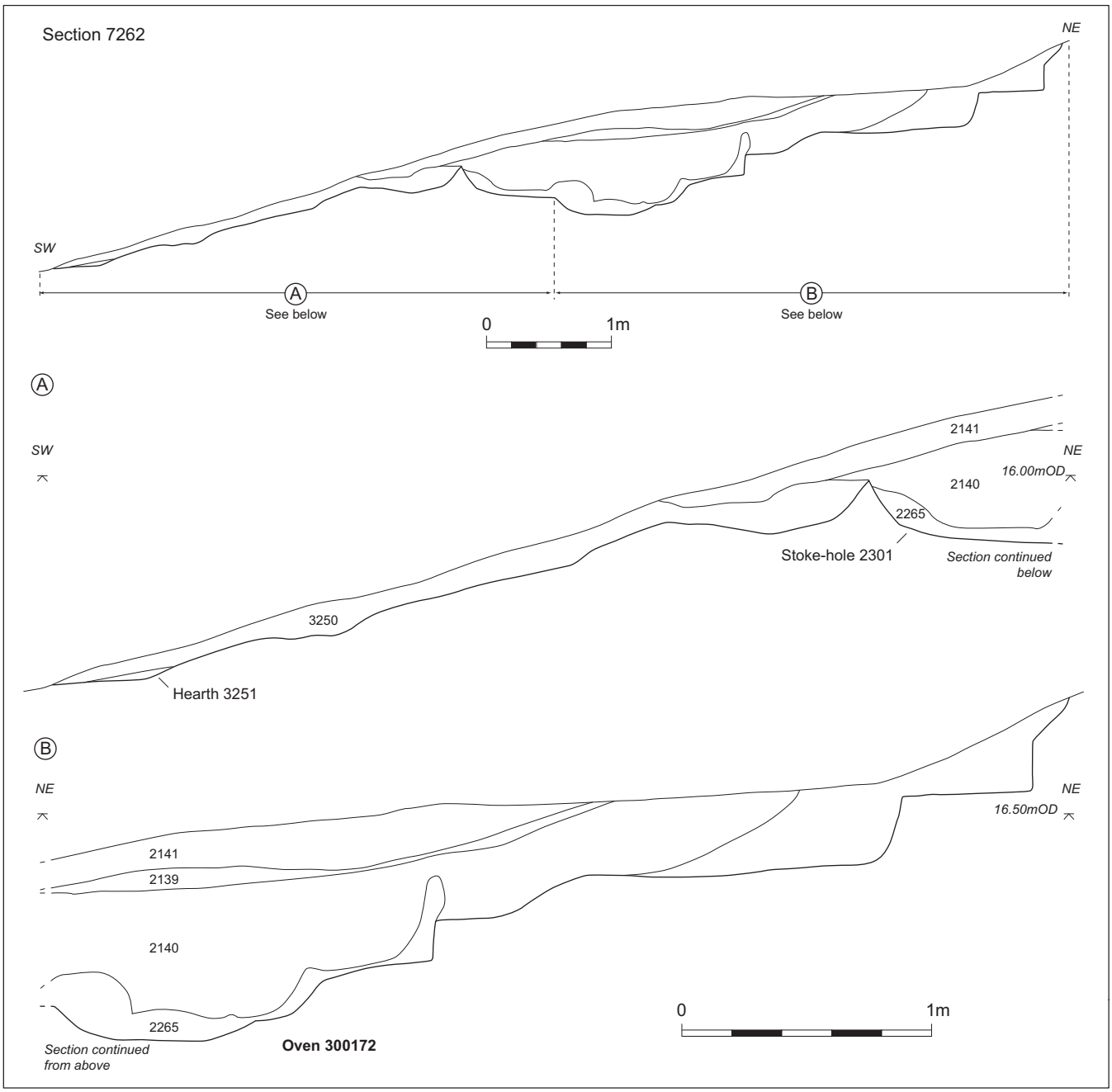

Figure 2.32 Section 7262 through 'Viewing platform'/terrace 400044

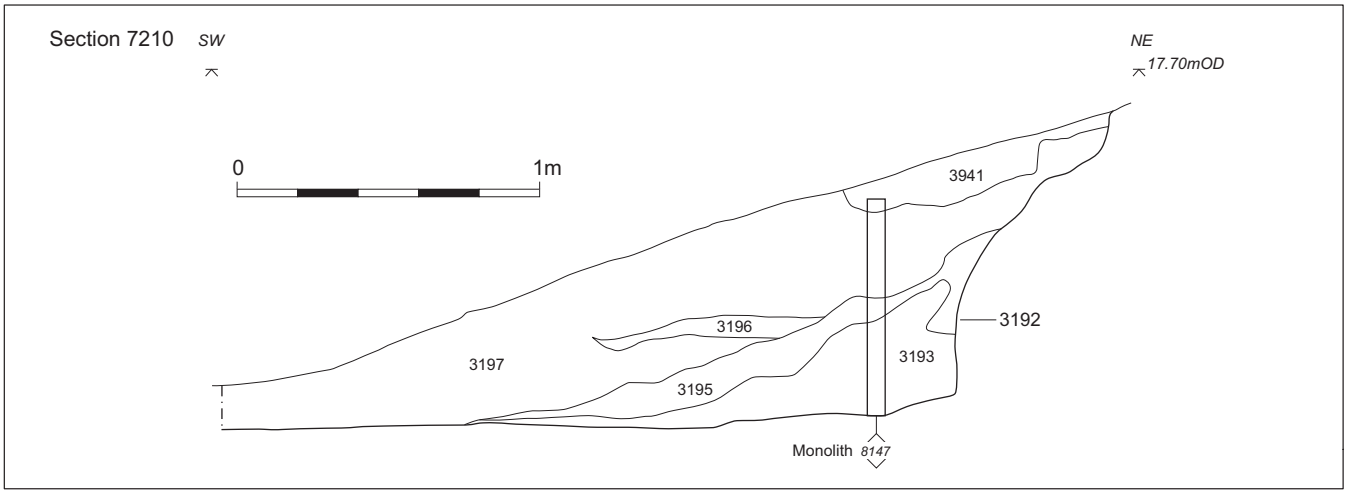

Figure 2.33 Section 7210 through northern part of 'Viewing platform'/terrace 400044

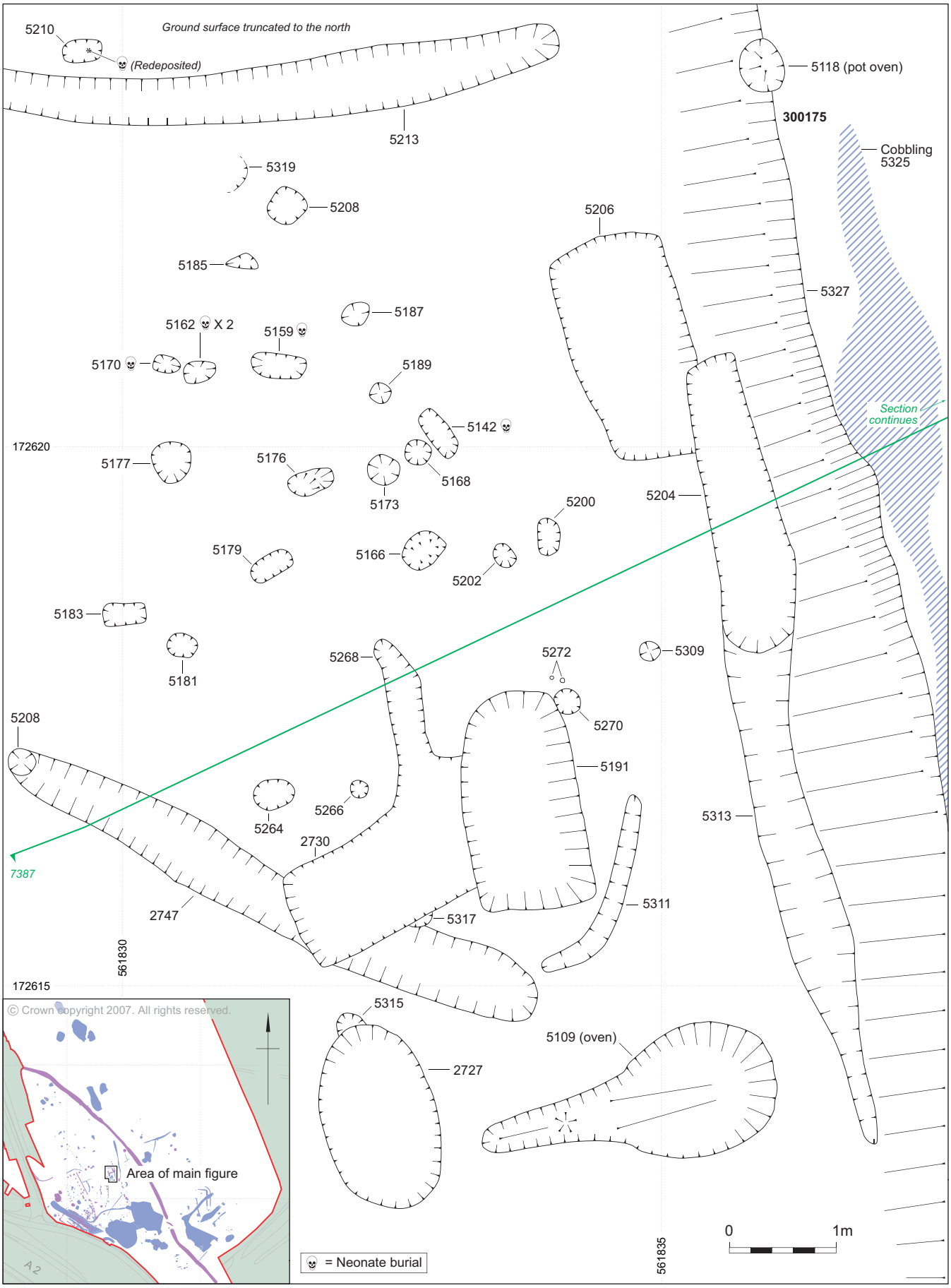

Figure 2.34 'Viewing platform' 400045–7 and associated features

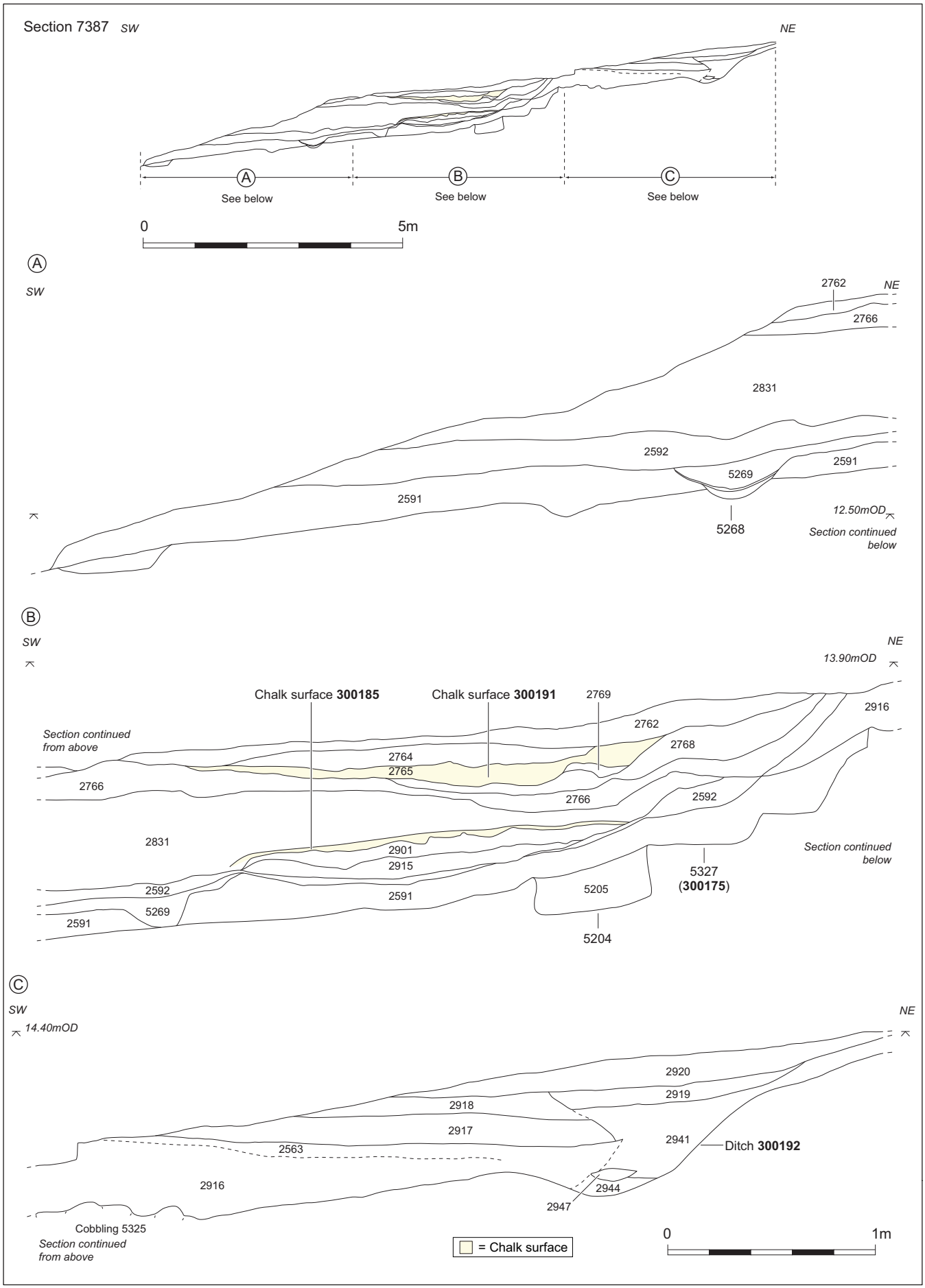

Figure 2.35 Section 7387 through 'Viewing platform' 400045–7

0.75 m. These cobbles appeared to be set directly on the natural, with no evidence for a foundation trench, and may have provided the base for a wall or simply acted as a revetment. The back edge of 400045 was 0.50 m high, stepped, with a slot/gully complex (5204/5313) along part of the bottom, though it is unclear whether this had a structural purpose. The base was flat, in places exposing the top of the natural chalk, and sloped gently to the south-west, at an average height of *c* 12.50 m aOD.

No surfaces were identified in the base of 400045, but towards the southern end was a complex of early features, most of probable mid- to late 1st century date, the majority of which could have been contemporaneous. Furthermore, it may not be coincidental that the five neonatal burials and virtually all of the possible post-holes lay within an approximately triangular area measuring 8 m by 8 m defined by gullies 2747, 5213 and 5311 (Fig 2.34). Whether these gullies had some structural purpose is unclear and if, for example, they held fences then there is no evidence for associated stake- or post-holes. Approximately 20 features have been identified as possible post-holes within the area enclosed by the gullies, though these varied in shape and size and most were quite shallow. No patterns could be discerned and partly for this reason their interpretation as post-holes remains uncertain. The small quantity of pottery recovered from them cannot be closely dated, though gully 5213 did contain mid–late 1st century material. The five neonatal burials were found in four graves (5142, 5159 and 5170, with 5162 containing two individuals) which lay close together, possibly forming a shallow arc. All of the graves were shallow, with 5162 and 5170 being nothing more than irregular scoops, not dissimilar to some of the possible post-holes. Redeposited neonatal bone was also recovered from a similar, shallow feature (5210) outside this group and immediately to the north of gully 5213. Immediately to the south of gullies 2747 and 5311 lay two relatively substantial features comprising pit 2727 and keyhole-shaped feature 5109, the latter possibly an oven, though there was no lining or evidence for burning. Both were early, perhaps the earliest features present within 400045, with pit 2727 containing late Iron Age/early Roman pottery and pit 5109 containing pottery assigned a mid-1st century date. To the north of these pits and within the angle formed by gullies 2747 and 5311 was a further large pit (5191) of uncertain function which contained pottery of mid–late 1st century date, and thus slightly later than 2727 and 5109, but whether it pre- or post-dated the complex of post-holes and neonate burials could not be established. Two shallow, sub-rectangular features (2730 and 5206) were later, of late 1st/early 2nd century date, with 2730 cutting gully 2747 and 5206 probably cut by slot 5204. Finally, part of a large pot of late 1st/early 2nd century date, apparently reused as a pot oven, was found in a shallow pit (5118) dug into the back edge of 400045.

The features in the base of 400045 were sealed by up to 0.30 m of deposits, in part reflecting colluvial infill, although the earliest layers, which included 2591 and 2592 (Fig 2.35), were dark, almost black in colour, and contained relatively large quantities of pottery and animal bone. The pottery indicates a late 1st or very early 2nd century date for these layers, thought to have derived from activity associated with the original use of the 'Viewing platform', and analysis of the animal bone indicates that the material derives mainly from meals rather than representing butchery waste (see Grimm and Worley, Vol 3, Chap 2).

Above the basal layers were make-up/levelling deposits (eg, 2901 and 2905) for chalk surface 300185 (Fig 2.35) which was up to 2 m wide and covered the central southern part of the 'Viewing platform', its former extent to the north unknown as it had been eroded here. No structural features clearly associated with surface 300185 were identified though there was evidence for at least one contemporary hearth, and it appears that ditch 300192 to the rear was at least partly re-cut at this time. Chalk surface 300185 was sealed by a substantial deposit (2831) which was similar to basal layers 2591 and 2592 in that it was dark in colour and contained large assemblages of pottery and animal bone, in this case probably relating to the use (or disuse) of surface 300185. The vast majority of the pottery from 2831 has been assigned a late 1st–early 2nd century date, but there is a small component which extends the range as late as *c* AD 130–140.

Further colluvial or levelling/make–up deposits (eg, 2766 and 2768), containing pottery of mid-2nd century date or slightly later, underlay a second chalk surface (300191; see Fig 2.35) of similar extent to surface 300185, although in this case surface 300191 appeared to form the base for a cobbled surface (2764) which directly overlay it. As with the earlier surface, there appeared to be no contemporaneous structural features. Layers (eg, 2762) overlying cobbled surface 2764 contained only residual early Roman pottery but its use is likely to date to around the middle of the 2nd century and pre-dated the construction of mid-Roman building 400048 on top of the infilled 'Viewing platform' (see below).

Building 400054

Timber building 400054 lay on gently sloping ground towards the base of the slope, at *c* 11.50 m aOD, immediately to the south of 'Viewing platform' 400045 (see Fig 2.28). The building as a whole had suffered from erosion, particularly in the south-west corner, but sufficient survived of the wall trenches and post-holes to indicate that it was aligned north-south and measured 9.0 m by 5.75 m (Fig 2.36). The wall trenches along the east and west sides (300217 and 300218) were deeper than the surviving wall trench at the north end, and both had post-holes (2546, 2791, and 2793) at their southern ends. No timber ghosts or impressions were evident within wall trenches 300217 and 300218, though

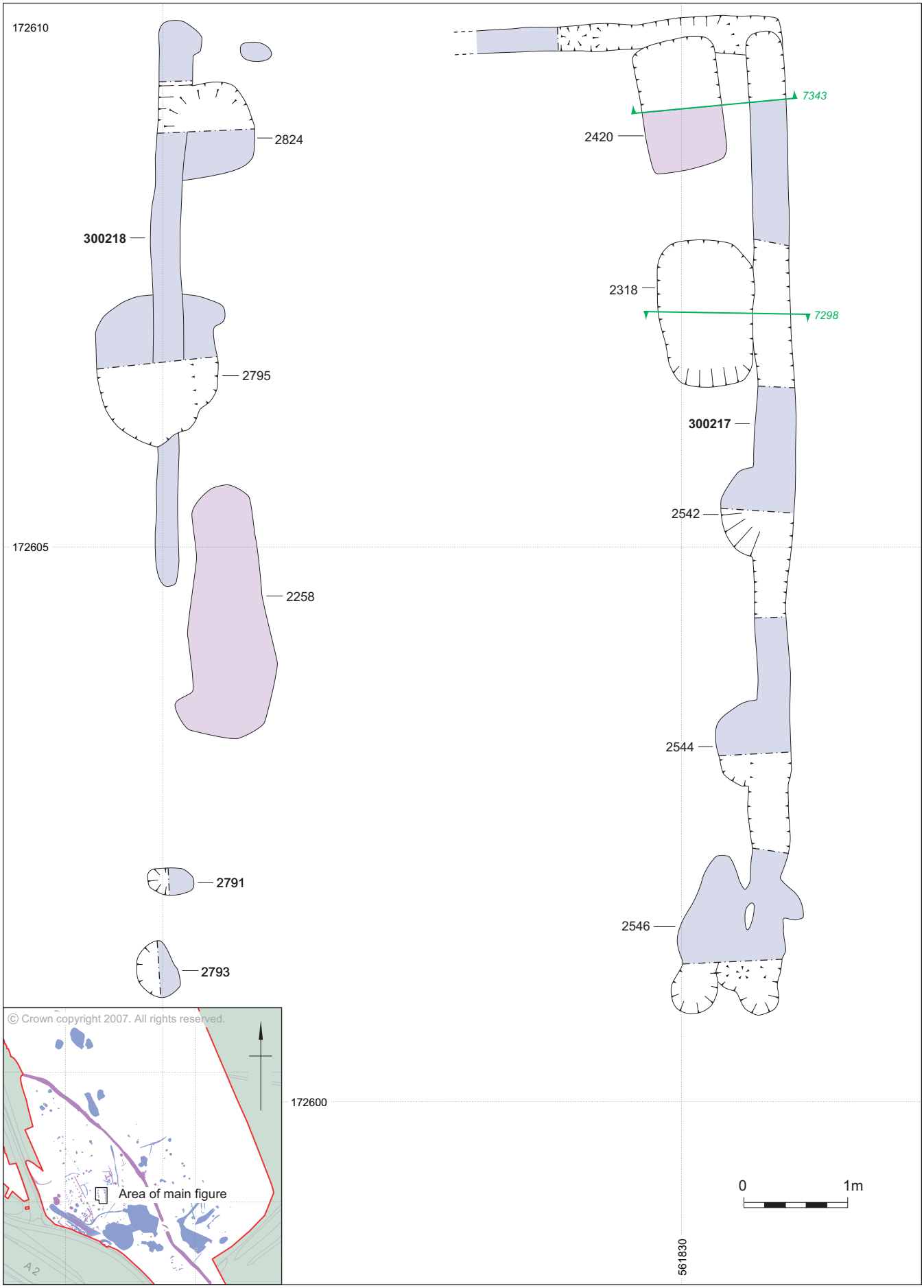

Figure 2.36 Building 400054

features 2542 and 2544 on the west side of 300217 presumably had some structural significance. No other internal features were identified and the function of building 400054 is unclear.

Building 400054 post-dated shallow pits 2795 and 2824, both of which contained mid–late 1st century pottery, and pre-dated pits 2318 and 2420, both assigned a mid-Roman date, as was irregular scoop 2258 which also lay within the confines of the building (Fig 2.36). Very little diagnostic pottery came from the structural features but, overall, an early 2nd century date seems most probable for construction of building 400054, perhaps contemporary with chalk surface 300185 in 'Viewing platform' 400046 a few metres to the north.

Pits 2318 and 2420 were sub-rectangular, vertical-sided and flat-bottomed, and appeared to respect the wall trenches on the east and north sides of building 400054 (Fig 2.37). Both pits cut the inside edges of the wall trenches, though it seems likely that the walls themselves were still standing when the pits were dug. The pits were notable for the large quantities of pottery they contained, particularly pit 2318, the smaller of the two, which contained substantial parts of several large vessels. Pottery dating suggests that pit 2318 was the earlier of the two, in use during the first half of the 2nd century, whereas 2420 appears not to have been infilled until the second half of the 2nd century.

Various other features in the vicinity of building 400054 may have been associated with it, including as many as three possible fence lines (see Fig 2.28). Extending southwards from the south-east corner of building 400054 was a short line of irregularly-shaped post-holes and shallow scoops (300221), and to the south-east was a shallow gully (300231) approximately 20 m in length. To the east of the latter was a further, short line of post-holes (300064), though their alignment suggests they may have been associated with an early roadside ditch, rather than building 400054. Another, more irregular, north–south post-hole alignment may be represented by 300063, but this is less certain. To the west of building 400054 was a shallow gully (300072) parallel to the slope, probably defining a boundary, with a rather more irregular, curving ditch or gully (300070) extending south-eastwards from it. A small number of scoops and shallow pits (eg, 2800, 2837, and 5230) and various post-holes in the same area may also have been contemporary with building 400054, though some may have been earlier and others later, containing only small quantities of residual pottery (these are discussed further below).

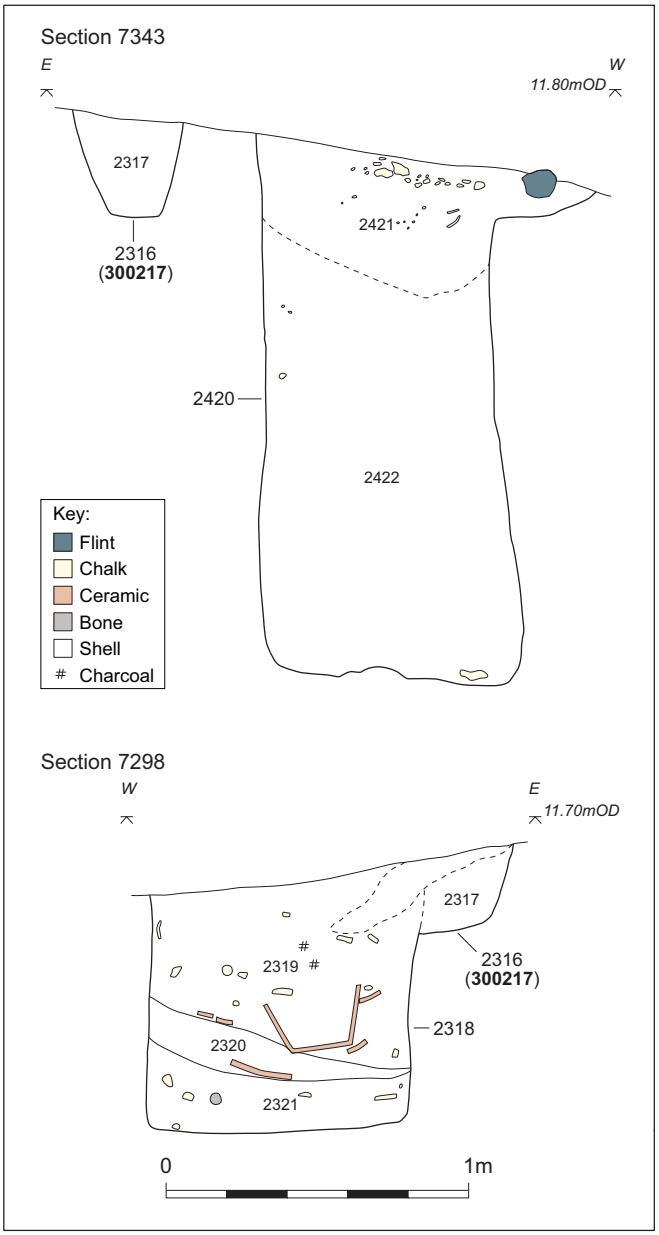

Figure 2.37 Sections through building 400054 and mid-Roman pits 2420 and 2318

Features at the north end of the site

Three relatively isolated and probably unrelated Roman features have been identified towards the north end of the site, around 0.5 km or more from the springs. Two were shallow ditches (28 and 300248) and both have been assigned an early Roman date, though the quantities of pottery recovered were very small. The other feature was a small pit (5) of mid-Roman date (Fig 2.38).

For most of its length of more than 50 m, ditch 28 ran parallel to the slope, continuing beyond the limit of excavation to the west and curving to the south at the east end where it cut the easternmost of the two ditches defining the late Iron Age processional way (400010) (see Fig 2.2 above). A terminus here may reflect the survival of a bank on the upslope (east) side of the Iron Age ditch. If so, then ditch 28, along with this bank, may have served to enclose the north end of a strip of moderate to steeply sloping ground along the east side of the Ebbsfleet. Grazing for animals would seem the most likely purpose for enclosing such an area.

Further to the north, four sections of what has been assumed to be the same, sinuous, shallow ditch (300248) running along the east side of the Ebbsfleet

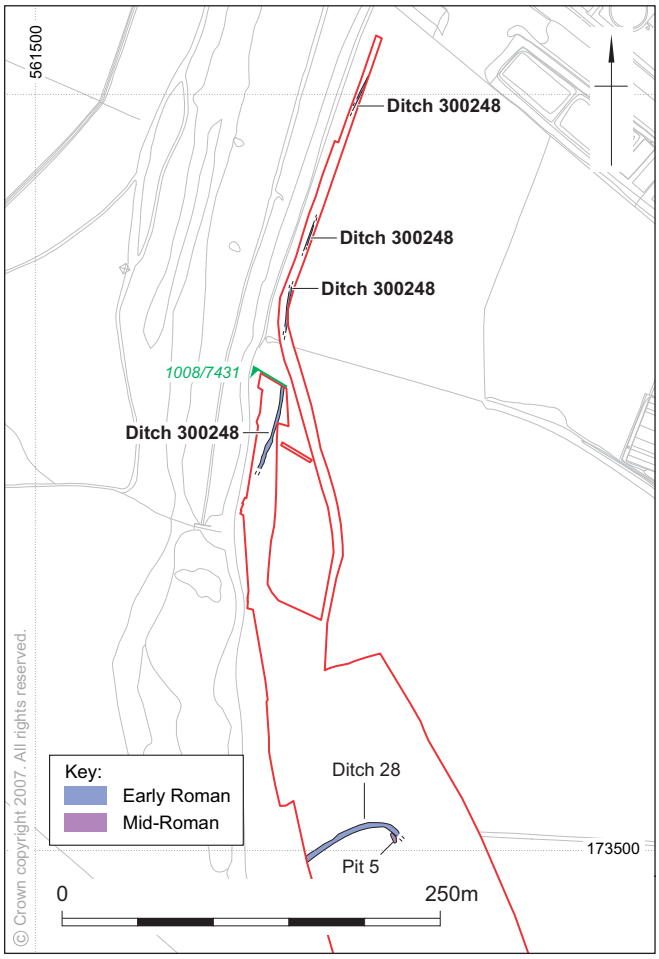

Figure 2.38 Roman features at the north end of the site

Plate 2.12 Mid-Roman temple 400035 within sanctuary complex, following initial exposure; the figures mark its extent (ARC SPH00) (2 m scales). Looking south-west

have been recorded over a distance of approximately 300 m, much of it within the narrow easement for a service trench. The size and nature of these sections of ditch suggest that it is a single feature, but there are some inconsistencies in its dating and it is possible that two ditches or two phases of ditch are represented. Ditch 300248 was up to 2.5 m wide but only 0.30 m deep and had a flat bottom (see Fig 2.39). At the northern end the ditch ran approximately a few metres from, and parallel to, the edge of the Ebbsfleet, but at the southern end it continued down into the Ebbsfleet and its extent here was not established. The ditch cut early Bronze Age deposits, was sealed by post-Roman colluvium in this area and contained a few sherds of Roman pottery. However, several small, discrete dumps of burnt flint and charcoal were noted within the fill in various places along the ditch and one of these produced a radiocarbon date of cal 560–400 BC (NZA-28619, 2419±30 BP) placing it in the early Iron Age. The matter is not easily resolved for there are no other deposits or finds of this date, but the possibility remains that ditch 300248, or at least the southern part of it, originated in the Iron Age with some Roman material accumulating in the upper fill.

It should be noted that a small quantity of residual late Roman pottery was recovered from the lower fills exposed on the edge of the Ebbsfleet channel in this area (layers 403, 411, and 413; see Fig 2.39), along with a few items of metalwork, including coins, and a small dump of iron smelting slag. The lower deposits were sealed by a built up of peat (layers 408 and 410) of probable early–mid Saxon date (based on radiocarbon dates obtained from a river edge sequence 100 m to the south; see Barnett and Stafford, Vol 3, Chap 3), the peat lying beneath alluvial and colluvial deposits. This slender evidence points to some small-scale Roman activity in the vicinity, the nature of which may be resolved by future excavation in the area to the east.

Pit 5, lying just to the west of the east end of ditch 28, was little more than a shallow scoop, but it contained a substantial assemblage of mid-Roman pottery, virtually all small sherds, the presence of which in this apparently isolated location has no obvious explanation.

Mid-Roman Sanctuary Complex (ARC SPH00)

At some time during the second quarter of the 2nd century, probably *c* AD 140, the area around the springs on ARC SPH00 underwent a significant transformation when what has been interpreted as a sanctuary complex was established. This complex comprised a variety of elements, most but not all new, focused on the springs but also extending up the lower part of the valley side to the east. It is likely that the vast majority of this complex was exposed in the HS1 investigations, but a small part at least lay beyond the south-western limit of the excavations.

The springs are now dry, and have been for almost 70 years, a result of de-watering of the chalk quarries further down the Ebbsfleet valley which has led to a substantial drop in the water table and the failure of any organic materials to be preserved in the vicinity of Springhead. However, on the basis of the available evidence, the approximate extent of the Ebbsfleet in the Roman period has been indicated (Fig 2.40). There is no reason to think that it was any different to what it had been in the 1st century AD when the early road (300017) was in use, but establishing the precise limits and depth of the water is difficult. As before, the water is likely to have been shallow but moderately fast-flowing,

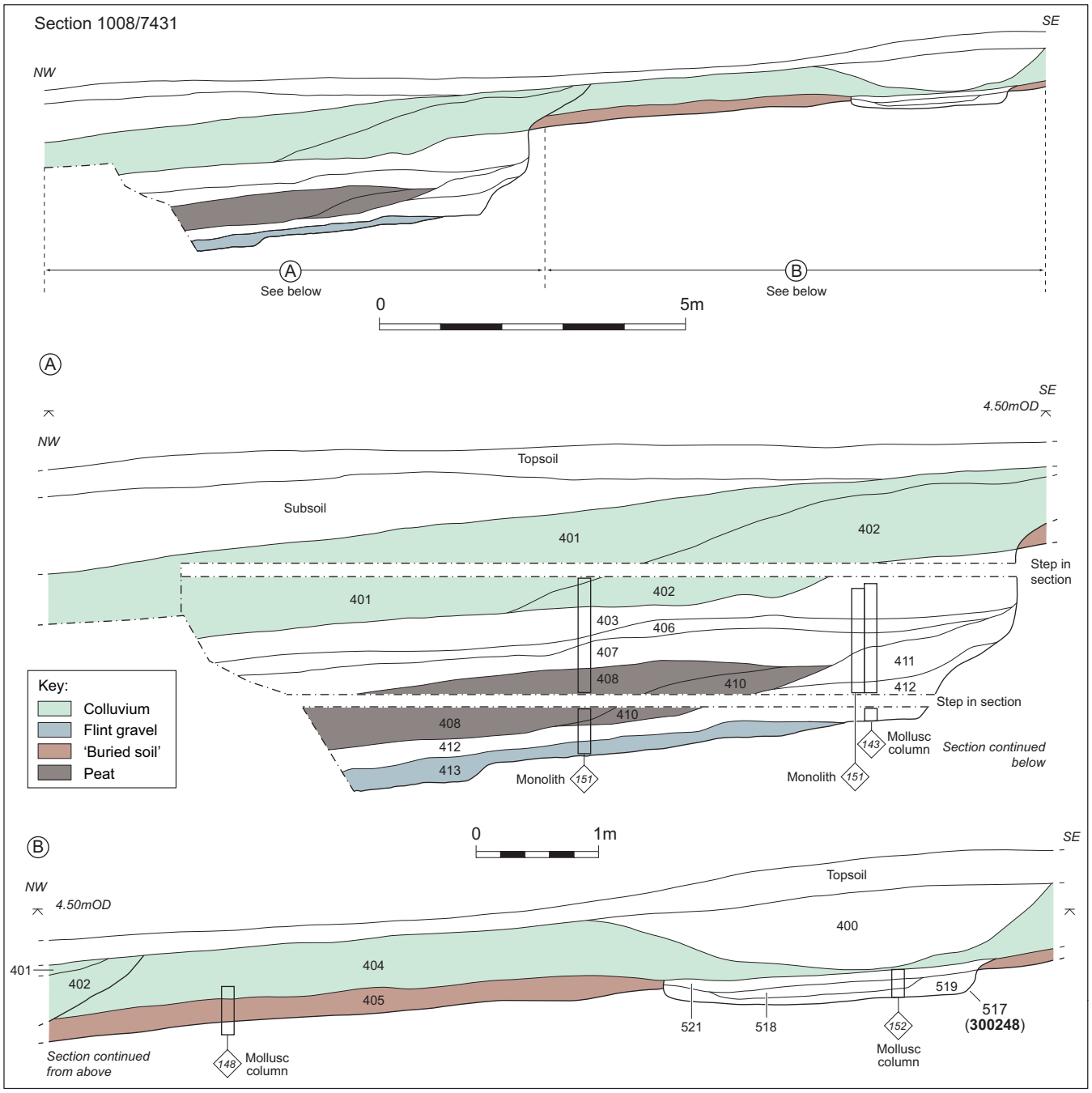

Figure 2.39 Section through ditch 300248 and the Ebbsfleet channel (ARC ERC01)

and the Ebbsfleet was perhaps around 30 m wide at this point, forming what may have appeared as a pool at the head of the river around which several of the sanctuary structures were grouped (Fig 2.41).

Temple Building 400035

Building 400035 appears to have been the principal structure in the complex (Figs 2.41–2; Pl 2.12). It has been interpreted as a temple, and was aligned north-west to south-east, facing the head of the Ebbsfleet less than 5 m away. It was initially thought that there was a timber precursor to this structure (URN 2003a), but further analysis has indicated that this was probably not the case and the various remains probably belong to a single building, though seemingly of more than one phase.

There is some evidence for limited preparation of the ground prior to construction of building 400035. This perhaps involved some levelling, but the most obvious work comprised the laying down of a chalk 'raft' to consolidate what is likely to have been relatively soft ground close to the Ebbsfleet. Although this consolidation layer was no more than 0.10 m thick it is likely to have provided a sufficiently strong base to support the front part of structure 400035, which, it is suggested below, was of more substantial construction than the remainder. Pottery associated with this phase of consolidation indicates that it took place in the mid-2nd century.

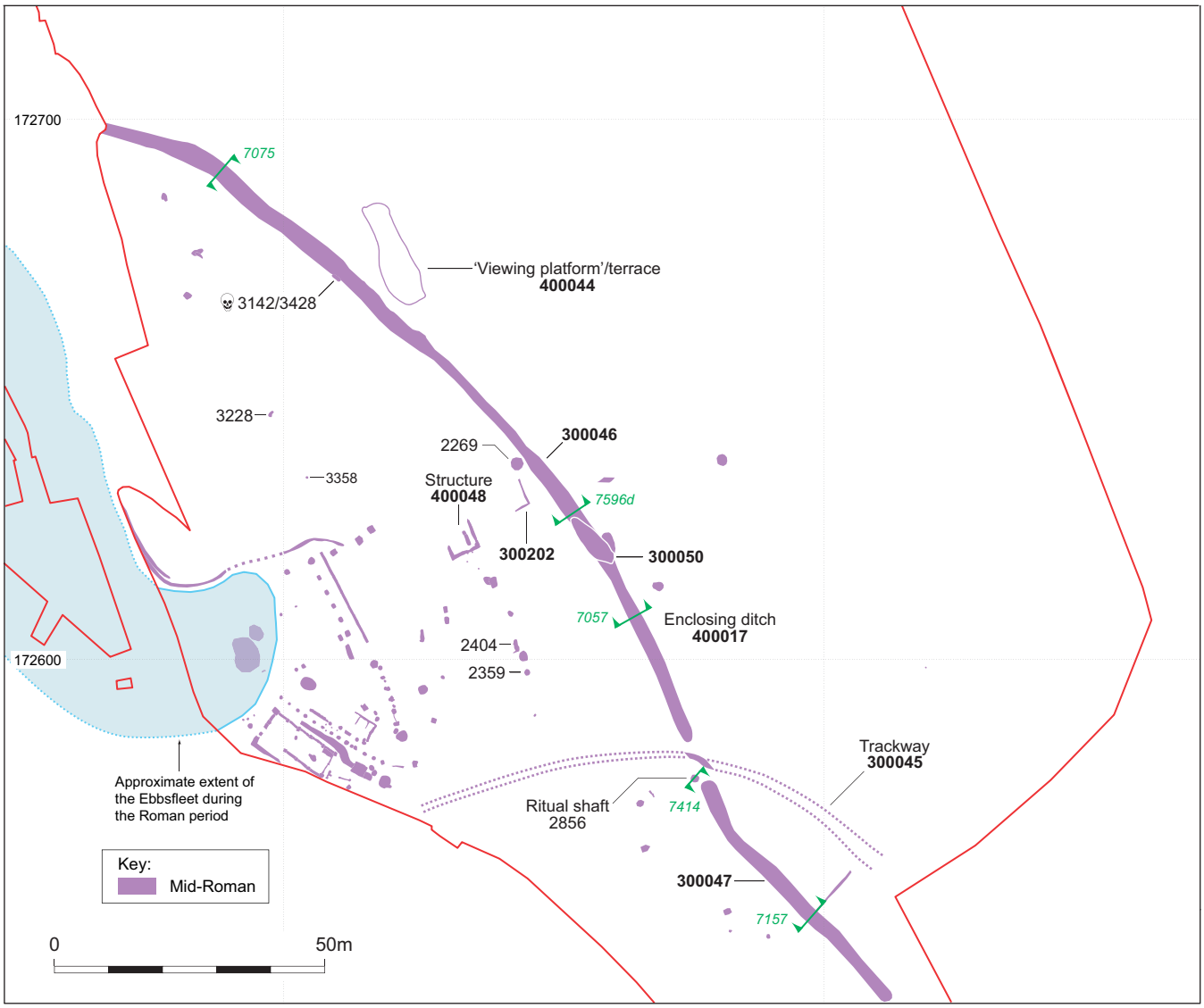

Figure 2.40 Mid-Roman activity in the vicinity of the springs (ARC SPH00)

The central part of structure 400035 was rectangular, measured 13.5 m by 5.0 m, and was defined by six pairs of flint and mortar foundation pads, with two other pads centrally placed at either end. The pads along the sides were linked by a series of narrower, flint-filled foundation trenches, while those at the back and the front were linked by shallow gullies or slots which contained no flint packing. Most of the foundation pads were approximately square or sub-rectangular, measuring up to 1.0 m by 0.60 m and 0.80 m deep (see section in Fig 2.16 above), though the central pad (5806) at the rear was slightly smaller and that at the front (5658) was relatively shallow. The pads at the front corners (5608 and 5655), however, were substantially larger than any of the others and both extended to the top of the underlying, pre-Roman 'natural' colluvial deposits; none of the other pads extended as far as the bottom of the earlier Roman deposits. Pad 5655 measured approximately 1.40 m by 1.15 m and was 1.20 m in depth, while 5608 which had been largely robbed was certainly deeper. A small part of the latter survived in the bottom of the foundation trench where it had been dug down to the base of an underlying middle Bronze Age ring-ditch. It is unclear when pad 5608 along with the next pad to the south-east and the foundation trench between them were removed, as the robber trench was only detected where it cut the top of the Roman deposits in this area and the fill contained nothing later than mid-Roman in date. However, on balance a post-medieval rather than Roman date is considered more likely.

The foundation trenches between the pads were up to 0.50 m wide and 0.30 m deep and were filled with tightly-packed flint nodules but no mortar. It seems most likely that they formed an integral part of the initial structure, as probably did the shallower trenches (5660 and 5665) between the pads at the front and perhaps the smaller, narrower 'timber' slots (5940 and 5955) at the rear. However, there is a possibility that the flint-filled trenches represent part of a later modification to the structure as trench 5847 appeared to cut hearth 5989 in the north-east corner (see below), and perhaps these replaced a series of earlier 'timber' slots of which 5940 and 5945 may represent surviving examples.

Extending from the front corner pad (5608) on the south side of the building were the remains of a further,

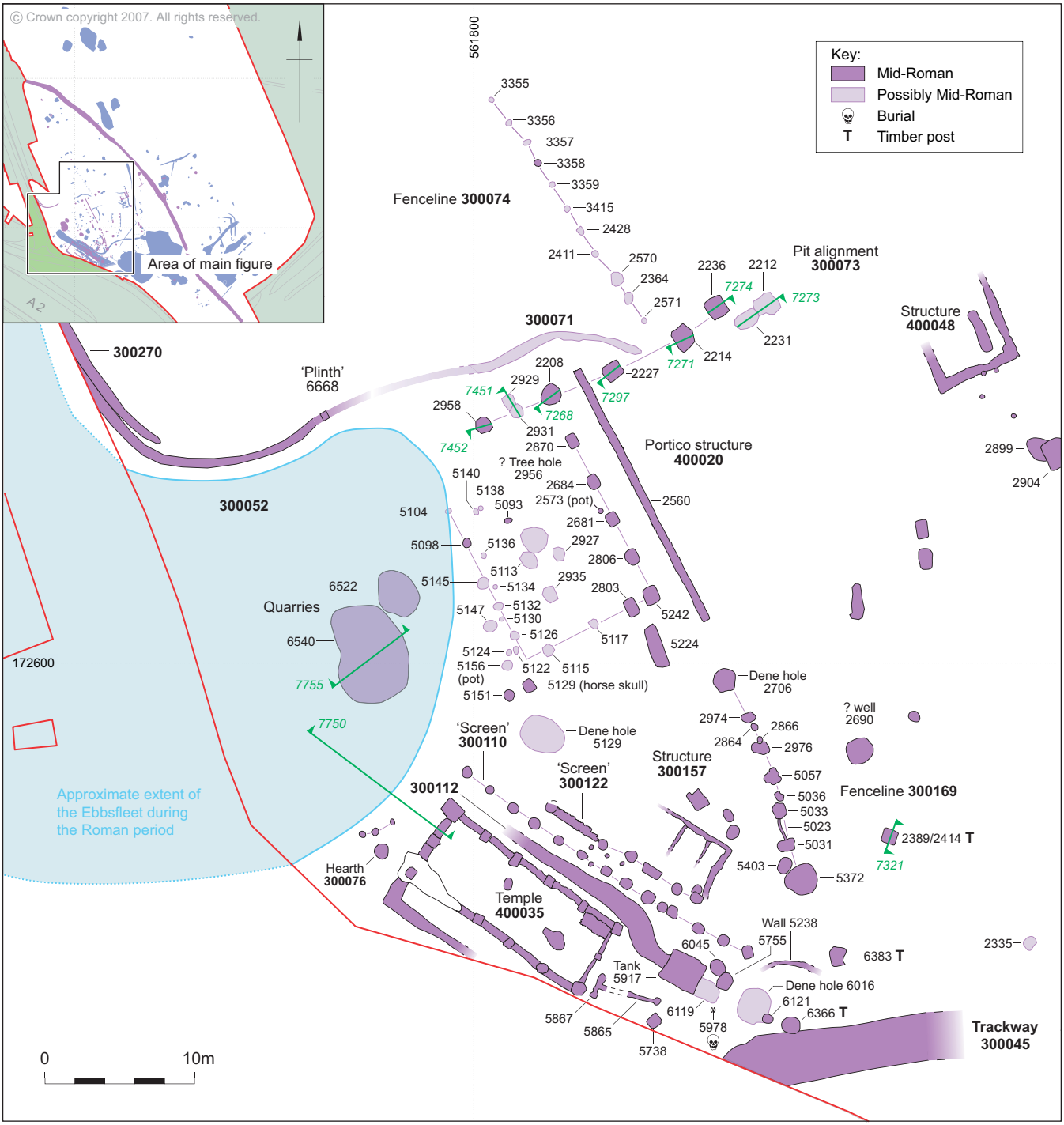

Figure 2.41 Mid-Roman sanctuary complex

L-shaped foundation (300121), comprising a shallow, insubstantial slot filled with crushed chalk which had been truncated to the south-east. This may have been a later addition (see below), perhaps increasing the width of the building (to 7.5 m) by adding an aisle or an ancillary structure to the side.

The tops of the pads were flat, but a small remnant of apparently *in situ* plaster surviving on one (5816) provides some evidence for them having possibly supported square, plastered timber posts or 'columns', perhaps with wooden screens or panels between forming a wall along both sides and probably at the rear. The more substantial and deeper-founded pads at the front suggest that these provided support for a heavier, perhaps monumental façade that faced the Ebbsfleet and which is likely to have been visible to travellers on Watling Street approaching Springhead from the west. What remains unclear is the form and nature of the roof, though the absence of roof tile from this area would seem to rule out this as a covering material.

Within structure 400035 was a clay floor (5938) which only survived in the south-east half of the building, the remainder having been truncated thereby exposing the underlying dumped/make-up deposits. A rectangular hearth (5989) contemporary with floor 5938 lay in the north-east corner of the building, and was

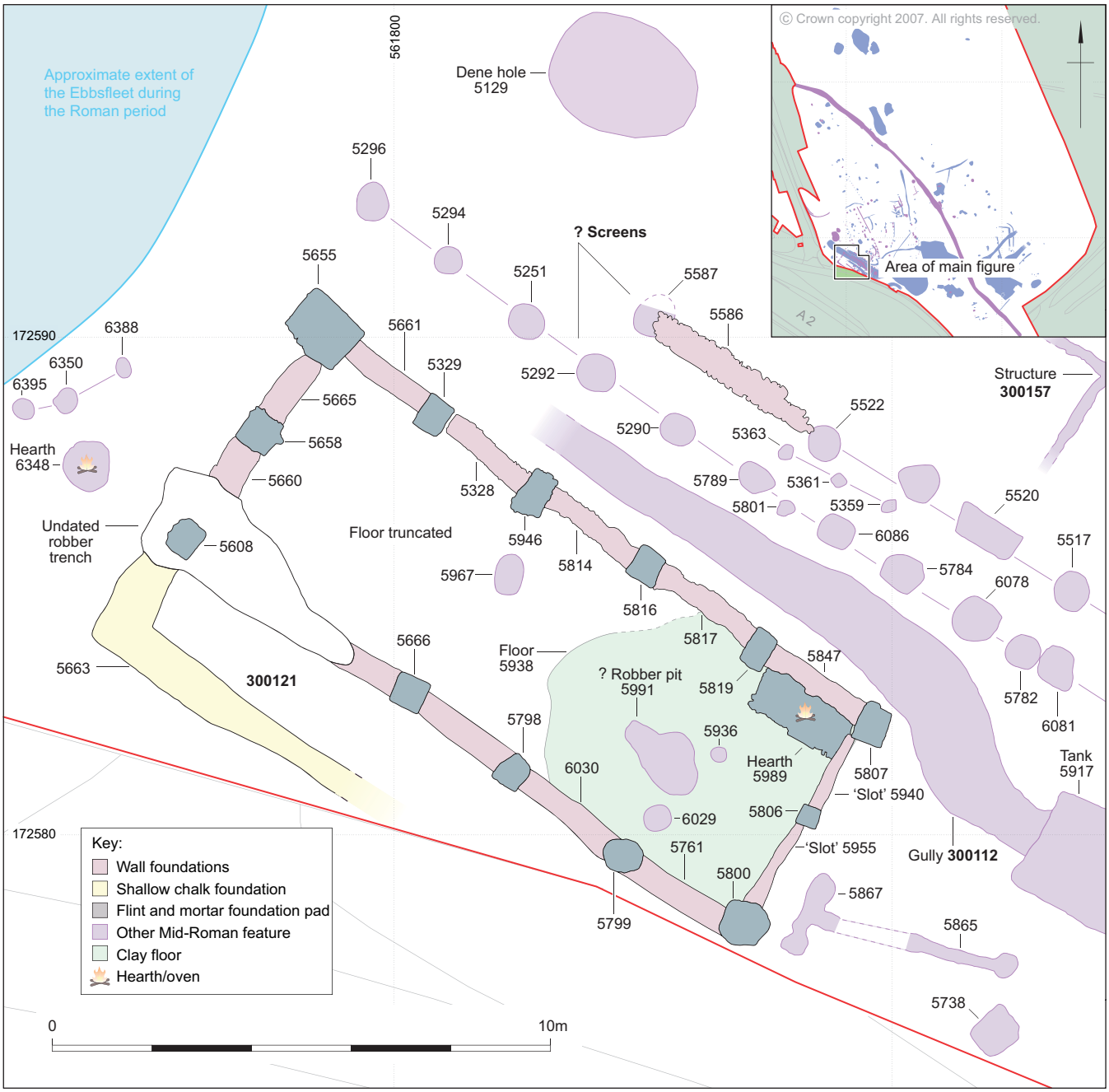

Figure 2.42 Temple 400035 and associated features

possibly cut by rather than built against foundation trench 5847, though it did appear to be contemporary with slot 5940 in the rear wall. The edges were lined with small, irregular blocks of chalk and the base was formed of a clay pad. Two chalk-packed post-holes (5936 and 6029) were aligned with the north-west edge of the hearth, and between and immediately to the north-west of these was a shallow pit (5991), possibly a robber pit, which may have been cut from a higher level but was only clear where it cut floor 5938. The only other internal feature identified within the building which may have been contemporary with this phase was shallow scoop 5967. The small quantity of pottery from floor 5938 is of mid-2nd century date.

Floor 5938 was covered by a chalky spread (5905, not illustrated), perhaps a later floor surface, which also extended across hearth 5989, the foundation trenches along the south-west side of structure 400035 and slots 5940 and 5955 at the rear. It did not, however, extend across the foundation trenches in the north-east side of the building suggesting, therefore, that some form of walling survived between the pads here but that it was removed between those to the south-west, perhaps when the building was extended, a possibility considered above in the discussion of foundation trench 300121. No dating evidence was recovered from spread 5905, but it was overlain by a thin layer of demolition debris (5906, not illustrated) containing some burnt daub and pottery assigned an early 3rd century date, the latest pottery recovered from the entire structural sequence. It is possible that there was a subsequent phase of re-use of structure 400035 as remnants of a gravel surface (5804, not illustrated) extended over much of the south-east end of the building and also sealed the foundation

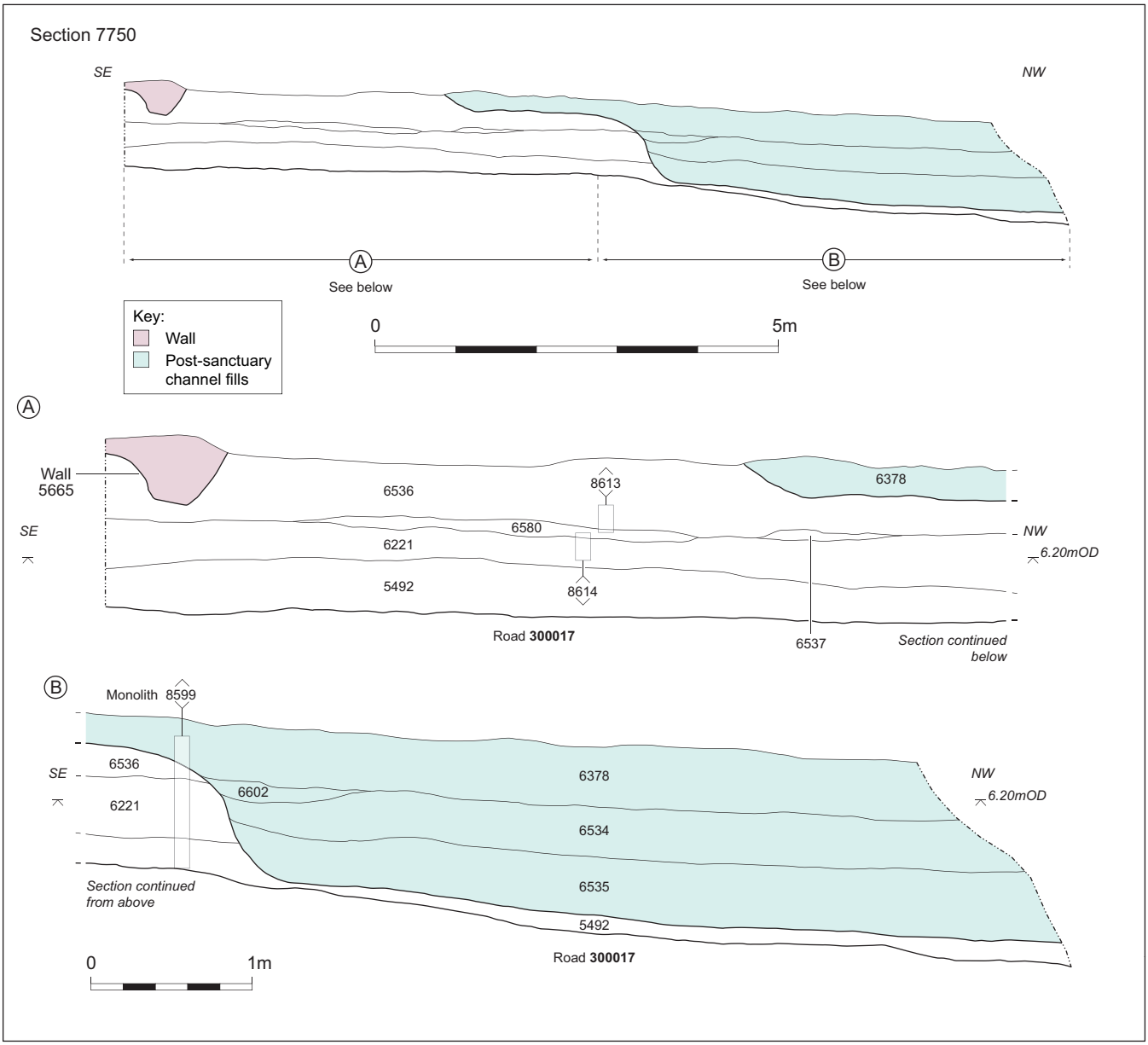

Figure 2.43 Section through temple 400035 and the head of the Ebbsfleet

trenches on all sides at this end; its relationship to the foundation pads was equivocal, though it appears in some cases at least to have respected them. Gravel surface 5804, though undated, was probably the uppermost surviving Roman deposit and lay directly beneath a deep sequence of colluvium of likely medieval and later date.

What is perhaps surprising is that there were no demolition or abandonment deposits that succeeded the final identified phase of use of structure 400035 as was the case, for example, for the temple in property 2 on ARC SHN02, though the latter was more substantially built, of flint, brick, stone and mortar with a tile roof. There was early Saxon settlement in the vicinity of structure 400035, represented by a sunken-featured building (see below), but it appears that any Roman surfaces or deposits post-dating the early 3rd century (as well as Saxon deposits) in this area may have been removed or heavily disturbed as a result of colluvial activity. Elsewhere around the springs the latest pottery is of mid-3rd century date, occurring in very small quantities, and evidence for late Roman activity, continuing until the end of the 4th century, is provided only by what is a relatively large assemblage of coins, many from the bed of the Ebbsfleet.

Features associated with structure 400035

Between structure 400035 and the edge of the Ebbsfleet was a large sub-circular hearth (6348) and beyond this three post-holes (6350, 6388 and 6395), the latter perhaps representing a small fence or screen (Fig 2.42). The ground dropped away quite steeply into the bed of the Ebbsfleet in front of the post-holes (Fig 2.43), but there was no evidence for any form of revetment or modification of the riverbank. Examination of a monolith taken from here showed slight evidence for the presence of a turf line at the interface of layers 6378 and 6536, perhaps indicating that this area was grass-covered (see Barnett, Vol 3, Chap 3).

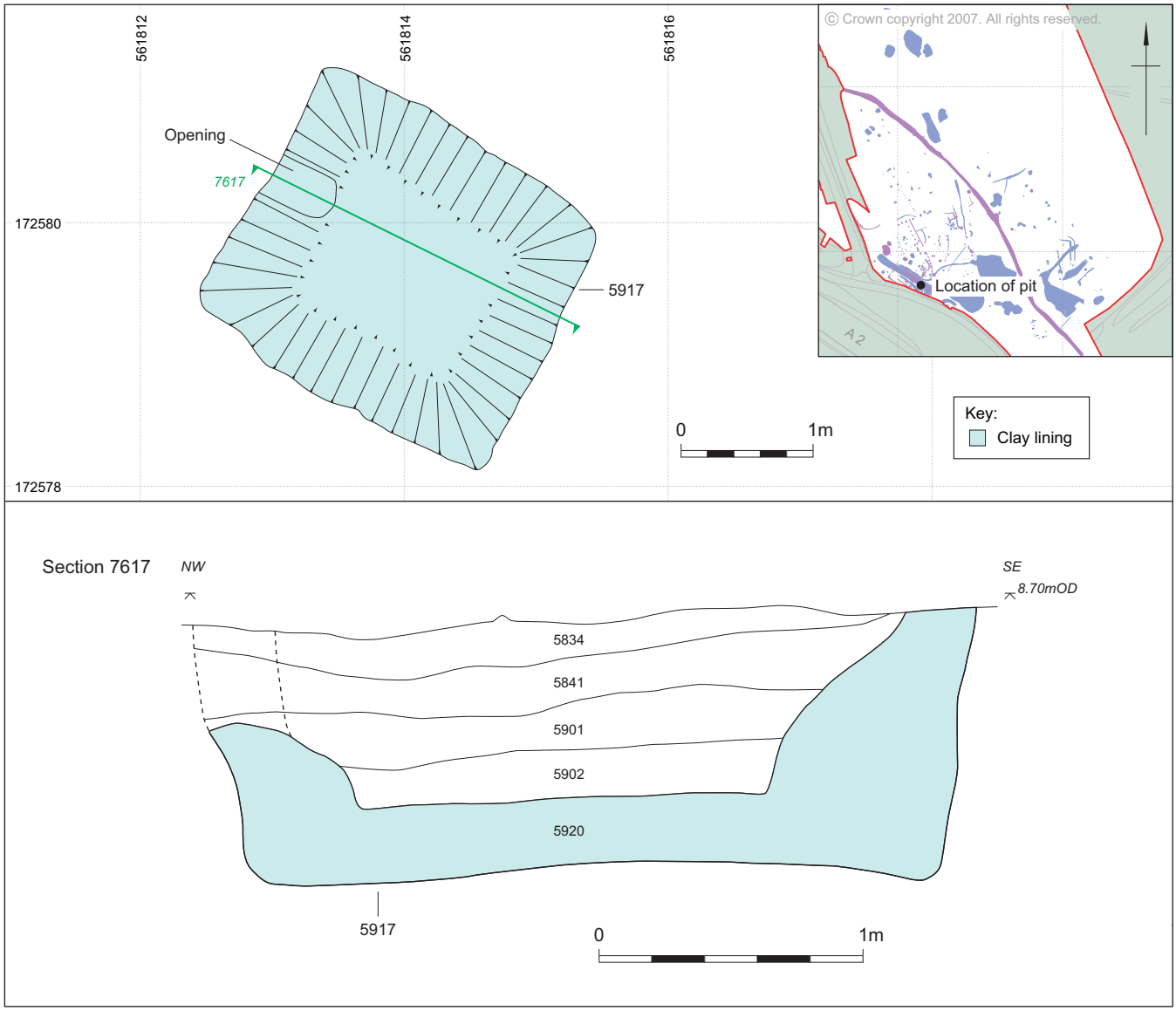

Figure 2.44 Plan and section of tank 5917

Close to the edge and within the bed of the river were at least two relatively large pits (6540 and 6522, see Fig 2.41), both approximately 1 m deep, which cut through the earlier gravel consolidation deposits (see Fig 2.17 above). These pits are interpreted as small quarries, dug to extract gravel for use in the sanctuary area, perhaps as part of the consolidation deposits or for metalled surfaces (see below).

To the rear of structure 400035 was a gravel surface (5843, not illustrated), contemporary with which was a T-shaped arrangement of shallow slots (5865 and 5867) and a possible post-hole (5738), perhaps part of a screen or ancillary structure which extended to the south beyond the limit of excavation. Also at the rear was a rectangular clay and timber-lined tank (5917) measuring approximately 2.50 m by 2.25 m and 1.0 m deep (with internal measurements of 1.50 by 1.20 m and 0.70 m deep) (Fig 2.44). The clay lining (5920) had slumped around the sides, but traces of probable planks did survive around the base and in the bottom. In the middle at the north-west end was a gap in the clay lining and it appears that there may have been some form of inlet here allowing water from gully 300112 to drain into the tank. Gully 300112 was relatively broad and shallow, up to 2 m wide and 0.40 m deep, and extended along most of the north-east side of structure 400035, petering out towards the north-west corner of the building. It seems most likely that it was dug as a drain to carry water run-off from the roof, and the fact that this was apparently channelled into tank 5917 rather than the river may be of significance in terms of the use of the Sanctuary complex, and structure 400035 in particular, which it is suggested was a temple. The sequence of fills in tank 5917 produced nothing that would indicate its function, though these related to its disuse and backfilling which took place in the late 2nd or early 3rd century. Close to tank 5917 and probably contemporary with it were neonate burial 5978 and two substantial post-holes (6045 and 5755), one perhaps replacing the other (see Fig 2.41). Further to the south-east lay

trackway 300045 which is likely to have provided access to the rear of the Sanctuary complex; this is discussed further below.

On the north side of structure 400035 and parallel to it were two lines of post-holes (300110 and 300122; see Figs 2.41–2) which have been interpreted as defining screens or fences since neither appears to have been part of 400035. Of the two screens, 300110 closest to structure 400035 may have been constructed earlier, though this was difficult to establish with certainty, and there is evidence to suggest that both this and screen 300122 were in existence at the same time. Screen 300110 was 23 m long, projecting slightly beyond the front of structure 300121 but continuing for a further 8 m to the rear, beyond tank 5917. It comprised 13 substantial post-holes, fairly regularly spaced at intervals of between 1.60 and 1.90 m (centre-to-centre), with diameters of up to 0.90 m and depths of up to 0.60 m. Most contained post-ghosts that indicated that they held posts approximately 0.30 m in diameter (see, for example, Fig 2.16, post-hole 6078). The gap of around 2 m between screen 300110 and the north wall of structure 300121 was occupied by gully 300112, interpreted as a drain, whereas the gap between screen 300110 and 300122 to the north contained no contemporary features but was narrower, perhaps 1 m wide at most. Screen 300122 was approximately half the length of 300110 and of different construction, with an overall length of 12 m and comprising five or six post-holes and a 4 m length of wall (5586) of clay-bonded flint nodules. The post-holes were spaced at approximately 2 m intervals, but were of less regular shape and generally shallower than those belonging to screen 300110. Wall 5586 survived to a height of no more than 0.30 m and continued the line of post-holes to the north-west, but does not appear to have extended beyond 5587, a very shallow feature; to the south-east there is no certain evidence that the wall ever extended beyond post-hole 5522. The insubstantial nature of the wall and the absence of a foundation trench suggest that it most likely provided the base for part of the postulated screen. Why this form of construction should have been employed here is unclear; possibly it was a later extension or repair, perhaps supporting a timber beam which held wattle and daub panels. Between the north-east wall of structure 400035 and screen 300122, and filling the upper part of gully 300112 (see Fig 2.16, layer 5914), was an extensive spread of burnt daub (eg, 5914), including many large, flat fragments that were roller-stamped, perhaps deriving from the destruction of one of the screens, more probably 300110. The spread also respected the post-ghosts in this part of 300110, providing convincing evidence for the co-existence of the two screens. Pottery from this spread spans the mid–late 2nd to the early 3rd century and provides a likely date of shortly after AD 200 for this destruction episode which perhaps included structure 400035 (see above). The only later structural evidence comprised a line of three small post-holes (5359, 5361 and 5363) between screens 300110 and 300122 which were cut in to the top of the burnt layer.

Other Structures Within the Sanctuary

Structure 300157

Structure 300157 lay immediately north of screen 300122 and may have been built against it, though the stratigraphy in this area was discontinuous and the relationship between the two could not be established (Figs 2.41 and 2.45). The structure certainly overlay structure 400041 (see Fig 2.22 above), the latest in the sequence of three early Roman circular structures which, it is suggested above, may have survived into the mid-Roman period and possibly been retained as part of the Sanctuary complex. Precisely when structure 400041 went out of use is unclear, but it is unlikely that it survived for long after the Sanctuary was established. However, structure 300157 did not succeed it immediately for 400041 was overlain by a thin build-up of soil containing late 2nd–early 3rd century pottery and a sequence of chalk and gravel make-up deposits for cobbled surface 2732 (Fig 2.45). This surface was contemporary with structure 300157, surrounding it on the north and east sides, its extent to the south and west being unclear having been truncated in these areas by (?water) erosion which preceded or was accompanied by the later deposition of colluvium in this area.

Probably somewhat less than one half of structure 300157 had survived truncation, but there was sufficient of the north-east corner to indicate that it was rectangular in plan, measured at least 5 m by 3.5 m, and was probably oriented with its axis north-west to south-east. Unlike the earlier circular structures, the extent of 300157 was represented by clearly-defined structural features, in this case comprising a continuous, shallow, vertical-sided, flat-bottomed beam slot (2733) which ran around the outer edge of the structure. Slot 2733 was probably originally 0.30 m wide and the very fragmentary remains of a mortar facing survived on parts of the north-east side. Internally, parts of two narrower beam slots formed continuations of the outer beam slot, perhaps originally holding joists for a planked floor. Gravel surface 2989 may have served as an internal surface, but is more likely to have been part of the make-up deposits. It is difficult to date structure 300157 with any degree of precision, but on the basis of the pottery and stratigraphic sequence its construction is probably best ascribed to the third quarter of the 2nd century, with its use perhaps continuing beyond the end of the 2nd century.

External cobbled surface 2732 was partly covered by further make-up layers of chalk which formed the base for a later cobbled surface (2390, not illustrated). This also appears to have been contemporary with the use of structure 300157, and both surfaces extended as far north-east as fence line 300169, a replacement of the latest of the earlier sequence of curving fence lines which enclosed the circular structures. The post-holes for this

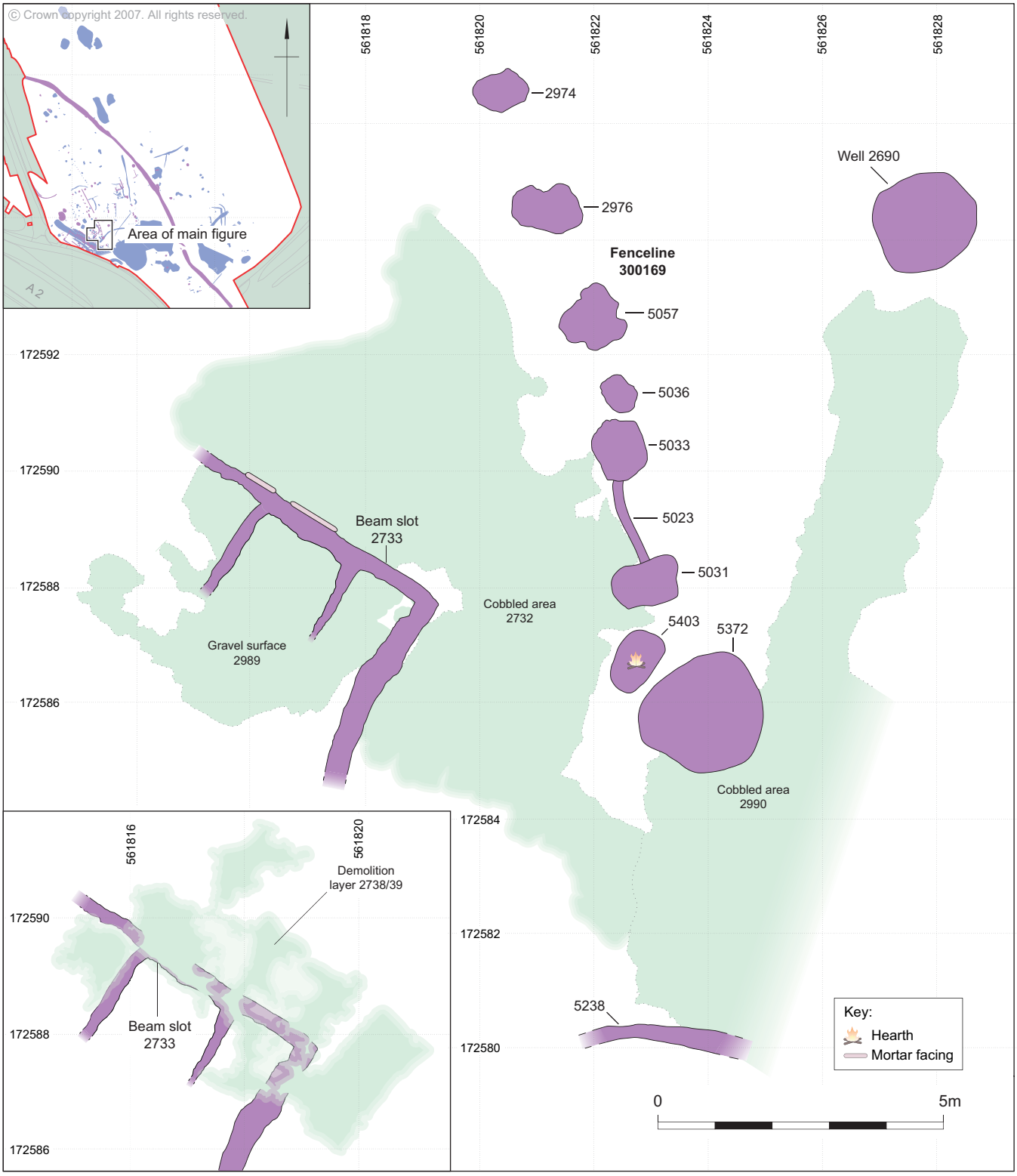

Figure 2.45 Structure 300157 and associated features

new fence were larger than their predecessors and at the southern end were a hearth (5403) and a shallow, flat-bottomed pit (5372). A 4 m wide gap between pit 5372 and a remnant of insubstantial, curving wall or wall foundation (5238) constructed of flint cobbles probably marks an entrance to the enclosed area containing structure 300157. Wall 5238 and pit 5372 may have been slightly later than the fence line 300169 (though still of mid–late 2nd century date), and pit 5372 cut cobbling 2990, a path which led from the entrance northwards for approximately 10 m towards a well or dene hole (2690; Fig 2.45). The upper metre of feature 2690 had been lined with flint nodules (presumably to revet the more weathered chalk nearer the surface) with no evidence for any lining below this, though excavation was only possible to a maximum depth of less than 2 m.

Pottery recovered from the homogeneous fill confirmed only that the upper fills at least were of mid-Roman date, with no later material present.

Structure 300157 and cobbled surface 2390 were overlain by a spread of dark soil (2675, not illustrated) which contained pottery extending into the early 3rd century, whilst amongst the coins were some 4th century issues, the latter perhaps trodden into the surface of the spread. Layer 2675 may represent an abandonment horizon, but above this was a poorly-defined and discontinuous layer of quite tightly packed chalk rubble (2738 and 2739, see Fig 2.45), with few fragments larger than 0.10 m in size. This may have been a demolition deposit, though there is no evidence that it derived from structure 300157, and it is possible that it was the remains of a later structure. Pottery from an associated deposit has been assigned a late 2nd–3rd century date and was the latest recovered from this area, although a few late Roman sherds came from around the springs approximately 20 m to the west (see below). The chalk rubble was the uppermost surviving Roman deposit and was sealed by a deep colluvial sequence which also covered a Saxon sunken-featured building a few metres to the south-east. It is probably unlikely, therefore, that very much in the way of any later Roman features or deposits had been disturbed or destroyed in this area.

Plate 2.13 Wall of mid-Roman portico structure 400020 within sanctuary complex (ARC SPH00). Looking north

Portico structure 400020

This lay on the east side of the springs, approximately 10 m from the estimated position of the edge of the Ebbsfleet (Figs 2.41 and 2.46). The location of structure 400020 indicates that it formed an integral part of the Sanctuary complex, continuing the line of fence 300169 (and its predecessors) which lay to the south-east, and seemingly bounded to the north-west by pit alignment 300073 which lay perpendicular to the structure.

The rear of structure 400020 was defined by a 19 m long, 0.45 m high wall (2560) built in a shallow cut in the gently sloping ground towards the valley bottom (Fig 2.46; Pl 2.13). The wall was approximately 0.70 m wide at the base, 0.45 m wide at the top, and constructed of flint nodules and chalk rubble set in a hard, yellowish-white sandy mortar. Surviving traces of mortar facing on the upper part of the wall on the south-east side suggests that it was also applied here as a render, with the rear and the both ends left more roughly finished. Wall 2560 had been breached in one place towards the northern end, though when this occurred is unknown, but had otherwise suffered little damage. Some flint, chalk, and mortar debris was found near the top of pit 2958 (see below; Fig 2.41), possibly deriving from wall 2560, though associated pottery of late 2nd/early 3rd century date probably rules out this being material left over from construction. The flat and level surface of the wall top suggests that it probably survived to its original height and may have provided the base for a timber structure above.

A little over 2 m in front of wall 2560 was a line of five substantial post-holes, regularly-spaced at 3 m intervals, with another substantial post-hole (2803) at the south-east end lying at 90° to this line. Post-ghosts indicated that all had held posts up to 0.30 m in diameter (Fig 2.47). It seems most likely that these post-holes were contemporary with wall 2560, though this could not be proven, and it is probable that they held posts which supported the front of a roof structure, with wall 2560 providing support for the rear. The evidence suggests that the rear wall was enclosed but the front, facing the water, may have been open, creating some form of narrow, portico-like structure. However, other interpretations might be considered for this structure including, for example, the possibility that the posts were free-standing, or that they belonged to a structure which either pre- or post-dated wall 2560. Virtually no roof tile was found in this area, nor was there any burnt daub which might have provided more information about the nature of the structure. It might also be significant that the line of post-holes did not lie centrally in front of wall 2560 but was slightly closer to the southern end, with pit 2208, a shallow pit forming part of pit alignment 300073 in the position where a further post-hole might have been anticipated at the north-west end of the line.

There were no surviving floors or surfaces to the south-west, in front of wall 2560, where a spread of dark soil directly overlay natural and contained a mixed assemblage of pottery of early and mid-Roman date, as well as some Saxon sherds. Natural chalk was exposed immediately behind the wall, but pottery recovered from the post-pits indicates a mid-Roman date for these.

Between structure 400020 and the Ebbsfleet were a variety of post-holes, small pits, and shallow scoops (see Fig 2.41). In many cases it was not possible to establish which were of mid-Roman date and contemporary with

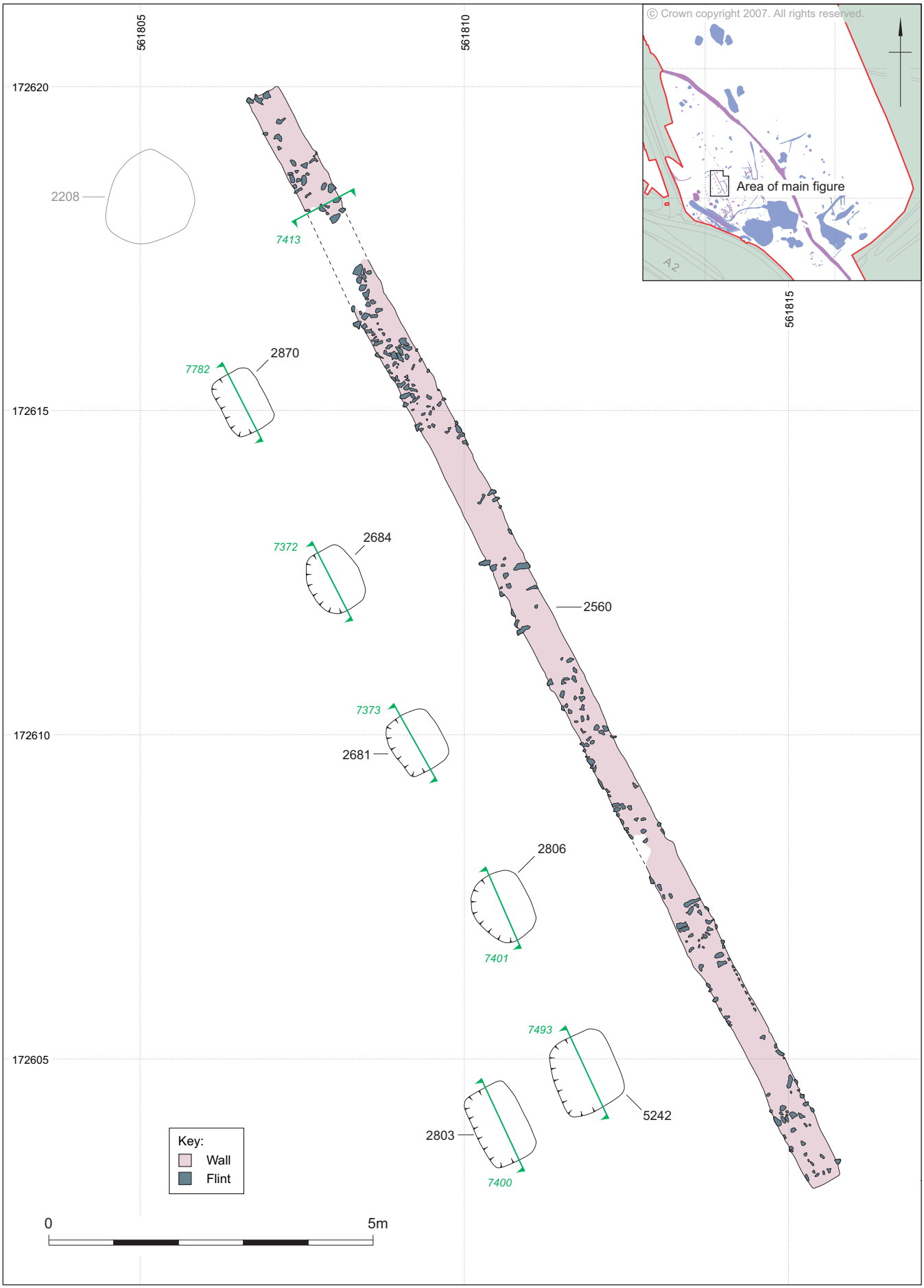

Figure 2.46 Portico structure 400020

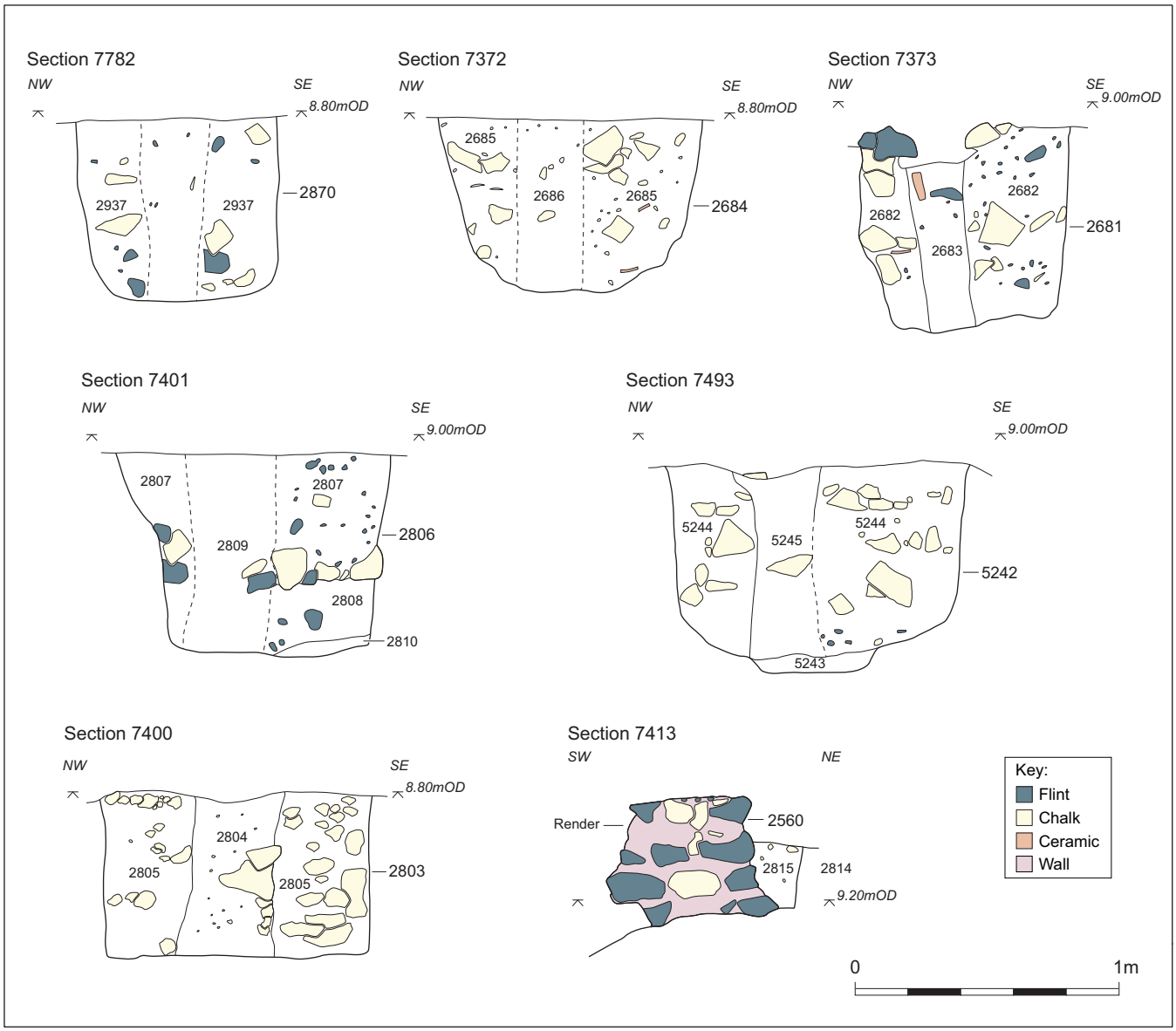

Figure 2.47 Sections through portico structure 400020

structure 400020 as at least some of the generally small quantities of pottery from them is likely to have been residual early Roman material. However, two possible fence lines might be discerned forming part of a rectangular enclosure measuring approximately 15 m by 10 m in front of structure 400020. Lying centrally within this area was a probable tree-throw hole (2956), suggesting that a tree may have stood here and formed a focus within this area. Immediately outside to the south was a pit (5129) containing a horse skull, with a shallow pit (5156) containing the base of an *in situ* pot nearby. This pot and the remains of another, in pit 2573 close to the front of structure 400020 may, however, be of early Roman date and thus have possibly pre-dated the Sanctuary complex.

The area between structure 400020, the possible fenced enclosure in front of it, and rectangular structure 300157 (or its circular precursor) to the south appears to have been open, perhaps entered via a 3.5 m-wide gap between the end of wall 2560 and dene hole 2706 (this example with no evidence for any lining), with fence 300169 beyond screening off the area (see Fig 2.41). A further dene hole (5129) and a shallow rectangular slot (5224) were the only surviving features within this area, though there had been some disturbance and erosion here which may have removed post-holes and other shallow features.

Pit Alignment 300073 and Possibly Associated Features

Immediately to the north of portico structure 400020 and at 90° to it was a line of seven pits, two (2929 and 2931) of which intercut, with a further intercutting pair (2212 and 2231) offset slightly to the south at the north-east end of the alignment (Fig 2.41). The latter pits were probably part of this group, and including these the alignment was 22 m long and extended from less than 5 m from the edge of the Ebbsfleet directly upslope to the north-east. The shape and size of the pits varied and

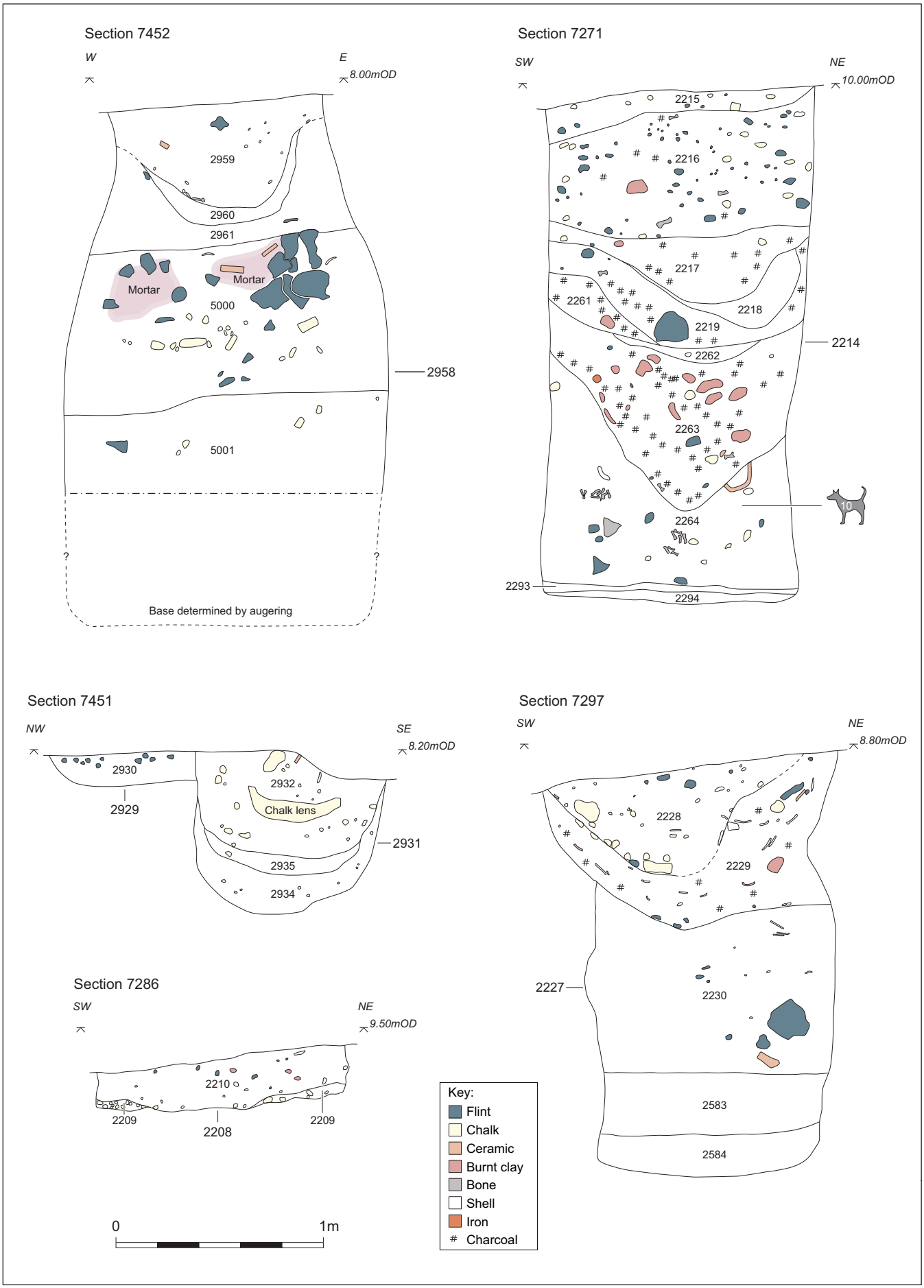

Figure 2.48 Sections through pit alignment 300073

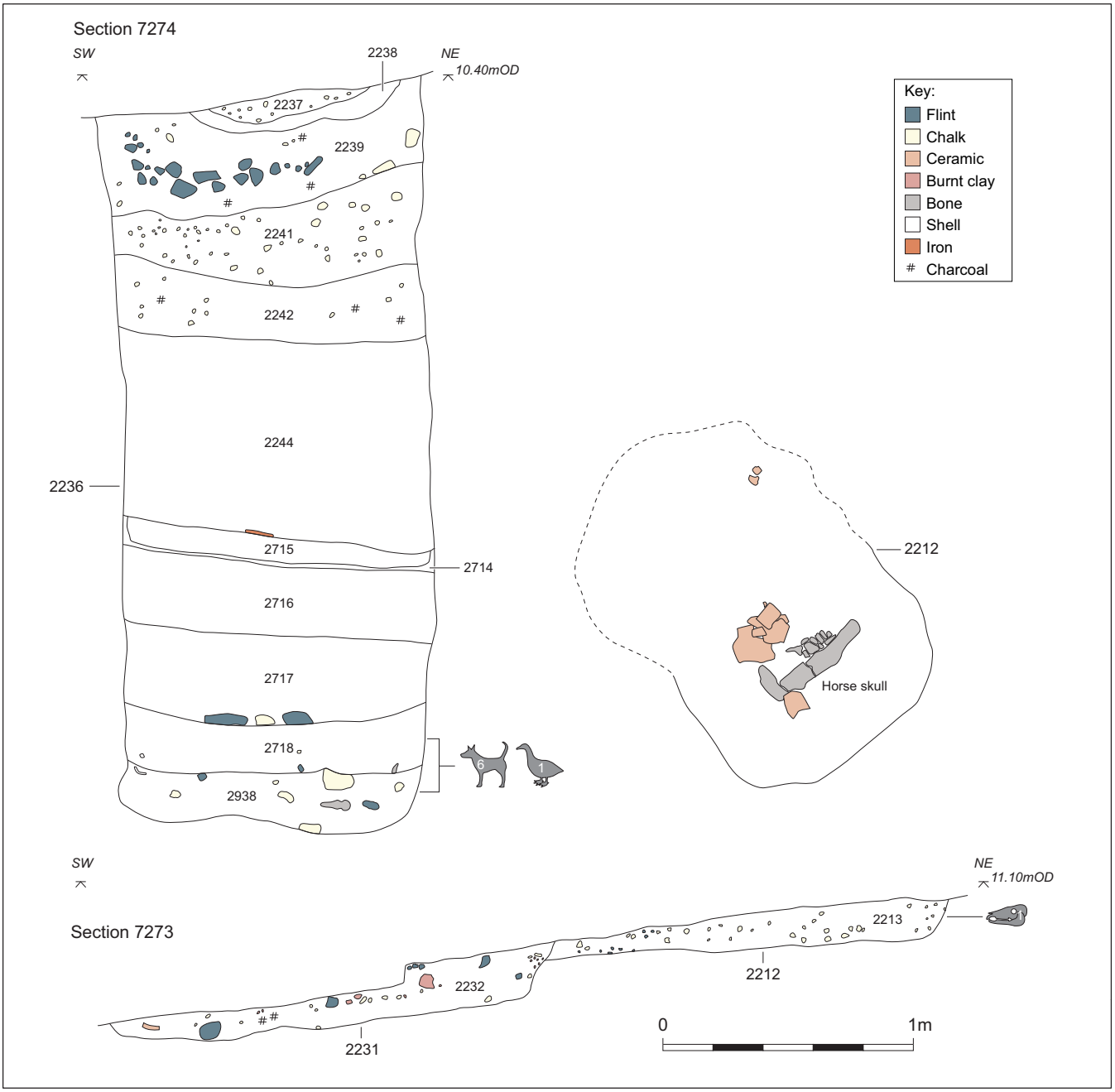

Figure 2.49 Sections through pit alignment 300073

they were spaced at intervals of between 1.5 and 4 m. It is not certain that they were all in use at the same time, with the two pairs, comprising the four smallest pits, possibly of early Roman date and the remainder in use during the mid-Roman period, with deposition in one at least (2958) probably continuing into the early 3rd century. This date range is certain to overlap with that of portico structure 400020 and indicates that the pit alignment was broadly contemporary with it.

Pit 2958 at the south-west end of the alignment was sub-circular, 2.5 m deep, and the only bell-shaped example in this group (Fig 2.48). It was also notable for the concentration of large flint nodules, chalk, and mortar debris it contained in the upper part of the fill. This material may have derived from wall 2560 of structure 400020 (see above). The pottery recovered from the lower fills of pit 2958 is of late 2nd/early 3rd century date and is the latest from any of the pits in this alignment, suggesting that it may have been the last to have been dug.

Pit 2929 was a very shallow feature and was cut by pit 2931, a slightly larger round-bottomed feature of probable 2nd century date (Fig 2.48). The function of neither of these pits, amongst the smallest in the alignment, is clear, and there is no evidence in their morphology and fills that either were large post-holes. Pit 2208 at the north-west end of the line of post-holes belonging to structure 400020 was sub-circular, flat-bottomed, and also small and, as noted above, seems clearly not to have been one of these post-holes.

Plate 2.14 Mid-Roman pit 2214 in pit alignment 300073 within sanctuary complex (ARC SPH00). Looking north-east

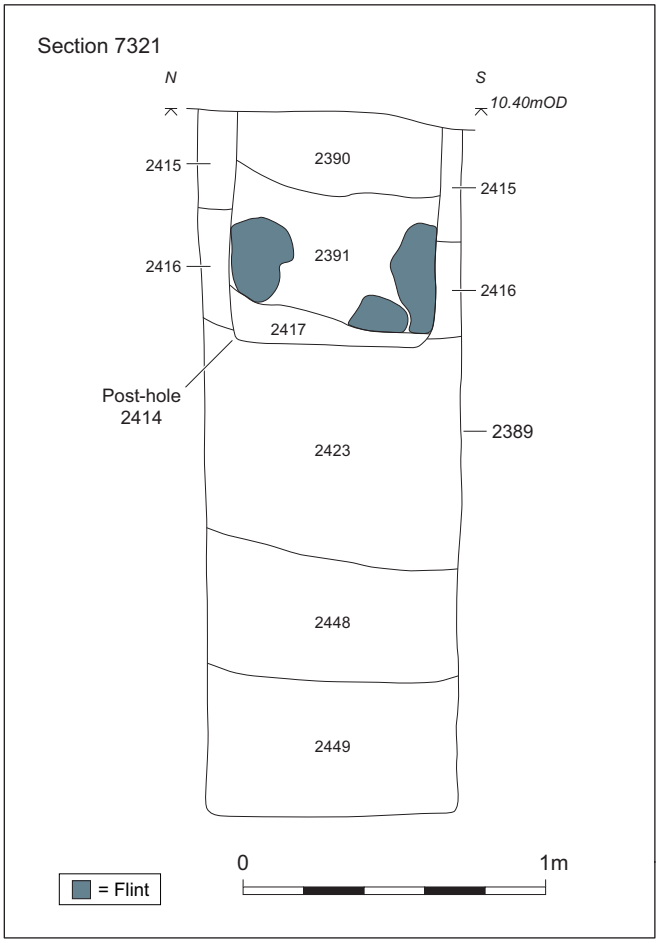

Figure 2.50 Section through pit 2389 and post-hole 2414

Pit 2227, continuing the pit alignment to the north-east of structure 400020, was larger than those immediately to the south-west with a depth of 2 m (Fig 2.48). It was square in plan and there was some evidence that the upper part had been re-cut, these fills producing mid-2nd century pottery and the lower fills containing material of slightly earlier 2nd century date.

Pits 2214 (Fig 2.48; Pl 2.14) and 2236 (Fig 2.49) towards the north-east end of the alignment lay less than 2 m apart, were the deepest in this group, and might be seen as a pair, with 2214 probably the earlier of the two. Pottery from pit 2214 suggests a mid-2nd century date, with that from 2236 indicating a late 2nd century date for infilling. Both pits were sub-square in plan, with near-vertical sides and fairly flat bases, though pit 2236 at approximately 3 m deep was 0.5 m deeper than 2214. Like the other large pits in this group, these two pits produced substantial assemblages of pottery and animal bone and, in the case of pit 2214, a moderate amount of burnt daub. However, both pits also contained notable numbers of dog burials, with ten dogs from 2214 and six (and a dove) from 2236, in both cases from the bottom or lower fills. The dogs appear to have been dumped in the pits, with no evidence for deliberate placing as seen, for example, in the ritual shaft (pit 2856, see below), and the fill (2264) containing the dogs in pit 2214 also produced a particularly large assemblage of pottery, including a number of partially-complete vessels. In this pit there is some evidence that it might have been partly cleaned out, with 2263 and the layers above perhaps representing later, though still mid-2nd century infilling. Alternatively, this break in the sequence may simply reflect a change in the nature of the material being deposited, with what may have been a more liquid earlier fill (2264) being squeezed up the sides of the pit as a result of subsequent deposition.

The source of the material being deposited in these and the other pits in alignment 300073 is unclear, for other than the Sanctuary complex itself, there are no other structures known in the vicinity, and it seems that the material must have been brought in from some distance away. This raises the question of why the pits were dug where they were and why was the material disposed of in them, for there seems little doubt because of its location that the pit alignment formed a boundary feature of some sort and that this formed part of the Sanctuary complex.

Pits 2212 and 2231 at the north-east end of the alignment were quite different to 2214 and 2236, both being less than 0.20 m deep and both possibly being of early Roman date (Fig 2.49). The main interest was that 2212, a roughly sub-rectangular feature and the earlier of the two pits, contained a horse skull that had been deliberately placed on the base of the pit. Seemingly associated with this skull was a deposit of pottery, including several large sherds, derived from a variety of vessels, to which an early Roman, possibly 1st century, date has been assigned. If this is correct then it would suggest that this pit at least may have pre-dated the Sanctuary complex by several decades.

Two further groups of features which lay to the north of pit alignment 300073 are likely to have formed part of the Sanctuary complex (Fig 2.41). At approximately 90° to the pit alignment and extending to the north-west was fence line 300074, which comprised 11 post-holes and was 16 m long. Although only one of the post-holes contained mid-Roman pottery, the few early sherds from several others may have been residual, and a mid-Roman date is preferred. The two largest post-holes (2364 and 2570) towards the south-east end could have defined an entrance, but there is no evidence that the fence line formed part of an enclosure. There was nothing beyond post-hole 3355 at the north-west end

that was certainly contemporary with the fence line, and only one small pit (3228) amongst the scatter of features here was of mid- rather than early Roman date (see Fig 2.40).

Also to the north of pit alignment 300073, and originating close to the junction of this and fence line 300074, was a shallow, irregular curving gully (300071) which may have served to divert rainwater run-off away from the north end of portico structure 400020 (see Fig 2.41). Gully 300071, containing possibly residual early Roman pottery, may have continued further to the west as 300052 which was of mid-Roman date, but later erosion in this area had removed any link between the two. Gully 300052 had been partly recut (as 300270) and its sinuous course probably defined the northern edge of the pool formed by the springs at the head of the Ebbsfleet in this area, though the precise extent of this in the Roman period was impossible to establish. Of possible significance is what is best described as a small, sub-rectangular 'plinth' (6668), apparently cut by gully 300052. 'Plinth' 6668 was set in a shallow semi-circular 'cut' in the sloping ground close to the postulated edge of the water. It comprised a rectangular footing measuring 0.95 m by 0.75 m, with a flint and rubble core faced with small, roughly dressed chalk blocks up to 0.25 m by 0.12 m by 0.12 m in size. Two courses survived on the south side, nearest to the water, with a slight offset between the courses. Only one course survived to the north, where it was surrounded by clay packing on the exterior. The function of 'plinth' 6668 is uncertain, but it could perhaps have provided the base for a small statue or something similar.

Features to the East of the Sanctuary Complex

To the east of and behind the Sanctuary complex were three substantial post-holes (2414, 6366, and 6383) which, it is suggested, held free-standing posts as there is no evidence that they formed part of a structure (Fig 2.41). One post-hole (6366) cut the edge of trackway 300045, with 6383 lying 5 m to the north-east, both post-holes perhaps part of some entry arrangements to the rear of the complex. A further 8 m to the north-east was post-hole 2414 which had been dug into the top of pit 2389 (Fig 2.50). All three post-holes contained post-ghosts up to 0.40 m in diameter, with gravel packing in 6366 and 6383, and large flint nodules in 2414 (Fig 2.50). The digging of post-hole 2414 in the top of pit 2389 is unlikely to have been fortuitous – perhaps it was selected as a soft spot, and the fills of both contained pottery assigned to the second half of the 2nd century. Pit 2389 was an unusual feature in that it was only 0.85 m square but 2.40 m deep with vertical sides and a flat base, though what its intended purpose was is unknown.

One other, small feature (2335) to the east of this group of three post-holes might have been related to the use of the Sanctuary complex. Pit 2335 was a small, shallow cut in the upper fill of quarry 300204 (see Fig 2.41), and in the base of this cut was a rectangular clay slab on top of which was the base of a pot, perhaps originally a complete vessel when placed on the slab. There was no cremated bone to indicate that this was a burial and nothing was recovered from the surviving fill of the vessel to suggest a specific function.

Building 400048

Located *c* 22 m north-east of portico structure 400020 was building 400048 (Fig 2.51). Only the foundations of the south-eastern half of this building survived, the north-western half having been entirely truncated by erosion. However, there was sufficient to show that the building's alignment broadly followed that of early Roman terrace 400045 (see above) and that it had been rectangular in plan, with an internal width of 4.5 m and a length in excess of 6 m. The foundations were shallow, approximately 0.75 m wide, and comprised a mixture of mainly crushed chalk – along with some larger pieces, flint nodules and occasional patches of mortar, presumably providing the base for a timber structure, quite different to anything which had previously occupied terrace 400045. A remnant of chalk floor (2606) survived in the south-eastern corner of the building and a small hearth (2771) lay adjacent to the south wall. Also towards the south-eastern corner was an oven (2711) with traces of burnt clay lining and partly filled with daub; this appears to have derived from the collapse of the building rather than the superstructure of the oven. Lying on the base at the southern end of oven 2711 was a complete poppyhead beaker, dated to AD 130–170, which appears to have been deliberately placed here after the oven went out of use. On the basis of the chronology ascribed to the preceding stratigraphic sequence on the terrace (see above), a date nearer to AD 170 than 130 is considered likely for the cessation of use of oven 2711 and perhaps also building 400048 as, with a single exception (an external post-hole), there were no surviving features or deposits in the immediate vicinity which contained pottery dating to beyond the end of the 2nd century. However, two intercutting pits (2899 and 2904) a short distance to the south-east (see Fig 2.41) produced material assigned to the second half of the 2nd and the late 2nd/early 3rd centuries respectively, and the presence of this material might reflect the continuing use of building 400048 into the beginning of the 3rd century. Further to the south-east were several other mid-Roman pits, which may also relate to the use of this building (see Fig 2.40 and also Fig 2.28 above). Pit 2359 was noteworthy amongst these as it was one of a tiny number of features on ARC SPH00 that contained late Roman pottery (of probable late 3rd century date), though only in the upper fill.

Immediately to the south of building 400048 were the remains of two successive yard surfaces, both comprising flint cobbles set in chalk foundation layers, the lower surface (not illustrated) cut by several small post-holes and the upper (2695/2697; see Fig 2.51) sealed by a spread (2699), the latter producing pottery no later than 2nd century in date. To the east of building

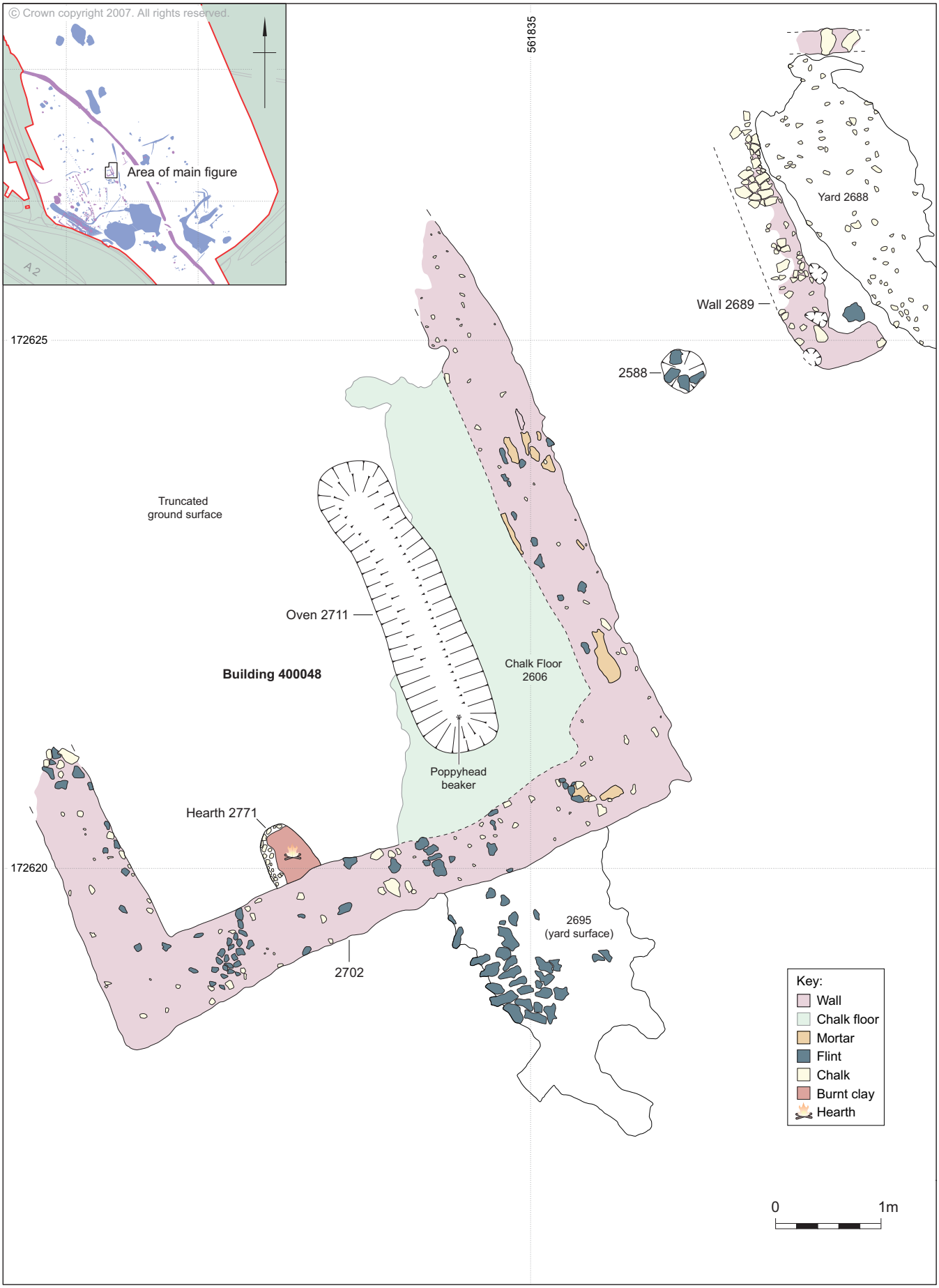

Figure 2.51 Building 400048

2687 were the insubstantial remains of what may have been a narrow wall (2689) built of flint nodules and apparently forming the western boundary to a gravel surface (2688), possibly a yard contemporary with the building. A further 5 m to the north-east, beyond ditch 300192, was a shallow L-shaped slot (300202; see Fig 2.40), perhaps a beam slot or wall trench defining the south-east corner of a rectangular timber structure measuring at least 5 m by 3 m and aligned south-east to north-west. Feature 2269 to the north was probably a dene hole (Fig 2.40), with mid-Roman pottery in the upper fill, its presence likely to have restricted the northern extent of structure 300202. This postulated structure was on the same alignment as building 400048, though whether the two were contemporary could not be established.

One other feature of interest which may have been contemporary with building 400048 was 2404, part of a complex of shallow pits some 20 m to the south-east (see Figs 2.40 and 2.52). This contained the remains of a neonate (2405), almost certainly a disturbed *in situ* burial not recognised as such during excavation, accompanied by three heavily truncated pots (pots 1, 2, and 4 on Fig 2.52) and sherds from a fourth vessel (pot 3). Pit 2404 probably cut an irregular, shallow grave to the south which also contained a neonate burial (2409), as well as pit 2406 to the north.

Enclosing ditch 400017

The east side of the Sanctuary complex was enclosed by a substantial and extensive ditch, comprising two sections (300046 and 300047), with a total length in excess of 225 m (Fig 2.40). There is nothing in the location, layout, extent and date of enclosing ditch 400017 to suggest that it served a defensive function or was part of an agricultural enclosure, and it seems certain that it was associated with the Sanctuary complex, perhaps effectively forming a *temenos* boundary.

The longer, north-western section of ditch (300046) was at least 150 m long, curvilinear and dug across the most steeply sloping part of the valley side, not following the contour of the slope, whilst the shorter southern section (300047), just 65 m long, was straighter and followed a more gentle gradient. Trackway 300045, running downslope on a curving course from east to west passed through the gap left between the two sections of ditch and seems certain to have originated earlier, probably in the later part of the 1st century AD (see above).

The extent of ditch 300046 to the north-west could not be determined as it continued beyond the limit of excavation, where it was sealed below at least 2 m of colluvium. However, excavation here showed it becoming shallower and it is possible that the ditch faded out as it approached the edge of the Ebbsfleet, in an area which fell away steeply close to the river. The ditch here appeared to avoid an earlier, Iron Age enclosure containing a group of small pits (400015; see Figs 2.2 and 2.3 above) and it is possible that this

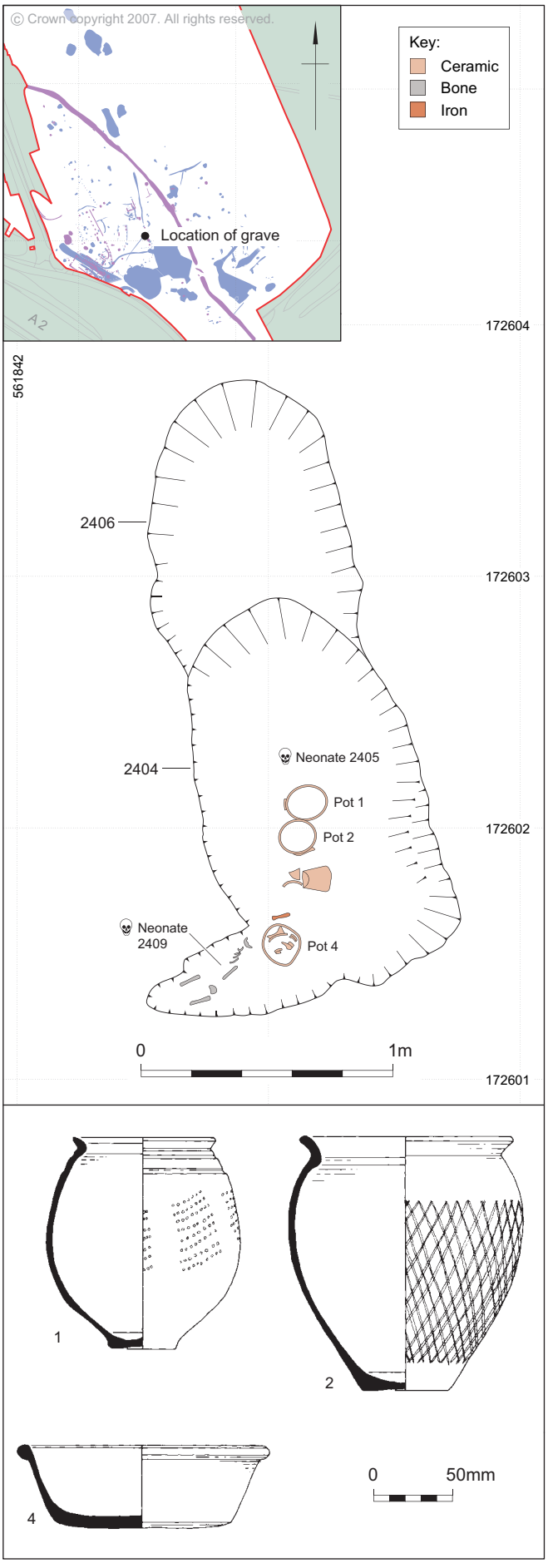

Figure 2.52 Burial group 2404, 2405, and 2409

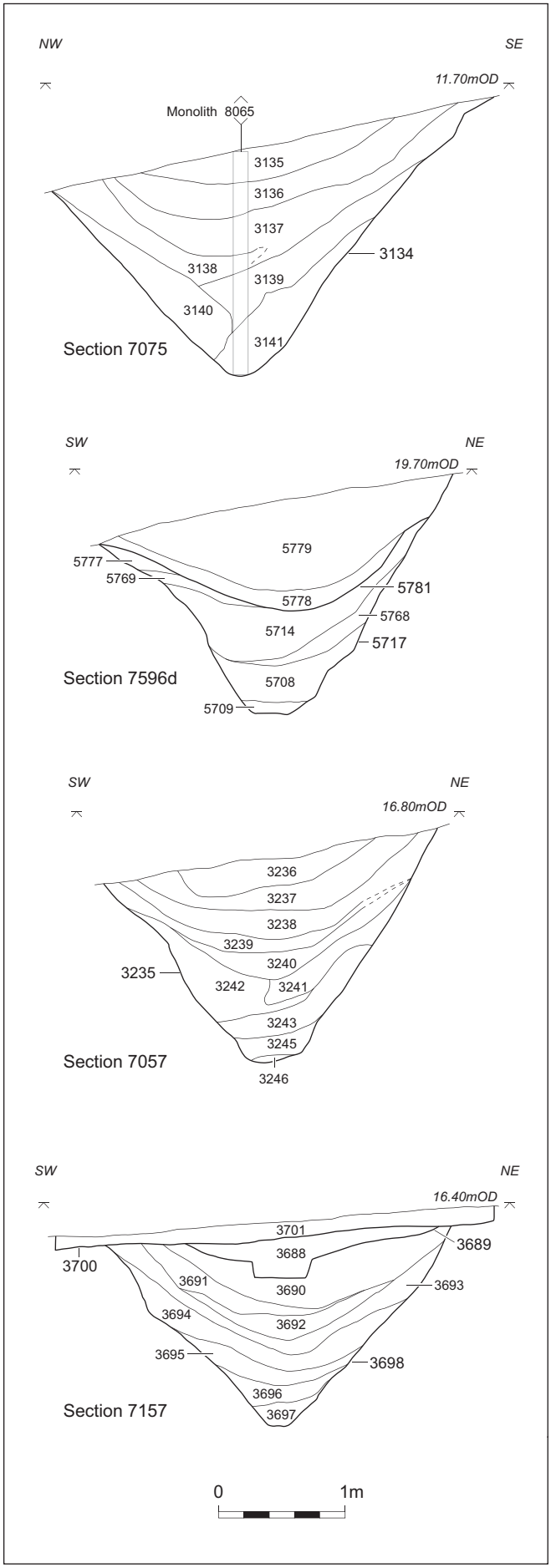

Figure 2.53 Sections through '*temenos*' ditch 400017

Plate 2.15 Mid-Roman grave 3428, prone burial (ARC SPH00). Looking south-east

enclosure was still visible when ditch 300046 was dug. To the south-east of this the ditch continued up slope and across the valley side, between earlier 'Viewing platforms' 400044 and 400045 and north of chalk quarry 300203, before turning slightly to the south and descending on a gentler gradient (see Figs 2.26, 2.28, and 2.40). For the most part ditch 300046 was 3–3.5 m wide and 2 m deep with a V-shaped profile (Fig 2.53). As elsewhere, there was surprisingly little evidence for natural silting of the ditch which was largely filled with what appears to have been domestic refuse, the origin and dating of which is discussed further below.

At its southern end, ditch 300046 had a rounded terminus which was mirrored by the opposing northern terminus of ditch 300047. Excavation of both terminals revealed no unusual deposits, but ritual shaft 2856 lay close to the terminus of ditch 300047 and immediately south of trackway 300045 (see Fig 2.40). Trackway 300045 lay in a shallow hollow-way where it passed through the 7.5 m wide gap between the two terminals, presumably created by the trackway being narrowed at this point. Only a small amount of metalling was present here and pottery indicates continued use throughout the mid-Roman period and quite possibly beyond.

Ditch 300047 followed the same alignment as ditch 300046 for a short distance down slope before turning to the south-east and continuing in a straight line for a further 45 m up slope where it terminated, the south-

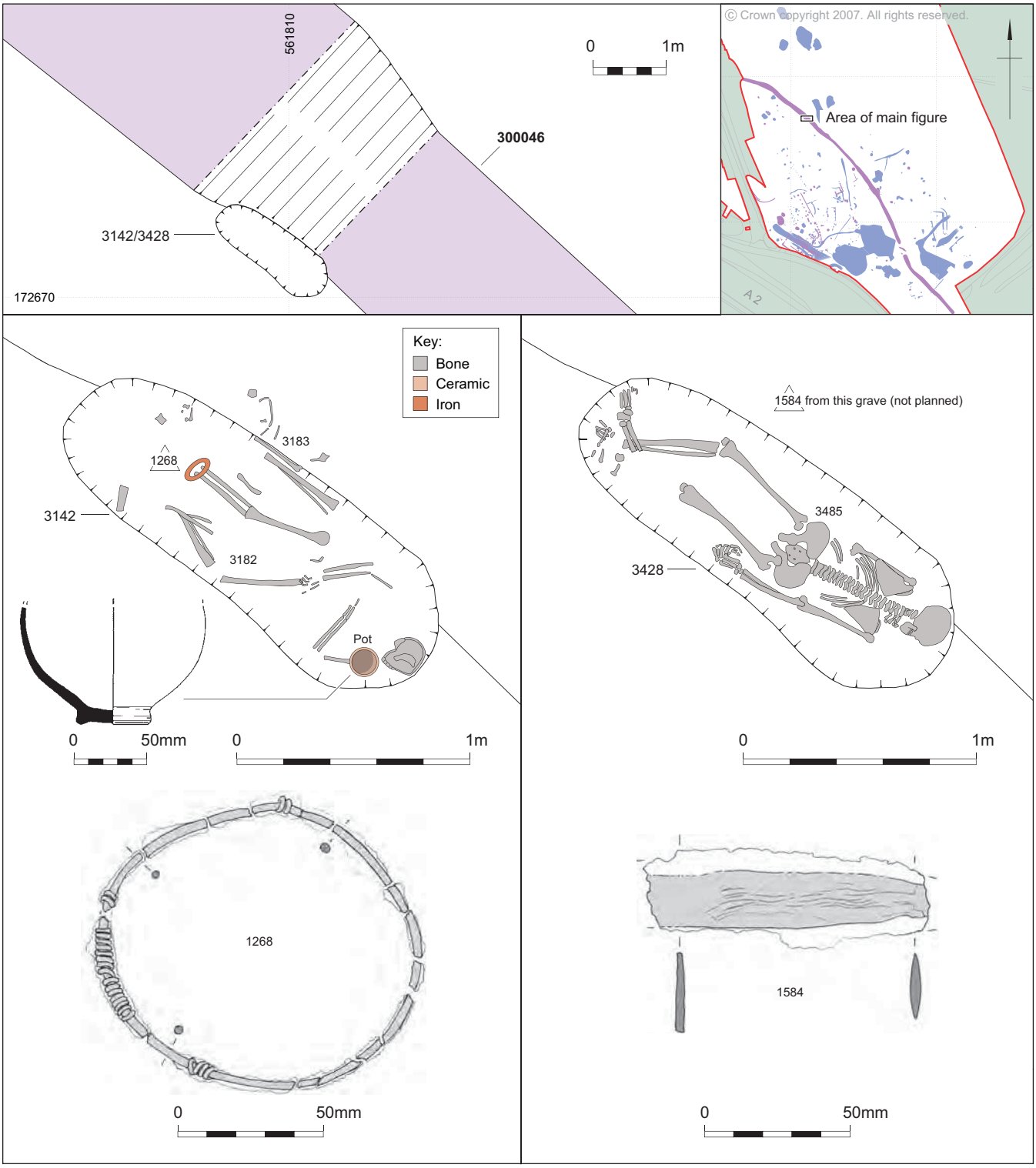

Figure 2.54 Graves 3142 and 3428 cutting through ditch 30046

eastern terminus being almost square-ended. The profile of ditch 300047 was very similar to that of 300046 to the north, but in places was slightly narrower and shallower (Fig 2.53). The change in alignment of ditch 300047 and why it terminated where it did are not easily explained unless it was respecting the late Iron Age ditches, or at least the surviving banks, less than 20 m to the west, which may have formed part of an early enclosure (400069) at the head of the Ebbsfleet (see above). Perhaps the surviving late Iron Age earthworks were incorporated into part of the later enclosing arrangements around the west and possibly the south sides of the Sanctuary complex.

The dating of the enclosing ditch rests largely on the pottery recovered from the various excavated segments, all of which produced relatively large assemblages. Although some segments produced exclusively early Roman material from the bottom fills, others contained mid-Roman pottery at the base and it is probable that the early Roman sherds were residual. Virtually all of

the middle and upper fills in all segments contained mid-Roman pottery, with the latest material being assigned to the mid–late 2nd century and nothing of certain 3rd century date.

The source of the large quantities of pottery and animal bone disposed of in the enclosing ditch is unclear and, as noted above, there was very limited evidence for occupation in the immediate vicinity. This suggests, therefore, that the refuse was brought to the site from elsewhere in the settlement and used to backfill the ditch, an explanation that is considered unlikely given its location, or else the material may represent the remains of ritual feasting occurring within the Sanctuary itself. The infilling perhaps occurred not too long after the ditch was dug because there was very little evidence for natural silting which would certainly have been expected, particularly on the most steeply sloping part of the valley side. Furthermore, the general absence of silting episodes within the ditch indicates that any associated bank must have been an internal feature on the western, downslope side, though no evidence for a bank had survived subsequent ploughing and erosion.

After the ditch had been almost completely backfilled a small number of features were cut into the top of it, serving in some way to emphasise or re-establish this boundary. Excavation in the central part of the southern section (300047) revealed part of a 0.45 m wide, shallow, flat-bottomed slot (3689) running along the centre of the infilled ditch (see Fig 2.53). How far slot 3689 extended to the north-west and south-east was unclear, as is its function, which seems unlikely to have been structural, and the latest pottery recovered from the fill and the layers overlying it was mid-Roman in date.

There were several inhumation burials in the ditch, with all of those recorded assigned to one of two groups within the northern section (300046). Grave 3142/3428, which was cut into the inner edge of the ditch towards the north end, contained a sequence of three individuals, of which two were articulated (3182 and 3485), both with their head towards the south-east end, and the third (3183) heavily disturbed (see Figs 2.40 and 2.54). The primary burial was 3485, an unusually large young male in a prone position (Pl 2.15). Next came 3183, an adult possible male, probably interred when the grave was re-opened, which perhaps resulted in the removal of the lower part of the right leg of 3485. Burial 3183 was itself disturbed by 3182, the final burial in the sequence, of an adult female which appears to have been laid on the left side with the arms and legs flexed. Burial 3182 was the only one in this group to be accompanied, the base of a jar assigned a mid-Roman date lying next to the skull, both truncated by later ploughing and erosion, whilst around the right ankle was a ring of twisted iron wire.

Approximately 70 m to the south-east of grave 3142/3428 was a large, shallow, sub-oval pit (300050) which cut the top of ditch 300046 and was on the same alignment (see Fig 2.40). The exact extent of pit 300050 was difficult to determine as it contained similar fills to those in the ditch, but it was approximately 12 m long, up to 4 m wide and a maximum of 0.80 m deep. Its purpose is unclear, but buried quite close together within the upper fills were three neonates, all aged 0–12 weeks, along with the redeposited remains of at least one other individual. Grave cuts could not be distinguished, though these were probably present, and pottery from the fills indicates a late 2nd or early 3rd century date for both the filling of the pit and the burials.

A further, apparently isolated grave (2308) lay approximately 25 m downslope to the west of grave 3142/3428 and this too has been assigned a mid-Roman date (see Fig 2.28). Grave 2308 had been dug through mid-Roman pit 2311 which itself was cut through two earlier pits (see Fig 2.30). The grave contained an unaccompanied inhumation burial (2309) of an adult male aged *c* 50–60 years, aligned north-west to south-east. The grave was at least 0.75 m deep and there was nothing to suggest that there was anything irregular about the burial other than possibly its isolated location close to the Ebbsfleet.

Ritual shaft 2856

This 4.5 m deep pit or shaft (Fig 2.55) was dug less than a metre to the north-west of the northern terminus of the southern section of the Sanctuary enclosing ditch (300047; see Fig 2.40). The location of shaft 2856, at an entrance to the area around the Sanctuary complex and adjacent to trackway 300045, is likely to have been a significant factor in terms of both its function and the sequence of deposition recorded. This feature was unique amongst the pits recorded on site for the sequence of 'structured deposits' it contained, from the bottom to within a metre of the top, and it seems certain that these various deposits should be attributed to some form of ritual activity associated with the use of the Sanctuary complex.

All except the uppermost part of the shaft was cut through chalk, and its shape in plan varied with depth, from sub-circular to sub-oval and, in places, sub-rectangular, with a pronounced step in the south side near the top.

At its base, which was flat, shaft 2856 was sub-circular, with a slight undercut on the north-west side. Lying on the base was a calf skeleton, its back tight against the south-west side of the shaft, perhaps dropped rather than deliberately placed in this position, given the restricted space (Pl 2.16). Above this, in the basal layer (6620), were the skeletons of six dogs, a pig, and three domestic fowl. Possibly as many as two or three of the dogs had chains with them, but because of time constraints imposed by impending construction work it was not possible to establish the exact associations or arrangements of these dog burials. A further six dog burials came from overlying layer 6619 and again it was not possible to establish their layout, though none of these had associated chains. Pottery from both layers 6619 and 6620 includes some material assigned a late 2nd century date and it seems unlikely, therefore, that shaft 2856 was dug and infilling began much before the final quarter of the 2nd century making this a relatively

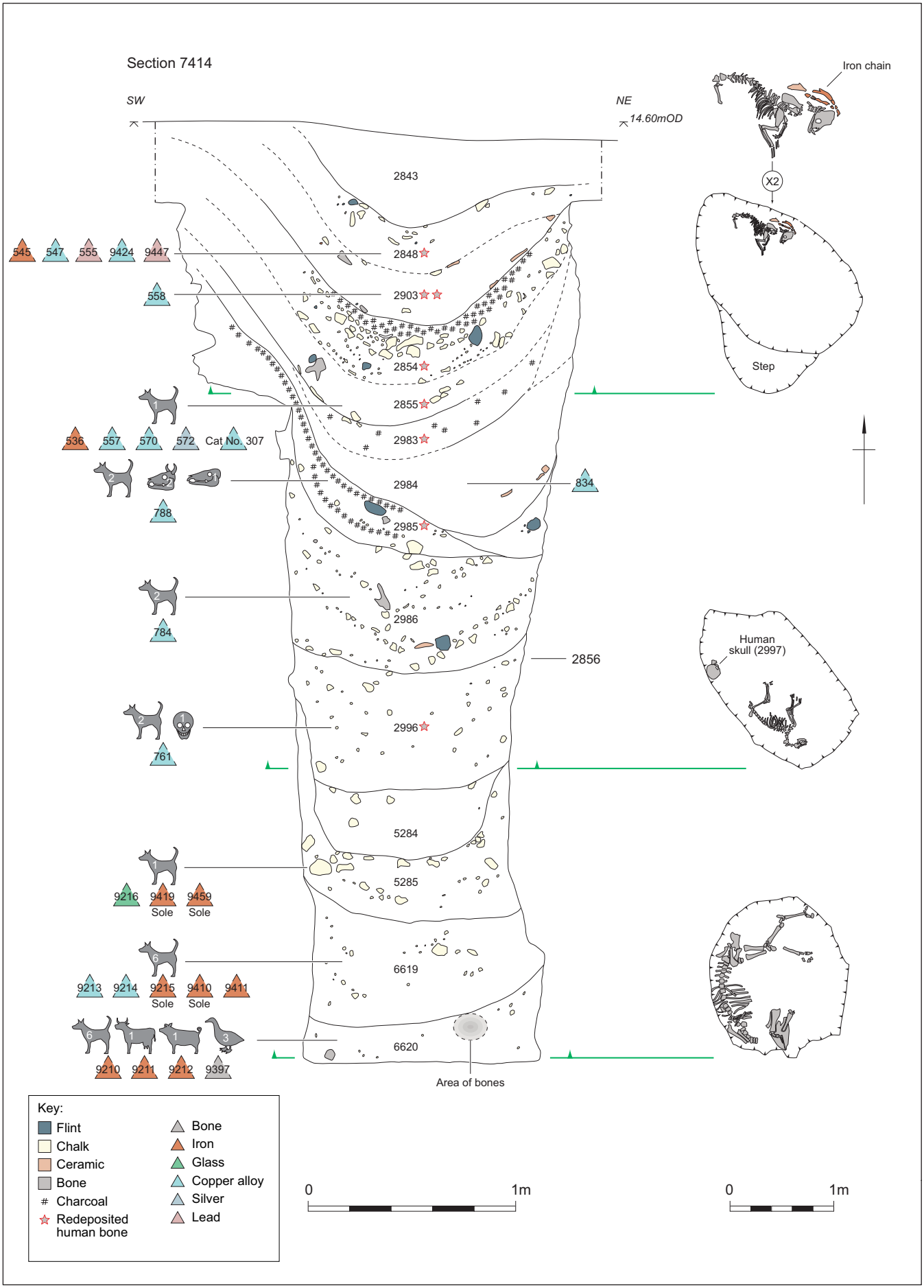

Figure 2.55 Ritual shaft 2856

Plate 2.16 Mid-Roman 'ritual shaft' 2856; cow skeleton in base (ARC SPH00) (1 m scale). Looking west

Plate 2.17 Mid-Roman 'ritual shaft' 2856; base of layer 2996, showing dog skeleton and human skull (1 m scale). Looking north-west

late feature within the main period of use in the Sanctuary complex.

The nature of the junction between layers 5284 and 5285 hints at the possibility that the upper part of the shaft was emptied at a later date, though there is nothing in the pottery sequence which might suggest this, and it is more likely perhaps that layer 5285 was in a soft, relatively liquid state and had been 'squeezed' up the sides of the pit under the weight of the overlying material. This layer contained only a single dog skeleton, but at the base of layer 2996 higher up in the shaft were two dogs, including one relatively large animal which appeared to have been laid out rather than dumped in the pit (Pl 2.17). Also at the base of layer 2996, and lying against the north-west edge of the shaft, was a human skull and mandible, that of an adult male (context 2997). The absence of any cervical vertebrae has been taken to suggest that they were deposited as dry bone (see McKinley, Vol 3, Chap 1). Pottery from layer 2996 indicates a mid-2nd century date for these structured deposits, though the mid–late 2nd century material from the bottom fills of the shaft suggests that a date in the final quarter of the 2nd century might be more likely, though the lower half at least of the shaft may have been filled very rapidly.

Small quantities of redeposited human bone, usually single occurrences, were recorded from seven of the fills in the upper half of shaft 2856, in addition to the skull from layer 2996. These other human bones came from layers 2848, 2903, 2854, 2855, 2983, 2985, and 2986, with those from 2903 deriving from a minimum of two individuals. Neonate bones were present in five contexts, a subadult/adult in one context and an adult in another. Whether any of these other bones were deliberately selected for deposition in the shaft is uncertain, though this is perhaps unlikely, particularly for those in 2855 and above, layers which probably post-date the ritual use of the shaft (see below).

Layer 2986 produced a further two dogs, and above this was layer 2985 which was distinguished by a concentration of charcoal and was rich in malted grain waste. Layer 2985 also produced two dogs, and at the interface of this and layer 2986 below were two cow skulls and one pig skull. Although these skulls had been badly crushed by the weight of overlying material, it seemed clear that they had been deliberately placed around the edge of the shaft, which here was sub-oval in plan. Although the pottery from layer 2985 could only be assigned a broad mid-Roman date, layer 2986 is late 2nd century and layer 2984 above early 3rd century, suggesting a date for the structured deposits in layer 2985 of around AD 200.

Only one dog burial was found above layer 2985, this example occurring in layer 2855, where the dog appeared to have been laid out near to the edge of the shaft, with a chain folded behind its head. This might be interpreted as a 'closing deposit' within the shaft, particularly because the layers above this contained much abraded material and probably represent a combination of natural accumulation and deliberate levelling of the hollow which formed in the top of the shaft as the contents settled. Pottery from 2855 indicates an early to mid-3rd century date for this layer and it is likely, therefore, that the final dog burial in the shaft probably took place during the first quarter of the 3rd century.

The chalk and flint in layer 2854 is likely to be a capping layer and may have formed what was once part of a more extensive metalled surface associated with trackway 300045. This layer produced pottery of mid-3rd century or later date, whilst material from the layers above extended the range into the late 3rd and possibly the very early 4th century, indicating that the trackway probably continued in use into the late Roman period. If so then it probably represents one of only two or three features of this date recorded on ARC SPH00, and the pottery is almost certainly the latest assemblage from this site.

The Roadside Settlement on the West of the Ebbsfleet Valley (ARC SHN02)

Excavations on the west side of the valley (ARC SHN02), *c* 100 m from the Sanctuary site, exposed a relatively large part of the early to mid Roman settlement at Springhead, including a temple and substantial sections of Watling Street road, but there were few features or finds of earlier or later date (Fig 2.56; Pl 2.18).

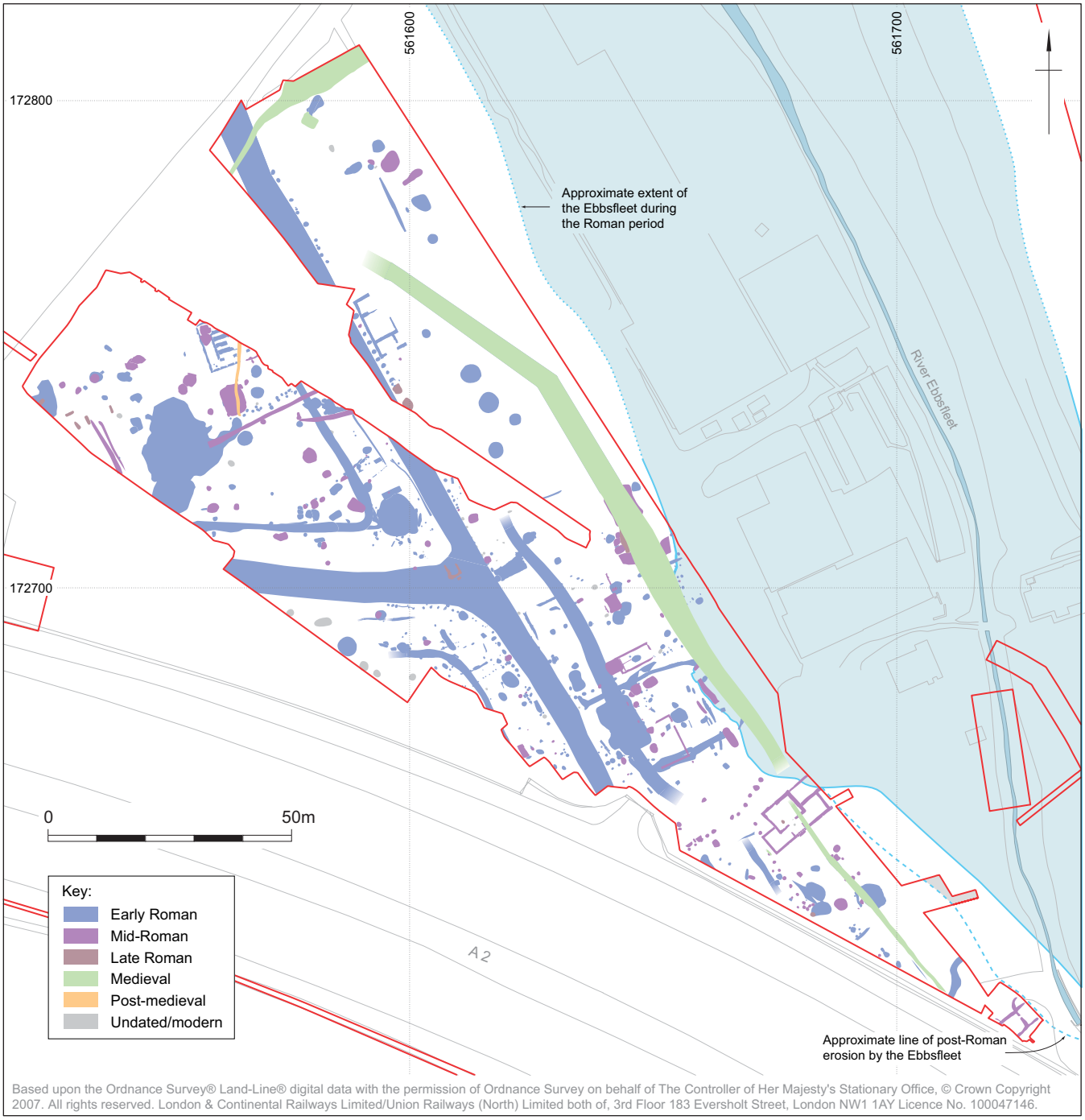

Figure 2.56 Phased features on the west side of the Ebbsfleet Valley (ARC SHN02)

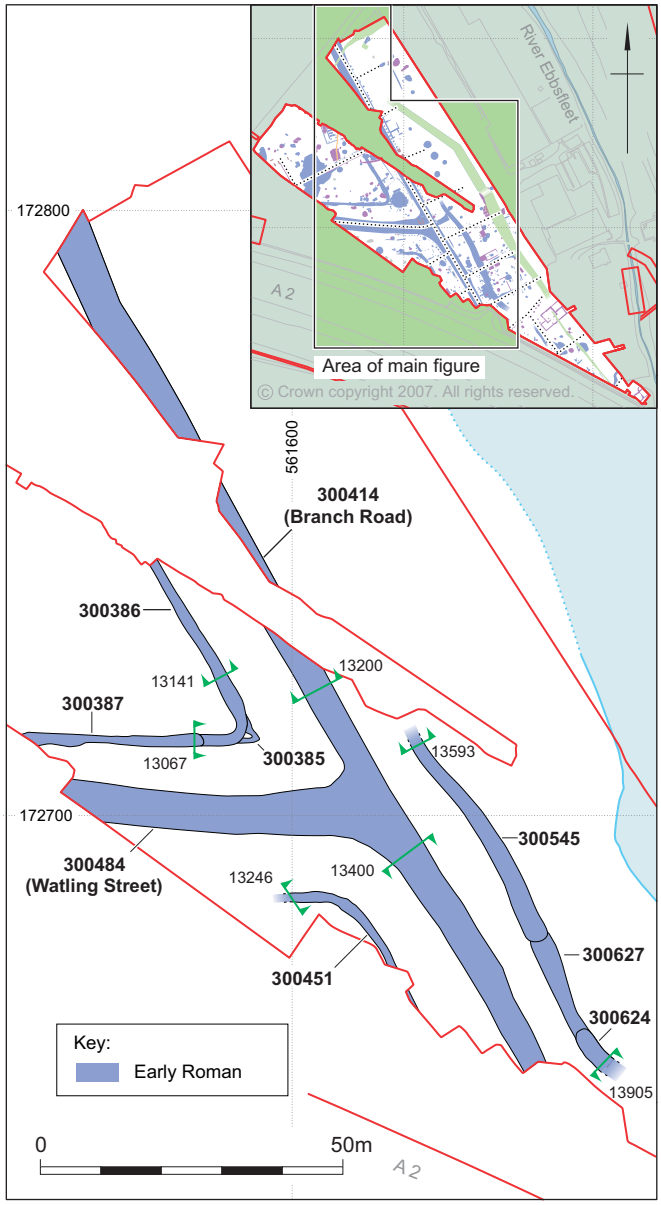

Figure 2.57 Roads and roadside ditches

Plate 2.18 General view of Springhead Nursery site (ARC SHN02), taken from valley side on ARC SPH00, with A2 in background. Looking west

Plate 2.19 General view of Springhead Nursery site (ARC SHN02) under excavation; curving line of Watling Street to right, chalk footings of roadside shrine 16662 in left foreground. Looking south-east

Roads and Roadside Ditches

The excavations (specifically ARC SHN02/W51724) exposed significant elements of the street layout within Springhead and, in particular, enabled the course of Watling Street (designated R1 in earlier investigations) through this part of the settlement to be clarified (Fig 2.57). For most of its course in this area, to the west of the Medway, Watling Street lies beneath the modern A2 (built in the 1920s and widened in 1964) and has probably been substantially damaged or destroyed by works associated with what is now a dual carriageway. For this reason, the HS1 and some of the earlier investigations have provided important evidence concerning the layout and construction of this Roman road. In addition, the junction of Watling Street with a branch road (designated R2 in earlier investigations) lay within the excavation area, the branch road continuing the alignment of one section of Watling Street to the north-west, towards the villa site at Northfleet and the Thames. Both roads appear to have been primary elements in the layout of the settlement in this part of Springhead and, furthermore, it is clear that Watling Street and the branch road were established at around the same time and that both continued in use throughout the life of the settlement, into the late 4th century and probably beyond.

Watling Street survived as the pre-eminent east–west route in this part of north Kent until the 17th century when it was superseded in importance by the road, subsequently turnpiked, running along the south side of the Thames between Dartford and Rochester, passing through Gravesend and Northfleet (Panton and Lawson 2004; see Chap 5). As a result, Watling Street became little more than a rural track, its course in places defined only by field boundaries, until it was re-established on its former, Roman, course during the 1920s. There is also some evidence to suggest that at least part of the branch

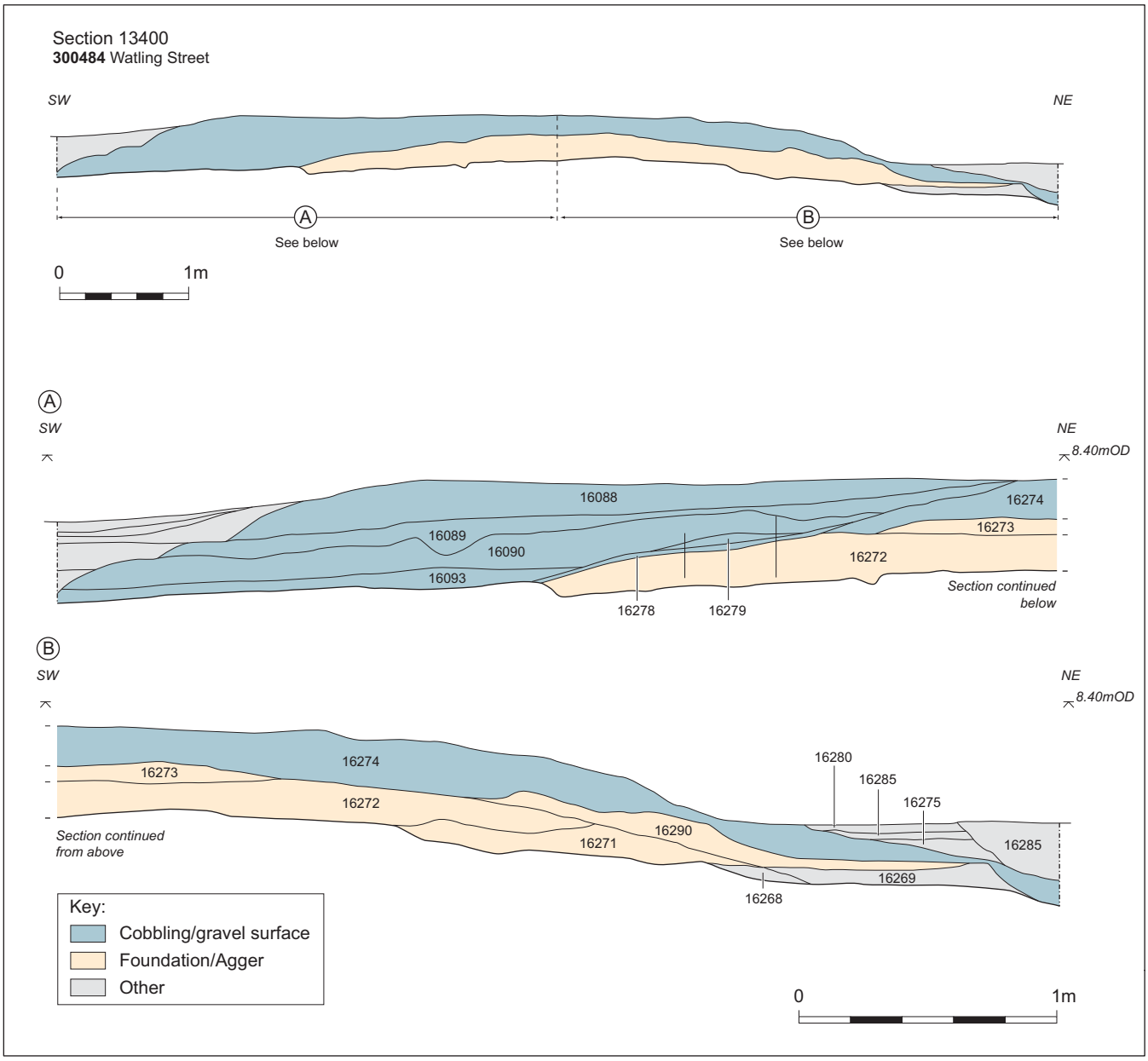

Figure 2.58 Sections through Watling Street

road was re-used in the medieval period, forming an element of a trackway which provided access to the springs at the head of the Ebbsfleet (see below).

Watling Street (300484)

Approximately 100 m of Watling Street was recorded (Fig 2.57; Pl 2.19), approaching from London and Dartford on an almost exact west–east alignment, then turning to the south through 45° to avoid the Ebbsfleet, and continuing (beyond the limit of excavation) for another 300 m or so where it then zig-zagged at a shallow angle around the head of the Ebbsfleet (and past the central temple complex) before continuing eastwards towards Rochester (see Chap 4, Fig 4.2). Evaluation trenching undertaken 0.5–1 km to the west of Springhead and immediately to the south of the A2 (at ARC PCR02) revealed no evidence for Watling Street (or any other features) here (see Chap 1, Fig 1.3), on the course indicated by Ordnance Survey mapping, and appears to confirm that the Roman road lies beneath its modern successor, as it does to the east of Springhead.

Gravel metallings did not survive on most of Watling Street where it was exposed west of its junction with the branch road, these having been truncated by modern terracing for glasshouses, though the course of the road was clearly indicated by the alignment of the roadside ditches (Fig 2.57). Where metallings did survive, around and to the south-west of the junction, they were a maximum of 0.45 m thick and showed the road to be up to 7.5 m wide (Fig 2.58). The underlying *agger* was approximately 5 m wide and 0.20 m thick in the centre and had been formed by creating a low embankment of the natural silts. With the exception of a few isolated, undated stake- or small post-holes, possibly associated

with the laying out or construction of the road, no deposits or features were identified below the *agger*. The earliest metalled surface (16274, along with 16278 and 16279) overlay the *agger*, but a sequence of at least four later surfaces (16093, 16090, 16089, and 16088) was largely confined to the south-west side and probably represents an increase from an original width of around 5 m up to a final width of 7.5 m for the road, perhaps corresponding with the recutting and extension of the roadside ditches (see below). From the excavated sections it was clear that the successive road surfaces had been kept clear of refuse and very few finds were recovered from them. The latest coins from the uppermost surviving surface dated to AD 350–360.

Branch Road (300414)

The branch road (300414) was recorded over a distance of 100 m within the excavation area (Fig 2.57), though some parts lay outside the areas investigated and the metallings towards the north-west end had been largely truncated by modern glasshouse construction. However, sufficient survived here to show that the alignment of the road may have changed very slightly to follow a more northerly route. Evaluations undertaken in 1997 as part of the HS1 programme (URL 1997a) and in 2005 as part of subsequent works (WA 2005) appear to confirm this minor re-alignment, though further excavation is awaited to demonstrate this with certainty. These two evaluations have also demonstrated that settlement extended for approximately 100 m alongside this road beyond the limit of the excavations reported on here, though they indicate a rapid fall-off in the density of occupation (see Chap 4, Fig 4.2). In addition, a small inhumation cemetery and a rather larger cremation cemetery have been recorded in these evaluations, both cemeteries lying to the east of the road, at or just beyond the limit of settlement, the cremation cemetery close to the edge of the Ebbsfleet. Further to the north-west, the branch road has been destroyed by modern chalk quarrying, though part of what may have been this road was exposed in work at Swan Valley School, Swanscombe on higher ground approximately 1 km to the north-north-west, where a substantial rectangular enclosure containing a square structure (both with rubble foundations) of Roman date was excavated.

The branch road was approximately 5 m wide, with a maximum of three surviving metallings (10602, 10605, and 10601) with a combined thickness of up to 0.25 m (Fig 2.59). There was no clear *agger* in any of the excavated sections and the metallings appeared to directly overlie natural deposits; no features were identified beneath these metallings. In one area, close to the junction, the road may have been widened to around 6 m on the north-east side, though the metalling (10644) may simply represent a yard surface contiguous with road surface 10602, with 10641 perhaps the make-up for this surface. As with Watling Street, the road had been kept clear of refuse and virtually no associated finds were recovered.

Roadside ditches

Roadside ditches were found flanking both Watling Street and the branch road (see Fig 2.57), varying in dimensions, the nature of their fills and the number of phases identified. Individual details of these ditches are described below as far as they relate to particular roadside properties, but they are discussed here in more general terms.

All of the ditches appear to have been dug in the third quarter of the 1st century AD, though the earliest section of one alongside Watling Street may date to immediately after the Conquest. They probably remained open for no more than two or three decades and, with one exception (which was re-cut in the late 1st or early 2nd century), went out of use and were built over or had pits dug through them before the end of the 1st century.

The apparent absence of a ditch on the north-east side of the branch road can in part be explained as a result of extensive modern terracing for glasshouses in this area, but it is also possible that any surviving elements were not recognised, for the fills of this ditch (300545) a little further to the south (Fig 2.60, section 13593) comprised mainly homogeneous deposits of silt which were very difficult to distinguish from the natural. Close examination of a section at the north end of the site also failed to identify any trace of a ditch in the location anticipated, and though it is possible that it did not extend this far, this seems unlikely as a ditch (300386) was found on the south-west side of the branch road. Future excavation immediately to the north-west of the site should clarify the extent of these roadside ditches.

There was in most places a gap of 7.5–8.5 m between the edges of the roads and the associated roadside ditches, though the gap was reduced to as little as 6.25 m along the north-east side of Watling Street. This may reflect the proximity of the edge of the Ebbsfleet in this area, though it might be noted that the ditch (300345) was a little wider than the others and followed a very slightly meandering course.

The overall plan of the ditches clearly demonstrates that the branch road was not a significantly later addition to Watling Street, for the layout of ditches mirrors that of the roads (Fig 2.57). There is, however, evidence which indicates that the roadside ditches alongside Watling Street may have been progressively extended north-westwards as the settlement grew in size. At least three and possibly four phases of ditch have been identified within the south-east corner of the site (Fig 2.60, section 13905), the earliest (300624) dating to around the Conquest and producing what is amongst the very earliest Roman pottery from the excavations. The terminus of this ditch corresponded approximately with the (later) boundary between properties 2 and 3 (see below), whereas its successor (300627) continued for a further 15 m as far as what became the boundary between properties 3 and 4. These ditches both contained moderate quantities of domestic debris, presumably brought in from what is assumed to be the

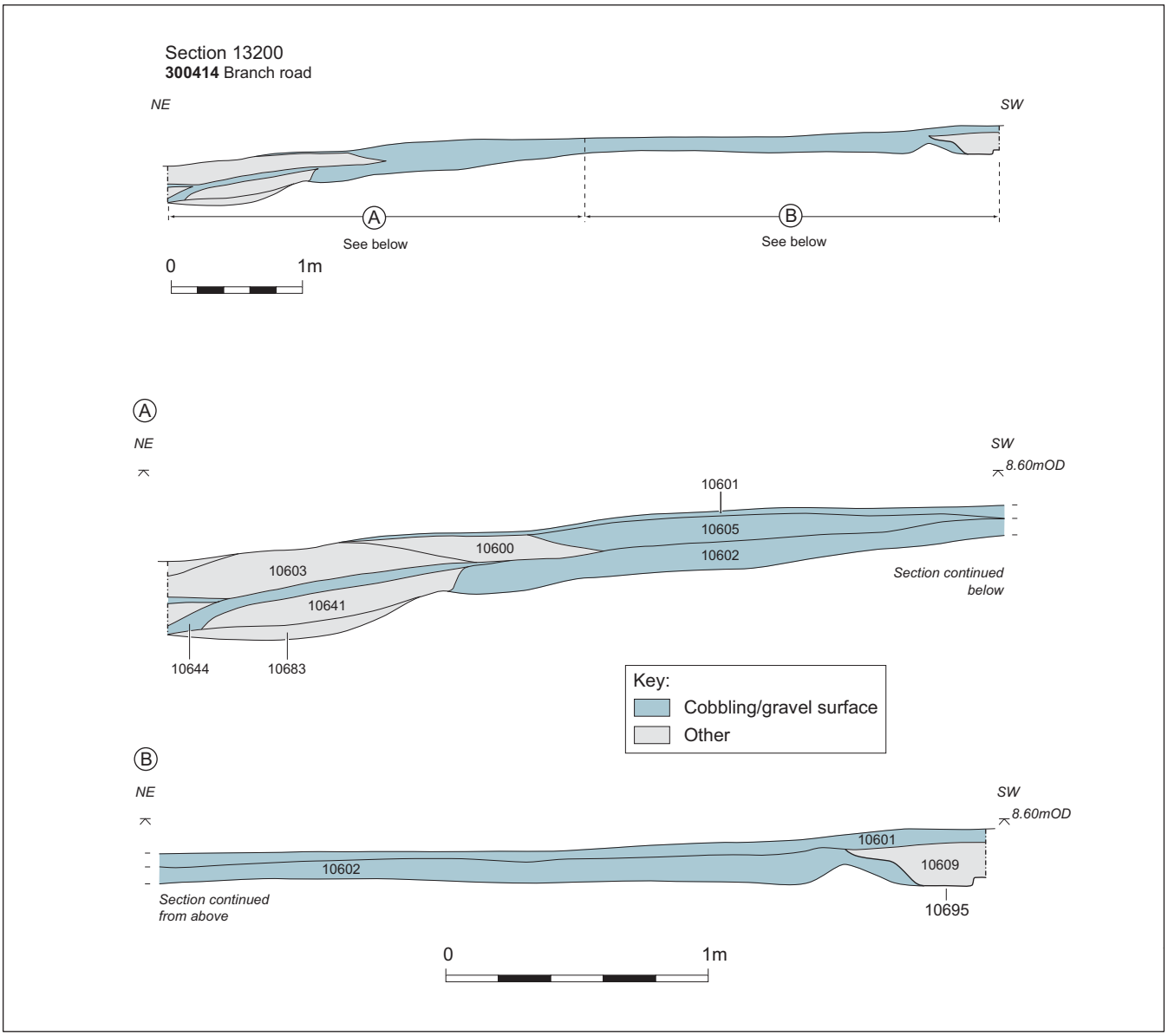

Figure 2.59 Section through branch road 300414

earliest part of the settlement to the south-east, but the final re-cutting and extension of the ditch (300545) contained very little debris, particularly to the north-west where the fills had largely accumulated through natural silting. All phases of ditch on the east side of the Watling Street were characterised by their U-shaped profiles, and this contrasts with the more V-shaped profiles of the ditches to the west.

Only one phase of ditch 300451 to the south-west of Watling Street was recognised though it is possible that at least two phases were present, reflecting the early ditch sequence to the north of Watling Street and west of the branch road. Here, only a small part of the earliest ditch (300385) survived, in the angle between the two roads, where it had not been removed when the ditch was recut. The fill of ditch 300385 comprised entirely natural silting and its successor (300386), like ditch 300451 to the south of Watling Street, also contained mostly silted deposits, along with a small assemblage of finds, presumably reflecting the distance from the nearest contemporary buildings which are likely to have lain at least 50 m to the south-east. The final phase of ditch (300387) in this area was confined to the north side of Watling Street and post-dated all of the other roadside ditches. Ditch 300387 was probably dug towards the end of the 1st century and may have remained open throughout the first quarter of the 2nd century, but why only this part of the roadside ditch should have been recut is unclear. Its extent to the east appears to have respected a circular structure standing in the angle between Watling Street and the branch road in property 11 (see below), and it continued beyond the limit of excavation to the west. Perhaps it served as a boundary feature within property 11 rather than representing a more extensive recutting of the roadside ditch. Ditch 300387 was deeper than the other roadside ditches and was characterised by a narrow slot along the base (see Fig 2.60, section 13067). Furthermore, it contained a relatively complex sequence of fills, these being much darker and containing substantially more

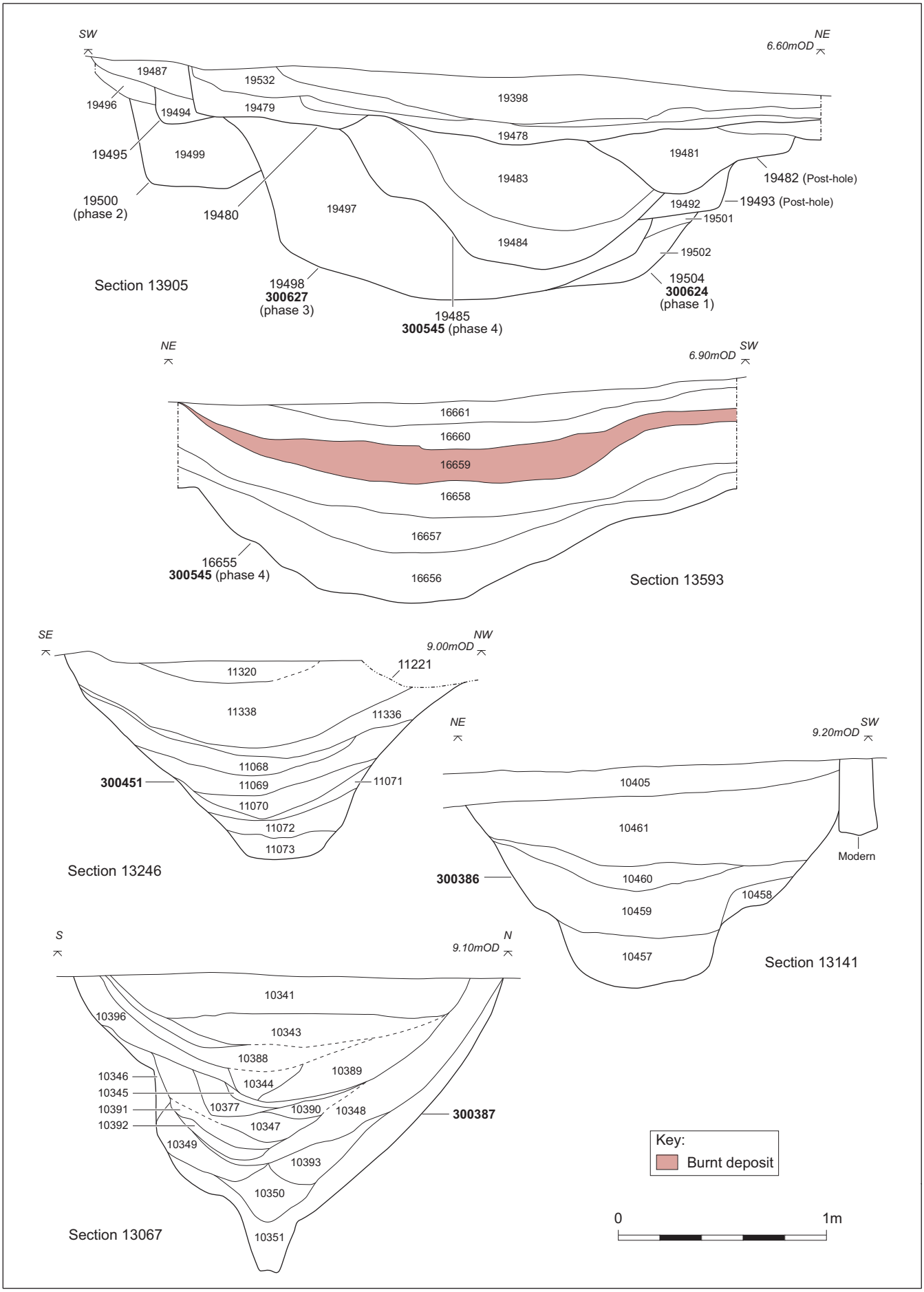

Figure 2.60 Sections through roadside ditches

finds than any of the other ditches, the finds apparently representing domestic debris, though part of an adult human skull from context 10186 might be interpreted as a 'placed' deposit.

Roadside shrine

Overlying the latest metalled surfaces on the north-west edge of the junction of Watling Street and the branch road were the insubstantial remains of what has been interpreted as a shrine (see Figs 2.56 and 2.61; Pls 2.19–20). This was represented by what originally may have been a rectangular arrangement of chalk footings (16662), measuring approximately 3.3 m by 2.6 m, though the north end had been truncated and elsewhere the chalk survived as little more than a spread a few centimetres thick. There were no foundation trenches and no structure was apparent within the chalk spread, though the edges were clearly defined in places. These indicated that the footings along either side were approximately 0.5 m wide and that facing the street junction 0.75 m wide. In front of this was a rectangular chalk footing (16663) measuring 0.75 m by 0.60 m, perhaps a step or a plinth of some form. Despite modern truncation, remnants of a dark spread (16640) survived within the main structure and from this came 17 coins, the assemblage spanning AD 260–402, and seeming to represent deliberate deposition within the structure, though what form this took is impossible to reconstruct from the scant surviving remains.

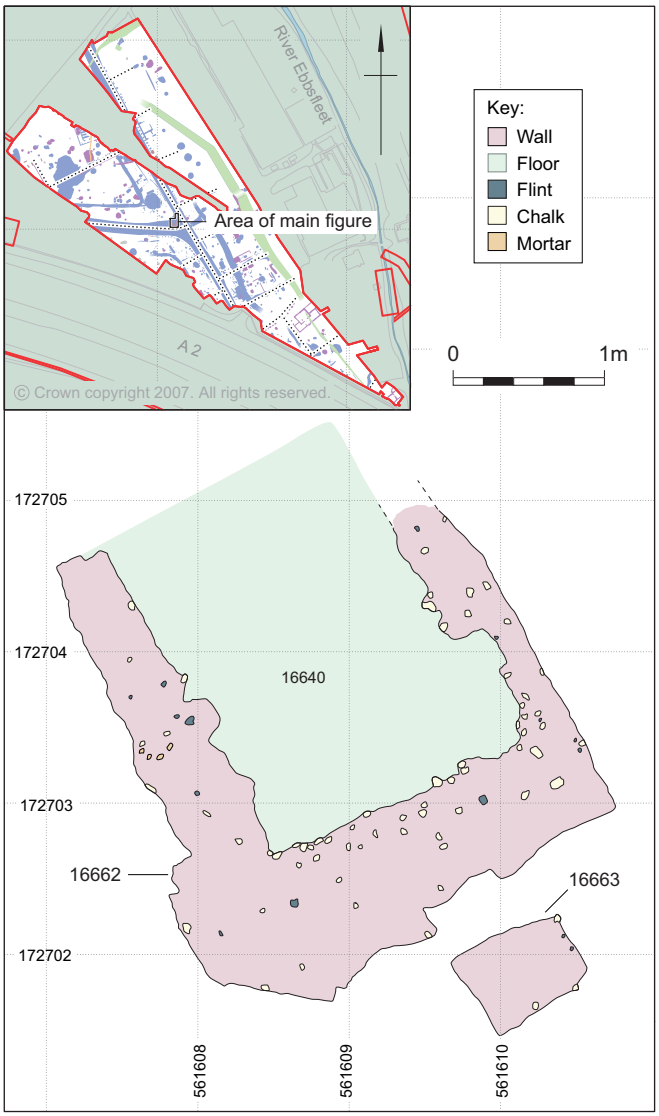

Figure 2.61 Late Roman roadside shrine 400147

The Roadside Properties

Twelve properties were identified during the HS1 excavations west of the Ebbsfleet (ARC SHN02), all aligned with and fronting onto either Watling Street or the branch road to the north-west (Fig 2.62). These properties are described below.

Property 1

Only a very small part of property 1 was exposed, in the extreme south-eastern corner of the area available for excavation (Fig 2.63). Property 1 lay on the north side of Watling Street with property 2 to the north-west, a shallow irregular ditch (12163) possibly marking the boundary between the two properties. The street frontage itself lay a minimum of 40 m beyond the limit of excavation, and the northern edge of the property showed clear evidence of having been eroded by the Ebbsfleet in the post-Roman period, with the loss of approximately 10 m of ground in this area. It is probable that increased erosion along this edge of the channel occurred as a consequence of the accumulation of colluvium at the base of the slope on the north-east side, thereby forcing the channel further to the south-west. This colluviation is likely to have taken place in the medieval period, a result of cultivation of the steeply sloping valley side above.

Within the limited area investigated were the remains of a building, interpreted as a possible bath-house,

Plate 2.20 Chalk footings of roadside shrine 400147 (ARC SHN02) (2 m scales). Looking south-east

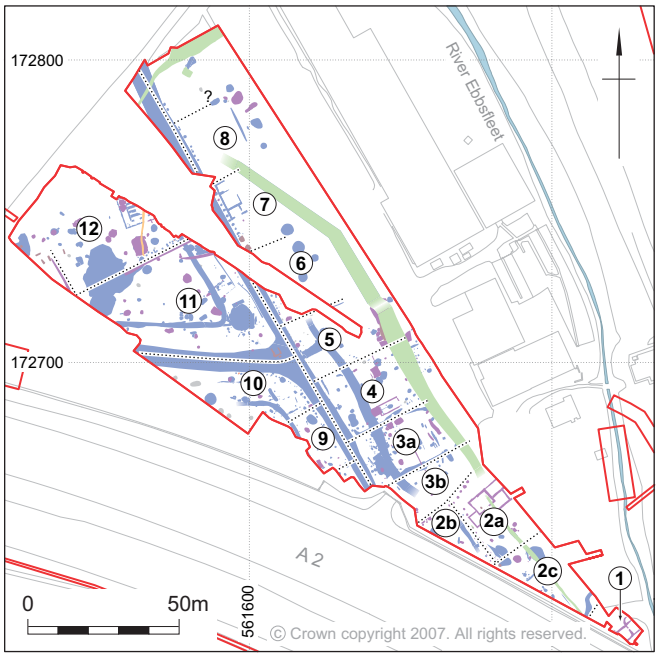

Figure 2.62 Roadside properties 1–2

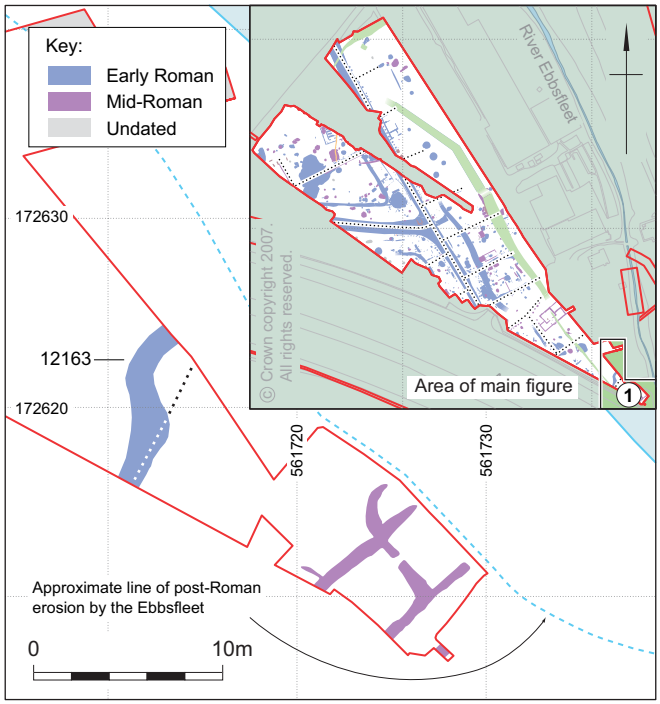

Figure 2.63 Property 1

extending beyond the edge of excavation to the south-east and south-west and destroyed by channel erosion to the north-east. There was, furthermore, some evidence to suggest that this structure had been partly uncovered and investigated during the 19th century (see below), resulting in the loss of some associated deposits.

No earlier or later structural phases were identified in the property and it might be surmised that the building was a long-lived structure, though this must be tempered by the fact that so little could be excavated and virtually no associated pottery was recovered. Certainly, there appeared to be a homogeneous layer of dark soil approximately 0.6 m thick overlying the natural and underlying the building in this area which may reflect earlier occupation within the property, or at least a phase of dumping or levelling prior to construction of the putative bath-house. On this admittedly rather tenuous basis a 2nd century, mid-Roman rather than a 1st century date might be suggested for the construction of the building, though there was nothing to indicate when it may have fallen into disuse.

The building (Fig 2.64) was represented by a series of substantial wall foundations or footings constructed in foundation trenches up to 0.75 m wide and approximately 1 m deep. In general the footings comprised a basal layer made up mainly of flint nodules, overlain by a mixture of chalk lumps and smaller fragments along with some flint nodules set in brown sandy clay. In only one place was there any surviving trace of the walls above footing level, comprising a mixture of chalk and flint in a relatively hard yellowish white mortar.

Two parallel walls (19551 and 19572) ran north-east to south-west, 3.75 m apart, with a dividing wall creating two adjacent rooms. The lengths of these rooms could not be established and only in that to the south-west were there any remains of a surviving floor. Here, one complete and a few fragments of tile were found embedded in a thin layer of pale pink mortar (19573), the remainder presumably having been robbed. The complete tile measured 0.24 by 0.20 m, similar to but very slightly smaller than those in the late 2nd century temple in property 2 (see below). Immediately above this floor was a deposit approximately 0.2 m thick which contained a small quantity of undiagnostic Roman pottery and a rather larger amount of mid-19th century pottery. It is suggested below that the latter was deposited during the time that this building may have been open for public viewing as one of the attractions at Springhead pleasure gardens. All trace of any floor surface in the room to the north-east had been destroyed through a combination of channel erosion, 19th century disturbance, and a more recent pipe trench. Bonded to the north-west side of wall 19551 was a semi-circular wall (19558), the northern part of which had been destroyed through erosion, and 3.5 m to the south of this were the remains of possibly a second semi-circular wall (19548), a small part of which was exposed on the edge of the excavation. Within the area enclosed by semi-circular wall 19558 was a circular cut (19559), 1.20 m in diameter and 0.25 m deep, which contained several layers of loose, possibly redeposited material, perhaps representing a Roman feature disturbed in the 19th century. There was some burnt clay present, but no Roman pottery, though the absence of any modern material in the fill might support an earlier date. Wall 19554 appears to have been later, butted at right-angles to the outside of wall 19551, between semi-circular walls 19548 and 19558, but only a very short length survived and its function is unclear. No contemporaneous, external surfaces were identified in this area which had seen extensive later disturbance.

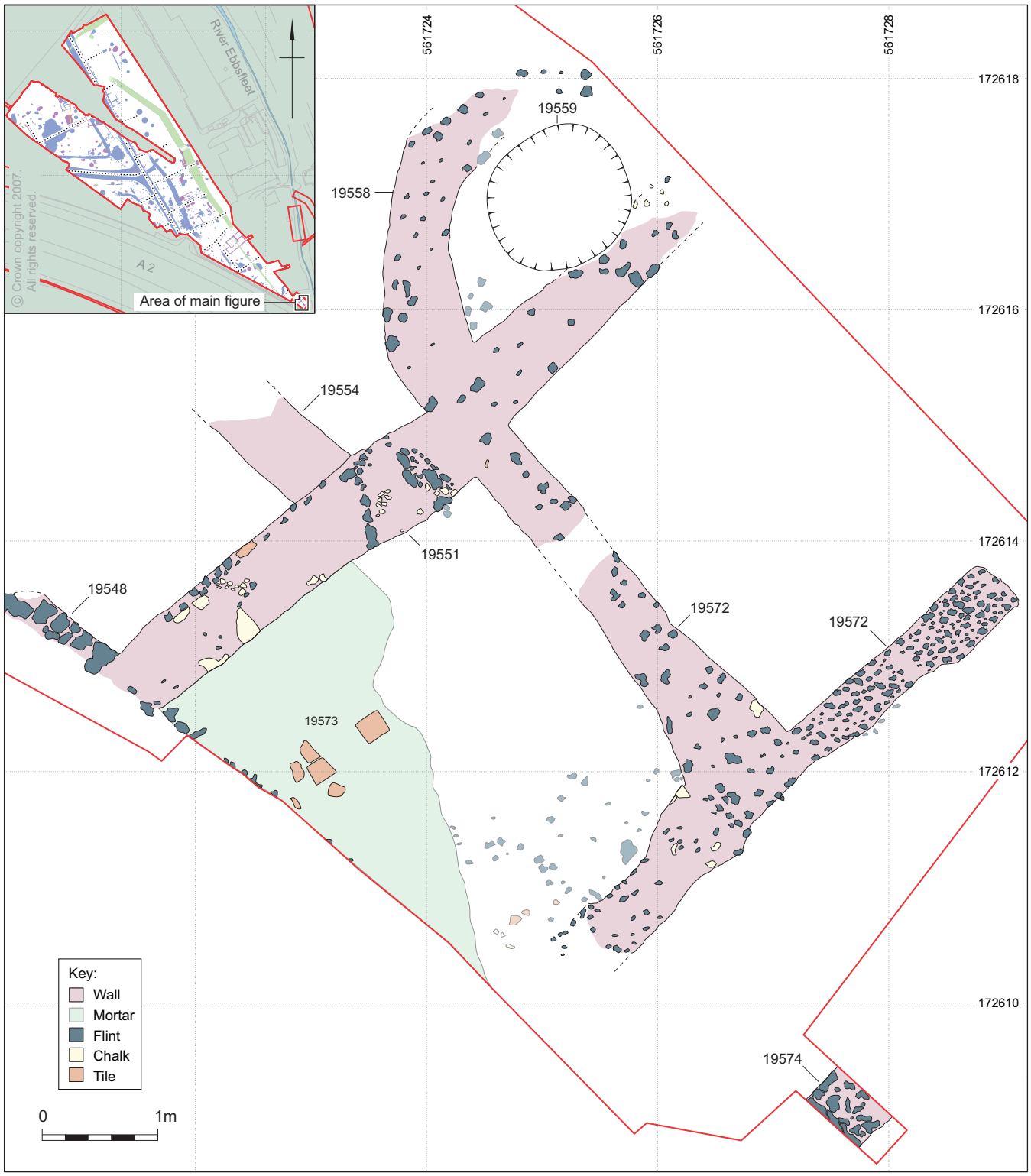

Figure 2.64 Possible bath-house in property I

Parallel to and south-east of wall 19572 was a further, probably contemporary wall (19574), the 2 m gap between them perhaps forming a corridor, though only a very short length of the latter wall was exposed and no floor levels survived in the intervening space.

The interpretation of the building in this property as a bath-house remains uncertain and is based almost entirely on the layout of the small part of it exposed in plan, in particular the semi-circular wall(s) on the north-west side. It was clearly a substantial structure and is considered unlikely to have served a purely domestic function, though its size, form and extent remain unknown, and no hypocaust or pool were found within the area investigated. The majority of the building lay to the south-east of the excavated area, probably set back from the Watling Street frontage at least 40 m away, with the north-east side close to the water's edge near the head of the Ebbsfleet. Although the period of use of the building is unknown, a suggested 2nd century date for its construction means that this may have overlapped

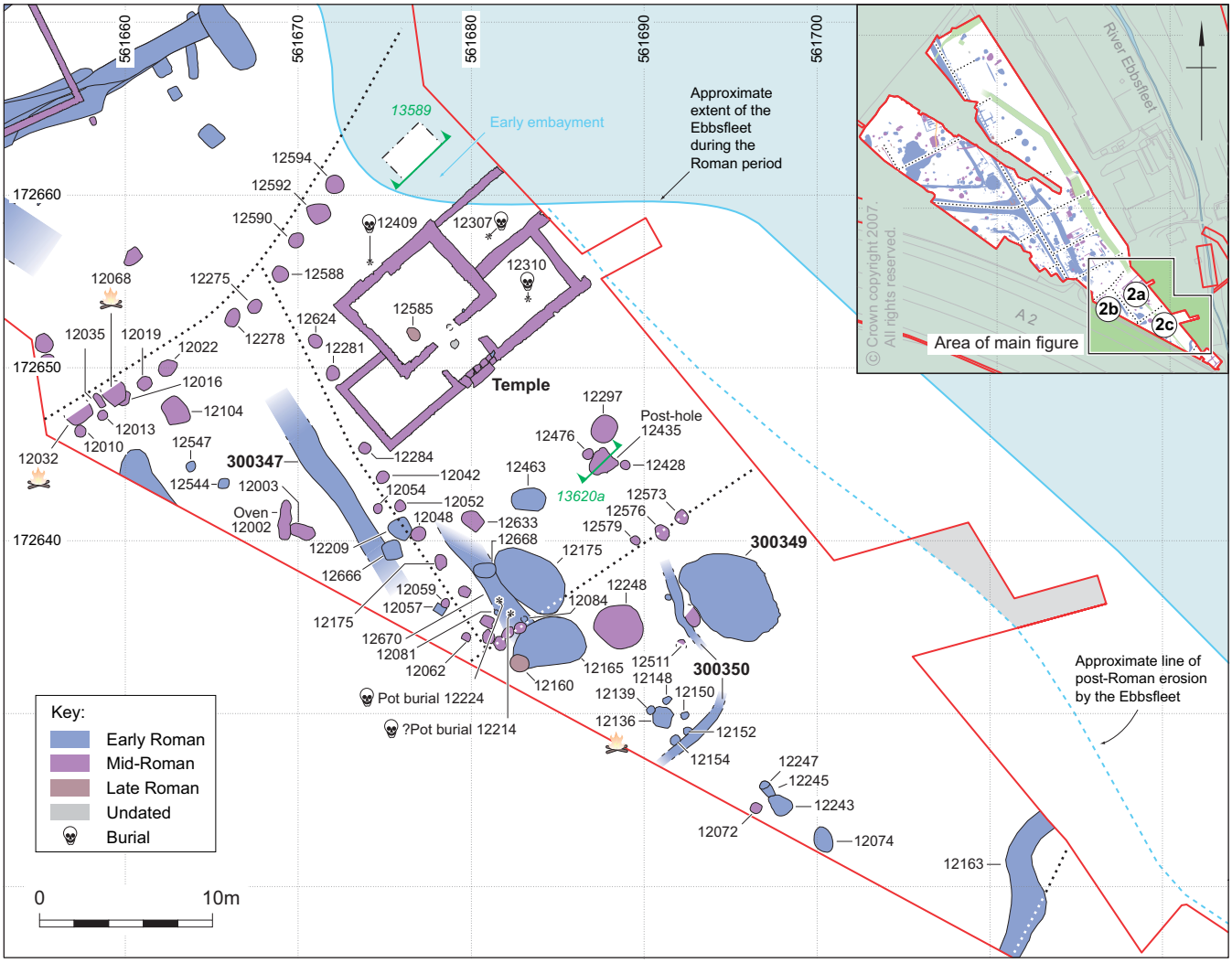

Figure 2.65 Property 2

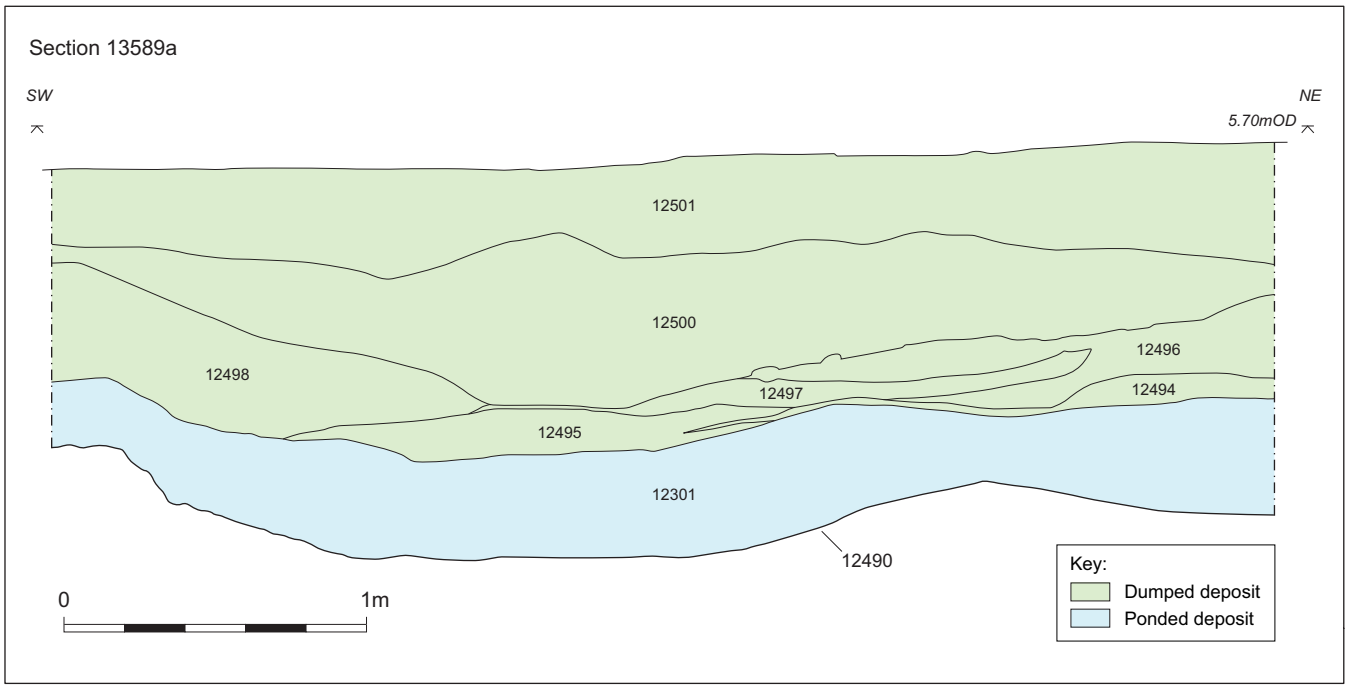

Figure 2.66 Section through early embayment of the Ebbsfleet River

with the late 2nd to late 3rd century temple in property 2 and what very tentatively has been suggested to be a *mansio* to the south-west, subject to minimal investigation in the 1960s and now buried beneath the A2 (Burnham and Wacher 1990, 197).

Property 2

Property 2 (Fig 2.65) lay on the north side of Watling Street, with property 1 to the south-east and property 3 to the north-west. The street frontage itself lay beyond the limit of excavation, perhaps by as little as 2 m to the north-west but increasing to more than 40 m to the south-east. However, virtually all of the remainder of the property was investigated, the northern edge showing clear evidence of having been eroded by the Ebbsfleet in the post-Roman period, perhaps with the loss of up to 8 m of ground in this area.

Bounded by Watling Street to the south and the Ebbsfleet to the north, property 2 was approximately 40 m long. However, the extent of the property to the west and east is less clear and it is possible that this changed over time, in part reflecting infilling and reclamation of a small embayment on the edge of the Ebbsfleet which extended across the suggested boundary between properties 2 and 3. A maximum width of at least 60 m is possible, though one property to the north-west (comprising 2a and 2b; see Fig 2.65) and another to the south-east (comprising 2c), each approximately 30 m wide, might also be suggested. The boundaries between 2a, 2b, and 2c were only clearly defined from the end of the 2nd century, by fence lines forming the *temenos* belonging to the temple that was established there at that time, whilst any earlier divisions remain uncertain. Part of the reason for this uncertainty is that the temple which occupied 2a was preserved *in situ*, thereby restricting excavation below and in the immediately surrounding area. Nevertheless, there is some indication of an early boundary feature between 2a and 2b (see below), and perhaps also between properties 2 and 3, the latter (not illustrated) represented by a short length of ditch pre-dating the temple which was observed close to Watling Street during the watching brief. Further to the south-east, a shallow, rather irregular ditch (12163) may have marked the boundary between properties 1 and 2, with pottery indicating a mid–late 1st century date for this feature.

It was not possible (for reasons of health and safety) to excavate the full depth of archaeological deposits in the western corner of the site within property 2 and, therefore, the roadside ditch on the north side of Watling Street, whose projected line crossed this area, was not investigated. However, its presence here was confirmed when a small part of it was exposed during the watching brief. Approximately 10 m to the north-east and parallel with the projected line of the roadside ditch was ditch 300347. This was approximately 1.5 m wide, 1.1 m deep and was traced for a distance of at least 12 m. Ditch 300347 has been assigned a mid-1st century date and may have been an early boundary feature (between 2a and 2b) or a marking-out ditch for Watling Street. The latter suggestion is perhaps more likely as there is some slight evidence to suggest that ditch 300347 extended into property 3, though not beyond, and may therefore have broadly corresponded with the extent of one of the earlier phases of roadside ditch (see above, and property 3 below). A further shallow ditch (12670) ran parallel to and 3 m north-east of ditch 300347, though only a relatively short length was seen. This ditch has been assigned an early Roman date, but whether it was contemporary with 300347 is unclear and its function is unknown.

The extent of the embayment indicated on Figure 2.65 marks its minimum limit. A section excavated through the deposits in this area showed them to be 1.3 m deep (Fig 2.66), with the lower part (12301) comprising a ponded deposit, overlain by a series of dumped deposits (12494–12501) used to infill the area in the 2nd century prior to construction of the temple. However, it is clear that there was a more extensive area of low-lying ground which extended further to the south-west and straddled what later became the boundary between properties 2 and 3. This area was infilled throughout the later 1st and 2nd centuries and its existence is likely to explain the somewhat irregular arrangement of (later) boundaries in this area. In particular it might explain the presence of the 'wedge' of land (designated 3b on Fig 2.62) between the north boundary of property 2, as defined by the extent of the later *temenos*, and the early ditches (300626/29/31) marking the southern extent of property 3. The 'wedge' of land was apparently added to property 3 at a later date following infilling and reclamation (see below).

The low-lying nature of the area which covered the north-western half of the area designated 2a and extended into area 2b probably precluded any buildings being constructed along the Watling Street frontage in 2b during the early Roman period, as the space available then would have been very limited. Apart from ditches 300347 and 12670, the only early features identified in this area were a couple of post-holes or small pits (12544 and 12547) and a shallow scoop. Closer to the junction between 2a, 2b, and 2c, however, were two sub-square pits (12209 and 12666) both of probable early 2nd century date, with two considerably larger and possibly slightly earlier pits (12165 and 12175) around the junction itself.

It is more likely that there was an early Roman building on the Watling Street frontage in 2c, though this area lay outside the limit of excavation, and various post-holes, shallow pits, and other features may reflect this. Hearth 12136, several surrounding post-holes and a gully perhaps represented an ancillary structure to the rear of this postulated building, but the function of a large, flat-bottomed pit (300349) on the very gently sloping ground nearer to the water's edge is uncertain. Pit 300349 was very approximately sub-rectangular in plan (at the base), measured 6 m by 4 m, and was 0.60 m deep with near-vertical sides. Because of the slope it was deeper on the west side, and an irregular gully (300350) here appears to have been associated

Plate 2.21 General view of mid-Roman temple in property 2 (ARC SHN02). Looking south-west

with the pit, perhaps to divert rainwater run-off. Although not as regular in plan, the flat bottom and straight sides raises the possibility that pit 300349 was some form of sunken-featured structure, similar to examples recorded in properties 5 and 12 (see below), and like these it contained no structural features. The sequence of fills provides no clue as to this pit's function, but the pottery suggests that it may have been in use in the second half of the 1st century, with infilling taking place in the late 1st to early 2nd century.

The temple

Towards the end of the 2nd century, following the infilling of the embayment, a building interpreted as a temple was constructed in property 2. The temple lay within area 2a, enclosed by fences, though the overall layout of fences suggests that the associated *temenos* also included area 2b and possibly 2c. Coin evidence indicates that the construction of this temple probably took place in the 180s or 190s and that it was demolished approximately a century later, though activity of some sort continued into the late 4th or early 5th century. It should be noted, however, that there is nothing in the nature of the coin assemblage to suggest that this building functioned as a temple, although the concentration of bone pins is significant (see discussion, Chap 4).

The temple was aligned north-east to south-west, at right-angles to Watling Street and the Ebbsfleet, and faced south-east (Fig 2.67; Pl 2.21). It lay approximately 20 m from the street frontage but probably only 5 m or so from the Ebbsfleet, though subsequent erosion had removed not only the former edge of the channel in this area but also the north-east end of the temple itself. A medieval ditch cut north-west to south-east across the top of the temple and a modern soakaway had been dug through the north-east wing, though neither of these intrusions had caused significant damage to the building. Furthermore, though having suffered some robbing in the late Roman period and having had a house having been built over it in the first half of the 20th century, the temple was generally well preserved, particularly the south-western half.

Because the temple was preserved *in situ* (beneath a new slip road on to the A2) only very limited investigation was possible of the underlying sequence (see Fig 2.68). This showed that the deposits infilling the embayment were overlain by a chalk surface (12603), though whether this was a consolidation layer or the floor of a structure pre-dating the temple is unclear. Immediately below the temple was a fairly extensive but discontinuous charcoal spread (12392), possibly a destruction layer though more probably a dump of some sort.

Two phases of construction – one major and one minor – appear to be represented in the temple, and there is some further evidence to suggest that the central part of the building may have been re-built or in some way re-used after the remainder had been demolished at the end of the 3rd century. The temple walls were built directly within foundation trenches which were approximately 0.30 m deep and up to 0.75 m wide, with no clear differentiation between the construction of the wall foundations and the walls themselves. However, there was in some places an offset at or just below floor level, usually on the inside of the wall, though in some places on the outside as well. The walls survived to a maximum height of approximately 0.50 m above contemporary ground level and comprised mainly irregularly-coursed or uncoursed flint nodules and a

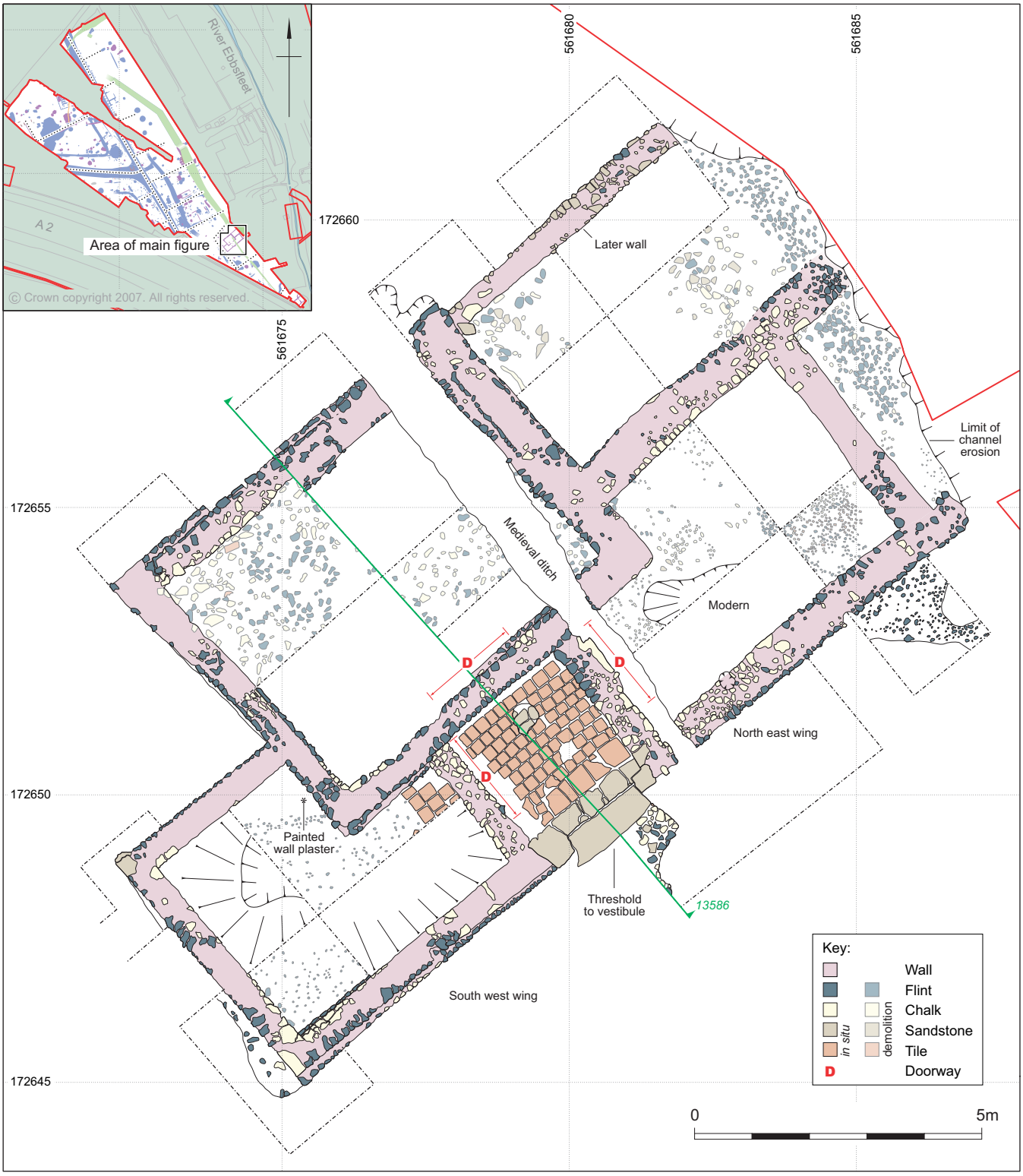

Figure 2.67 Temple in property 2

much smaller quantity of chalk set in a relatively hard, lime mortar. A substantial quantity of roof tile is likely to represent roofing material left over after demolition and robbing of the temple, with a notable concentration around the southern end of the building. All but one of the rooms within the temple were excavated in quadrants, with opposing quadrants retained in order to maintain the stability of the walls during their preservation *in situ*.

The temple vestibule measured 2.35 m square (internally), with doorways in all four sides. Access from the exterior was through an entrance the full width of the vestibule, with irregular slabs of Kentish ragstone forming two shallow steps to the south-east; the outermost slab was particularly substantial measuring 1.7 m by 0.60 m. Opposite the entrance was a 1.8 m wide doorway into the central room, with two doorways each 1.2 m wide in the side walls providing access to the

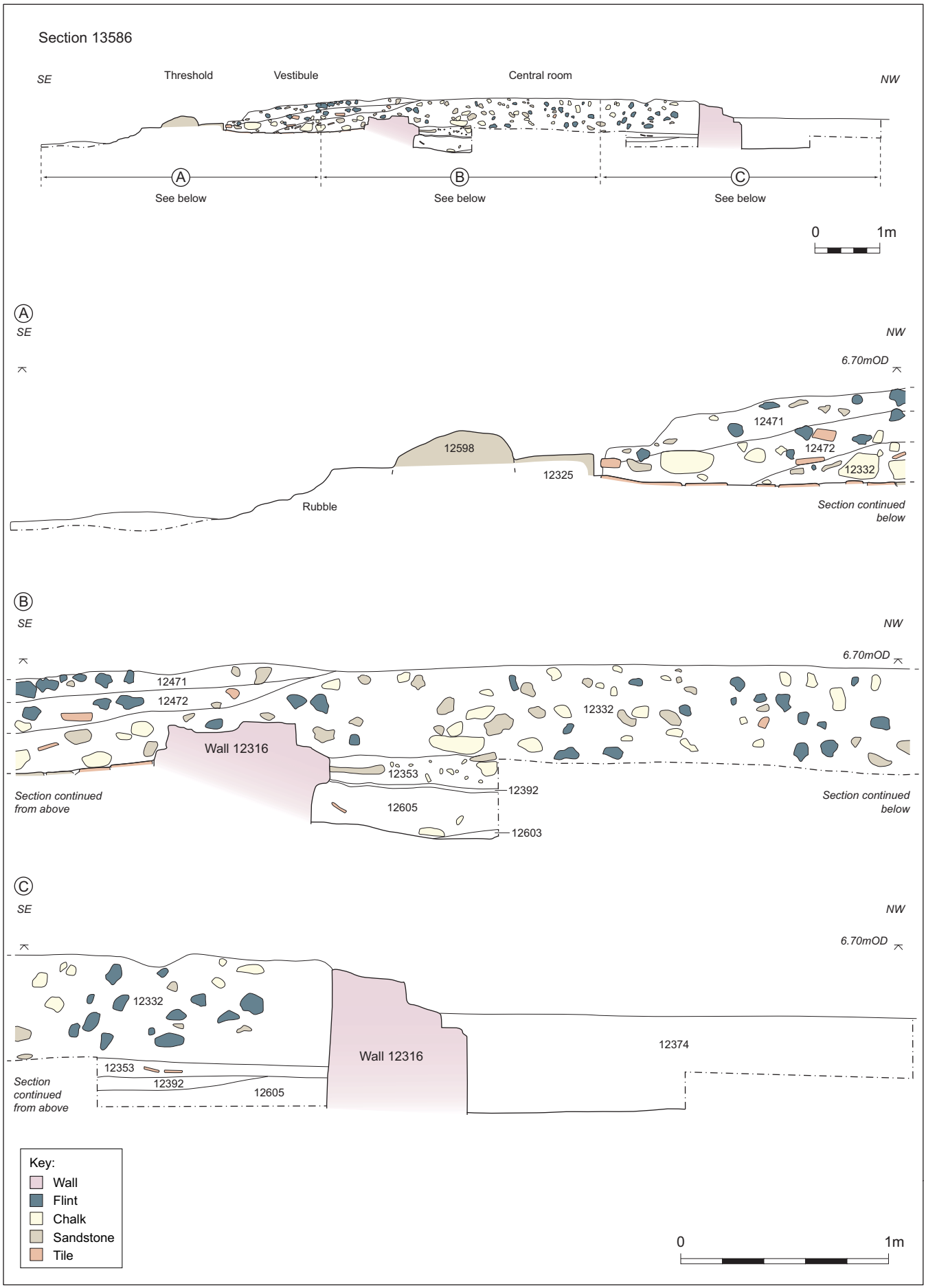

Figure 2.68 Section through the temple

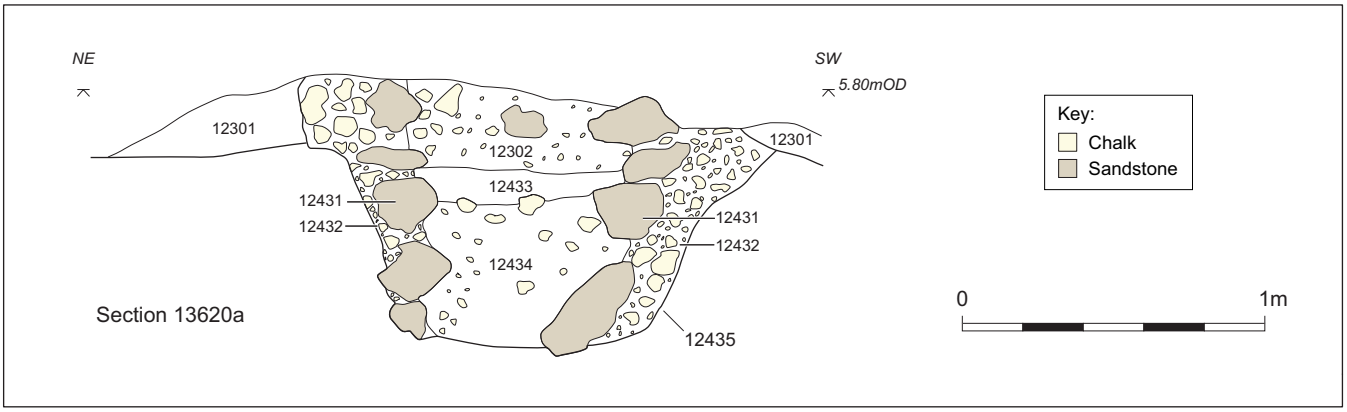

Figure 2.69 Section through post-hole 12435

wings. Within the vestibule was a tiled floor, for the most part comprising tiles 0.25 m square, with a line of larger tiles (maximum 0.40 m square) adjacent to the entrance. Centrally located in front of the doorway to the central room was a shallow, circular cut approximately 0.45 m in diameter where there were no tiles, and it seems clear that something – perhaps a pedestal – had stood here.

The central part of the temple measured 5.5 m by 4.5 m. No floor surface, wall plaster, or any other internal features survived in this room, but the floor level is indicated by the height of the offset in the walls and also by the level of the surviving tiled floor in the adjacent vestibule. Given the existence of the latter it seems likely that the floor in the central room had been robbed as there was no evidence whatsoever for any surface having been worn away. Though the walls of the central part were not clearly wider or more substantial than the walls elsewhere in the building they did appear to contain more flint in their construction, and it is quite conceivable that they stood to a greater height, perhaps forming a one and a half- or two-storey high tower.

Either side of the vestibule were two L-shaped 'wings', both a maximum of 3.7 m wide, with that to the north-east slightly longer at 5.5 m compared with that to the south-east which measured 4.8 m in length. It appears that construction of the wings was integral with that of the vestibule and central room, with no evidence for them having been added later. Remnants of a tiled floor survived immediately within the doorway to the south-west wing, the tiles being identical to the smaller examples in the vestibule. Very slight remains of painted wall plaster were also evident on a small area of one wall in this wing. Traces of red and green paint were visible but it was not possible to distinguish any further details of the decoration. However, because this was the only part of any wall in the temple where plaster survived, it seems likely that this was a fragment of what was once a much more extensive decorative scheme. The painted wall plaster has been conserved *in situ*, protected and subsequently buried along with the remainder of the temple as part of the preservation programme. No floor surface survived in the north-east wing, of which only the lowest parts of the walls remained, though it was evident that a further room lay to the north-east. Virtually all of the latter room had been removed by channel erosion, but it continued the line of the north-east wing, was of the same width, and appears to have belonged to the same construction phase. On the basis of the projected edge of the Ebbsfleet channel (ie, prior to post-Roman erosion) it might be suggested that this room was approximately 5 m in length, similar to the other rooms in the wings, though it could have been shorter or even as much as 2–3 m longer. Whatever its length, this room gave the temple an asymmetric plan and appearance.

A further room was subsequently added to the rear of the north-east wing, though its date of construction is unknown. This room was created by adding a wall which continued the line of the rear wall of the central room. At 0.5 m wide this was narrower than the other walls and contained more chalk and fewer flint nodules. This room measured 3 m by at least 5.5 m, its extent to the north-east uncertain as a result of later channel erosion and, as elsewhere, no floor surface or other internal details survived.

Outside the temple was a series of fence lines which are thought to have defined the *temenos* (and also separated areas 2a, 2b, and 2c (see Fig 2.65)). The probable boundary between properties 2 and 3 was marked by an angled line of 11 substantial post-holes extending for a distance of at least 20 m, continuing beyond the limit of excavation to the west but stopping at post-hole 12594 approximately 1.5 m short of the edge of the Ebbsfleet to the east. Virtually all of the post-holes contained post-pipes which indicated that they held posts approximately 0.2 m in diameter. Immediately north of the line at the west end were at least two hearths (12032 and 12068), probably relating to activity in property 3, cutting the edge of one of the post-holes. South-west of the temple was a slightly more irregular arrangement of smaller post-holes forming a line approximately 25 m in length, with a return to the north-east at the south-east end marking a rather less convincing fence line. These two fence lines enclosed an area measuring a maximum of 30 m by 15 m in front of the temple but, somewhat surprisingly, no gravel, chalk, or other contemporaneous surfaces were identified in this area, as might have been expected. This cannot be

Plate 2.22 Pot burial 12224, property 2 (ARC SHN02) (0.2 m scale). Looking south-west

attributed to their subsequent truncation as no such surfaces were present beneath the demolition deposits adjacent to the southern corner of the temple.

Approximately 9 m to the south-east of the entrance to the temple vestibule, and offset slightly to the north, was a substantial post-hole (12435). This was 0.90 m deep and the ragstone and chalk packing indicates that it held a post 0.50 m in diameter (Fig 2.69), almost certainly a free-standing post, perhaps a totem of some sort or the support for a statue. Adjacent and possibly associated with this were two much smaller post-holes (12428 and 12476) and a shallow bowl-shaped pit (12297) 1.6 m in diameter.

In the south-west corner of the area in front of the temple was approximately one-third of a large storage vessel lying on its side and containing the remains of a neonate burial (pot burial 12224; Pl 2.22). This pot appears to have been broken in antiquity and re-used as a container for the burial, probably placed in a shallow hollow in the top of earlier ditch 12670. The disturbed remains of a second neonate (12214) found close by are thought possibly to derive from the same pot burial. Pit 12633 may also have been contemporary with the temple, though it could have been an earlier mid-Roman feature, as may have been pit 12248 to the south-east (in area 2c) and pit 12104 to the south-west (in area 2b).

To the south-west of the temple, in area 2b, were two ovens (12002 and 12003), both of probable mid-Roman date, though whether contemporary with the temple is unclear and both may have been earlier. Oven 12003 was cut by oven 12002 and comprised a shallow, bowl-shaped feature filled largely with flint nodules and fragments of burnt clay probably representing the remains of a collapsed dome. This produced mid-Roman pottery, but the later oven 12002 contained only residual early Roman material. Oven 12002 was a narrow, keyhole-shaped feature 2.4 m long and up to 0.7 m wide with extensive remains of a burnt clay lining. The fill also contained much burnt clay and some flint nodules, again deriving from a collapsed dome, here associated with a chamber which appears to have occupied the narrower northern end, with the flue and stoke-hole to the south.

Coin evidence indicates that the temple was largely demolished towards the end of the 3rd century and it seems that most of the floors, probably tiled, were robbed and much of the plaster stripped from the walls prior to demolition. The rooms were filled with a series of demolition and levelling deposits (see Fig 2.68, context 12332), and this process appears to have culminated in the creation of a 'platform' of compacted building rubble within the central room. The walls of this room were probably demolished to this level, rather than being retained, as nowhere did they survive to a higher level than the platform. No structural features contemporary with the platform were identified, with the possible exception of a single post-hole (12585, see Fig 2.65), and it is unclear what form any structure which occupied it would have taken. However, the presence of the platform does indicate that this part of the former temple remained in use, perhaps into the mid-4th century from the coin evidence, though the precise nature of this use is unclear. Possibly contemporary with this were the remains of three neonates, two (12307 and 12310) recovered from the upper part of the infill deposits in two of the rooms in the east wing of the temple, with another (12409) from similar deposits to the north of the central room. These were not recognised as burials during excavation, but the quantity of bone surviving in each case makes it likely that they represent *in situ* burials rather than redeposited bone.

The coin sequence in property 2 continues into the late 4th/early 5th century, as it does in various places elsewhere on the site, but it is the distribution of late Roman pottery which is particularly unusual here, for this is the only property where late 4th–early 5th century material was found. This pottery shows a clear concentration in what have been interpreted as abandonment layers around the platform within the central part of the former temple, and seems clearly to focus on this area. Some pottery was found slightly further away, however, and at least one small pit (12160) is of late Roman date. Although there is nothing in the nature of the pottery assemblage (apart from its date) to suggest it is anything unusual, it seems improbable that it simply reflects the dumping of material in a particular part of an abandoned property. More likely it represents a very late phase of activity, possibly the latest so far identified anywhere at Springhead, with the remains of the temple, perhaps like some villa remains elsewhere (eg, Lullingstone), providing a focus for this activity.

Property 3

Property 3 lay on the east side of Watling Street, with property 2 to the south-east and property 4 to the north-west (Fig 2.70). Property 9 and a small part of what was possibly a further, un-numbered property (see below) lay on the opposite side of the road.

Property 3 extended eastwards from Watling Street as far as a shallow embayment on the western edge of the Ebbsfleet, a minimum distance of 25 m and a maximum of 30 m. The width of the property is uncertain but,

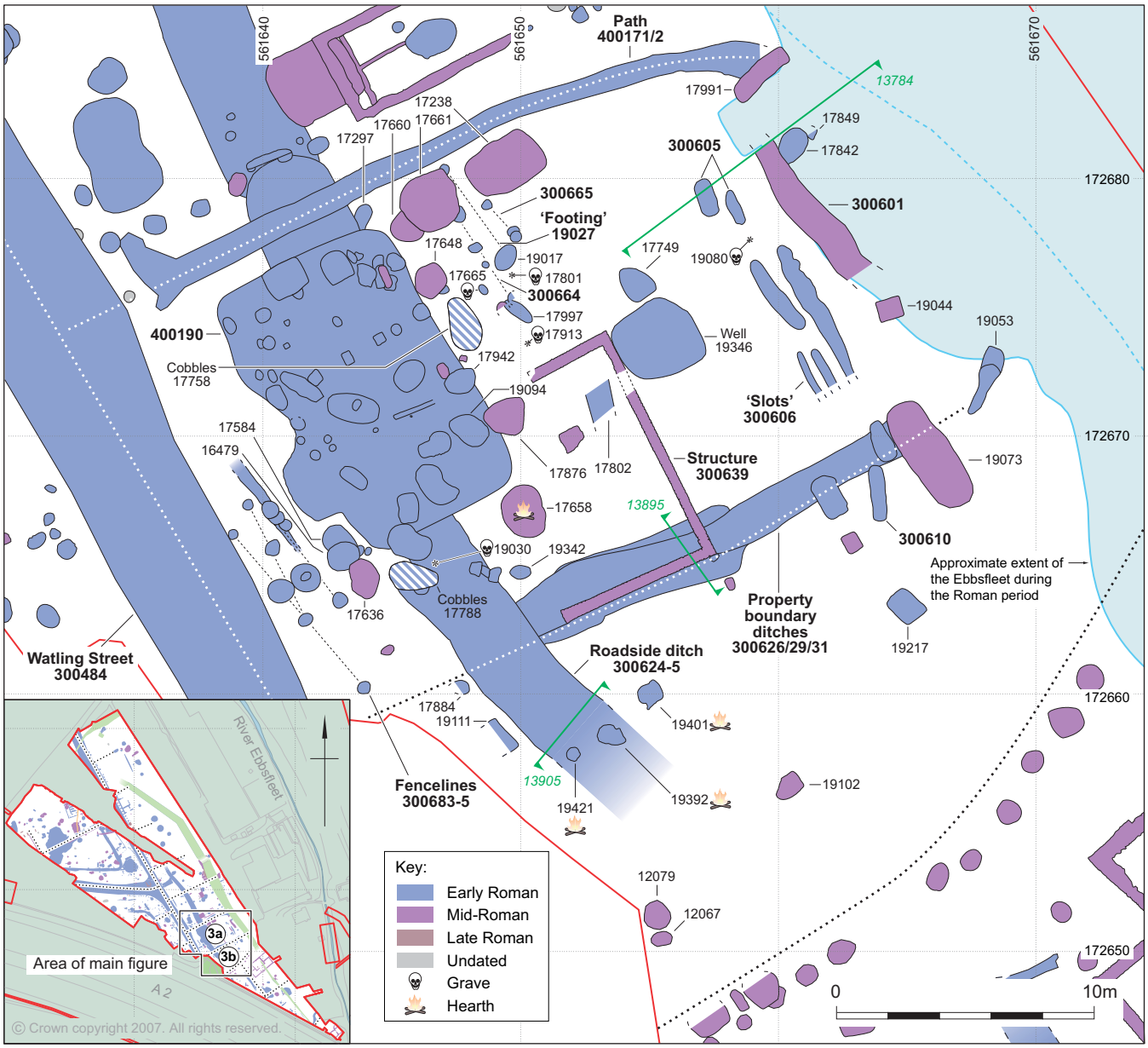

Figure 2.70 Property 3

initially at least, it was around 18 m wide, perhaps subsequently extended to a maximum of 32 m. The reason for this uncertainty is that a roughly triangular area of land may have been added to the south of property 3 around the end of the 2nd century, following reclamation on the edge of the Ebbsfleet and the construction of a temple in property 2. The two parts of the property have been designated 3a and 3b respectively, though it is possible that the latter actually formed part of property 2.

The earliest feature identified was the roadside ditch on the east side of Watling Street. Though its course wandered slightly, this ran approximately 6 m from the edge of the street and demonstrated a relatively complex sequence of recutting (see section 13905 on Fig 2.60 above). The earliest phase of ditch (300624) had been largely removed by a later recut (300627) and its width and extent to the north were unclear, but it was approximately 1 m deep and pottery indicates a very early, mid-1st century date for its establishment. To the south-west was another early feature (19500), a relatively small ditch just 0.70 m wide and 0.50 m deep. This almost certainly post-dated ditch 300624 and turned at 90° to the north-east probably continuing as one of the early sequence of boundary ditches (300626) separating properties 2 and 3 (see below). Ditch 19500 was, in turn, succeeded by a more substantial ditch (300627) approximately 2.5 m wide and 1 m deep which continued to the north to just beyond what subsequently became the boundary between properties 3 and 4. A rounded terminus here clearly defined its original extent and though the pottery recovered cannot be more closely dated than early Roman, a date for the ditch *c* AD 60–70 seems likely. The final phase of roadside ditch was represented by ditch 300545, approximately 1.75 m wide and 0.75 m deep with an open U-shaped profile at the south end. This ditch continued, in a slightly enlarged form, to the north at least as far as

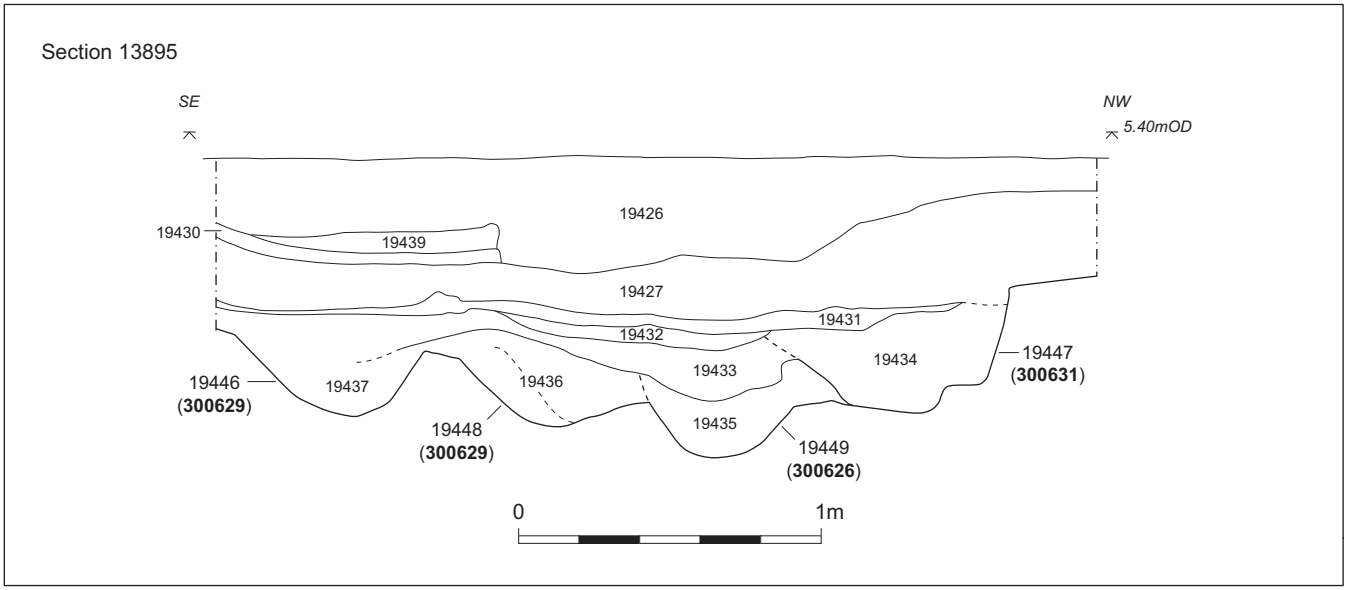

Figure 2.71 Section through property 3 boundary ditches

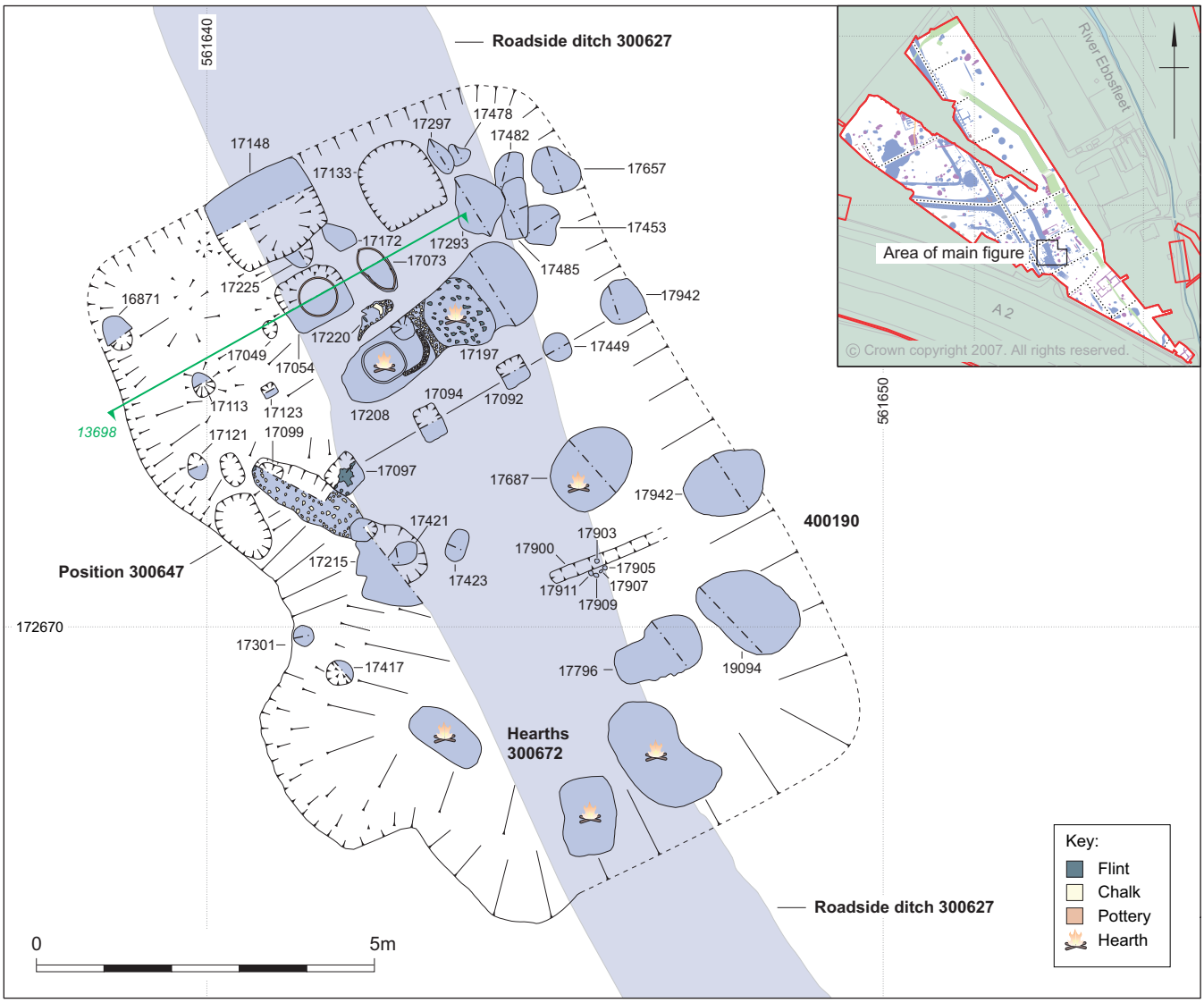

Figure 2.72 Plan of structure 400190

property 5. Pottery from the upper fill of ditch 19485 extends into the mid-Roman period and indicates that it probably survived as a shallow, linear hollow beyond AD 120. Indeed, part of this hollow towards the north end of the property was utilised in an early Roman 'bakery' structure (see below).

Approximately 7 m to the east of the roadside ditch was another early ditch (17802), though whether this pre-dated the former could not be established (Fig 2.70). Ditch 17802 was relatively small, with a width of 1 m and a depth of 0.35 m, and its extent is unclear. However, it did not continue as far north as the boundary between properties 3 and 4, and it might be equated with ditch 300347 in property 2 to the south. If ditch 17802 did pre-date the roadside ditch then it may have been dug as a marker ditch for the laying out of Watling Street; if later, then a boundary of some sort is likely (see above).

The northern boundary to property 3 was clearly defined, marked initially by a shallow ditch and subsequently by a path (400171/2) which ran between properties 3 and 4 and provided access from Watling Street to the waterfront. This path was a relatively long-lived feature which remained in use into the early 3rd century at least (see Property 4 below). The southern property boundary was also clearly defined in its earliest phases, represented by a sequence of shallow, recut ditches comprising 300629 (probably the earliest, to the south-east), 300626 and 300631 (the latest, to the north-west) up to 0.80 m wide and 0.30 m deep (Fig 2.71). Pottery from these ditches indicates that all had been infilled by the end of the 1st century AD. Unlike path 400171 and the shallow ditch which preceded it, both of which ran across the top of the infilled roadside ditch and up to the edge of Watling Street, the ditches to the south all extended only as far as the roadside ditch, indicating that the latter was probably still partly open when the southern boundary was established. By implication, it can be suggested that this boundary was in place earlier than that to the north. Indeed it would appear that one of the phases of boundary ditch (300626) was contemporary with an early phase of re-cutting of the roadside ditch (19500, see above). Ditch 300626 was also the only one of the four which continued almost as far as the waterfront, the other ditches terminating some 10 m short of this. Towards the end of the 2nd century the property boundary may have been re-established further to the south to take in part of a low-lying area of formerly vacant but now reclaimed land (3b), with the boundary now defined by the fence line along the northern edge of the temple *temenos* occupying property 2.

In the western half of property 3, closest to the street frontage, was a complex sequence of features and deposits, the vast majority assigned to the early Roman period. The focus of this activity was a semi-sunken-featured building (400190) towards the north-west corner of the property, partly occupying a shallow, linear hollow within the top of the largely infilled roadside ditch (Pl 2.23).

Plate 2.23 Northern part of structure 400190 showing hearth 17197/17208 and pottery vessels to right, property 3 (ARC SHN02) (2 m scales). Looking south-west

It appears that this pre-existing hollow was enlarged and extended to form an irregular sunken area measuring approximately 12 m by 6 m and 0.5 m deep, though the extent, particularly on the south-east side, was not always clear (Fig 2.72). Furthermore, there were no structural features such as post-holes and slots which defined the outer edge of the sunken area. Internally, however, a line of post-holes (300647) 5 m from the north end is likely to have supported the roof as well as forming a partition, this perhaps replacing an earlier partition. The majority of features within structure 400190 lay to the north of this partition, though it is unlikely that all were contemporary. Pits 17133 and 17148 at the northern end were square or sub-rectangular, vertically-sided, flat-bottomed features up to 1.2 m deep, perhaps originally lined and dug for storage. To the south of these pits were two large pots set into the base of the structure (no clear floor surface was apparent), pot 17073 pre-dating pot 17054, the latter in a shallow pit cut through a sequence of ashy layers that had accumulated around pot 17073 (Fig 2.73). Close to pot 17073 was a large fragment of lava quern lying flat, possibly re-used and *in situ*, on the base of the hollow, and a concentration of querns fragments, some near complete, came from the upper fills. It is unclear whether the two pots were complete when placed in the structure, but from the surviving evidence this seems likely, and presumably they were used for storage. Immediately to the south of these pots was a substantial hearth (17197/17208) with the remains of what was probably an oven (17099) to the south-west, apparently extending across the line of and possibly pre-dating partition 300647. To the south of the partition lay another hearth or oven (17687) and a probably associated slot (17900), with a cluster of three further hearths (300672) towards the south-western corner of the structure.

It might be suggested that structure 400190 was used for baking or brewing on the basis of the hearths, ovens, probable storage vessels, and pits, as well as the concentration of quernstone fragments. Pottery reflects a period of activity spanning the last quarter of the

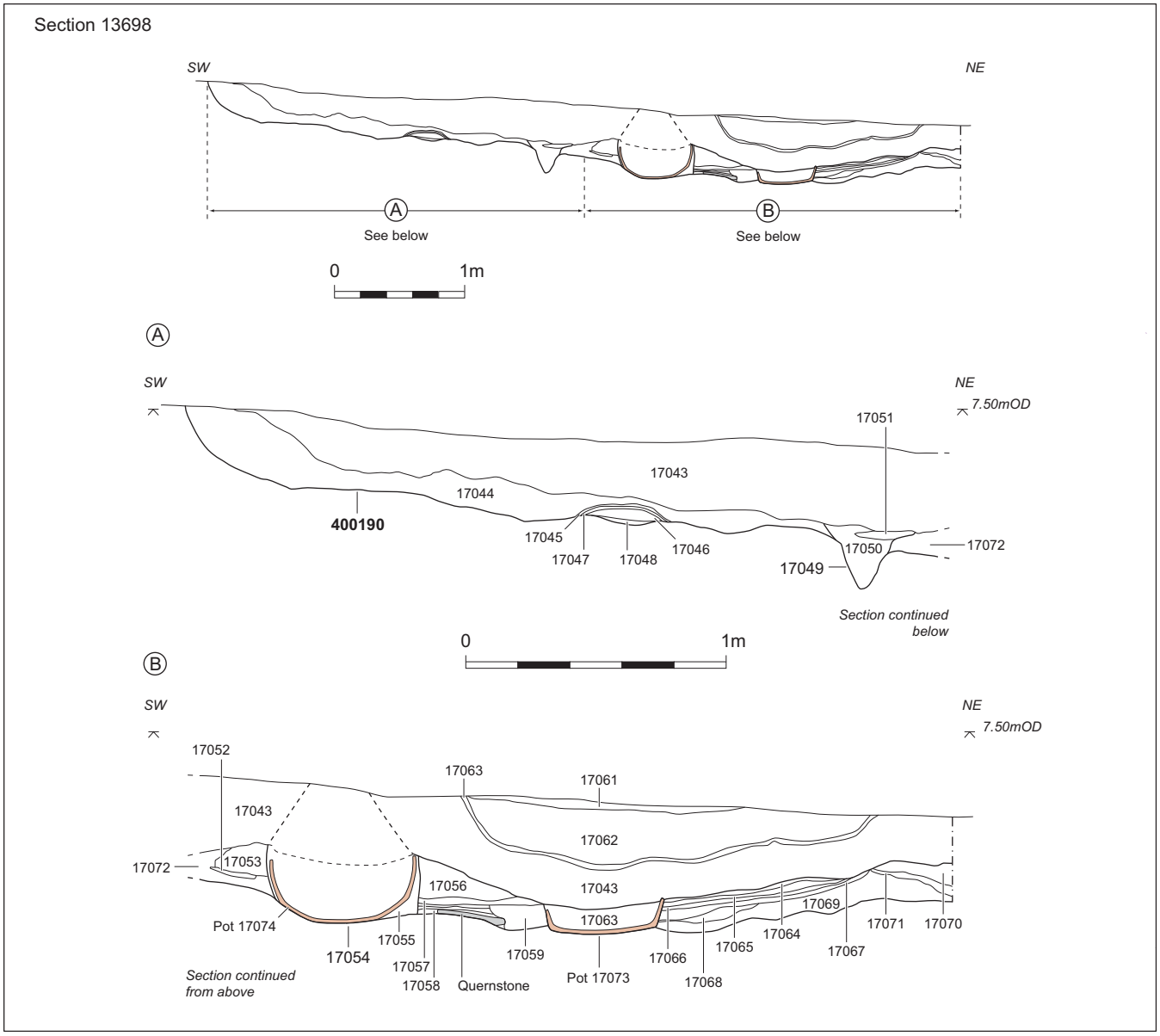

Figure 2.73 Section through structure 400190

1st century and the first quarter of the 2nd, with material from the abandonment layers (eg, 17043) indicating that the structure was infilled by the middle of the 2nd century, though its use may have overlapped with structure 300639 to the south-east (see below). The abandonment deposits contained a notable quantity of iron smithing slag, but there is no other evidence for ironworking in this property and the debris may have been brought in from elsewhere, possibly from the smithy in property 10.

To the south and probably contemporary with structure 400190 was a small area of cobbling (17788/300679), on the northern edge of which was a neonate burial in a shallow grave (19030). A sequence of probable fence lines (300683–5) lay adjacent to Watling Street and a single pit (17584) in this area has also been assigned an early Roman date. Further to the south, just beyond the early property boundary ditches, which by now are likely to have been infilled, was a group of at least three hearths (19392, 19401, and 19421) and two small pits (17884 and 19111), all of early Roman date. Two of the hearths overlay the infilled roadside ditch and all of these features were probably associated with property 3.

To the east of structure 400190 were the remains of a further cobbled surface (17758), a short, rather insubstantial line of flint nodules in a yellow sandy mortar (19027) – possibly the footing for a wall, and two probable fence lines at 90° to path 400171. The fence lines are unlikely to have co-existed and it is possible that one or both may have been of later, possibly mid-Roman date, perhaps contemporary with structure 300639 to the south. Near the southern end of the inner, longer fence line (300664) was a neonate burial (17665), and the remains of two other neonate burials (17801 and 17913) were recovered from a layer in the same area, though in neither of the latter cases could a grave cut be distinguished within what was a homogeneous dark spread of soil.

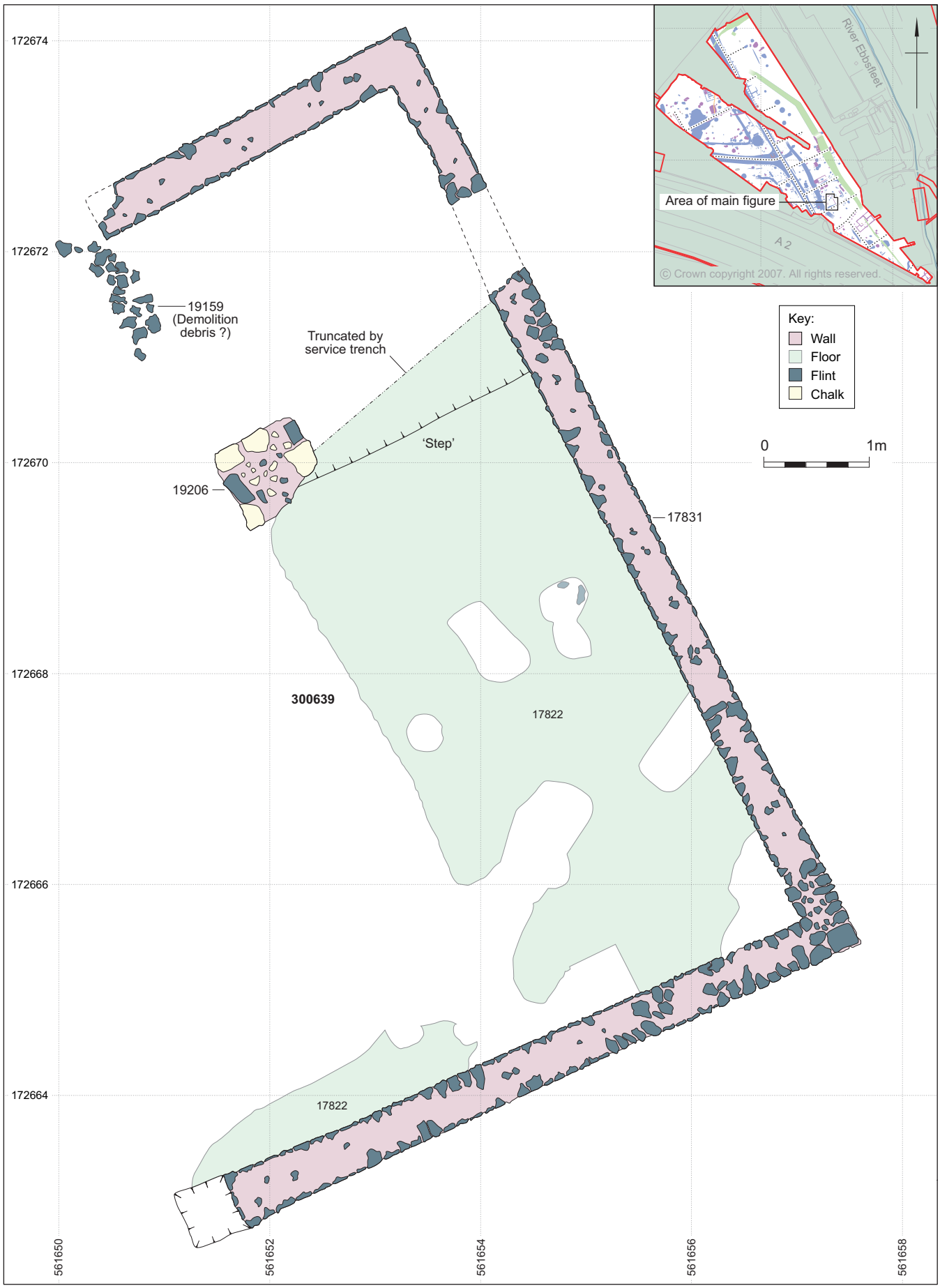

Figure 2.74 Plan of structure 300639

To the south-east of structure 400190, a later mid-Roman structure 300639 was underlain by a sequence of deposits including at least one gravel surface and two chalk spreads, probably make-up layers, assigned an early Roman date. Several post-holes (not illustrated) were associated with this sequence of surfaces but they formed no coherent pattern and it seems unlikely that they represented a building. More probably the surfaces were part of a yard area which extended just beyond the infilled ditches which had marked the original extent of the property to the south. A well (19346) lay on the north-east edge of this yard and, though not bottomed, appears to have had a square, timber-lined shaft of which only very degraded traces survived. This well appears to have gone out of use and been infilled by around AD 120 as there is nothing which could certainly be ascribed a mid-Roman date.

On the gently sloping ground close to the waterfront lay a series of shallow gullies or slots comprising 300605 to the north and 300606 to the south. These gullies were broadly parallel, of variable width, and from 1.5 to 6 m in length. It is possible that the southern group, in particular, were beam slots associated with a structure adjacent to the waterfront. Two other groups of shallow features (300610) a short distance to the south may have been related to this postulated structure, but their layout defies interpretation unless more than one phase is represented. This is possible but cannot be demonstrated, though pottery from the various fills includes material ranging in date from the mid 1st to the early 2nd century. Pit 19217 further to the south produced only 1st century pottery and, overall, the evidence suggests that this part of the waterfront, within property 3, was in use from well before the end of the 1st century.

Between gully groups 300605 and 300606 was an isolated inhumation burial (19080), aligned approximately west–east. The skeleton, that of a subadult aged *c* 13–16 years, lay directly on the surface of the natural brickearth and no grave cut could be distinguished in the overlying, homogeneous deposit of dark soil (17710). A mid- or later Roman date for the burial is possible, on the basis that the grave may have been cut through the mid-Roman (2nd century or later; see below) dark soil. This burial is unusual in that, excluding neonates, it is the only example from ARC SHN02 which did not lie within a cemetery, though there were a very small number of isolated adult burials on ARC SPH00.

The river edge in this property showed clear evidence of modification, probably undertaken in order to create an area where small boats could be drawn up alongside the waterfront. The natural embayment had been further dug out, to a maximum depth of 0.5 m (where the gravel underlying the brickearth was exposed), particularly at the north end where it was approached by path 400171. Various features including a large post-hole (17842) towards the north end and a shallow, square cut (19044) and an irregular slot (19053) towards the south end are all likely to have formed part of the waterfront arrangements, though their individual functions are unclear. Later, possibly in the mid-Roman period, a shallow ditch (300601) at least 8 m long was dug through the alluvial deposits which had accumulated in the river channel along the edge of the waterfront. A substantial, sub-rectangular slot (17991) to the north, at 90° to ditch 300601, may have been part of this later development, perhaps for a revetment of some form.

The principal development around the beginning of the mid-Roman period was the construction of what appears to have been an open-fronted structure (300639) measuring 9 m by a maximum of 6 m in the central, southern part of the property (Fig 2.74). The rear, east wall lay immediately next to well 19346, almost certainly infilled by this time though it is clear that the fill of the central shaft was still subject to settling. The south wall corresponded with the alignment of the earlier but by now no longer visible boundary ditches (300626, etc), and it seems unlikely that this was coincidental. The north wall at 3.5 m long was shorter than the south wall and it is uncertain if it originally extended to the same length. Although the west end of the north wall had suffered some later damage it did, nevertheless, appear to be part of a terminus and there was no indication that the associated, shallow foundation trench continued any further to the west. A spread of flint nodules and chalk (19159) in this area may have been later, demolition debris. The mortared flint and chalk rubble wall (17831) was approximately 0.4 m wide and generally no more than 0.3 m high including the foundation, and it seems certain that it provided the base for a timber superstructure. A large mortared rubble pad (19206) in the northern half of the building may have provided the base for a roof support, and its west edge corresponded with the western extent of the north wall. There was a small 'step' in the chalk forming the floor (17822) along a line extending east from pad 19206, suggesting a partition here, though this division was not marked by any structural features. The edge of the floor was clearly defined on the west side in the north part of the building, but was more irregular to the south where it had been partly destroyed. In neither area were there any structural features defining the west side of the building and for this reason it is interpreted as having been open on this side facing the road. No hearths or other internal features were identified within structure 300639 and its function remains unclear, though it may have served for storage. Outside to the west were remnants of a further chalk surface, probably part of a contemporary yard which may have extended as far as the edge of Watling Street.

As noted above, it is possible that the construction of structure 300639 may have overlapped with the use of the earlier, sunken structure (400190) to the north-west. Certainly, no mid-Roman features lay in the area occupied by the latter, and the fence lines 300664–5 to the west did not extend as far south as structure 300639 (see Fig 2.70).

A large hearth (17658) to the west of structure 300639 was thought, on stratigraphic grounds, to

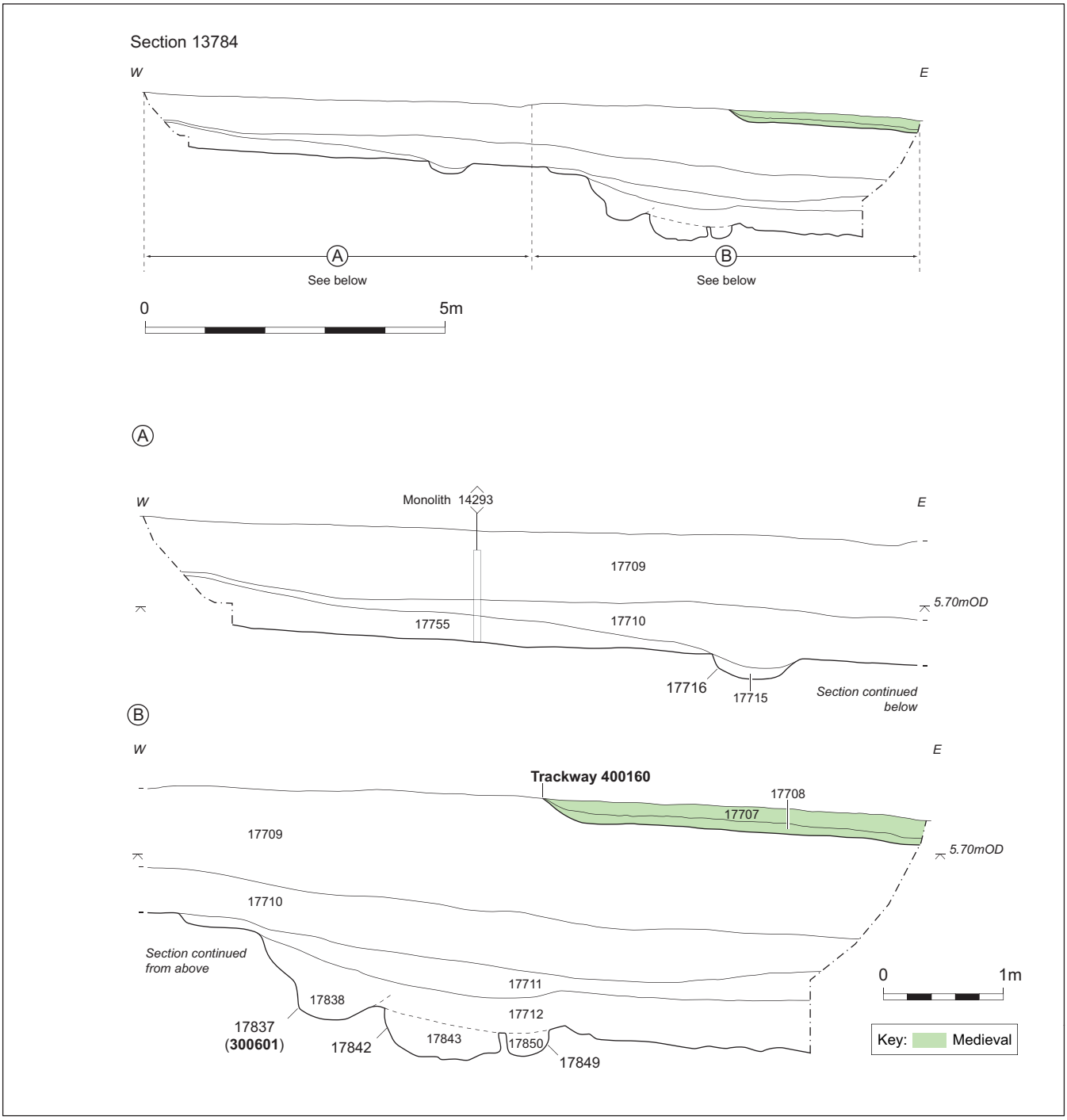

Figure 2.75 Section through waterfront deposits in property 3

pre-date the latter, but pottery indicates a mid–late 2nd century date, later than might have been anticipated, though this is likely to reflect the date of abandonment of a relatively long-lived feature. Pit 17876 to the north and pit 17636 to the west of hearth 17658 were broadly contemporary with it, with pit 17238, a large sub-rectangular feature adjacent to path 400171, assigned an early–mid-2nd century date. A later cluster of pits comprising 17660, 17661, and 17648 also lay close to the path, the latest of these (17648) containing pottery of mid-2nd to mid-3rd century date, and perhaps reflecting the use of structure 300639 continuing throughout much of the mid-Roman period. More extensive deposits (300640) contemporary with or post-dating the latest use of structure 300369 also contained pottery of mid-2nd to mid-3rd century date and this appears to confirm the suggested currency of this building.

Nearer the waterfront, only one feature (19073) might be assigned to the mid-Roman period on stratigraphic grounds, although this shallow elongated pit contained only residual early Roman pottery. Nevertheless, path 400171 was resurfaced (as 400172) and the waterfront is likely to have continued in use, with ditch 300601 and slot 17991 perhaps reflecting this later activity.

Alluvial deposits comprising grey, sometimes gravelly, clayey silts up to 0.40 m thick (eg, 17712; see Fig 2.75) filled the riverbed in this area. Above these was a sequence of dark soil layers (eg, 17709, 17710 and 17711), together up to 2 m thick, overlying the waterfront and extending across the edge of the river channel (as far as the eastern limit of excavation). Pottery from layer 17710 is no later than 2nd century and there are six Claudian coins, but the coin sequence from here continues to AD 364/378, while 3rd and 4th coins are plentiful from the overlying layer (17709) and the overburden above this, with the latest extending the date range to AD 402. These dark, homogeneous soils, sealed by medieval trackway 400160, seem clearly to represent abandonment of the waterfront area, perhaps in the later 2nd or 3rd century, with subsequent dumping and/or accumulation of material, perhaps later reworked or mixed by biological action, in this downslope area. The absence of late Roman pottery contrasts with the relative abundance of 3rd and 4th century coins, though a similar situation is seen in the waterfront deposits in property 4 to the north.

Property 4

Property 4 lay immediately to the east of Watling Street, with property 3 to the south-east and property 5 to the north-west (Fig 2.76). Properties 9 and 10 lay on the opposite side of the road. It extended eastwards from Watling Street as far as a shallow embayment on the western edge of the Ebbsfleet, a distance ranging between 27 m and 35 m. The width of the property was approximately 23 m, defined on the north side by the north wall of a building (400167) adjacent to Watling Street and further east by an irregular ditch (300560) perpendicular to the line of the Ebbsfleet. The southern boundary was marked initially by a shallow ditch and subsequently by a path (400171/2) which ran between properties 4 and 3 and provided access from Watling Street to the waterfront.

The earliest feature, as elsewhere, was the roadside ditch (300545) on the east side of Watling Street. This ran broadly parallel to the street, but at the south end was only 6 m from the edge of the road, the distance increasing to 8 m at the north end. The ditch had an open, V-shaped profile, was up to 1 m deep and a maximum of 3.5 m wide, narrowing to approximately 2.5 m wide at the north end. For virtually the entirety of its length within the property, ditch 300545 appeared to comprise a single phase with no evidence for recutting. However, close to the southern boundary it was clear that more than one phase was represented and the likelihood that there was the terminus of an earlier ditch here, subsequently extended to the north-west, has been discussed elsewhere (see property 3).

Roadside ditch 300545 was cut at 90° by a small, shallow ditch (300586; not illustrated) which extended almost the entire distance between Watling Street and the waterfront and marked the earliest phase of the southern property boundary. This clearly demonstrated that the roadside ditch had silted up prior to the property boundary being established in the second half of the 1st century. The boundary ditch was overlain by a path (400171/2), a metre or so wide, represented by two phases of chalk bedding layers each overlain by a gravel surface. The path was widest adjacent to Watling Street, though the junction between the two had not survived, and at the west end it curved slightly to the south as it approached the waterfront in property 3. Here, in this lower lying area, there was a sequence of three or more gravel metallings and associated chalk consolidation layers. Path 400171/2 is likely to have been established before the end of the 1st century and appears to have remained in use throughout the occupation of properties 3 and 4, into at least the beginning of the 3rd century.

Within property 4 two principal phases of activity have been identified, assigned to the early and mid-Roman periods respectively, and these are described sequentially below. It is clear, however, that some elements of phase 1 continued into phase 2. There is certainly good evidence from the coin assemblage for activity in the second half of the 1st century which continued into the 2nd century and, as in some other properties, there is a significant concentration of late 3rd and 4th century coins from channel fills and overburden in the waterfront area.

Phase 1 (early Roman)

In the north-west corner of the property was structure 400167, aligned at 90° to Watling Street (Fig 2.76). It was represented by an L-shaped arrangement of wall foundations or footings and a number of post-holes, though the overall form and extent of the structure is unclear. The north and west sides comprised flint, chalk, and clay foundations which are likely to have supported a timber superstructure measuring approximately 10 m by 6 m. These foundations were very shallow and had been destroyed near the north-west corner by modern intrusions. It is possible that similar foundations along the east side had been removed by later truncation, but what appears to have been a small part of the return to the south did survive in the north-east corner. Along the south side were three substantial flint-packed post-holes (300568) spaced at intervals of approximately 3 m, and the structure may have been open-fronted on this side, facing onto a yard. No floor surfaces survived but two burnt areas may represent the remains of hearths, one (16650) centrally placed at the east end. A further three post-holes, one flint-packed, and a hearth lay beyond the east end of the building and may have been part of the original structure or a later addition, perhaps extending it by a further 5 m or so, though the precise arrangements are unclear.

The area to the south of structure 400167 was a yard, represented by a series of cobbled surfaces (300575–7) which survived particularly well in the central part of the property. In the south-west corner, in the angle between Watling Street and path 400191/2, was an L-shaped arrangement of five substantial post-holes (300591) probably marking a fence, and a further cluster of intercutting post-holes (17037 etc), perhaps part of a

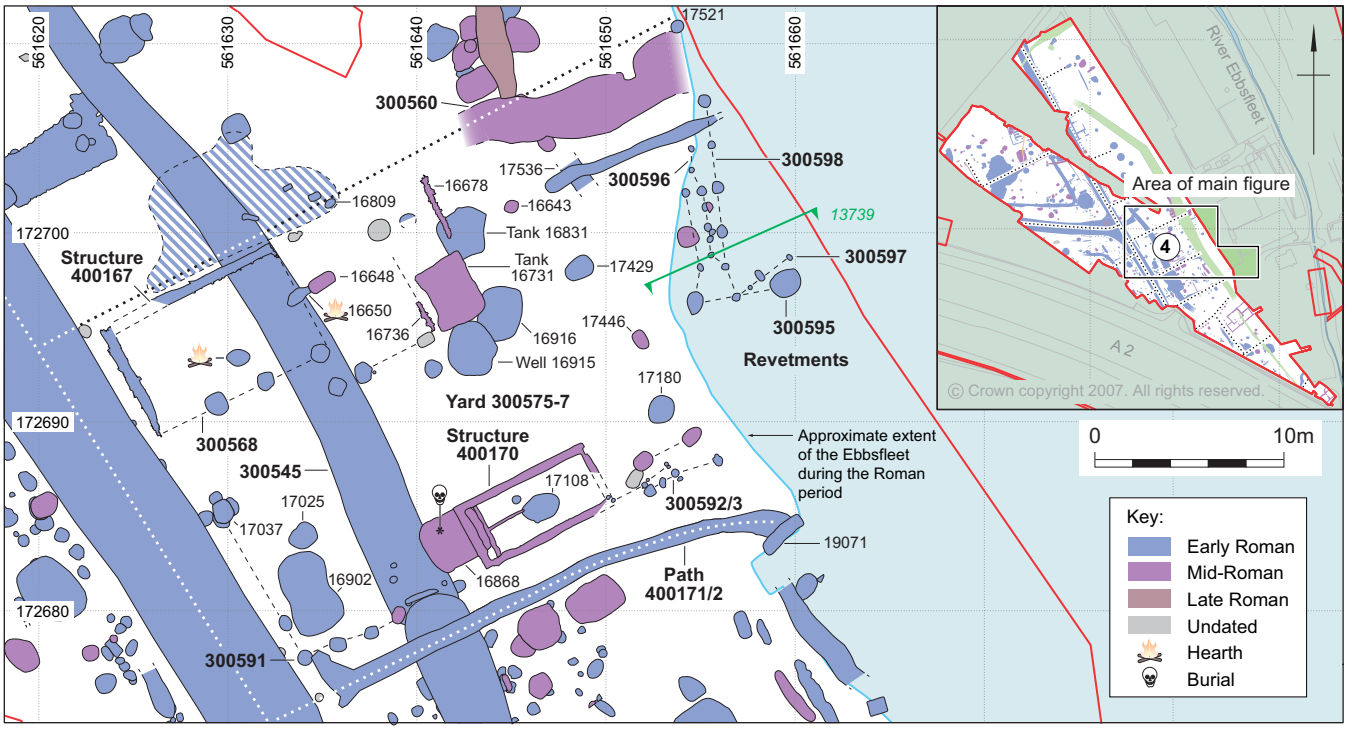

Figure 2.76 Property 4

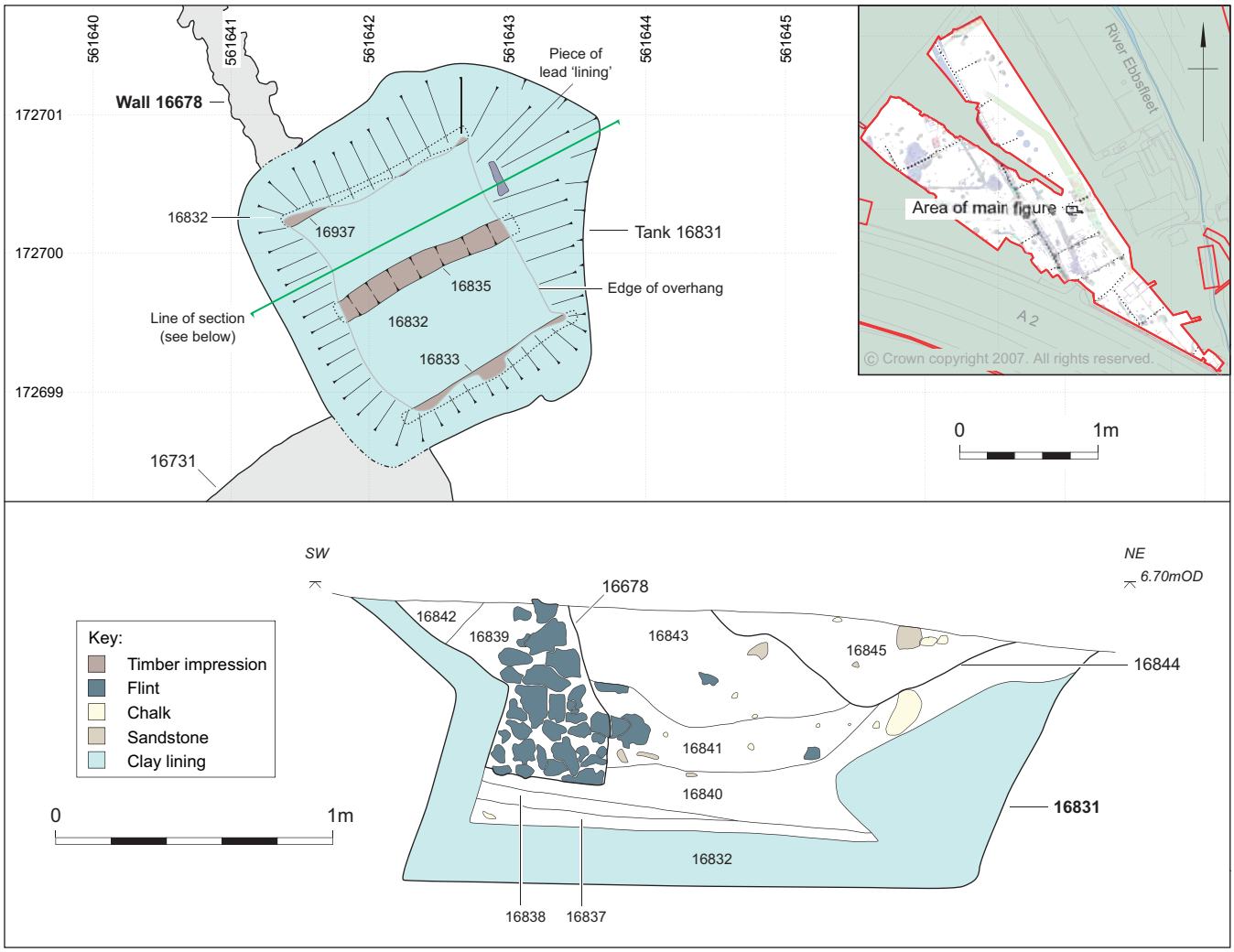

Figure 2.77 Plan and section of 'tank' 16831

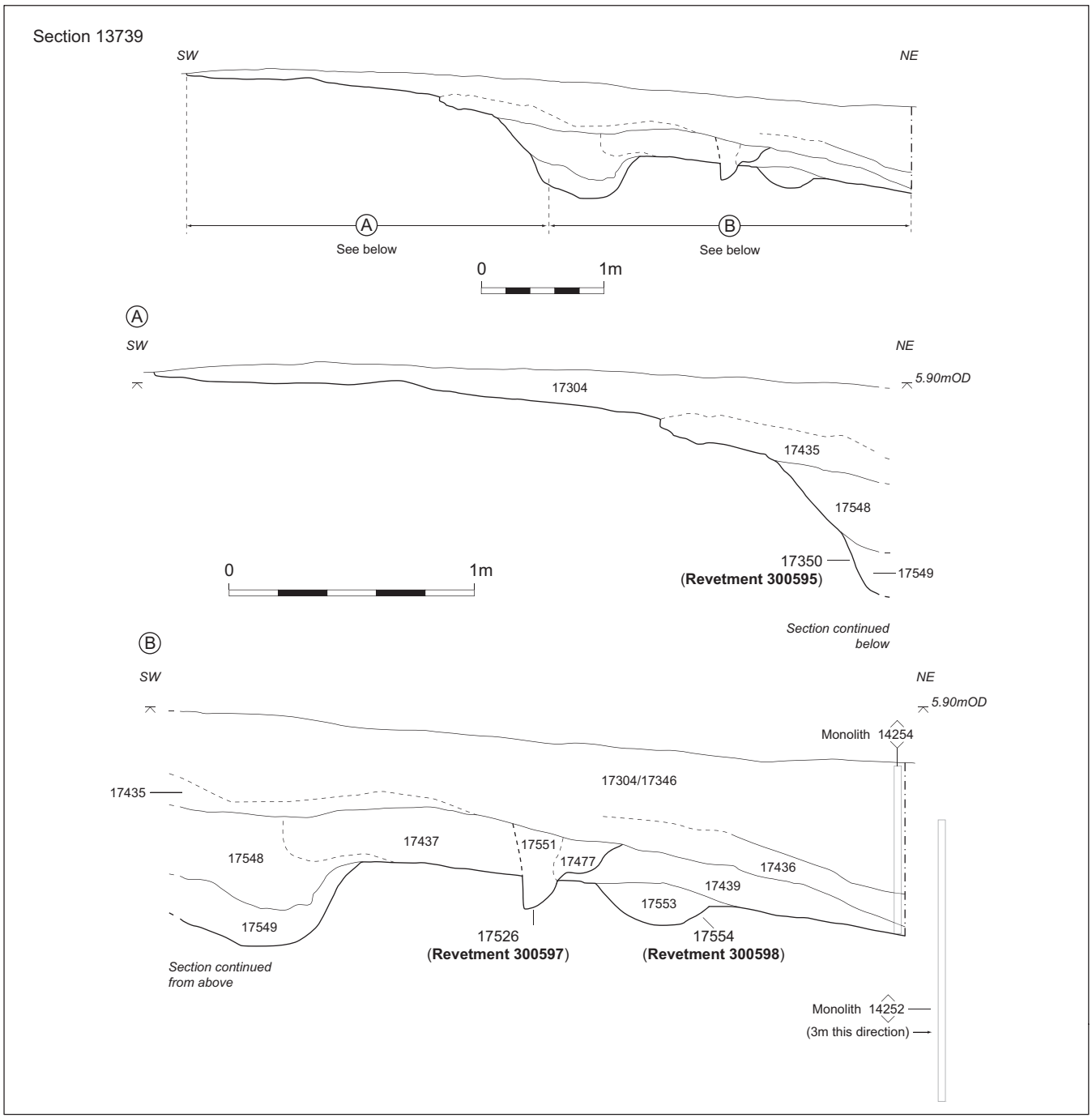

Figure 2.78 Property 4, waterfront deposits

gate arrangement, lay on the street frontage midway between this and structure 400167. Another fence line (300592), comprising at least two phases of post-holes, lay close to path 400171/2 in the south-east corner of the property, with three larger post-holes (300593) to the north representing part of an adjacent, riverside structure of uncertain form. It is possible that these fences were later than is suggested here on the basis of what may have been residual, early Roman pottery recovered from their fills (see below).

In the south-west corner of the property were two large, intercutting pits (16902) filled with domestic refuse. The only other probable rubbish pit was 16916, a sub-rectangular feature to the east of structure 400167, though the near-vertical sides and flat bottom might suggest that it originally had a more specific purpose.

Pit 16916 was cut by well 16915, which had a sub-circular well-pit and a central shaft lined with chalk blocks. Only the upper 1.5 m of the shaft was excavated and most of the chalk blocks had been robbed from this area, but pottery recovered from the latest fills indicates that it had been completely infilled by around the beginning of the 3rd century. It is possible, therefore, that well 16915 was a mid-Roman feature, but it is considered more likely that it was dug early in the 2nd century and remained in use for up to a century or so, spanning phases 1 and 2 in property 4.

Well 16915 may have been dug specifically to provide water for some process which involved 'tank' 16831 and

its later replacement, 16731, both of which lay to the north of the well. Tank 16831 was rectangular, measuring approximately 2.4 m by 2 m and 1 m deep, though the internal dimensions (ie, excluding the clay lining) were somewhat less (Fig 2.77; Pl 2.24). The clay lining, which had partly collapsed, was up to 0.2 m thick and formed an impermeable layer covering the entire interior of the tank. The inner face of the clay had itself been lined with timber planks, traces of which survived around the sides, and in the base were the impressions of three parallel, more substantial timbers which would have helped support the weight of the tank, probably made of wood though possibly of lead (or with a lead lining), and its (presumably) liquid contents. Along the bottom edge on the east side was a small, folded piece of lead which may have been used as a 'patch' of some sort. Of particular note from the backfill of this tank was a large, undamaged pivot stone (weighing approximately 25 kg) fashioned from a hemispherical piece of sarsen. A narrow U-shaped ditch, 17536, which lay 3 m to the east of tank 16831 and extended eastwards for almost 10 m into the edge of the Ebbsfleet, may have been a drainage feature associated with the tank and perhaps used to take away excess liquid. Certainly, the location of this ditch seems to rule out the possibility that it was boundary feature between properties 4 and 5.

Along the edge of the Ebbsfleet in this area, in the northern half of the property, were several post-hole alignments (see Fig 2.76; Pl 2.25), possibly representing a succession of revetments associated with some form of quayside or platform. The ground surface sloped down relatively steeply here into the bed of the now-dry Ebbsfleet (Fig 2.78) and in only one of the larger post-holes did any trace of wood survive. The alignments were up to 10 m in length and extended out a maximum of 3 m from the assumed water's edge. What may have been the earliest group (300595) comprised an L-shaped arrangement of the three largest post-holes, though one of these contained a sherd of mid-Roman pottery in the post-pipe. Post-hole line 300598 appears to have been broadly contemporary with this, but alignment 300597 which was a more irregular alignment of smaller post-holes was certainly later than both.

Phase 2 (mid-Roman)

The east end of the northern property boundary was probably defined in this phase by a meandering and rather irregular ditch (300560), perhaps created by the digging of a series of shallow intercutting pits (Fig 2.76). It extended for approximately 12 m, almost entirely within property 4, petered out at the west end and ran into the Ebbsfleet to the east. Ditch 300560, up to 3 m wide and generally no more than 0.5 m deep, was filled with material which showed little overall differentiation and appears to have silted up naturally. Pottery recovered indicates that this took place in the late 2nd or early 3rd century.

It is probable that structure 400167 continued in use in phase 2 (there is nothing to suggest otherwise), as did the waterfront – with at least the latest revetment

Plate 2.24 Clay- and timber-lined 'tank' 16831, property 4 (ARC SHN02) (1 m scale). Looking south-west

Plate 2.25 Waterfront area, rear of property 4, with posts marking the locations of revetments 300595/6/8 (ARC SHN02). Looking north

(300598) perhaps added at this time. Path 400171 to the south was re-surfaced (as 400172), and it is also likely that one or more of the yard metallings (eg, 300577), as well as the subsequent build-up (300578), belong to this phase. A new structure, 400170, can also be assigned to this phase, as can a shallow sub-rectangular pit (16868) which it overlay. This pit, with near-vertical sides and a flat bottom, is likely to have been dug for a purpose other than simply rubbish disposal, though what this was remains unknown.

Structure 400170 lay in the central southern part of the property, parallel to path 400172 and just under 2 m from its northern edge. It was rectangular in plan, measuring approximately 7.5 m by 3.5 m, and survived as a continuous line of shallow wall footings up to 0.5 m wide, constructed largely of chalk rubble and some flint bonded with clay (Fig 2.79). These footings would have provided support for a timber superstructure, though a spread of chalk rubble demolition (not illustrated) overlying the path suggests that the wall footings may actually have been dwarf walls rather than simply foundations. Within structure 400170 was a chalk floor (16688) which in the western half of the building was cut by a T-shaped arrangement of shallow slots which presumably defined some internal partitions or similar divisions at this end of the building. The small size and internal arrangements of structure 400170 make it

Figure 2.79 Plan of structure 400170

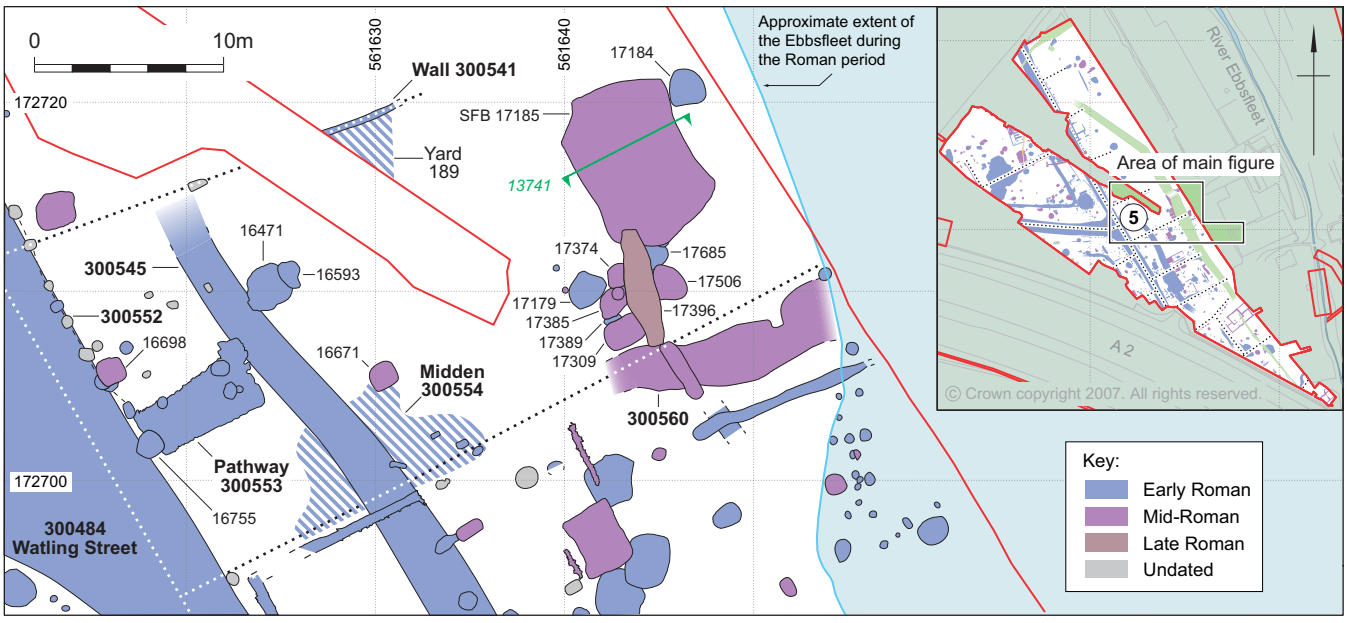

Figure 2.80 Property 5

most likely that it served an ancillary purpose, perhaps for storage.

It has been noted above that it is possible that fence lines 300591 and 300592 may have been later than suggested, and one post-pipe in the former group did contain a sherd of mid-Roman pottery. Furthermore, there is some indication that the two fence lines respected the location of structure 400170, extending from the south-west and south-east corners respectively. Certainly belonging to this later phase were the remains of an oven (not illustrated), built into the top of pit 16902 (by now largely infilled) in the south-west corner of the property.

Clay and timber (and/or lead)-lined tank 16831 was also replaced in this phase, by a similar but larger clay-lined tank (16731) immediately to the south. Tank 16731 measured 3.5 m by 2.5 m and was 0.60 m deep, but few details of its construction survived, and there was no evidence for a timber lining. In this example, the pit was almost entirely filled with collapsed or redeposited clay.

Probably associated with this second phase of tank were two parallel but offset lengths of what may have been wall footings for a shelter of some form. These footings (16736 and 16678) were constructed of flint nodules and may have been subject to varying degrees of truncation as they appeared to sit on the ground surface rather than in foundation trenches. The footing to the north (16678) was 4 m in long, perhaps close to its original length, and had been partly built across infilled tank 16831; here the footing was made deeper because of the softer ground. The footing to the south (16736) was only 2 m long and it is possible that its continuation to the north had been removed.

There were no features which could be assigned a late Roman date and the evidence suggests that this property perhaps continued in use into the early or possibly the middle of the 3rd century at the latest. However, as in property 3, there was a notable concentration of 3rd and 4th century coins (though no pottery) from deposits (eg, 17346) in the waterfront area (Fig 2.78), here post-dating the use of the revetments. As in property 3 the dark, homogeneous nature of the deposits themselves suggests abandonment, but the number of coins appears somewhat anomalous and is not easily explained, particularly in the absence of contemporary pottery.

Property 5

Property 5 lay immediately east of the junction between Watling Street and the branch road, with property 4 to the south-east and property 6 to the north-west (Fig 2.80). A small part of property 5 was unavailable for excavation, but the majority was investigated.

Property 5 extended eastwards from the branch road to the edge of the Ebbsfleet, a length of around 40 m, and the width appears to have been approximately 20 m. The boundary on the south side seems certain, defined at the east end by an irregular ditch at 90° to the Ebbsfleet and at the west end by a building within property 4. The boundary to the north is less clear but was probably defined by the south wall of a structure which lay within property 6.

The earliest feature was the roadside ditch (300545) on the east side of Watling Street. This ran broadly parallel to the street but, as elsewhere, this ditch meandered slightly. It had silted up such that it was virtually invisible on the surface and could only be defined in section, and then not always clearly. No re-cuts were observed in any of the excavated sections in this area and the ditch here had a relatively wide, open, flat-bottomed profile with a width of approximately 2 m and a depth of 1 m (see section 13593, Fig 2.60 above). The ditch probably continued to the north-west beyond property 5, although this remains uncertain as part of this area was unavailable for excavation and much of the remainder had been truncated by the construction of modern glasshouses.

Extending back approximately 6 m from the street frontage in approximately the middle of the property was a gravel pathway (300553) up to 3 m wide. No relationship between this and Watling Street could be established, but the pathway was an early feature, with a maximum of two surviving metallings, and was cut by several later post-holes. It was well-defined in plan and appeared to stop at the edge of the roadside ditch, though it seems unlikely that this was still open at the time the pathway was established.

No buildings were identified in the immediate vicinity of the street frontage, though various post-holes (300552) probably represent one or more fence lines of early Roman date. A possible sequence of three pairs of larger post-holes also lay along the frontage, centrally placed and approximately 4 m apart, perhaps defining an entrance to the property. All three pairs of post-holes probably post-dated pathway 300553, and post-hole 16698 which, along with 16755 comprised the latest pairing, was the only feature in the vicinity of the street frontage to contain pottery of mid-Roman date.

Three pits (16471/16593 and 16671) lay on either side of the projected line of pathway 300553, and what has been interpreted as the remains of a midden deposit (300554) covered the central southern part of the property. This survived as a spread of dark soil adjacent to the property boundary and extended across the top of the infilled roadside ditch. The remains of an infant were found within this midden deposit, but no grave cut could be identified. Midden deposit 300554 produced a very substantial assemblage of pottery, virtually all of early Roman date with only a few, possibly intrusive sherds which might belong to the later 2nd or early 3rd century.

The northern boundary towards the rear of the property appears to have been defined by wall 300541, most likely the south wall of a building which lay within property 6 (see below). To the south of this was a spread of chalk overlain by flint gravel (189) and perhaps representing the remains of a yard surface.

The property boundary towards the rear on the south side appears to have been defined by an irregular ditch (300560), which lay almost wholly within property 4 to

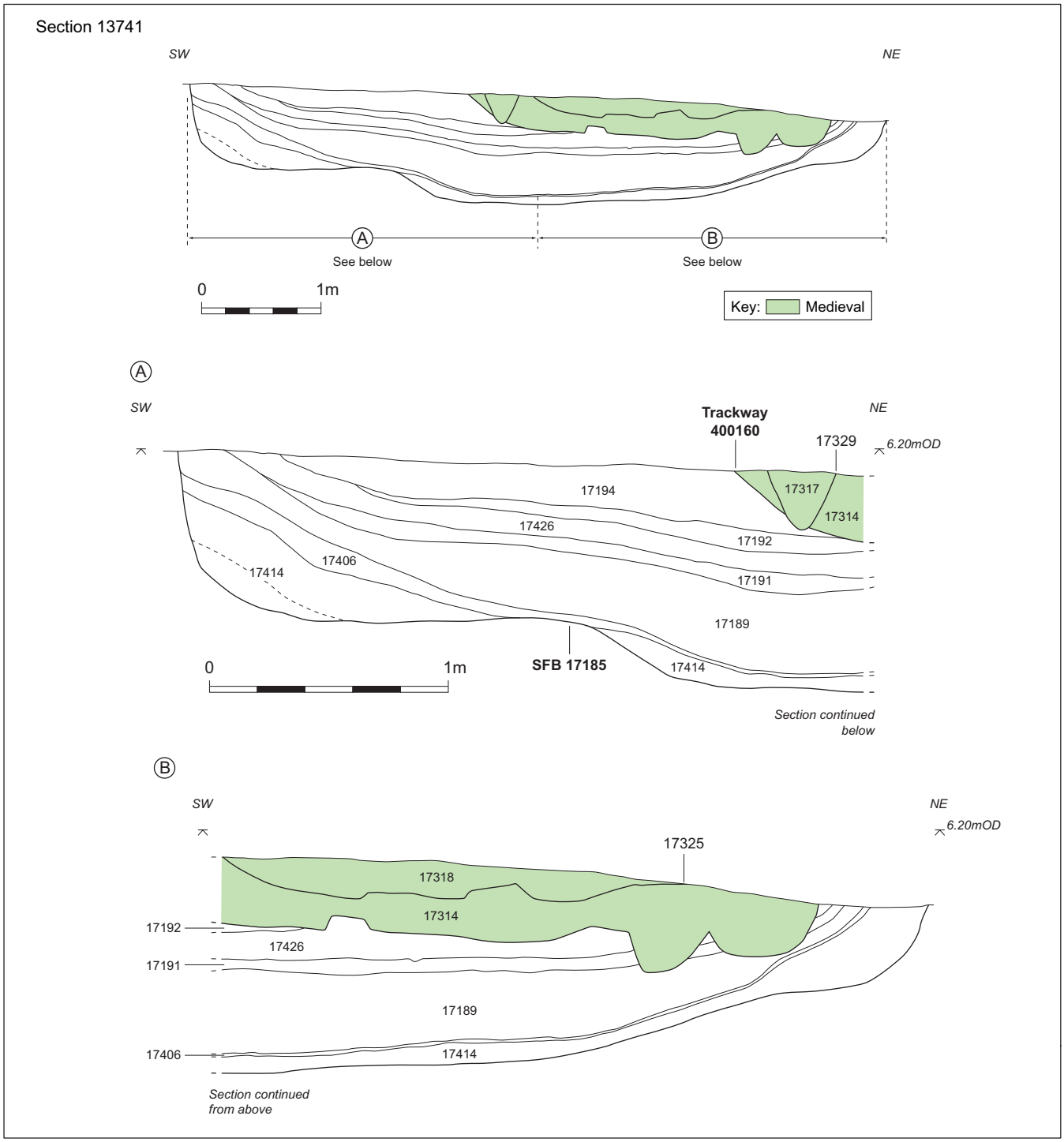

Figure 2.81 Section through SFB 17185

the south (see above). This ditch was infilled during the mid-Roman period, and the majority of features to the north of this in property 5 were also filled at this time.

The features to the north of ditch 300560 comprised a relatively dense complex of intercutting pits, one much larger feature and a few post-holes, all lying towards the rear of the property, within 12 m or so of the Ebbsfleet. The pits varied in shape and size, with diameters up to 2 m and depths not exceeding 1.2 m. Four of the pits (17179, 17184, 17389, and 17685) have been assigned an early Roman date, and a further four (17309, 17374, 17385, and 17506), which were tightly clustered, a mid-Roman date, with deposition in the latter probably continuing into the beginning of the 3rd century.

The most substantial feature in this group was sub-rectangular pit 17185 which lay immediately north of the main group of pits and within 5 m of the edge of the Ebbsfleet. Pit 17185 was approximately 9 m long, 6 m wide, and 0.9 m deep, with steeply sloping or near-vertical sides and a slightly undulating bottom (Fig 2.81). There were no associated post-holes, but its size and shape suggests that it may have been some form of sunken-featured structure, similar to a second example in property 12 (see below). Pottery indicates a

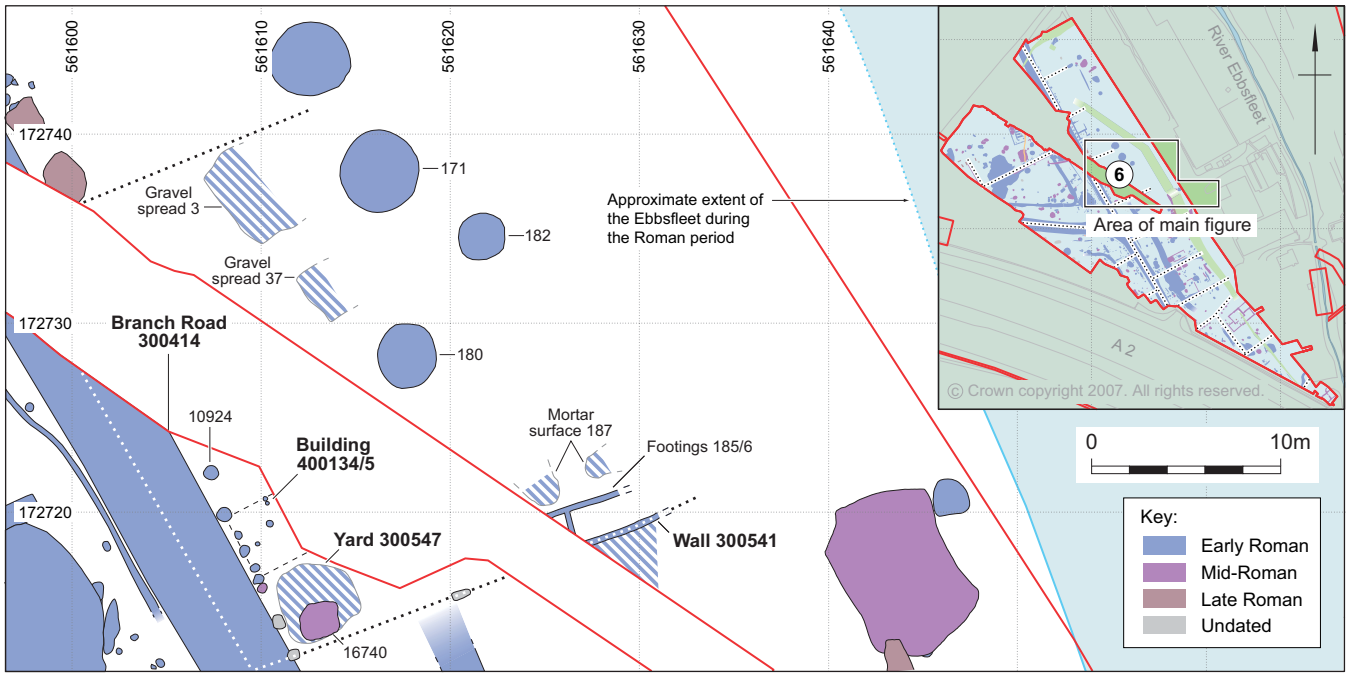

Figure 2.82 Property 6

mid-Roman date (like that in property 12) and it is possible that the cluster of mid-Roman pits immediately to the south were contemporary with it. The function of SFB 17185 is uncertain but it may have served for storage of some sort.

A single feature (17396) comprising a narrow, elongated, cigar-shaped pit, approximately 6 m in length, up to 1.8 m wide and less than 0.5 m deep, was dated to the late Roman period. It extended northwards at approximately 90° to the property boundary and was dug through the top of the cluster of infilled pits that occupied this area. Pit 17396 was the only feature in this or the adjacent properties to be assigned such a late Roman date, but its function is unclear. It was sealed by an extensive silty layer (17195) interpreted as a Roman flood deposit which, on the basis of the coin evidence, was laid down in the late 3rd or early 4th century. This deposit was in turn sealed by medieval trackway 400160.

Property 6

Property 6 lay on the east side of the branch road, with property 5 adjacent to the south-east and property 7 to the north-west (Fig 2.82). Property 11 lay on the opposite side of the road. Part of property 6 was unavailable for excavation, but a small area adjacent to the branch road and a rather larger area in the rear of the property were investigated. Part of the latter area had been truncated by modern terracing for glasshouses, but the damage caused by this truncation was considerably less than in properties 7 and 8 to the north-west.

Property 6 extended eastwards from the branch road to the edge of the Ebbsfleet, a length of around 40 m. The boundaries of the property to the north-west and south-east were unclear, though possible locations for these have been indicated on the basis of limited evidence from this and adjacent properties. These postulated boundaries would give a width of approximately 25 m, similar to that which has been suggested for properties 7 and 8.

Two phases of a structure (400134 and 400135), probably representing a building, were identified within the relatively small area excavated on the street frontage in the south-western corner of the property. Although it is uncertain, it appears that this building was oriented at 90° to the street, and was approximately 5 m wide and of unknown length (though it probably did not exceed 12 m). The evidence for a building is provided by two phases of post-holes, the later phase associated with a chalk floor (300446; not shown on plan). This floor was sealed by a shallow depth of deposits (300447) post-dating the building. There were no structural remains marking the sides of the building, though this appeared to be defined by the extent of the chalk floor, with the remainder of the building lying within the unexcavated strip which extended across much of the eastern half of the property. Immediately south of the building were the remains of a gravel spread (300547), probably representing a yard surface adjacent to the branch road.

The southern boundary towards the rear of the property appears to have been defined by wall 300541, most probably the south wall of a building which lay within property 6. Wall 300541 was 0.35 m wide, constructed of chalk and flint bonded with mortar, and survived to a height of approximately 0.3 m. It extended for a distance of at least 4 m, continuing beyond the limit of excavation to the west and truncated by terracing for modern glasshouses to the east. North of this wall and probably contemporary with it were the fragmentary traces of what may have been the remains of two further walls or wall footings, both comprising poorly defined, linear concentrations of flint nodules, the extents of which were unclear. Footing 185 was 0.50–0.60 m wide,

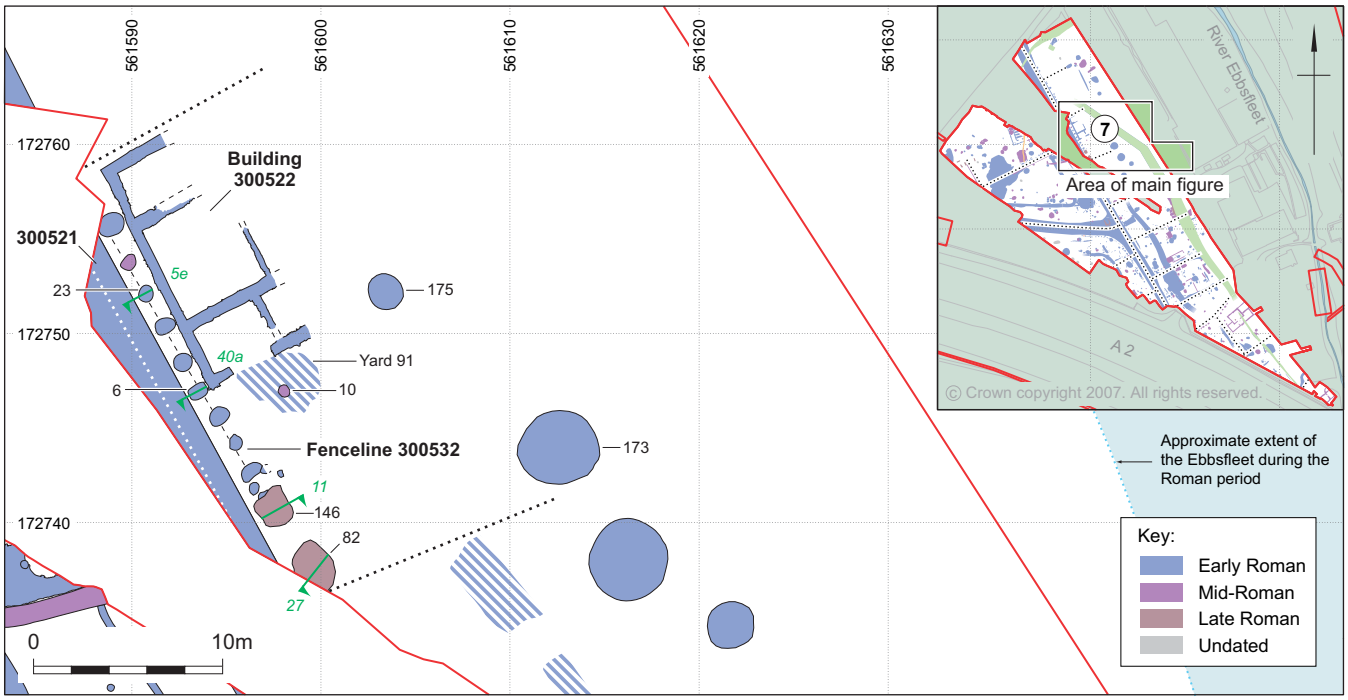

Figure 2.83 Property 7

at least 3 m long, parallel with, and 2 m to the north of, wall 300541. Lying between and at right-angles to these was footing 186 with a maximum width of 0.50 m. On the north side of wall 300541 and extending around footings 185 and 186 was a spread of chalk overlain by flint gravel (188; not shown on plan). This was probably the foundation for mortar surface 187, perhaps a floor, two patches of which were recorded on the north side of footing 185. Too little survived or could be excavated of the building represented by these various footings and surfaces to offer any further clue as to its size, date, or function.

In the north-western part of the property, 6–10 m from the road, were two sub-rectangular, well-defined spreads of gravel which perhaps indicate the locations of ancillary structures, though neither was associated with any post-holes, beam-slots, or identifiable stake-holes. Gravel spread 3 overlay a bedding layer of crushed chalk within a shallow, sub-rectangular hollow measuring 5 m by at least 4 m, and 2 m to the south of this were the remains of a similar spread (37) largely truncated by recent terracing.

Three pits (171, 180, and 182) north of the buildings were of 1st–early 2nd century date, but pit 16740 immediately to the south and close to the frontage contained material extending into the mid-2nd century.

Property 7

Property 7 lay on the east side of the branch road, with property 6 adjacent to the south-east and property 8 to the north-west (Fig 2.83). Properties 11 and 12 lay on the opposite side of the road. Modern terracing for glasshouses had substantially truncated archaeological deposits in the rear part of the property, but the frontage survived relatively undamaged. This terracing may well have removed all evidence for the roadside ditch on the west side of the branch road in this area, though it is uncertain how far the ditch extended to the north-west (see below).

The extent of the property is unclear, but it may have been in the order of 25 m wide, the north wall of building 300522 possibly defining the limit on that side; the boundary to the south-east is less clear, with part of this area lying beyond the edge of the excavation. The boundaries to the west and east were defined by the branch road and the Ebbsfleet respectively, giving the property a length estimated at just over 40 m. No features marked the former edge of the Ebbsfleet in this area (*cf* properties 3 and 4, for example) and the ground surface sloped gently down to a point where there was a more pronounced drop marking the extent of the channel. This area had been utilised for watercress beds in the later 19th and earlier part of the 20th century, and subsequently infilled following their disuse and prior to the construction of glasshouses. However, some earlier deposits survived in the channel and a small quantity of Roman finds was recovered (see below, property 8).

Building 300522 lay adjacent to the branch road and may have been rectangular, square or possibly L-shaped in plan, though this remains uncertain as virtually all of at least one room to the rear had been removed by terracing (Pl 2.26). The surviving part measured 12 m long and 5 m wide, but it could originally have extended considerably further to the north-east, particularly if pit 175 pre-dated it. Building 300522 had walls of flint and mortar which were approximately 0.6 m wide and generally survived to a maximum height of 0.4 m, including the foundation courses which were set in shallow trenches (Fig 2.84). These walls are likely to have provided footings for a timber superstructure. Four

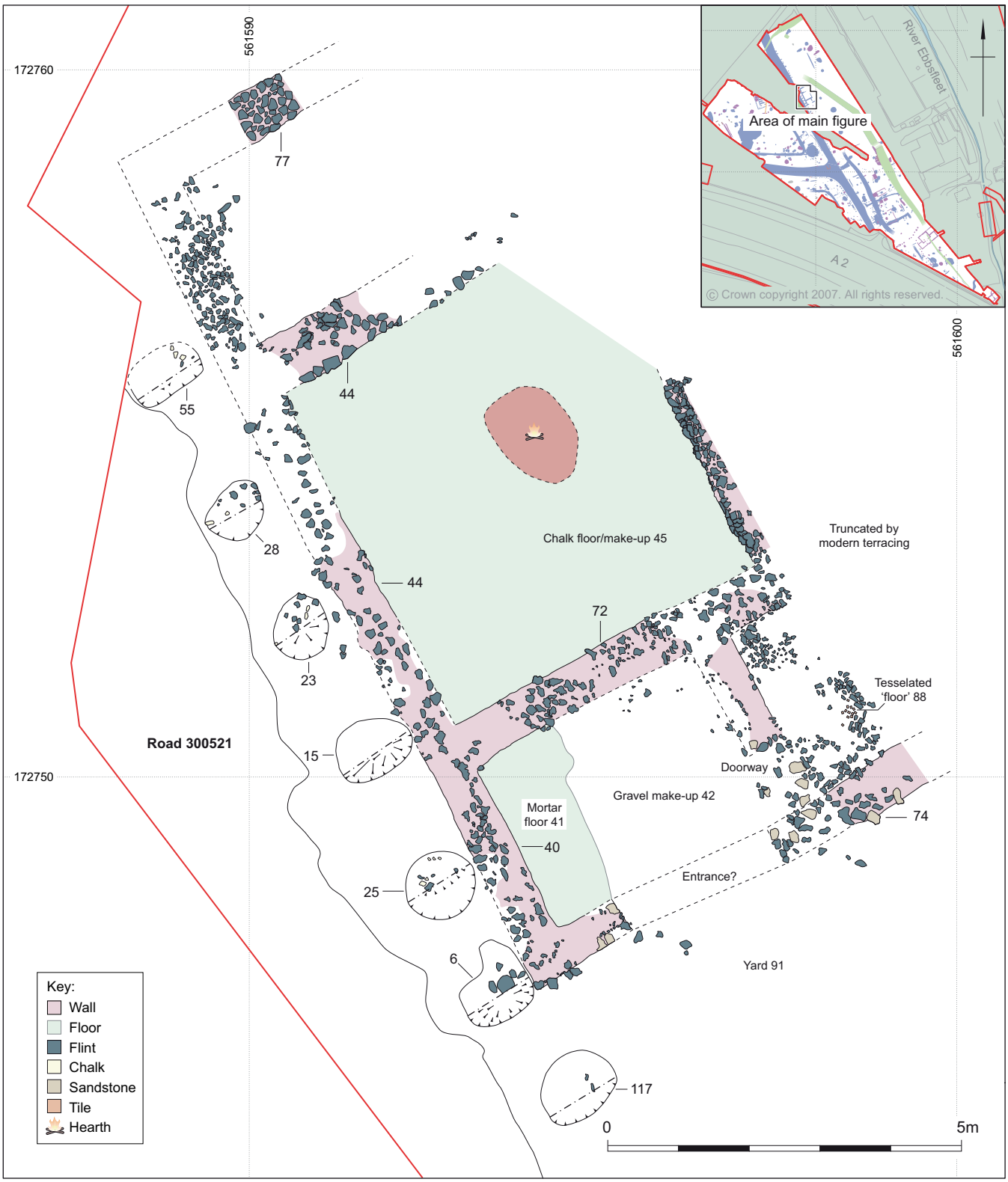

Figure 2.84 Building 300522

rooms were identified, three along the front adjacent to the road and one in the 'range' to the rear. The central room along the front measured 5.2 m long by 4.8 m wide internally, and had a chalk floor (45) scorched red in the middle – perhaps the remains of a central hearth. The rooms to the north-west and south-east both measured 2.6 m long, and were 4.8 m and 4 m wide respectively. The room to the south-east had traces of a mortar floor (41) and there was a possible external entrance in the south-east side. In contrast, the room to the north-west had no surviving floor surface, although archaeological deposits lay close to the surface in this area and had suffered some disturbance. Very little of the rear room remained, but this was 2.6 m wide, of unknown length (max. 7.5 m) and a very small area of tessellated floor (88) survived in a hollow within the

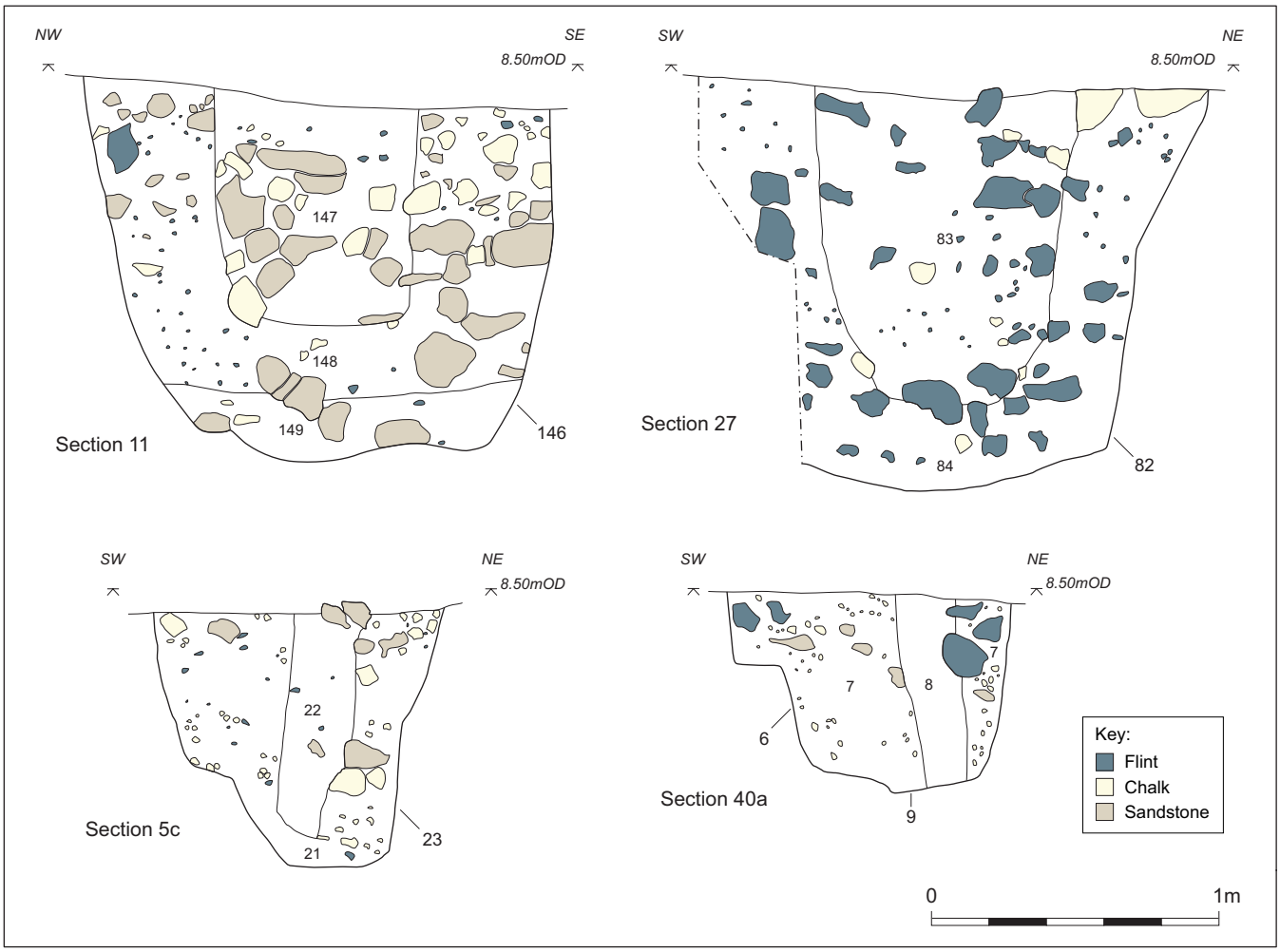

Figure 2.85 Sections of pits and post-holes in property 7

Plate 2.26 Building 300522, with post-holes marking edge of branch road 300414, property 7 (ARC SHN02). Looking west

chalk bedding layer (89) for the floor. Presumably the remainder of this floor had been robbed, but it represents the only evidence for tessellated flooring in any of the buildings investigated in the HS1 excavations at Springhead. No doorways between rooms could be identified. A pre-building soil (300527), possibly a levelling layer, was found beneath building 300522, but no earlier structural features, and beneath this was a shallow, irregular scoop (60, not illustrated) which contained a copper alloy zoomorphic spout from a vessel.

Immediately to the south of building 300522 was a thin spread of gravel (91), perhaps a yard surface outside the possible entrance in the south-east side of the building. Further to the south-east, but possibly in property 6, were two well-defined spreads of gravel (3 and 37) which perhaps indicate the locations of ancillary structures (see above).

Along the front of building 300522 and cutting the edge of the uppermost surviving road surfaces was a line of at least a dozen substantial post-holes (300532). This line extended to the south-east beyond the corner of the building and suggests that, as elsewhere, the post-holes represent fence lines rather than parts of buildings. Here, as in other properties, the evidence also indicates that the fence lines were constructed within individual properties. For example, the post-holes in property 7 were larger and of a more consistent size and spacing than the 12 post-holes alongside the road in property 8 to the north-west. The post-holes in property 7 were spaced at roughly 2 m intervals (centre-to-centre), were *c* 1 m diameter with an average depth of 0.70 m, and had post-sockets *c* 0.20 m diameter (see Fig 2.85). At the south-eastern end of this group were two later, particularly substantial post-holes which, on the basis of the ceramic evidence, are dated to the late Roman period. Post-hole 146 was 1.60 m diameter, 1.25 m deep with a post-socket 0.70 m diameter, and post-hole 82 was approximately 2 m diameter, 1.4 m deep and with a post-socket 0.90 m diameter (Fig 2.85). Perhaps these two post-holes defined a 2 m wide entrance to a yard adjacent to building 300522 in this property, though it is uncertain whether this was still standing at this time. Some mid- but no late Roman pottery came from the deposits sealing the floor surfaces, although a few sherds came from a small hollow (10) in yard surface 91.

The number of pits assigned to the property is dependent on its extent, particularly to the south-east. On the basis of the assumed location of the boundary perhaps only two pits (173 and 175) lay within property 7, a surprisingly small number, and both contained material of early Roman date. One explanation is that at least some domestic rubbish was disposed of along the edge of river channel.

Overall, the dating evidence indicates that building 300522 was constructed towards the end of the 1st century and its use may have continued a little into the mid-Roman period. However, there was clearly some activity in the property in the later 3rd or 4th century.

Property 8

Property 8 lay on the east side of the branch road, with property 7 adjacent to the south-east. Property 8, together with property 12 on the opposite side of the road, represent the most north-westerly properties examined, and it is clear from previous work that they lay close to the periphery of the settlement (Fig 2.86). Earlier HS1 evaluations had confirmed the course of the branch road and established that although further Roman features lay to the north-west of the area subsequently excavated, these were comparatively sparse. It is possible, however, that there was at least one further property to the north-west of property 8.

Modern terracing for glasshouses had substantially truncated archaeological deposits in this area, particularly along the street frontage, but sufficient survived to provide some details of the nature and layout of the property. Terracing is certain to have removed the roadside ditch on the east side of the branch road in properties 7 and 8, but the ditch was not seen in the exposed section at the north end of the site, despite careful examination, and possibly it did not extend this far. However, it was very difficult to identify the ditch in properties 5 and 6 to the south-east, where there was very little difference between the natural deposits and the silted fills of the ditch, and it is quite conceivable, therefore, that any surviving remains of the ditch went undetected in properties 7 and 8.

The precise location of the boundary between properties 7 and 8 is uncertain. It has been taken here to be the north side of the building 300522 within property 7, though it may have lay a few metres to the north-west, perhaps marked by a fence line for which no evidence has survived. The boundary to the north-west is also uncertain; it may have fallen within the excavated area or beyond the site limit to the north. If the former, then a property width of approximately 25 m might be indicated (see below). The length of the property, defined by the branch road on one side and the Ebbsfleet on the other, is likely to have been a little over 40 m, similar to that in property 7. Towards the north edge of the site the valley edge showed a more steeply sloping profile than was evident in property 7, descending from *c* 6 m aOD to below 3 m aOD, with up to 1 m of colluvium present in places on the valley side and along the edge of the valley bottom. The colluvium sealed alluvial deposits containing a few finds of prehistoric (Bronze Age–Iron Age) and Roman date. Elsewhere, within the valley bottom, up to *c* 0.80 m of slightly organic silts were present which appeared to contain only Roman material, though in relatively small quantities and confined to the edge of the valley bottom.

There is likely to have been a building on the higher ground close to the road (300521), as was the case in all but one of the other properties which backed on to the Ebbsfleet, but no structural evidence had survived within this area. The road metallings had also been largely truncated in this part of the site, with only a small area of gravel surviving on the west edge of the

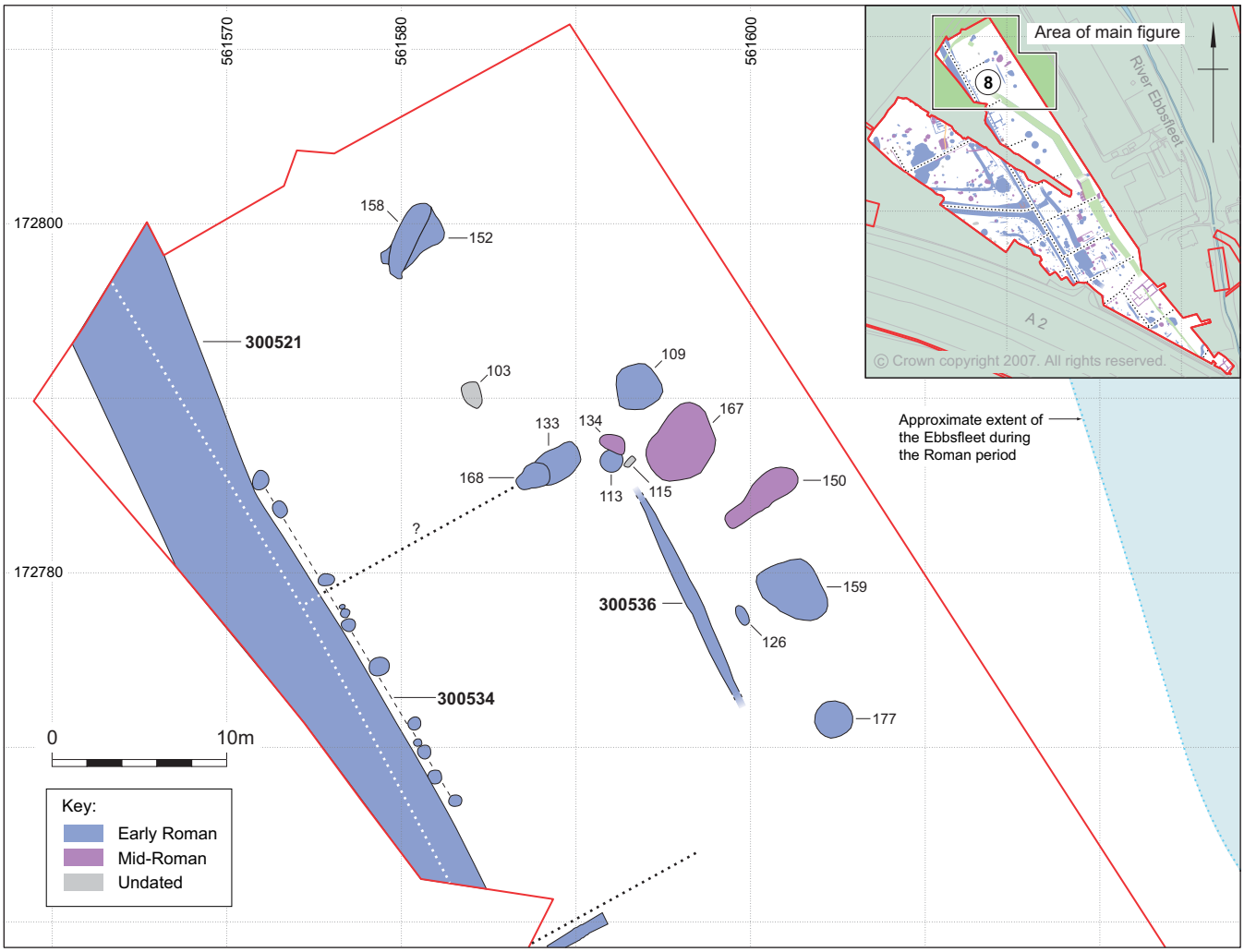

Figure 2.86 Property 8

excavation. However, a dozen post-holes (300534), probably representing a fence line, were preserved in a narrow strip over a distance of approximately 20 m along the edge of the road. These post-holes were smaller and less regularly spaced than was sometimes seen elsewhere, for example in property 7, and the line did not continue as far north as the edge of the excavation.

Approximately 20 m back from the street frontage was a shallow gully (300536) at least 10 m long which is likely to have marked a boundary within the property, and it may be significant that all of the dozen or so pits which survived in this area lay to the north or east of this feature. The small cluster of pits to the north may have defined a boundary on the north-west side of the property, but there is no other evidence for this. All of these pits appear to have been used for rubbish disposal, but 134 had part of a large, mid-Roman storage vessel lying on its side in the top of the pit, and the associated burnt clay layers suggest that this was utilised as a pot oven. Further to the north-west were two, shallow irregularly shaped pits (152 and 158) containing very few finds and one undated pit (103).

Pottery from the pits indicates that most were filled in the later 1st and 2nd centuries, but there was limited evidence from two of the larger pits (150 and 167) that these remained open into the beginning of the 3rd century.

Property 9

Property 9 lay on the west side of Watling Street, to the south-east of property 10 and opposite properties 3 and 4 (Fig 2.87). A 30 m length of the street frontage was exposed, but it was only possible to examine an area extending a maximum of 10 m back from the frontage within the area available for excavation. From this it was not clear whether the extreme south-east part of the area was part of a separate property.

Part of the roadside ditch (300451) was exposed along the south-western edge of the excavation and represents the earliest feature other than the road itself. This ditch lay approximately 9 m from the edge of the road and excavation of a single section revealed only one phase, with no evidence of recutting, the same as was seen in property 10 (see below).

No structural remains apart from a kiln or oven and various fence lines were revealed, but it is quite possible that other, more substantial structures lay slightly further back from the street frontage, beyond the limit of excavation. It appears that the front part of the

property was open and largely comprised a sequence of yard surfaces along with a small number of pits and other features.

Pits 16419 and 16464 towards the north-eastern corner of the property were possibly the earliest features, both dating to the later 1st century AD. The larger, 16419, was a sub-rectangular, relatively shallow, flat-bottomed pit, and 16464 a smaller, deeper feature, the upper fills of which contained later 2nd century pottery. They were sealed by a chalk surface (16135) which continued into property 10 (see below) and whose extent to the south-east perhaps marked a boundary between properties 9 and 10. This may have been re-defined by later fence line 300497 which perhaps shifted the boundary 5 m or so to the north-west (see below). At least three chalk surfaces survived within property 9 (none shown on plan) and, of these, 16468 was broadly contemporary with surface 16135 in property 10, with 16457 being earlier and 16140 later. These chalk surfaces may have provided the bedding for gravel yard surfaces, and various patches of gravel probably represent the remnants of such metallings which appeared to be contiguous with some of the street surfaces.

Towards the south-east corner of the property were several features assigned to various phases. Possibly the earliest of these was a neonate burial (16230), with the latest being two shallow pits or scoops, 16175 and 16253, the former containing some 3rd century pottery and probably representing one of the latest features in the property. Within this sequence, and of likely mid–late 2nd century date, was a rectangular kiln or oven (300511). Only the base of this feature survived, but there was sufficient to show that it measured approximately 2.8 m by 1.3 m, was aligned parallel to Watling Street and set back approximately 7 m from the street frontage. It was built of chalk, with a clay-lined flue extending the length of the feature and another opening on the north-east side (Fig 2.88). No clear evidence of its function was obtained from the environmental remains, but it is most likely that it represents a drying kiln rather than an oven.

A cluster of post-holes (300518) to the east of kiln 300511 may indicate the location of a boundary between property 9 and a further property to the south-east though, as noted above, this could not be established with any certainty. However, the surfaces to the south-east were somewhat different to those to the north-west and were characterised by several that were roughly laid and comprised flint cobbles of various sizes with bedding layers of chalk (300515/6). The cobbled areas extended up to the edge of Watling Street, forming what in effect were continuous surfaces, and are best interpreted as hard-standing, perhaps parts of a more extensive yard as also seems to have been the case to the north.

Alongside Watling Street were one or more fence lines, all of which appear to fall relatively late in the sequence. One group of four substantial post-holes

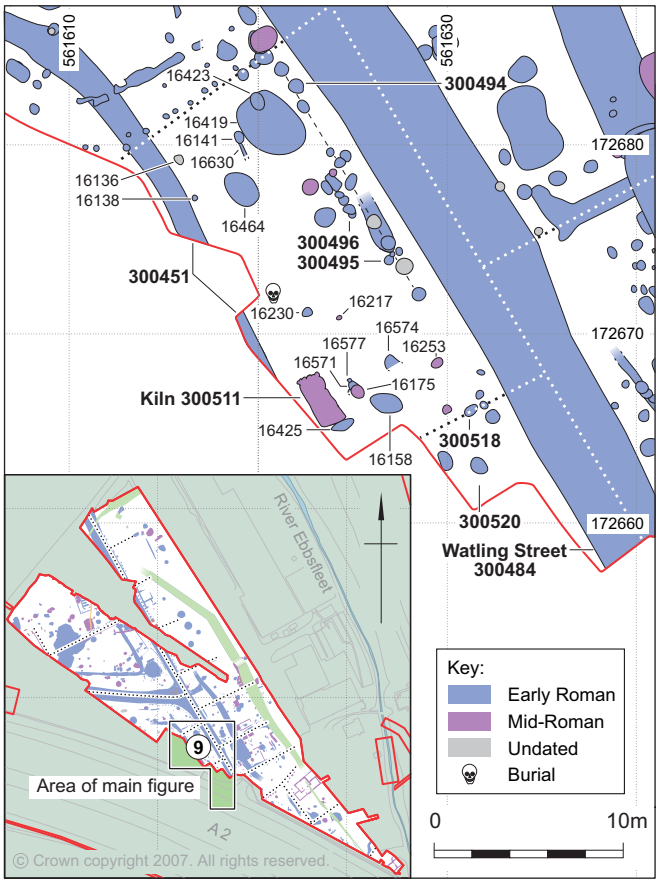

Figure 2.87 Property 9

(300494) lay at the northern end of the property and perhaps continued an alignment in property 10, their limit broadly matching that of chalk surface 16135 and perhaps reflecting the postulated earlier extent of that property to the south-east. A second group (300495) was represented by six or more post-holes, also substantial, forming an alignment 9 m in length and perhaps centrally placed within the property along the street frontage. Several smaller post-holes belonged to an earlier alignment in the same location and there was a shorter, parallel alignment (300496) immediately to the south-west. A gap to the south of the central group of post-holes is likely to have allowed access to the property from the street.

It is difficult on the basis of the available evidence to establish the nature of the activity undertaken within property 9. If feature 300511 was a drying kiln then some sort of agricultural function might be assumed, perhaps some form of crop processing.

Property 10

Property 10 lay immediately south of the junction of Watling Street and the branch road, opposite properties 4/5 and 11, with property 9 adjacent to it to the south-east (Figs 2.89 and 2.90). It appears to have occupied a triangular area within the angle formed by Watling Street as it approached from the west and 'dog-legged' around the springs at the head of the Ebbsfleet. The full extent of property 10 was not exposed, though the boundary to

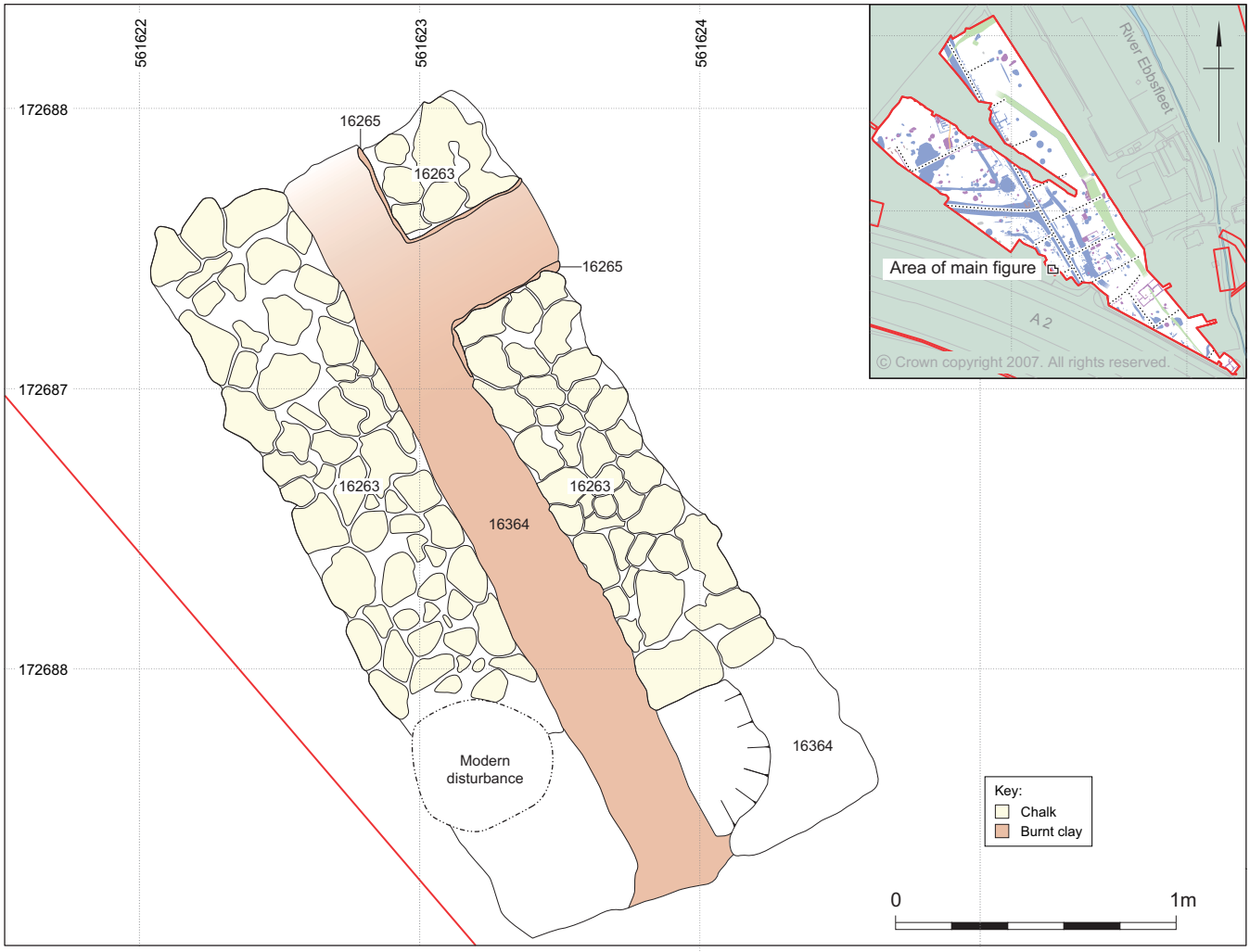

Figure 2.88 Plan of kiln 300511

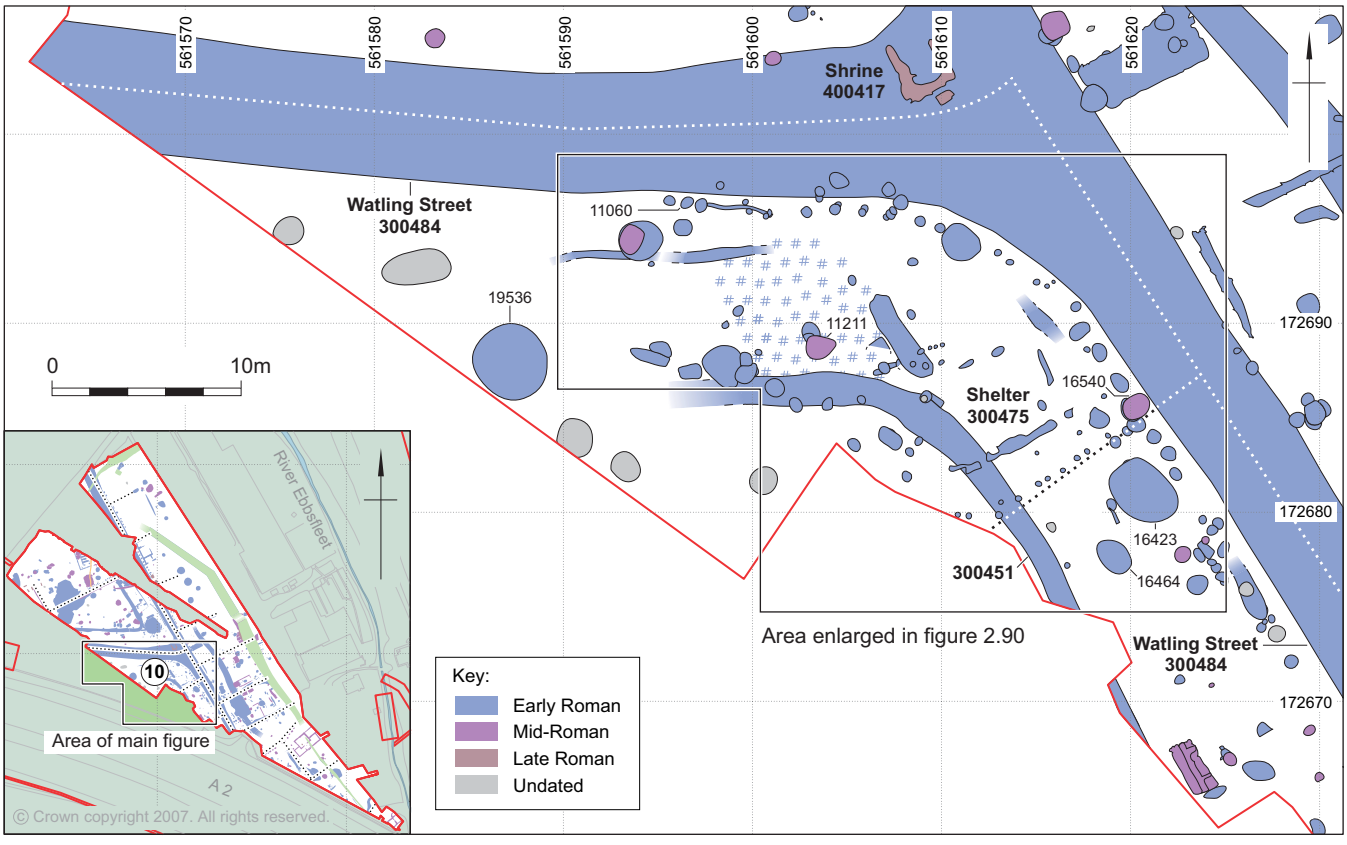

Figure 2.89 Property 10

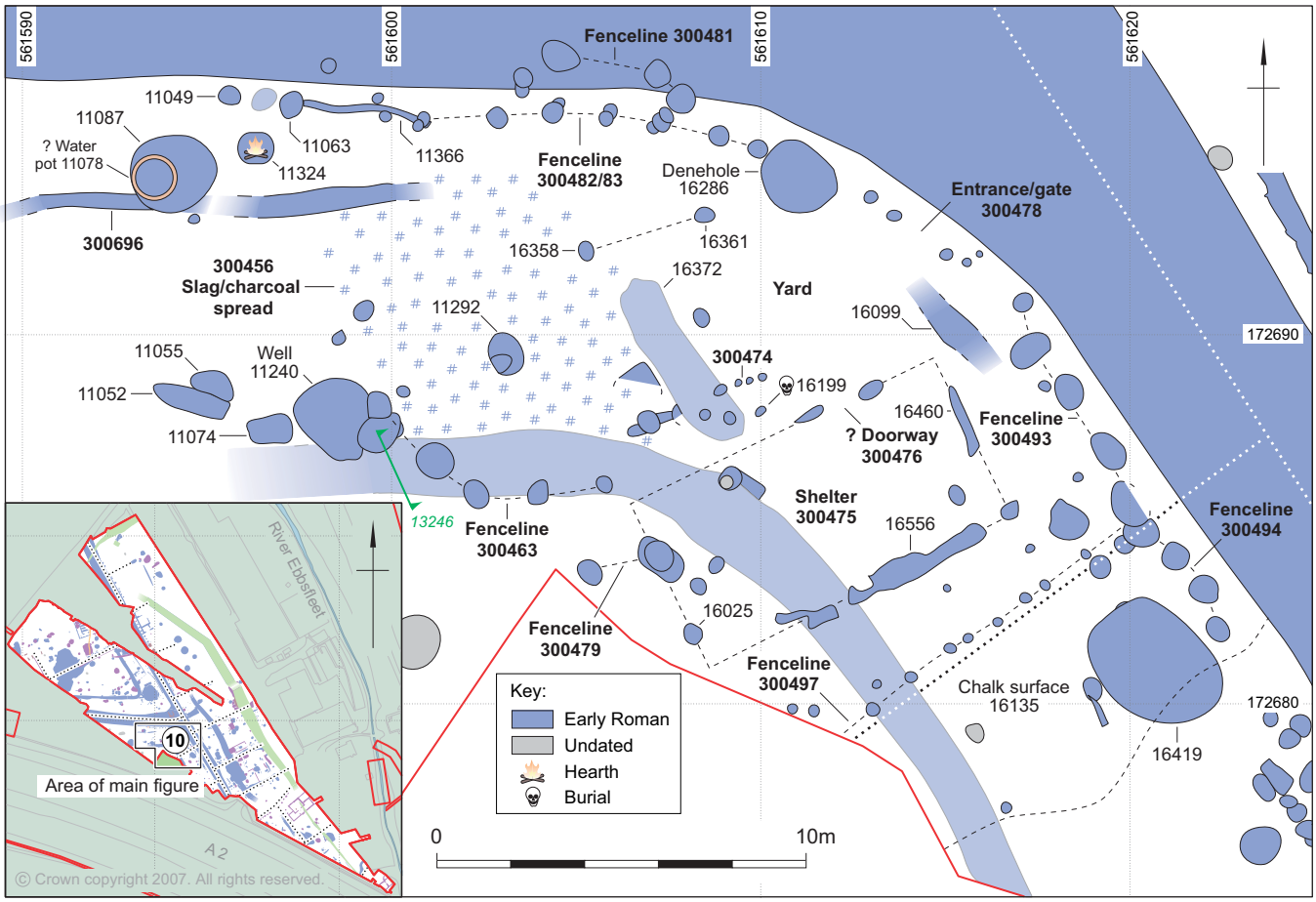

Figure 2.90 Property 10, detail of smithy area

the east was established and probably most of the structural sequence alongside Watling Street did lie within the area available for excavation.

The earliest feature was the roadside ditch (300451), approximately 9 m from the edge of the road, its alignment closely reflecting the bend in Watling Street at this point. It was similar in size and profile to the roadside ditch to the north of the junction (see property 11) but, in contrast, only one phase was recognised with no evidence for it having been re-cut (see section 13246, Fig 2.60). However, pottery from ditch 300451 indicates that it had probably silted up by the end of the third quarter of the 1st century, around the same time as that to the north. A substantial but shallow, early slot (16372), 5 m long and 1 m wide, lay adjacent to the bend in the ditch and may have been contemporary with it, possibly part of the marking out process for the ditch and road. Two short lengths of a shallow gully (300696) approximately 3 m from the edge of the road also appear to have been part of an early feature (of which gully 16099 may also have been a part), though whether they were marking-out ditches associated with the construction of the road or were slightly later is uncertain.

Shortly after the roadside ditch had silted up the area was built over, the property being occupied by a smithy. There was a clear difference between the deposits in the east and west parts of the property, the area to the east being occupied by a structure, probably a shelter, perhaps partly open-sided, and the area to the west having several pits, a sequence of metalled surfaces and several spreads of ironworking slag. The nature, quantity, and distribution of the slag are discussed in Volume 2, Chapter 5. The use of the smithy appears, on ceramic and numismatic evidence, to have spanned the later part of the 1st century and the beginning of the 2nd century with only limited evidence for later activity within this property.

The structure (300475) was represented by the insubstantial remains of two wall footings perpendicular to each other, one (16556, on the south side) of chalk rubble surviving to a length of approximately 7 m, the other (16460, on the east side) of flint cobbles only 2 m long (Fig 2.90). From these fragmentary remains it appears that structure 300475 lay at right-angles to Watling Street, approximately 4 m from the frontage, and was probably open to the north-west. Two small slots along the north side may have held posts which supported the roof and also defined a doorway (300476), and a post-hole (16025) may have marked the location of the west side, though there was nothing surviving of the wall at this end. Nevertheless, the evidence suggests that the structure may have measured approximately 9 m by 5 m. No internal features were identified, but the remnants of a chalk surface probably represent a floor. Immediately outside the doorway was a neonate burial (16199), probably contemporary with shelter 300475 though it may have pre-dated it.

Outside, to the rear (south-east) of the structure was a chalk surface (16457; not illustrated), probably contemporary with that inside, overlain by a later, more extensive rammed chalk surface (16135). This later surface extended 6 m or so to the rear of the structure and partly overlay and had subsided into pits 16419 and 16464, these pits possibly originally falling within property 9 (see Fig 2.87 above). Sometime in the 2nd century a fence, marked by a line of stake-holes (300497) at least 7 m long, was built within 2 m of the rear of the structure, cutting chalk surface 16135 and perhaps re-establishing the boundary between properties 9 and 10 in its original position.

The area in front (north-west) of structure 300475 appears to have been open, most likely a yard, with a small group of stake-holes and a slot (300474) immediately outside the structure and two flint-packed post-holes (16358 and 16361) 6 m to the north probably indicating the location of a fence or windbreak. To the west of this, and extending almost to the edge of Watling Street, was a sequence of metalled yard surfaces and spreads of iron smithing slag (300456). These deposits once continued further to the west though their extent is unknown, having been removed here by modern terracing for glasshouses. The earliest deposit in this sequence comprised the chalk consolidation (11232) for a gravel yard surface (11330), over which lay a spread of slag (11320). This in turn was covered with a further chalk consolidation layer (11203) for a second gravel surface (11243). Above this was a variety of charcoal and slag spreads (principally 16144), with several patches of gravel and cobbling representing the remnants of later yard surfaces. At least five flint-packed post-holes marked two probable fence lines, represented by two post-holes (300479) immediately to the west of structure 300475 and by at least three post-holes (300463) to the north-west. A notable assemblage of Niedermendig lava quern fragments came from both the earlier and later phases of charcoal and slag deposits but their association, if any, with iron smithing is uncertain.

On the west side of structure 300475 were several pits, including 11240 which was almost certainly a well. This was irregular in plan but had traces of a sub-rectangular timber lining measuring 0.60 m by 0.50 m in the base. An early Roman date for this feature is indicated. Approximately 6 m to the north-west of well 11240 was a shallow circular pit (11087) containing the bottom part of a large storage vessel (11078), the pot being of probable mid-Roman date. This had been set upright in the base of the pit and may have been for water storage, possibly for use in the quenching of iron objects during smithing. However, the date of the pot is later than is suggested for the use of the smithy based on the other ceramic evidence, and perhaps the pot is earlier or the smithy continued in use later than has been allowed for here. One other, small, pit (11292) lay in this area, close to structure 300475, but there is no evidence for a specific function other than the disposal of domestic refuse along with some smithing debris. This pit was infilled during the 1st century but a recut (11211) contained mid–late 2nd century pottery, perhaps representing the latest feature in this property. However, what was probably a dene hole (16286), sub-circular in plan with vertical sides and in excess of 3.5 m deep, did contain some pottery of late 3rd/4th century date in the uppermost fill. This lay adjacent to Watling Street, on the inside of the bend, and there were at least two other dene holes to the north of Watling Street in property 11. Several pits on the west edge of the site were recorded as part of the watching brief and were not subject to excavation. These probably lay within property 10 and are all likely to have been Roman, although the only pottery recovered came from the surface of pit 19536.

A sequence of at least three fence lines (300481–3, with 300493 to the south-east) lay around the northern edge of the property, separating it from Watling Street and extending from its junction with property 9 to the south-east as far as pit 11087 to the west. The size of several of the post-holes indicates that they held substantial posts, the largest being post-hole 16540, a late feature, 1.20 m in diameter, marking the junction between properties 10 and 9. A gap between dene hole 16286 and fence line 300493 probably marks an entrance to the property, with several smaller post-holes (300478) in the gap perhaps representing a later blocking or a gate arrangement.

Property 11

Property 11 lay immediately west of the junction of Watling Street and the branch road, opposite properties 10 and 6, with property 12 adjacent to it to the north-west (Fig 2.91). It occupied a triangular area within the angle between the two streets, measuring a maximum of approximately 60 m by 40 m, the western corner extending over part of an early brickearth quarry (300370). Almost all of the property was exposed, with only small parts in the north and south outside the limits of excavation.

The roadside ditch is likely to have been the earliest feature, running around the inside junction of the two streets, 9 m from the edge of the branch road and 8 m or less from Watling Street. It appears that the ditch was dug as part of a single operation, with no evidence in this area for the ditch alongside Watling Street pre-dating that alongside the branch road. The ditch was re-cut on two occasions, with very little of the earliest phase surviving, represented only by a short, acute-angled length of ditch (300385) closest to the junction. The second phase was represented by a slightly larger ditch (300386), mostly naturally silted, though sufficient pottery was recovered to indicate that it had probably become infilled by around the end of the third quarter of the 1st century. The section of ditch along the north side of Watling Street was subsequently re-cut over a length of at least 30 m, extending beyond the limit of excavation to the west, though the re-cutting stopped short of the street junction to the east, almost certainly reflecting the presence of a circular structure in this location (see below). This final phase of ditch (300387)

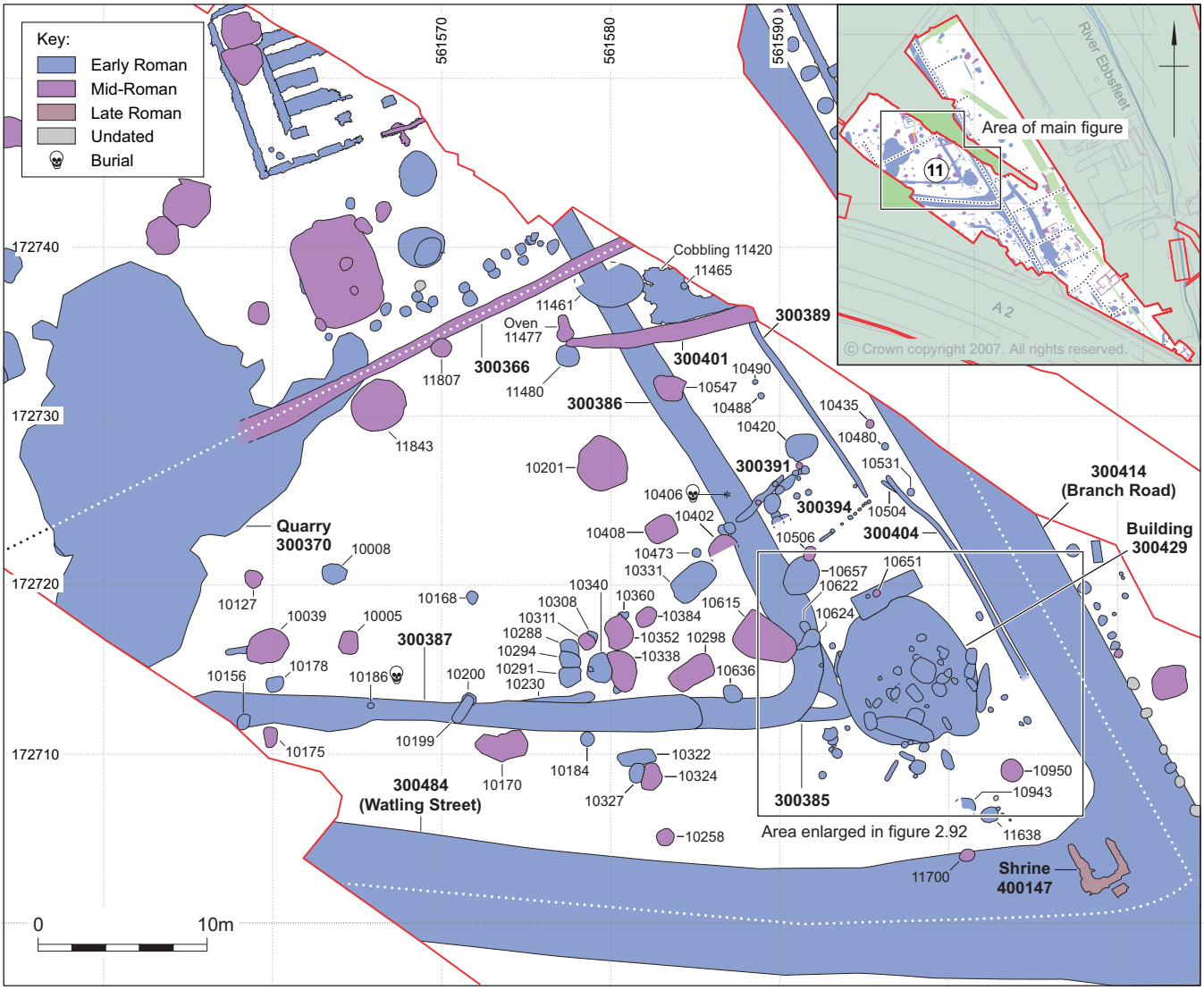

Figure 2.91 Property 11

contained a relatively large quantity of pottery and animal bone, as well as part of a human skull (10186) and a dog skull (both towards the west end), these two skulls possibly representing deliberately 'placed' deposits. Ditch 300387 had a very much darker fill than either of its predecessors, reflecting the large amount of refuse disposed of along its entire exposed length. This refuse is likely to have derived mainly from property 11, though 18 smithing hearth bottoms were recovered from various features and deposits throughout the property as a whole, presumably coming from the smithy in property 10 to the south of the street junction as there was no other evidence for iron working (eg, spreads of smithing slag and charcoal) in property 11. Ditch 300387 appears to have been filled by the middle of the 2nd century at the latest, but why the roadside ditch should have been recut at such a relatively late date, and along this stretch only, is unclear. Of further interest is a small pit (10156), assigned an early Roman date on the basis of the pottery, which cut ditch 300387 and lay approximately 8 m to the west of human skull 10186 This pit contained a horse skull in the base and appears to represent another example of a 'placed' deposit in this area.

A sequence of two circular structures lay within 10 m of the street junction, overlying a complex of features (400127) of uncertain function which appear to have post-dated the silting up of the first phase of roadside ditch (300385) but possibly not the second (300386). No coherent pattern could be recognised amongst these early features which comprised a number of post-holes, at least one small pit, a hearth, and a shallow gully parallel with the branch road (Fig 2.92, Phase 1). The gully (11761) appears too slight to have served a structural purpose, but it may have been an eaves drip associated with some form of shelter, perhaps one constructed over hearth 10708. On the east side of gully 11705 were two neonate/infant burials in shallow graves (10712 and 11710) approximately 5 m apart, and to the south-east were the remains of a cobbled surface (300430) which did not extend as far as the street junction. This may have been a path or simply an area of hard-standing, and what was almost certainly a dene hole (10950, at least 3.5 m deep; Fig 2.91) lay between it and the street surfaces. Layers 300407/300431 which sealed the early features contained moderate amounts of charcoal and burnt clay, and perhaps represented

Figure 2.92 Property 11, details of structural sequence at road junction

destruction deposits, though there was no burnt daub or other structural debris. Pottery recovered from various features assigned to this phase indicates that they had probably been infilled by around AD 75, at approximately the same time as the second phase of roadside ditch went out of use.

To the east, alongside the branch road, was a shallow gully (300404) at least 14 m long, with a similar feature (300389), in excess of 12 m long and offset 1.8 m to the west, continuing to the north-west, both gullies perhaps representing fence lines. The gap between the two may have provided an entrance, and a line of stake-holes (300394) at 90° to the south-east end of gully 300389 possibly marked a further fence, though this did not extend as far as the roadside ditch which may not have fully silted up by this time. Several other post-holes alongside the branch road were probably contemporary with the gullies, and it may be significant that no similar features were identified alongside Watling Street. All of these features were probably broadly contemporary, perhaps associated with the early complex at the street junction, and it is possible that all can be accommodated within a short period *c* AD 70–80.

The extent of the earliest circular structure (400129), which overlay feature complex 400127, was indicated by a clearly defined clay floor (300422) approximately 8 m in diameter, but only around a short length of the north-west side were there any associated structural features (Fig 2.92). Here, an arc of stake-holes defined the edge of the floor and presumably represents part of a wattle (and ?daub) wall of which there was no other trace. An irregularity in the edge of the clay floor on the south-east side may indicate the location of a doorway, facing the street junction, and the earlier cobbled surface 300430 may have continued to serve as a path or hard-standing in this area. There was a hearth (11613) towards the southern edge of the floor and several post-holes in the interior of the structure, but the latter formed no coherent pattern. The floor and these features were sealed by a thin build-up of deposits (300426), over which the clay floor of the second (and latest) structure was laid.

The second circular structure (400128) appears to have been slightly offset to the north-east of the first, and the floor (300408, not illustrated) survived more patchily than its predecessor (Fig 2.92). Indeed, it is unclear from the extent of the floor whether structure 400128 was circular. Two substantial but somewhat irregular slots (10843 and 11623) lay at almost 90° to each other and may have defined a south-east facing entrance approximately 3 m wide, in the same location as has been suggested for the earlier structure. Slot 10843 was 4.0 m long, 1.25 m wide and 0.65 m deep, whereas slot 11623 was smaller, measuring 3.0 m by 0.75 m and 0.30 m deep. Both were filled with a mixture of material, with 10843 containing burnt clay and other material probably representing hearth debris. Slot 10843 also contained a substantial stone weighing 50.5 kg; this was fairly flat, possibly a sarsen, and showed evidence of use in the form of several, shallow mortar holes. It may have been re-used as a packing stone. In neither of the slots was there any evidence for post-ghosts or similar remains and, although a structural purpose is possible for both, their precise function remains unclear. The same applies to a third substantial slot (10646) which perhaps defined the north-west edge of the structure. This rectangular feature was approximately 4 m long, 1.25 m wide and 0.60 m deep, with vertical sides and a flat bottom, and its fill included what may have been the remains of hearth debris.

Within structure 400128 was a centrally-placed, sub-rectangular hearth (10929) and around this were several smaller hearths (10939, 10953, 10959, 10988, 10999, and 11662), presumably not all contemporary as two of the three on the east side overlapped. A small number of post-holes and small pits also lay within this structure, some perhaps associated with the central hearth, but of otherwise unknown function. Immediately outside structure 400128 were two cobbled surfaces, that to the south-east (300411) succeeding an earlier surface and lying outside the postulated entrance, and that to the north-west (300432) extending around part of the rear of the structure and overlying the arc of stake-holes associated with structure 400129. Further to the south-east, within a few metres of the street junction, there were, in addition to probable dene hole 10950, several post-holes and small, shallow pits (Fig 2.91).

Structure 400128 was overlain by what is interpreted as an abandonment or destruction level (300421) which contained a notable quantity of pottery, virtually all of early Roman date. This deposit also contained a disturbed infant burial (10828), though no grave cut could be discerned, and no other certainly later features were identified in this area.

It is difficult to envisage the form of circular structures 400128 and 400129, in the case of the earlier because of the paucity of structural features, and in the later because of the arrangement of the slots. Indeed, had it not been for the survival of the circular clay floor in the former then it is unlikely that the presence of a structure would have been recognised. These were the only such structures identified on ARC SHN02, although a succession of three similar clay-floored structures were recorded on ARC SPH00, where they are interpreted as possible bakeries of late 1st–early 2nd century date, lying adjacent to the early road pre-dating the Sanctuary complex (see above). Here also the floors, hearths, and ovens were well preserved but there were few associated post-holes or stake-holes. The hearths in structures 400128 and 400129 might suggest that these also were bakeries, but there were no ovens, and their function is less certain. There was, however, a notable concentration of quernstone fragments, of a variety of stone types, present in features and deposits associated with both phases of circular structure. A domestic purpose for these structures is therefore possible, and there is nothing from the pits in this property that might suggest otherwise, but their form and proximity to an

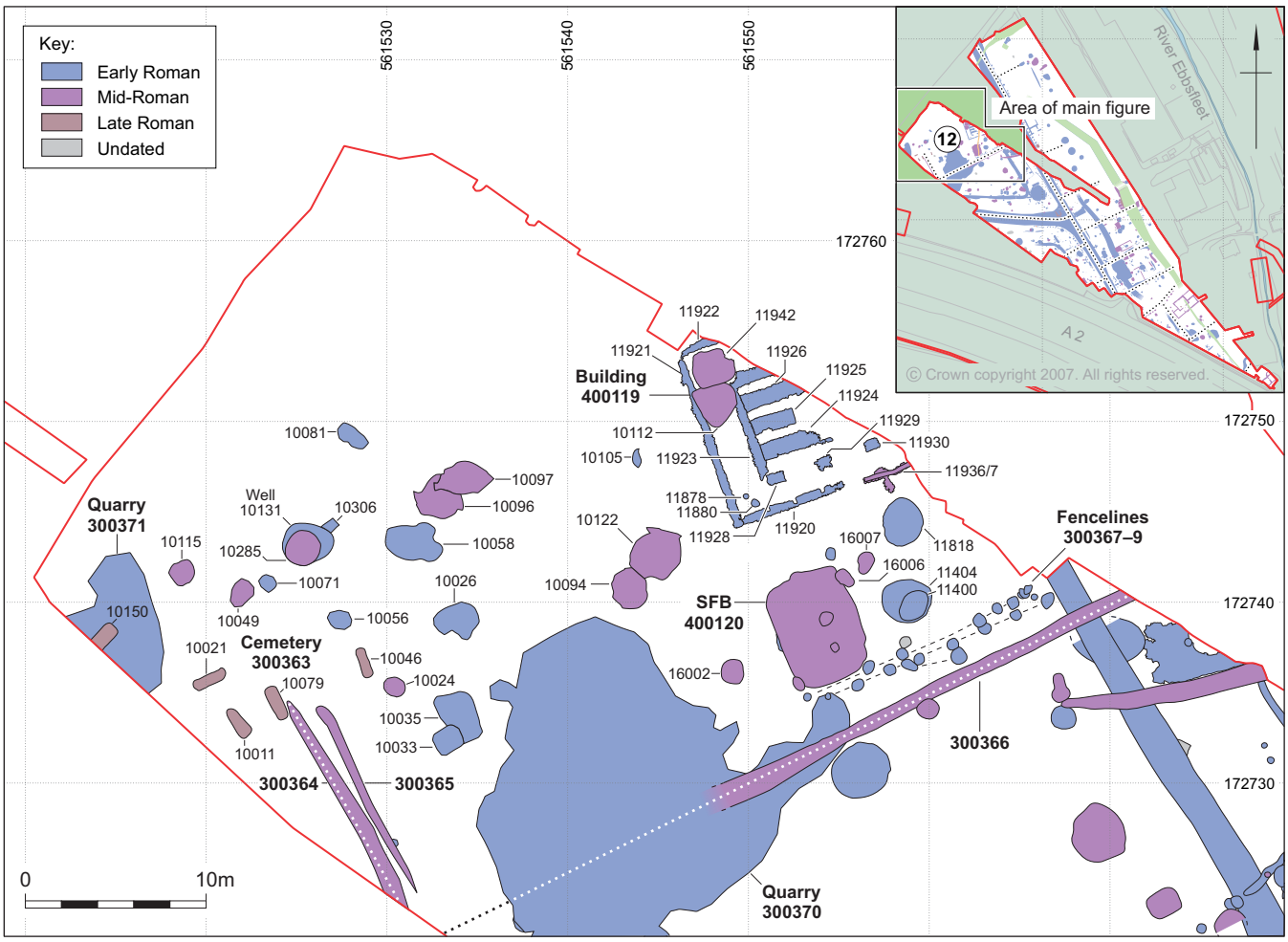

Figure 2.93 Property 12

important street junction close to where a later roadside shrine was established (see below) might require other possibilities to be considered.

Dating evidence provided by the pottery indicates that the use of the two circular structures may have lasted little more than two or three decades, from around AD 75 until possibly the first decade or two of the 2nd century. The latest pottery from what may have been a destruction or abandonment level (300421) overlying the second of the circular structures has been dated to *c* AD 120/130, and none of the pottery from the immediately surrounding deposits extends to later than the middle of the 2nd century. The coin assemblage from this property, which includes two late Iron Age issues, supports an emphasis on a 1st century date for this activity, and there is a relative dearth of later coins.

The early Roman date of the structural sequence at the street junction is also reflected by the majority of pits in this property. Although at least a dozen have been assigned a mid-Roman date, few contained any pottery of mid-2nd century or later date and only 10201, one of the largest features, contained 3rd century material, in its upper fill. There was a cluster of pits, some intercutting, less than 20 m to the west and north-west of the two circular structures, and it is possible that the concentration in part reflected a north-east to south-west boundary indicated by an alignment of gullies and post-holes (300391) at almost 90° to the branch road and extending across the top of the infilled roadside ditch. An infant burial (10406) lay immediately to the north of this alignment, the shallow grave cut into the top fill of the ditch. To the west, the late re-cut of the ditch alongside Watling Street (300387) stopped short of the circular structures by about 8 m and continued to define a boundary on this side. A scatter of pits lay further away from the street junction in this relatively large and irregularly shaped property, most probably filled before the end of the 2nd century, and in the north corner was a small complex of later features.

These later features lay within a small area defined by property boundary 300366 to the north, curving gully 300401 to the south and the branch road (beyond the limit of excavation) to the east. At the west end of gully 300401 was a small keyhole-shaped oven (11477) containing mid-3rd century pottery and perhaps contemporary with this was a cobbled area (11420) to the east, perhaps representing a late focus of activity within the property after the remainder had been abandoned. It might be noted that this late focus was adjacent to the branch road and not Watling Street as might have been expected, and perhaps there were no further properties to the west with, in the later period

Figure 2.94 Structure 400119

at least, a roadside cemetery (300363) occupying the area alongside Watling Street adjacent to property 11 (see below).

Property 12

This property lay at the north-west end of the site, adjacent to property 11 and on the opposite side of the branch road to properties 7 and 8 (Fig 2.93). It extended approximately 50 m back from the street frontage formed by the branch road to the east, the south-western corner of the property lying within 15 m or so of Watling Street. This demonstrates that it was the branch road rather than Watling Street that determined the layout of properties in this area, the reverse of what might have been expected. The frontage itself lay just over 10 m beyond the site limits, but probably most of the rear of the property was exposed in the excavation. The width of the property is uncertain, but it is possible that this was in excess of 40 m. The absence of features in the north corner of this part of the site, together with the presence of at least two early brickearth quarries and part of a later cemetery, indicate that the property probably lay on or very close to the periphery of the town, and this was confirmed during a subsequent evaluation and watching brief which revealed no further Romano-British features to the north-west in this area.

The earliest features, with the probable exception of the roads and their associated ditches, were two quarries dug for the extraction of brickearth. One (300370), measuring approximately 25 m by 15 m, lay almost entirely within the excavation area and straddled the boundary between properties 11 and 12, clearly pre-dating the establishment of this boundary. The other (300071) was only partially exposed in the corner of the site and its extent is unknown. Both quarries were irregular in plan and comprised a series of flat-bottomed pits, most 1.2–1.5 m deep, presumably reflecting episodes of extraction which are likely to have taken place in the second half of the 1st century AD. Both quarries were filled with large quantities of domestic debris which appears to have been deposited from the later 1st century through into the earlier part of the

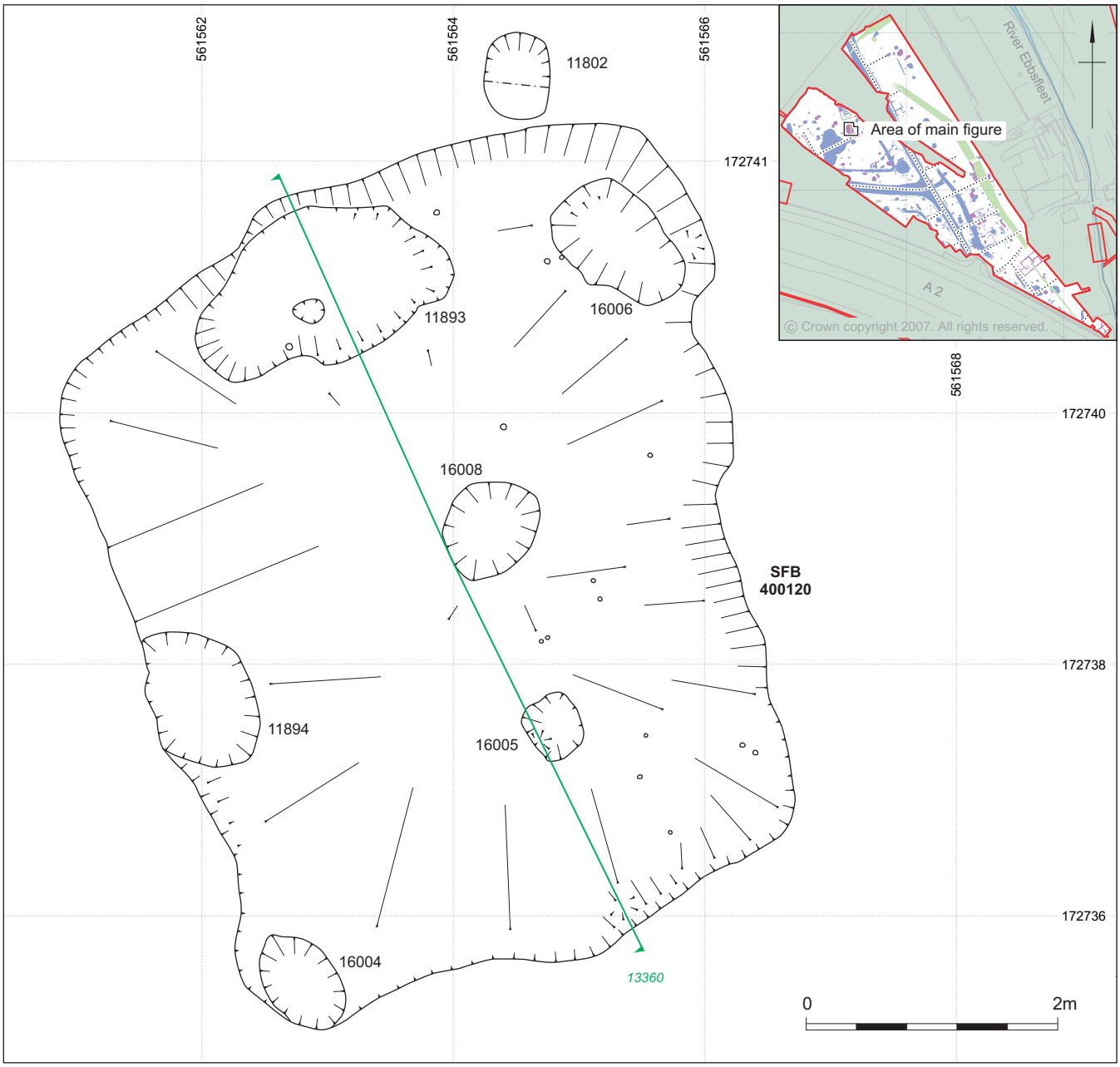

Figure 2.95 Plan of SFB 400120

3rd century. An inhumation grave had been dug through the upper fill of quarry 300071, probably in the later 3rd or 4th century, one of several graves in the western corner of the site belonging to what was probably a small roadside cemetery (see below).

The earliest property boundary to the south-east was defined by a sequence of at least two lines of post-holes, the earlier of these (300367) comprising a series of regularly-spaced post-holes at 2 m intervals, replaced later by a less regular arrangement (300068). The post-holes, probably marking fence lines, extended back approximately 30 m from the street frontage and were subsequently replaced by a boundary marked by a shallow ditch or gully (300366) which ran across quarry 300370, by then perhaps largely infilled. The full extent of ditch 300366 could not be established where it crossed the quarry and was sealed by the upper fills, but it seems probable that it ran almost as far as gullies 300364 and 300365 which lay at 90° to it and defined the western limit to the property. These gullies terminated approximately 15 m to the north-west and there were no further boundary features to the north, probably indicating that it was open on this side, with any properties beyond not extending very far back from the frontage formed by the branch road.

Only the rear part of the principal structure (400119) was exposed in the excavation area, but this showed it to be 10 m wide, a maximum of 22 m long (if it extended up to the road frontage), and slightly skewed to the alignment of the branch road (Fig 2.94; Pl 2.27). It appears to have been an aisled structure, possibly a barn, which was probably constructed in the later 1st century and continued in use until the second half of the 2nd century. It sealed no earlier features, but was cut by two

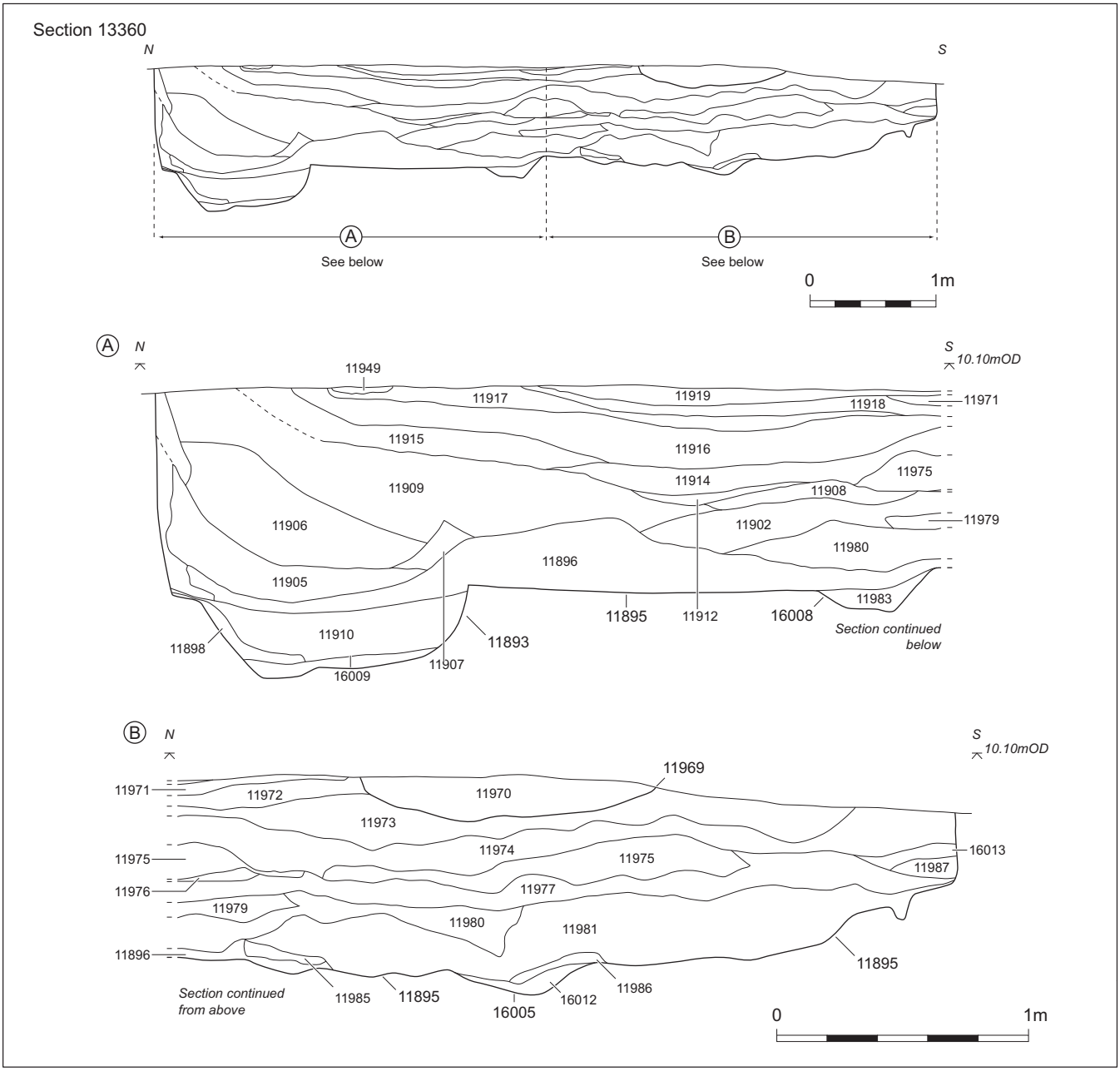

Figure 2.96 Section of SFB 400120

pits, one (11942) containing 3rd century pottery. The outside wall was represented by fairly insubstantial flint and chalk footings, approximately 0.30 m wide, with no clear indication of a foundation trench, although the rear wall (11921) had been terraced into the gentle north-east facing slope. A narrow gap between walls 11920 and 11937 in the south side may represent an entrance, and there is some evidence for the re-modelling of this part of the wall footings. Perhaps wall 11937 was not in fact a wall but simply demolition debris, with an entrance at least 3 m wide here, gully 11936 representing a drip gulley or door/wall slot of some form and chalk surface 11931 the remains of a floor. The rather flimsy nature of the outer wall is likely to reflect the fact that that these were non-load bearing footings which supported the walling material used to infill the space between the ground and the eaves. Within the building, along the

Plate 2.27 SFB 400120, with Building 400119 in background; property 12 (ARC SHN02) (2 m scales). Looking north-west

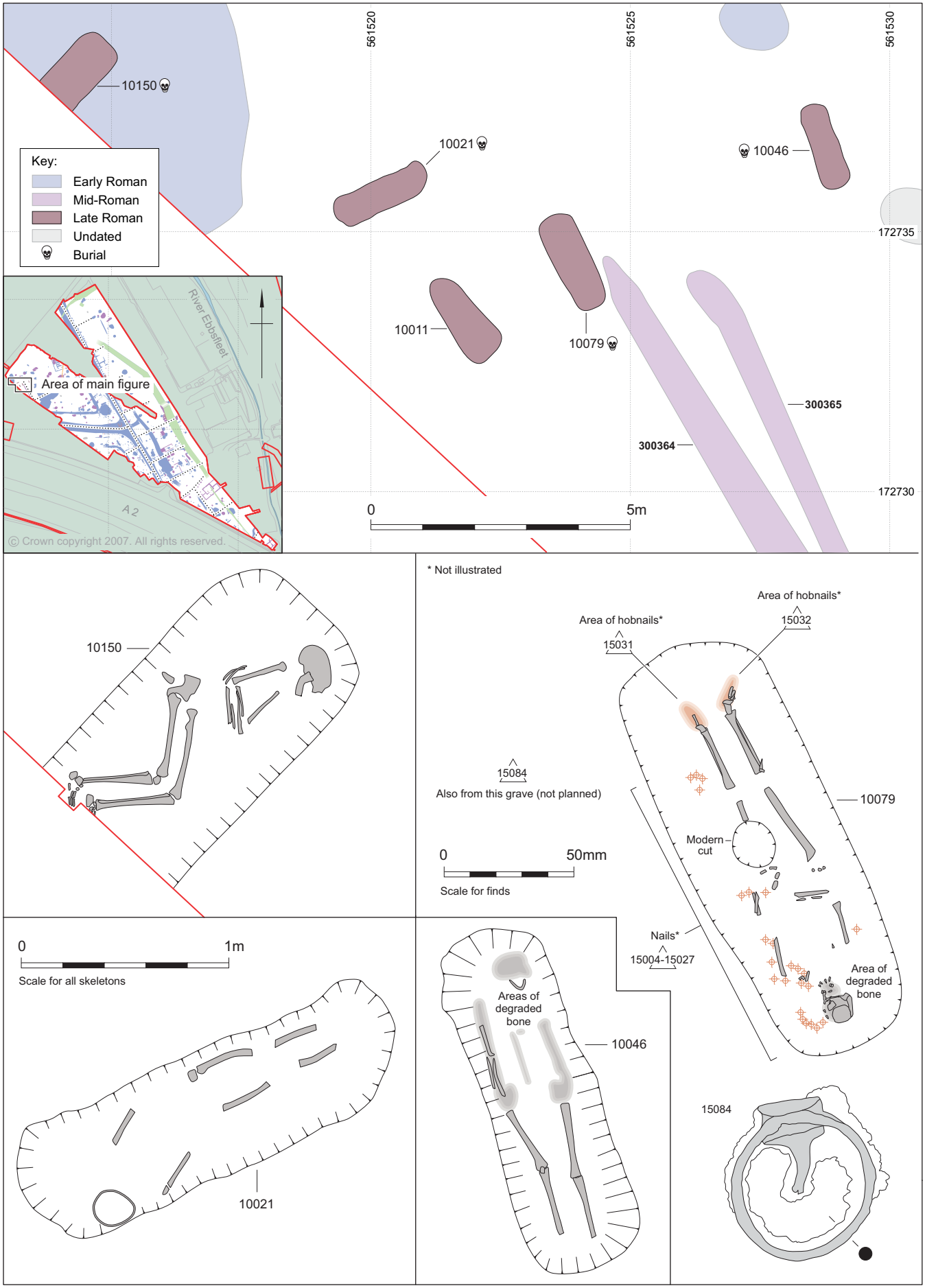

Figure 2.97 Late Roman cemetery 300363

south side, was a line of at least three sub-rectangular flint and chalk pads (11928–30), 0.75 m from the wall and 1.80 m apart, which are likely to have been the bases for aisle posts. The presumed location of one pad on the north side had largely been removed by a later pit (11942). At the west end of the building, between the two projected lines of aisle pads, was an internal wall (11923), similar in construction to the outer walls.

To the east of this were four broader flint and chalk footings (11924–6 and 11963), approximately 0.80 m wide and extending between 2.5 and at least 3.5 m from wall 11923, between which were chalk surfaces (11927 and 11944–6). East of these, on the edge of the excavation, was part of what appears to have been a square or sub-rectangular flint footing (11941), cut by gully 11938, a probable post-medieval feature. The precise nature and purpose of these various footings is uncertain, but some parts showed slight traces of burning (eg, 11940) and it is possible that they supported some form of raised platform used for drying grain.

Plate 2.28 Late Roman grave 10079, burial with hobnail boots; property 12 (ARC SHN02) (1 m scale). Looking north-east

Between structure 400119 and the southern boundary to the property was a large, rectangular, flat-bottomed pit (400120). This measured 6.0 m by 4.5 m, was 0.80 m deep, and has been interpreted as a possible sunken-featured building (SFB) (Figs 2.95–6; Pl 2.27). There were no clearly associated post-holes, but the vertical sides might suggest that it had been lined, perhaps with timber. The pit was filled with a complex series of deposits probably representing a combination of natural erosion of the upper edges and deliberate dumping, but nothing which might clearly indicate its original purpose, though storage (for grain?) is a possibility. Pottery recovered from pit 400120 spans the early/mid 2nd–early 3rd century, suggesting that the pit may have been dug slightly later than the construction of Structure 400119, though its use is likely to have been broadly contemporaneous. A similar pit lay at the rear of Property 5, adjacent to the waterfront, its function also unknown (see above).

Two relatively large sub-circular pits (11404 and 11818) lay in the restricted area exposed to the south of Structure 400119 and east of SFB 400120, both pits probably broadly contemporary with these structures (Fig 2.93). A further dozen or more pits lay to the west, in the rear of the property, with the largest of these (10131) possibly a well. Several of the pits were quite shallow, often with little differentiation within the fills, and there were fewer finds in those furthest to the west. The pottery from the various features was predominantly early Roman, but at least nine of the pits have been assigned a mid-Roman date, representing approximately 50% of those available for excavation in the property. This is an unusually high percentage for any of the properties investigated and of these pits, four (10049, 10097, 10122, and 10285) contained sherds of possible early–mid-3rd century date in their upper fills, as did quarries 300370 and 300371 which may have provided the main receptacles for domestic refuse. Furthermore, there was a notable concentration of six coins issued 330–348 from the eastern part of the property, in the vicinity of SFB 400120, with a further three coins of this date range from the upper fills of quarry 300370. Overall, the ceramic and numismatic evidence suggests that not only did occupation of this property continue a little longer than in some of the others, but also that the area may have subsequently been used for the dumping of rubbish.

Cemetery 300363

Five inhumation graves representing part of a larger cemetery towards the corner of the site to the rear of property 12 (Fig 2.97) probably post-dated the use of that property. The graves were dispersed, with one (10046) within property 12 as defined by boundary gullies 300364/300365, and the remainder immediately beyond to the south-west. Three graves (10011, 10046, and 10079) were aligned north-west to south-east and may have been part of a line of burials, with two others (10021 and 10150) aligned approximately north-east to south-west. The bone was generally poorly preserved, and none survived in grave 10011, but that in 10150 was in much better condition, presumably reflecting the different burial conditions, this grave having been inserted into a backfilled quarry pit and the others dug (and backfilled with) brickearth.

The four graves with surviving bone all contained adults aged over *c* 30 years. The individual in grave 10079 (Pl 2.28) was buried with hobnail boots, and half a snaffle bit was also found on the base of the grave, the latter object probably incorporated in the backfill. This grave also contained at least 23 nails, all but one found on the left side, and perhaps the body was placed on a re-used board which included these nails; an interpretation as part of a coffin seems less likely. Grave

Figure 2.98 Plan and section of walled cemetery (ARC WCY02)

10046 contained two nails and from grave 10150 came a fragment of bone pin and a biconical lead weight, though there is a likelihood in the latter case that the objects were redeposited from the underlying quarry fill.

The finds and stratigraphy indicate a mid- or, more probably, late Roman date for the burials which are likely to have belonged to what may have been a small, dispersed, roadside cemetery some 25 m back from the street frontage. This cemetery lay on the edge of the settlement and continued for an unknown distance to the west, one of several cemeteries that are known around the periphery of Springhead and which were focussed on routes into and out of the settlement.

The Walled Cemetery at Springhead

The walled cemetery site lies immediately to the south of the Pepperhill roundabout at Springhead (Fig 2.98) and, since 1964, has been afforded protection as a Scheduled Ancient Monument (Kent County Monument KE198). The ground surface rises steadily from north-east to south-west, from *c* 16 m aOD adjacent to the roundabout embankment up to almost 20 m at the south end of the Scheduled Area. 'Natural' geological deposits comprise brickearth overlying Chalk in this area. The Scheduled Area has been laid to rough grass, periodically cut, but was subject to arable agriculture prior to 1964.

Excavations in 1799–1802 directed by the Rector of Southfleet uncovered a high status Roman cemetery which lay within a stone (inner) enclosure about 18 m square (Rashleigh 1808b). It contained two inhumation and at least six cremation burials with exceptionally rich grave goods, including a stone sarcophagus, two lead coffins, two glass urns, a variety of gold jewellery, and a pair of woman's shoes incorporating gold thread (now displayed in the British Museum).

The precise location of this cemetery subsequently became confused. In 1964 W S Penn, whilst undertaking a watching brief during road widening on the Pepperhill roundabout, recorded wall foundations which he thought represented the *temenos* of a temple on the east edge of Springhead Roman town and overlooking Watling Street approximately 100 m to the north. He subsequently undertook small-scale excavations and identified what he presumed to be the temple, but was actually part of the inner enclosure of Rashleigh's walled cemetery, the foundations recorded in his watching brief representing part of the outer enclosure wall. Penn's investigations were never published, although reference to the results is made in the National Monument Record (NMR TQ 67SW6, 13, KCC). It should be noted that, prior to Penn's watching brief and limited excavation, the inner enclosure had been correctly identified as a walled cemetery by Jessup (1959, 29–30), based on the records of Rashleigh's investigation, although he was uncertain of its location. A geophysical survey and limited excavation in 2001, coupled with a study of the original excavation and map evidence, resulted in the 'rediscovery' of the walled cemetery and demonstrated that the site did not represent a further temple (Davies 2001). In 1997 evaluation undertaken for the HS1 to the east of the Scheduled Area revealed a very small number of prehistoric features on the higher ground to the south, but no evidence for Roman settlement in this area.

HS1 construction works in the area included the building of an access road to the railway tunnel below the A2, which impinged on a small part of the walled cemetery within the north-east corner of the Scheduled Area. This area was, therefore, designated for detailed excavation and comprised a roughly triangular plot measuring approximately 22 m by 15 m and covering *c* 180 m^2. However, during construction of a site compound at Pepperhill in early May 2002, a narrow trench for a water-pipe was inadvertantly dug across the north-east corner of the Scheduled Area instead of around the outside of it, immediately to the south-west of the area designated for detailed excavation (see Fig 2.98).

The digging of the water-pipe trench (approximately 75 m long, 0.5 m wide and 0.8 m deep) within the Scheduled Monument necessitated a rapid response to record the archaeological deposits exposed in the trench sections, with further recording undertaken in late November 2002. The detailed excavation was carried out in late May 2002 and the results of this and the recording of the water-pipe trench are described and discussed together here.

Results of the Fieldwork

The excavation and water-pipe trench exposed two sections of the outer enclosure wall on the south-east side of the walled cemetery (Pl 2.29). A length of approximately 2 m, damaged by machine, was recorded in section in the water-pipe trench, and possibly up to a further 5 m had been removed by machine immediately to the north of this. A possible buttress was also recorded in section in this trench, and subsequent excavation of the area to the north confirmed this interpretation.

The excavation exposed a 15 m length of the outer wall a short distance to the north of where it had been recorded in the water-pipe trench. Only the foundations survived and it is clear that these had been disturbed by ploughing, with a number of plough scars clearly visible; topsoil (and subsoil where this was present) was a maximum of 0.30 m thick above the wall but in places was as thin as 0.20 m.

The wall foundations were approximately 1 m wide and there were footings for two, small external buttresses 8 m apart. These buttress footings measured approximately 0.8 m square and were clearly integral with the wall foundations, rather than later additions. The wall foundations were built within a trench 0.80 m deep, and comprised six alternating layers of flint nodules and rammed chalk. The buttress foundations were only 0.25 m deep and comprised entirely flint

Plate 2.29 Wall footings (8) along east side of walled cemetery (ARC WCY02). Looking north-east

nodules. No part of the walls or buttresses survived above foundation level.

No other archaeological features were observed following machining or after the surface of the brickearth had been allowed to weather for several days, nor were any further features seen in the sides of the water-pipe trench.

A very small quantity of finds was recovered from the topsoil and subsoil during the course of the excavation. These included two Roman coins, a late medieval copper alloy strap end, two fragments of clay pipe stem, and two sherds of post-medieval pottery.

Discussion

The location of the wall foundations revealed in the excavation and water-pipe trench in 2002 confirms the layout of the outer enclosure wall of the Roman walled cemetery indicated by the geophysical survey (Davies 2001) and the watching brief by W S Penn in 1964. Penn described this outer enclosure (which he thought was part of a *temenos* of a temple) as '… extremely large, measuring some [133.5 m x 119 m]' (NMR TQ 67SW6-13). It is not clear how he arrived at such precise dimensions, although they may well be correct. The plan derived from the geophysical survey (Davies 2001, fig 2, but note incorrect scale) indicates the south-east (and north-west sides) at close to 130 m, with the length of the other sides unknown but in excess of 100 m (*contra* URN 2004b).

The wall foundations of the outer enclosure of the walled cemetery were recorded at shallow depth in the excavation and pipe trench, and have clearly suffered from plough attrition in the years before it was designated as a Scheduled Monument. Penn in 1964 describes the walls he saw as being 3 ft [*c* 1 m] wide of flint rubble faced with Kentish ragstone. Excavation in March 2001 of the buttress and walls at the west corner of the inner enclosure showed these to be composed of chalk rubble, flint, and mortar, and faced on both inner and outer faces with Kentish ragstone (Davies 2001, 162).

There is clear evidence from the excavation and pipe trench for buttresses along the outside of the south-east wall of the outer enclosure (and presumably the other walls), with these spaced at regular intervals of about 8 m. The inner enclosure, approximately 18 m square, also had buttresses along the outside of the walls (except the south-west wall which appears to have had internal buttresses), but these were placed at intervals of approximately 6 m (see Davies 2001, fig 3). The outer enclosure wall buttresses had relatively shallow foundations, although they appeared to be an integral part of the (deeper) wall foundations, and it is perhaps more likely that they served a decorative rather than structural function, as may also have been the case for the buttresses on the inner enclosure wall. Certainly, the location, size, and appearance of the walled cemetery would have made it an imposing structure, particularly when viewed from the north by travellers passing along Watling Street.

No evidence has been forthcoming from any of the archaeological work undertaken so far of what lay between the inner and outer enclosure walls of the walled cemetery. There is no indication of any further stone structures, nor any negative features such as ditches or gullies. Perhaps the area was grassed, or there were gardens, but it is unlikely that any evidence for such will have survived ploughing.

No further information was provided by the fieldwork to clarify the date of the walled cemetery. Accumulated evidence from other sources suggests that it was 'in the nature of a family/group memorial, set up in the early 3rd century' (Davies 2001, 165), although material of perhaps 4th century date was also recovered (Jessup 1959, 30).

In a wider context, Roman walled cemeteries are rare monuments within Britain – only 13 examples are known, and are largely confined to south-east England (Jessup 1959). Kent is exceptional, with eight examples, most lying close to Watling Street (*ibid*, 11). The known walled cemeteries are generally square or rectangular in plan, and are likely to represent important burials or burial groups, with a broad date range for their construction and use spanning the late 1st/early 2nd century through to the end of the 4th century (*ibid*, 19).

Chapter 3
Northfleet Villa

by Edward Biddulph, with contributions by Daniel Stansbie

The site of Northfleet villa is located on the south side of the Ebbsfleet River at the southern end of the HS1 Section 2 works. It is some 600 m south-west of the River Thames and 2 km north of the Springhead settlement. Archaeological investigation ahead of construction of the rail link, a connecting line to the existing North Kent Line, the Ebbsfleet International Station, and station access roads revealed two main areas of Roman period activity (Pls 3.1–2). The villa complex (Fig 3.1) includes barns, a bath-house, and other buildings that sit on a gravel spur, and an area of marsh and peat along the river edge – the Wetlands area – that preserved the remains of a malting oven and timber-built waterfront structures. The second area, a short distance to the west, is the Sports ground excavation site that contained field boundaries and enclosure ditches, and is identified below as the Western Roman Complex (Fig 3.2).

The robbing of building material in antiquity, medieval ditch digging, modern quarry working, and previous archaeological excavation all left their mark on the Roman landscape. Deposits in the central part of the villa complex – principally the courtyard area – were considerably affected, although bath-house deposits survived reasonably well below alluvial and colluvial deposits. Masonry from the barns had not survived to any great height, and the lines of some walls were preserved only as robber trenches. Floor surfaces were also much disturbed. However, the structures were phased with some accuracy through examination of surviving walls and the use of ceramic and scientific dating of material retrieved from stratified deposits. Features in the Wetlands area were very well preserved under alluvial deposits, and many timbers and other organic remains survived *in situ*. The busy landscape of the Western Roman Complex was reasonably well-preserved, although the extensive intercutting of successive ditches and enclosures made this site particularly complex in terms of phasing.

The Topsoil and Natural Deposits

The topsoil (10000) in the Gravel Spur trench (Fig 3.1) was a grey–brown soil that overlay a sequence of colluvial clay deposits. These were relatively thick at the northern edge of the site and thin at the southern edge, the highest part of the site, confirming that the deposits were colluvial in origin. By the beginning of the Roman period, the colluvium had not been allowed to accumulate to any depth in the eastern half of the site near the top of the slope, and the earliest features, including timber building 16812 (see below), had been cut into the natural yellow–orange sandy soil (10002). In the western half, further down the slope where activity was scanty in the early Roman period, hillwash had built up, so that aisled building 16578/16640 that formed the west range of the villa complex in the first half of the 3rd century (Villa Phase 5) was dug into sandy silt colluvium (10038). The colluvium extended into the southern part of the Wetlands trench as far as the channel edge, and is likely to have begun to accumulate during the Pleistocene. The course of the river had undoubtedly changed since then, resulting in alluvial deposits overlying the earlier hillwash.

Late Iron Age/Early Roman, *c* 50 BC–AD 70

The site was almost devoid of late Iron Age activity. Late Iron Age objects, even residual ones in later contexts, were sparsely represented across the whole site. A *Kragenfibel*, a type of brooch dating to the late Iron Age, was recovered from an early Roman gully and was therefore residual when deposited or effectively an antique if worn after the Conquest (see Schuster, Vol 2, Chap 4). Grog-tempered pottery, ubiquitous on late Iron Age sites in the south-east, accounted for just 1% of the entire ceramic assemblage by weight. However, soil (including layers 10142 and 16075) that had accumulated over natural deposits contained a very small amount of probable late Iron Age pottery and may point to limited occupation or agricultural activity. This may in any case more properly belong to the thirty or so years immediately following the conquest.

Western Roman Complex
by Daniel Stansbie

Evidence for late Iron Age–early Roman activity was scarce, being limited to a single length of gully (20742), orientated NW–SE, and three pits, 20784, 20785, and 20790. Gully 20742 measured 6.70 m in length by 0.66 m in width and 0.37 m in depth, on average (Fig 3.3, section 20807). The gully ended in a terminus to the

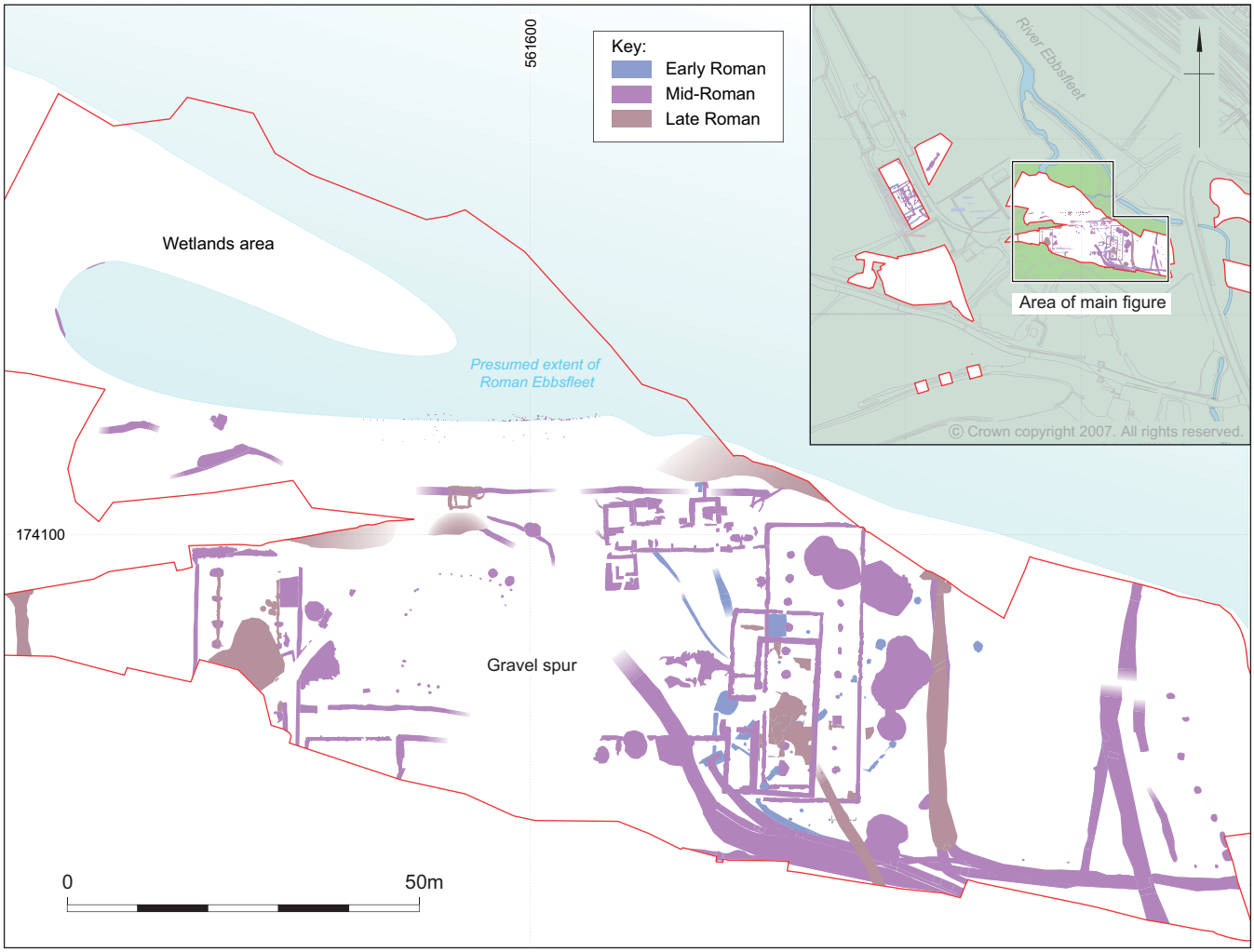

Figure 3.1 Northfleet villa complex: plan of all Roman features

Plate 3.1 General view of villa complex, view from south

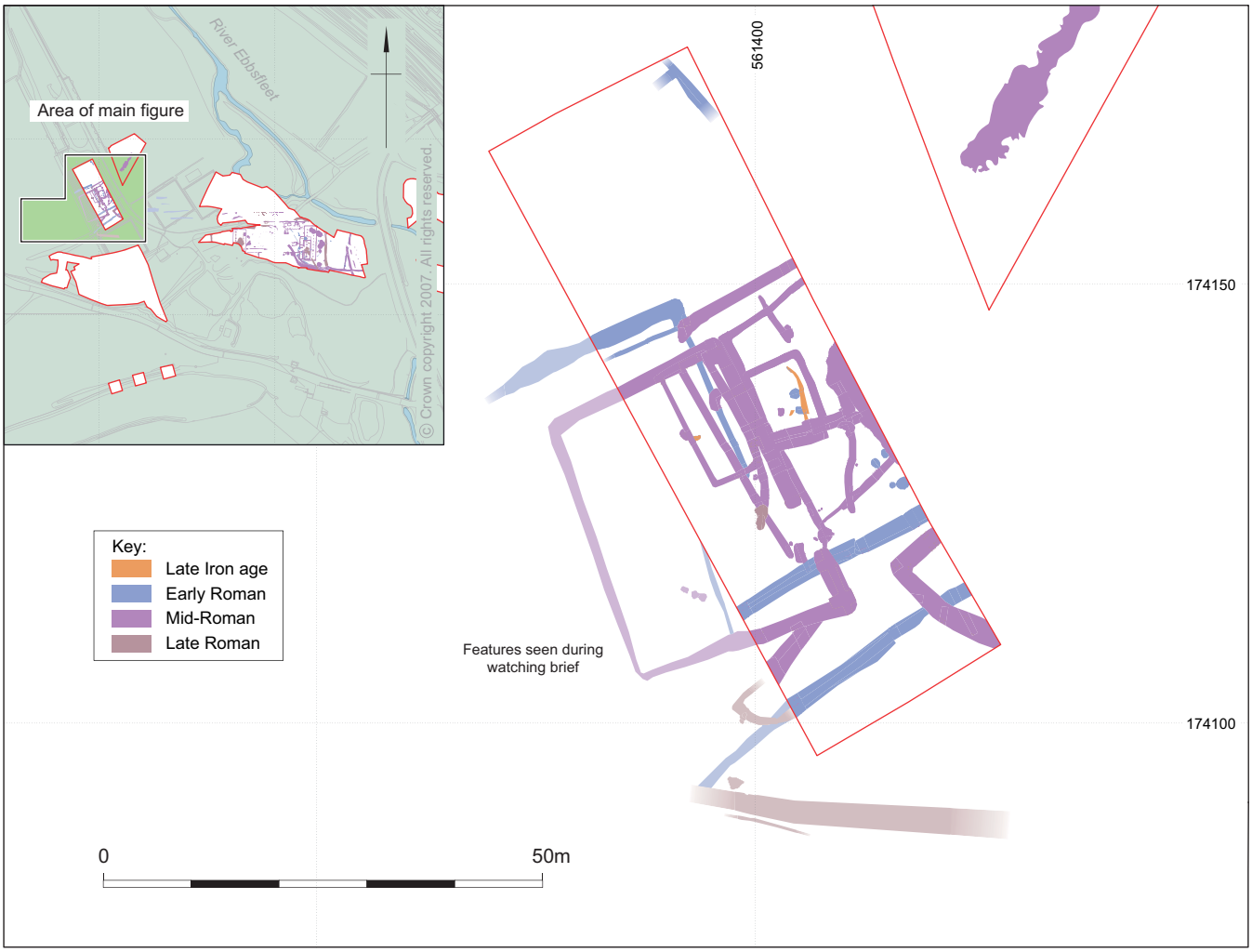

Figure 3.2 Western Roman Complex: plan of all Iron Age and Roman features

Plate 3.2 General view of Western Roman Complex, view from south-east

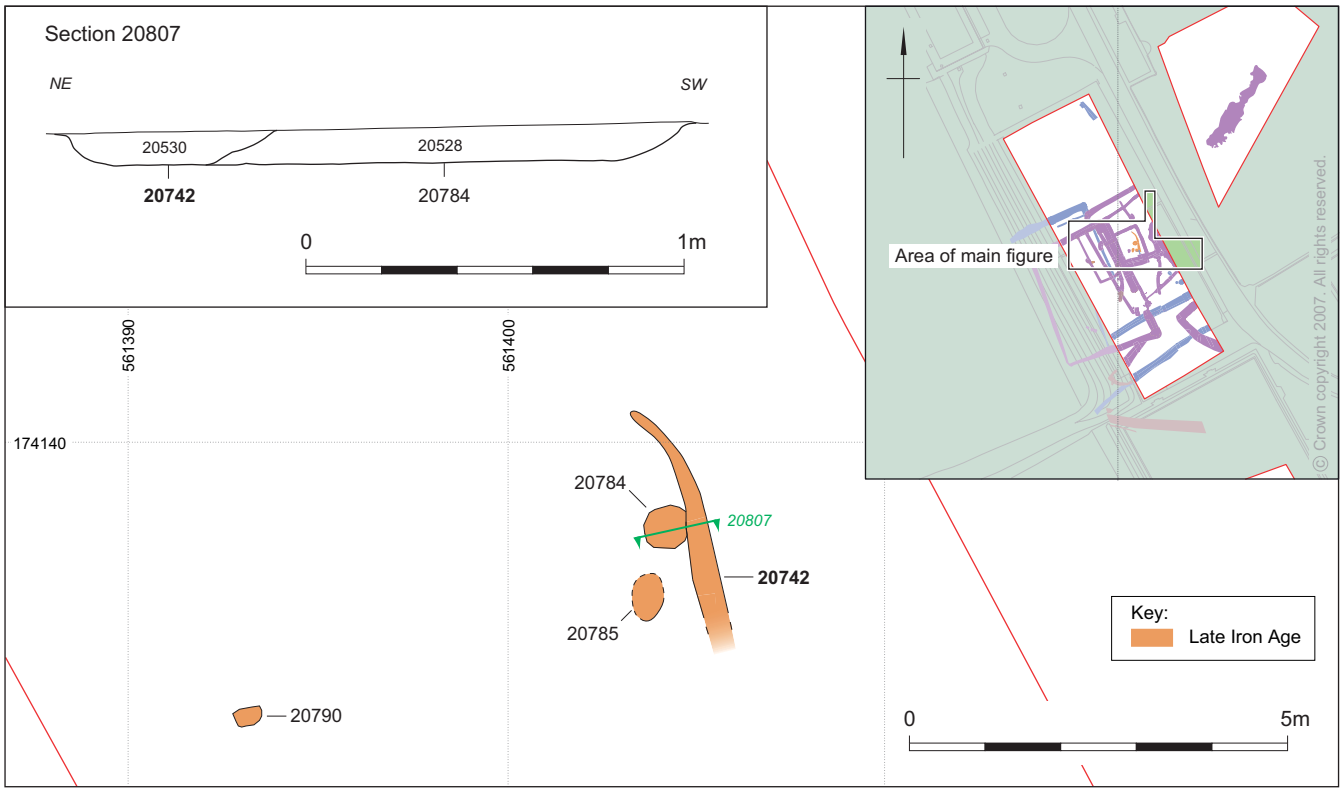

Figure 3.3 Late Iron Age–early Roman features in the Western Roman complex

north-west and was cut away by a later ditch at its south-eastern end. A single sherd of flint-tempered pottery of late Iron Age to pre-Flavian date came from the fill of the gully terminus.

Pit 20785 was sub-circular in plan and measured 1.10 m in diameter by 0.11 m in depth. A single sherd of Thameside grey ware was recovered from the fill. Pit 20784 was sub-rectangular in plan and was cut away at its south-eastern end by gully 20742. It measured 1.50 m in length by 0.80 m in width and 0.40 m in depth. A single sherd of flint-tempered late Iron Age–early Roman pottery came from the fill. Pit 20790 was sub-circular in plan and measured 0.85 m in length by 0.60 m in width and 0.12 m in depth. Three sherds of late Iron Age to early Roman grog-tempered pottery were recovered from the fill.

Early Roman, AD 70–120

Villa Phase 1 (AD 70–120)

Building 16812

A number of post-holes appeared to define the outline of a large, rectangular building, 36 m long and 11.50 m wide (Figs 3.4–6). With its long axis orientated NE–SW, it did not share the alignment of the later masonry east range, nor was the building incorporated into that subsequent structure. The later structure, and other features, including limekiln 16801 and boundary ditch 15749, had almost entirely obliterated the internal space of the building and much of its eastern side. However, enough post-holes survived to give its basic outline.

Nine post-holes, all on the same alignment, were uncovered on the structure's western side. The post-holes were circular or rectangular, steep to vertical sided with concave bases, and measured on average 1.0 m long, 0.80 m wide and 0.50 m deep; the corner posts, 10432 (Fig 3.6, section 10735) and 16311, were largest (the former contained a large amount of stone used as packing). The post-holes were regularly positioned, having a gap of 3.0 m or 4.0 m between each, or 7.0 m to 8.0 m in the longer gaps where intervening post-holes may have been removed by subsequent activity (this is comparable to the spacing of 3–4 m between the post-holes belonging to the Villa Phase 4 eastern aisled building and Phase 5 western aisled building, and might indicate the use of a formal measurement; 3 m is equivalent to 2 Roman paces). Post-hole 16248 was cut into a sequence of rectangular pits (16735; not shown on plan) that measured a maximum of 1.10 m long and 0.93 m wide, and it is possible that they belonged to earlier phases of construction and repair or development. Small pit or post-hole 16288, immediately north-east of 16207, was tentatively associated with structure 16812, but was not in strict alignment and contained a complete sheep skeleton. The feature may instead represent ritual activity, though still potentially linked to the building.

The building's east side was established with less certainty, given that just four post-holes were identified. Indeed, that the building extended east from the line defined by corner-posts 10432 and 16311, rather than west, is not known absolutely, although the absence of appropriately positioned post-holes further west, and the fact that the area west of that line was busy with probably

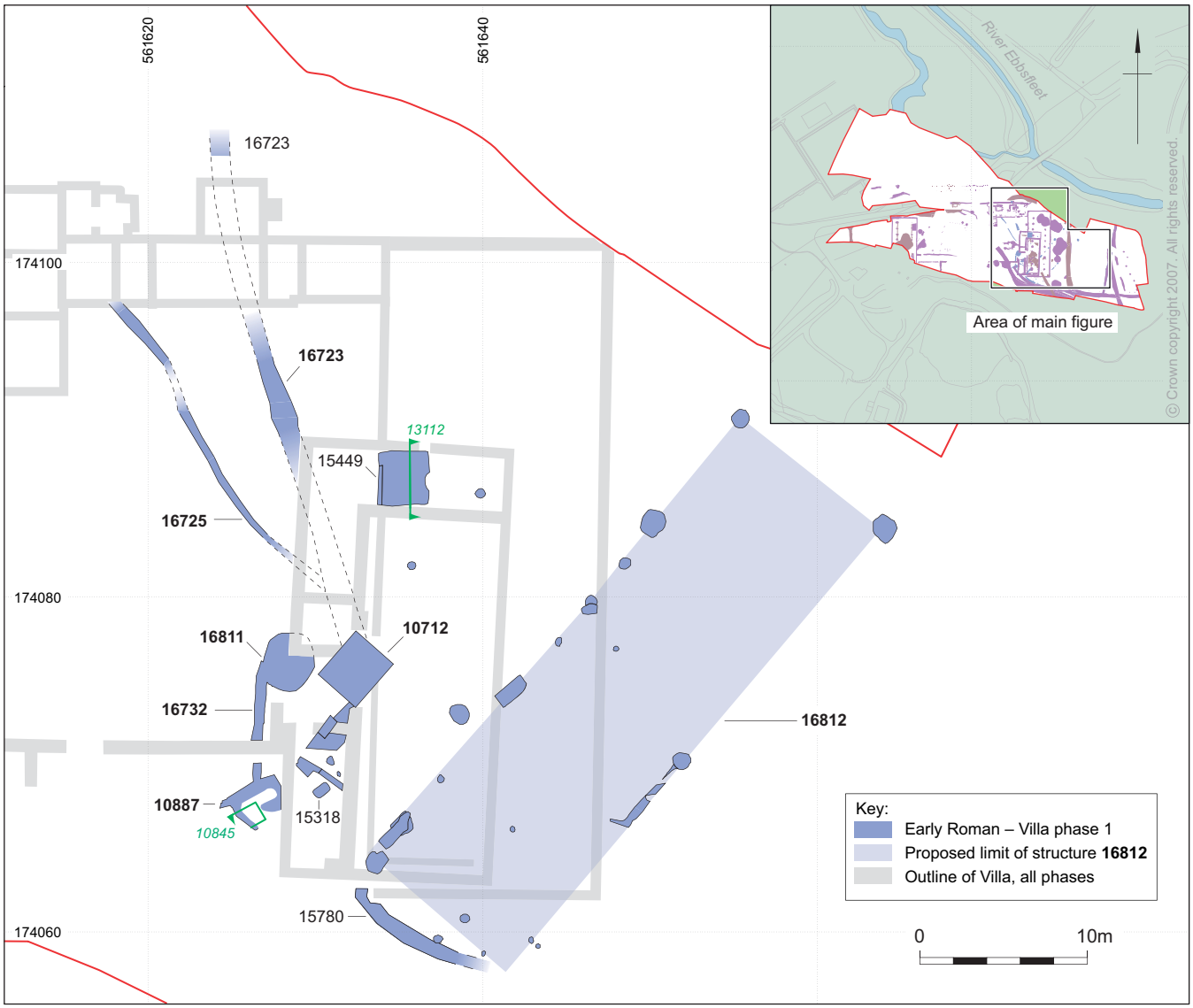

Figure 3.4 Plan of early Roman features, Villa Phase 1 (AD 70–120)

contemporaneous clay-lined pits and ditches, make an eastern extension more likely. The northernmost post-hole, or eastern corner-post, 10478, was previously excavated by the Thameside Archaeological Group (TAG), but, like corner-post 10432, was substantial (1.50 x 1.36 x 1.06 m) with vertical sides and a concave base. A long gap (18 m) separated this and the next post-hole, 10817, but, being a factor of three, nevertheless fits within the spacing observed along the west side of the building and suggests that up to five post-holes may have been removed by later activity. The gap between 10817 and 10978, the next identified post-hole, was 14 m and conformed less well, though 10978 was in any case different from others, being much smaller (0.30 m in diameter). Another post-hole (15019) immediately adjacent to 10978 may have been incorporated into the structure.

Two beamslots may have belonged to the structure. Post-hole 10817 cut a thin linear feature (10962), 0.60 m wide and 0.19 m deep, though this appeared to turn west at its southern end, and possibly related to an earlier enclosure or structure. Two post-holes (10630 and 10632) at the south end of 16812 may have been incorporated into the short east–west axis, though the post-holes were smaller, 0.60 m in diameter and up to 0.16 m deep, and not strictly in the correct alignment. Curving gully or beamslot 15780 provides the other possibility for the building's southern end, though is perhaps more likely to represent a drainage feature. Two more post-holes, 15797 and 15673, may represent traces of internal division. A post-hole, 16255, 10 m west of the building and set at right-angles to 16274, may have formed part of an adjoining structure, perhaps an enclosure or annexe. Tantalisingly, another post-hole (15809), 6 m south-west of 16255, potentially defines the west end of the possible annexe.

The evidence points to an early Roman date. Most post-holes had been cut into the natural soil and earlier features (10962 and 16735), into which some of the post-holes were cut, contained North Kent/South Essex shelly ware consistent with an early Roman date. In stratigraphic terms, building 16812 must have existed before Villa Phase 2 building 15773; post-hole 16252 on the west side of 16812 (recorded as a rectangular

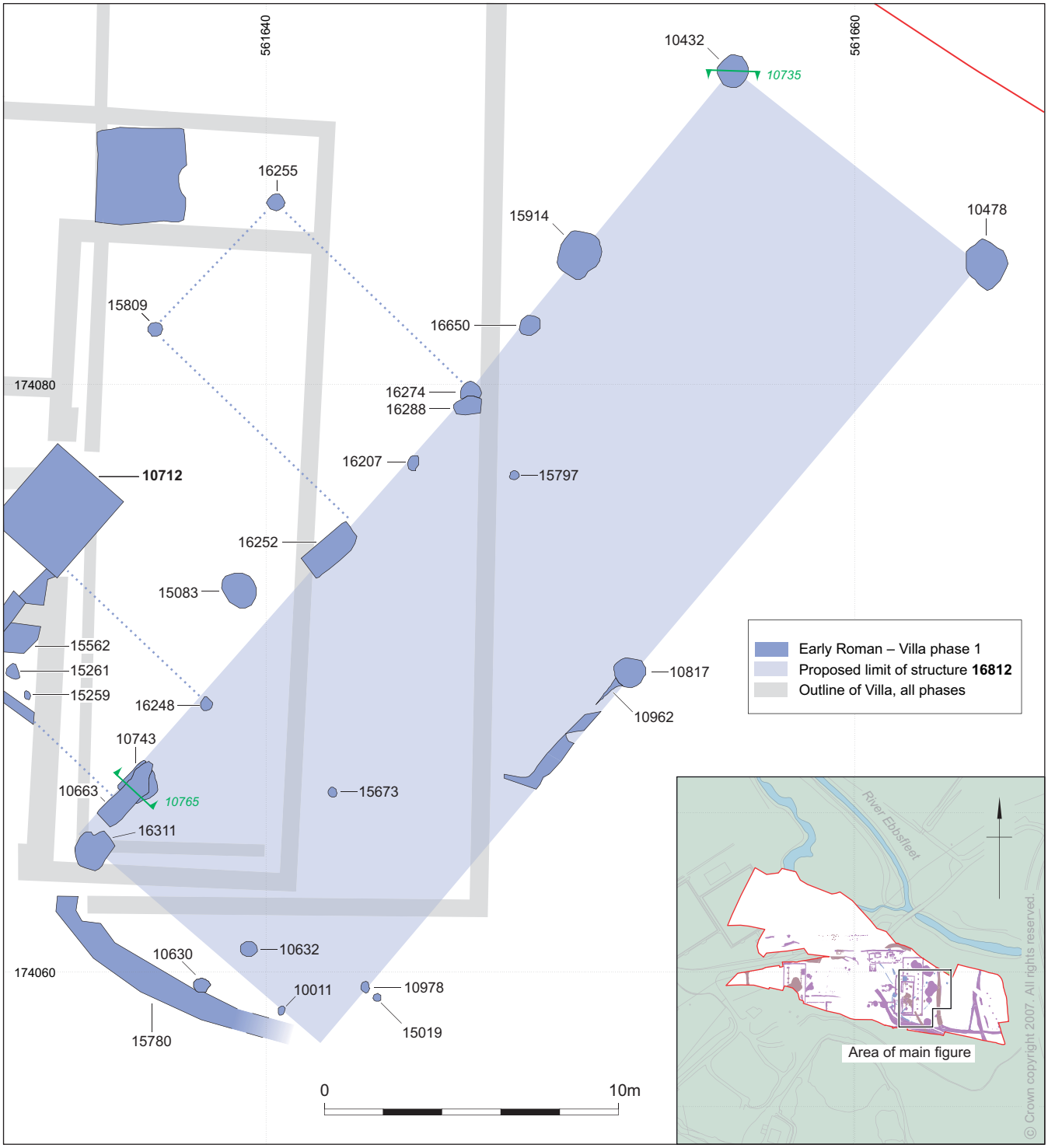

Figure 3.5 Plan of building 16812

feature, possibly a robber trench) was truncated by wall 10106, while the southern corner post-hole, 16311, was cut by wall 10104 (both masonry elements belonging to the building's earliest phase). Pottery from the post-holes spanned the period AD 50–150, and included shelly ware, North Kent white-slipped oxidised ware, and Thameside grey wares (pottery supply patterns gleaned from key ceramic groups suggest that the supply of shelly ware dwindled after AD 120). A broad date range of AD 50–120 therefore can be given to the structure.

Two features potentially connected to building 16812. Pit or slot 15562 was rectangular and vertical sided, measuring 5.0 m by 1.30 m, and 1.30 m deep, and was filled with alternate layers of silty clay and chalk rubble. Another pit, 10663, 6 m south-east of 15562 and parallel to it was smaller, though essentially identical, again being filled with clay and chalk (Fig 3.6, section 10765). If the chalk layers related to the use of pits 10663 and 15562, then five sherds of pottery – comprising bead-rimmed jars in shelly and Thameside grey wares – found below and in between the chalk give

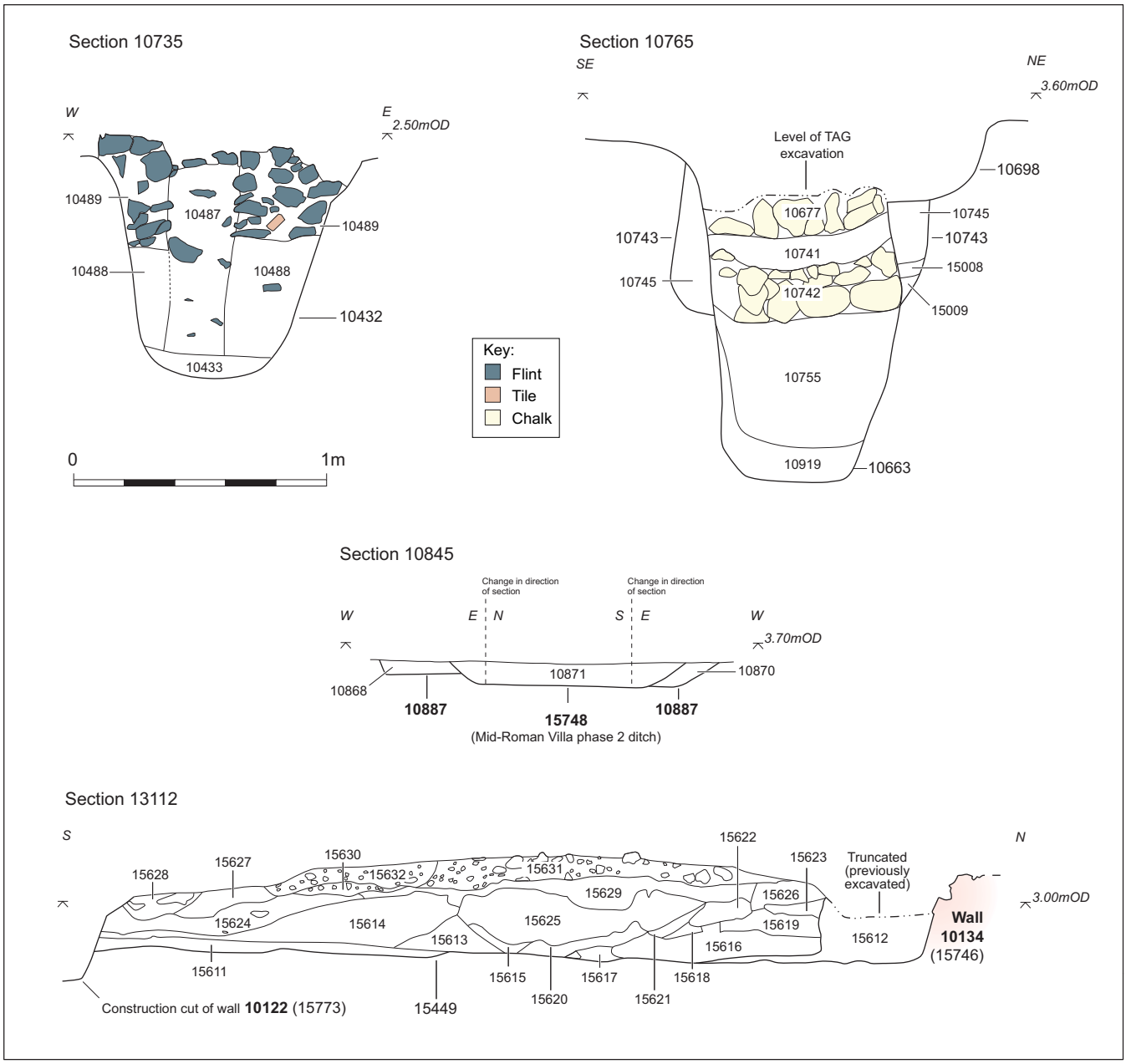

Figure 3.6 Sections of 16812, post-holes, ditches, and tanks

a date within the second half of the 1st century AD for use. Additionally, feature 15562 was cut by Villa Phase 2 structure 15773 and must pre-date it. Function is uncertain, though the chalk layers, each reasonably level and a uniform 200 mm thick, may have provided the foundation for a wall or other structural element. If so, then small pit 15318 (Fig 3.4), 1.0 m wide and 0.20 m deep, may be included in this tentative structure as a post-hole that helped support the structure's south-western side. Small post-holes 15261 and 15259 may have related to internal elements. Crucially, pit 10663 was positioned along the west side of building 16812 and may have been incorporated into it. Pit 10663 cut post-hole 10743 that has otherwise been assigned to the building, though the pit may have represented a second phase of occupation or construction and the addition of a second annexe.

Pits

A sequence of pits (16811) was uncovered 9 m west of the west wall of building 15773. The earliest, 10839/15544, was cut into the natural soil and measured up to 3.20 m wide at the top and at least 1.30 m deep (the feature was not bottomed). Its profile was initially vertical sided, but then flattened out to create a horizontal ledge or step before resuming its steep angle, though it had narrowed to *c* 1.50 m. It was filled with a succession of sandy silt fills, probably colluvial in origin; these were largely sterile, though a lower fill contained four sherds of grog-tempered ware and Thameside grey ware broadly dating to the later 1st century AD. After the pit had filled, it was cut by a second pit, 10836. This, 2.60 m wide and 0.30 m deep, followed the upper part of the profile of the former pit, though it may have extended the eastern side a little further. It was filled

with similar sandy silt or colluvial deposits, which yielded another four sherds of pottery. This included shelly ware, a *Verulamium*-region ware disc-mouthed flagon, and North Kent white-slipped oxidised ware that suggested an AD 70–160 date range for filling. This feature was in turn cut by a third pit, 15226, which was *c* 2.50 m wide and 1.05 m deep. It contained at least two fills; one was formed from sandy soil eroded from the side or surface but the pit was otherwise substantially filled with a charcoal-rich silty layer (15212) that was deliberately dumped, perhaps to fill a hollow in the top of pit 10836. No dating evidence beyond broadly dated Roman tile was recovered from this fill, but wall 10124, which formed part of new entrance to the first phase masonry building 15773 (see below), cut into the upper levels of the pit group, suggesting that the feature had filled totally by *c* AD 150/60. However, given that it had been cut by ditch 16732, the pit group may have been filled by the late 1st century. The function of the group is difficult to determine, since it could not be fully excavated. Its regular shape in plan, profile and depth suggest a well, though no evidence of a lining was found. Alternatively, the regularly-recut pit acted as a sump into which ditch 16732 discharged waste-water from tank 10887.

Cisterns

Pit 15449 was a rectangular, clay-lined cistern measuring 2.54 m wide, 3.34 m long, and 0.40 m deep (Fig 3.6, section 13112). It was cut by the short north wall of structure 15773 (or, rather, its construction cut) and therefore pre-dated the masonry building. The pit was filled with a sequence of silty clay fills and charcoal-rich deposits (see Barnett, Vol 3, Chap 4). Three upper fills (15630–2) yielded building material, including tile and *opus signinum*, which presumably derived from a demolished structure. Dating evidence from the pit included a sherd from a Thameside grey ware cooking-pot type, dating after AD 120, although other pottery from the feature need not have dated beyond AD 100. If the pit was deliberately levelled ahead of the construction of 15773, then the pottery provides a *terminus post quem* for that event. The pit best fits within the early Roman period, possibly AD 70–120.

Another clay-lined pit or tank was uncovered some 20 m south-west of 15449 (Fig 3.4). The tank (10887) was rectangular in plan, 2.15 m long, 1.75 m wide and relatively shallow at 0.15 m deep (Fig 3.6, section 10845). A 0.12 m thick clay deposit (10867) on the edge of the feature suggests that the pit was clay-lined. The tank was filled with a sequence of silty sand deposits that are likely to have accumulated naturally. It appears to have been connected with a north–south aligned ditch (16732), which was 7.0 m long, 0.60 m wide and 0.30 m deep. The relationship is far from certain; the excavator recorded the ditch as cutting – and therefore later than – the tank. However, a water-pipe collar found in the ditch hints that the two features worked concurrently. The tank was cut by ditch 15748 (see below, Fig 3.13), suggesting that the tank had filled by the early 2nd century. No dating evidence was recovered from ditch 16732, but it had been cut into the top of a sequence of pits (16811) that suggested that, like 15449, it had been dug after AD 70.

Tank 10712 was situated within the entrance of the later masonry east range and at the southern end of ditch 16723 (Fig 3.4). The clay-lined feature had been excavated previously by the Thameside Archaeological Group (V Smith 1979, 157), but enough of the feature survived to suggest dimensions of 3.0 m wide, 3.50 m long, and 1.0 m deep.

Ditches

Ditch 16723, aligned NW–SE, extended at least 30 m between the third clay-lined tank (10712) to the south and the Ebbsfleet to the north (Fig 3.4). The ditch had an average width of 1.50 m and depth of 0.70 m; it had a variable profile, being either U-shaped or V-shaped and a deposit on the base of an excavated segment of the ditch suggests that the base was lined with clay and chalk (V Smith (1979, 157) noted a chalk-block lining in previous fieldwork). The ground surface was higher at the south end of the ditch (3.0 m aOD), compared with the north, where the surface was *c* 2.0 m aOD. The relationship between the ditch and the tank could not be investigated, but excavations by TAG suggest that the features were connected (V Smith 1979, 157). Its slope and course suggests that the ditch was dug to take water from the tank, and this appears to be confirmed by iron pipe collars that were found in 1979 in the bottom of the ditch. The ditch was initially filled with a sequence of thin silty sand and clay waterlain deposits, usually sterile except for occasional charcoal fragments that accumulated during drainage. Upper fills were more mixed, however, containing building material and, in one fill, abundant oyster shell, suggesting deliberate dumping to close the feature. The ditch was cut by the long west wall of building 15773, and must have been earlier than the second phase of the villa complex (Villa Phase 2). Pottery from the upper fills of the ditch, which included North Kent/South Essex shelly ware, bead-rimmed dishes in Thameside grey ware, Central Gaulish samian ware, and South Spanish Dressel 20 amphorae sherds, suggests that this dumping began in the early 2nd century, possibly after AD 120, and was complete by the mid-2nd century.

The feature cut an earlier gully, 16725, which was aligned NW–SE and extended towards the Ebbsfleet River, and may have been a replacement of it. The earlier feature contained Thameside grey ware, fine grey ware and shelly ware, pointing to a later 1st or early 2nd century date for infilling.

Western Roman Complex (AD 43–120)

by Daniel Stansbie

The ephemeral late Iron Age–early Roman activity was superseded between AD 43 and 120 (possibly after AD 70) by a substantial L-shaped ditch (20740), measuring approximately 24 m in length by 1.95 m in width and 0.77 m in depth, running NE–SW, before

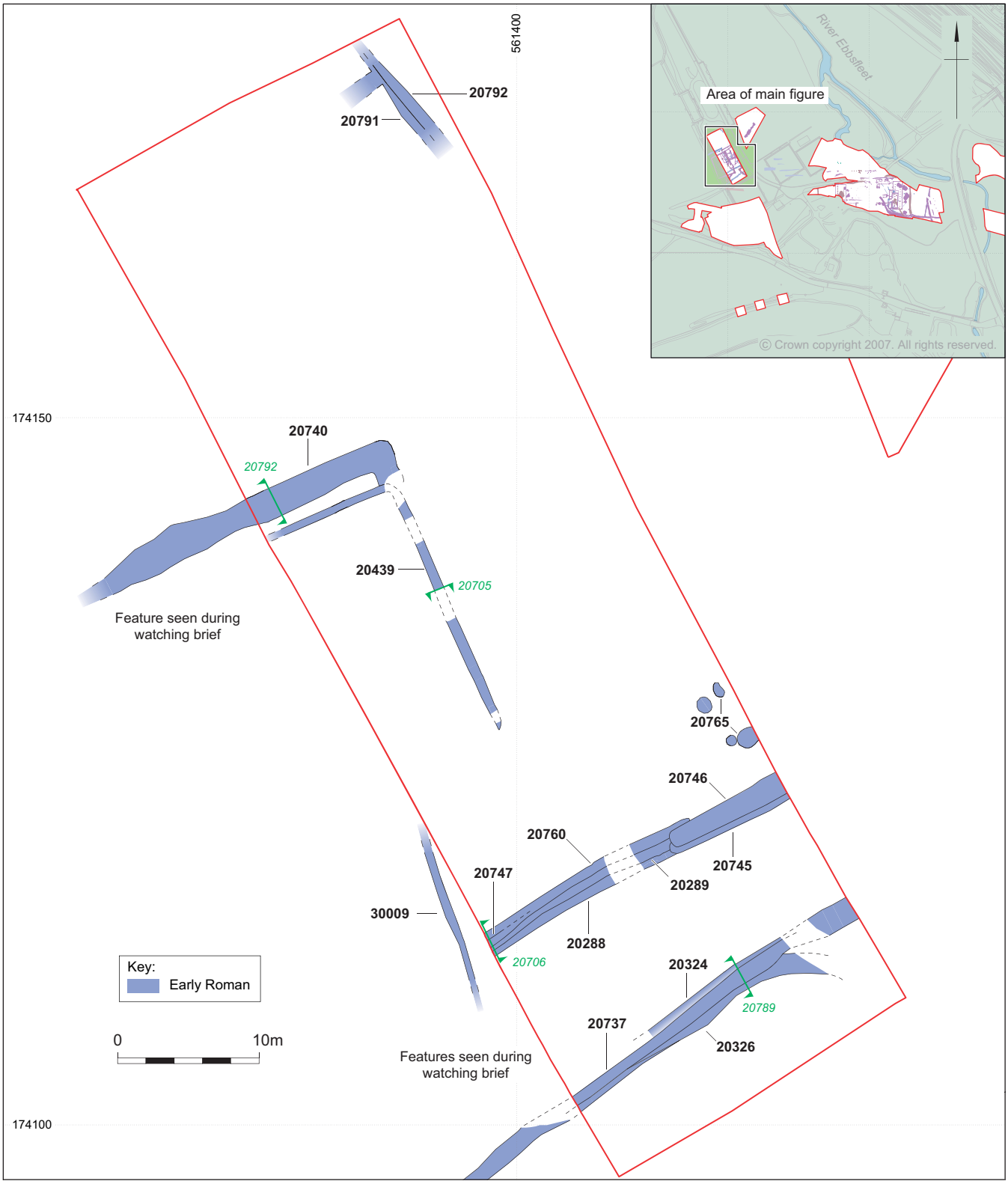

Figure 3.7 Western Roman Complex: plan of early Roman features

turning to the south-east (Fig 3.8, section 20792). This may represent part of an enclosure, which mostly lay beyond the edge of excavation to the south-west; two sherds of Thameside/Upchurch grey ware were recovered. The ditch was cut by NW–SE aligned ditch 20439, which turned to extend SW–NE at its northern end and, based on orientation, may have been contemporary with another ditch (30009) to the south. Ditch 20439 had a rounded base and convex sides, and was approximately 27.1 m length, 0.65 m wide and 0.25 m deep (Fig 3.8, section 20705). Two boundary or drainage ditches (20324, 20288) extended SW–NE across the site at its south-eastern end. Ditch 20288 measured 14.4 m in length by 0.65 m in width and 0.54 m in depth, and had a U-shaped profile. Thirteen sherds of Roman pottery, including a form 18/31 dish in Central Gaulish samian, and a jar and a beaker in Thameside/Upchurch grey ware, were recovered dating

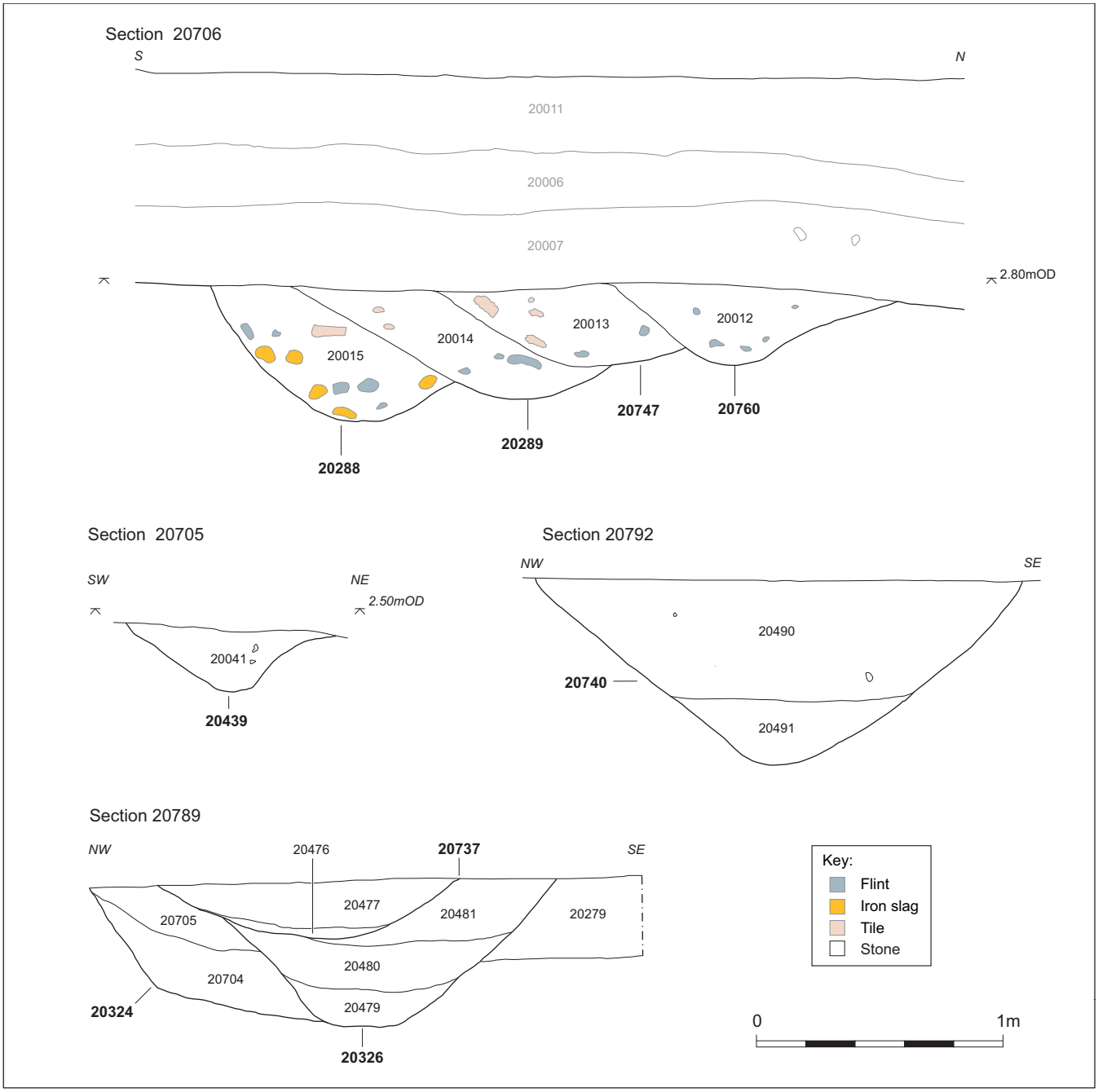

Figure 3.8 Western Roman Complex: sections

to *c* AD 120/30. A single sherd of pottery from a form 18/31 dish in Central Gaulish samian came from the fill of ditch 20324, which is likely to have filled at the end of the period; this feature was 34.7 m long, 2.0 m wide and 0.65 m deep.

Ditch 20324 was recut successively by two ditches, 20326 and 20737. Ditch 20326 was curvilinear and orientated NE–SW, turning to the south-east at its north-eastern end. It measured 19.5 m in length and was on average 1.15 m in width and 0.63 m in depth. In profile the ditch had a rounded base and steeply sloping sides (Fig 3.8, section 20789). Thirteen sherds of Roman pottery, including a bead-rimmed jar in Thameside grey ware and a sherd of Upchurch oxidised ware were collected. Ditch 20737 was orientated NE–SW. It measured 18.6 m in length and was on average 1.05 m in width and 0.20 m in depth, and had a rounded base and gently sloping sides.

Ditch 20288 was recut successively on the same alignment by ditches 20289, 20747, 20760, 20745, and 20746 (Fig 3.7 and Fig 3.8, section 20706). Ditch 20289 was 14.8 m in length, and on average 0.60 m in width by 0.42 m in depth. It had a concave base and gently sloping sides. Eight sherds of Roman pottery, including three sherds of Central Gaulish samian were recovered from the fills. Ditch 20747 was 15.2 m long, 1.05 m wide and 0.61 m deep, and had a concave base and gently sloping sides. It contained 38 sherds of pottery, including sherds from a plain rimmed dish, a bead rimmed jar and a cooking jar, all in Thameside/ Upchurch grey ware, in its fills. Ditch 20760 was 15.2 m in length and measured 1.15 m in width by 0.30 m in

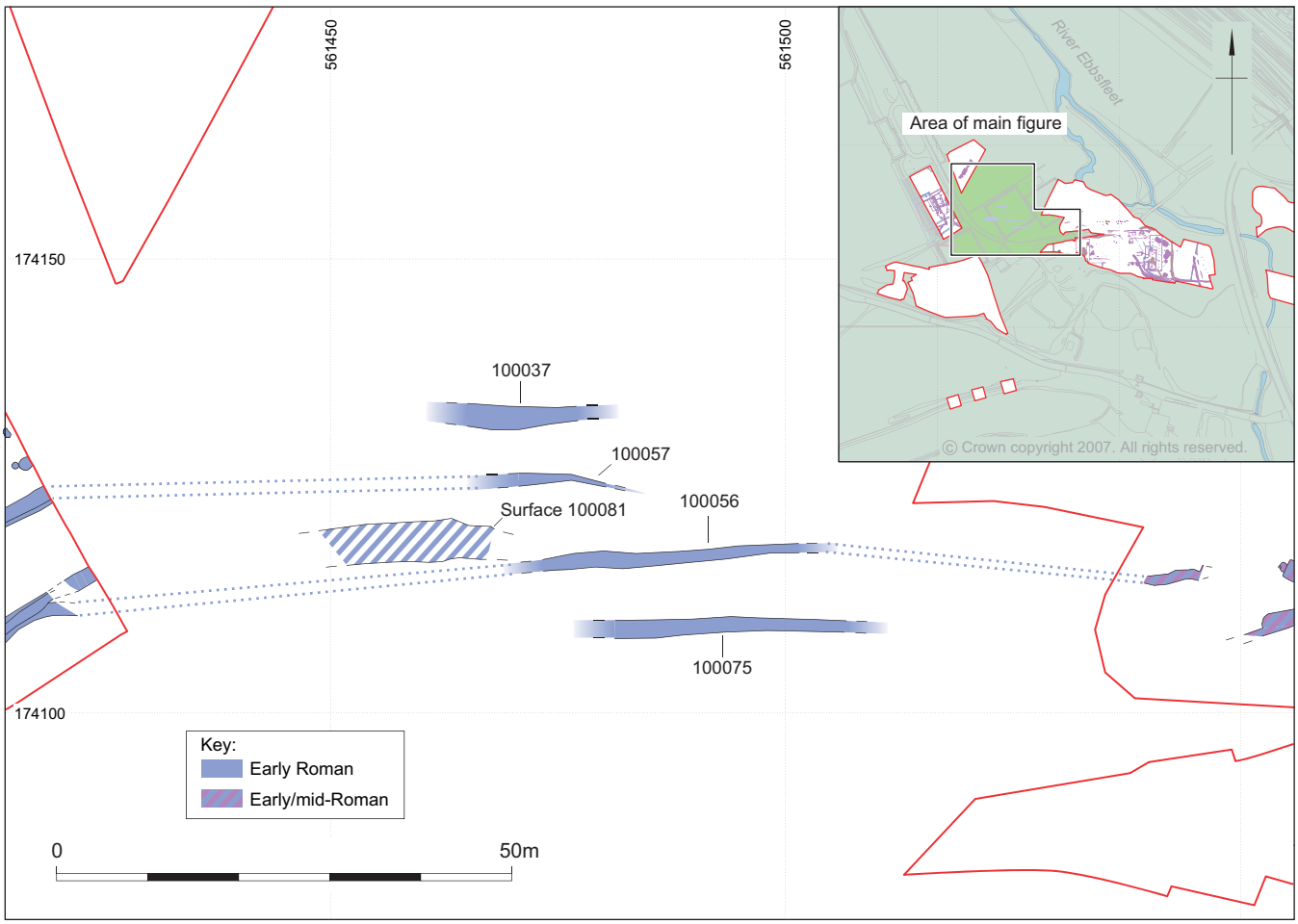

Figure 3.9 Roman road linking Western Roman Complex and wetlands

depth. It had a rounded base, with gently sloping sides. The fills contained no finds. Ditch 20745 was 9.2 m in length and measured 1.10 m in width by 0.20 m in depth. Ditch 20746 was 8.80 m in length by 1.45 m in width and 0.20 m in depth. The fills of both produced small assemblages of early–middle Roman pottery.

A group of four pits (20765), situated near to the north-eastern edge of the site also dated to the period. The pits averaged 1.19 m in diameter by 0.92 m in depth and had shallow, saucer-shaped profiles with flat or gently rounded bases. All the pits had two fills, apart from pit 20535, which had one. Eight sherds of early Roman pottery, including Thameside/Upchurch grey ware, flint-tempered ware and North Kent or South Essex shelly ware were recovered from the fills.

Two sections of a NW–SE-aligned ditch (20791 and 20792) were exposed in a narrow sondage in the far north-eastern corner of the site. Ditch 20791 measured 0.75 m in width by 0.63 m in depth, and had a flat base and concave sides. Two sherds of Thameside/Upchurch grey ware were recovered from the fill. Ditch 20792 averaged 0.65 m wide and 0.50 m deep. Two sherds of early Roman pottery were recovered.

The road

Features in the Western Roman Complex were connected to the main villa complex to the east by a road, orientated NE–SW (Fig 3.9). Two areas of metalling were uncovered during a watching brief (ARC 342W02) immediately east of the east edge of the Wetlands area. One area (100240) was a compact layer of small, flint nodules, 0.14 m thick (100081). This had been laid onto a deliberately-dumped, charcoal-rich, bank of clay silt, 0.21 m thick (100080). Alluvial clay lay below. A more substantial road surface (100190) was found a little distance away and comprised a series of silty-sand and flint gravel deposits (100200–100204) that was built up to form a bank 0.40 m high. Both areas were flanked by ditches, and another pair of ditches were dug outside these. All the ditches were filled with laminated, silty-clay, water-lain deposits. Together, these elements formed the characteristic profile of the Roman road (*cf* Chevallier 1976), comprising the gravel-surfaced *agger* some 8.0 m wide, scoop-ditches cut either side of it (material taken from the ditches, in this case Pleistocene gravel, was used to form the bank), and boundary ditches beyond them.

No further surfaces were recorded, but projecting the line west, the scoop ditches (100056 and 100057) are likely to have met ditches seen in the Western Roman Complex, or beyond it through an extension to the site made during the watching brief. The alignment is imperfect, however, and the road would have been required to turn towards the south-west. Ditch 100056 best corresponds with 20326, though it could join the recuts of 20326 (20324 and 20737; see above), while

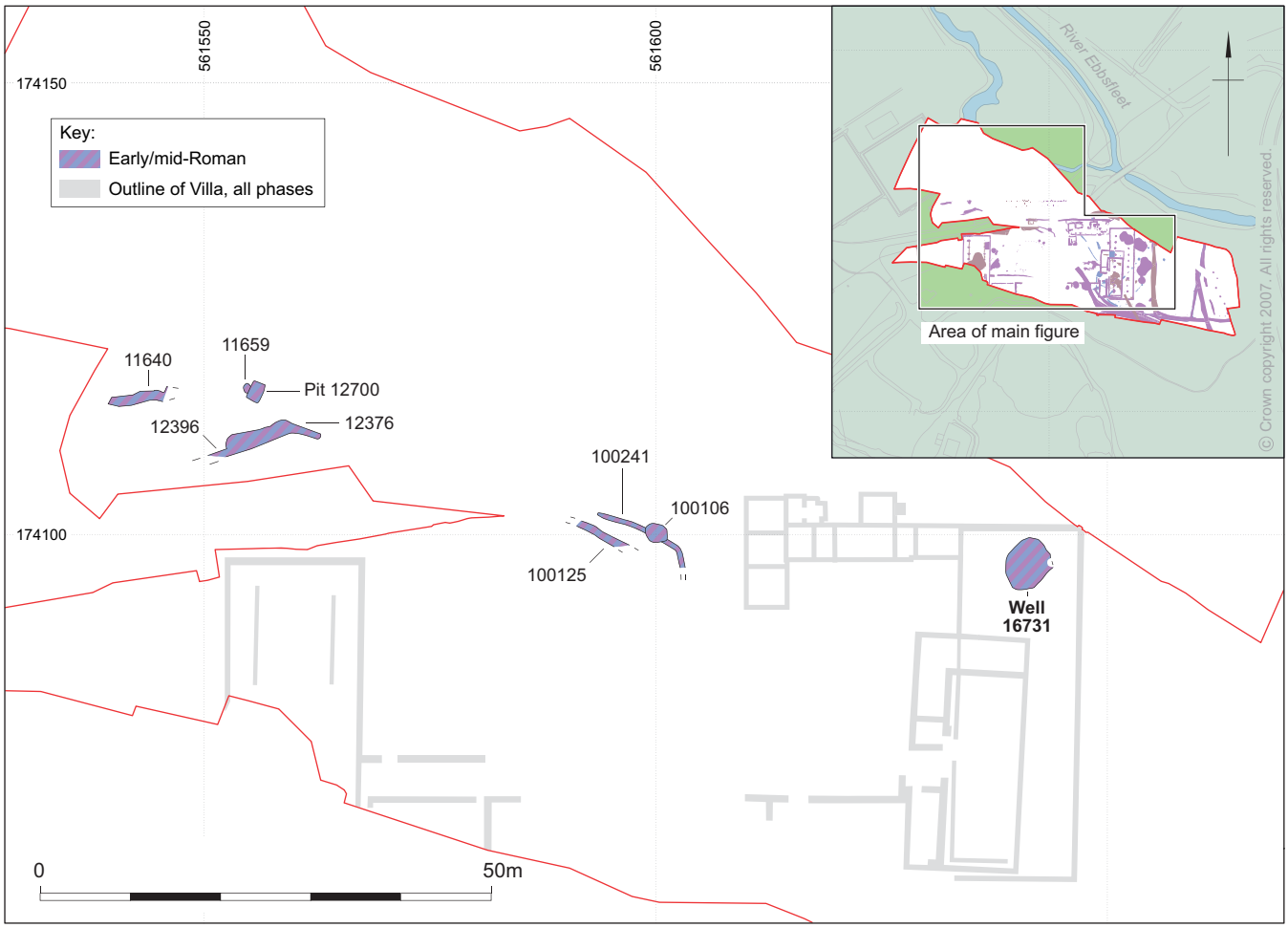

Figure 3.10 Plan of early/mid-Roman features, Villa Phase 1/2 (AD 70–160)

100037 matches 20745 or 20746. The road, if extended east, entered the Wetlands area and would have had to stop or turn south before reaching the river channel. A gully segment in the Wetlands area (11640; see below) may have joined the road's southern ditch, but, if so, the road must terminate there. Alternatively, the road continued east, as suggested by ditch 12376 (Villa Phase 1/2 see below) on the southern edge of the Wetlands trench, though the alignment is not so convincing.

A lid-seated grey ware jar and white-slipped oxidised Upchurch ware from layer 100080 below metalled surface 100081 suggests that the road was laid in the second half of the 1st century or the first half of the 2nd. Dating evidence was scanty elsewhere, though pottery from ditch 20326 and its recuts was consistent with this date.

Early/Mid-Roman, AD 70–250

Villa Phase 1/2 (AD 70–150/60)

Well 16731

Well 16731 (Figs 3.10 and 3.11) was defined by a circular construction pit that was cut through sandy silt and measured 5.84 m wide at the top, narrowing to 3.0 m at the base, and, as excavated, 3.20 m deep. A layer of chalk nodules (16728) was spread around the edge of the base to provide a surface for the square timber lining (16696) that was inserted subsequently (Fig 3.11). The lower four boxes of the lining survived. Planks were up to 2.80 m long, 0.60 m wide, and *c* 50 mm thick, giving the box an internal width of about 2.60 m, and were usually fixed with bridle joints and occasionally reinforced with nails. One plank (16673) had a square notch removed from its long edge at one end. This may have held a wooden corner rung or brace, but with no opposing notch on the joining plank, it probably indicates more that the timber was reused; a small piece of wood that was nailed behind the notch to close the gap appears to confirm this view. The lining appears to have been inserted after eight stakes or posts were driven vertically into the floor of the feature – one in each corner of the cut (except the south corner, which had two) and one down the middle point of each side. The planking was simply held unfastened by the stakes and the wall of the cut. Further planks were then inserted vertically in between six of the stakes and the lining. Finally, eight shorter planks – 1.39 m long and 0.41 m high – were nailed to the inside face of the lowest box, each short edge butting against the side of a stake (see Goodburn, Vol 2, Chap 8) (Fig 3.11, Elevations 10830–3; Pl 3.3). The space between the lining and construction pit was backfilled mainly with deposits of

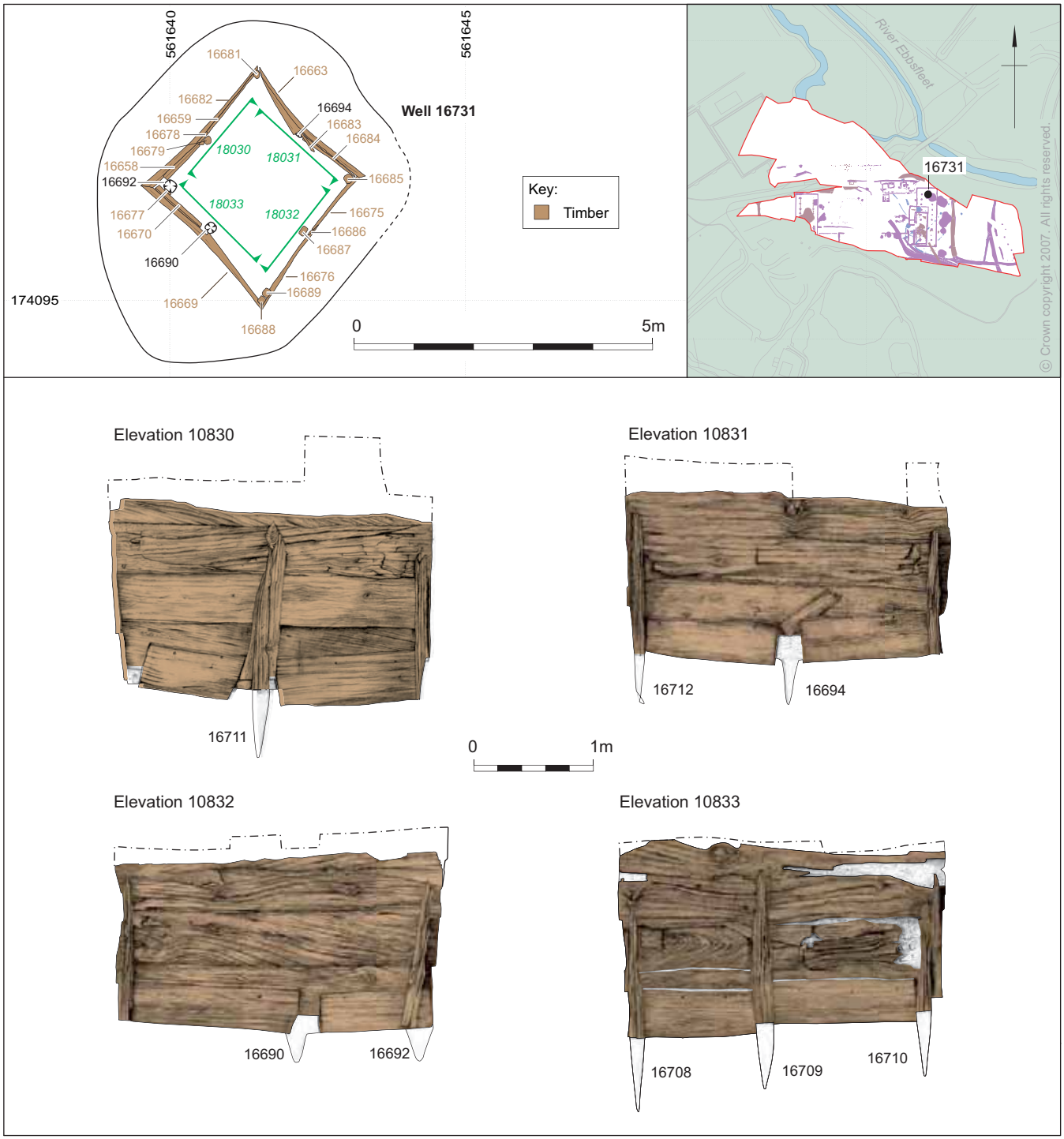

Figure 3.11 Well 16731, detailed plan and elevations of lining 16696

sandy silt with chalk nodules (16728–9) and clay towards the top.

The well could have been contemporary with the wells assigned to Phase 2 (see below). As they lacked sapwood, it was possible to determine only that the planks from the lining were from trees felled after AD 56 (see Tyers, Vol 3, Chap 3), and if the planks were re-used, construction could have been some number of years after. No pottery was recovered from any fill associated with its use, but the feature's lowest deposit of silt (16631), possibly accumulating after it was abandoned, contained a small cooking pot type jar in Thameside grey ware that dated from AD 150. Pottery from the fill above (16597), which included a Cologne colour-coated beaker, a Central Gaulish samian dish, and a North Kent white-slipped oxidised ware flagon, is unlikely to have dated beyond AD 150. The well was therefore open any time between AD 70 and 150. Pottery from later deposits suggests that infilling had ceased by the end of the 2nd century, and possibly well before; the mixed nature of some of the upper fills – containing building material, including a fragment of mid-2nd century roller-stamped flue tile (see Poole, Vol 2, Chap 6), chalk rubble, and pottery – suggested a reasonably rapid

Plate 3.3 Well 16731. Looking north-west

sequence of filling. Of especial note was the discovery of a complete skeleton of a horse from a middle disuse fill (16545). The skeleton was articulated and evidently deposited before the animal had decomposed (see Worley, Vol 3, Chap 2). A hollow at the top of the feature was levelled using material probably from the limekiln (see below), presumably in readiness to build the aisled structure.

The feature was wider than the near-contemporary wells 16516 and 16002 (see below) and, indeed, wider than later wells 15011 and 10977. It was also deeper, being dug to a depth of 0.03 m aOD. By comparison, the other wells reached an average depth of 0.22 m aOD. Evidently *c* 0.20 m was sufficiently deep to reach the water table, and so clearly 16731 must also have encountered water. The feature can therefore be identified as a well, rather than, say, a tank or cistern for storage. Its size, though, is exceptional and points to water extraction on a very large, industrial, scale. The contents of the well add little to the understanding of its function, being related solely to the period of abandonment. Rich assemblages of waterlogged and charred plant and faunal remains suggest that the well attracted household, industrial, and human waste, as well as plants and insects that drifted in naturally. Abundant germinated charred grain and chaff and grain pests recovered from silt that accumulated at the base of the feature provides evidence for grain storage and malting during this period. Though not associated directly with feature use, the material suggests why such a large well was needed, since malting and brewing required vast volumes of water for the necessary stages of steeping, mashing, and fermentation. But the well need not have been exclusively dedicated to those activities. If it was in use during the second half of the 2nd century, then it is possible that water from it fed the limekiln (Villa Phase 2) or even the bath-house (Villa Phase 3). Saltmarsh related plant remains and insects found in the well (see Stevens, Vol 3, Chap 4; D Smith, Vol 3, Chap 3) point to a slightly saline environment. However, it seems unlikely that water lifted from the well during its early use was salty; the depth of the well ensured that the bucket or other water-lifting device reached freshwater. No part of the lifting gear was found, but a pair of iron hinges from an early silting fill were of the type fixed to doors, and it is possible that they belonged to a trapdoor or lid covering the well (see Schster, Vol 2, Chap 4).

Wood-lined pit 12700

A wood-lined pit (group 12700) was dug in the Wetlands area almost 100 m north-west of the villa (Fig 3.12). It was cut from a height of *c* 1.70 m aOD and comprised a vertical-sided rectangular pit, 2.26 m long, 1.60 m wide and 0.70 m deep, which was lined on the base with timber planks, of which at least four survived (11570, 11571, 11537, 11538); another plank (11540), set on its edge against the short north end of the pit suggests that the sides were at least partially lined or that wood from the remaining three sides had been removed in antiquity. The base planks lay above a bed of moss or other green organic material (11560), which may have acted as a sealant similar to the use of moss on the underside of nail heads on some Roman ships (eg, Rule 1990, fig 5.2; D Goodburn, pers comm). The final component of the feature was a group of six stake-holes, which were positioned inside the pit around the edges of the long axes and measured an average of 0.18 m wide and 0.32 m deep. The stakes helped secure the side planks, although the profiles of the stake-holes suggest that the stakes had been pushed out of alignment from the subsequent pressure. The pit, dug at the edge of the river channel, would have rapidly filled with water; the layer of moss below the timber planks may have acted as a filter to remove impurities. Although they lacked sapwood, tree-ring dating of the base timbers indicated that the feature was dug after AD 77. Pottery from the feature – admittedly recovered from upper fills – spanned the period AD 50–150, as suggested by the presence of shelly ware, Thameside grey ware and fine (Upchurch) grey ware (two Upchurch ware body sherds from deposit 11529 may be part of a cordoned bowl dating up to *c* AD 120). Burnt flint (five pieces) and ceramic building material was also recovered from the feature. Abundant cereal chaff, plus some grain sprouts, were collected from upper, charcoal-rich, fills (see W Smith, Vol 3, Chap 4).

Other features

A post-hole (11661) was located 0.5 m west of wood-lined pit 12700. It was bowl-shaped with a maximum width of 0.32 m and depth of 0.10 m, and was filled with a single clay-silt deposit. No dating evidence was recovered, but the feature may have been associated with the pit, possibly relating to a cover or other form of basic superstructure. Both features cut a circular-shaped pit (11659) that was 1.16 m wide and 0.80 m deep and filled with a series of silty-clay deposits. The pit pre-dated the wood-lined pit, though it need not have been very much older; three sherds of North Kent/South Essex shelly ware from 11659 potentially date infilling to the 1st or first half of the 2nd centuries AD.

A sequence of ditches was uncovered immediately south of the wood-lined pit (Fig 3.10). Ditch 12376

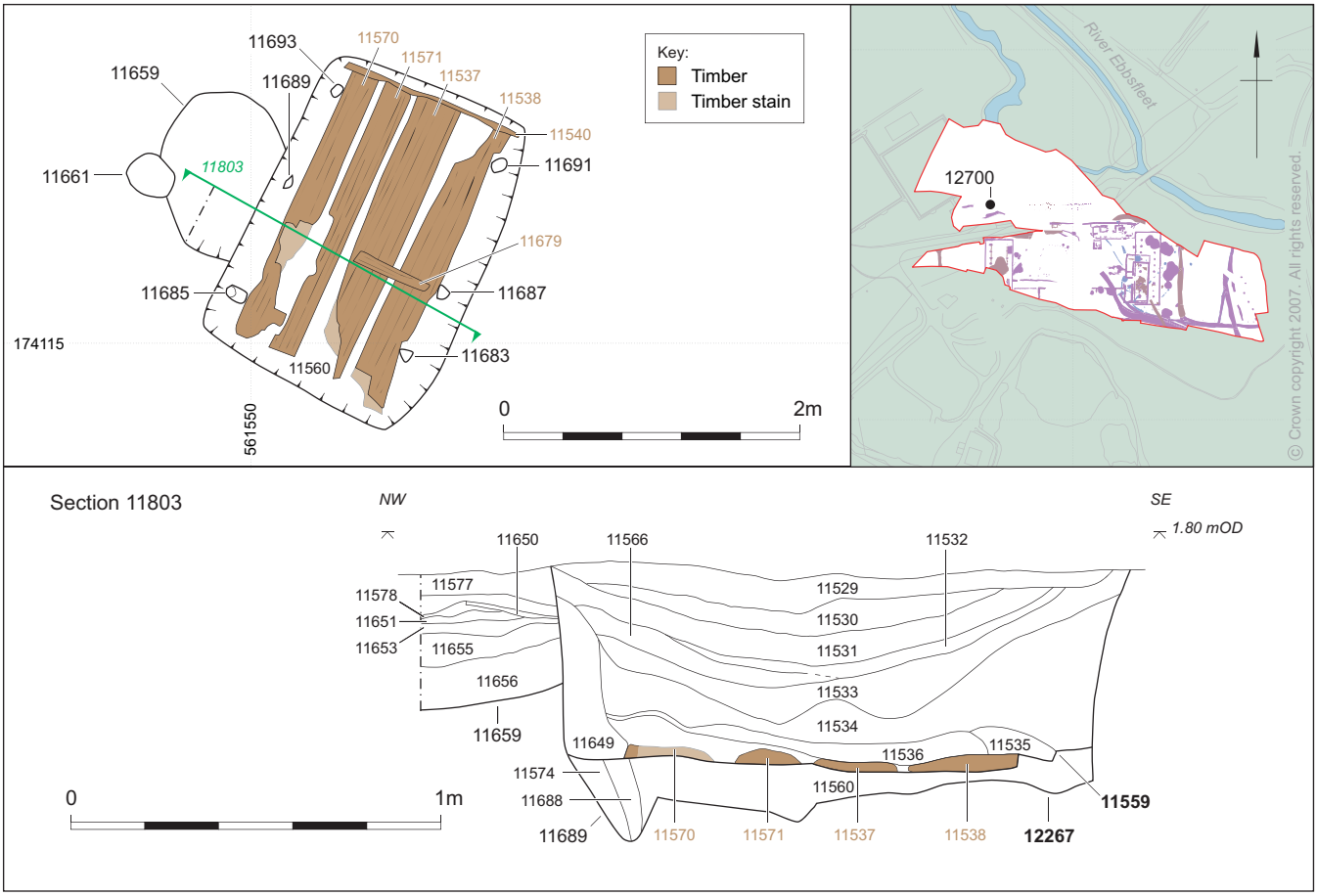

Figure 3.12 Pit 12700, detailed plan and section

extended NE–SW before turning towards the south-east at its east end, and was approximately 0.90 m wide and 0.70 m deep. Ditch 100241, uncovered further east during the Watching Brief, continued the alignment of 12376 and may have been part of the same ditch. Dating is uncertain; no finds except burnt flint was recovered, but it is possible that the ditch defined an area of activity represented by the wood-lined pit; alternatively the ditch was related to the road (Villa Phase 1) seen further west (see above). Ditch 12376 was cut subsequently by ditch 12396, that followed the same NE–SW orientation as 12376 and was of similar size, 1.0 m wide by 0.80 m deep. Once infilled, ditch 100241 was cut by pit 100106.

Pits also immediately south of the wood-lined pit may belong to this phase, though firm dating evidence is again lacking. This group of features included 11512, 11519, 11604, 11608, and 11622 (not shown on plan). Burnt flint, nearly 2200 pieces in total, was recovered from 11512, 11519, and 11608.

Mid-Roman, AD 120–250/60

Villa Phase 2 (AD 120–150/60)

The east range

After *c* AD 120, building 16812 was demolished to make way for a stone-built structure, 15773 (Fig 3.13). Robber trenches and parts of the wall foundations defined the outline of the rectangular building, 22 m long and 9 m wide. The wall footings survived best along the long axis on the eastern side and the north-east corner; wall 10106 was 0.89 m wide and 0.52 m deep along its north–south axis, and 0.92 m wide and 0.57 m deep east–west. It was built with unmortared and unfaced flint cobbles and occasional chalk and ragstone, which were bedded into coarse, orange sand. Wall 10122, at the northern half of the west side of the building, was similarly constructed. A gap between the end of this wall and a robber trench that preserved the outline of the southern part of the west side may have included an entrance, with the widening at the end of 10122 possibly designed to support a substantial doorway. A much smaller length of wall (10104) survived along the short, southern end of the building. No internal features were recorded. The stone walls of this building or its subsequent phases are unlikely to have extended any more than 1.0 m high; wall-daub found within the east range – some pieces with impressions of wooden rods and stone slabs – suggests that the external walls were continued with wattle-and-daub or cob with daub render. The external side was completed with a limewash or stone facing (see Poole, Vol 2, Chap 6).

The building truncated a number of earlier features that pointed to a date after AD 120 for construction. Among these, pit 15449 and ditch 16723 were especially useful (see above), since pottery from their top fills –

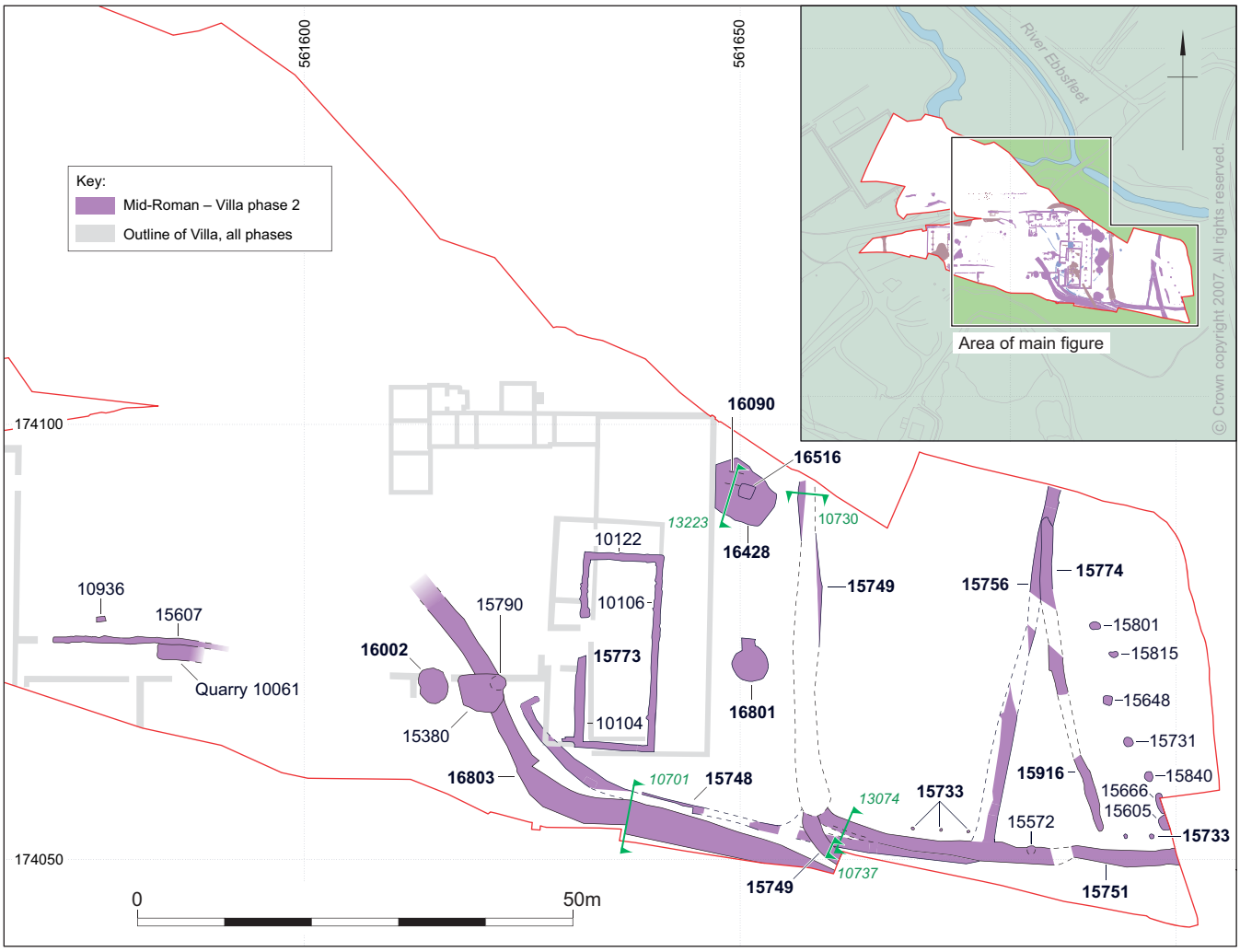

Figure 3.13 Plan of mid-Roman features, Villa Phase 2 (AD 120–160)

probably dumped to level the features ahead of construction – dated from *c* AD 120. This phase extended perhaps only 30 or 40 years; features surrounding the structure and conceivably contemporaneous – well 16516, pit 15790, and ditch 16803, for example – gave *c* AD 150/60 as a terminal date. Given that wall 16641, a subsequent development of the villa complex, truncated pit 15790, this date is compelling as the start date for the third phase of villa construction.

Like preceding timber building 16812, the masonry structure 15773 was set within an industrial landscape defined by a limekiln, wells, and cisterns, suggesting that the structure also served in some industrial capacity. This is explored more fully in Chapter 4, but the simple, hall-like design of the structure, and potentially large entrance seems consistent with this interpretation.

Limekiln 16801

A kiln was constructed 10 m east of building 15773. Presumably dug through the remains of floor surfaces associated with the early Roman structure 16812, and reaching underlying natural gravel, it consisted of a circular oven or chamber and channel. The inverted cone shaped chamber, stepped towards the base of its profile, had a surface diameter of 3.60 m and depth of 1.64; the flue was 1.50 m wide and *c* 2.0 m long (Pl 3.4). Both elements were built with chalk blocks, flint nodules, and ceramic building material, which were set within a sandy clay matrix. A series of charcoal-rich baked clay or sandy silt layers, usually 10–20 mm thick, was built up from the floor of the kiln, occasionally interrupted by surfaces of compacted chalk. These formed through use and repair or relining, indicating that the kiln underwent multiple firings. A pit or circular depression in the ground surface joining the north end of the chalk-lined channel may be identified as a feature in which the burnt lime was stored before removal or further processing. Layers of sandy silt were removed from there to reveal a series of trampled ash, burnt clay, and chalk deposits overlying a surface of crushed chalk.

A radiocarbon date (cal AD 140–170; NZA-27444, 1915±30 BP) taken from a charcoal deposit indicates that the kiln was in use during the mid-2nd century. The burning of limestone to produce quicklime or its product, slaked lime, an essential ingredient of mortars and cement (including *opus signinum*), pre-supposes the existence of a contemporaneous masonry structure. Building 15773 (Villa Phase 2) is an obvious candidate, but it is also possible that the kiln remained open to contribute to structures belonging to Villa Phase 3. Central Gaulish (Lezoux) samian ware, black-burnished

ware category 2, and fine (Upchurch) oxidised ware from the kiln's top fills suggest that the kiln was abandoned by the end of the 2nd century. The kiln was previously uncovered during excavations in 1910 by W H Steadman, who also noted the existence of a second kiln three-quarters of a mile south; no details were recorded, except that the kiln was found to be of similar construction (Steadman 1913, 11–2).

Ditches

North–south ditch 15756 extended some 45 m from the northern edge of excavation before turning to the west and continuing for 55 m (as ditch 15748) and cutting clay-lined tank 10887 (Villa Phase 1; see above) and terminating there. It was 1.50 m wide and 0.60 m deep and had a bowl-shaped profile, with 15748 providing a similar description. Both were generally filled with single deposits along their lengths, though some segments showed two or three deposits (Figs 3.14–15, sections 13074 and 10701); in any case, fills generally consisted of light brown silty clay with occasional chalk and charcoal fragments. The ditch had been cut into a gently-sloping land surface, which was highest at the western terminal, and steadily reduced in height towards the northern end of 15756. This, allied with the uniformity and silty nature of its fills, suggests that the ditch, like 15749, was dug for drainage. As for dating, pottery from both features was generally consistent with an early Roman date. A high-shouldered, cordoned bowl (Mon 4F4) and a wide-mouthed jar (Mon 3I), both in Thameside grey ware were collected from upper fills of 15756 and dated to AD 70–100, while the pottery from 15748 was similarly early, including a South Gaulish samian ware platter, North Kent/South Essex shelly ware jars, and Gallic amphora sherds. A Colchester hammerheaded mortarium from cut 10831 typically dated to the later 2nd–early 3rd century, though the ditch at this point had been cut by villa extension 15746 during the same period and so the vessel may be intrusive. In any case, ditch 15748 was replaced by ditch 15751, which in turn was cut by 15749. These aspects help to place the date of 15748 certainly within the first half of the 2nd century, and probably the end of the first quarter. Overall, ditches 15749, 15748, and 15756 only just nudge the start of Villa Phase 2, and would more comfortably fit a period spanning *c* AD 100–130.

Ditch 15748 was replaced by new ditch 15751. This was orientated east–west and extended *c* 40 m from the eastern limit of excavation, then began to turn north before being obliterated by the cutting of a subsequent ditch, 15752, in Villa Phase 6. However, a trace of 15751 may have been detected in a section through the northern end of those ditches, which shows the profiles of three cuts; the middle cut in the sequence may have been part of 15751, and suggests that 15751 continued on a north-south alignment (Fig 3.14, section 10730). The ditch was wider than 15748, measuring 2.0 m in places, and was deeper, too, with an average depth of 0.83 m. Also, given its profile – steep-sided with a narrow, rounded base (Fig 3.15, section 13074) – the ditch probably served more as a boundary than a drain. This is supported by the molluscs collected from the feature; freshwater species were absent, suggesting that conditions were dry during infilling (see Stafford, Vol 3, Chap 3). The ditch was filled mainly with two or three, silty clay or sandy deposits along its length. Finds were few, but North Kent/South Essex shelly ware from a base fill is consistent with a date within the first half of the 2nd century for initial infilling, and Central and East Gaulish samian ware from an upper fill suggests that this process was complete by the mid-2nd century, or a few decades beyond.

Plate 3.4 Limekiln 16801. Looking south-west

A fence line (15733) ran parallel to ditch 15751 on its north side for 28 m before disappearing underneath the eastern edge of excavation (Fig 3.13). Five irregularly-shaped post-holes were recorded, and ranged in diameter from 0.30 m to 0.58 m and were between 0.12 m and 0.52 m deep; each contained a single, silty clay fill. No dating evidence was recovered, but given the group's proximity to the ditch, it seems likely that these features were associated.

Ditch 15749 was orientated north–south and dug parallel with the eastern range of the villa. The feature emerged from the southern limit of excavation and extended downhill for some 44 m before disappearing under the northern baulk and, therefore, appears to have truncated the north-east corner of building 16812 (Villa Phase 1). It averaged 2.10 m wide and 1.10 m deep, and

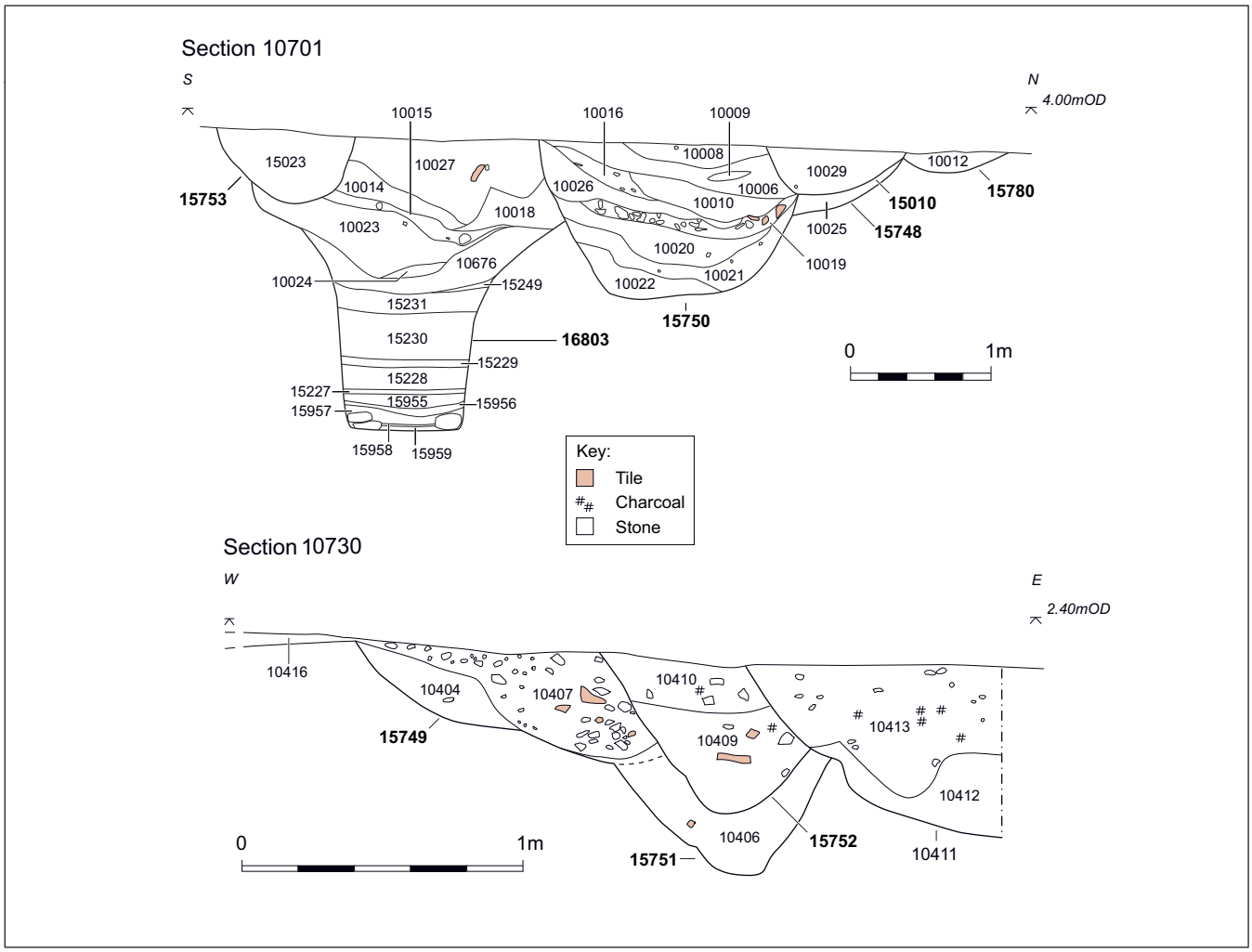

Figure 3.14 Section 10701: ditches 15010, 15748, 15750, 15753, 15780, 16803; section 10730: ditches 15749, 15751, 15752, pit 10411

contained multiple fills of silty sand or silty clay suggestive of natural accumulation resulting from its probable use for drainage (Fig 3.15, section 10731). Its stratigraphic associations are unclear; it may have emanated from a single ditch that divided into two branches just south of the eastern range – the other branch being ditch 16803 – though inevitably evidence confirming such a view was not forthcoming. Pottery from 15749 supports a date for initial infilling within the first half of the 2nd century. North Kent/South Essex shelly ware and a poppy-headed beaker in fine (Upchurch) grey ware from a lower fill of section 10627 potentially confined deposition to AD 90/100–150/60. Given its dating evidence, ditch 15749 is unlikely to have been in prolonged use.

A short, north–south orientated ditch, 15774, cut 15756 at the end of the 1st century or early in the 2nd and was probably contemporary with 15751. The ditch extended for 20 m and was 2.50 m wide and 0.68 m deep. The ditch was generally filled in a single episode along its length, though three silty sand fills were recorded in one section. After a gap of 10 m, ditch 15774 appears to have continued as ditch 15916, cut on the same orientation further south. Together, the ditches formed a segmented boundary, possibly functioning in conjunction with 15751. However, no dating evidence was recovered to confirm this.

Ditch 16803 emerged from the southern edge of excavation, extending downhill in a west-north-west direction for 35 m before turning a little more towards the north-west for a further 25 m and disappearing through modern truncation. Six sections were excavated, giving average dimensions of 1.90 m wide and 1.50 m deep (Fig 3.14, section 10701). The ditch had steep sides (the profile of cut 15263 was stepped) and had a stone channel laid along the flat base, at least for part of its length (Pl 3.5). The ditch had been cut through sand, and so if it served as a drain or water conduit, the stone channel helped to ensure that it remained functional. It is possible that the stone acted as an 'ankle-breaker' to prevent people from gaining access to the enclosed buildings, but we might expect a V-shaped ditch with a slot in the base, a design more typical of a defensive function. Dating is a little tentative; the feature cut an earlier gully 10349, which in turn cut a gully that contained two sherds of black-burnished ware dating after AD 120. Pottery from 16803 itself was almost exclusively mid-2nd century in date, though this was recovered from upper fills and can only have been deposited well after its abandonment. The exception was

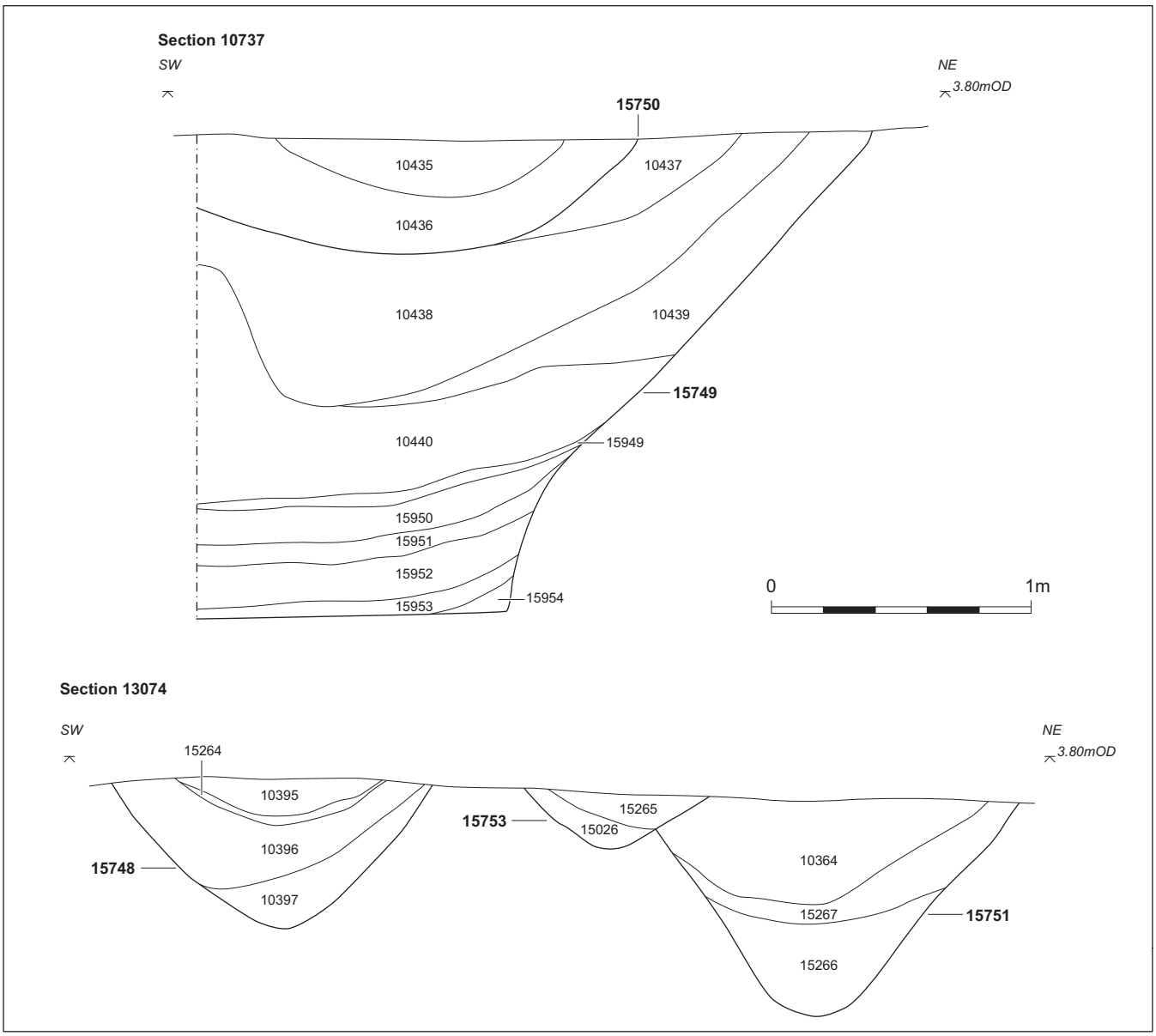

Figure 3.15 Section 10737: ditches 15749, 15750; section 13074: ditches 15748, 15751, 15753

a sherd belonging to a Central Gaulish samian ware Drag 18/31 dish dating to *c* AD 120–150; this was recovered from the second fill, which accumulated during or soon after ditch use.

Pits

A pit to the north-east of building 15773 was also assigned to Villa Phase 2. Pit 16428 was oval in plan, 7.0 m long at its widest and at least 1.50 m deep (like 16811 in phase 1, it was not fully excavated). It was filled with a series of clay deposits that were generally devoid of finds. A near-complete whiteware unguentarium see Biddulph, Vol 2, Chap 1, fig 63, no. 68), probably made in Colchester during the late 1st or 2nd century, was recovered from top fill 16105, and this dating is consistent with pottery recovered from the lowest-recorded fills of well 16516 that cut the pit and suggests that the well was cut between AD 70 and 150. The function of pit 16428 is inevitably uncertain; it could have been dug to facilitate construction of the well, its clay fills dumped as packing. However, a 7.0 m width seems rather excessive, particularly compared with the much smaller construction cuts of other wells within the villa complex, and a quarry pre-dating the well again remains an alternative explanation. The putative quarry's clay fills were probably dumped deliberately and rapidly to level the area before the well was inserted.

Pit 15380 was cut into the top deposit of recently-infilled ditch 16803. The feature was 1.47 m wide and 0.55 m deep and contained a single silty sand fill. This yielded building material, pottery, and bone, which had probably been deliberately deposited to allow a clay-lined pit or tank, 15790, to be inserted. Pottery from pit 15380 included a sherd each of Oxfordshire red colour-coated ware and gritty grog-tempered ware, both late Roman fabrics, though these are likely to have been introduced later during the construction of courtyard wall 16641 (Villa Phase 5). The ceramic evidence otherwise spanned the period AD 120–300.

Plate 3.5 Ditch 16803, showing 'ankle-breaker'. Looking south

A group of smaller pits (16816) was uncovered along the eastern edge of excavation and parallel with ditch 15916. Pits 15572, 15605, 15648, 15666, 15731, 15801, 15815, and 15840 were circular, averaging 1.30 m in diameter and 0.22 m deep. All contained abundant burnt flint – there were some 2390 pieces in 15815 – while the fills of 15572, 15801, and 15840 were also charcoal-rich. Dating evidence appears to place the group within the 2nd century. Pit 15572 had been cut into the top of infilled ditch 15751, suggesting that the pit was cut during the second quarter of the 2nd century; shelly ware and Patchgrove grog-tempered ware recovered from the pit also suggest a date within the earlier part of that century. Central Gaulish samian dating to AD 120–150 was collected from 15801, while similarly-dated black-burnished ware was recovered from 15666. Oak charcoal from 15605 was radiocarbon dated to cal AD 0–140 (NZA-28395, 1917±30 BP), while spelt from the same feature gave a result of cal AD 80–240 (NZA-28399, 1859±30 BP), putting the use of the feature within the early or mid-Roman periods. The function of the pits is uncertain, but one possible use of the heated flint was as pot-boilers, the pits being used to heat the stones by means of fire. Alternatively, the hot stones remained in the pits, which could then be used as hearths or ovens. Given the evidence for germinated grain at the site, the temptation to link the use of heated flint with malting and brewing is a strong one; the stones could have been rolled in the grain to arrest germination, or temporary structures built over the hot pits to achieve the same effect. Alternatively, the stones could have been dropped into tanks of mash at the brewing stage (*cf* Dineley 2004).

Wells 16516 and 16002

Well 16516 was 13 m north-east of the north-eastern corner of building 15773. Its construction and use is reasonably well understood. First, a construction pit (16090) was cut through sandy silt and into the recently-filled pit or quarry 16428 (Fig 3.16, section 13223). The cut was approximately 2.0 m wide at the top – its shape was not well-defined in plan – and narrowed a metre down to a width of 1.30 m. The well was 2.25 m deep and reached 0.15 m aOD. A square timber lining was inserted tightly into the shaft. The lining comprised three prefabricated box-frames, each made from four oak planks, with the planks that formed the middle and lowest boxes – and probably the planks of the upper course (its preservation was not so good) – being connected by bridle joints (Fig 3.16, section 18002). The upper box was taller than the lower two, 430 mm compared with 290 mm. Four square- or rectangular-sectioned oak piles (16497–16500) were driven into the corners of the lining, extending into the lowest silts that filled the well; all had rotted away at the top, though 16498 was best preserved and survived to a length of 1.38 m. The corners of the boxes were not apparently nailed and so the stakes were presumably meant to prevent the planks from separating. However, the stakes were not tight against the wood when excavated and seem to have pulled away from the corners during use. Finally, the upper part of the construction cut was partially backfilled with clay (16102–3) to narrow and line the upper shaft. A sandy deposit (16388) at the bottom of the well probably represents the gradual silting of the well during use. The silty fill above it (16387) may also have formed through use, but it contained a reasonably large amount of pottery that suggests that the well was beginning to attract some waste at this time. The pottery included a central Gaulish samian Drag 38 bowl, Thameside grey ware and black-burnished bead- and plain-rimmed dishes, and a grey ware high-shouldered, necked bowl, that date this first deliberate filling to AD 140/50. A sequence of near-identical silty clay deposits (16092–5, 16098–101, 16404) followed, apparently in rapid succession, since the pottery from these was consistent with a mid-2nd century date; assemblages from fills lower in the sequence dated securely up to AD 150/60.

Another well (16002) was excavated 15 m west of building 15773 (Figs 3.13 and 3.16). The construction pit (16000), which had been cut through the upper sand into the chalk solifluction below, was 4.10 m wide and reached a depth of 0.29 m aOD. The well had a sequence of different linings. At the base was a stone circular lining, 1.60 m wide (16396), which was made of irregularly-shaped flint nodules, and sealed with clay. Pottery associated with the lining included shelly ware

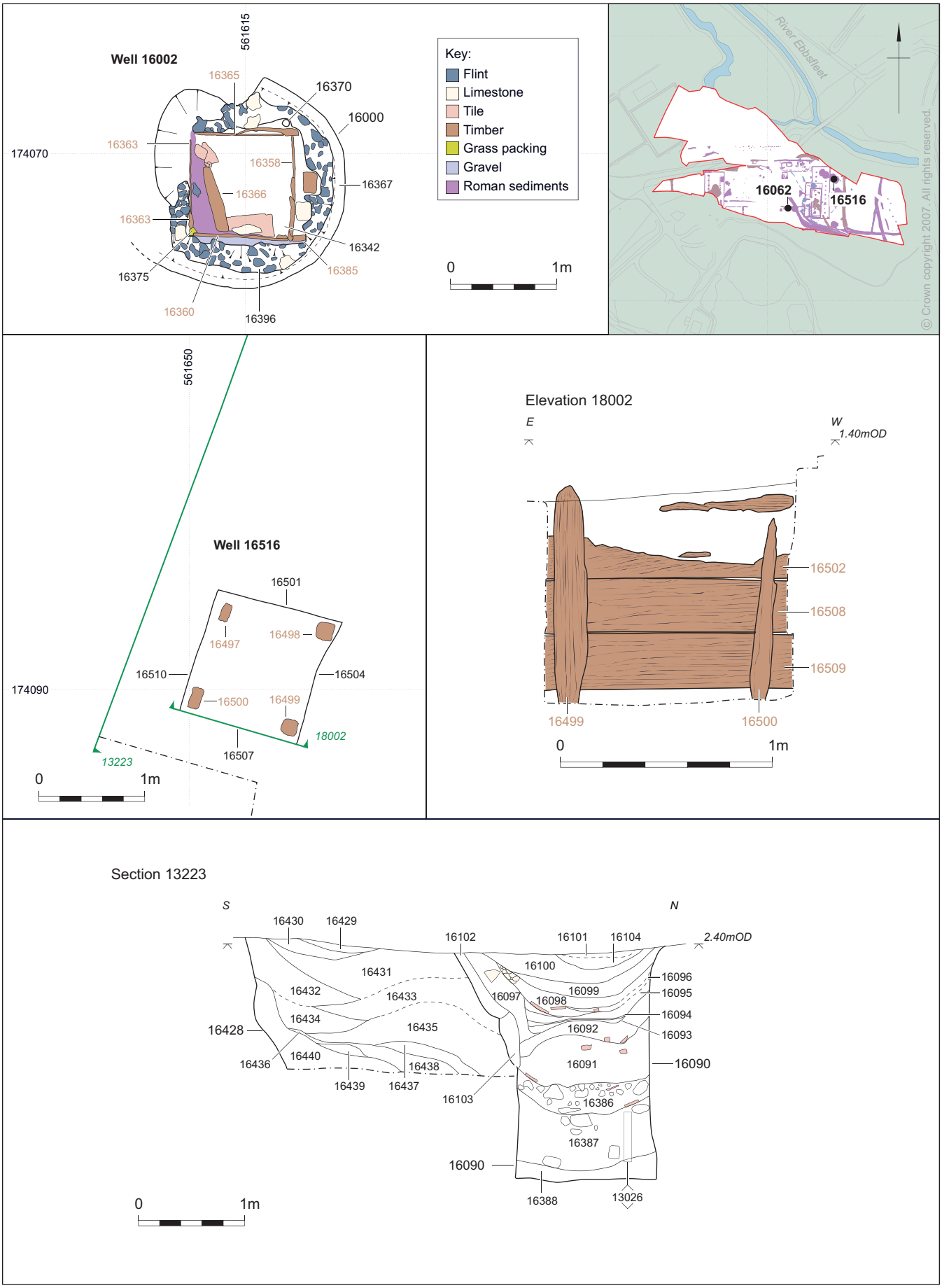

Figure 3.16 Wells 16002 and 16516, detailed plans and sections

Figure 3.17 Plan of mid Roman features, Villa Phase 2/3 (AD 120–200)

and fine grey ware (possibly from a butt-beaker), hinting at a mid–late 1st century date for construction. A square timber lining, 1.0 m across, almost 2.0 m high and formed from two boxes, was inserted on top of the stone. The oak planks (16358–65) were poorly-preserved and no details of how they were fixed were recorded. An organic deposit – possibly grass or reed – was placed at one corner of the upper box. The upper part of the stone lining (16368) was made from irregular flint nodules and tufa blocks, which were faced and possibly reused from a demolished building. The gap between the construction cut and linings was filled with gravel; one such deposit (16385) contained three millstone fragments (see Shaffrey, Vol 2, Chap 9), which, like another millstone fragment built into the upper lining itself, must have been part of a Roman (?tufa-built) mill, presumably dating to the early Roman period, given the dating evidence from the lower stone lining. Two silty sand deposits (16342–3) were the earliest fills encountered. The character of the fills suggests that they formed during use. The upper deposit contained black-burnished ware category 2, a Thameside cooking pot, North Kent oxidised ware, and shelly ware that date this period of infilling to AD 120–150 or later. Soon after, the well was filled with stone rubble (16003) that signalled a collapse of the lining or, more likely, its deliberate destruction. A timber beam that may have formed part of the well's superstructure was recovered from the bottom. The well may have been dismantled in order to make way for a courtyard wall (10089, Villa Phase 5) which cut it, though the precise relationship and upper levels of the well were lost through previous excavation.

Clay-lined tank 15790

Clay-lined pit 15790 was dug late in Villa Phase 2, as it cut pit 15380 (Fig 3.13). The roughly rectangular pit was at least 0.46 m deep and up to 4.80 m long and 4.15 m wide. Its clay lining appeared to be somewhat patchy on excavation, and part of it had probably been removed as soon as the feature fell out of use. Its impermeable surface suggested that it was a water storage cistern. Its sandy silt fill contained abundant waste material, including charcoal, chalk, daub, and other building material. Pottery was also recovered and included Cologne colour-coated ware, Central and East Gaulish samian, and *Verulamium*-region whiteware, as well as the ubiquitous Thameside grey ware. The assemblage's dating was consistent with the ceramic evidence produced by 16803 and suggested that the pit filled *c* AD 170.

?Beamslot 15607

An east–west orientated slot (15607) was recorded in the south-western part of the site. It measured on average 0.85 m wide and 0.31 m deep, and extended for almost 17 m; it was truncated at its eastern end by a later tramway cutting. A post-hole cut into the fill provides

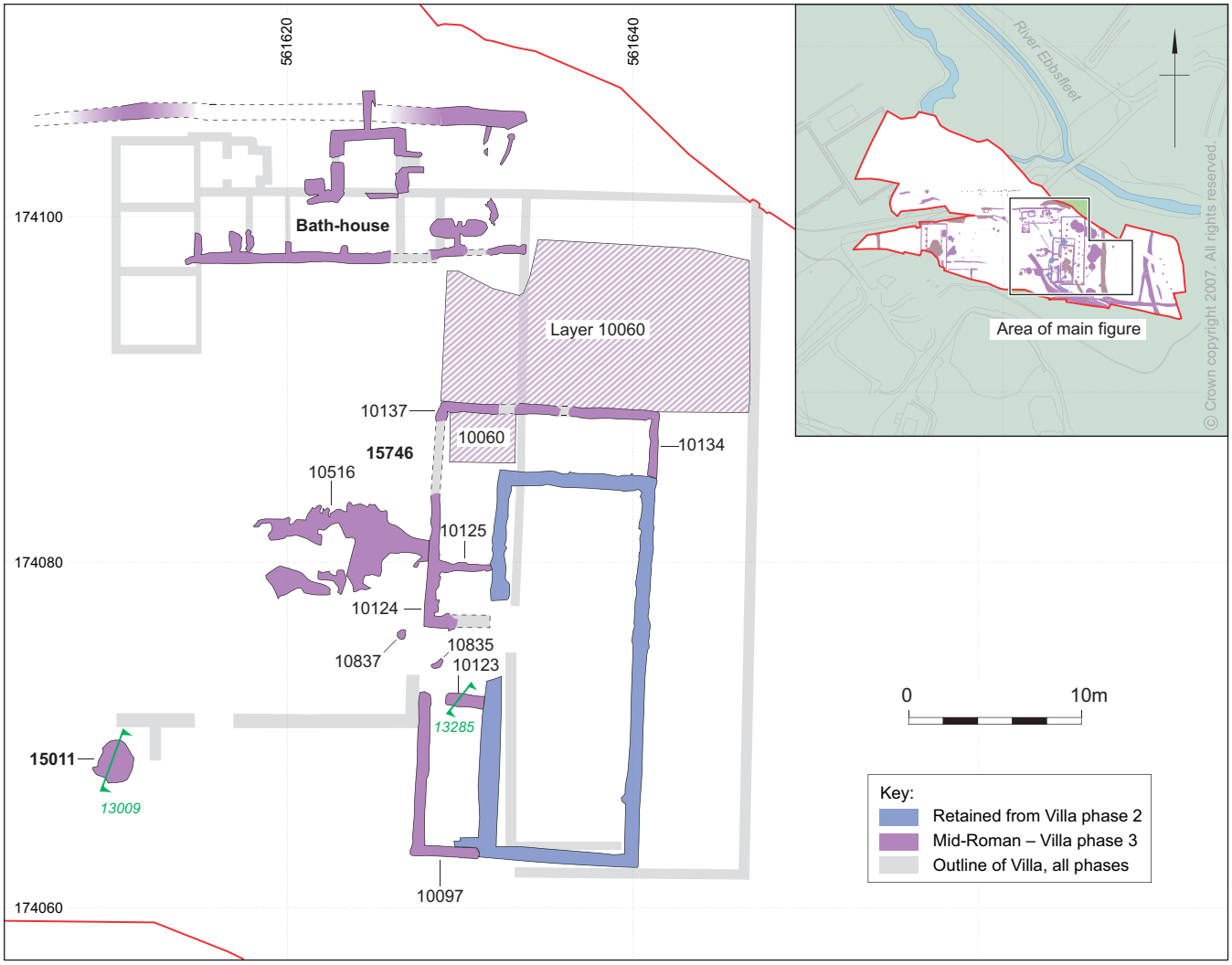

Figure 3.18 Plan of mid-Roman features, Villa Phase 3 (AD 150/60–200)

some support for interpreting the feature as a beamslot, although, given the absence of similar features that may relate to it, what form the resulting structure would have taken is unknown. The slot cut quarry pit 10061, and pottery from its fills suggests that the quarry was backfilled – possibly deliberately to hold the posts in place – between AD 120 and 170. A rectangular mortar and tile block (10936), measuring 1.08 m by 0.58 m by 0.24 m and possibly a footing or plinth for a stone column, was found 2.0 m north of the beamslot and may be associated, though it is otherwise similarly isolated.

Villa Phase 2/3 (AD 120–200)

Quarries

The eastern part of the site, especially the area between the eastern wall of building 15773 and north–south ditch 15749, was used for quarrying, probably for sand (Fig 3.17). The abandoned pit of limekiln 16801 was cut by a large, oval-shaped pit (10100), 8 m wide and 1.10 m deep. It was filled with a sequence of silty deposits, most of which had been deliberately dumped and contained frequent burnt soil and charcoal – presumably deriving from the underlying kiln – and occasional domestic waste, such as building material, pottery (all sherds spanning AD 70–200), and oyster shell. Examination in the field suggested that the east side of the pit cut ditch 15749 and was cut by replacement ditch 15752. Given, too, its relationship with the kiln, this suggests that the pit was dug sometime during the 2nd century. Pit 10384 was similarly cut after ditch 15749 was filled and 15752 dug. It was 2.50 m wide and 0.95 m deep and filled with silty deposits. Stratigraphy suggests that the pit was cut and filled during the 2nd century, though two sherds of gritty grog-tempered ware and Alice Holt grey ware from an upper fill point to final deposition occurring after AD 270.

Another large pit (10548) was dug 10 m to the south. This was circular in plan and measured 6 m wide and 1.30 m deep, and had silty fills. The pit cut ditch 15748 (Villa Phase 2) and was truncated by ditch 15750 (Villa Phase 4), which, when considered with a rim of a mortarium imported from the Rhineland recovered from an upper fill, suggests that the pit was dug during the early 2nd century, and was not filled totally until AD 150–200.

Plate 3.6 East range

A little way north of the limekiln was pit 16013. This was circular in plan, measuring 6 m in diameter; it was 1.20 m deep, while its profile was stepped. The feature was filled with a succession of sandy silts, probably deliberately-laid in preparation for the construction of wall 10143 (Villa Phase 4) that overlay the feature.

Villa Phase 3 (AD 150/60–200)

The East Range

A new entrance and range of rooms (15746) were added to the west and north sides of the first masonry structure (15773) in the mid 2nd century (Fig 3.18; Pl 3.6). Internally, the width of the new, L-shaped front was 3.0 m throughout; the short east–west axis was 12.0 m long, while the longer north–south axis was a little over twice the length at 24.5 m. Wall 10134 – or rather the footing of the wall – butted onto the north-east corner of 15773, confirming that it was a later addition. It was up to 0.50 m wide and survived to a height of 0.30 m, and consisted of flint nodules, ragstone, and occasional chalk. The west end of the wall (now labelled 10137) was 0.50 m wide and 0.35 m deep and similarly constructed with flint and chalk. No ragstone was apparent, however, and additionally the wall was bonded with *opus signinum*. The masonry elements that formed the north–south wall (10124 and 10097) were flint-built and mortar bonded, though occasional chalk was also present in 10124. The wall was 0.50 m wide and survived to a height of up to 0.40 m, and rested on a foundation comprising, at its base, chalk blocks and, above those, flint nodules bonded with *opus signinum*, adding a further 0.40 m. It is certain that an entrance was provided approximately halfway along the length of the wall, slightly out of alignment with the entrance through the west wall of the first masonry structure; two cornerstones, each made from a faced ragstone block, were set within the south end of 10124 and the north end of 10097, creating a gap of almost 4 m. At the south end of 10097, the wall turned east, continuing for 4.0 m before overlapping the now levelled south-west corner of building 15773.

Two short, east–west orientated walls (10123 and 10125) divided the space into three rooms. The former, 0.70 m wide, flint-constructed, mortar-bonded, and built on a foundation bonded with *opus signinum*, would have butted the west wall of 15773, as indicated by faced ragstone blocks set in the east end of 10123 (Fig 3.19). The wall's west end was lost through root disturbance. Wall 10125, or the foundations of a wall, joined 10124 and, again, the west side of 15773. It was built from flint, with occasional chalk and ragstone; traces of mortar were also recorded.

The structural elements that formed the new front were similarly constructed and, notably, parts of them, especially the foundations, were bonded with *opus signinum*. The water-resistant properties of this

mortar are well known, and its use protected the foundations, built close to the Ebbsfleet River, from weakening in wet soil. Its absence within the footings of 10134, then, might be considered a fundamental oversight, and gives rise to the possibility that this wall in fact belonged to a phase of development in between Villa Phases 2 and 3. This view is given more weight with the examination of a clay-silt deposit (10060) uncovered north of the east range. The extensive layer was cut by wall 10137 and appeared to butt against wall 10134, suggesting that the deposit accumulated probably as a garden soil between the periods that these walls were built. Pottery, too, suggests an earlier date for 10134; a black-burnished ware category 2 bead-rimmed dish and a barbotine-dot-decorated beaker was more in keeping with the AD 120–150/60 date range offered for Villa Phase 2. But the uniform dimensions of the new front – 3.0 m internal width and 1:2 ratio wall – indicates that 10134, even if built earlier, was certainly incorporated into the later development. (The deposit 10060 was cut by wall 10138 from the later aisled building (Villa Phase 4), but was recorded as overlying post-holes that also belonged to that structure, and it seems likely that successive accumulations have been recorded as a single deposit.)

No dating evidence was recovered from the wall trenches or within the masonry, but the walls truncated pit group 16811, which contained pottery that dated its final filling to *c* AD 160. Ditch 15748, also cut by the wall, though long abandoned by this time, yielded an intrusive fragment of a Colchester mortarium dating to *c* AD 160–240 that may have been introduced during the construction of the new front if some levelling work was required.

Two post-holes within the new entrance may have been related to it, possibly supporting posts for an external structure. Post-hole 10837 – more probably a post-pit – was 1.40 m wide and 0.95 m deep; a chalk rubble layer in its base provided a pad for the post. Post-hole 10835 was smaller at 0.65 m in diameter and 0.24 m deep. It had been previously excavated, and no further information could be recorded. No dating evidence was recovered, but 10837 had been cut into the top of pit 15226, which had filled by AD 150/60, if not earlier.

The bath-house

The mid-2nd century saw the construction of a bath-house north of the villa's east range (Fig 3.20; Pl 3.7). There appear to have been two main phases of development. In its earliest phase, probably beginning *c* AD 150/60, the bath-house comprised a cold room (*frigidarium*), a warm room (*tepidarium*), and possibly a bath, which occupied a rectangular block 20.0 m by 4.0 m set within a clay colluvial horizon, terraced to the south. The original ground level was reasonably uniform throughout the block at *c* 2.1 m aOD. There was also a hot room (*caldarium*), which measured 4.50 m by 4.0 m, built on the north side of the range. The second phase, in which a suite of rooms was added to the west

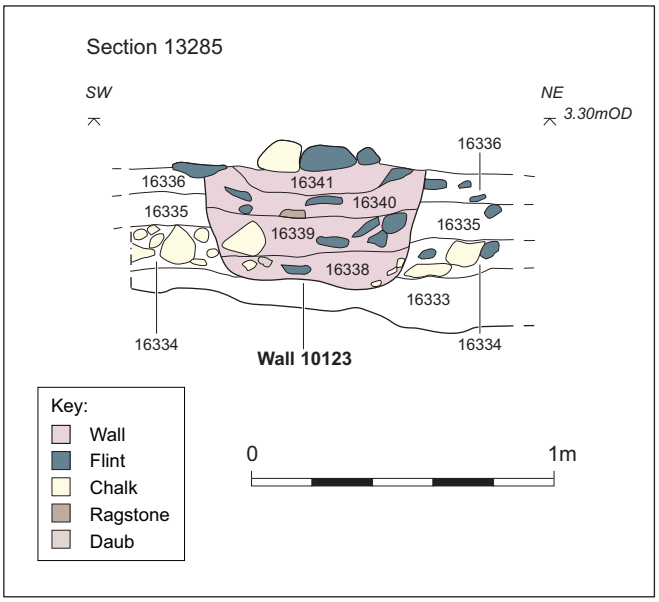

Figure 3.19 East range, structure 15746 section

end of the bath-house, dated from *c* AD 200 (see Villa Phase 5 below).

The development of the bath-house is complicated, but in its earliest form, the building appeared to comprise a small block of two or three rooms (10330, 10331, and 16805). Very soon after, however, it was extended to include a further two rooms (10332 and 10333). The surviving foundation of the southern external wall (10171) of room 10331 was 0.60 m wide and built with chalk and a flint core, bonded with yellow mortar. The eastern side had been removed by a later arch, but part of the flint-built and dry-bonded north wall (10177) survived. Wall 10173 butted the west end of 10171 and extended 0.70 m north; it was 0.34 m wide and probably an internal wall. A stack or wall fragment (10174), comprising alternate layers of mortar (type unspecified) and tile, may have formed part of a hypocaust (TAG noted *pilae* in this part of the bath-house during its excavation (Smith 1980, 43)). A flint floor surface (10175; not illustrated), extending across most of 10331, was uncovered. The east wall of 10331 appeared to be preserved only as a trace of the construction cut (10283), 0.60 m wide. Masonry further east belonged to a slighter structure (a *praefurnium*) that housed a furnace. A flint-built wall (10206) on the south side extended 5.0 m east (its east end had been removed by subsequent alteration) before turning north to form the east end of the bath-block (16805). The remains of a flue and furnace (10280) were limited to fire-reddened soil and traces of a flint and brick lining. The burnt soil was linear in plan measuring 1.50 m long by 0.90 m wide. While the soil, probably the remains of a flue, did not meet the east wall of room 10331 – the later insertion of a bath (10344) saw to that – the apparent distance between the furnace and 10331 (over 3.5 m), if the two were associated, maintained the room's cooler temperature. This contrasts with the furnace servicing the *caldarium* 10330, which was half the distance.

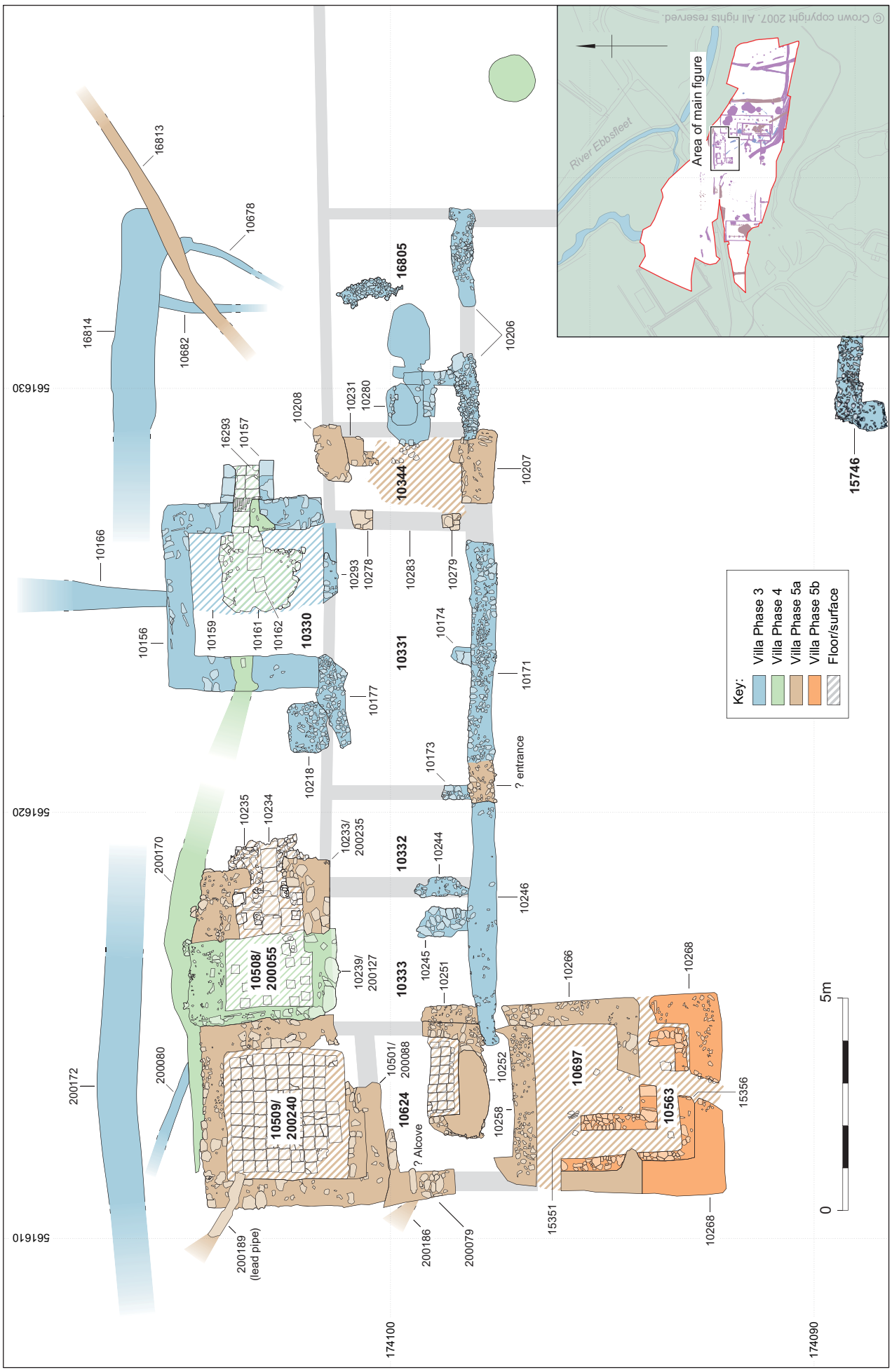

Figure 3.20 Bath-house, showing all phases

Plate 3.7 Bath-house, overhead view

A *caldarium* or hot room (10330), square in plan, was built on to the north side of room 10331. Its west, north, and east sides were defined by external wall 10156, which was up to 0.80 m thick and composed of alternating courses of chalk blocks and tile, bonded with *opus signinum* and filled inside with a flint rubble core (Pl 3.8). It was built on a flint and chalk foundation, bonded with yellow mortar. This room and 10331 were separated by chalk wall 10293, which, at 0.28 m wide, was an internal wall, suggesting that both rooms were built together. The floor of 10330 was surfaced with *opus signinum* (10159). This survived best in the eastern part of the room where it covered an area 3.10 m by 1.10 m. Traces of *pilae* – ceramic fragments and square mortar bases – seen on the surface suggest that the room accommodated a hypocaust during this phase of use. (If room 10331 was not hypocausted, then the floor level of this room and the level of the raised floor in 10330 were probably identical; a hypocaust in 10331, however, would have required bathers to step down into 10330). A gap 0.90 m wide in the east side of wall 10156 marked the position of the flue (Pl 3.9). Both south- and north-facing sides of the gap in 10156 were lined with tiles; the north-facing side was extended slightly, narrowing the gap to 0.60 m. This change seems to have occurred early in its use, possibly to improve efficiency of the heating. Further changes to the flue occurred in Villa Phase 4. A drain (10166) was recorded at the base of the north wall.

A masonry block (10218), 0.88 m by 1.10 m and surviving to a height of 0.20 m, was uncovered within the junction of walls 10156 and 10177; it was made of flint and bonded with mortar, though the lowest course of stones produced no mortar and appeared to be dry-bonded. Interpretation of the stonework is uncertain. It was relatively substantial and may have functioned as a buttress or one side of an entrance. If the latter, then it might date to Villa Phase 5 when a suite of rooms was added to the west end of the bath-house, closing off any entrance. Another possibility is that the block supported a vaulted roof – voussoir fragments were found in a later phase of room 10330 – though the absence of a similar structure argues against this.

The bath-house was extended west soon after the first block of rooms was built, the new block being roughly the same size as room 10331. Only the southern wall foundation (10246) of new rooms 10332 and 10333 remained extant, the north and west walls having been removed or partially demolished through subsequent development. Wall 10246 survived to a height of 0.31 m and measured 6.0 m long and 0.54 m wide; it was flint-constructed and bonded with *opus signinum*. A 1.20 m by 0.38 m wall fragment (10251) composed of flint and occasional chalk and yellow sandy mortar, which butted the west end of 10246 may have been a later addition associated with room 10624 built in a subsequent phase, rather than the remains of the original west wall, since its west side was not flush with the west-facing end of 10246. More convincing as a first-phase wall was 10244, a footing of flint nodules and pink mortar, probably *opus signinum*, 1.30 m long and

Plate 3.8 Bath-house, room 10330, west wall. Looking west

Plate 3.9 Bath-house, flue serving room 10330. Looking east

0.40 m wide. The wall is likely to have been contemporary with 10246, given their identical construction method, and formed an internal dividing wall to create two rooms (10332 and 10333). The use of *opus signinum* but no trace of a heating system identifies one of these rooms, probably 10332, as the *frigidarium*; room 10333, the end room in the new sequence is potentially identified as the *apodyterium*, or changing room, assuming entry through the west side. Limestone and yellow mortar-bonded wall 10245, which butted 10246, was a later construction that altered the size of the room.

The absence of a common foundation along the south side of the bath-house, and the observation that wall 10246 butted 10171, suggests that rooms 10331 and 10332/10333 were built at different times, 10332/10333 probably being the later. However, the two units were identical in size, suggesting that the later element was built with reference to the earlier one. Given its lack of *opus signinum*, room 10331 served a different function from 10332/10333. In conventional bath-house plans, the *tepidarium* followed the *frigidarium*; if identified as such, then its construction was consistent with that of warm rooms noted at Lullingstone and Beddington villas; these lacked *opus signinum*, which was otherwise present in the cold or hot rooms (Meates 1979, 91–100; Howell 2005, 28–31).

Gullies and ditches uncovered immediately north of the bath-house may relate to the structure, though there were no direct relationships to link them. North–south orientated gullies 10678 and 10682, had been truncated at the north end by later ditch 16814 and extended into an unexcavated area at its south end. North Kent/South Essex shelly ware recovered from the single fill of 10682, suggest that the gully pre-dated the bath-house, having filled by *c* AD 150/60. At the western end of the bath-house, gully 200080 may have taken water away from the building and hints at a cold bath in, most likely, room 10332. These gullies appear to have drained into larger ditch 16814/200172. Ditch 16814, dug parallel to the north side of the bath-house measured 1.0 m wide and 0.25 m deep. It contained a uniform, probably naturally-accumulating silty clay fill that yielded Thameside ware dishes dating from AD 120 to no later than 300. Another part of the ditch was uncovered further west and identified as 200172, which measured 1.40 m wide and 0.50 m deep and contained a Drag 37 Central Gaulish samian bowl with a Paternus advertisement stamp dating to AD 160–190. Ditch 200172 ran parallel to the bath-house. Another part of the ditch, further west still and on the same alignment, was uncovered in the Wetlands area (see Fig 3.22). Ditch 19061 was 0.35 m deep and 0.45 m wide and was initially filled with silty clay before being capped by ragstone rubble in the late Roman period. It continued as ditch 19650, which was truncated by malting oven 12591 after AD 350. All these features suggest something of the complexity of servicing the bath-house, but little more can gathered from them. More certain in terms of function was gully 10166, which extended under the floor of hot room 10330; it contained the impression of a wooden pipe, resting on a ridge of clay, and was clearly identified as a drain. It is uncertain how it related to 16814, since the latter was not seen while 10166 was excavated. However, 10166 appeared to extend beyond 16814, perhaps to issue directly into the Ebbsfleet.

Dating evidence from features pre-dating or associated with the bath-house tentatively places its construction to after AD 150/60. The structure cut ditch 16723 (Villa Phase 1), whose latest infilling was dated to AD 150–200, and this is consistent with the dating from the ditches and gullies that were potentially associated with the bath-house.

The courtyard

The construction of the bath-house and the new front to the east range was accompanied by the beginnings of a formally-defined courtyard (Fig 3.18). The evidence is limited to a deposit (10516) immediately west of wall 10124, which formed part of the new front (15746) of the east range. The deposit comprised well-rounded gravel pebbles and was 80 mm thick and spread across a 5 m by 10 m area. No dating evidence was recovered, but the surface butted against the villa wall and was therefore no earlier than the wall.

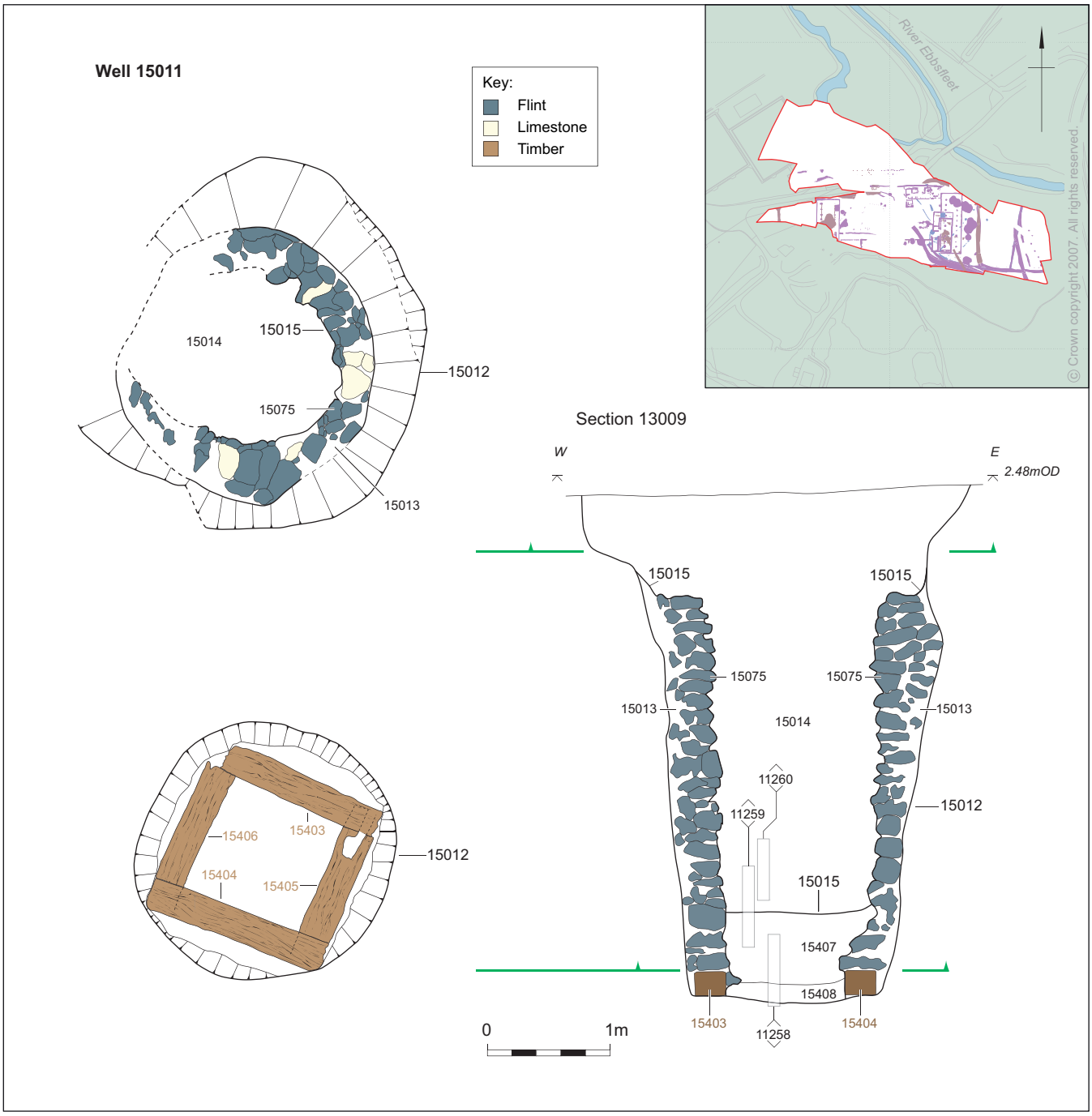

Figure 3.21 Well 15011, detailed plans and section

Well 15011

A well (15011) was sunk within the southern part of the villa complex, 17 m west of 15746 (Fig 3.21). The construction cut that penetrated the sands and through chalk solifluction deposits was at least 3.45 m deep, 2.50 m wide at the top, reducing to 1.40 m wide near the base. It reached a depth of 0.20 m aOD. A stone lining set above a timber frame was assembled within the cut, and the gap between the lining and construction-cut walls backfilled with sandy silt (which was also used to bond the stones). The timber frame was formed by a single course of four oak planks, or rather beams, averaging 1.15 m long and 0.16 mm high, with an edge 0.20 m wide; these were joined with halvings. The circular stone lining, composed of a flint and chalk nodules that formed a wall 0.20 m wide, was 1.80 m in diameter and over 3 m deep. Dendrochronological dating of two planks from the frame indicated that the well was built after AD 144, possibly before 180, though no sapwood was present (see Tyers, Vol 3, Chap 3). Pottery collected from the construction cut fill (three Thameside grey ware sherds) is consistent with a mid-2nd century date. The well had been excavated previously by Steadman (1913, 8), and its upper fill recorded during its recent re-examination were found to have been redeposited after that earlier intervention. However, while much of the finds assemblage recovered from the well must be regarded with some suspicion with

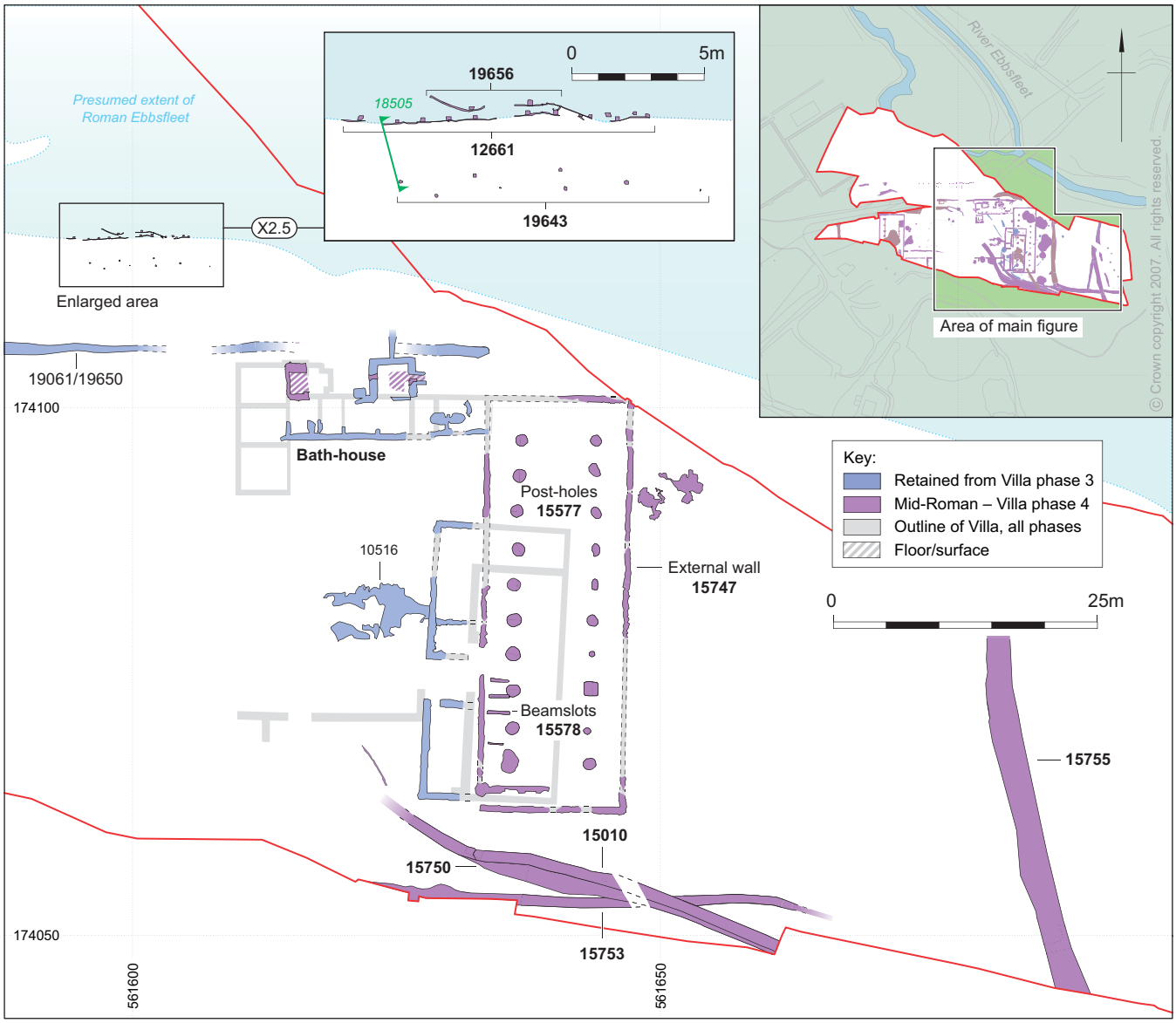

Figure 3.22 Plan of mid-Roman features, Villa Phase 4 (AD 150/60–200)

regard to overall reliability, especially for dating purposes, the lowest-recorded fill (15408), which contained the mid-2nd century pottery and a glass gaming counter, seems to have remained undisturbed. This early episode of dumping was followed by total abandonment and a period of natural silting. Of interest were the finds from a rubbish pit, recorded by Steadman, that had been cut into the top of the well. The substantial part of a Nene Valley colour-coated bag-shaped beaker (Steadman 1913, fig 2) was among the finds and suggested that the well had filled up by the late 2nd or early 3rd century (*cf* Perrin 1999, 93).

Villa Phase 4 (AD 150/60–200)

The east range

Building 15773 was replaced by a much larger aisled building during the second half of the 2nd century (Figs 3.22 and 3.23). The west-facing entrance and suite of rooms built after AD 150/60 (Villa Phase 3) were retained. The aisled structure measured 39 m by 13 m – its long axis orientated north–south – and comprised an external wall (15747), internal post-holes (15577) and internal beamslots (15578). The dwarf walls or wall footings (continued with wattle, timber, clay, and daub) were built almost exclusively of flint. Ragstone and chalk nodules were occasionally recorded, but appeared to be rarer compared with the walls constructed in previous phases. The stones were faced on the external and internal sides; or, rather, they were relatively flat and were selected on this basis. A sandy mortar was used to bond the stones. The walls averaged 0.51 m wide and survived to a maximum height of 0.28 m or three courses. They sat on foundations 0.54 m wide and 0.14 m deep, similarly flint-constructed, though unmortared, and set in shallow trenches.

The outline of the structure was reasonably well-preserved, though the north-west corner had been lost to medieval truncation. This also destroyed the relationship between the building and the east end of the bath-house,

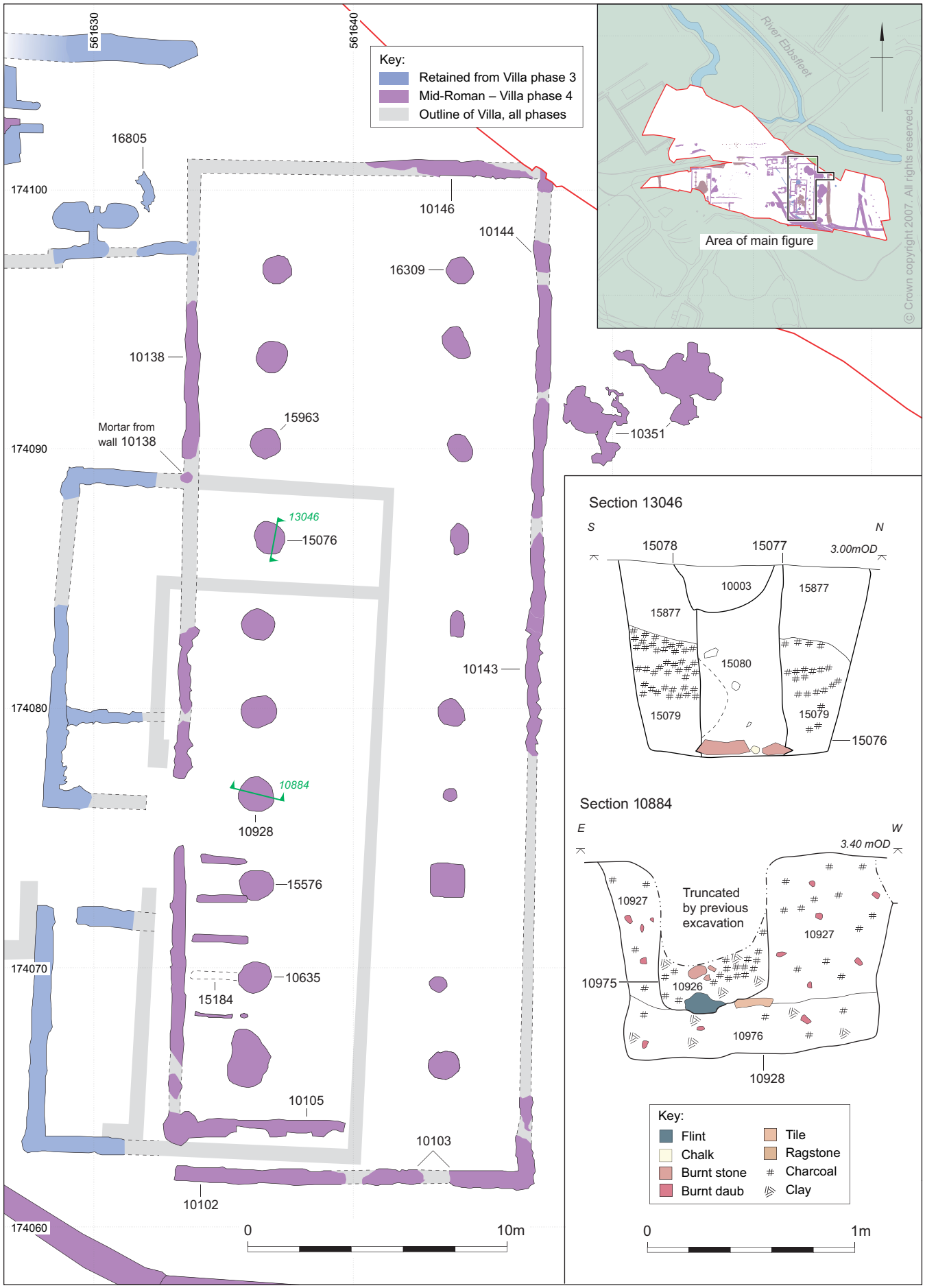

Figure 3.23 East range and aisled building, detailed plan, post-hole sections

though the little masonry that survived suggested that the former was the later construction. Wall 10138, which formed the north part of the west aisle, disappeared short of the structure's north-west corner, but, projecting its course northwards, the wall would have butted against the south-east corner of bath-house room 16805. The aisled structure's short north wall (10146) was aligned with the north wall of the main bath-house block revealing, if not the sequence of construction, at least that one was built with reference to the other. The east wall (10143 and 10144) survived best towards its north end, but enough of it was present to see it turn to make the south end of the building. The short south side consisted of two parallel flint-built walls (10102, 10103, 10105) separated by a gap of 1.50 m that overlapped to form a narrow side-entrance or corridor, or possibly even a staircase. The northernmost of the two apparently turned at its east end to continue on a north–south alignment, dividing the aisled building along its length, though Steadman (1913) provides the only record for this (see discussion, Chap 4).

There were 22 post-holes (15577) within the structure. These were generally bowl-shaped and measured on average 1.10 m wide and 0.70 m deep, though 2 m separated the narrowest and widest post-holes. Two of those at the narrower end of the range, typically 0.50 m wide, did not so readily conform to the positioning and spacing of the larger post-holes – for example being set in between two larger ones or off the main alignment – and may have represented later additions or repair. Excluding these gives two rows of ten post-holes with 3 m wide aisles and a 7 m wide central nave; the gap between each post-hole was *c* 3.50 m. Post-pipes were identified in nine post-holes and indicate where posts rotted *in situ*; these measured up to 0.40 m wide and suggested that the post sat on a silty or sandy clay packing and not directly on the base of the hole, or rested on ragstone, flint, or tile pads (see sections, Fig 3.23). The posts belonging to post-holes that lacked post-pipes may have been deliberately removed. These were seen mainly along the east row, and potentially could be linked to subsequent structural changes (Villa Phase 6), which were concentrated in the south-eastern part of the building. A neonatal burial was made in the top of the infilled post-hole 15576 (McKinley, Vol 3, Chap 1). The post-hole at this stage had apparently lost its post, tentatively dating the burial to after AD 250, rather than to the second half of the 2nd century.

Further internal features were recorded. A group of beamslots (15578) was uncovered within the southern part of the west aisle. The features were all parallel and aligned east–west and had a uniform 1.50 m gap between them (but 3 m in one case). On average, the beamslots measured 1.90 m long, 0.30 m wide and 0.40 m deep. Feature 15184 had been partially cut into packing fill of post-hole 10635 (15577) and, along with the other beamslots, must have been contemporary with the group of post-holes – and therefore formed part of the aisled building – or was later that it. Function is uncertain, though it must be confined to the south-western part of the east range. The slots indicate sleeper-beams that may mark the position of stalls, or a raised floor or platform 2.50 m by 6 m that provided storage space, perhaps for grain.

A ragstone surface (10351) was laid east of the aisled building to create a yard or working area. Three patches were recorded, the largest being roughly 3 m square. The surface overlay well 16516 (Villa Phase 2; see above) that had filled totally by the mid-2nd century and pottery from the surface itself belonged to the late 2nd or first half of the 3rd century. Material from a cleaning layer above the surface included late Roman wares, which may have been introduced from overlying disuse deposits, or suggested that the surface remained in use into this period.

A number of key stratigraphic relationships identify the aisled structure as the fourth phase of villa development. The likely connection between the north end of the building and the bath-house has already been alluded to. In addition, mortar on the west end of unmortared foundation wall 10134 (Villa Phase 3) appeared to belong to wall 10138, which formed part of the west aisle, pointing to 10138 being the later. Post-hole 16309 in the north-east corner of the building was cut into the upper disuse deposits of well 16731 (Villa Phase 1/2), which had filled by *c* AD 150. The eastern side wall, 10144, had been cut into the filled construction cut of well 16516. Pottery from the post-holes generally dated up to AD 150. The post-pipe of post-hole 10635 contained the largest assemblage – 14 sherds that included Central Gaulish samian ware and Dressel 20 amphora fragments and *Verulamium*-region white ware – dated to AD 120–150/60. Charcoal from the packing fill of post-hole 15963 provided a radiocarbon date of cal 50 BC–AD 90 (NZA-27531, 1968±30 BP) but, given the stratigraphic and ceramic indications, the dated wood is likely to be residual, perhaps deriving from the first-phase timber building (16812).

The absence of a clear chronological gap to separate this building and that belonging to Villa Phase 3 suggests that the work to expand the eastern range by way of a massive aisled building was undertaken within a matter of years after the new entrance, and probably the bath-house, was built.

The bath-house

Room 10330 underwent further changes (Fig 3.20). The *opus signinum* floor was covered with mortar 0.06 m thick – the original *pilae* probably having been removed – and a brick surface (10161) 0.07 m thick laid on top; the *pilae* were then restored. A row of tiles set on their edges was inserted into the base of the flue to raise the level of the flue base in line with the new hypocaust floor (now at a level of *c* 2.20 m OD), while a stack of tiles was added to the north-facing side of the gap in the east wall of 10156 to narrow the flue still further (see Pl 3.9 above). The construction of the flue itself (10157) – lined with bonded brick, flue-tiles, and re-used *tegulae* –

may have been contemporaneous, though it was possibly an original element. In another alteration, a vent was set into the upper part of the west wall of 10156. These developments point to a change in function; the room remained a hot room, though the near-absence of *opus signinum* suggested that it was used as a dry room (*laconicum*), rather than a wet one (*caldarium*).

A second heated room (10581/200055) to replace the original *caldarium* was probably added while these changes were being made. It was defined on its south, west, and north sides by an *opus signinum*-bonded chalk wall (10239/200127); the south side was built on top of a flint foundation (10498) and seems to have replaced the original north wall. An *opus signinum* surface (10497) was laid and *pilae* stacks – of which seven survived up to a level of 2.16 m aOD – were built on top of this. No trace of the raised floor surface was encountered. The east end of the south wall butted flint wall 10233, which formed part of an extension to the hot room (Villa Phase 5) that had cleared away the remains of the original flue that may have existed. An east–west-aligned gully (200170) running along 200055's north wall possibly connected with the new drain through the west wall of room 10330. Wall 200127, along the west side of 200055, was butted by the east wall of room 10509/200240, another Villa Phase 5 addition.

Ditches

At the east end of the site, the 2nd century ditch 15756 was replaced by ditch 15755 (Fig 3.22). The ditch was more substantial than 15756, averaging 2.20 m wide and 0.50 m deep, and was orientated slightly differently – roughly NNW–SSE, rather than NNE–SSW. It extended to the southern limit of excavation, but its northern terminal was within the area of the villa complex, though was not actually found during excavation. The ditch contained two or three silty clay fills along its length, which were largely devoid of finds – and nothing datable – suggesting that these formed through natural accumulation. The ditch presumably aided drainage of the site, though as it terminated within the villa complex, rather than extending to drain into the stream, and given its size, it may been dug to serve primarily as a boundary; indeed, molluscs from the feature, comprising species associated with dry conditions, argue against a drainage function (see Stafford, Vol 3, Chap 3). The feature cut ditch 15751, which had filled completely in AD 160–200, with stratigraphic associations favouring a mid-2nd century terminal date. Ditch 15755, then, must have been dug during the second half of the 2nd century or later and was possibly contemporary with the eastern aisled building, though could equally have been part of the Villa Phase 3 landscape.

Sometime after *c* AD 150/60, ditch 16803 was re-cut. The resulting ditch (15750) also cut 15749. Ditch 15750 was on average 1.80 m wide and 0.90 m deep (see Fig 3.14, section 10701 above). It was filled, like all the ditches in this area, with a series of silty deposits, largely devoid of finds and naturally accumulated. Part of the ditch, however, received deliberate dumps of building material and domestic waste, though this occurred late in the sequence of infilling. The ditch began to fill during the second half of the 2nd century or later, probably after AD 170; a bottom fill contained a Thameside grey ware necked jar dating from this time, and a Colchester mortarium from a second fill confirms this chronology. Pottery from the upper fills – almost 300 sherds, including bead-rimmed dishes, cooking pots and necked jars – confines the terminal date for filling to the early 3rd century, although Tilford/Overwey ware and handmade gritty grog-tempered ware from a top fill suggests that the surface above the ditch had not been levelled totally by the 4th century. In any case, the ditch was subsequently cut by ditch 15010, which also had a later 2nd/early 3rd century date range.

Ditch 15010 was a slighter feature: just 0.47 m wide on average, and 0.32 m deep (Fig 3.14, section 10701 above). It was sinuous in plan, extending downhill on a rough SE–NW orientation from beyond the southern limit of excavation for 40 m before trace of the ditch was lost. Evidence of a pipe in the form of iron collars was found along the length of it, and it seems reasonable to conclude that it contained a pipe, possibly to take water to the bath-house. The ditch was filled with a single silty sand fill, which was presumably deposited to cover the pipe once it had been laid. Pottery from the fill belonged to the period AD 170–230, and a late 2nd or early 3rd century date for its cutting and use is supported by the feature's stratigraphic relationships: the ditch truncated ditches 16803 and 15748, which had filled by *c* AD 150/60, and was overlain by the southern courtyard wall 10089 (16641/16642).

Ditch 15010 appeared to have cut 15753, though the relationship between the two features was unclear. Like 15010, ditch 15753 was sinuous, though extended in a mirror image of the earlier ditch on an east–west alignment along the southern edge of excavation for 40 m. It measured on average 1.03 m wide and 0.43 m deep and was filled with one or two silty sand deposits along its length (Fig 3.15, section 13074 above). Pottery from the feature did not date much later than AD 150, but – its perceived relationship with 15010 apart – it truncated ditch 15750, dating its digging to the late 2nd or early 3rd century or later.

The quayside

The villa complex was built on a bend of the Ebbsfleet River, which flowed past the east side of the complex before turning north-westwards and continuing north of the villa buildings. Although the river must have provided food, a means of communication, and access to river-based trade throughout the Roman period, the earliest that structures directly associated with such activity can be dated is to the late 2nd or early 3rd century. These structures formed part of a quay that, in its early phase, extended for 12 m along the water's edge, and comprised a timber revetment (12661 and 19656),

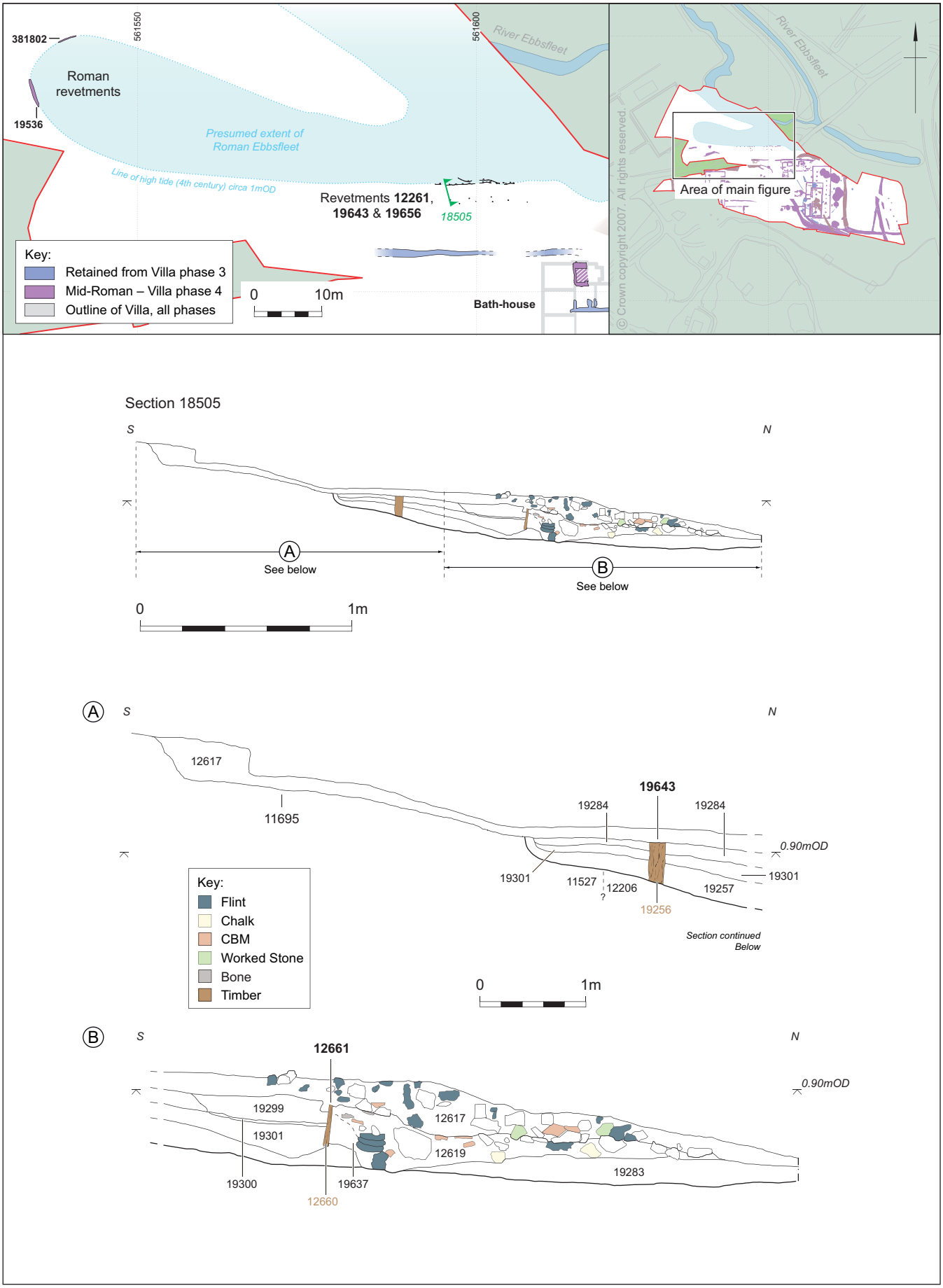

Figure 3.24 Plan and section of the quay revetments

timber posts (19643) behind that, which probably supported a surface or platform, and dumped deposits between (Figs 3.22 and 3.24).

The revetment consisted of a plank-and-pile built wall or, rather, three sections of timber wall comprising the principal 85 m long line, and two shorter revetments to the north (see Goodburn, Vol 2, Chap 8). The piles were mainly square-sectioned – there were some round-sectioned examples – and chamfer-pointed, and were driven through alluvial silt along the channel edge into river-bed gravels; the uppermost alluvial deposit, 19257, had accumulated to a height of 0.90 m aOD. Oak was used predominantly, though a maple stake (12689) and a hazel stake (12684) were recorded along one of the northernmost lines. The piles were spaced at intervals of between 0.50 m and 1.0 m. The timbers survived to a length of up to 1.80 m and height of 0.90–1.00 m aOD. Planks 1.60 m to 1.90 m long, averaging 0.40 m wide and up to 0.03 m thick, were set on their long edges and placed against the south sides of the piles so that the piles fronted the river. No evidence for joints or fixings was noted; mortise holes were recorded on the north side of some timbers (for example 12669), but appear to have been unrelated to the structure and suggest that a few piles were reused. One course of planking was found. One plank (12680), heavily saw-marked, was one of the few timbers from the villa site to retain any sapwood, and its felling was dated by dendrochronology to AD 171–207 (see Tyers, Vol 2, Chap 3). However, the two short lines of revetment may represent repair or phases of reclamation and, therefore, later structures. A series of clay deposits were dumped behind the main revetment on top of the alluvium, and a row of timber piles (19643) was sunk into these layers to the south of the revetment. This may have helped to support the timber staging or quayside. The timbers in this group – this time round-sectioned, with the occasional square-sectioned example – were not quite flush, and alternate timbers at the west end of the group were set apart by 0.50 m so that piles were either 2.20 m or 2.90 m south of the revetment.

A further element of the Roman timber work was uncovered during the evaluation (ARC ESG00) 40 m north-west of the west end of the main structures (Fig 3.24). This comprised a south-east-facing oak plank (381802), 3 m long, 0.27 m high, and set on its long edge. Two squared oak timbers, up to 1.10 m long and 0.96 m wide and surviving to a height of 1 m aOD, were sunk into a peat deposit (reaching the alluvium below that) against the south-east face of the plank. There was no evidence of jointing, but the plank had been sawn and is likely to have been of Roman date. Another revetment structure (19536) was located 10 m south of 381802 and comprised seven vertical oak stakes, sharpened into a point, sunk against the front (east) face of a 0.80 m long oak plank set on its long edge. The structure would have been built into the south bank of the channel as the bank began to curve round to begin the west end of the channel's north side and confirms that the channel did not run through at this point, but instead pooled (see discussion, Chap 4). Further stakes and wattle structures (19428 and 19429) were positioned behind and east of 19536, but these probably relate to Saxon consolidation of the channel edge.

Western Roman Complex (AD 120–200)

by Daniel Stansbie

The layout of the site changed little between the early Roman period and the earlier part of the middle Roman period (Fig 3.25). Various ephemeral features, including NE–SW aligned ditches 20773, 20348, and 20322, gully 20336, and pit 20774, were dug and infilled, but are difficult to interpret as they were largely cut away by later features. Ditch 20773 was a curvilinear length of ditch measuring 5 m in length and on average 0.95 m in width and 0.62 m in depth. It had an irregular concave base at its south-western end, narrowing to a rounded base with steep sides towards the north-east. Twenty-four sherds of mid-Roman pottery came from the fill. Ditch 20348 was 5.40 m in length and on average 0.87 m in width and 0.30 m in depth. In profile it had a rounded base and concave sides. Two sherds of residual early Roman pottery were found in the fills. Ditch 20322 was 7.60 m in length, 1.10 m in wide and 0.35 m deep, and was V-shaped in profile. Fifty-eight sherds of Roman pottery, including a Drag. 35 cup in Central Gaulish samian, were recovered from the fills. Gully 20336 was orientated NW–SE and 6.40 m in length. It measured 0.75 m in width and 0.28 m in depth and was U-shaped in profile. Thirty-four sherds of mid-Roman pottery, including a lid-seated jar and a cooking jar in Thameside/Upchurch grey ware came from the fill. Pit 20774 was sub-circular in plan and 2.20 m in length. It measured 1.25 m in width by 0.38 m in depth and was U-shaped in profile, having a flat base and steeply sloping sides. The fill contained 18 sherds of Roman pottery from vessels including a lid-seated jar and a grooved rim dish.

A trackway was established, orientated NW–SE and defined by ditches 20290 and 20287. Ditch 20287, which turned to extend NE–SW at its north-western end, may also have served to define part of an enclosure to the east. The ditch was L-shaped in plan, and measured 34.4 m long, 0.90 m wide and 0.30 m deep. It was varied in profile, having a rounded base and concave sides towards the south-eastern end and a flatter base towards the north-west. Sixty-two sherds of Roman pottery – including bead-rimmed dishes, Patchgrove ware, and Central Gaulish samian ware dating up to AD 150 – were recovered from the fills. Ditch 20290 may originally have been L-shaped like ditch 20287, the return having been cut away by ditch 20286 (see below). The ditch measured 24.7 m in length by 0.95 m in width and 0.25 m in depth, and had a flat base, with steeply sloping sides. Twelve sherds of Roman pottery, including a flanged dish and a triangular rimmed dish in Thameside/Upchurch grey ware were recovered from the fills. The south-eastern boundary of the enclosure

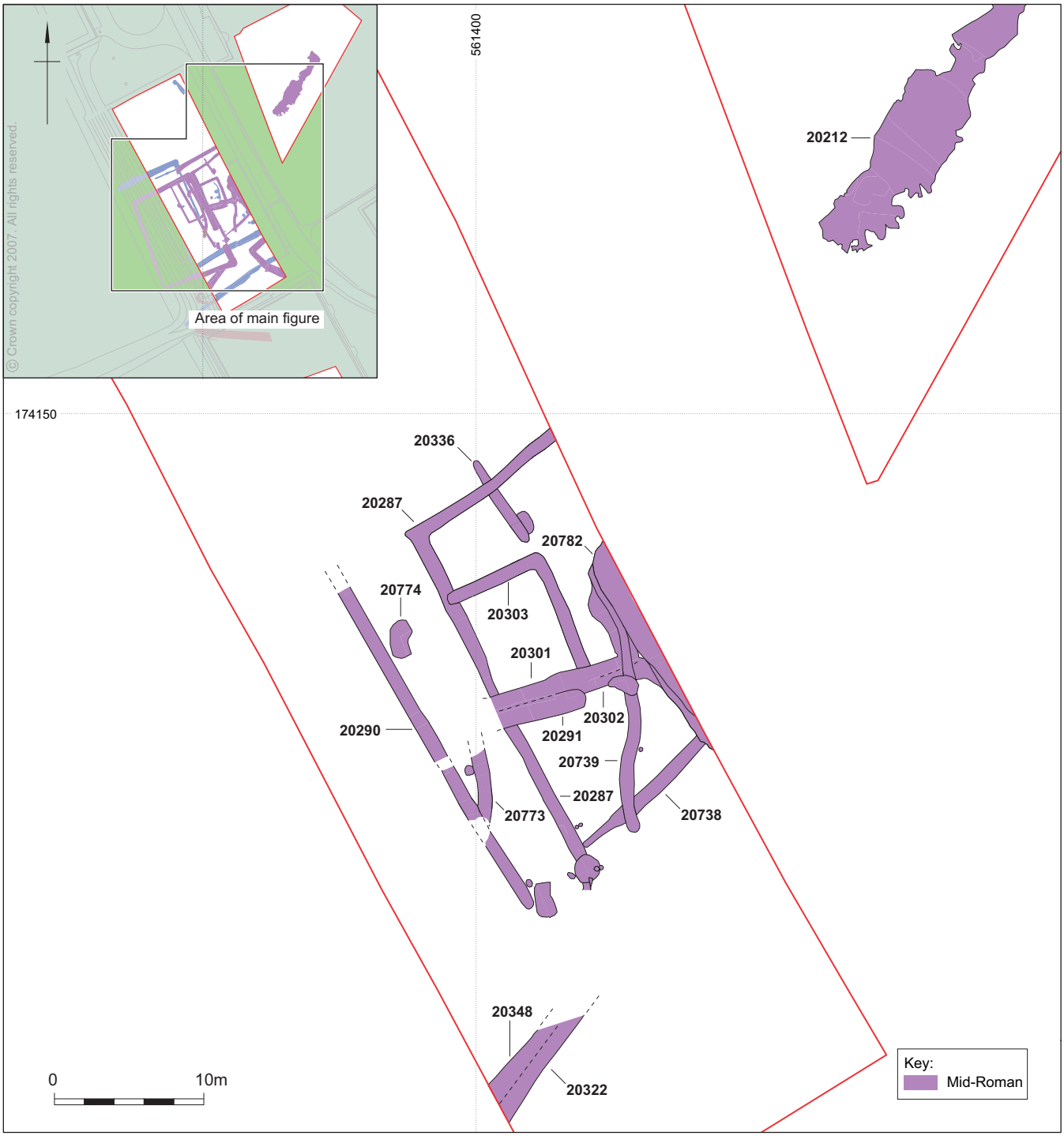

Figure 3.25 Plan of mid-Roman Western Roman Complex (AD 120–200)

formed by ditch 20287 may have been defined by ditch 20738, which ran roughly parallel to the northern arm of ditch 20287. Ditch 20738 was 10.5 m in length and measured 0.95 m in width by 0.50 m in depth; it was varied in profile, being V-shaped at the north-eastern end with a flat base and convex sides towards the south-west. Five sherds of Roman pottery including a triangular-rimmed dish came from the fill.

At some point after ditches 20287, 20290, and 20738 had silted up and gone out of use, but still within the period AD 120–200, a series of ditches and pits were cut and backfilled. These features included L-shaped ditch 20303, ditches 20302, 20301, 20291, and 20739, along with a shallow cut containing a cobbled surface (20782), which was exposed along the north-eastern edge of the excavation.

None of these features formed a coherent pattern as they had all been partly cut away by later features, or were only partly exposed. However, a limited stratigraphic sequence can be discerned. The earliest feature was ditch 20302, which was recut by ditch 20291 on the same alignment. Both were cut by ditch 20303, which may have formed part of a rectangular enclosure. Ditch 20303 was subsequently cut by ditch 20301. Ditch 20739, which cut 20302, was cut by cut/cobbled surface 20782.

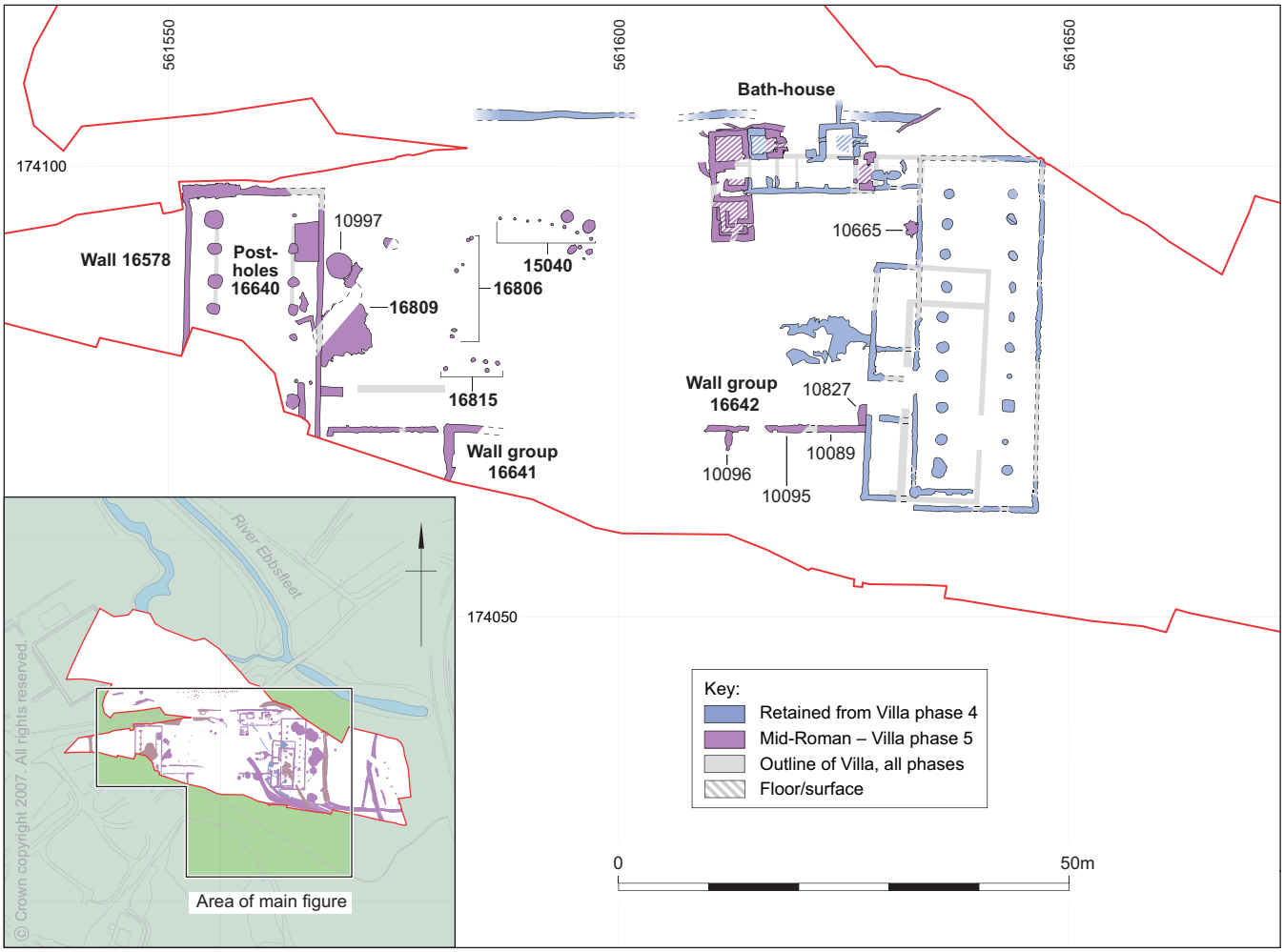

Figure 3.26 Plan of mid-Roman features, Villa Phase 5 (AD 200–250)

Surface 20782, which was only partly within the area of excavation, comprised an irregular cut 15.8 m in length by 1.50 m in width (area exposed during excavation), filled with a surface of crushed flint and ceramic building material, overlying a clay-silt. This feature was possibly part of a road or surface (20212) and extended along the north-eastern limit of the excavation. Twenty-eight sherds of mid-Roman pottery, including sherds from an everted-rim jar in Thameside/Upchurch grey ware and a form 31 dish in Central Gaulish samian came from the surface itself. Surface 20212, undated within the Roman period, consisted of a single course of densely packed, large flint nodules. It was situated approximately 25 m to the north-east of the main area of excavation and orientated NE–SW, measuring 24.5 m in length and 5 m in width at its widest. This represented part of a road or trackway of Roman date, possibly connecting the sports ground site with the villa complex.

Villa Phase 5 (AD 200–250/60)

The west range

A second aisled structure was erected over 60 m west of the east range (Figs 3.26–27; Pl 3.10). The structure covered an area 14 m wide by at least 28 m long – the long axis being aligned north–south – and comprised external masonry walls (16578) and two rows of internal post-holes (16640). The external walls (10148, 10151, and 10153) were flint-constructed (the core of wall 10153 including ragstone), measuring up to 0.60 m wide and surviving to a height of 0.40 m, or three courses. Mortar was used for 10151, while the stone of the other two walls was not bonded, but set within a sandy and gravel matrix. The walls had footings of unmortared flint, 0.30 m deep and between 0.60 and 1 m wide, laid within construction trenches cut into older colluvial deposits. Wall 10148 had been substantially robbed and was extant only at the north end of the building, but its robber trench (16569) preserved the wall's outline to the southern limit of excavation. The north-west corner of the building was exposed during the subsequent watching brief (ARC 342W02).

Ten post-holes were uncovered mainly in the northern half of the building, where later quarrying and other disturbances were less severe. The features were substantial, averaging 1.30 m wide and 0.90 m deep; all had vertical-sided profiles with concave or flat bases. Post-pipes, which recorded the base of a post that had rotted *in situ*, were recorded in four post-holes (Fig 3.28, sections 13048 and 18008). A millstone grit fragment, possibly from a quern, had been placed at the

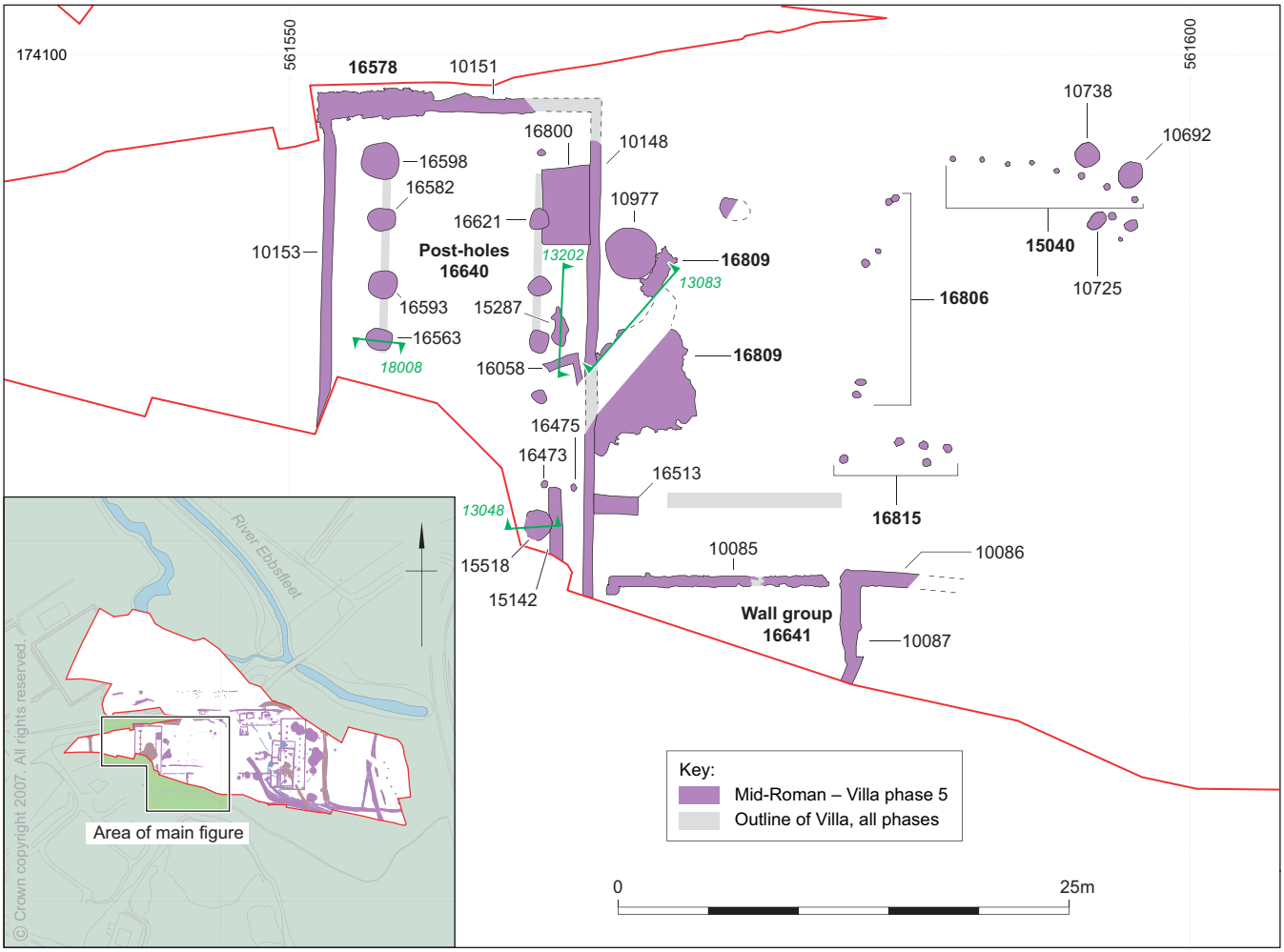

Figure 3.27 West range and western courtyard features, detailed plan

Plate 3.10 General view of main complex, showing east and west ranges

base of post-hole 16598 as a post-pad; another possible quernstone fragment was recovered from post-hole 16563, but did not appear to have been used as a pad, though it may have been introduced as packing, along with ragstones that were occasionally recorded within the fills of the other post-holes. The two rows created aisles 2.5 m wide and an 8 m wide nave.

The building's internal arrangements were suggested by post-holes and areas of surfacing, though none can be assigned with certainty to this phase. Two post-holes (16473 and 16745) within the southern part of the east aisle appear to reveal a partition or entrance into a room. The post-holes were near-identical – up to 0.43 m wide and 0.24 m deep – and almost certainly associated with each other. A beam-slot (16058) 6 m north of the post-holes may have held the corner of a wall, possibly ragstone-built, given the presence of the stonework in the fill of the feature. The feature was awkwardly located, being out of alignment with the building's axis, but this may have been of little concern if the wall was short. No dating evidence was recovered, though the feature appeared to extend into the nave, and therefore may have pre-dated the Villa Phase 6 internal wall. Surface 15287, up to 0.22 m thick and consisting of rough chalk blocks, was also found in the east aisle. It overlay a make-up deposit (15923) of chalk fragments within a sandy silt matrix, which in turn sealed pit 16086 (Fig 3.28, section

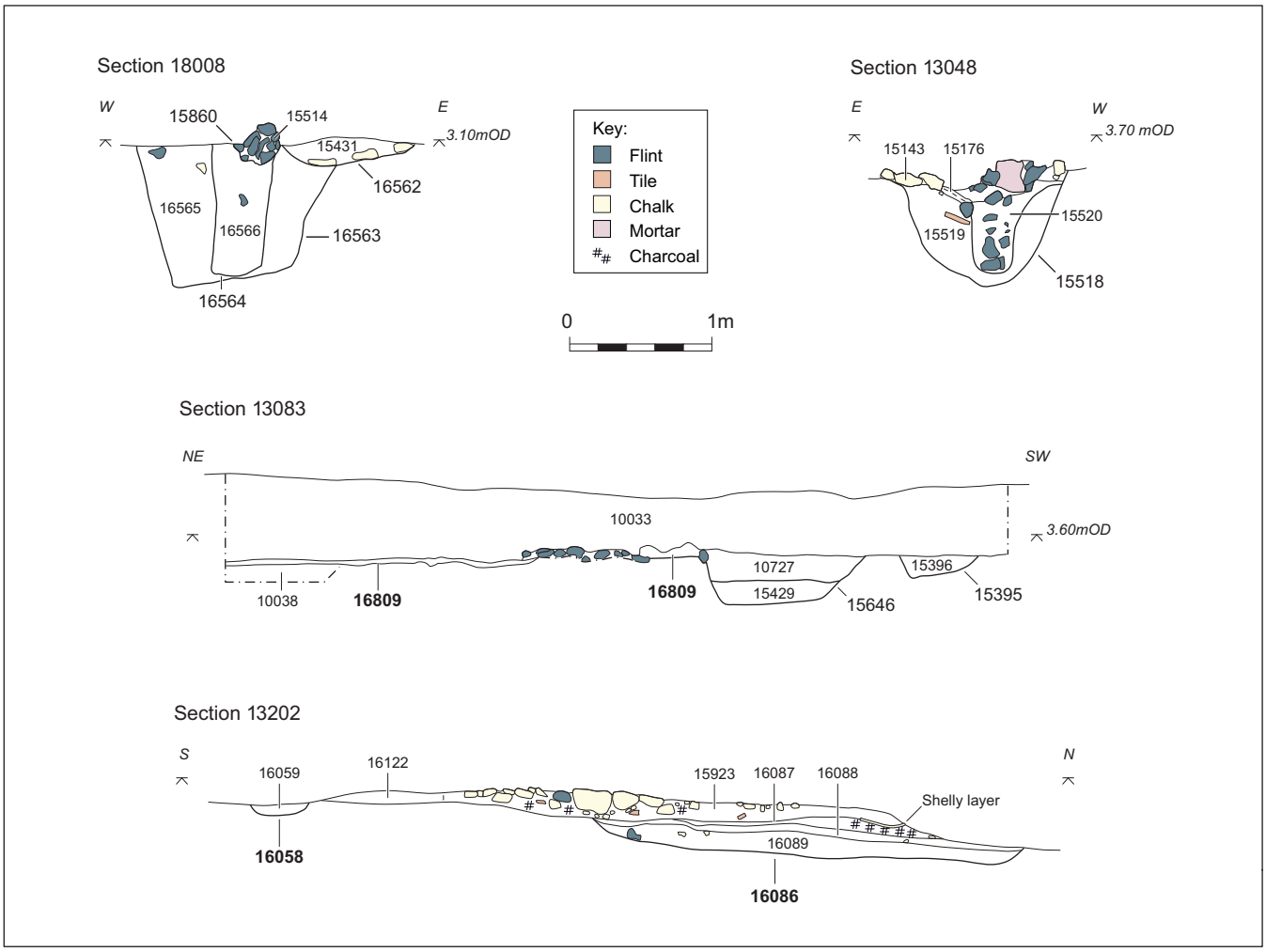

Figure 3.28 Post-holes and surface sections

13202). The primary fill of the pit contained a body sherd from a South Gaulish samian vessel and so the feature probably pre-dated the aisled building. Pottery from deposit 15923 – 19 sherds in total – dated to AD 120–160, better placing surface 15287 within the aisled building's first phase, rather than its second phase which commenced after AD 250. The quantity of brick recovered from the building suggests that it was floored in brick in part (see Poole, Vol 2, Chap 6).

As for dating evidence from the rest of the building, charred grain from the post-pit of 16621 produced a radiocarbon date of cal AD 50–220 (NZA-27443, 1898±30 BP), placing construction within the early or mid-Roman periods. No dating evidence was recovered from the external walls, but the post-holes yielded some pottery. An Oxford colour-coated ware carinated bowl (Young 1977, type C82) found in the packing fill of post-hole 15582 dated to AD 270–410. Pottery from some of the other post-holes was, however, of later 2nd and early 3rd century date: the 40 sherds or so from the packing fills of 15518 included an early 3rd century East Gaulish samian Drag. 33 cup, and a mid-/late Roman Thameside grey ware plain-rimmed dish, while the post-pipe of 16593 contained a fragment of a Colchester colour-coated ware vessel. This chronological conflict is not easily resolved from the structure's few stratigraphic relationships, though 15518 cut a clay-lined gully or trough (15142) that contained a bead-and-flanged dish (Monaghan 1987, type 5A), normally of 3rd–4th century date. Pottery from an external flint and chalk surface (16809) that lay immediately east of the aisled building and probably formed part of a courtyard surface (see below) contained pottery spanning the period AD 160–270, and pottery from the construction cut and lining of well 10977, which may have supplied water to the building's inhabitants, belonged to the second half of the 2nd century. The later mid-Roman emphasis of the ceramic dating supports the radiocarbon determination, and suggests that the small amount of late Roman material was introduced during the construction of masonry walls 16579, which replaced the post-holes in the late Roman period, probably during the late 3rd century or early 4th (see below). Nevertheless, it remains possible that construction of the first-phase building may yet belong within the period AD 270–325.

The south range and courtyard

The east and west ranges were connected by an east–west aligned, 60 m long wall (16641 and 16642). Much of the wall had been truncated by later disturbances, and the central part had been removed

Plate 3.11 Bath-house, room 10509. Looking south

completely by a tramway cutting. However, enough elements were present to show that the wall formed the southern boundary of a courtyard, and that further structures led off from it.

Little more than wall footings survived (Figs 3.26–7). At the east and west ends of the wall (10085 and 10089), ragstone blocks and occasional flint nodules were laid within trenches and mortar-bonded to create foundations up to 0.50 m wide and 0.27 m high. Some of the wall proper was recorded above 10085; this was built from faced ragstone blocks and a ragstone and chalk core, all mortar-bonded, and was 0.46 m wide and 0.15 m high. Wall 10086, in between 10085 and 10089, turned to form a corner of a structure. The wall was similarly ragstone-built and mortar-bonded, and was 0.80 m wide, surviving to a height of 0.13 m. It rested on top of a wider ragstone foundation that added a further 0.45 m to its height. A robber trench (10087) preserved the course of an internal wall. Another structure lay 30 m to the east. Ragstone and mortar-built wall footing 10095 butted the west end of 10089, continuing its east–west alignment for 3 m; it was 0.62 m wide and 0.72 m high. Wall footing 10096 met 10095 at right-angles and extended north–south for 2 m; its full extent remains unknown due to truncation, though it presumably mirrored the structure to its west.

This southern range was previously investigated by W H Steadman; his plan of the excavations suggests that the structures described above formed part of two double-roomed buildings 10 m long and 5 m wide. Well 15011, which was sunk to the west of wall 10096 (see Fig 3.18), suggests that the space between the two structures was an external one. In this light, the structures may be interpreted as gatehouses either side of an open entrance or more elaborate gateway.

The extensive use of ragstone in these walls differed from the walls in the eastern and western ranges, which were predominantly flint-built and suggests that the southern range was built in a separate phase. But clearly both buildings had to exist before the southern wall could be built. A construction date after *c* AD 200 is likely, though probably within the first half of 3rd century given the ceramic dating of features that the wall overlay: footing 10089 cut clay-lined pit 15790, which had filled completely by *c* AD 160/70, and it also overlay pipe-trench 15010, which had been cut between AD 170 and 230. Little material was recovered from the south range itself, though two sherds of Patchgrove ware from 10095 was consistent with mid-Roman construction. The east end of wall 10089 butted wall 10097 from the east range (15746). A patch of mortar (10827), 2.40 by 0.50 m, laid within the corner of 10097 and 10089, may have provided a foundation for a column or other decorative feature that flanked the east range entrance. In any case, the feature further serves to link the courtyard wall with occupation of the east range.

The courtyard was now beginning to be defined formally, and covered an area of at least 61 m by 26 m. Much of the courtyard had been denuded through later quarrying, and a deep cutting for a tramway had been made through the centre of the area in the 19th century. However, deposits survived at the edges, which allow us to reconstruct the courtyard to a limited extent.

Excavation revealed two patches (16809) at the west side of the courtyard, butting the east wall (10148) of the west range. The larger patch, measuring 7.50 m by 4.50 m, comprised a make-up layer of flint nodules, which was overlain by a crushed chalk deposit (Fig 3.28, section 13083). This was in turn overlain by a gravel surface, 70 mm thick. Above this was a clay silt layer, which contained charcoal, animal bone and pottery, and appeared to represent the remains of a midden. More traces of a surface, some 4.60 m long by 1.80 m wide (16809), were found a little further to the north and consisted of rounded flint pebbles, gravel and tile fragments. A second area of surfacing was located along the northern edge of the courtyard, but unfortunately no data were recorded. A patch of compact flint with occasional ragstone and chalk, each covering an approximate area of 1.97 m by 1.70 m (10665), were located adjacent to wall 10138 of the eastern aisled building (Villa Phase 4) and may have been contemporary with it.

These deposits are likely to have been laid during the mid-Roman period, probably during the second half of the 2nd century (possibly during Villa Phase 3) or the first half of the 3rd. Twenty-eight sherds of pottery recovered from 16809 included a Central Gaulish samian decorated bowl (Drag. 37) and conical cup Drag. 33 – also present in East Gaulish samian ware – and pointed to a date range of AD 160–200. A larger assemblage – 58 sherds, including bead-rimmed dishes and cooking-pot-type jars, both in Thameside grey ware – was collected from the midden-like deposit (15268) above courtyard surface 16809 and was consistent with a mid-Roman date up to *c* AD 250.

Not all the courtyard area was surfaced. Three groups of post-holes uncovered within the courtyard appeared to define three sides of a timber building or fenced enclosure. On the north side, a row of post-holes roughly aligned east–west was recorded (15040; Fig 3.27). Another post-hole set 2.50 m south of the easternmost post-hole formed a corner. The post-holes

were U-shaped and measured on average 0.30 m in diameter and 0.10 m deep; no evidence of post-pipes was observed and they were generally filled with silty clay soil. The west side of the putative enclosure was formed by three pairs of post-holes (16806) which were larger than the northern group, averaging 0.40 m in diameter and 0.25 m deep. But they were again U-shaped and filled with clay silt. Five post-holes (16815) made up the south side. These were larger still at 0.50 m wide and 0.25 m deep. The east side formed by joining the east corner of 15040 with the easternmost post-hole of 16815 lacked post-holes and appeared to be open, though it is possible that evidence for this side was lost through later truncation. The enclosure or structure covered an area 20 m by 12 m. The arrangement of post-holes on the west side is interesting and may relate to a system of gates or entrances. The size difference between post-hole groups provides a further suggestion that the posts were erected at different times. Assuming that the groups belonged to a single enclosure or structure, a sherd of fine (Upchurch) oxidised ware from post-hole 10647 (15040) tentatively places the groups within the mid-Roman period or earlier.

A group of three pits was dug among the northern group of post-holes (15040). These bowl-profiled features were on average 1.20 m in diameter and 0.18 m in depth, though they were variable in terms of the amount of burnt flint they contained. Almost 2200 pieces were recovered from 10692, and 600 pieces were found in 10725, but only one was from 10738. The features are undated, and are placed here only on the basis of their proximity to the post-hole group. However, they were similar in form and content to the 2nd century group of pits at the eastern edge of excavation (16816, Villa Phase 2; see above), and may share their function. Ceramic building material was collected from 10725, suggesting that at least one pit was of Roman date.

The bath-house

A suite of rooms was added to the west end of the bath-house, while, at the east end, a bath and furnace were inserted (Fig 3.20). Bathers entering room 10509/200240, probably through its western or southern sides, enjoyed a cold bath (Pl 3.11). The room was square, 3 m across, and surrounded by ragstone and ceramic walls bonded with yellow mortar. The wall (10501/200088) was 0.60 m wide and survived to a height of 0.70 m. The internal face of the wall was covered with *opus signinum*, which in turn was coated with a layer of red-painted plaster. A tile and *opus signinum* bench or step, 0.35 m wide and surviving to a height of 0.21 m, was built against the internal face of the south wall; it was finished on its north-facing side with more red-painted plaster. The floor was tiled. Most of it survived intact (to a level of 2.40 m aOD) and it was possible to calculate that 90 floor tiles were required. A fragment of Purbeck marble floor tile found in a lower fill of the room originally may have been incorporated into it, though given the completeness of the ceramic tiled floor, appears to have belonged to a neighbouring room or another building altogether (see Shaffrey, Vol 2, Chap 9). The edge of the tile covering did not exactly meet the wall, and *opus signinum*, drawn from the underlying deposit, was used to seal the gap. Below the 0.07 m thick *opus signinum* layer was a further 0.08 m thick deposit of mortar, but bordered with tile. This was laid on a layer of crushed mortar, which was in turn placed on a rammed gravel deposit. It is possible that one or both of the *opus signinum* deposits represented earlier surfaces. Water flowed from the bath into a lead pipe (200189) that punctured the north-west corner of the wall at the base. The lead pipe was 0.12 m in diameter and 1.50 m long and jacketed with overlapping curved *imbrices* (Pl 3.12).

Plate 3.12 Bath-house, tile-jacketed lead pipe 200189. Looking west

Plate 3.13 Bath-house, hypocaust in room 10508. Looking west

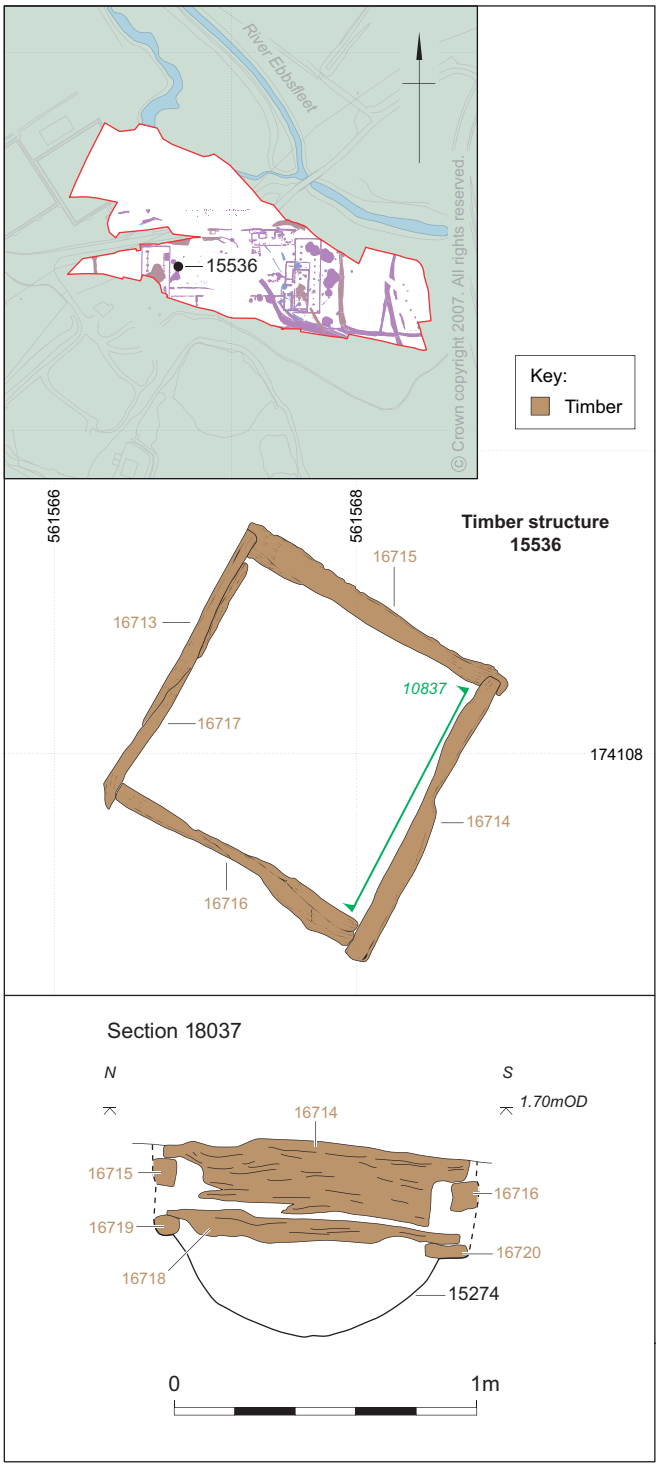

Figure 3.29 Well 10977, timber lining

Room 10624 was a cold room or cold bath. It was defined by a wall (10252) 0.55 m wide and surviving to a height of 0.25 m and constructed from flint nodules bonded with sandy yellow mortar and faced internally with chalk. Traces of *opus signinum* were seen on the internal face of the south wall. The wall cut the west end of bath-house wall 10246 (Villa Phase 3) and therefore was dated later. A tile floor, some 1.80 m square and at a level of 2.30 m aOD, was laid within the room above a mortared flint foundation. The gap between the tiles and the wall was sealed with *opus signinum*. Joining the room on the west side was an alcove or small tub. Its floor was lower and users were required to step down into it. It was formed on its north, east and south sides by *opus signinum* bonded tiles, including re-used flue tiles, which created a wall 0.30 m wide and up to 0.19 m high. The floor was surfaced with *opus signinum* (10560). The west wall (200079) of this alcove was ragstone-built and similar in construction to the wall belonging to 10509/200240, suggesting that these elements were contemporaneous (the relationship between the two was unfortunately obscured by later truncation). A ceramic pipe was fed through wall 200079 and out into a gully (200186) 0.70 m wide and 0.20 m deep that extended north, possibly discharging into the early ditch, 200172 (Villa Phase 3). The recovered pipe fragment consisted of horizontal and vertical elements. The top of the vertical pipe was level with the floor of the larger room and would appear to have been in a position more suitable for draining water from that room; it is clear from the top of the pipe that another pipe would have connected to it. How the small tub, if it served as such, was filled or drained is unknown. The construction of room 10624 would have blocked any entrance through the west wall of room 10333 (Villa Phase 3). However, the results of the 2000 evaluation suggest that direct access into the room was maintained via a 1 m gap made through wall 10246 at the junction of rooms 10331 and 10332 (OAU 2002, fig 12).

Along the north side, the hot room 10508/200055 was extended eastwards and a new flue inserted (Pl 3.13). The new walls (10233/200235) were made from chalk and tile courses set within a matrix of flint nodules and yellow sandy mortar. The interior faces of the walls were coated with successive layers of chalk and tile and pointed with *opus signinum*; a final layer of chalk had been scorched from the intense heat of the fire drawn through the flue. The flue was a tile-lined structure 1.30 m long and 0.80 m wide. A tiled floor, some 1.20 m by 0.80 m, was laid throughout the extension, but did not extend beyond the western edge of the new wall. Stacks of tile and *opus signinum* were built on top of the floor to form the hypocaust. The upper tiles from a *pilae* stack belonging to the original part of the room were angled so as to form an arch, which drew the heat from the flue into that end of the room. The relationship between this stack and the original mortar floor was unclear, so it is uncertain whether the stack was an original feature or part of the subsequent alteration. But, if the mortar floor was an original surface, it is possible that all *pilae* stacks overlying that floor were later additions, as the surfaces in the first hot room, 10330 (Villa Phase 3), and in the extension to 10508/200055 were made of tile. In any case, that the extension to the room was a later development is suggested not only by the different wall and floor construction, but also by the trenches in which the walls were built; these were two separate cuts that terminated at the junction of the walls. Abundant cereal chaff was recovered from the floor of the hypocaust, and it is likely that this by-product of crop-processing was used as fuel (see W Smith, Vol 3, Chap 4). Oak

roundwood was also recovered from the deposit; a radiocarbon determination from the wood gave a date range of cal AD 130–340 (NZA-27433, 1778±30 BP).

Changes were also made at the east end of the bath-house. A bath was inserted immediately east of room 10331 and above the east end of the putative flue. This necessitated the replacement of the east wall of the *tepidarium* (10331) with an arch represented by two *opus signinum* bonded brick columns (10278/9) set 1.50 m apart, and the insertion of a north-south wall to create a room (10344) 2.50 m by 1 m. The wall, made up of three masonry elements (10207, 10208, and 10231) was chalk and flint-built and yellow mortar-bonded. Excavations by TAG suggested that the furnace 10280/16805 – here assigned to Villa Phase 3 – was a later feature requiring the removal of the bath (Ansell 1981, 202). However, the fact that wall 10207 overlay 10206 (though perhaps crucially did not truncate it) points to 10207 being the later. The short west-facing side of 10207 was reasonably smooth and probably terminated there. How it connected with masonry further east is unknown, but it is possible that a gap was intended to accommodate a drain- or water-pipe. Traces of *opus signinum* were recorded on the north, internal, face. If the furnace remained operational during this time, then 10344 can be identified as a hot bath. Gully 16813 to the north-east cut earlier ditch 16814 (Villa Phase 3) and may have served as a drain for the bath, discharging water directly into the river channel. However, the relationships between the furnace, bath, and gully have been much truncated, and so the interpretation and sequence remains very tentative.

Shortly after it was built, room 10624 was enlarged to the south and its floor raised. The south wall of the room (10252) was dismantled to a height of 0.25 m and replaced with wall 10258 0.50 m to the south. This was chalk-built and yellow mortar-bonded – the masonry being much robbed – and measured 0.63 m wide and survived to a height of 0.40 m. The wall turned north at its east end and butted earlier wall 10246 (Villa Phase 3). The east side resumed with wall 10251, a flint and yellow mortar wall 0.38 wide and 0.22 m high that butted the north side of 10246. These changes increased the internal size of the room to 3 m square. A layer of *opus signinum* 0.07 m thick was recorded on the top of the shortened 10252 and this represented the remains of a floor surface that met 10258 and presumably extended throughout the room. The expansion of the room may have been concomitant with the final phase of works in the villa complex, potentially dating the use of the room to after AD 250, but it is also possible that use began earlier than this. Dating evidence from the fill of a robber cut (15349) of wall 10258 included late Roman shelly ware and Alice Holt grey ware fragments that placed abandonment within the range AD 350–410.

We can be more certain, though, that room 10697 was added at the same time that room 10624 was expanded, or was built afterwards, since it butted wall 10258 to the south. The room measured 3.50 m by 2 m and comprised wall 10266, which was constructed with

Plate 3.14 Well 10977. Looking west

flint nodules and yellow mortar and measured 0.48 m wide and survived to a height of 0.30 m. Its east and west sides were best preserved; these returned at their southern ends to form the south wall. This had been substantially removed through the subsequent expansion of the room. A wall (10268) was added to the south face of 10266, creating a new space (10563) and expanding the roon to measure 3.50 m by 3.70 m. The wall, 0.48 m wide, was flint-built with *opus signinum* bonding; two courses survived to a height of 0.30 m. A chalk and flint ledge or low wall (15356) was built around the inside edge of wall 10268 and wall 10266, while a similarly-constructed L-shaped structure (15351) was built in the centre of the room. These served as piers for a suspended floor, surviving to a level of 2.80 m aOD. The mortar and hypocaust, absent in 10697, indicate a change of function to a hot room, requiring the room to be expanded. Painted wall plaster found within room 10563 suggests that the room was decorated.

The construction cut for room 10697 had been cut into a clay-silt deposit that contained an *antoninianus* or *follis* belonging to the 3rd or 4th century. With this in mind, a fragment of fine (Upchurch) grey ware from 15350 dates the construction of 10697 and its expansion to the mid-3rd century; while the ware continued in production into the late 3rd or early 4th century (Pollard 1988, 211), supply to Northfleet had all but ceased by the early 3rd century. The primary fill of the hypocaust channel contained a black-burnished ware category 2 plain-rimmed dish, suggesting that use of the room continued to at least AD 300.

Well 10977/15536

A well was sunk on the east side of the western aisled building (Figs 3.27 and 3.29; Pl 3.14). A shaft 2.80 m in diameter and *c* 3 m deep was dug through chalk solifluction to reach 0.20 m aOD. A two-course timber frame (15536) was inserted at the base. The lower course comprised planks averaging 0.98 m long and 0.10 m high, with an edge 0.12 m wide. The planks forming the upper course were deeper at 0.20 m, but more or less the same length and width at, on average, 1.09 m and 0.07 m respectively. All planks were

connected by half-lap joints; part of the ends of two timbers (16715–6) in the upper course were sawn diagonally, as if a dovetail joint was intended. The lining above this was built in stone. It was 1.90 m deep, 1.60 m in diameter, and had a wall *c* 0.40 m wide. A foundation of chalk and flint nodules was laid above the timber frame and followed by three chalk block-courses. For the remaining part of the lining, a mixture of flint, ragstone, and chalk was used. Dark clay silt was observed around some stones and this may have been used for bonding. The space between the construction cut and the lining was backfilled with grey/orange silty clay; tip lines were preserved with the deposit, indicating that several loads were required to complete the process. There were no prolonged time gaps, though, since the soil was taken from the same source. Later 1st and 2nd century building material and pottery, including a Dressel 20 amphora, a poppy-headed grey ware beaker, and South Gaulish samian, were recovered.

The primary fill of the well (16705) was a clay silt that accumulated during the feature's use. A jar base, probably from a cooking pot, was recovered from it and dated after AD 120. The next deposit in sequence was deliberately dumped and signalled the end of the use of the feature as a well. It contained building material – tile, mortar, chalk, and flint – as well as two sherds of Alice Holt grey ware that dated the episode to AD 270 or later. A layer of tile capped this deposit, and this was followed by further dumps of building material.

Given its location, it is reasonable to suppose that the well was used by the occupants of the western aisled building. Chronologically the well and building were less perfectly matched, since the pottery from the construction cut was earlier than the 3rd century date proposed for the first phase of the building. However, the pottery from the well, excluding the heavy amphora fragment, was poorly-preserved, the sherds being small and weighing an average of 9 g, and might be regarded as residual, especially if incorporated within soil that derived from an eroded or re-deposited midden. The pottery from the primary fill does not clarify the chronology, but the late Roman date given to the first dumped deposit hints at a date more in keeping with that offered by the building.

Tanks or cisterns

A rectangular pit (16800), 4 m long by 2.50 m wide, and 0.40 m deep, was sunk into the north-east corner of the western aisled building within the east aisle (Fig 3.27). The pit did not fit exactly and had slightly cut into the internal face of wall 10148. A clay deposit, 0.25 m thick, lined the feature. Pottery that accumulated when the feature was abandoned included a black burnished ware flanged bowl dating up to *c* AD 230. A smaller clay-lined feature, 16513, was dug at the southern end of the building, but butted the external face of wall 10148. It was smaller, too, at 3.20 m long, 1 m wide and 0.30 m deep. The clay lining was similar in colour and composition to the lining of rectangular pit 15142, 4 m by 1 m, cut within the east aisle. This was truncated by post-hole 15518 (16640) and must pre-date the structure, though judging by the clay lining that may have been quarried from a common source, not by any lengthy period.

Western Roman Complex (AD 200–250/60)

by Daniel Stansbie

After the earlier mid-Roman features had silted up and gone out of use, the site underwent a major phase of reorganisation (Fig 3.30). A substantial SE–NW orientated rectangular enclosure (20286) with a north-east facing entrance was established, cutting the underlying early and earlier–mid-Roman boundary ditches. The north-eastern arm of this enclosure was re-cut at least once during its use (re-cut 20323). Enclosure 20286 measured approximately 30 m in length and 24 m in width, with a 5.5 m wide entrance in the south-east corner. The ditch measured 1.90 m wide and 0.88 m deep, and had a rounded V-shaped profile (Fig 3.31, section 20751). The ditch fills produced a very large assemblage of mid-Roman pottery, comprising 603 sherds, weighing 6425 g. This included Thameside/Upchurch grey ware, including everted rim jars, cooking jars, lid-seated jars, plain-rimmed dishes, grooved rimmed dishes, and triangular rimmed dishes. Some fine and specialist wares were also present, including Central Gaulish samian.

To the east of enclosure 20286, a substantial L-shaped ditch (20673), may have formed the corner of another similar enclosure. The ditch was orientated NW–SE, turning to the north-east at its north-western end. It extended beyond the limits of excavation to the north-east. The ditch was 18.5 m in length and 2.30 m in width by 1.02 m in depth. In profile was varied, being V-shaped, with steeply sloping sides in some places and having a flattish base with gentle sides in others. Pottery recovered from the feature was dominated by jars and dishes in Thameside/Upchurch grey ware, with some Central Gaulish samian ware and sherds from a Wiggonholt mortarium also present.

Another substantial ditch (20438) was cut to the north-east of enclosure 20286, running across the site on a SW–NE orientation. The ditch ended in an irregularly-shaped terminus to the south-west and extended beyond the limits of excavation to the north-east. It measured 15.7 m in length and was 1.45 m in wide and 0.62 m deep. It varied in profile, being irregular at the south-western end, but saucer-shaped with a rounded base and gently sloping sides at the north-eastern end. Two sherds of Roman pottery, including a sherd of Patchgrove ware were recovered from the fills.

An oven (20748) constructed of flint, chalk, and tile was built over the top of silted up enclosure ditch 20286, overlying what had been the north-eastern corner of the enclosure (Fig 3.31, section 20763; Pl 3.15). Presumably the oven was related to contemporaneous activity on the site, but with the exception of three pits

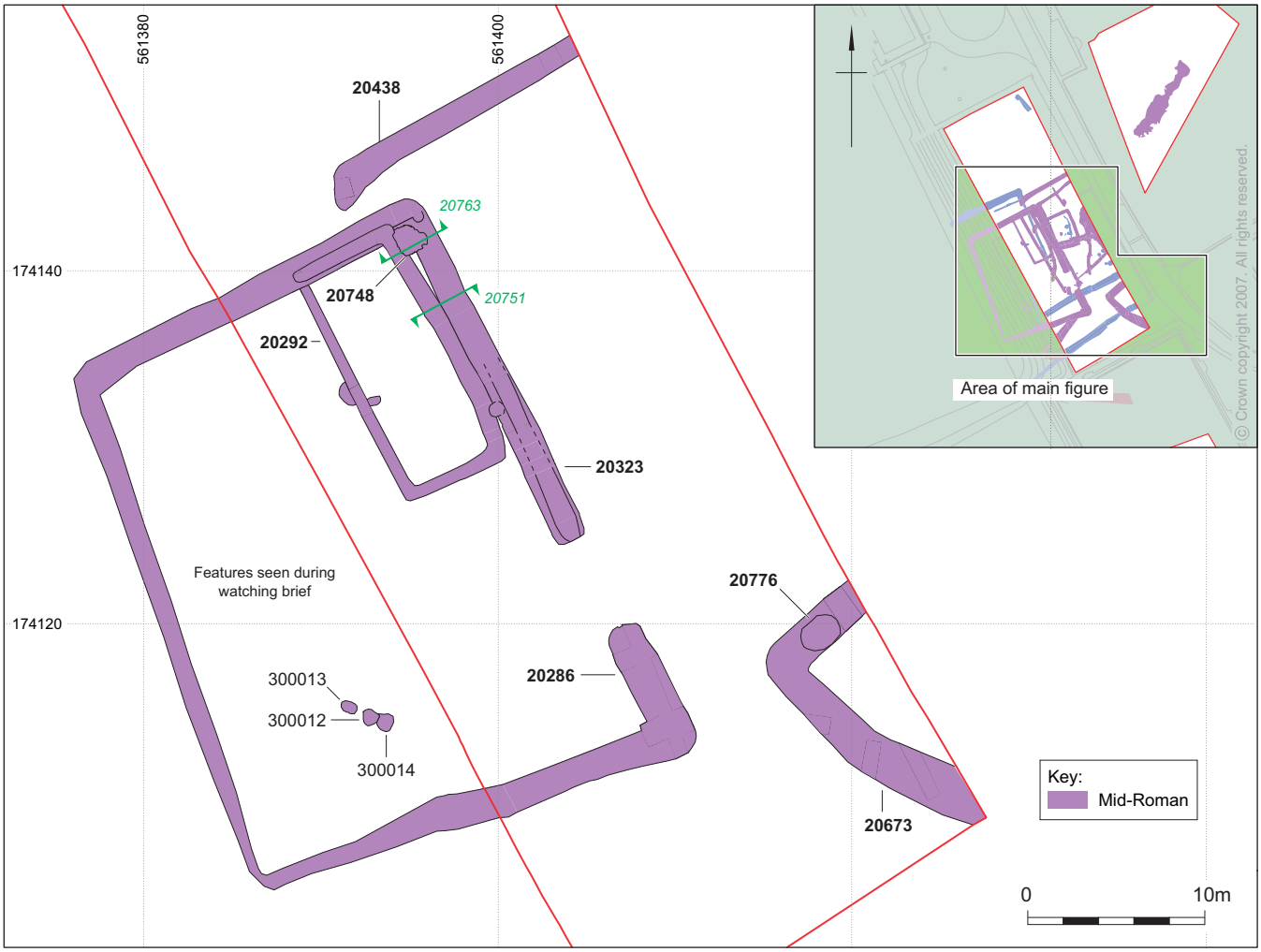

Figure 3.30 Plan of mid-Roman Western Roman Complex (AD 200–250)

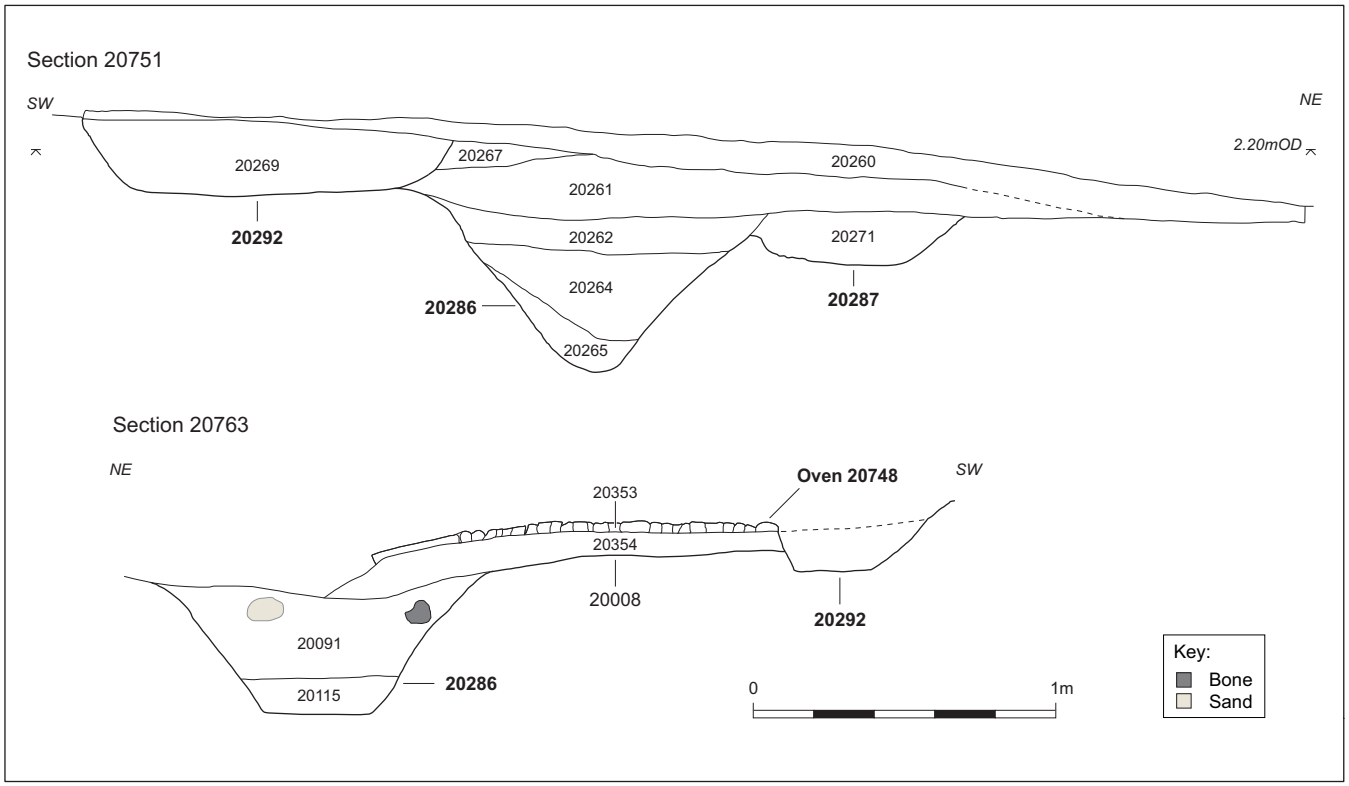

Figure 3.31 Western Roman Complex sections

(300012, 300013, and 300014) towards the south-eastern end of the enclosure, no traces of such activity was recovered. Oven 20748 comprised a bedding layer of sand, overlain by a floor of reused tiles surrounded by a wall of packed flint nodules and chalk blocks, with a flue orientated to the north-east. The structure was sub-circular in plan and measured approximately 1.60 m by 1.40 m. The backfill of the oven, comprising fragments of ceramic building material in a silty matrix, produced six sherds of Thameside/Upchurch grey ware, including a rim sherd from a grooved dish. A half-box flue tile, a type strongly associated with military or high-status early Roman buildings, was also recovered from the feature. Pits 300012, 300013, and 300014 were sub-circular in plan and averaged 0.93 m in diameter by 0.15 m in depth. In profile the pits were saucer-shaped, having rounded bases and gently sloping sides. A single rim-sherd from an everted rim jar in Thameside/Upchurch grey ware came from the fill of pit 300012.

A relatively small rectangular enclosure (20292), orientated NW–SE and measuring 14.8 m in length by 6.9 m in width, was established after oven 20748 had gone out of use, cutting both the oven and enclosure ditch 20286 (Fig 3.31). The ditch forming 20292 measured 0.70 m in width by 0.50 m in depth, and was U-shaped in profile. An assemblage of mid-Roman pottery, comprising 44 sherds weighing 344 g, was recovered from the ditch fills. This material included triangular-rimmed dishes, a cooking jar, a poppyhead beaker and an everted-rimmed jar in Thameside/Upchurch grey ware, along with a poppyhead beaker in fine Upchurch grey ware.

A large pit (20776), contemporary with enclosure 20292 or oven 20748 was cut into enclosure ditch 20673. The feature was sub-circular in plan, measuring 2.55 m in length by 1.24 m in width and 0.23 m in depth. In profile the pit was saucer-shaped, having a rounded base and gently sloping sides. Pottery recovered from the feature included sherds from two bead rimmed jars and two triangular rimmed dishes in Thameside/Upchurch grey ware, along with a sherd of Colchester colour-coated ware.

Plate 3.15 Oven 20748 in the Western Roman Complex

Late Roman (AD 250/60–410)

Villa Phase 6 (AD 250/60–380)

The east range

A burnt deposit (15580) dating to the late 3rd century or later was recorded. It was contained largely within the south-western part of the aisled structure and was observed as five discrete, silty clay deposits that produced abundant charcoal and burnt daub and chalk fragments. The largest, 10586, was 0.05 m thick and covered an area 9.25 m by 6.45 m and overlay post-hole 15283 and beamslot 10824 belonging to the Villa Phase 4 structure (the post appeared to have been reduced to carbon and both features contained burnt daub). Two smaller areas (10747 and 10748), also 0.05 m thick, butted against the internal face of the Villa Phase 2 wall and suggest that the earlier structure, at least in part, remained upstanding when the aisled building was erected, serving as internal walls (Figs 3.32–33).

The latest pottery from 10586 was a fragment of an Oxfordshire parchment ware bowl (Young 1977, type P24) that arrived at the site after AD 270. Most of the pottery, though, was generally of earlier date, falling within a 120–160 range. Sherds belonging to a grey ware vessel were very burnt, becoming pumice-like in the process. The vessel undoubtedly had been affected by the fire, but the assemblage as a whole, totalling 38 sherds, was unburnt and scrappy in terms of condition, having a mean sherd weight of 7 g (against the site mean of 15 g); rims were poorly-represented, with just three fragments present. A small animal bone assemblage was similarly scrappy. Interpretation of the layer is equivocal. The pottery and bone suggests that the deposit incorporated long-discarded material and had been brought into the building from elsewhere, possibly to be spread across part of the building as a preliminary action before re-surfacing (see below); the charcoal assemblage from 10737 represented the remains of fuel, rather than a burnt beam. However, burnt daub recovered from the aisled structure (see Poole, Vol 2, Chap 6), as well as the burning in the post-hole, point more convincingly to a house fire. If so, then the fire appears to have been reasonably discrete, largely contained within the space occupied by the villa phase 2 building. Far from seeing the destruction of the aisled building, the fire may have simply represented work to clear structural elements. Even if accidental, the fire presented the opportunity for redevelopment.

All burnt deposits were covered with a chalk surface (15581) that heralded a new phase of occupation. The surface of rammed chalk was uncovered in patches within the southern part of the aisled structure. It was 0.06 m thick and had been pressed into the underlying charcoal-rich layer. No dating evidence was recovered, but the surface must have been laid after AD 270. Immediately to the east of the surface were the remains of a bath-suite. These were limited to a T-shaped masonry block (15246), 2.40 m by 1.40 m, composed of *opus signinum* mortar and tile fragments. Another block

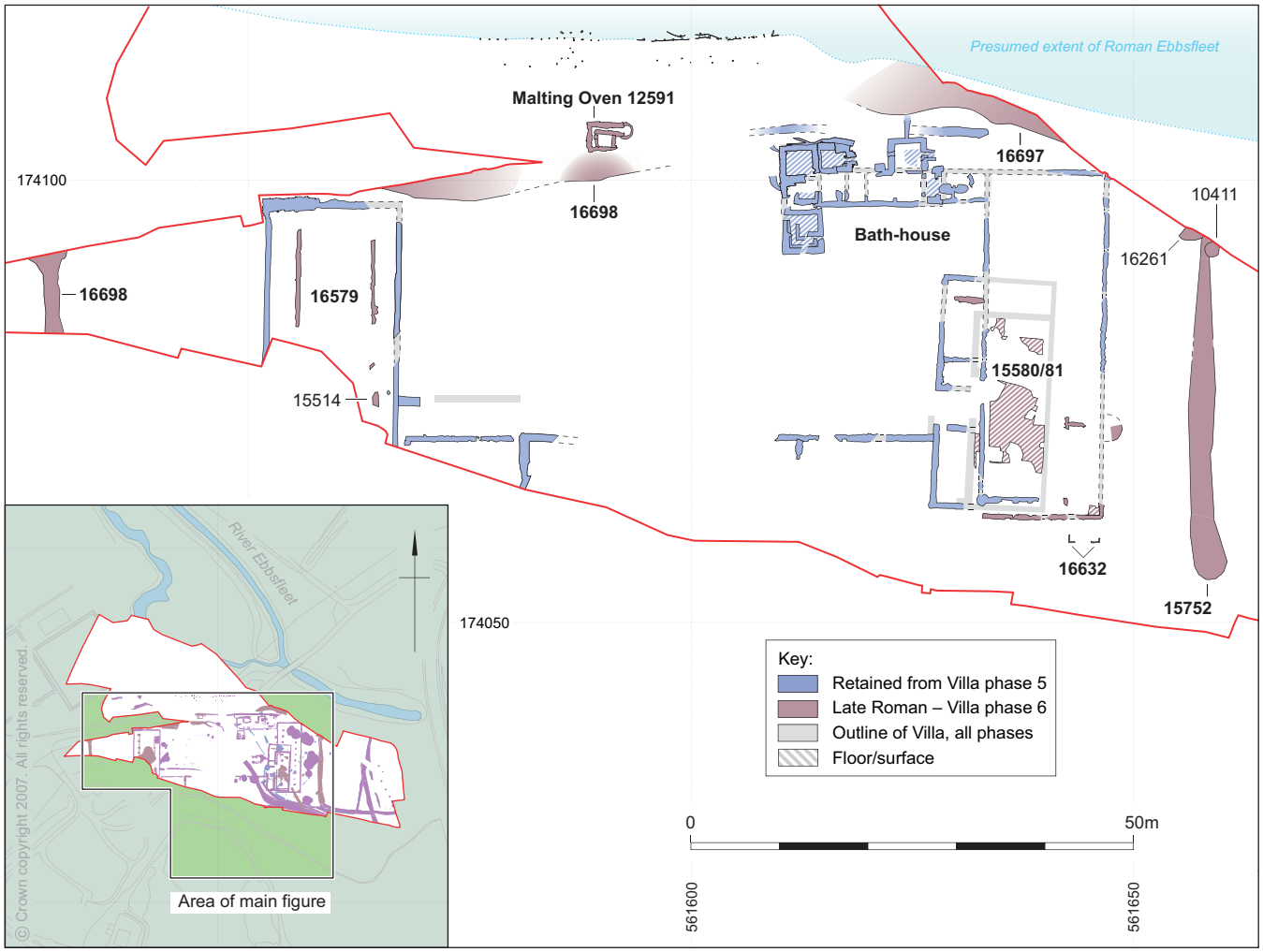

Figure 3.32 Plan of late Roman features, Villa Phase 6 (AD 250–380)

of *opus signinum*, but semi-circular (15851), was located 3 m east of the first and protruded through the side of the building. Both were first initially uncovered by Steadman, who noted that the semi-circular structure was floored with *opus signunum* and that it measured 8 ft (*c* 2.4 m) in diameter (Steadman 1913, 10). He also traced the outline walls of an adjoining room similarly mortared, of which 15246 may have been part. He speculated that the room housed a hypocaust and was presumably a *caldarium*, additionally identifying a stoke room or praefurnium to the north. He saw the semi-circular area as a *sudatorium* or sweat room, but given the use of *opus signinum*, an alcove for a bath is also possible, if not more probable.

There were other structural changes during the late Roman period (16531). A fragment of a flint wall (15364) was recorded in the south-eastern corner of the aisled building. This was 0.50 m wide and 0.18 m deep and may have been part of an internal wall uncovered by Steadman but since obliterated. The south wall of the aisled building appears to have been rebuilt or repaired, as a flint wall (10098, 10099), up to 0.60 m wide and surviving to a height of 0.40 m, was built on top of earlier foundations (10102, 10103). The wall did not exactly match the line of the footings – the older wall being just visible along the south edge – suggesting that 10098 and 10099 belonged to a later phase. The chalk surface met the internal face of 10098/9, which could make both elements contemporaneous. No dating evidence was recovered, but the insertion of the bath-suite provides a possible context for the work on the external wall. It may also explain the construction of a short wall 2.5 m south of the south-eastern corner. Structure or room 16632 consisted of an east–west-aligned wall 3.7 m long made from chalk blocks (10264/5), of which a single course survived. A clay-silt deposit containing abundant charcoal, burnt chalk and mortar (including *opus signinum*) was found within the space between 10264/5 and 10098/9. Pottery recovered from this deposit was dated to the mid-2nd century, though with an average sherd weight of just 3 g, this should be residual. However, no masonry was found to connect this with wall 10098/9, and it cannot be certain that the two were related. The burnt deposit hints at an association with the bath-house, structure 16632 being possibly a *praefurnium*. Steadman, however, saw no trace of a hypocaust in the corner of the main building, and this interpretation seems unlikely. Indeed, the provision in 16632 of daub *tesserae* – probably as inlay, rather than flooring (see Poole, Vol 2, Chap 6) – hints at living space or a room connected with the 'front-end' use of the bath-suite. Both room 16632 and the south-eastern corner of

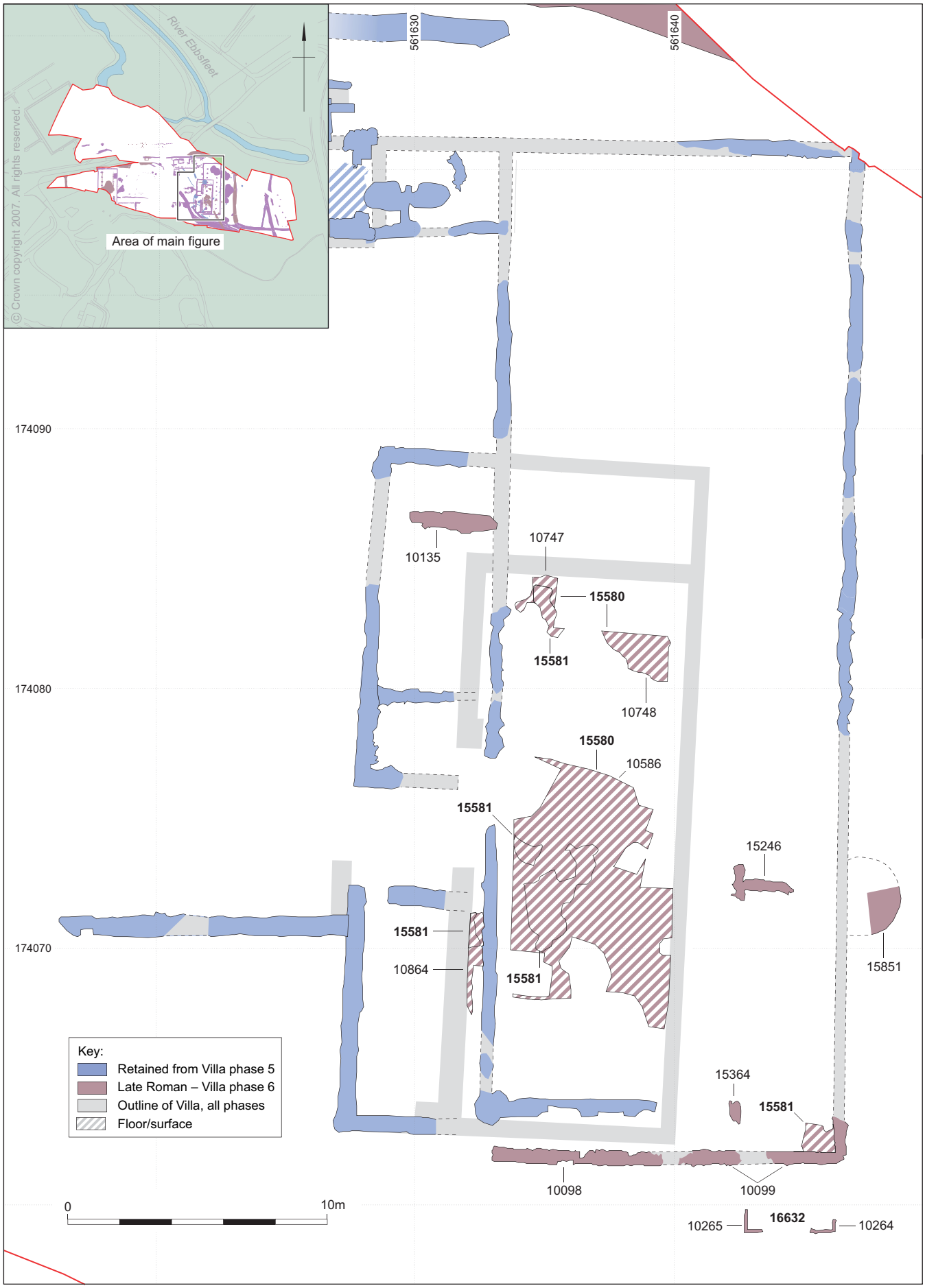

Figure 3.33 East range, detailed plan

the aisled building were truncated by ditch 15754 (see below). Wall 10135, built within the north-west corner of Villa Phase 3 extension 15746, may also be attributed to this phase – the excavator noted similarities in construction between this and wall 10098 – and appears to have created a small room in the top end of Villa Phase 3 extension 15746.

The west range

The two rows of posts from the aisled building (Villa Phase 5) were removed entirely or to ground level and replaced with masonry footings (16579) that supported new or re-erected posts or narrow internal walls (Fig 3.32). The wall foundations were flint-built, roughly-faced, and dry-bonded, though traces of mortar on some stones suggest that these had been re-used. The exception was wall 15514, the southernmost wall fragment of the east side, which had a layer of sand between courses and was bonded with lime mortar; it was also deeper at 0.66 m and may have supported extra structural elements at the southern end of the building, such as a tower or storeroom. Generally, though, the walls were 0.43 m wide and 0.37 m deep with two courses of flint extant. The walls overlay post-holes (16640) belonging to the first phase of the aisled building (the masonry from 15144 had collapsed slightly into a dip within the top of post-hole 15518 as its fill settled) and was clearly later. A sherd of Oxfordshire colour-coated ware introduced into post-hole 16582 probably during the construction of the second-phase building dated after AD 270. An area of compacted tile, mortar and chalk fragments recorded in the void of clay-lined tank 16800 (Villa Phase 5) within the east aisle were identified as the remains of a floor foundation or surface; it contained an *antoninianus* coin dating to AD 270–296.

The bath-house

Despite the construction of a second bath-house in the eastern range, the original bath-house continued to function. Oak charcoal used as fuel and recovered from the flue of room 10330 was radiocarbon dated to cal AD 220–390 (NZA 27440, 1743±30 BP), indicating that the earliest part of the bath-house remained operational in the 3rd century, possibly well into the 4th century.

Ditches

East of the east range the villa phase 2 ditch 15751 was re-cut by ditch 15752 (Fig 3.32). The north–south aligned ditch was 39 m long and extended beyond the northern limit of excavation. It averaged 2.80 m wide and 0.58 m deep and contained up to two silty fills along its length; these included deliberately dumped deposits of domestic waste and building material. Pottery from its fills consistently dated to AD 160–240, including a colour-coated beaker and mortarium from Colchester and an East Gaulish samian ware cup, but the ditch truncated pit 10384, which yielded gritty grog-tempered ware and Alice Holt grey ware from an upper fill, suggesting that the ditch was not cut until after 270.

A sinuous ditch (16697/16698) extending across the northern part of the villa complex may have been part of the same ditch as 15751 (Villa Phase 2), though the relationship between the two could not be examined. The ditch may then have turned south to form the third side of what would have been a large enclosed area almost 130 m by 55 m within which subsequent villa development occurred. Ditch 16697/8 was very wide; its northern edge went beyond the limit of excavation, but, given that no trace of the ditch was seen in the southern tip of the Wetlands trench, it is likely to have measured 3–5 m wide. It terminated towards the western part of the site, then resumed, suggesting that the boundary was segmented. Overall, the ditch generally had a bowl-shaped profile, stepped in places, and was up to 1.70 m deep. It was filled by up to eleven silty clay fills, which were probably largely alluvial in origin, though deposits in one segment were frequently ashy and organic in nature, while domestic waste was recovered from other fills, suggesting that some deposits had been dumped deliberately. The course of the ditch, in appearing to respect the locations of the western and eastern aisled buildings and the bath-house, suggests that it was dug after the latest of these features had been built. Moreover, it appeared to cut ditch 16723, which had filled by AD 150/60, and replaced a series of east–west-aligned ditches (16814, 200172–4) that had filled by the end of the 2nd century (see above). It truncated bath-house gullies 10166 and 16813 hinting that the ditch was not cut until the bath-house was abandoned, though the relationships were again not investigated. Curiously, the finds evidence from the feature fits better with that from ditch 15751; the fourth fill along the western arm of the enclosure included a *sestertius* of Hadrian dated AD 117–138, while a 1st or 2nd century *as* or *dupondius* was recovered from the primary fill on the north side. Pottery from the same primary fill included a Thameside grey ware ledge-rimmed jar and North French/south-east English whiteware that belonged to the early Roman period. Though it is tempting to link the ditch with 15751, ultimately all this material must be residual. The ditch may instead be related to ditch 15752, though none of the remaining pottery from 16697/8 needs be dated later than 250. Anglo-Saxon pottery from upper fills indicates that the ditch remained open to some extent into the 5th or 6th century.

Pits

Two features cut the north end of ditch 15752 (Fig 3.32). Pit 10411 was 1.60 m wide and 0.62 m deep (see Fig 3.14, section 10730 above). It was backfilled with two clay deposits, which contained a little ceramic building material. Given its stratigraphic position, the pit must date to the late Roman period or later. It should be noted that the feature resembled large post-pits belonging to aisled buildings of earlier date, but with no associated contemporaneous features in the vicinity, the interpretation of 10411 as a post-hole or post-pit cannot be confirmed. Oval pit 16261, 2.7 m along its widest

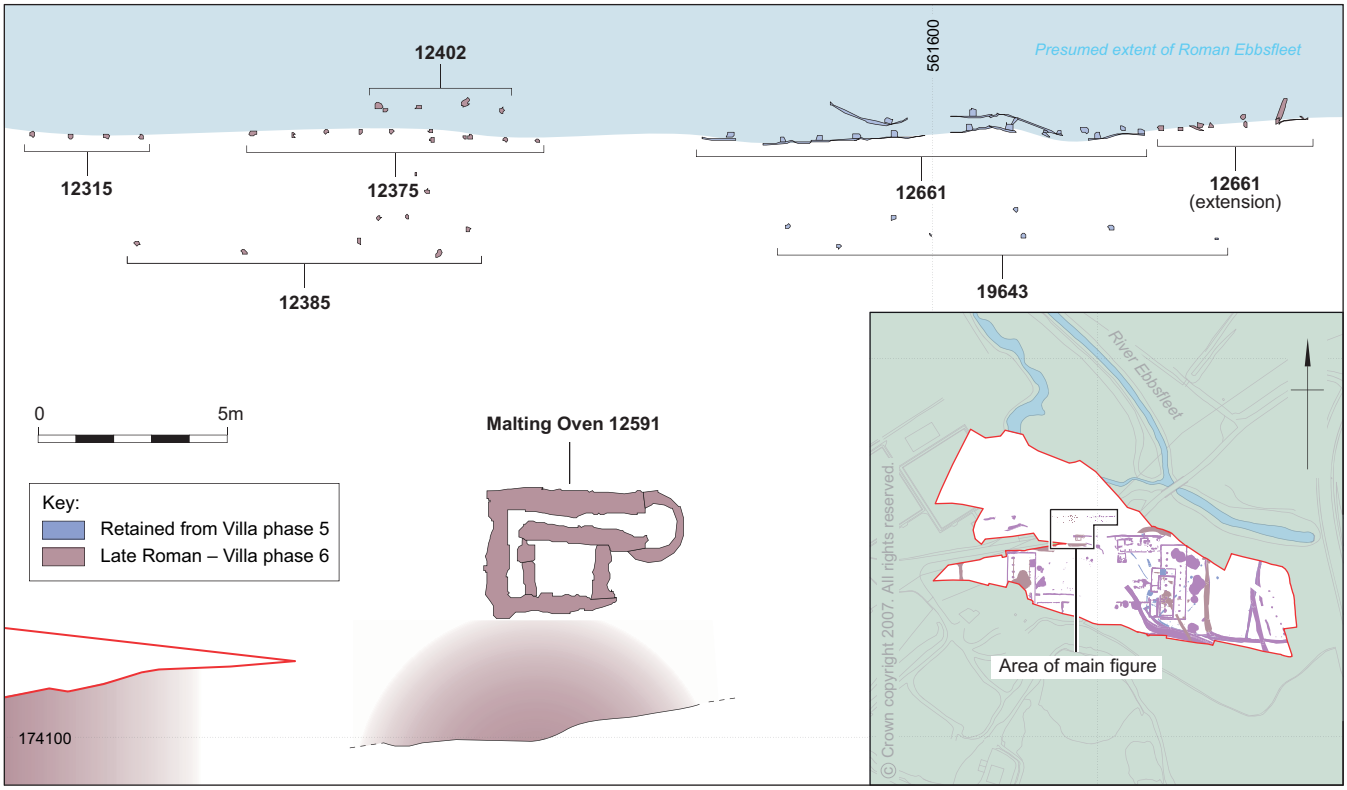

Figure 3.34 Malting oven and quay, detailed plan

extent, also cut 15752, though being devoid of finds, it cannot be dated more certainly than late Roman or later.

The malting oven

A malting oven (12591) of a type conventionally identified as a crop dryer was uncovered in the south-eastern part of the Wetlands trench 20 m west of the west end of the bath-house (Fig 3.34; Pl 3.16). Its north side appeared to truncate ditch 19650 that continued eastwards to run parallel with the bath-house. The central and southern portions of the oven, however, cut through a sequence of deposits, uppermost being a layer of crushed chalk (19056) that may have been the remains of a surface or occupation layer. The layer essentially represented a ground surface and lay at a height of *c* 1.90 m aOD. This overlay a clay soil (19055), which in turn lay above a midden or destruction deposit (19213/19214) that contained plaster fragments, chalk, charcoal, tile, pottery, bone, shell, and glass. It was on top of this lowest deposit that the base of the oven rested. Pottery from 19213 and 19055 consistently dated to AD 120–160 and the deposits are likely to have accumulated during Villa Phase 2 occupation. The oven was built up to 200 years later.

The rectangular structure measured 4 m by 3 m. The external wall was built with ragstone and occasional flint and chalk. The masonry was roughly-faced and dry-bonded, though traces of mortar seen on one stone suggest that this stone, at least, had been reused. The wall was 0.35 m wide along the structure's west and south sides and 0.53 m along its north side; one course survived. An internal wall was built parallel to the north side to create a flue 3.50 m long and up to 0.50 m wide. This was also ragstone-built. A stoke-pit, almost 2 m in diameter, joined the flue at its east end. Two shorter internal walls, again built with ragstone, were aligned north-south to form a 1.50 m square room or main chamber. The eastern wall butted the south face of the internal wall and the north face of the southern wall. It was 1.46 m long, 0.39 m wide and survived to a height of 0.15 m or four courses. Its neighbour to the west was shorter at 0.90 m long and slightly thinner at 0.28 m wide. It butted the north face of the southern wall, but met a square column, 0.58 m wide and made of alternating courses of tile and ragstone, at its north end. This left a small gap to admit the hot gases generated in the stoke-hole. Fragments of clay and daub from the structure (see Poole, Vol 2, Chap 6) suggest that, like the walls of the east and west ranges, the masonry provided short lower walls that supported a largely tile- and clay cob- or daub-constructed superstructure.

Ashy deposits that formed on the floor of the structure accumulated during its use. The primary fill in the main chamber contained an extraordinarily rich assemblage of germinated grain, detached embryos, and sprouts, which must have resulted from malting (see W Smith, Vol 3, Chap 4). The flue contained a primary deposit of charcoal-rich clay and burnt tile and stone. Pottery recovered from the fill comprised 13 sherds of shelly ware, one sherd of Hadham oxidised ware, and a fragment of Tilford/Overwey ware, all suggesting that the structure was in use during the second half of the 4th century. Pottery recovered during the excavation of wall 12589 was similarly dated; another sherd of

Hadham oxidised ware, complete with so-called 'Romano-Saxon' decoration (*cf* Roberts 1982), places construction within this date range. This is consistent with a radiocarbon date (cal AD 320–460; NZA 27438, 1652±30 BP) from germinated spelt wheat grains found in the primary fill of the main chamber.

The quayside

The quay was extended east, and possibly west, after AD 300 (Fig 3.34). The eastern extension (12661) comprised vertical timbers and only a few horizontal planks, while the western extension (12315 and 12375) comprised vertical timbers only, suggesting that the quay at these points was not revetted, but consisted of staging that was open underneath. The western extension comprised at least 13 posts positioned at approximately 1 m intervals. The piles were not lifted during excavation and so their full dimensions have not been recorded. Most, however, were round-sectioned, with the occasional square-sectioned post also evident. The timbers grouped as 12315 were driven into the natural river gravels. Another row of posts (12385), sunk 3 m south of 12315 and 12375, continued the alignment of 19643 and were presumably meant for identical use, probably to support horizontal planks or beams that formed the surface platform. Five or so intermediately-positioned posts were recorded, and these were behind a short row of four posts (12402) which projected into the channel. The extra posts at this point hint at the need to strengthen the quay structure, perhaps to accommodate machinery to load and unload cargo, or may simply have represented repair. A further ten or so vertical posts continued the line of the quay eastwards. Like the timbers in the original structure, these timbers were sunk through naturally-deposited alluvium into the gravels below. The area behind, or south of, the timbers was built up with dumps of clay and rubble, and posts that were likely to have supported the surface were driven through these deposits. Pottery from these dumps included bead-and-flanged dishes in Nene Valley colour-coated ware and a bowl (Young 1977, type C81) in Oxfordshire red colour-coated ware, pointing to deposition after AD 300.

The quayside saw major reconstruction work after AD 350. The putative timber platform that formed the surface was removed, and the vertical supporting timbers was cut down to the level of, or just above, the clay and rubble dumps. The level was then built up again with a considerable amount – up to 0.60 m thick – of building rubble and clay. The work brought the surface up to a height of *c* 1.70 m aOD (Pl 3.17) and about level with the ground surface as recorded at pit 12700 and the malting oven. (Whether the timber decking of the quay's previous phases extended to this height, or sloping gangways or steps were provided to give access from the quay to the villa beyond is uncertain.) The rubble dump was extensive, covering the entire quayside. That the rubble sealed the vertical timbers (which could serve no further practical use) confirms that the work belonged to a subsequent phase. The dating of this work is uncertain,

Plate 3.16 Malting oven 12591. Looking north

Plate 3.17 Quayside

as the dump deposit contained no pottery, but clearly it must belong to the 4th century or later. In the middle Saxon period, the rubble was pulled out into the channel as part of the alterations to the channel and construction of the mill pond (see Chap 7). The deposits that were laid as a result against the north face of the quay revetment contained pottery, including Hadham oxidised ware, late shelly ware, Tilford/Overwey ware, and late Roman grog-tempered ware, that pointed at an assemblage date within the second half of the 4th century. However, none of this material needs to have been associated with the quay, and, indeed, since the dump layer was devoid of pottery, these comparatively rich layers are more likely to have been taken from middens or demolition deposits from another part of the site; one deposit contained Saxon pottery and so cannot have been incorporated into the re-modelled quay during the Roman period. As a result of the Saxon work, this deposit underlay the earlier, probably Roman, deposit north of the quay revetment.

Villa Phase 7 (AD 380–410+)

The west range

A series of quarry pits (16810) was dug through the south end of the building (Fig 3.35). Together, the pits covered an area over 10 m across, obliterating the southern parts of internal walls (16579) and earlier

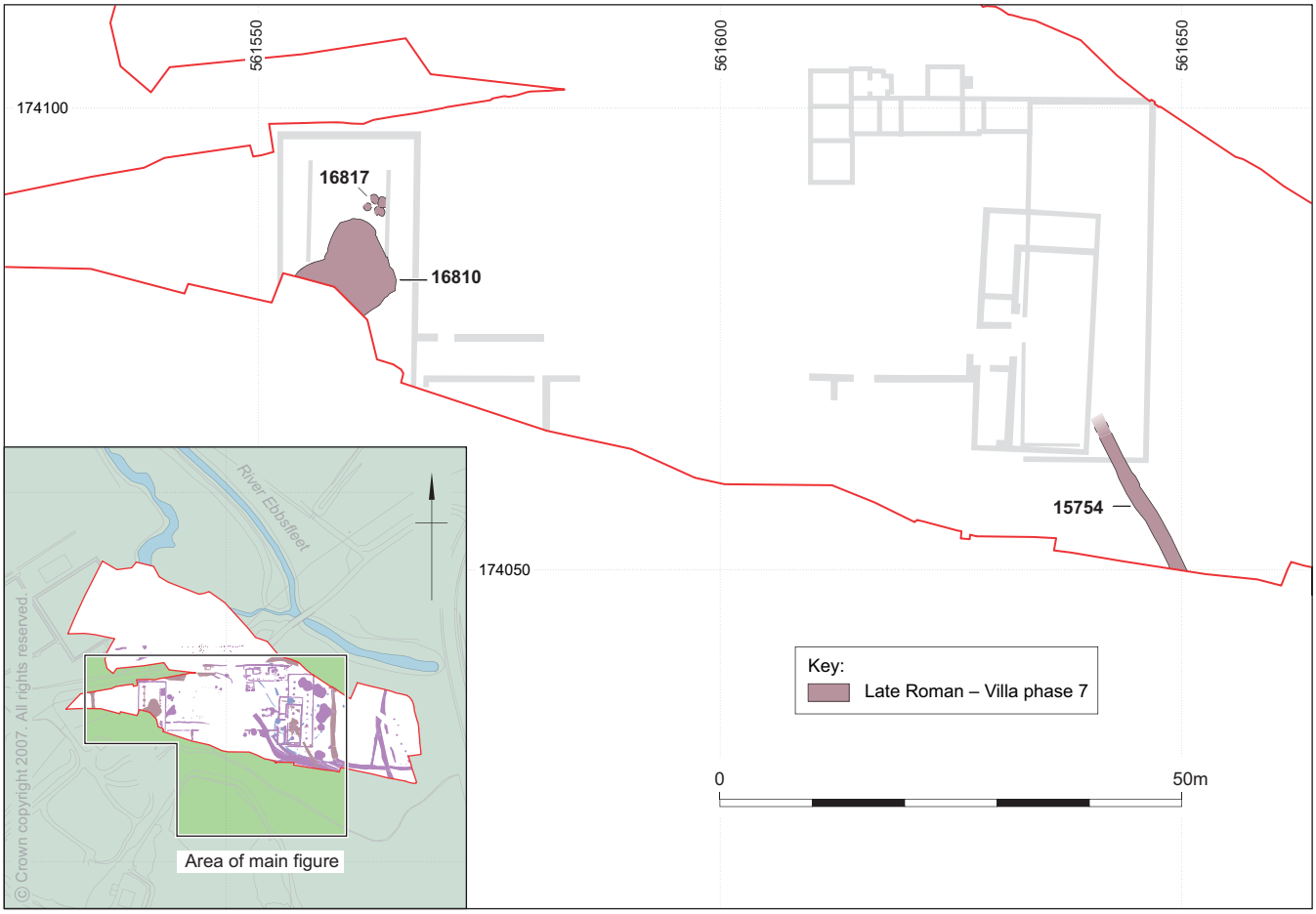

Figure 3.35 Plan of late Roman features, Villa Phase 7 (AD 350/80–410)

post-holes (16640). The pits were dug to a depth beyond 1.5 m, probably to reach sand beneath the clay subsoil. Once quarrying had ceased, the pits began to accumulate silty deposits that were devoid of finds and had formed naturally through weathering. The upper fills contained building and domestic debris, suggesting that demolition or robbing of the aisled structure did not immediately follow the abandonment of the building. The pit was capped by a layer of silt that contained 4th century pottery. This underlay a deposit of building and domestic debris that contained Anglo-Saxon pottery and must have been laid after 410. Smaller pits (16817) were dug in the north-eastern quarter of the building. These cut the building's post-holes and wall footings, and contained 4th century pottery. Function is uncertain, but the features seem to join the quarry pits in this phase of activity.

Much of the north-western quarter of the building that had escaped quarrying was covered by an extensive silty clay layer (16755; not illustrated). This was up to 0.20 m thick, but contained only a moderate quantity of building and domestic debris, and therefore represented a gradual accumulation of soil after abandonment perhaps equivalent to the lower deposits in the quarry. An *antoninianus* coin (AD 270–296) places this build-up within the late Roman period, with some 20 sherds of pottery, including Tilford/Overwey ware and gritty grog-tempered ware, suggesting a date after 325. Episodes of wall-collapse – particularly of external walls 10151 and 10153 – and dumping of domestic material followed, and accumulated up to a depth of 0.15 m. A *follis* of Valens – one of the latest coins from the site – gave a date of AD 364–378 or later, and this was confirmed by over 200 sherds of pottery that included late shelly ware, grog-tempered ware, Alice Holt grey ware and Oxfordshire wares and pointed to a date after 350.

The bath-house

The bath-house was completely abandoned after AD 380. A dark, silty layer accumulated on the floor of room 10509, and this contained a sherd of imported pottery (*céramique a l'éponge*) that arrived during the 4th century. The room was subsequently filled with mortar and plaster that fell from the walls; pottery recovered from these deposits included Tilford/Overwey ware, which dated after *c* 325. Other rooms (10508, 10624, and 10563) filled with collapsed building material, and this process continued – probably gradually – into the 5th century, as indicated by Anglo-Saxon pottery recovered from upper deposits. The bath-house proved a useful quarry, though, and material was deliberately robbed. Robber trenches 200170 and 200177 record the removal of water pipes from the west and east sides of the bath-house, while a trench was dug against wall 10258 from room 10624 and much of the stone robbed.

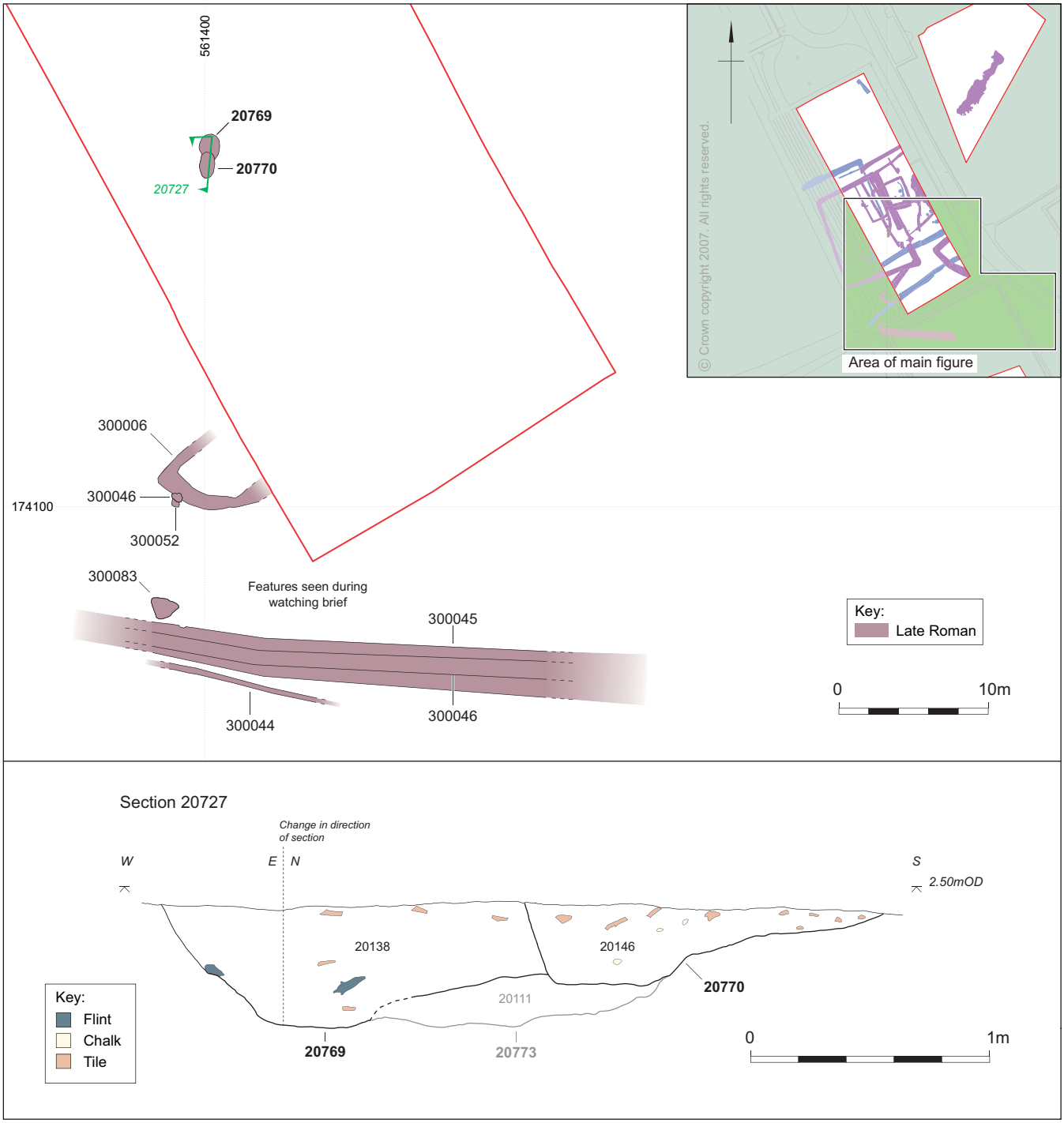

Figure 3.36 Plan of late Roman Western Roman Complex (AD 250–410)

A sherd of late Roman shelly ware from the trench suggests a date after AD 350 for the removal.

Ditch 15754

A ditch (15754) aligned NW–SE cut through room 16632 and the south-eastern corner of the eastern aisled building and truncated a band of earlier ditches, including the latest, 15753, which had filled by the late 2nd or early 3rd century. Ditch 15754 was at least 17 m long – its southern end extended beyond the edge of excavation – and appeared to terminate some 3 m inside the southern half of the building, though no terminus was recorded; it measured on average 1.30 m wide and 0.60 m deep and was filled with up to three silty clay deposits. The ceramic assemblage of 25 sherds recovered from the feature was dated as a whole to AD 170–200, though some pieces, including a handmade black-burnished ware flanged dish, dated up to 250/300. Even so, much of this is likely to be residual.

Colluvial build-up

Areas of the villa complex that had been abandoned or had never seen intensive occupation were subject to inundation by silty-clay hillwash. The process began during the life of the villa, for instance in the eastern and western parts, which were sparsely occupied and had

experienced little activity. While the villa stood, though, colluvial action was largely checked, and it was not until the late Roman period – probably towards the end of the 4th century – that larger areas succumbed. The process continued into the Anglo-Saxon period and was not stopped by the limited occupation that occurred at that time (see Chaps 5 and 7).

Western Roman Complex (AD 250–410)

by Daniel Stansbie

Late Roman activity was concentrated in the south-eastern part of the site and comprised several pits and ditches, mostly observed within the watching brief area (Fig 3.36). The most southerly of these features comprised a substantial ditch (300045) with a narrower recut (300046), flanked to the south-west by another ditch (300044) which extended across the site on an east–west axis. Ditch 300045 measured 26.40 m in length by 2.50 m in width and 0.66 m in depth. It was U-shaped in profile, having a rounded base and concave sides. The upper fill produced six sherds of late Roman grog-tempered pottery. The ditch was recut along its length by 300046, which measured 0.80 m in width by 0.26 m in depth and had a flat base with steeply sloping sides. Ditch 300044 was 11.36 m long, 0.34 m wide and 0.80 m deep, with a U-shaped profile.

Immediately north of ditch 300045 at its western end was a substantial tree-throw hole (300083), which produced a single body sherd of Oxfordshire colour-coated ware. This feature was supplemented by a curvilinear ditch (300006), further to the north, which was cut by a group of two pits (300050 and 300052). Ditch 300006 defined an approximate horseshoe, or part of a sub-rectangular enclosure in plan. It measured approximately 10 m in length by 1.10 m in width and 0.40 m in depth, and was U-shaped in profile, having a rounded base and steeply sloping sides. The upper fill of the ditch produced a single sherd of Thameside/Upchurch grey ware and three sherds of Oxfordshire colour-coated ware. Pit 300050 was sub-circular in plan, measured 0.76 m in diameter by 0.24 m in depth and had a rounded base with concave sides. Pit 300052 was sub-circular in plan and measured 0.56 m in diameter by 0.16 m in depth and had a rounded base, with concave sides.

In addition two intercutting pits, 20769 and 20770, lay just inside the entrance to the silted up late mid-Roman enclosure (20286). Pit 20769 was oval in plan, measuring 1.10 m in length by 0.50 m in width and 0.46 m in depth, with concave sides and an irregular base (Fig 3.36, section 20727). The pit produced 23 sherds of Roman pottery, including two sherds of Oxfordshire colour-coated ware and a sherd of East Gaulish samian, indicating that the pit must have been backfilled at some point in the mid to late third century or later. Pit 20770 was oval in plan and measured 1.50 m in length by 0.60 m in width and 0.30 m in depth. In profile the pit was U-shaped. The pit fill produced a mid-Roman pottery assemblage, including Central Gaulish samian ware, but given that pit 20770 cuts pit 20769 this must be viewed as residual.

Chapter 4

Curing Ails and Brewing Ales: the Story of Springhead and Northfleet from the Late Iron Age to Late Roman Period

The Development of Springhead

by Phil Andrews and Alex Smith

The results of the HS1 excavations undertaken at Springhead have added substantially to our knowledge of the small Roman town of *Vagniacis*, with its remarkable complex of temples, and the important prehistoric sequence that preceded it. Undoubtedly, ongoing and future fieldwork will provide further information and most probably change at least some of the interpretations that are presented here. However, the overall picture that we have at present is likely to stand the test of more rigorous interrogation, pending future large-scale excavations – though these are unlikely to be undertaken in the foreseeable future. Only relatively small pockets of archaeological deposits now remain to the north of the A2, and most of the much more extensive area surviving to the south is protected as a Scheduled Monument (SAM KE158), including the important central temple complex investigated by Penn and Harker between the 1950s and the 1980s (see, for example, Penn 1965; Harker 1980; Burnham and Wacher 1990, 192–8).

Prehistoric Background

The sequence of 'ritual' use of this part of the Ebbsfleet valley is of particular interest, beginning perhaps with the middle Bronze Age barrows adjacent to the springs. The prehistoric evidence that provides relevant background information to the Roman activity on the site – particularly the Sanctuary complex on ARC SPH00 – is, therefore, briefly outlined here.

A significant concentration of struck flint in fresh condition was found around the head of the Ebbsfleet in the vicinity of the now dried-up springs. Some of the material comprises long blades characteristic of a late Upper Palaeolithic industry and it seems likely that the concentration of struck flint represents a relatively undisturbed – though not *in situ* – knapping area. In contrast to this, there was very little from the entire site in terms of either features or finds that could be assigned a Neolithic date.

Two intercutting ring-ditches of middle Bronze Age date lay at the head of the valley, immediately adjacent to the former springs. These had been dug through the spread of late Upper Palaeolithic flint and underlay the Roman Sanctuary complex. Part of one of the ring-ditches had been eroded by an advancing springline and, although the remains of a central urned cremation burial survived, this had been substantially truncated by the early Roman road which lay in a shallow, linear hollow that had been cut through the area down to the water's edge. This burial probably had a small mound erected over it, but little trace survived the building of the Roman road. Furthermore, it is clear that neither of the two Bronze Age monuments would have been visible when the Roman Sanctuary complex was established, both having been buried beneath later Bronze Age colluvium.

A small cluster of late Bronze Age pits was found at the head of the Ebbsfleet, but these appeared to be isolated and there was a notable absence of any early or middle Iron Age features or finds. This absence has been highlighted during recent work in the immediate vicinity of Springhead which has revealed nothing of this date, confirming what appears to be a gap of perhaps a millennium between the late Bronze Age and the late Iron Age activity in the area, with no evidence for settlement in the upper part of the valley during the intervening period. Approximately 2 km to the south-east, however, evidence for settlement spanning the late Bronze Age and earlier part of the Iron Age has come from the HS1 section 1 and subsequent A2 re-routing works in the vicinity of Northumberland Bottom (Askew 2006; OA 2008a; 2008b), and excavations just to the north of the A2 have recorded part of a late Bronze Age droveway and associated settlement (Mudd 1994).

Iron Age Beginnings at Springhead

Together, the ceramic and coin evidence from the HS1 excavations indicates that there was little, if any, late Iron Age activity at Springhead prior to the last quarter of the 1st century BC at the earliest; indeed most of the finds can be accommodated within the first half of the 1st century AD. The few potins may have been old coins which remained in circulation, possibly into the 1st century AD, and the large number of struck bronzes confirm a late date for the start of late Iron Age activity at the site (see Holman, Vol 2, Chap 2). However, subsequent excavations on the high ground on the east side of the valley have uncovered at least one late Iron Age enclosure along with several potins but no later

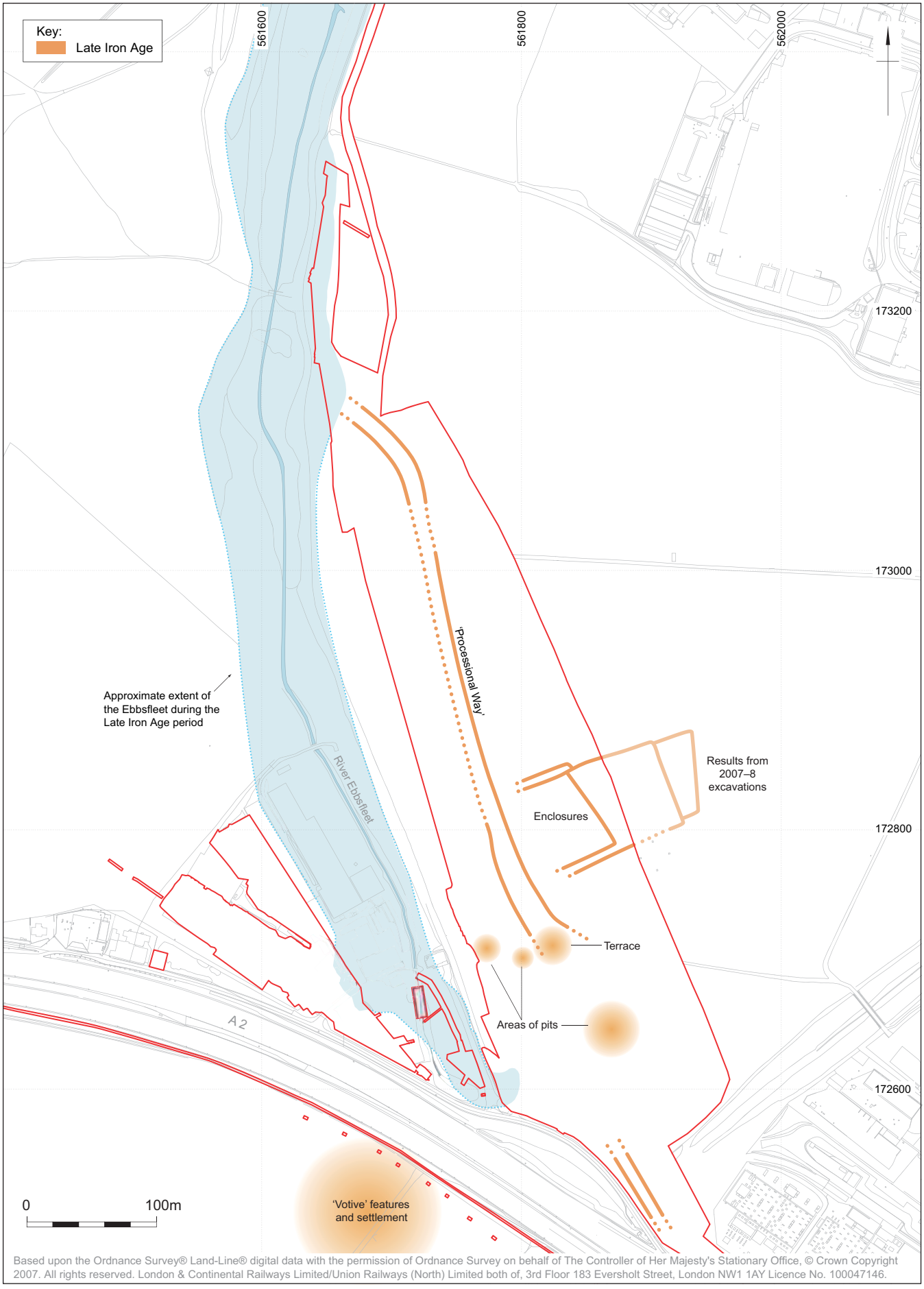

Figure 4.1 Interpretation of the late Iron Age landscape at Springhead

coins and it is likely, therefore, that there was a focus of slightly earlier, probably settlement related activity in this area which was not present within the area excavated for the HS1 (WA 2008). Furthermore, some evidence for broadly contemporaneous late Iron Age settlement has been found in earlier excavations to the south of the A2, below the principal Roman temple complex and the surrounding buildings, though it has been suggested that elements of this may be votive in character. That there was pre-Roman activity here was first stated by Harker (1980), and evidence to substantiate this was subsequently presented in an unpublished dissertation (French 1984). This suggested that there was late Iron Age settlement perhaps spanning the period from *c* 50 BC to the Conquest, as well as a possible precursor to the Roman temples there. Parts of several ditches and gullies as well as pits were recorded, but the limited areas exposed preclude more certain interpretation. What they and the HS1 excavations do show, however, is that there was late Iron Age activity prior to the Roman settlement at Springhead, as has been found at Canterbury where the possibility that this represents a sanctuary rather than an *oppidum* has been suggested (see Millett 2007, 140).

Excavations just over a kilometre to the east at Northumberland Bottom and, more recently, in advance of widening of the A2, have uncovered part of a large late Iron Age/early Roman enclosure, associated structural remains, and an important group of richly-furnished, high status cremation burials of mid-1st–early 2nd century date (OA 2008b). This complex of features represents a significant addition to the late Iron Age/early Roman landscape of this part of north Kent and is undoubtedly of relevance to what has been found at Springhead (see below), though their overall interpretation awaits further analysis. What might be remarked on here, however, is that there is increasing evidence to suggest that Springhead may have been an important place, possibly even a tribal centre, in this area of Kent during the late 1st century BC and first half of the 1st century AD. This was a period which saw increasing contacts between southern Britain and Gaul, particularly through trading, via the Thames estuary and especially the Wantsum channel in Kent (see landscape discussion below). Millett (2007, 146) has remarked that not only here but elsewhere around the Kent coast it appears that many settlements that became important centres during the Roman period and had late Iron Age origins were located on river estuaries or navigable rivers close to the coast. Springhead, at the head of the Ebbsfleet, fits this pattern, and Millett (2007, 148) has further ventured to advance the hypothesis that, 'we could relate individual social groups to each of the river valleys and perhaps see these as remaining focal in the later development of the settlement pattern in the Roman period'.

A ritual landscape?

The functions of many of the late Iron Age features excavated during the HS1 work at Springhead are, like those recorded in earlier investigations, difficult to interpret, though not in this case because the excavation area was limited in extent. None of the late Iron Age features clearly represents settlement or agricultural activity, and most if not all might be suggested to have had some association with a ritual or ceremonial use of this part of the landscape (see Fig 4.1). Nevertheless, the charred plant remains from some of these features attest to the importance of cereal cultivation, particularly spelt wheat and, to a lesser extent, emmer and barley, the accompanying weed species indicating that a range of soils was cultivated locally. Furthermore, the animal bone generally comprises a mixture of butchery and food waste deriving almost entirely from cattle, sheep/goat, and pig, with nothing present in the assemblage, apart from one structured deposit, that clearly attests to the suggested ritual use of the landscape.

The late Iron Age features and many of the finds recorded in the HS1 excavations came from the higher, eastern and south-eastern parts of the site, with few finds other than coins from the riverbed in the vicinity of the springs or in the immediately surrounding area, a distribution which is in marked contrast to that in the Roman period. Although as many as 25 of the 65 brooches from the spring area are of 'early' types, even the earliest would straddle the Conquest and it is possible that the deposition of brooches did not begin here until the second half of the 1st century AD (see Schuster, Vol 2, Chap 3).

Apart from the springs themselves, probably the most significant and possibly the primary feature in this part of the landscape is what has been interpreted as a 'ceremonial or processional way' (400010), the extent and alignment of which may have determined the location and layout of many of the other late Iron features on the site. It lay close to but not actually on the crest of the slope on the east side of the valley, and was defined by a pair of parallel, recut ditches which extended over a distance of 450 m. The ditch (and associated bank) on the upslope side may have been made larger in an attempt to control rainwater run-off and associated erosion which would have been a regular factor to contend with. A droveway for animals seems an unlikely interpretation for this feature given the moderate to fairly steep slope of this part of the valley side, and such a droveway could more easily have been constructed higher up on the flatter ground on or just beyond the edge of the valley. Furthermore, it ran parallel with the Ebbsfleet for most of its length and did not provide a link between any fields or enclosures, but led up from the edge of the river downstream, terminating at a point high up on the slope where the springs and the whole of the surrounding area below come into view. The 'view-shed' obtained at the southern end is thought likely to have been the pre-eminent factor in the layout of the 'processional way'. The precise spot where the pair of ditches terminated adjacent to the river could not be established, but there was a shallow embayment at this point which survives today as

a tree-fringed, almost pond-like area where the Ebbsfleet is wider. It is possible that some visitors to the site arrived by boat, disembarking here and then walking southwards along the 'processional way' while gradually ascending the valley side, which environmental evidence indicates supported short sward grassland.

Near the southern terminus of the 'processional way' were several groups of features, all of which are thought likely to have been broadly contemporaneous, though this cannot be demonstrated with certainty and their function(s) remains enigmatic. No certain structures have been identified, and though it is possible that evidence for these has been destroyed by erosion on the valley side this is not an altogether convincing explanation, particularly given their absence within the well-preserved sequence in the valley bottom and also on the higher, flatter ground to the east. One possible exception is terrace 400011 which lay just within the southern end of the 'processional way'. The precise nature of this putative structure is difficult to establish, but it may have had some form of roof and the collapsed turf wall is reminiscent of one of the later, Roman terraces or so-called 'viewing platforms'. An agricultural function can probably be ruled out and this feature too could have served as a 'viewing platform' for observing rituals which may have been conducted around the springs. Moderate quantities of pottery and animal bone were recovered from the fill, but there is nothing in the composition of the assemblages which serves to differentiate terrace 400011 from most other late Iron Age features and nothing which might be construed as a structured deposit.

Rather more pottery and animal bone came from the two largest pits which cut the east side of the 'processional way' and probably re-defined this part of the boundary after the ditch had silted up. The similarity in the pottery and animal bone assemblages from these pits indicates that they were probably filled at the same time and from the same source. The animal bone represents mixed butchery and food waste but the origin of this, in the apparent absence of structures, is unclear. Rectilinear enclosure 400012 lying perpendicular to the 'processional way' is the most likely candidate for the location of these, but there is nothing approaching a coherent building plan represented in the surviving post-holes, most of them undated (though one contained a potin), and not a single four-post structure or fence line can be discerned. Structures may have lain in the western third of the enclosure which occupied the crest of the slope and had suffered considerable erosion, but this is a particularly exposed location in inclement weather and does not seem a likely spot for buildings. Erosion along the crest of the slope had also removed the junction between the 'processional way' and enclosure 400012 and it not clear if there was any direct access between the two, though there were no gaps in the eastern ditch of the 'processional way' which might indicate an entrance.

The HS1 and subsequent excavations (WA 2008) have shown that enclosure 400012 was extended to the east on two occasions, over a total distance of 150 m, but, with the exception of a single possible round-house, in neither of these extensions were any structures certainly identified amongst the dispersed pattern of post-holes recorded. Enclosure 400112 might, therefore, be interpreted as having been used for corralling stock. However, the recent excavations have revealed what appear to be discrete deposits of pottery in various parts of the ditches, as well as several possible cremation burials, raising the possibility of a different or additional function for this enclosure. Also, from one part of the upper fill of the innermost and earliest ditch came seven brooches of mid-1st century date, at least some probably pre-Conquest, along with two silvered strap fittings and a possible amulet. Enclosure 400012 may, therefore, have served something less prosaic than an agricultural purpose, and the possibility remains that at least some of post-holes may, for example, have held totems of some form. Given the nature of the site at Springhead such alternative explanations should always be considered, and analysis of the more recently excavated material may help clarify the function of enclosure 400112.

The three groups of pits on the slope below the 'processional way' are also interpreted as having had a non-domestic function. This is largely on the basis of their location on the steeply sloping valley side, their spatial relationship to the other late Iron Age features and the lack of associated structures, though two or three possible post-holes may represent elements of a shelter or fence. At least two pits contained what may be fairly certainly interpreted as structured deposits, both comprising substantial parts of several pottery vessels, while an apparently isolated pit (3342) had been 'closed' with the burial of a horse. The animal bone from pit group 400016 was more numerous and somewhat different to the other groups of non-articulated material in that sheep/goat dominated and approximately half of the entire assemblage had been burnt, with most of the bones calcined. One possibility that might be suggested is that these remains derived from feasting activity on the slope overlooking the springs.

Perhaps the most enigmatic late Iron Age feature was a small part of a possible enclosure (400069), represented by a pair of ditches – one particularly substantial – which was constructed at the head of the Ebbsfleet and extended beyond the southern end of the site. This was apparently open on the north-west side, but the extent, layout, and function of this postulated enclosure remains a matter of considerable uncertainty which requires future investigation. One very tentative interpretation might be that the ditches defined a pre-Roman religious enclosure, of the type identified at Gosbecks, Colchester (Hull 1958, 263–4). Parts of a possible enclosure in this area have been identified during previous investigations at Springhead (see below), but though similarly aligned, the available evidence suggests that the early Roman date assigned to this is correct and that it was not part of enclosure 400069.

Of the 100 or so Iron Age coins recovered, the vast majority are likely to have been lost or deposited prior to the Conquest. The distribution of these coins is clearly focused on the springs and the valley side to the east, with very few coming from the west side of the Ebbsfleet, and although the nature of the activities which resulted in their loss is impossible to establish, some at least were probably ritually deposited. There is nothing clearly distinctive in the assemblage of coins from the springs themselves, though the slightly higher occurrence of plated examples is noted. Overall, it is only the number of coins and their distribution that indicates that their presence is likely to have been of some significance in the veneration of the springs, as may be the presence of the 'Arretine' vessels.

The head of the Ebbsfleet was modified in the early Roman period and so it is difficult to know how it appeared in the immediately preceding period. However, though dry today, it is likely that the calcium-rich water welled up to the surface in some quantity in several places (sufficient to support a watercress industry in the 19th and 20th centuries; see Chap. 5) forming what in effect was a 'pool', perhaps fringed in places by sedges, reeds, and rushes, with grassland beyond this.

In summary, therefore, the topography, layout of features, and distribution of finds, particularly coins, is suggested to reflect a ritual use of this part of the landscape in the absence of any clear evidence for settlement here. Furthermore, though it appears that the springs and immediately surrounding area were not specifically utilised until the Roman period, the lack of structural evidence (and other features) does not mean that the springs did not form a focus in the ritual landscape. Rather, the nature and use of this focus may have been different in the late Iron Age from what it became in the Roman period.

Early Roman Activity Around the Springs and Eastern Valley

Small quantities of Roman pottery and occasionally metalwork were recovered from the upper fills of several of the late Iron Age features, but there is no certain evidence for continuity in their use. Nevertheless, the banks, if not the ditches, associated with both 'ceremonial way' 400010 and enclosure 400012 are likely to have remained as clearly visible features in the landscape at the time of the Conquest. Furthermore, it is possible that at least part of the bank(s) belonging to postulated enclosure 400069 was slighted and the ditches backfilled to make way for a new enclosure around the middle of the 1st century AD (Fig 4.2).

Early road and enclosure

The first Roman activity appears to have been focused around the head of the Ebbsfleet, an area apparently devoid of late Iron Age features, with the earliest post-Conquest samian (including the five Claudian vessels) and a concentration of Claudian coins from here. The excavations have demonstrated that the Ebbsfleet was shallow but wide in this area, as it appears to have been for most of its short length, the edges marshy and dominated by sedges, reeds, and rushes, but with no evidence for saltmarsh or brackish water this far upstream. The appellation *Vagniacis*, with its indication of a marshy place, would certainly have been appropriate. How much of the Ebbsfleet was tidal may be established by ongoing borehole and associated palaeo-environmental work, which has revealed that approximately 1 km downstream from the springs the water is 1–2 m deep in a channel now containing peat and other deposits up to 4 m thick. What, if any, impact the 19th century watercress beds had in this area is unclear, and the date of the deposits here remains to be established, though a post-Roman date for a considerable part is likely on the basis of the results of analysis of channel-edge deposits (see Barnett and Stafford, Vol 3, Chap 3). Penn (1965, 113) remarks that the creek was navigable until 1939, and it is suggested that a landing place was established at the head of the Ebbsfleet early in the Roman period, accessible by small, shallow draught vessels that could have travelled up river from the Thames approximately 3 km distant, perhaps with goods and people having been transferred from larger vessels at the Northfleet villa site or nearer the mouth of the river.

There is evidence that the Ebbsfleet had been cleaned-out in the vicinity of the springs early in the Roman period and a compact layer of gravel laid down to consolidate and perhaps control the riverbed in order to provide a small landing place. The HS1 excavations have clearly demonstrated that, contrary to previous assertions (eg, Penn 1965, 113), the bed of the river in this area had not been cleared of all earlier deposits and filled with concrete just prior to 1939. Furthermore, the flint revetment of possible Roman date recorded in the earlier excavations is most likely to have been the remains of 19th century watercress beds, while the 'metalled road' which surrounded the water here was probably an exposure of natural gravel or the material laid down to consolidate the riverbed in the Roman period. However, a short length of Roman road (300017) was found in the HS1 excavations (see Chap. 2, Fig 2.14). This led to the south-east from the landing place at the head of the river, towards what may have been the north-east corner of a newly established square or rectangular enclosure, appearing to turn to the west along the front of this enclosure. Finds from the metalled surface, including seven brooches, indicate a pre-Flavian date for this road, with several burials alongside assigned to the middle–late 1st century AD.

Like its possible late Iron Age predecessor, little is known of the new enclosure, represented by ditch 300021, but further lengths of probably the same ditch were recorded during the watching brief and also in earlier excavations (Penn 1965, 116; Harker 1969; V Smith 2004, 4; see also Burnham and Wacher 1990, fig 59). These suggest that the enclosure was broadly aligned on the head of the Ebbsfleet, measured 150 m in

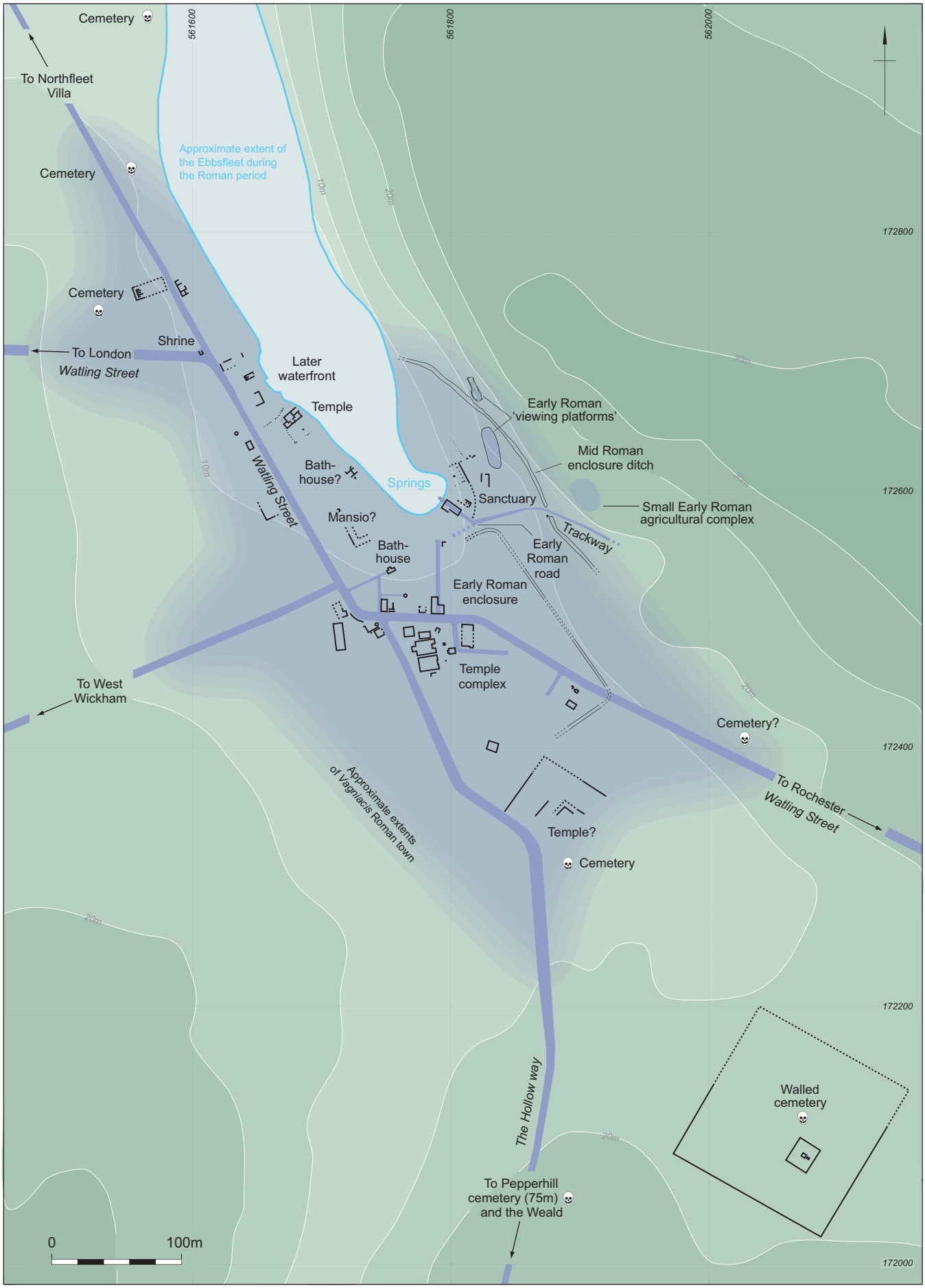

Figure 4.2 Interpretation of the Springhead Roman settlement and religious complex

one direction (north-west to south-east; the other not established), in places had a V-shaped profile and that one corner at least may have been rounded (Fig 4.2). Unfortunately, the internal arrangements remain completely unknown, the interior lying beneath the A2, a railway embankment, or within the Scheduled Area. Of particular interest is its relationship to Watling Street which crosses the enclosure on a diagonal alignment and passes through the projected location of the south-east corner (now beneath the A2) and possibly also the north-west corner. This layout makes it unlikely that the two were contemporaneous, unless this enclosure was deliberately built astride a pre-existing Iron Age route, perhaps at its junction with another track that ran south towards the Weald. Whichever was the case, an early date is proposed for the enclosure, which must have been in use for only a very short period before it was abandoned and built over, presumably when Watling Street became established as a Roman road.

The chalk quarry pits immediately to the south-east of the road linking the waterfront and the enclosure may have been opened as part of this early development, as may the brickearth quarry pits higher up on the valley side (see Chap. 2, Fig 2.14). Chalk would have provided, for example, consolidation material for roads and yards (none was incorporated in the early road, but it was used elsewhere), as well as being used in the foundations and floors of buildings, while brickearth would have provided material for daub. The source of the gravel used on this and other roads and surfaces has not been established, but it is likely to have been nearby, some perhaps coming from the gravels capping the high ground on the east side of the valley.

In summary, the rather tenuous evidence appears to indicate that an enclosure was established at a strategic location at the head of the Ebbsfleet early in the Roman period, perhaps at the junction of two pre-existing routes and only a short distance by water from the Thames. The presence of freshwater springs at this point would have provided an additional attraction. This enclosure lay between the Roman river crossings on the Darent and Cray (possibly the site of *Noviomagus*) to the west, and the Medway at Rochester (*Durobrivae*) to the east. Such an enclosure might be interpreted as having a military association, perhaps as a small fort or temporary supply base, an interpretation that has been proposed by previous excavators (but see Millett 2007, 150). One might note here that there is increasing evidence for Springhead having been an Iron Age centre of some form, with settlement and ritual activity attested, as well as the recently discovered high status burials a kilometre or so to the east (OA 2008b; see above). Could it be that there was very short-term military occupation to oversee this postulated Iron Age centre, before administrative control was passed to a local pro-Roman aristocrat who subsequently took charge of the area on Rome's behalf? There is little if anything amongst the finds assemblage which helps in this respect and the presence of, for example, several armilla (Conquest period military award) fragments might simply indicate that soldiers passing through Springhead may have lost or deposited such items. These and several other military items need not, therefore, be taken as evidence for a more permanent though short-lived military presence at the site, although the mid–late 1st century *busta* at Pepper Hill cemetery do suggest that a military community from the Rhineland/Danube regions was stationed in the area (Biddulph 2006c). Indeed, as Millett (2007, 150) remarks, 'the short term presence of soldiers at strategic locations, for instance at Canterbury or at sites along Watling Street, would not be surprising even if clear evidence has to date not been forthcoming'. At present, however, the function of the postulated early enclosure cannot be resolved and must await any future investigation within the Scheduled Area.

Ritual activity?

During this early period there is some evidence to suggest that there might have been further ritual activity on the site, including in the vicinity of the springs, though the nature of this was apparently different to that seen in the late Iron Age. Whether this activity followed or overlapped with the use of the early road and possibly associated enclosure is impossible to establish. Of particular note is the large number of brooches dating mainly to the second half of the 1st century AD, but also including some earlier (and some later) types, which were found within the 'pool' at the head of the river. There are too many to be explained as accidental losses and it is considered most likely that these were deliberately deposited, this form of deposition involving brooches perhaps being introduced only after the Conquest. Attention is drawn below to several structures and features that were possibly associated with this postulated early Roman phase of ritual activity, but establishing relationships between them is difficult when they are scattered and there are no stratigraphic links.

Firstly, there is the question of the function of the three successive circular structures – presumably round-houses – and associated features immediately to the north of the early road, the earliest of which is likely to have been contemporary with the road (see Chap. 2, Fig 2.21). These structures are interpreted as bakeries, on the basis of the associated hearths and ovens, and a domestic function is perhaps most likely, particularly given the presence of a cluster of rubbish pits nearby, with others scattered around the east side of the springs towards the base of the slope. However, the structures appear to have been relatively isolated, stood close to the springs, and burials were being made alongside the road to the south. Finds included six brooches dated to the second half of the 1st century, and a horse skull had been placed on the edge of the floor within one. Perhaps the possibility should be considered that one or more of these structures might have functioned as some form of shrine with baking, or rather bread, forming some part of a ritual that took place there.

The two so-called 'viewing platforms' on the slope overlooking the springs on the east side of the valley also appear to have had their origins during the second half

of the 1st century, perhaps nearer AD 50 than 100 (Fig 4.2). Like the possible late Iron Age example, their location, form, and fills, including large quantities of finds, make it improbable that they were agricultural terraces or house platforms, and perhaps these too may have served some ritual purpose within the landscape.

Colluvial deposits indicate that the slope was relatively unstable, sparsely vegetated, and probably grassland when these 'viewing platforms' were created. Whether any form of structure was erected within them is unclear, though one appears to have had a turf revetment at the rear, as is also suggested for the late Iron Age example, and the other had a rather irregular pattern of post-holes perhaps associated with a fence or screen. In neither case, however, is there any evidence for them having been roofed. Both contained ovens and 400045 (the southernmost platform) had a cluster of several neonate burials in the base, perhaps partly enclosed by a fence or screen that may have served to define an area where different activities were taking place on the terrace. Another possible indicator of their use comes from the larger southernmost example, for this produced a large quantity of animal bone, probably representing food waste, and this suggests that the terrace may have been the focus of feasting activity. A notable concentration of brooches, mainly post-Conquest types, is also likely to be of significance in terms of the likely early date of this 'viewing platform', the use of which was seen to continue into the second half of the 2nd century.

On the top of the hill there is some evidence in the form of a concentration of metalwork and pottery in the upper part of one of the ditches, as well as a few post-holes, which suggests that late Iron Age enclosure 400012 may have seen some use after the Conquest, though the nature of this is unclear. A square arrangement of shallow ditches in one corner of part of the enclosure has been provisionally assigned a Roman date and may have been associated with this later use (WA 2008). Apart from this, there is a cluster of three burials (which may pre-date the Conquest) and only a handful of sherds of Roman date from elsewhere in the extensive investigations in this area (*ibid*). What is particularly notable here and elsewhere immediately surrounding the Roman settlement at Springhead is the apparent absence of field systems and agricultural enclosures. Certainly, the extensive HS1 investigations as well as earlier and more recent excavations have failed to identify any ditches that may have defined such systems or enclosures.

There is a variety of other early Roman features, mainly pits, and occasional structures scattered across the eastern side of the valley, mainly towards the valley bottom or on the more moderate slopes, but there is no evidence for any of these having had any ritual function. One might note here that Dunkin (1848) refers to features (presumably visible) on the slope on the east side of the Ebbsfleet valley as 'habitations of the aboriginals'. Where precisely these were, what form they took and their date are unknown, but it is just possible that they were the flint and chalk footings of Roman structures, exposed as a result of hillwash, and subsequently recorded in the HS1 excavations.

Post-road development

The early Roman road extending south-east from the springs remained in use for only a short period, perhaps no longer than a decade or two, the associated burials indicating a date around the end of the third quarter of the 1st century AD for its disuse. Presumably the landing place here also became redundant, though a new landing place may have become established on the west side of the Ebbsfleet at this time (see below). Following this, there was a clear change in both the layout and use of the area in the immediate vicinity of the springs, and no element of the postulated early enclosure appears to have been preserved in the subsequent plan of the settlement. The road was fairly rapidly buried beneath up to a metre of generally homogeneous dark soil that must have been imported from elsewhere in the settlement to raise and level the ground. This deposit contained large amounts of pottery and animal bone and was probably domestic in origin, though there were five mid–later 1st century AD brooches amongst the metalwork recovered. The nature of the material, which appears to represent rubbish, provokes questions of its suitability for levelling purposes and why this area was apparently deliberately raised, for it preceded the construction of the Sanctuary complex by several decades.

What was happening in the vicinity of the springs at this time? Perhaps the second, and later the third of the sequence of circular structures noted above was standing adjacent to the abandoned road, while overlying the infill deposits on the west side was a sequence of three further structures (see Chap. 2, Fig 2.19). These were sub-square or rectangular in plan, with a path that followed the line of the earlier road and led to the springs. The second structure of this latter sequence has been identified as a smithy, the functions of the other two remain unknown, but the evidence suggests that the post-road, pre-sanctuary use of the area around the springs was settlement rather than ritual related. It is salutary to remember that had the well-preserved and clearly defined clay floors not survived, there would have been little or no evidence for the existence of these buildings given the paucity of structural features such as post-holes.

There appeared to be no property or plot boundaries and little if any organisation in the layout of structures here, presumably reflecting the topography – including the presence of the springs – and their peripheral location in relation to the developing settlement. Trackway 300045 running down slope from the south-east passed immediately to the south of this group of structures and also close to what was probably a small agricultural complex on the higher ground above which included at least one structure along with a crop dryer

Plate 4.1 Artist's reconstruction of the mid-Roman temple, 400035, and central part of the Sanctuary complex (ARC SPH00). Looking east (Thomas A Goskar)

(Fig 4.2). Unusually, this crop dryer was associated with free-threshing rather than spelt wheat, a crop thought to have been largely absent during the late Iron Age and Roman periods, while crop dryers themselves are rare in the early Roman period.

The 2nd Century Sanctuary Complex

The Sanctuary complex represents a significant discovery, perhaps unparalleled elsewhere in Britain, although Bath, Buxton, and Coventina's Well at Carrawburgh provide other examples of specialised religious sites associated with springs (Burnham and Wacher 1990, 165–78; Allason-Jones and McKay 1985). Other spring shrines/temples include a possible shrine outside Silchester (Boon 1974, 159) and a temple at Dean Hall in Gloucestershire, where the spring appears to have been contained within the actual temple *cella* (Jones and Mattingly 1990, 292). On the Continent, one might most usefully look to Gaul for comparable sanctuary arrangements focused around springs or water, such as the healing sanctuary at *Fontes Sequanae* in Burgundy, which was focused around the source of the River Seine (Green 1999). The complex at Springhead is especially important for the range of structures and associated features that were recorded, both within the complex itself as well as in the surrounding landscape. It is thought likely that most of the complex was exposed in the excavation, along with a large part of the adjacent waterfront around the former springs, and it is clear from this that topography was a very important element in its setting. Furthermore, the quantity of finds, particularly metalwork, recovered from the riverbed, has provided important information on the nature and use of the Sanctuary complex which seems to have been largely confined to the second half of the 2nd century, though some activity may have continued into the 4th century (see below).

The head of the river was enclosed on the eastern side by a substantial, curving ditch approximately 200 m long that lay approximately halfway up the slope (Fig 4.2). This appears to have been laid out so as to define an area around the springs, in this case a sanctuary *temenos*, rather than, for example, to serve a defensive function. A single east-facing entrance approximately 8 m wide was identified, and the ditch terminated 45 m to the south-east of this. The fact that all of the late Iron Age features lay outside and upslope of this enclosing ditch must be purely coincidental as a period of almost a century separated these from the development of the Sanctuary complex.

In the immediate vicinity of the springs there was a further change in the layout and use of the area, though it is just possible that the latest of the three clay-floored circular structures was retained as part of the Sanctuary complex, at least for a short period. If so, then this might support the suggestion that these structures may have served some ritual purpose.

What appears to have been the principal building, probably a shrine or temple, overlooked what was in effect a large pool formed by the springs at the head of the Ebbsfleet (see artist's reconstruction in Pl 4.1). The appearance of this structure is difficult to ascertain,

despite the entire ground plan being exposed. There may have been a monumental façade on the north-west side facing the pool at the head of the Ebbsfleet, both the façade and the pool probably visible to travellers approaching Springhead from the west along Watling Street. The 'columns' along either side were square and perhaps built in timber and rubble with plaster faces, the intervening spaces possibly infilled so that the interior was partially or fully enclosed. The interior was covered by a pebble surface, and the absence of roof tile is likely to reflect a thatched or shingled roof. No evidence for any internal structures or features was identified, and no finds have been recognised which might reflect the use of the building. Its interpretation as a temple rests primarily with its location in the heart of the Sanctuary complex overlooking the springs, and the fact that it was the most substantial building in the area. However, alternative functions certainly cannot be ruled out. Immediately to the north-east, and almost certainly directly associated with the structure, were two parallel lines of substantial post-holes which may have marked some form of ambulatory, aisle, fence, or screen. One of these lines of post-holes extended to the rear boundary of the complex and may have served to separate or screen activities within different parts of it. The large quantity of roller-stamped daub and arrangement of post-holes can, however, be suggested to indicate a colonnade supporting an upper storey to this part of the structure.

To the rear of the temple was a rectangular plank-lined pit or tank that would have held water, perhaps for ritual washing or a similar use, while in front was a large hearth, which seems to have been contemporary with it. Beyond this the ground sloped down to the water's edge, probably covered in grass as there was no indication for any more formal arrangement, such as steps, nor for any timber or stone revetments.

East of the temple was a small, rectangular, timber building which replaced the latest of the three clay-floored circular structures (see Chap. 2, Fig 2.28). Whether this structure was a bakery, a possibility suggested for at least one of its predecessors, is unknown. A bakery was found during the earlier excavations of the main temple complex to the south-west of Watling Street, and it was suggested that bread might have been moulded into various shapes, for example fingers, and ritually cast into the sacred flame (Penn nd, 18).

The extent of the central part of the Sanctuary complex was defined to the south-east by a semi-circular arrangement of post-holes, probably representing a fence, which effectively enclosed it. There is some evidence to suggest that there was an entrance to the Sanctuary complex from the south-east via a trackway which ran down the hillside from the east (Fig 4.2). However, it is fairly certain that what may have been the principal entrance lay on the south-west side (outside the limit of excavation) where earlier excavations indicate the existence of a street leading to the Sanctuary complex from Watling Street. To the north and north-east the central part of the complex was defined by a pit alignment and 'portico' structure.

North of the temple was the 'portico' structure, perhaps a shrine or another temple, facing the Ebbsfleet to the west. It had a stone wall almost 20 m long to the rear and a line of five substantial post-holes along the front, though its precise form remains unclear. No exact parallels exist for this building in terms of Romano-British religious sites, although a long corridor (with possible portico) building next to the temple at Lydney Park may have been similar in some sense. This was interpreted as a sacred sleeping area based on analogy with the *abaton* within the great healing sanctuary at Epidauros (Wheeler and Wheeler 1932, 51), although it could have been used for other purposes such as shops, notice boards, or the display of statues and/or offerings. A contemporaneous tree-throw hole in a central position in front of it provides persuasive evidence for the existence of a sacred tree. Around this were several shallow pits, one containing a horse skull. One or possibly two fence lines are also indicated in this area, perhaps representing internal divisions within this part of the Sanctuary complex. The northern boundary to the complex was defined by a pit alignment extending up the slope, including two pits almost 3.5 m deep that contained a number of dog burials (see below). What remains unclear is the source of the large quantities of what appears to be domestic debris that filled the majority of these pits, for no domestic buildings have been identified in the vicinity (see below). A further post-hole alignment extended approximately 25 m to the north of this pit alignment and in all probability was also associated with the complex. A small, rectangular rubble footing or stone pad approximately 15 m to the west of the pit alignment, on a slightly raised area just above the water level, may conceivably have supported a small statue. This feature perhaps marked the northern limit of the Sanctuary complex on the edge of the Ebbsfleet channel.

Excavation coupled with metal-detecting within the bed of the Ebbsfleet recovered a substantial quantity of coins, a large number of brooches, and numerous other, almost exclusively metal finds spanning the 1st–4th centuries. Many of these finds are likely to represent items deliberately deposited within the shallow 'pool' directly in front of the Sanctuary complex, created by a series of springs upwelling at the surface in this area. However, apart from their number, there is nothing in the make-up of the coin assemblage that characterises it as a 'temple assemblage' (see Cooke, Vol 2, Chap 2) and, similarly, it is the presence of the brooches in the riverbed here rather than anything particularly distinctive in the brooch assemblage that suggests that they were votive. The date range of the coins extends considerably beyond the period of use of the Sanctuary complex as it is currently understood, as this appears to have been abandoned around the end of the 2nd century. Interestingly the peaks of deposition, based upon intrinsic artefact/coin dating (1st and 4th centuries), also lie outside the main period of use of

the Sanctuary complex. This implies that whatever circumstances led to the construction of the Sanctuary also led to changes in cult ritual. Perhaps associated with the later use of this area were remnants of a cobbled surface around the edge of the water, possibly used to consolidate the riverbank to provide access to allow deposition or other activities to be enacted there.

Beyond the Sanctuary complex, on the south-west facing slope overlooking the site, were a number of other features which reflect the ritual focus around the springs. From the entrance in the north-east side of the Sanctuary complex a trackway led up the slope and through the entrance in the enclosing ditch. Immediately adjacent to the southern terminal forming this entrance was a 'ritual shaft' approximately 4.5 m deep that contained an unusual sequence of 'structured deposits'. These included at least 20 dogs, several buried with their chains, a number of near-complete pots, a human skull, a group of animal skulls, and a pig, raven, goose, domestic fowl and cow placed in the bottom of the shaft (see Grimm, Vol 3, Chap 2; Fig 2.55). This was the only feature on site that is interpreted as a ritual shaft and its location by the entrance in the enclosing ditch must have been a deliberate choice, reflecting the widespread practice of placing an emphasis on the entrance (including specific rituals) into the sacred site (A Smith 2001, 153). Nevertheless, the remainder of the fill contained material that showed no obvious differences from that which is normally interpreted as domestic debris.

There are also several pits which on the basis of their physical characteristics (ie, relatively deep and narrow) and also, in some cases, their contents (eg, dog and other animal burials, large deposits of pottery) and location (eg, pit alignment 300073 within the Sanctuary complex), make them candidates for 'ritual shafts'. The most obvious examples are pits 2214, 2227, 2236, and 2958 in pit alignment 300073, and possibly also pit 2420 within building 400054. Some dene holes too which may have been open in the early–mid-Roman period might also be considered as a form of 'ritual shaft'. Of course this depends on the way they were perceived at the time, but they could have been seen as potential routes of communication with chthonic deities. Dene hole 2706 and possible well 5224, both within the Sanctuary complex, and dene hole 3646 just outside but adjacent to trackway 300045, might be placed in this category.

Ritual pits and shafts have a strong and widespread tradition in Iron Age and Roman contexts, especially in south-east Britain (Webster 1997). In Kent in particular there are many examples of pits and/or shafts filled with structured deposits including animal burials and pottery, such as at Aylesford, Bekesbourne, Crayford, Greenhithe, and Northfleet (*ibid*, 141–2; Wait 1985, 322–44). Dog burials are especially common in some of these deposits, occurring, for example, in eight ritual pits or shafts from a villa site at Keston in north-west Kent (Philp 1999, 21). Black (2008, 2–8) has suggested that these pit deposits containing dog burials may be associated with the Gallic god Sucellos, patron of craftsmen and the underworld (see below).

Lying between the outer enclosure ditch and inner Sanctuary complex were several post-holes approximately 1 m in diameter which, from the surviving post-sockets, could be seen to have held substantial posts. These post-holes formed no clear pattern and are perhaps best interpreted as having held free-standing timber posts, perhaps supporting statues. In the same area was a rectangular building (400054) at least 12 m long and approximately 5 m wide defined by a series of timber slots. This building had suffered from some erosion and its function remains unclear, although its location suggests that it was probably associated with the Sanctuary complex.

Higher up, cut into the slope, and overlooking the Sanctuary complex, the two large terraces interpreted as 'feasting or viewing platforms' continued in use, though the nature of this may have changed, the southernmost example having a rectangular structure containing an oven built into the top.

The Roadside Settlement West of the Ebbsfleet in the Early to Mid-Roman Period

In contrast to the evidence for peripheral and rather dispersed early Roman settlement recorded on the Sanctuary site at the head and to the east of the Ebbsfleet, the Roadside Settlement to the west, which lay astride Watling Street, showed a more regular layout of clearly defined properties. This can in large part be attributed to topographic factors, the Roadside Settlement occupying a flatter, gently sloping area and not constrained by the steep slope of the east side of the valley (see Fig 4.2). In this respect, it is surely significant that in contrast to the east, no late Iron Age features were identified pre-dating the Roman settlement on the west side of the Ebbsfleet and there were very few finds of Iron Age date from the area. The earliest Roman settlement here has been assigned to the middle of the 1st century AD, the pottery, coins, and metalwork, particularly the brooches, suggesting that this probably began at a very slightly later date than at the head of the Ebbsfleet. This reflects the start of a period of economic prosperity that became widespread in the late 1st century, the establishment of Watling Street – probably in place by AD 50, though likely following a pre-existing route – providing both a focus and impetus for such development. By chance rather than design the area covered by the Roadside Settlement excavation has allowed investigation of a 'slice' of Springhead either side of Watling Street and extending from the periphery to near the centre of the settlement. In this it allows comparison with the recently investigated rural roadside settlement at Westhawk Farm near Ashford, Kent, where a partly planned layout is apparent with some regular plots and other, more irregular enclosures and spaces alongside the main road (Booth *et al* 2008).

Streets

Watling Street appears to have been the primary Roman feature on the west side of the Ebbsfleet. The evidence from the roadside ditches shows these were extended progressively to the north-west, presumably as the settlement expanded, and that this probably happened over a very short period of time, perhaps no more than one or two decades. Furthermore, the branch road to the north-west was clearly part of this early development, rather than a later addition, the roadside ditches and metalled surfaces being continuous with those on Watling Street. Of particular significance is that as a result of the HS1 excavations, the former uncertainty concerning the route of Watling Street through the settlement has now been resolved. There were several changes in the road's alignment, taking it around the marshy area at the head of the Ebbsfleet, before continuing west towards London via the Darent and Cray crossings and east towards Rochester and the Medway crossing.

From the HS1 and previous work at Springhead it seems clear that the 'junction' of Watling Street and the head of the Ebbsfleet was the focal point around which settlement developed with the main, central temple complex established near to this focal point. Watling Street was the principal determining feature in the layout of what became a typical, somewhat elongated 'roadside settlement', with the other roads of lesser importance in this respect.

The branch road to the north-west led out of the settlement towards the site of a square enclosure which surrounded a structure with rubble footings approximately 2 km away on the higher ground at Swanscombe, the function of this complex remaining uncertain (see Fig 4.9 below). Much of the intervening area between Springhead and this site has been destroyed by chalk quarrying and thus the precise route of the branch road remains uncertain. There is no evidence that it led directly to the villa site at Northfleet, and it seems probable that this must have been served by a further road which diverged from the branch road but whose course also remains uncertain. Nearer to the Thames, the branch road may have turned to the west and followed a course along the south bank of the river.

Running south from Springhead was a road that ran towards the North Downs and the Weald (see Davis 1994), an important source of iron in the Roman period. At the moment there is no evidence that this road was of more than minor local significance, though the presence of the Pepper Hill cemetery alongside it is notable and may signify a greater importance. The somewhat sinuous course that this road appears to follow may be a reflection of a pre-Roman origin though this remains speculative. Earlier excavations revealed two lengths of this road (Philp and Chenery 1997; Biddulph 2006c), just within and beyond the edge of the settlement, though the location of its junction with Watling Street has not been ascertained and its postulated route along the west side of the main temple complex (see Fig 4.2) remains to be demonstrated.

In addition to Watling Street, the branch road to the north-west, and the one to the south, there may have been one other road which extended beyond the limit of the settlement. This ran south-west from Watling Street, broadly in the direction of the newly-discovered Roman settlement at West Wickam recently suggested to be the site of *Noviomagus* (Philp 2000; Fig 4.2). The evidence for this road comes largely from a cropmark recorded on aerial photographs (see Burnham and Wacher 1990, figs 59–60; Harker 1980, 286), although earlier investigations have proved inconclusive in demonstrating its existence. The possibility that this was a ditch (or upcast from an associated bank) pre-dating Watling Street, rather than a road, has been considered. However, the nature and appearance of the cropmark, which is very similar to that of Watling Street, makes a road the most likely interpretation. Furthermore, the cropmark is only visible on the south-west side of Watling Street, with no evidence for it continuing to the north-east as might be expected if it was reflecting an earlier ditch.

Evidence for other streets at Springhead, within the settlement, is limited, with most of those recorded so far being in the vicinity of the central, main temple complex. These streets do not extend far, are sometimes narrow, and appear to have been constructed on a pragmatic basis to provide access to particular elements of the settlement. Though most are roughly perpendicular or parallel to the principal roads, there is no indication of any overall, regular plan in the street layout, such as is found in more 'urban' settlements.

In addition to the actual streets, the Ebbsfleet River itself would have allowed access by water to Springhead. The early development of the waterfront at the head of the river has been discussed above, and perhaps overlapping with the use of this was the waterfront in properties 2 and 3 of the Roadside Settlement (Fig 4.2). Whether this simply served the requirements of these two properties is unknown, but a path possibly linking both with Watling Street may have allowed at least small numbers of pilgrims and visitors to visit Springhead by boat.

Properties

The excavation of a substantial area on the west side of the Ebbsfleet provided the opportunity to examine the layout of a significant part of the Roadside Settlement extending more than 150 m from close to its centre as far as the northern periphery (Fig 4.3). Various evaluations have confirmed the extent of the settlement in this area and have shown that possibly a further two or three properties may lie along either side of Watling Street beyond the limit of the HS1 excavations. This area will be the subject of future excavations in advance of proposed development, and thereby complete the plan of this part of Springhead.

All of the 12 properties identified during the HS1 work were aligned with and fronted onto either Watling Street or the branch road to the north-west. Surprisingly, perhaps, it was the alignment of the branch

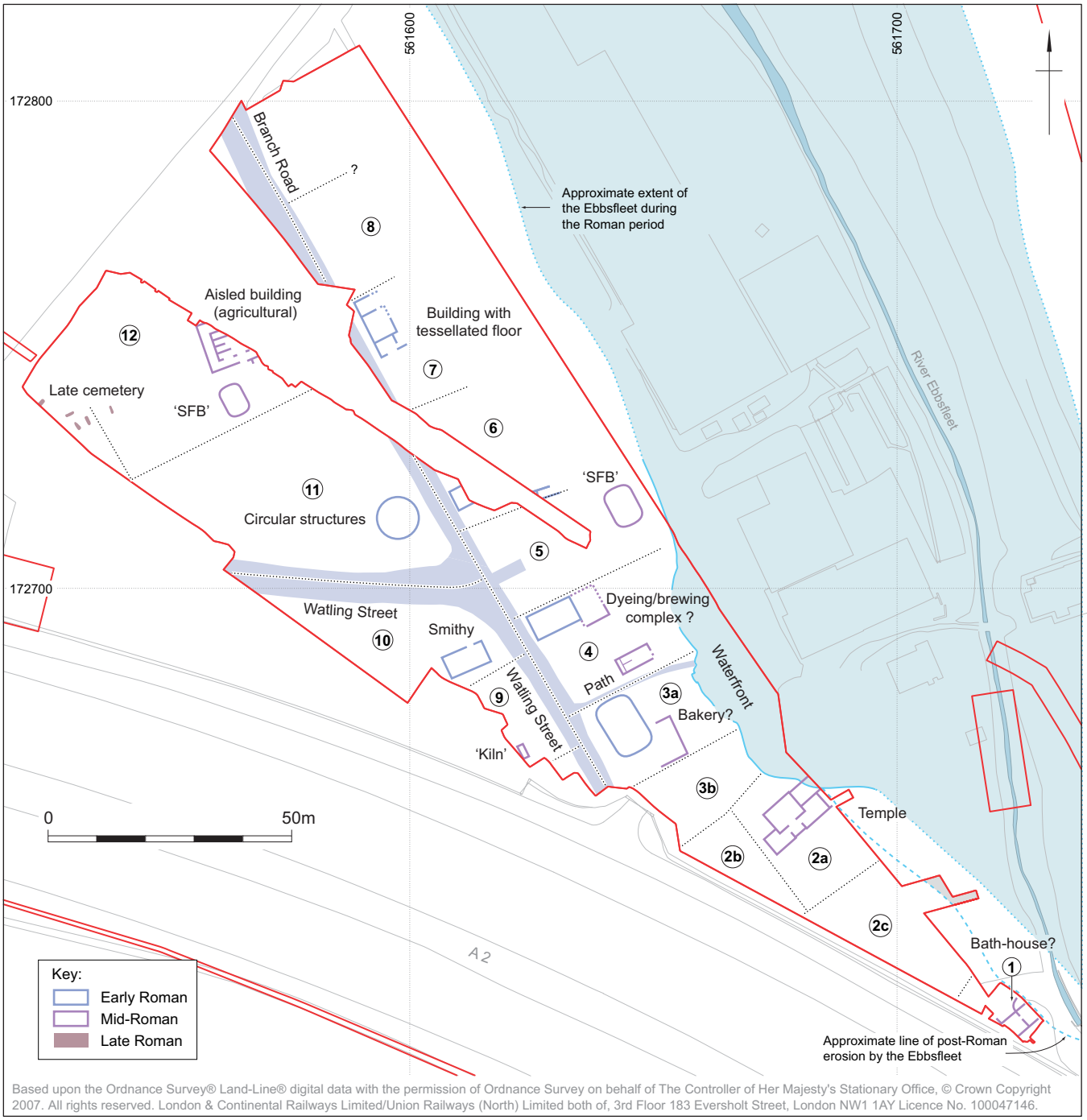

Figure 4.3 The roadside properties at Springhead

road rather than Watling Street which determined the layout of property 11 at the junction between these two streets, whereas the reverse might have been anticipated. Several of the properties were defined by shallow ditches, others by fence lines, and most if not all appear to have been established during the 1st century and survived more-or-less unchanged into the late 2nd or early 3rd centuries, and in at least one case (property 2) considerably later.

Towards the south-eastern end of the site, for example between properties 2 and 3, the earliest boundary ditches were contemporary with the latest of the roadside ditches. Further to the north-west the property boundaries post-dated the roadside ditches, which had become largely infilled well before the end of the 1st century. However, it was here, in property 11, that part of the ditch alongside Watling Street was re-cut later than elsewhere and remained open during the early decades of the 2nd century, perhaps serving as a drainage feature. In this area, close to the edge of the settlement, the boundary between properties 11 and 12 was established after the brickearth quarrying complex which straddled them was partly infilled, possibly in the early 2nd century. Nevertheless, quarrying brickearth (for daub) probably continued in the vicinity well into the 2nd century and these quarries did not become finally infilled until some time in the 3rd century. A series of substantial post-holes was recorded along the

roadside frontages of several properties (eg, 5 and 7 to the north-east of Watling Street and the branch road, and properties 9 and 10 to the south-west) and may represent fence lines, perhaps re-establishing boundaries or screening the properties from the road. However, the size, regularity, and extent of these post-holes might suggest that they held free-standing posts. 'Fence lines' at other sites, for example Keston (Philp 1991) and Thurnham (Lawrence 2006), also involve quite substantial posts, and this appears to be a Kentish characteristic.

Although not all of the properties were fully uncovered, it appears that there was considerable variation in terms of their width, length, and size, with no evidence for the even apportionment of land. This can in large part be attributed to topography, in particular the proximity of the Ebbsfleet, and the nature of the development which probably proceeded in a rather piecemeal fashion along the street frontages as the settlement expanded to the north-west in this area. Property 11 was large and asymmetric in plan, reflecting its location at the junction of Watling Street and the branch road, and property 10 may have been similar in this respect. The infilling of a small embayment on the edge of the Ebbsfleet was probably the cause for the apparent change in location of the boundary between properties 2 and 3, with 3a and 3b coming to form part of a single property. Property 2 in its final form, containing a temple, may have been created by the amalgamation of two original units – 2b and 2c – and a third (2a) created from the infilling of the embayment. This is the only example of possible property amalgamation and may in part reflect the late (3rd century) development here, unique for the site, at a time when many of the other properties, particularly those towards the edge of the settlement, had already been abandoned.

The layout of properties revealed at Springhead can be compared with that at the recently excavated site at Westhawk Farm near Ashford, where an extensive rural roadside settlement has been revealed through a combination of excavation and geophysics (Booth *et al* 2008; Williams 2003; see also Millett 2007, 164–5). Here, the settlement spans the mid-1st to the 4th century, with the main period of activity during the 2nd century (in the (6 ha) excavated area, occupation effectively ceased after the mid-3rd century). The plan shows a regular pattern of properties along the north side of the principal road, similar to that seen at Springhead, implying that some control was exercised in their layout, though this is less clear to the south.

The waterfront

All the properties along the north-east side of Watling Street and the branch road backed on to the river, with some of those towards the southern end of the site having evidence for a degree of formalised development of the waterfront (ie, properties 3 and 4; Fig 4.3). Those further to the north-west (ie, possibly property 5, as well as 6, 7, and 8 beyond) appeared to simply extend down to the marshy ground alongside the river. Properties 1 and 2 may also have seen development of the waterfront, but no evidence for this had survived later (post-Roman) channel erosion in this part of Ebbsfleet. The evidence recorded in properties 3 and 4 is indicative of a managed waterfront that involved rather more than simply the stabilisation of the riverbank. It is suggested that these waterfronts may have served for loading and unloading goods and perhaps also passengers from small, shallow boats that could navigate this far upstream.

It is likely that the waterfronts in properties 3 and 4 were established towards the end of the 1st century, probably later than that at the head of the Ebbsfleet which may by this time have gone out of use. It is clear that the scale of these waterfronts was small, perhaps only serving the individual properties in which they lay. There were no substantial quaysides here and the pattern of post-holes and associated features indicates a series of revetments, perhaps with a small jetty (in property 4) projecting into the shallow waters near the head of the river. There was, however, access from Watling Street via a path between the two properties and this may have allowed visitors or goods passage into and out of Springhead. This access, seemingly serving property 3 in particular, was maintained throughout the 2nd century, into the 3rd, and perhaps later, hinting at the continued use of the waterfront in this area, a possibility also supported by a concentration of late Roman coins. The evidence is equivocal but together it might represent some level of trading activity. There was no evidence for any waterside buildings in property 4, but at least one group of shallow slots in property 3 might represent the remains of such a structure, perhaps a small warehouse, next to the river.

Analysis of the deposits here indicates that they were laid down in shallow water, subject to trampling, and that the waterfront area was well vegetated, with grassland dominant and cereals almost absent. As might be expected, plants of disturbed soils were well represented and there was a clear indication of nutrient enrichment related to habitation and livestock. This was one of only two areas where waterlogged plant remains were preserved, though nowhere did wood survive, the springs now being dry and the flow of the Ebbsfleet intermittent, today fed only by surface water run-off.

The use of the small waterfront at Springhead cannot be seen in isolation for it was early in the 2nd century that the more extensive waterfront development at Northfleet villa took place (see Biddulph below). This was expanded towards the end of the 2nd century and appears to have remained in use up to the end of the Roman period. Millett (2007, 169) has suggested that this might be viewed as a small harbour and trading site, rather than part of a normal villa complex, and thus of greater significance in terms of its function and relationship to the settlement at Springhead.

Structures

The majority of the properties contained relatively well-preserved though generally shallow sequences of

deposits, most with evidence for one or more structures. Overall, the sequences were deeper and more complex towards the south-east, nearest to the centre of the settlement, and shallower towards the north-west, nearer the periphery. The structures demonstrated considerable variety in terms of their ground-plans and types of construction such that no two properties had structures which, from the archaeological evidence, appeared to be the same or even broadly similar. Chronology is unlikely to have been significant and function is thought to have been most important factor in this respect, though in many cases what this was is difficult to establish with any certainty. The wide variability in the construction, form, and (probably) function of the excavated structures, standing side-by-side in adjacent properties along Watling Street, appears to be one of the characteristic features of the Roadside Settlement at Springhead. In this respect it is noted that previous excavations at Springhead have uncovered relatively few buildings other than temples, but these also have included a range of structures, in different parts of the settlement, most rectangular with rubble footings, with various functions suggested (see below). It might be suggested that the small number of timber structures recorded during previous work (two of the 13 buildings, excluding temples, listed by Penn (1965, 110–12)) is probably partly a result of the difficulty of recognising coherent structural plans within the limited areas often exposed. Overall, however, the variety of structures serves further to emphasise the agglomeration of domestic and non-domestic buildings present within the settlement at Springhead.

The earliest structures recorded in the HS1 excavations were built largely of timber, some of them on rubble footings, and are likely to have had wattle and daub infill, though very little burnt daub was found associated with these structures. There is no evidence that any of these had tile roofs, most may not have been substantial enough to support the weight, and reed or straw thatch can be assumed. Broken or re-used tiles were, however, used in a number of the hearths, ovens, and kilns, the vast majority likely to have been produced locally (see Poole, Vol 2, Chap 6). Where ground plans could be established, many buildings were rectangular, such as the successive post-built structures in property 6 and the larger but probably later timber building with rubble footings, possibly an aisled barn, in property 12. The remains of four early–mid-Roman structures found on the eastern side of the Ebbsfleet were also of rectangular plan. However, there was a sequence of three circular clay-floored structures in property 11 at the street junction, very similar to those in the sequence near the head of the Ebbsfleet. These were the only circular structures identified in either area and both have been assigned to the second half of the 1st and earlier part of the 2nd century. It might be suggested that they represented a continuation of a native tradition during the first generation or two following the Conquest, though of smaller diameter than their precursors and perhaps of specialised function (see below).

It is important to note that, in all of these examples, the evidence for their existence was largely provided by the survival of the clay floors as there were few associated post-holes and these alone would not have indicated the ground plans of the structures. It is very likely, therefore, that similar structures existed elsewhere at Springhead but, because the floors have been removed by, for example, ploughing, their presence has gone unrecognised. Circular, timber structures were also a feature of the roadside settlement at Westhawk Farm near Ashford, and were there represented by ring-gullies (Booth *et al* 2008). These spanned the 1st–3rd centuries and demonstrate the continuation of this tradition of building at a relatively late date, on a rural site where there is some evidence for a formal planned layout.

Many of the structures at Springhead appear to have served ancillary purposes, for example as workshops, and it is not certain that all of the properties contained buildings that provided living accommodation for the people who owned or worked in them. Amongst these, we might single out a possible bakery in property 3, a smithy in property 10 (though not all of this property was exposed), a sequence of circular structures in property 11, as well as a temple in property 2.

Amongst these probable ancillary structures, the two sunken-featured buildings in properties 5 and 12 are very similar to each other in all respects, whilst that in property 3 appears to represent the opportune use of an existing hollow in the top of the roadside ditch. Whilst not unknown from Kent, particularly east Kent and the Isle of Thanet (for the 2nd century examples at Monkton, see Millett 2007, 162–3), these do represent a relatively unusual form of Roman structure, confined elsewhere to rural sites, with one example at Northumberland Bottom approximately 2 km to the south-east of Springhead, excavated during the HS1 section 1 works (Askew 2006).

Of all the excavated structures, that in property 7, of which only the front part survived, was perhaps the most likely to have been a purely domestic building, with the remnants of a tessellated floor in one of the rooms. A few fragments of painted plaster may also have derived from this building, attesting to the likelihood that this was of higher status than the surrounding structures, though there was nothing to indicate that it had a tile roof. More generally absent from Springhead, at least in excavations so far, are the remains of any building that might be considered a 'town house', although perhaps within such a settlement there is no reason to expect that buildings of this type and status should be found.

The two most substantial buildings lay at the southern end of the site, in properties 1 and 2 respectively, their size and construction probably reflecting their function, location (nearer to the centre of the settlement), and possibly in at least one case the relatively late date of the structure. The temple in property 2, constructed wholly in mortared flint rubble and stone, and with a tile roof, was built towards the end of the 2nd century, approximately 100 years later than most of the buildings in this part of the settlement

(Pl 4.2). This was the only building with *in situ* evidence for painted plaster decoration, albeit with only fragmentary remains surviving on one wall in one room.

Only a small part of the building in property 1, immediately to the south, lay within the excavated area, but this appeared to be of similar construction to the temple and is interpreted as part of a bath-house. The date of this building is uncertain because of the paucity of associated finds (it was probably uncovered and displayed as an attraction in the 19th century pleasure gardens), but there was no evidence for any later structures and it is possible that it was in existence at least as early as the 2nd century and that its use continued into the 3rd century and perhaps beyond.

As alluded to above, the functions of the various structures are in many cases difficult to establish, though it is clear that few if any served a purely domestic purpose. Past excavations and the more recent HS1 investigations have shown that baking and brewing were significant activities within the settlement, and there is evidence from several sites for iron smithing (eg, Penn 1959, 11; 1968b, 257; Boyle and Early 1998), though rather less for copper alloy working (eg, Penn 1965, 115). Some buildings appear to have had an agricultural function, for example the large building to the west of the main temple complex which served as a granary before its later use as a bakery (Penn 1957; *cf* V Smith 2004, 10). Two or possibly three structures have been interpreted as shops (Penn 1958, 79–81; 1965, 112; 1968a, 164–71), and whether or not this is so in these cases, shops are certain to have been a feature of the settlement. There is also some slight evidence for salt processing, though drying and packing rather than its actual production, which would have been restricted to the margins of the Thames estuary. Conspicuous by its paucity, however, is the evidence for spinning and weaving, with only a small number of spindle whorls and virtually no loomweights. Perhaps these 'rural activities' were not a feature of the Roadside Settlement. There is very little evidence for bone or antler working and none for leatherworking, though the repair and possibly the manufacture of shoes etc is likely to have been undertaken, if not the actual processing of the hides. At least one kiln associated with pottery or tile production has been claimed (Penn 1965, 116, F25), but the evidence is far from conclusive and both pottery and tiles may all have been manufactured and brought to the settlement from further afield.

Properties 1–12: a consideration of their uses

Property 1

A limited area of what is interpreted as a bath-house was exposed in this property, though little more can be gleaned from the available evidence. However, this may have been a substantial and extensive structure and was possibly associated with another large building, a small part of which was investigated in the 1960s prior to widening of the A2 (Penn 1965, 111, B9). A tiled corridor was revealed at this time, and one interpretation of this building is that it was a *mansio* or guest-house that provided accommodation for travellers and pilgrims visiting the temples and shrines at Springhead (see Fig 4.2 above). A bath-house is a typical component of *mansio* complexes in Britain.

Property 2

The principal structure in this property has been identified as a temple, and, because of its significance, this has been preserved *in situ*, beneath an embankment. It was of relatively late date, constructed towards the end of the 2nd century and thus likely to post-date most of the structures which lay to the north-west, though it may have been contemporary with the probable bath-house to the south-east in property 1. It was the largest and most impressive of the excavated structures, facing south-east towards the springs rather than south-west towards Watling Street. From the front this building would probably have looked to be of 'Romano-Celtic type' with a *cella* in the form of a one-and-a-half or two storey tower, and single-storey surrounding rooms comprising an entrance porch or vestibule and two asymmetrical 'wings'. However, the fact that there was no real ambulatory, even around three sides of the *cella*, does mark it out as distinct from the more typical Romano-Celtic temples within the main complex. The remains of a possible chalk floor below the temple may represent the remains of an earlier and less substantial structure, though very little of this was exposed and its association and function remains unknown. Probably contemporary with the temple was a sequence of two ovens to the south, perhaps associated with the activities there, and within the *temenos* was a large stone-packed post-hole interpreted as having held a free-standing post, possibly a totem.

Many of the finds pre-date the temple, coming from earlier pits and infill deposits within the small embayment on the edge of the Ebbsfleet. At least some of these deposits are likely to derive from structures or activities on the street frontage, beyond the area of excavation, the remainder perhaps imported specifically for raising the area prior to construction of the temple. A concentration of malting waste is perhaps more likely to result from being incorporated in material imported for this purpose, though some early malting activity within the property cannot be ruled out. Therefore, although the pre-temple use of the part of the property (originally possibly two properties) adjacent to Watling Street cannot be established, the subsequent development of the rear part of this area with the building of a temple and associated *temenos* immediately next to the Ebbsfleet is clear.

There is a marked peak in coin loss during the last third of the 3rd century, the likely destruction date of most of the temple, and a further peak in the mid-4th century, which is the likely date of the destruction of the majority of the remainder of the building. Amongst the other finds it is the quantity of bone pins in particular which marks this property out from the others, with the

second largest group coming from property 3 immediately to the north. This might, to some extent, reflect the late chronology here, the bone pin assemblage as a whole spanning the mid-2nd to 3rd/4th centuries, with all but one from property 2 being of late Roman date. However, the possibility of a ritual use – with the apparent deliberate 'ritual killing' of some pins – has been suggested, and similar concentrations of bone pins on temple sites elsewhere have been interpreted as perhaps associated with a healing function (see below). Two seal boxes and the pot burial from within the *temenos*, as well as a miniature votive shield of silver from immediately outside the *temenos* in property 3, are also likely to have been significant in the terms of the temple's use. A Fortuna figurine, from a relatively late dump layer in property 4, conceivably may also have had a link to the temple in property 2.

Plate 4.2 General view of Springhead Nursery site (ARC SHN02) under excavation; temple in property 2 in foreground. Looking north-west

The final phase of use of property 2 remains somewhat shadowy. The rubble platform created within the central 'tower' following the demolition of the remainder of the temple may have continued in some way the ritual use of the building, although there is no certain evidence for this. Several burials of dogs and of three human neonates were apparently focused around this rubble platform but there was also a relatively large quantity of pottery and some disarticulated animal bone which might simply represent domestic refuse that had been brought from elsewhere and disposed of in an abandoned property. However, it is unclear why, if this were the case, the domestic refuse appears only to have been disposed of in this part of this particular property and not elsewhere as well. Some of the pottery belongs to the late 4th, possibly the early 5th centuries, representing the latest pottery from the site, at least a century later than the vast majority of the assemblage, though the latest coins from property 2 were minted in the third quarter of the 4th century and were not the latest recovered on the site. It remains quite possible that the dumps of material in this place indicate continued rituals associated with the ruined temple, although this is perhaps more likely to have been in the nature of sporadic acts of worship rather than organised official cult activities (see below).

Property 3

Several structures lay within this property, which was one of two that had evidence for modification of, and development alongside, the waterfront. A small warehouse has been suggested as the possible use for a putative structure close to the waterfront, whilst the sunken structure which lay closer to Watling Street may have been a bakery, on the basis of the associated hearths, pot ovens, and other vessels found there. There was also a concentration of quern fragments within this sunken structure which, along with the charred cereal remains, might support its interpretation as a bakery rather than, for example, having been used for brewing, for which there is abundant evidence elsewhere. However, it might be noted that the puddingstone querns, of which there are several examples from property 3, are considered more suitable for coarsely grinding malt than flour, and brewing (or at least part of the process) is suggested as one of the possible activities that took place in the adjacent property 4. Bakeries, such as this putative example, could have served the needs of individual households and other inhabitants of the settlement as well as visitors and pilgrims passing through Springhead. One unusual feature of the early sequence in this property was the burial of a subadult close to the waterfront, perhaps below or adjacent to the putative structure in this area, and in what may have been considered a liminal location.

The rectangular building (300631) which probably replaced the so-called bakery also seems to have had a non-domestic function, though the precise nature of this is unknown and there appears to have been only a single hearth that was possibly associated.

There appears to have been a considerable amount of later dumping in this property, and also in property 4 to the north-west, particularly in the vicinity of the waterfront (which continued in use), extending evidence for activity here well into the 3rd century. There was a notable concentration of lead pot mends and a concentration of pot sherds which showed evidence for gluing, a number of toilet instruments, and some of the more eye-catching brooches, as well as a deposit of iron

smithing slag (but not hammer scale) in the abandoned sunken structure. However, none of these finds and material need necessarily have been associated with the use of any of the structures, and the property may simply have provided a convenient area in which to dispose of rubbish as the settlement contracted during the later 2nd and early 3rd centuries. Amongst the other finds, the two votive figurines, of Fortuna and of a horse are of note as possibly having been associated with the use of this property, though the proximity of the temple in property 2 may also be significant in this respect.

Property 4

This property also had evidence for waterfront development and, either side of a yard, a complex of what appear to have been ancillary structures (400167 and 400170), though 400170, the later structure, may have provided domestic accommodation. The presence of a well and a sequence of two clay and timber-lined 'tanks', one at least with evidence for having had a lining of lead sheet, are indicative of some 'industrial process' being undertaken here. Analysis of soil samples has failed to establish what this activity might have been, though tanning can probably be ruled out. There is a possibility that it may have been dyeing, either of cloth or leather, or perhaps brewing, in particular the soaking or steeping of unthreshed grain to promote germination prior to malting (in one of the ancillary structures?), but none of these suggestions can be substantiated. However, part of a copper alloy strainer was found in one of the tanks and might relate to its use. A relatively large number of lead offcuts found here (with some in property 3) might derive from the fabrication or, following disuse, cutting up of a lead lining of one of these tanks.

Property 5

Property 5 was somewhat unusual as both structures, which included one of the two large, sub-rectangular sunken-featured buildings, lay close to the water, as did most of the pits. There was no evidence for any waterfront management as seen in properties 3 and 4, and the remainder of the property appeared largely empty, or rather an open area, with a metalled surface extending north-east from the street junction and a probable midden deposit to the south of this surface. The finds provide no clue as to the function of this property, though it is suggested below that this and the sunken-featured building in property 12 may have been used for storage.

Properties 6–8

All of the properties in this group backed on to the Ebbsfleet, had suffered truncation to a greater or lesser degree or were not fully uncovered, and their functions are uncertain. However, both the sequence of rectangular timber buildings in property 6 and, particularly, the building with rubble footings and remains of a tessellated floor in property 7 may have been for domestic use.

Property 9

Although only a small part of this property was exposed, the oven or kiln and surrounding yard surfaces adjacent to Watling Street suggest that this, like property 12, may have served an agricultural function, in this case probably crop drying. The presence of these properties that appear to have been associated with agricultural activity within the settlement at Springhead is of some significance in terms of characterising the nature of this roadside settlement.

Property 10

The large quantity of iron smithing slag and the small group of crucible sherds recovered from this property demonstrate beyond doubt that this was the site of a smithy where small-scale copper alloy working was also undertaken. Associated structural remains show that the smithy was established at an early date and stood in a prominent position within a bend in Watling Street at its junction with the branch road. Only two possible tools were identified amongst the metalwork and, surprisingly, there were no obvious offcuts of iron which might have been expected. A concentration of lava quernstone fragments in this property is difficult to explain unless perhaps they had been used for sharpening knives etc, though lava would not be a very suitable material for this purpose.

Property 11

The possibility has been raised that the sequence of three circular structures near the head of the Ebbsfleet may have served some ritual purpose and, like these, the circular structures at the street junction, also contained several hearths, particularly the final, phase 3 structure in the sequence. Possibly of significance in this respect is that what was almost certainly a roadside shrine was built at this junction, a short distance to the south-east, probably during the 3rd century. Though not directly replacing the circular structures, there may have been some continuity in the use of this area.

Like the smithy in property 10, the structural sequence in property 11 began early, perhaps pre-dating structural development in most of the properties in the vicinity, and the location of these properties, at the road junction, may be significant in this respect. Amongst the finds was part of a pipeclay Venus figurine, and property 11 is noteworthy in that it contained the highest proportions of toilet and medical items of any of the properties. However, there were a relatively large number of pits for which no specific function other than rubbish disposal can be ascribed and a small, possibly enclosed area in the northern corner of the property contained a later oven for which a domestic function is likely. Charred plant remains indicate baking, as appears to have been the function of virtually all of the small ovens.

A considerable amount of rubbish, including iron smithing slag, was dumped in the south-eastern part of property 11 following the abandonment of the last of the circular structures, which probably took place quite early

in the first half of the 2nd century. The malting waste in this property might also be a result of the dumping of rubbish here, some perhaps deriving from property 12, rather than reflecting malting activity within the property itself.

Property 12

The principal structure in this property was one of the largest recorded and provides the only example on the site of what has been interpreted as an aisled barn. Only the rear part of this lay within the excavation area but the probable crop dryers or kilns at the western end indicate an agricultural function, not unexpected towards the periphery of the settlement. A reasonable concentration of malting waste in this property may indicate that malting was undertaken here, and perhaps the dryers or kilns within the aisled barn were malting kilns. This property also contained a large sunken-featured building, the infilling if not its use post-dating the aisled barn. Like the similar example in property 5, the function of this structure is also unknown, though the lack of hearths in both might suggest that they were used for storage or some other, ancillary function rather than occupation.

Pottery and the nature of the settlement

The excavations have produced a huge assemblage of Roman pottery, the bulk of which spans a period of approximately 150 years, between the mid-1st century and the end of the 2nd century (see Seager Smith *et al*, Vol 2, Chap 1). What has become apparent from study of this material is that as the sample size increases, fewer differences are apparent. There is consistent patterning between areas and properties and, overall, the individual assemblages from these various entities are remarkably uniform.

As a whole, a 'normal' utilitarian, domestic assemblage is represented, with no evidence for higher status areas or properties apparent, and nothing that might be clearly associated with any ritual activity. The same picture emerges from the small assemblage of vessel glass, although this may be more a comment on the lowly to moderate status of the inhabitants of the settlement. The proportion of samian, in particular, is similar to that of other roadside settlements rather than larger Romanised urban settlements. Nevertheless, all the main production centres are represented, presumably a reflection of the location of Springhead on Watling Street and the possibility of some riverine trade via the Ebbsfleet and the Thames. Other imports, however, were not significant and made up only a minor element of the assemblage, as is the case elsewhere in this part of Kent, with the exception of Lullingstone. It appears that little imported pottery was moving overland east to west beyond Canterbury, and most destined for London was going directly via the Thames. From the late 1st century AD British finewares mainly from the local north Kent industry more than made up for the shortfall in imported tablewares.

Burials and cemeteries

Burials around Springhead show considerable variety, with perhaps the most striking being the small number of very wealthy people interred within a vast walled cemetery 200 m to the south-east of the Roadside Settlement (Rashleigh 1808b; Jessup 1959; Davies 2001). This cemetery, on a slope overlooking Watling Street, dates to the late 2nd/early 3rd century and its use broadly corresponds with a major new programme of building and refurbishment within the main temple complex (see below). The eight individuals (including two children) buried in the central stone-buttressed mausoleum were accompanied by one of the richest collections of grave goods ever found in Roman Britain.

In contrast, the late 1st to mid-/late 3rd century Pepper Hill cemetery nearby, excavated in 1998 as part of the HS1 works, contained 326 inhumation graves and 235 cremation pits in a fraction of the area and most of the graves were relatively poorly furnished (Biddulph 2006c). However, there were also a number of more richly furnished graves present, so it is likely that the cemetery accommodated a cross section of Springhead society (*ibid*). This cemetery, by far the largest yet found at Springhead, lay outside the settlement and adjacent to the road that followed a rather sinuous course to the south (Fig 4.2). This must surely have been the main cemetery for the general population of the settlement, and perhaps also for visitors to the temples who may have died here, as there are indications of people from western Britain and the continent (*ibid*). Another much smaller group of six burials also lay close to this road just within the periphery of the settlement (Philp and Chenery 1997, 8–12; Fig 4.2). Three cremation and three inhumation burials appear to have lain within a small ditched enclosure and all are likely to date to the final quarter of the 1st century AD. They are thus broadly contemporary with the burials adjacent to the early road on the Sanctuary site and, like these, two appear to have each been accompanied by a box or casket.

Individual burials and small cemeteries have also been recorded at several other locations around the periphery of Springhead. Part of one group of late Roman inhumation burials was found to the north of Watling Street in the recent excavations (see below) and another undated group to the north-east of the branch road during earlier HS1 evaluations (URL 1997a). Recent evaluation work in the latter area, just beyond the known limit of Roman settlement, has revealed what appears to be an early walled cremation cemetery (WA 2005), an unusual discovery which is likely to be further investigated in forthcoming excavations proposed for this area. There are references to burials being found in 1921–2 on Wingfield Bank (*VCH* 1932, 91), the steep slope on the eastern side of the Ebbsfleet

Valley, a large part of which was stripped on the Sanctuary site, the remainder lying to the south-east. Penn (1965, 117, F34) places these discoveries in the area of what is now an electricity sub-station, but subsequent archaeological work in the immediate vicinity has revealed no further burials.

In addition to the cemeteries and occasional isolated adult burials, neonate/foetal burials have been recorded on most excavations in Springhead, including 18 from within the boundary of the main temple precinct (Penn 1964 176–7). The recent work has revealed an exceptional number (*c* 80; see McKinley, Vol 3, Chap 1). In part this reflects the substantial area excavated. This has shown them to be distributed over much of the site in a variety of contexts, though a few concentrations are apparent, for example in the base of 'Viewing platform' 400045 and especially in the area around the springs, where 67% of all foetal/neonatal remains from the recent excavations were recovered. These areas (together with the main temple precinct) are presumed to have been of greater religious significance and so the burial of foetal/neonatal remains here must reflect deliberate practice. Burials of any kind are unusual within Roman religious contexts (A Smith 2001, 157), and the quantity at Springhead is unprecedented, surely representing something more than simply the casual disposal of the bodies of immature individuals. The chronology of the infant burials is also of interest, as most (especially among those by the springs) appear to belong to the mid-2nd century, just prior to the construction of the Sanctuary. This is the same date as those in the main temple complex, which Penn suggested were all buried at the same time, perhaps as the result of some kind of natural disaster (Penn 1964, 177). If most of these burials were made around the same time it suggests that such practice was not a regular part of cult ritual, but as a result of some specific event/set of events during this period.

Although the foetal remains probably represent natural still-birth, whether the infants also died of natural causes or were 'sacrificed' (eg, by exposure) is unknown. Scott (1999) has discussed the role of neonates and young infants in ritual sacrifice, suggesting that the neonate was a 'liminal' creature, providing a potentially powerful link between life and death, and therefore suitable subjects for 'bargaining' with gods and the ancestors (see McKinley, Vol 3, Chap 1). Might the significant numbers of such burials, placed in liminal boundaries of the most sacred parts of the site, represent such a 'bargaining' act, perhaps in response to a dire set of circumstances such as localised plague or pestilence?

One other possibility worth mentioning here is that the overall numbers of foetal and neonatal burials on site may be, in part, a reflection of a presumed major aspect of the cult – healing (discussed below). Although in great healing temples such as that of Asklepios in Epidauros it was expressly prohibited for woman to give birth within the sacred *temenos*, there is evidence that pregnant women wishing help with childbirth came to the sanctuary, and indeed a specific building for this purpose was apparently set up outside in the Roman period (Dillon 2002, 252–3). Infant mortality in the Greco-Roman world is presumed to have been quite high at around 8% (French 1987, 69), and so if the sanctuary site did attract woman in the final stages of pregnancy, the numbers of foetal and neonatal burials may be more readily explained.

Late Roman activity

The evidence from the coins and pottery in particular, as well as the stratigraphic sequence, indicates that the majority of roadside properties had fallen into disuse by the earlier part of the 3rd century, and a similar pattern of abandonment has been seen elsewhere in Springhead (V Smith 2004, 19). Excavation on the southern periphery of the settlement for example, revealed a relatively large number of 1st and, particularly, 2nd century features, but few of 3rd and none of 4th century date. Pottery of possible 4th century date was virtually absent, though the coin sequence here extended into the second half of the 4th century, probably reflecting the continued use of the road (Philp and Chenery 1997, 34; Boyle and Early 1998, 40). Overall, it appears that there was a widespread decline and contraction of the settlement at this time, which appears to have become closely focused around the main temple complex (see below).

The decline seen at Springhead is likely to reflect the more general disruptions of the 3rd century, which resulted in an economic downturn and the subsequent contraction of a number of settlements. This is particularly apparent in the pattern of rural settlement and, in some cases, the decline is evident before the end of the 2nd century, as appears to be the case at Springhead. However, at Springhead this was not followed by a recovery in the late 3rd and early 4th centuries as has been demonstrated at a variety of other sites.

Nevertheless, Watling Street and the branch road continued in use, probably into the early 5th century at least, and the shrine at the street junction may have been constructed at the end of the 3rd century with the deposition of coins continuing there throughout the 4th century. Nearby, a small, linear roadside cemetery of probable 4th century date was established north of Watling Street and immediately to the east of property 12, one of several cemeteries on or near to the edge of the settlement.

Elsewhere, the coins indicate that there may have been some late Roman use of the waterfront in properties 3 and 4, possibly related to trading, though not perhaps continuing much beyond the end of the 3rd century. The temple in property 2 was a late 2nd century development and was largely demolished in the late 3rd century. However, the central element may have

been retained in some form and the late 4th–early 5th century pottery recovered from this property sets it apart from any other area (excluding the roads) or property on the site in terms of its longevity (see above).

In the area of the springs, at the head of the Ebbsfleet, the Sanctuary complex structures had probably been abandoned by the early 3rd century and were either demolished or collapsed and probably robbed shortly after. However, as discussed below, the deposition of coins in the springs and surrounding area appears to have continued until the end of the 4th century. Here, on the east bank of the river, the sediments indicate that the water flow was low in energy and terrestrial marsh conditions began to encroach in the later Roman period, though some overbank flooding continued. Several agricultural tools found in deposits in the vicinity of the former Sanctuary complex might reflect a late phase of cultivation in this area. Further away, in an apparently isolated location at the top of the slope on the east side of a valley, a small hoard of coins was buried *c* AD 360 in one of the infilled ditches of enclosure 400012. This was one of five 4th century hoards so far recovered in Springhead (see Vol 2, Chap 2), one dated to *c* 375 and another to *c* 388, the latter comprising a substantial group of approximately 450 silver and three gold coins that were placed in a pot and buried in the late 4th or early 5th century (Penn 1965, 111; undated). This hoard was discovered during pipelaying and the findspot appears to have been on the north side of Watling Street, opposite the main temple complex and close to its junction with the street that led to the head of the springs and the site of the former Sanctuary complex. There are also two Honorian hoards, one certainly and the other likely to be from Springhead, though the precise findspot of the latter is unknown. Together these hoards suggest more than simply casual activity in the second half of the 4th century.

Development of the Religious Centre at Springhead

The Sanctuary complex and the newly-discovered temple on the west bank of the Ebbsfleet add to the relatively large number of Roman religious buildings so far recorded at Springhead, with at least five in the central complex (although not all contemporary with one another), another possible example to the south-west on the outskirts of the settlement, and others almost certainly remaining to be discovered (Fig 4.2).

The concentration of temples and shrines within what was a relatively small settlement at Springhead suggests that it was a major religious centre that performed an important role in at least this region of Roman Britain. As discussed above, it clearly developed from a significant late Iron Age religious site, focused around the springs and eastern valley. The development of specialised constructed sacred sites in Britain generally occurs during the latter stages of the late Iron Age (eg, Uley, Harlow, Maiden Castle; A Smith 2001, 67) and this appears to be the case here, with most evidence pointing to ritual activity occurring from the start of the 1st century AD. This is no doubt related to more widespread changes in parts of southern Britain (and especially the Thames estuary) brought about by increased contact with the Continent following Augustus's reorganisation of the Gallic provinces (Millett 2007, 146). Although no definite religious structures of this date have been found at Springhead, the processional pathways, enclosures, and 'ritual platforms' point to a high degree of spatial organisation, undoubtedly relating to certain prescribed sets of rituals.

There followed a period around the Conquest when there was a significant shift in the organisation of the site, although the exact nature of activity remains unclear. A possible extensive enclosure may or may not have had a military origin, but in any case it was very short lived as it apparently went out of use when Watling Street came into existence, probably just a few years after the Conquest (Tatton-Brown 2001, 122; see Biddulph below). There is enough evidence (discussed above) that some ritual activity associated with the spring continued throughout this time, and later activity clearly reveals that the site retained its religious importance. A possible circular shrine located near to the spring would represent the earliest religious structure on site, dated to the mid-late 1st century AD, although its interpretation is uncertain (see above).

The establishment of Watling Street had a fundamental effect upon the nature and development of the site at Springhead. The earliest evidence for settlement was positioned along the road on the western side of the Ebbsfleet not long after it was built, in the mid-1st century AD. It remains uncertain as to how far the establishment of this settlement was related to the existing cult site around the spring, or if it developed more for reasons of trade and communication, being at the junction of Watling Street and a Thames tributary (see below). Unfortunately, as much of the site along Watling Street close to the springs remains unexcavated, these and other crucial questions are likely to remain unanswered for now. However, what is apparent is that a substantial temple complex soon developed at the heart of the site, just beyond the point where Watling Street deviated from its south-easterly orientation and before it turned again to the north-west. Interestingly, the complex lay on the other side of the road from the springs, about 80 m in distance, with its position in relation to traffic upon Watling Street seeming to be of greater importance than immediate proximity to the springs.

The building sequence of the main temple complex spanned the late 1st–late 3rd centuries, with abandonment probably coming in the mid–late 4th century. The exact chronological sequence has sparked some debate, in part due to the variable and piecemeal nature of the published excavation data, although the chronology of Detsicas (1983) is generally preferred

here. The earliest temple in the complex, and the first definite religious building at Springhead, is dated to the later 1st or early 2nd century, a period when villas were being constructed along many parts of Watling Street and beyond (Harker 1980, 286; Detsicas 1983, 66; see Biddulph below). The masonry-footed building was of typical Romano-Celtic concentric design, although is among the smallest of its type to have been excavated in Britain at 8.3 m by 8.9 m in overall dimensions. This temple may have stood by itself in an open area adjacent to Watling Street, at a time when the properties laid out along this road to the north-west had become well established (see above). The meagre dating evidence for the range of masonry buildings found closer to the temple suggests they were constructed in the 2nd century (Detsicas 1983, 60–76; see below), probably post-dating this structure and possibly coinciding with the wholesale reorganisation of the central temple site. It remains uncertain if earlier buildings did exist in this area, although this would not be surprising if the north-western properties had developed along Watling Street from a central core.

A larger Romano-Celtic temple (Penn's Temple I/B3) seemingly replaced the earlier building, probably in the early–mid-2nd century. The base for a 'Jupiter column' (fragments of a Corinthian column were found in an adjacent pit), which is likely to have supported a statue, was found *c* 7 m in front of the temple (Blagg 1979). To the north of the column, a small rectangular shrine (Penn's Temple IV/B6) aligned upon the main temple was probably built at the same time. This shrine, which contained an oven and an altar/statue base, had an infant burial placed in each of the four corners, with two of these being decapitated. A somewhat enigmatic rectangular building adjacent to this shrine contained at least eight ovens, possibly for use in ritual feasts, although the building also contained 14 infant burials, all carefully placed and covered with a clay bank (Penn 1964, 176). The burials were dated to the mid-2nd century, and their purpose here is unknown (although see discussion on burials above). These buildings were situated within a cobbled *temenos* surrounded on at least two sides by a well-built masonry wall (Penn 1958, 81).

During the later 2nd/early 3rd century, at the same time as the Sanctuary around the spring was in use, a major programme of building and embellishment took place within the temple complex, culminating in an impressive architectural arrangement that must have had a significant visual impact upon those people travelling along Watling Street from the east. Projecting wings were added to the first temple, while a second Romano-Celtic temple of similar size (Penn's Temple II/B4) was built to the south and joined to the first via a connecting wall. These temples were both raised significantly above the level of the courtyard and would have dominated the whole complex. Almost certainly built as part of the same architectural arrangement, a monumental gateway (and possibly subsidiary temple; Penn's Temple VI/B19) was positioned along the eastern *temenos* wall, aligned exactly at the mid-point between the two main temples (Penn 1967, 105). The building, and central altar/statue base within it, would have created a suitably impressive transitional zone into the sacred site. A rectangular structure to the north of Temple I (Penn's Temple III/B5) was probably also built at this time, although its function is not certain. It was interpreted by the excavator as a 'sacred pool', though some doubt has subsequently been cast upon this (Detsicas 1983, 71).

Although further buildings were added and structural modifications made, this period appears to represent the most active use of the main temple complex, and it is also during this time that the temple on the west bank of the Ebbsfleet was constructed (see above). The range of buildings between this temple and the central complex is barely understood in any detail at all, but is believed to have included a *mansio*/guest-house and at least two bath-houses, although one may never have been fully functional (Detsicas 1983, 63; Fig 4.2). As poor as it is, the dating evidence from these buildings generally suggests a mid–late 2nd century date for construction and they, therefore, possibly also belong to the same programme of building works.

The wealth needed to finance such an ambitious structural programme during the later 2nd century would have been quite considerable, and Davies has already suggested that this may have come from the family who constructed the elaborate walled cemetery, *c* 300 m south-east of the temple complex and also visible from Watling Street (Davies 2001, 167; Fig 4.2). The undeniably rich and exclusive nature of this funerary monument, which dates to the later 2nd/early 3rd centuries, must certainly connect it in some way to the expansion of the Springhead religious complex, although no obvious villa is known in the immediate vicinity that may have been an associated place of residence. On the other hand, a wealthy family may have had extensive estates that could have incorporated large areas of land including the settlement at Springhead, and their principal residence could have been some distance away, perhaps even at Northfleet, where the villa complex was reaching its greatest extent at this time (see Biddulph below). The evidence for wealthy elite in this area is also shown by recent excavations along the A2, *c* 2 km to the south-east of Springhead, where a small number of very high status cremation graves were found, dating from the mid-1st to early 2nd century (OA 2008b). These burials, which lay within enclosures, were clearly located to impress those who were travelling along Watling Street, and it is possible that these represent the same family who were subsequently buried within the walled cemetery near Springhead in the later 2nd century.

Wherever the wealth came from it is clear that, during the course of the 3rd century, the finances – or at least the impetus – for such conspicuous religious display started to decline. The Sanctuary around the spring does not appear to have lasted much beyond the

end of the 2nd century (see above), while the only new religious building of any size was a masonry structure of unknown form just to the south of Temple II in the main complex, dating to the later 3rd century (Penn's Temple V). This coincided with the abandonment of the west Ebbsfleet temple and, taken together, it seems to represent a considerable contraction of the religious elements of the site (with the exception of a small roadside shrine to the north-west). This chronology is in accordance with the decline of activity in the rest of the settlement and the communal cemetery at Pepper Hill, suggesting that the resident population, while probably never that substantial, was eventually reduced to little more than that of a dispersed rural settlement (see above). In this respect, it is interesting that the main temple complex was apparently still functioning until well into the 4th century, which is testimony to continued religious reverence within the site, and no doubt helped by its position astride Watling Street, which remained an important and, no doubt, well-used communication route. In this respect, it may be relevant that at Westhawk Farm, also in Kent, almost the only feature that survived into the 4th century was a roadside waterhole, which was probably used for occasional votive deposition of coins (Booth *et al* 2008, 58–61).

Eventually, from the mid-4th century, there is evidence that the main temples were no longer being maintained and fell into decay, with the rear of Temple I apparently being briefly used for metalworking. There is no reason at all to suspect that this decline was connected with emerging Christian zealots and, indeed, no definite Christian imagery has been recovered from the site. Instead it was more probably the lack (or re-direction) of finances from among the one or more local elite families who had previously maintained the complex that led to the eventual abandonment of the site. Biddulph (see below) discusses the changing economic environment of the late Roman period in this region, with financial resources being redirected towards increased productivity from larger centralised estates, at the expense of more ostentatious architectural displays of wealth.

Nevertheless, it appears likely that, despite the ruinous state of the buildings, some devotional practices continued right through the 4th century and perhaps beyond. There was a marked concentration of very late Roman pottery on top of the west Ebbsfleet temple platform (see above), late Roman coins were found on top of rubble over 'Temple V' in the main complex, and the small roadside shrine and probably also the springs themselves continued to be venerated. It is perhaps unlikely that there was a fully functioning cult operating in the site at this time and these devotions most probably came from people travelling along Watling Street, paying their respects to the spirits of a place with a long recognised tradition of sanctity.

The character of the Springhead temple complex

The number and density of religious structures found at Springhead is, as yet, unparalleled in Britain, although pairs of temples have been found elsewhere, such as at Caistor (Atkinson 1930) in Norfolk and Richborough in Kent (Bushe-Fox 1932). One of the few vaguely comparable sites is at Sheepen, just ouside Colchester, where a series of at least four Romano-Celtic temples and other buildings lay over a substantial area, although it is uncertain how many would have been in use at any one time (Crummy 1997). A substantial sanctuary complex existed at Marcham/Frilford, Oxfordshire, dating from the 1st–4th centuries, where, in addition to the large temple and circular shrine within the main *temenos*, there has recently been revealed many buildings outside of this interpreted as commercial outlets, craftworking areas, and additional shrines, along with a large amphitheatre which was no doubt closely connected with cult ritual (Kamash *et al* forthcoming). Perhaps a closer parallel to Springhead is the temple complex at Bath, also centred around a sacred spring (Cunliffe and Davenport 1985). Unlike Springhead, the springs at Bath were architecturally integrated with the main cult complex, which was first constructed on a monumental scale around AD 65–75, and continued until decline in the 4th century. Compared to Springhead, vastly more finds were recovered from the main spring at Bath, undoubtedly reflecting different cult practices at this site, and perhaps a different clientele.

Such grand religious complexes may be very rare in Britain but they are far more widespread in Gaul, with examples including Ribemont, Orrouy-Champlieu, *Fontes Sequanae*, and Drevant. Such cult sites often included temples, bath-houses, and theatres along with guest-houses, industrial areas, and commercial zones. The complex at *Fontes Sequanae*, although not on an especially grand scale, contained at least two main temples in addition to a colonnaded precinct, and other structures, all focused around the source of the River Seine (Jacomin 2006). Large quantities of votive offerings were recovered from this site, including coins, jewellery, and anatomical body part representations in wood and stone, these relating to the primary healing aspect of the cult (Green 1999; see below).

Derks (1998, 192) suggested that such large religious complexes were public sanctuaries of the *pagus* (regional administrative district) and it is almost certain that the temple complex at Springhead was also a regionally important public cult centre, with its location along the main road from Canterbury to London probably ensuring an even wider appeal. This setting, alongside one of the major roads of Roman Britain, has further parallels with the temple complex at Nettleton Scrub in Wiltshire (Wedlake 1982). This site, dedicated to Apollo-Cunomaglos, was located next to a river alongside the Fosse Way Roman road in the mid-2nd century and developed over the next 200 years, with a range of streets and buildings assumed to include commercial outlets and guest-houses. The river seems to have played a significant role within the cult, which is assumed to have had a strong healing aspect. From the mid-4th century there is a clear decline, reflecting the

situation of many local villas and also the temple at Bath just 12 km further south-west along the Fosse Way. As with Springhead it is assumed that the temple buildings declined because of the lack of financial resources for their upkeep, these resources perhaps being re-directed towards industrial work on site including pewter-casting, iron smelting, and bronze working.

The large scale of some of the sites discussed here, especially those such as Bath, Frilford/Marcham, and Springhead, has led to some difficulties of interpretation, in terms of whether they were functioning civic towns with a major religious focus or else substantial religious complexes incorporating a variety of civic and commercial functions. This is an especially grey area when it is considered that Roman towns and cities, in general, were very closely associated with ritual and religion, as illustrated by the concept of the *pomerium*, a sacred boundary that reinforced the limits of a settlement (Stambaugh 1988, 9). Classical Roman temples often acted as official meeting places and civic offices (Stambaugh 1978, 580) and such may have been the case at places like Springhead. However, it is clear that sites such as this were not ordinary urban centres but are likely to have owed their very existence and development to the presence of important sacred sites. The settlement at Springhead cannot really be classified as a small town but was a roadside settlement that was primarily a religious centre (see Henig 1984, 159; Burnham and Wacher 1990, 193; Booth 1998, 616), and its success (and decline) reflected this function, with bakeries, smithies, etc, perhaps also a *mansio*, all existing to provide for travellers and worshippers passing along Watling Street or arriving by water at this unique place.

The nature of the cult

The nature of the cult in operation at Springhead is very difficult to determine. As with many temple sites in Britain, no specific dedications survive to provide the name of the presiding deity or deities, and so it is to the overall finds and environmental assemblages that we must turn to if we are to gain any insight into what kind of cult existed here. Of course this is also very problematic as Roman religious sites are known to have often housed a number of different deities, with a myriad of different functional spheres. The few iconographic images we have from the site include two figurines of Fortuna and a number of pipeclay Venus figurines, including one from within the main temple. Whilst these cannot really be used to demonstrate that these were major deities worshiped within the site, an overall feminine aspect to the cult would certainly be in keeping with many other spring sanctuaries where the name of the main divinity is known, such as Sulis-Minerva, Coventina, and Sequana. There are also depictions of a number of deities on the decorated samian vessels found at the site (see Seager Smith *et al*, Vol 2, Chap 1), including Venus, Neptune, and Apollo. Joanna Bird (2004) has discussed the significance of the use of iconography depicted on decorated samian bowls from London, and it remains possible that the Springhead vessels were deliberately selected for use, as they were of direct relevance to the cult at the site.

Schuster (Vol 2, Chap 3), in discussing possible deities worshipped at Springhead using the evidence from the finds assemblage, points to a possible association with Mars. Mars is certainly one of the most common Roman deities found in dedications across Britain and Gaul, often syncretised with native deities such as Mars-Nodens as at the Lydney Park temple in Gloucestershire. The cult at Lydney seems to have had a strong association with healing, with large numbers of dog figurines, pins, and certain specific items such as a votive limb and an oculist's stamp, the last of which hints at the presence of a professional physician at the site (Wheeler and Wheeler 1932). In many ways, the overall assemblage from Springhead shows significant similarities to that at Lydney Park, and this is despite the fact that the latter temple was not even constructed until the former was in terminal decline during the early 4th century.

In most respects the general finds assemblage from Springhead is fairly typical for what may be expected for a temple site, with coins and personal items being by far the most prevalent objects recovered, both in recent excavations and during previous work in the main temple complex. However, it has been commented upon by Schuster (Vol 2 Chap 3) that there are some marked differences in the patterns of deposition of certain finds types within the site, notably a concentration of brooches in the spring and bone pins around the west Ebbsfleet temple. Pins in particular have been associated with fertility and childbirth in Greco-Roman sanctuaries (Rouse 1902, 252) and their concentration in this temple may suggest such an association here. Interestingly this temple is located some way from the main temple complex and, as discussed above, childbirth was generally not allowed within the confines of the major sanctuary in Greco-Roman cult sites.

Another aspect indicative of a healing cult is the number of dog bones recovered during the recent excavations, especially those articulated burials found within specific structured deposits (see above and Grimm, Vol 3, Chap 2). Dogs have known associations with both the underworld (hence their regular occurrence in ritual shaft deposits) and healing and the existence of 'sacred dogs' within the great healing sanctuary of Asklepios at Epidaurus is well attested (Tomlinson 1983, 20). Black (2008, 2) has suggested that many of the Roman ritual shafts containing dog skeletons, which occur in considerable numbers in south-eastern Britain (especially in Kent), were dedicated to the Gallic deity Sucellos (or a local version thereof), patron of crafts and the underworld.

Perhaps the most telling indication of a healing cult at Springhead can be found with a number of objects recovered from the main temple complex, comprising bronze models of a thumb, an arm, and a hand. The offering of models representing body parts for which divine help was needed was a distinctive feature of

healing shrines all over the Greco-Roman world (Rives 2007, 96), though was not as much of a widespread practice in Britain.

Overall, the evidence from excavations at Springhead is enough to suggest that this was the site of a major healing cult, which would no doubt explain its fairly rapid expansion during the 1st and 2nd centuries AD. Such cults were particularly attractive and often drew people from great distances, seeking divine cures for particular afflictions (see, for instance, Green 1999). These sanctuaries often had attendant physicians and, in this respect, the concentration of toilet/medical instruments from property 11 is particularly interesting. Bath-houses were also commonly found at Greco-Roman healing sanctuaries, for reasons of hygiene, therapy, and general spiritual cleansing (Jackson 1988, 149), and so the two discovered at Springhead would be entirely appropriate. Finally, the simple fact that the religious centre at Springhead was actually focused around a sacred spring suggests that a healing cult is most likely. Springs were seen to have deep-rooted spiritual significance associated with the underworld, rebirth, and life, and thus they were the focus for healing cults right across the Roman world (Rives 2007, 134).

The Development of Northfleet Villa

by Edward Biddulph, with a contribution by Daniel Stansbie

Chronological Sequence

When the timber hall that preceded the villa's east range went up during the late 1st century AD, the site had seen no significant occupation for some 1500 years. Late Iron Age evidence from the villa site is almost unknown. Pottery belonging to a late Iron Age tradition – predominantly grog-tempered, but including sand and flint-tempered fabrics – accounted for just 1% of the total ceramic assemblage and was, in any case, found as residual occurrences in Roman period features. Nevertheless, the material attests to late Iron Age activity in the area and the source of this must, in part, be found in the Western Roman Complex, where pre-Conquest features were recorded. A gully and a small group of pits dating to the late Iron Age were identified, although structural evidence was lacking, which, along with the general paucity of artefactual evidence even here, suggests that the focus of settlement existed outside the area of excavation. Much more significant settlement activity was uncovered further south at Springhead and had ceremonial and religious significance, focusing particularly on the springs (see above).

The Northfleet villa site remained quiet in the decades following the Claudian invasion. A group of large pits (16811) may have been dug before AD 70, but probably more likely dated to the late 1st century when timber building 16812 was erected (Villa Phase 1; Fig 4.4). Contemporaneous features – including a well, cisterns, gullies, and pipes – appeared to be concerned with the extraction and control of water, probably for industrial purposes, including malting and brewing. Other ditches also may have related to drainage and enclosures. (The location of Northfleet's wells, incidentally, appears to have determined how they were constructed. Wells 16731 and 16516 in the north-eastern part of the site were both dug into sandy silt soil and had timber linings. Wells 10977, 15011, and 16002 in the south and south-western part of the site were dug through chalk solifluction deposits and had stone linings in addition to wooden framing. In the case of these southern wells, the use of stone appears to have been a more appropriate material than wood to resist the pressure exerted by the chalk.) The Western Roman Complex was turned over to agricultural use, perhaps as an outlying field system, for the developing villa complex. The relatively small quantities of pottery recovered from the ditch fills support this interpretation. A metalled road linked this site with the main villa complex and continued south, possibly towards Springhead.

Building 16812 was abandoned after AD 120 (Villa Phase 2; Fig 4.4). A rectangular structure (15733), built with stone foundations, wattle and daub walls, and a tiled roof, replaced it, but not directly, since the buildings shared neither orientation nor structural elements. Boundary and drainage ditches divided the land to the south and east of the stone building. More cisterns or tanks were dug and these were joined by at least two wells, all revealing a preoccupation, continued from the previous phase, with water access and storage, relating in the main to industrial or activity, chiefly brewing. To the north-west, in the Wetlands trench, a pit lined with wood (group 12700) was dug during this or the previous phase. A beam-slot (15607) in the western half of the main excavation area hints at the provision of a second building, though no outline was traced.

A limekiln (16801) situated immediately east of structure 15733 was operational from the mid-2nd century (Villa Phase 2), and it presumably made mortar for use on a building within the villa complex, possibly 15733 and its new west front, 15746, built after AD 160. A second limekiln, further south, was excavated by W H Steadman in 1910 and may have been contemporaneous, given that the two kilns were of similar construction (Steadman 1913, 11–2). Quarry pits near to the first limekiln were probably used to extract sand for construction. A new entrance and range of rooms (15746) was added to the north and west sides of 15733 during the second half of the 2nd century (Villa Phase 3), although part of the north wall may have been added during an intermediate phase (Fig 4.4). The villa complex continued to expand with the construction of a bath-house (10330–3, 16805). By now a courtyard was gaining definition and this was formalised with the laying of a gravel surface (10516).

Villa Phase 4 (AD 160–200) was characterised by significant structural work to the east range, representing an abrupt change of architectural style (Fig 4.4). The

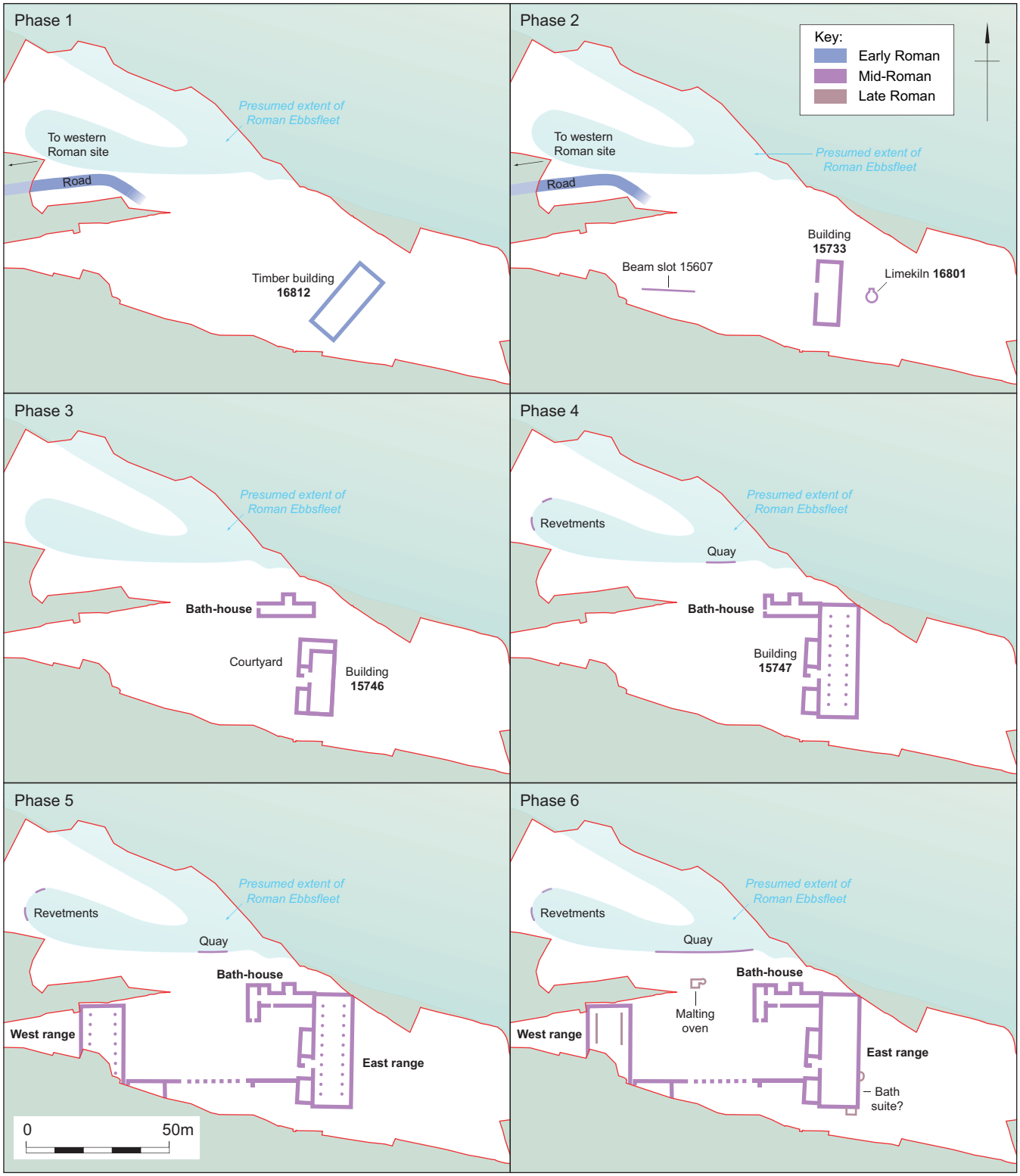

Figure 4.4 Development of the Northfleet villa complex

walls of the original villa structure (15733), along with much of the north wall of the west front (15746), were removed to allow the construction of a large aisled building (15747). Internally, it comprised ten pairs of substantial posts (15577) and a number of beam-slots (15578). The bath-house underwent minor change during this time and ditches to the south and east of the east range were re-cut, re-defining boundaries and re-newing the drainage. A quay (12661) was built alongside the river channel to the north while the Western Roman Complex saw further development as ditches (20290 and 20287) defined a trackway that extended north-westwards before turning to the north-east towards the river channel. A cobbled surface (20782) was encountered, as were a number of post-holes. None contributed to a coherent pattern but both the post-holes and the surface hint at domestic or agricultural activity taking place within the area of excavation.

A second aisled building was constructed during the first half of the 3rd century (Villa Phase 5) to form the west range of the villa complex (Fig 4.4) and comprised external stone walls or footings (16578) and internal post-holes (16640); like the east range, it is likely to have had wattle and daub walls and a tiled roof (see Poole, Vol 2, Chap 6). A well (10977) and three clay-lined pits were associated with the structure. The southern edge of the courtyard was formally defined with the construction of a wall that connected the east and west ranges. A suite of three rooms was added to the west end of the bath-house. The sequence of development is complicated but the rooms appear to have been built and altered in stages. The physical growth of the villa complex during the later 2nd and early 3rd centuries is mirrored by increased material consumption. All the decorated samian, for instance, belongs to this period, and there is a higher than expected proportion of East Gaulish pottery, usually the latest type of samian to arrive (see Seager Smith *et al*, Vol 2 Chap 1).

At the Western Roman Complex, the presence of a small number of pits and the ephemeral enclosure ditches indicates the beginnings of domestic occupation during the mid-Roman period, although a modified agricultural function is also a possibility. By the end of the period, about AD 200–250, the nature of occupation certainly changed, taking on a more domestic function with the construction of large ditched enclosures. The idea that these enclosures were the focus for substantial habitation is supported by the relatively large quantities of pottery recovered from their fills. The pottery assemblage is dominated by dishes and also shows a substantial component of decorated samian, making it indistinguishable from the villa assemblage in this phase. It may be suggested that the occupation at the Western Complex was closely related to the villa, representing part of the expanding villa estate.

The late Roman period (AD 250–380, Villa Phase 6) heralded a change in function for the eastern aisled building (Fig 4.4). Burnt deposits within the structure suggested that a fire consumed much of its southern half. However, the fire did not lead to the destruction of the building, rather a less dramatic re-modelling of the internal arrangements. HS1 excavations have confirmed the findings made by W H Steadman that an apsed, hypocausted room (16531) was inserted into the south-eastern quarter of the building. This may have served as a small bath-suite. A small, square structure (16632) tacked onto the external face of the south wall, if associated with the putative bath-suite, may be identified as a changing room or entrance, the hot rooms being nearer the centre of the main building. The west range saw few changes. The timber posts were replaced by stone walls (16579), but this need not have affected the building's original function. The quayside was extended after AD 300. It was radically altered during the later 4th century with the deposition of a huge amount of rubble comprising building stone, tile, and domestic material. A malting oven (12591) – identified by its structural form and the presence of abundant germinated grain – was erected a little further south. Activity at the Western Roman Complex had begun to decline in scale. Enclosure 20290 was established, but activity was much reduced.

The latest Roman coins from the villa complex dated up to AD 378, and, considered with the absence of coin dated after 388 (otherwise relatively abundant in Roman Britain, and known from a Gravesend hoard; Brickstock 1989), suggests that the villa was abandoned by *c* 380. However, occupation of a different sort occurred after this time, apparently associated with quarrying (16810) in the western half of the site and the digging of a ditch (15754) that truncated the southern part of the east range. It is uncertain whether the people responsible for this lived within the crumbling remains of the villa complex or outside it; modern truncation and previous excavation have removed the upper levels and surfaces of the east range and, along with them, any hearths or other traces of inhabitation. Nor is it clear that the activity followed unbroken from the end of villa occupation. Significance may be placed on the observation that most occurrences of the latest pottery to have arrived at the site were found in abandonment or demolition layers, or colluvial deposits that formed in the Saxon period, rather than occupation deposits associated with the use of the villa. Moreover, these assemblages were in good condition and contained a relatively small amount of residual pottery and did not have the appearance of having been dredged up from quarrying and other ground-breaking activities. Deposit 10402, a demolition layer that accumulated over the western aisled building, provides a useful illustration. It contained, among its 500-odd sherds of pottery, some very late Roman products: dishes and jars in late shelly ware, a handled carinated bowl (Young 1977, type C85) that arrived from the Oxford region after AD 350, Oxford white-slipped red ware, Eifelkeramik, Tilford/Overwey ware, gritty grog-tempered ware, Alice Holt grey ware, and Hadham oxidised ware. This pottery was available for deposition well into the second half of the 4th century, and it is therefore possible that ceramic supply continued for a time after the villa was abandoned. If so, then there must have been a population to receive and use the pottery, even if it no longer used coin to pay for it.

The Development and Use of Buildings

The earliest structure identified in the excavated areas was timber building 16812 (Fig 4.4). The various post-holes assigned to the structure are well-aligned and can be joined to make three convincing sides of the building. However, most post-holes are missing from the east side, and little is known of the short south end. The building is not as well-defined as the later masonry structures, and it rather emerges from the background with the judicious selection of post-holes among the mass of isolated features, supported by the recovery of daub and tile from associated features. Nor do the post-holes

present appear to form a particularly coherent group, varying tremendously in size – ranging from 0.30 m to 1.60 m wide and 0.09 to 1.15 m deep – and shape, with square, round, and rectangular forms represented. But wide value ranges were also obtained from buildings whose interpretation is not in doubt. The standard deviation calculated from the widths of post-holes belonging to 16812 was 0.42 m. This was similar to the values obtained from the eastern and western aisled buildings (0.40 m and 0.53 m respectively), indicating that the widths of post-holes from all structures were just as variable. However, depths tended to be more consistent in the later structures, but this may be a result of the systematic removal of the posts during subsequent alterations of the buildings. Shape need not be identical, either, as round and square post-holes were recorded in the eastern aisled structure. It would be difficult to imagine how the post-holes forming 16812 might otherwise be configured. No evidence, such as hearths and surfaces, was observed inside the structure, although a few seemingly isolated post-holes hint at internal division. Better evidence for use was recovered from post-hole 16650. Germinated grain from the feature (W Smith, Vol 3, Chap 4) suggests that the building was used for the storage of malted grain, or that malting was undertaken in the structure, although no evidence of heating was recovered.

The expansion of the site from the early 2nd century onwards was accompanied by the increased exploitation of stone resources. Little more than the footings of walls of the excavated buildings survived, making it almost impossible to determine the full range of materials used in the construction of the villa complex. However, Blagg's maxim that local availability was the main consideration (Blagg 1990, 48) must be correct in relation to Northfleet. Flint was the dominant material used in the surviving foundations and walls of the east and west ranges and the bath-house. This stone was extracted locally from seams within the Upper Chalk underlying the sandy clay and colluvial soil on which the villa complex was sited, or from the thicker bands in lower strata. The flint had long attracted settlers to the area. The chalk from which the flint derived forms part of the Coombe Rock that proved so rich for the middle Palaeolithic inhabitants who quarried the deposits for flint tools; Baker's Hole, the archetypal Levalloisian site (R Smith 1911; Wenban-Smith 1993), lay a short way south of the villa complex. The chalk itself was utilised in the building work. Nodules filled the cores of the walls, while chalk blocks were an important component of the bath-house and, in some parts, were used to the exclusion of flint. Wall 10156 that defined the first-phase *caldarium* was particularly well-preserved and alternating courses of chalk blocks and tile levelling were recorded. The south walls of rooms 10331 and 10624 were similarly constructed. Ragstone (or Kentish Rag), a form of limestone quarried from the Hythe Beds, arrived from the Maidstone district and was incorporated occasionally within the walls of the east and west ranges, though used as the principal stone in the southern courtyard wall and malting oven. As ragstone was used to build the town walls of London and Rochester, quarries and transportation were almost certainly matters of imperial contract and possibly state control (Worssam and Tatton-Brown 1993, 104; Pearson 2002, 215). Northfleet may have taken a small share of this supply or received the stone from small-scale concerns. But in any case, given the abundance of local material in the Northfleet area, ragstone was always likely to remain a minor component of structural requirements.

Chalk was important, too, in the production of lime for use in mortars, limewashes, and wall plasters. The Villa Phase 2 limekiln (16801) attests to lime burning on site during the 2nd century and the presence of a second kiln, seen in 1910 (Steadman 1913, 13), suggests that the activity was undertaken on a large scale. Chalk, if not too soft, makes an excellent white lime and can be converted relatively easily by being covered with wood or other fuel and burnt (Mason 1999, 1). Structures could take the form of a kiln box – a simple, rectangular, open structure – and it is likely that the operation of kiln 16801 was similarly basic. As it is burned, the chalk (calcium carbonate) is converted to quicklime (calcium oxide) which, though removed from the kiln at this point as 'lump lime', remains highly reactive. This reactivity is reduced with the addition of water which produces hydrated or slaked lime (calcium hydroxide) as a fine powder (*ibid*). The addition of more water produces a putty that can be stored indefinitely and, when required, mixed with sand to make mortar (*opus signinum* has ceramic fragments added). In modern, vertical-shaft kilns, the optimum temperature range for calcination is 1000–1200°C (*ibid*, 2) and the temperatures reached in the Northfleet kiln would not have been far off this; analysis of burnt deposits within the chamber of a limekiln at Weekley, Northamptonshire – also located near to a villa – suggested that that structure had been fired to about 1100°C (Jackson 1973, 135).

The inverted cone structure of the Northfleet kiln recalls Cato's instruction to dig a pit at the bottom of the chamber to hold the burnt fuel (*De Agri Cultura*, 38). The abundant charcoal found at the base of the structure confirms that the chalk was burnt by fuel placed underneath and identifies the structure as an intermittent or periodic kiln which was loaded, fired, allowed to cool, then emptied (Williams 2004, 11). At the kilns at Weekley (Jackson 1973, 137) and Helpston, near Peterborough (Dakin 1961) the limestone seems to have been piled onto a timber dome structure supported by a ledge built around the edge of the chamber. As the timber was burnt, the limestone calcified but retained its domed shape (Jackson 1973, 137). Kiln 16801 is likely to have worked in a similar way, even matching these examples with its internal shelf. At 3.6 m in diameter, 16801 was a little larger than the Weekley kiln (3.0 m) and larger still compared with a possible limekiln (1.2 m) associated with the villa at Brantingham, East Yorkshire (Liversidge *et al* 1973, 87).

The mid-2nd century date of the Northfleet limekiln makes it possible that the lime from it contributed to the

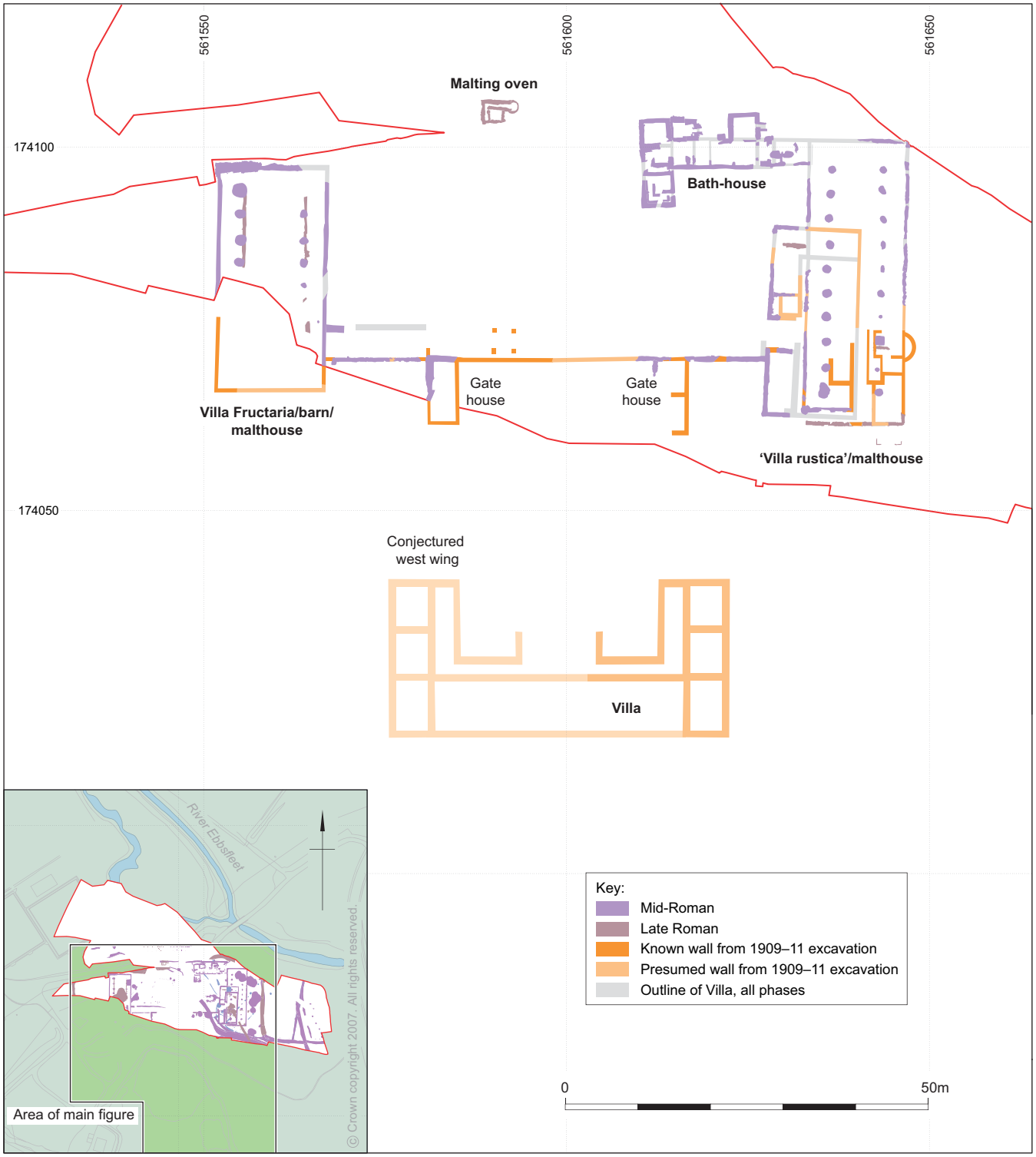

Figure 4.5 Interpretation of the Northfleet villa complex

construction of the first phase of the east range (15773). This building conforms most clearly to J T Smith's hall-house type. The hall-house is a rectangular, barn-like, internally open structure; it can be both narrow and broad in plan and have a roof supported by its external walls or posts, or by internal posts that define aisles and a nave (J Smith 1997, 26; Percival 1976, 134–6). The internal space may be functionally divided, the use-areas being indicated by multiple hearths, drains, surfaces, or, more clearly, partition walls, usually at one or both ends. The hearths, essential for heat, light, and cooking, reveal that halls were occupied domestically; other parts of the structure may have been devoted to craft activity or agricultural work or for stalling livestock. These ideas are well-illustrated by a stone-built rectangular building, 7.5 by 16 m, uncovered at Catsgore, Somerset. In its first phase (mid-3rd century), building 3.17 was divided in half along its short axis by a drain. In one half, hearths were positioned on a floor paved with stone slabs while post-holes hinted at further partition. The other half of

the building was, in contrast, relatively featureless; drains extended round the edge of a space floored with gravel (Ellis 1984, 6, fig 5). The differences suggest that the building was divided by function: one half was domestic (the partition probably screening off a sleeping area), the other served as a byre for livestock. The internal evidence for structure 15773 is not nearly so emphatic. Robbing, modern truncation, and previous excavations had entirely removed surfaces and hearths and any other sign of occupation, although wells and cisterns close to the buildings gave any residents good access to water. J T Smith (1997, 45) acknowledges that evidence relating to the use of hall-houses is fragmentary, but the internal division and the provision of hearths in many make domestic occupation in those lacking such evidence a near-certainty.

In the second phase of the east range (AD 160–200), a set of rooms and new entrance were added to the west face of building 15773. The addition is in keeping with developments seen at other hall-houses. The single-celled building at Sontheim an der Brenz (phase III) in Germany acquired a long room on one side; at Monréal, the hall-type house, in its second phase, was given a passage or gallery at the front and a long room along its side (J Smith 1997, fig 30). Closer to home, building 3.17 at Catsgore, in its second phase, was extended east, gaining two rooms, and a third room was added to the building's north side (Ellis 1984, fig 6). The work at Northfleet also recalls the L-shaped lobbies enclosing two sides of the main villa-block (J Smith 1997, 70), although division of the new west front into at least four rooms suggests a different function. Unlike the lobbies added to halls or blocks of rooms (Smith's row-type houses) seen, for example, at Orpington villa period III (Philp 1996, fig 16), it could not function as an unbroken passageway around the main block, nor did it lead to a reception room or rear corridor. The new rooms appear to have been mainly utilitarian, providing extra working or private space though, typically, evidence of function is scanty. The Villa Phase 1 clay-lined cistern (15449) had now been brought into the building, was truncated by the walls of 15773, and must have been out of use by the time the extension was built. Steadman (1913, 10) noted a hearth within the southernmost room of the new west front, speculating on the basis of iron fragments that the room served as a smith's workshop. But, if anything, the hearth is likely to pre-date the east range, as Steadman's plan suggests that it was cut by the west wall of 15773 and it is, perhaps, better to be associated with timber building 16812. Yet, with the construction of the west front, the importance of the wide, central, entrance – similar to that fronting the main house at Sparsholt, Hampshire (Wilson 1973, fig 15) – was maintained; the very tentatively-identified column base flanking one side of it, and porch-supporting post-holes, may have given the building a public face.

If the east range potentially functioned both in public and private spheres and provided domestic accommodation within the villa complex, then this role was reduced with its conversion into an aisled building during the second half of the 2nd century (Villa Phase 4). The sequence from single-celled hall to developed hall, then back to basic hall (albeit in a different and larger form), would be considered extraordinary if the building was, or continued to be, the principal house. Hall-houses never seemed to have developed in this way (*cf* J Smith 1997, 80–93) and the east range can only have had subsidiary status. A series of short beam-slots at the southern end of the building, probably relating to stalls or, more likely, a wooden raised platform, provide an indication of functional change and a greater emphasis on agricultural use, for example grain storage. That said, the phase 3 entrance and range of rooms were still present and continued the public and social role of the building. We might expect accommodation of a sort but it is not clear how this was arranged. Alternatively, domestic quarters were in an upper storey, reached via an external staircase within a narrow passageway along the southern end of the building. If so, then the residents, forced to enter the building by an inconspicuous side entrance, are more likely to have been estate workers than a family household. Interestingly, the imposition of Steadman's 1913 plan on the plan of the east range as recently excavated (Fig 4.5) offers a little more clarity, suggesting that parts of the Phase 2 building (15773) were incorporated into the new phase; the robber trenches associated with 15773 appear to be the result of masonry removal during the construction of the aisled building rather than after the villa was abandoned altogether. With Steadman's plan, the narrow passageway and entrance leads to a short north–south passage which, along with the surviving east wall of 15773, divides the southern half of the aisled building lengthways essentially into two units. How much of this represents Villa Phase 6 work (associated with the possible new bath-suite), however, remains uncertain. The main west entrance continued to serve as the public face of the building, with the rooms to the side perhaps functioning as offices. Germinated grain recovered from the beam-slots hints at the building's identification as a malt-house (W Smith, Vol 3, Chap 4) though the deposits that contained the grain related to feature disuse and so the malt cannot be attributed to the building with absolute certainty.

The western aisled structure, another undeveloped hall-house built during the second half of the 3rd century (Villa Phase 5), shared a probable working role with the eastern aisled building. It had mixed flooring – a brick floor and a rough chalk floor – that hints at different uses (some bricks were burnt suggesting that they stood under hearths or ovens). Post-holes and a beam-slot suggest some partitioning while a cistern was located at the aisle's north end. Germinated grain from one of the post-holes (entering the feature after the post had been removed) suggests that, like the east range, the building was used as a malt-house. The southern courtyard wall, built during this time, incorporated two structures, each comprising a pair of rooms. The structures recall the buildings seen at Minster-in-

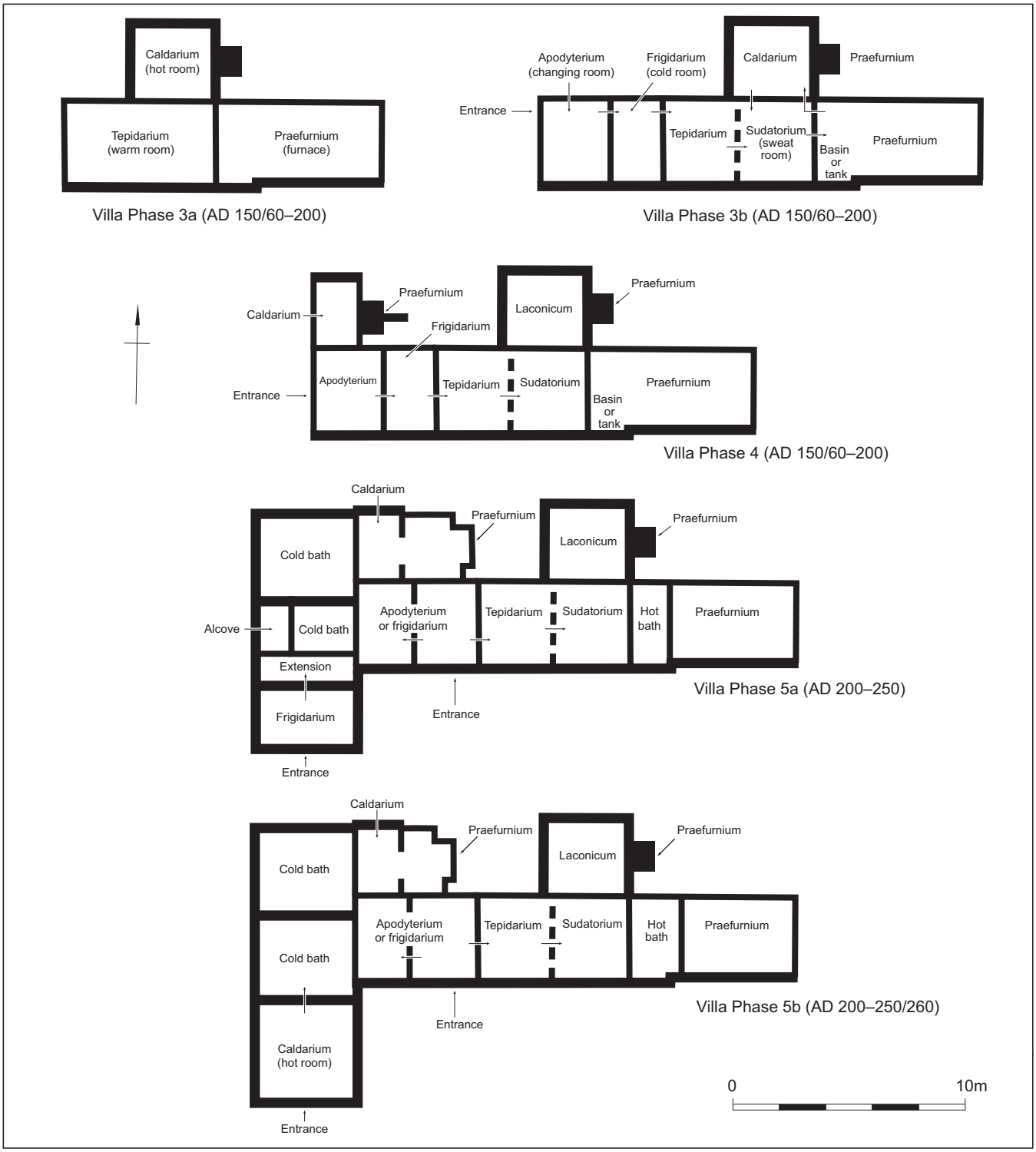

Figure 4.6 Phases of the Northfleet bath-house

Thanet, Thurnham, and Darenth villas, among others (Parfitt 2006; Lawrence 2006; Philp 1984), specifically in terms of their inner rooms. Such structures have been regarded as guest-houses or secondary houses (*cf* Black 1981, 182), or accommodation for the estate bailiff and his family (Parfitt 2006, 132) but these interpretations seem inappropriate for the Northfleet structures which lacked the usual distinctive concentric plan and were devoid of domestic evidence. Alternatively, the structures can be interpreted as gatehouses, although their relatively large size argues against this too.

Crucially, the western aisled building remained virtually unchanged in its next phase, when the internal post-holes were replaced by walls. This is in contrast to the eastern aisled building which underwent considerable alteration, including the provision of small rooms and a bath-suite (Villa Phase 6). The building therefore acquired the functions and status of a principal house and, in this respect, began to follow the conventional pattern of development of hall-houses (*cf* J Smith 1997). The alterations suggest that the social organisation of the villa complex changed during this

time. If the main house to the south of the excavated area continued to be occupied then the householders in the main house may have abandoned the structure and moved to the eastern aisled building, or possibly the estate was shared by a least one other household, though not necessarily equal in status. However, given its own entrance against the south wall of the aisled building, the bath-suite was not necessarily reserved for private use, suggesting that the aisled building continued to accommodate estate workers.

The bath-suite in the aisled structure was the second bath-house at the site and may have replaced the first. This original bath-house, a detached structure when first built, was identified on the basis of its form, hypocausted rooms, and use of *opus signinum*, among other factors (Fig 4.6). Much of the internal arrangement had long disappeared by the time of excavation but some attempt at dividing and assigning function to the space within the building remains possible with an examination of extant evidence and by analogy. At its fullest extent, the first-phase building consisted of a row of rooms orientated east–west and measuring 20 m by 4 m; an additional room, 4 m square, projected from the north side. A change in the construction of the south wall – from flint and *opus signinum* in the east to limestone, flint, and mortar at the west end – and north–south oriented short wall fragments extending from the south wall, mean that the main block can be divided into at least four rooms. Assuming that the bath-house conformed to certain Roman norms, then these rooms should, in theory, be identifiable. This is made difficult by the paucity of internal features but, to help us, it is worth highlighting the spaces whose function is certain.

The projecting room (10330) was hypocausted and heated by its own *praefurnium*. Given the direct heat source, the room should be the *caldarium* (hot room). It could be the *sudatorium* (sweat room), but, where a sweat room was provided, bathers usually entered the *caldarium* from the *sudatorium* (Nielsen 1990, 160) and so we should not expect the latter to be at the end of the sequence as room 10330 clearly was, since it could only be accessed through the east half of 10331. The easternmost room of the main block (16805) contained a flue and furnace and must also be a *praefurnium*. This could only heat the adjoining hypocausted room (10331). Rooms with suspended floors included the *tepidarium* (warm room) and *sudatorium*. To maintain a cooler temperature, the former was not usually heated directly (*ibid*, 155–6) and so would be expected to be separated from the *praefurnium* by another room, while still receiving heat from it. The double size of room 10331 – 6 m long, compared with 2–3 m for rooms 10332–3 – makes the division of 10331 into two a strong possibility. Potentially, then, we can identify a *sudatorium* which was, typically, heated directly and positioned between the *tepidarium* and *caldarium*. A tank (*testudo*) may have been positioned over the flue of the *praefurnium*; one was almost certainly present here in a later phase (room 10344) when it was drained by gully 16813 but, perhaps, was also present at this early stage. This would explain the relatively long length of flue (almost twice that of the flue serving room 10330). Room 10332 was unheated and appears to correspond with the *frigidarium* (cold room) which normally preceded the *tepidarium* (*ibid*, 153–4). A cold bath may have been provided, though there is no trace of this or any means of its drainage, except that the *opus signinum* bonded walls were a waterproofed element that could allow the provision of a tub. Room 10333, at the west end of the main block was also unheated and should logically be the *apodyterium* (changing room).

In its first phase, then, the bath-house was built to a reasonably conventional linear plan or axial-row type (*cf* Nielsen 1990, fig 1). Bathers entered the *apodyterium* then moved through into the *frigidarium*. This gave access, up a step or two, to the *tepidarium*, where bathers acclimatised before entering the *sudatorium*. They may have been scraped clean with a strigil here or probably in the *caldarium* where a drain was provided. Bathers rinsed off possibly in a basin filled with hot water taken from the tank over the flue before making their way back to the cold room to cool down (Fig 4.6, Phase 3b). The linear plan is familiar from a number of detached bath-houses in Kent and beyond, for example at Plaxtol, Hayes and Foot's Cray (Detsicas 1983, figs 24 and 31), and the first-phase bath-houses at Beddington, Surrey (Howell 2005, 30). However, there are points of difference, these being the provision of cold or hot baths in separate rooms (not present at Northfleet) and the apparent absence of *sudatoria*. In this respect, the bath-house from the villa at Wingham, near Canterbury (Jenkins 1984), provides a much closer match, as a *laconicum* appears to have been included (Detsicas 1983, 133).

Water was required for the *caldarium*, the putative *testudo*, and, if provided, a bath in the *frigidarium*. Drainage gullies, mentioned above, took the waste water to the river channel 15 m to the north. However, no pipes appeared to feed the baths (ditch 16723, though extending towards the bath-house from a cistern, underlay the structure and must be earlier) and so the baths were likely to have been filled manually with water carried from wells. No evidence survived to reveal anything of the internal decoration of the bath-house. Nothing, either, is known of the superstructure above the lower courses of extant wall, though Nielsen (1990, 153–60) notes that rooms of the types identified at Northfleet, except the *apodyterium* and *praefurnium*, were normally vaulted. Two ceramic voussoir fragments were recovered from the *caldarium*, though the total assemblage from the site as a whole was very small, fewer than 20 pieces.

The construction in Villa Phase 4 of a second, later expanded, *caldarium* (10508/200055) – heated directly with its own *praefurnium* using cereal chaff as fuel (see W Smith, Vol 3, Chap 4) – was met by alterations in the original hot room; the suspended floor was replaced, a vent was cut through the west wall, and the flue narrowed. Water was now no longer a consideration, the

Plate 4.3 Artist's reconstruction of Northfleet villa complex with quayside in the foreground (P Lorimer)

opus signinum mortar having been covered or removed. The result was to transform the original *caldarium* into a *laconicum* (hot dry room; Fig 4.6, Phase 4).

A block of three rooms was added to the west end of the bath-house in the 3rd century, though probably in stages. Room 10509/200240 and room 10624/200241 were unheated, built with *opus signinum* bonded walls, and had tiled floors; the internal walls of 10509 were decorated with red plaster while pink plaster covered at least the internal face of 10624's west wall. These factors, plus the additional observation of drain-pipes, suggest that both rooms served as cold baths or pools (*baptisteria* or *piscinae*). Again, both were filled with water manually with the waste water entering gullies and draining into the river channel. Entry through the west wall of the *apodyterium* was now blocked and a new entrance made through the south wall of room 10332; the functions of rooms 10332 and 10333 may have been switched or combined (Fig 4.6, Phase 5a). Room 10624 was subsequently expanded and a new room added to its south wall. This room (10697) had a suspended floor and presumably functioned as a *caldarium* though the position of its *praefurnium* is unknown (Fig 4.6, Phase 5b). The addition of two cold baths and two *caldaria* at the west end of the bath-house may have been in response to an expanding population within the villa complex – the western aisled building had recently been built and the construction of the southern courtyard wall hints at development south of the excavated area, possibly relating to the main domestic building. More intriguing, though, was the evident requirement for separate cold baths. While access between the rooms may have been possible (floor levels were identical), the pools were effectively paired off with their own *caldarium*. Movement between the north cold bath and its *caldarium* was somewhat awkward; the former was at a higher level, suggesting that the room had its own entrance or that bathers entered via the south cold bath. In contrast, bathers stepped down into this southern cold bath from its adjacent *caldarium*.

So, in its final form, the bath-house became less communal or, at least, more clearly segregated. The obvious basis for this was sex. Mixed bathing in public baths had been banned under Hadrian (117–38) and the legislation was reinforced by Marcus Aurelius (161–80) and then by Severus Alexander (222–35), presumably after persistent flouting of the law (Nielsen 1990, 147). The early to mid-3rd century additions suggest that mixed bathing was prohibited at private houses too and the work may have been in response to state enforcement across a range of establishments. Alternatively, and less dramatically, increasing affluence allowed the villa owners to incorporate separate bathing facilities. But the southern *caldarium* was originally a cold room and the initial plans for the expansion had not accounted for segregated bathing, making this explanation less likely. In any case, during the period when there was no purpose-built means of separation, men and women perhaps entered at different times. This appears to have been the case at a mining community at Vipasca, Portugal, where, according to a 2nd century inscription, the manager of the baths was required to

keep the baths open 'every day from daybreak to the seventh hour for women, and from the eighth hour to the second hour in the evening for men' (Lewis and Reinhold 1990b, 104).

The Quayside

The revetment and jetties built along the riverside formed part of a quay to the north of the villa complex (see artist's reconstruction in Pl 4.3). The quay was constructed during the late 2nd century or possibly earlier. It may have been one of a number of riverside structures; others may yet be uncovered a little way towards the source of the channel at Springhead or further north towards Northfleet (Robin's) Creek where the river issued into the Thames. A length of timber revetment (381802) seen 40 m west of the quay structures but set at a different alignment to them appeared to define the western limit of the channel on which the quay was built, suggesting that the channel was, in fact, a backwater and not the main stream of the Ebbsfleet (see Fig 4.4 above).

The course and flow of the main Ebbsfleet channel in the Roman period cannot be reconstructed with certainty as too little is known about the tidal range, the volume of fresh water coming from the spring head (impossible to measure today after water extraction and drainage into large quarries reduced the Ebbsfleet to a trickle), and the interaction between the fresh water and seawater (similarly difficult to gauge since the mouth of Robin's Creek was built over in the 1980s). However, various indicators provide a reasonable idea of water levels. Ground surface level on the south side of the backwater in the mid-2nd century was *c* 1.7 m aOD, this being the height at which pit 12700 was cut and the level of a dated surface underlying the malting oven (subsequently raised to *c* 1.9 m aOD with the construction of the structure). The top of the revetment timbers forming the first-phase quay, dated AD 171–207, was between 0.9 m and 1.0 m aOD, while the uppermost alluvial layer deposited by the stream and into which the revetment timbers were driven was little lower than 0.9 m aOD. This provides a reasonable level for the later 2nd or early 3rd century mean high tide. Tide profiles calculated for the Thames offer some support for this level. The mean high water level of the tidal Thames in the mid-1st century lay between + 1.0 m and 1.5 m aOD (Killock 2005, 36, 38; Yule 2005, 16), a height based on the evidence of timber quays and revetments from Billingsgate Buildings, Pudding Lane/Peninsular House, and Miles Lane in the City. However, Killock (2005, 38) noted that the surfaces of contemporaneous alluviation and dumping in Southwark were consistently lower. Moreover, levels were falling after the mid-1st century, allowing marginal land below 1 m aOD to be exploited during the later 1st century and first half of the 2nd. An early Roman surface in Southwark Street was built to a height of 0.65 m aOD. Mid-1st century alluvium reached a height of 1.05 m aOD at 213 Borough High Street. Alluvium was deposited to 0.8 m OD at 175–177 Borough High Street in the late 1st century, and to 0.7 m OD at 93–5 Borough High Street during the first half of the 2nd century (Killock 2005, 3–40). The height of Northfleet's quay in the late 2nd–early 3rd century is comparable to the levels recorded in Southwark. It is reasonable to suggest that in broad terms – and notwithstanding the complicating factors of the Thames' creeks and tributaries – the tidal model extrapolated from Southwark can be correlated with data from Ebbsfleet.

The final phase of work on the Roman quay saw extensive dumping of rubble which took away the timber staging, sealed the vertical piles, and built up the surface to a level of *c* 1.7 m aOD. This may have been in response to rising water levels; ditch 16697/8 dug along the north side of the villa complex may well have acted as a flood defence. However, peat formation at Tilbury in the 3rd century and Mar Dyke in the 6th century and surface levels at Thamesmead in the 4th century, indicate that the water level did not begin to rise until after the Roman period (Lakin 1999, 333). More simply, then, the rubble consolidation brought the level of the quayside up to that of the ground surface around the malting oven.

Taking estimated tidal levels into account, the water along the quay was undoubtedly shallow even at high tide. The height of the river bed in front of the Villa Phase 4 quay was *c* 0.25 m aOD, giving a suggested depth of 0.65 m. The extended quay at its east end was sunk into river gravel seen at a level 0.60 m aOD, which gives a depth of water of just 0.30 m; these are of course approximate and a depth of 0.50 m, perhaps the minimum required for estuary craft, was presumably regularly reached across the quay front. Mean low tide is unknown but it is very likely that the backwater was largely dry when the tide receded, leaving boats moored along the quay beached and resting on the exposed gravel foreshore. Sailors would have been required to wait for high tide before moving off into the main flow of the Ebbsfleet and access to the quay may have been restricted to vessels that were manoeuvrable yet capacious, in particular dugouts and coracles or flat-bottomed barges and lighters with draughts of 0.30–0.50 m. Among the best known vessels are the barges uncovered at Zwammerdam in Netherlands, and Pommeroeul in Belgium. One of the boats (1st century Zwammerdam 3) recorded at the former, the site of an auxiliary fort on the south bank of the Rhine, was distinctive, though consistent with the 'Celtic' or continental tradition of shipbuilding. Its flat base was formed from a series of timber planks laid edge to edge and nailed to the ribs of the internal frame; the sides were made from overlapping planks. Overall, the barge measured 22.75 m long, 2.80 m wide at the base, and 0.95 m high (draught) (de Weerd 1978, 15–21). The draught of a barge from Pommeroeul was shorter at 0.67 m (*ibid*), and some rivercraft were shallower still. Mainz type A, a boat dated *c* AD 375, had a draught of 0.45 m, though it was probably a naval vessel that

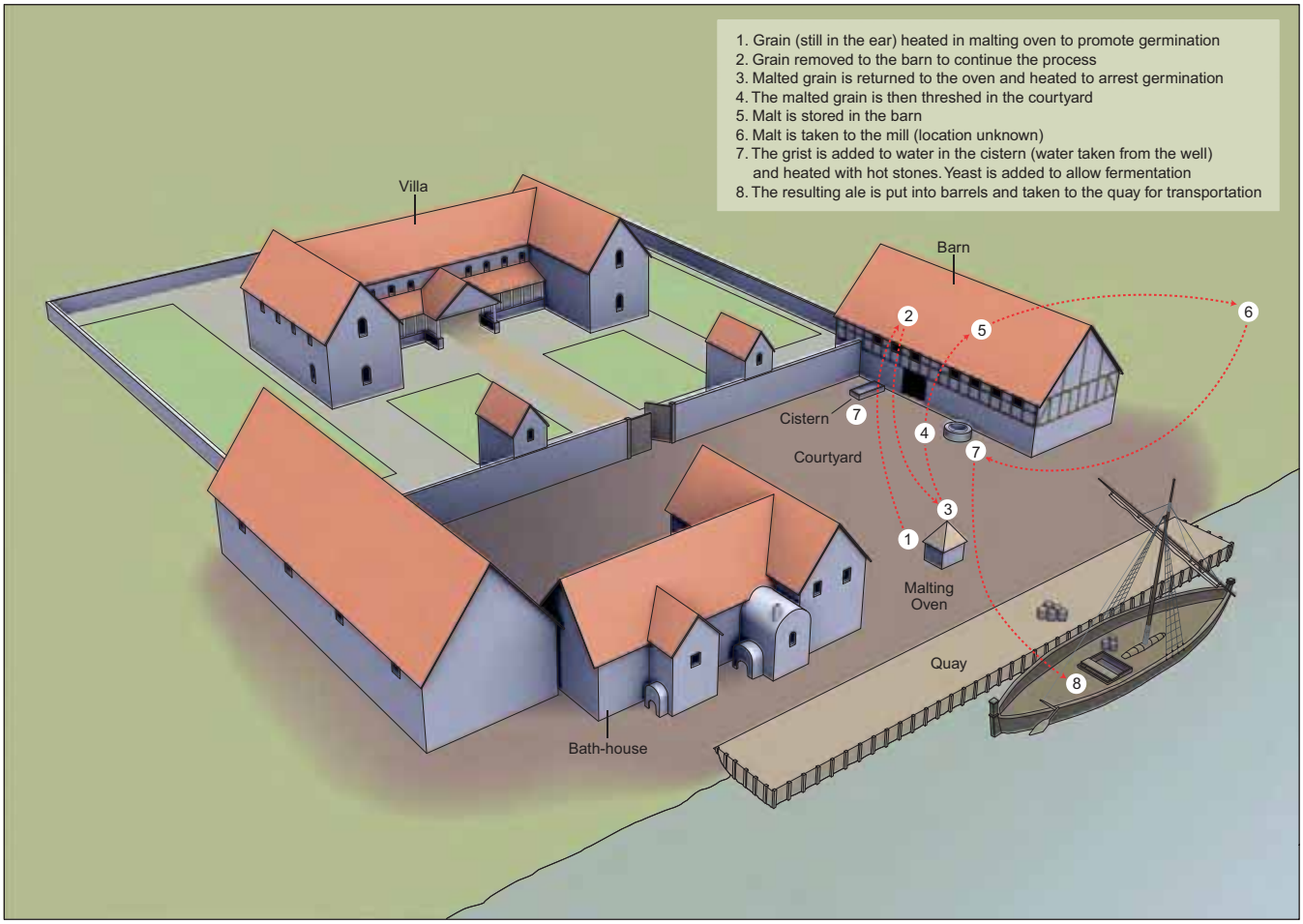

Figure 4.7 Schematic view of the villa complex showing the phases of ale production (R Lorimer)

patrolled the waterways of the Rhine and Danube rather than a barge like Zwammerdam 3. Both types were propelled by oar or sail (Mason 2003, 46–7), though vessels moving along the Ebbsfleet may have done so with poles or simply with the tides and stream. The types of craft found closer to home in the Thames may have been seen at Northfleet but, on the whole, seem too large. Blackfriars I, a merchantman, though flat-bottomed, had a draught of 1.2 m and was 6.7 m wide (Marsden 1967); the County Hall ship, a merchantman dating to the end of the 3rd century, had a beam of 5.0 m and draught of 1.8 m but, in any case, was not flat-bottomed and would have been unsuited to the Ebbfleet's shallow waters. No Roman craft have been recorded in Kent but the remains of clinker-built boats reminiscent of 'Romano-Celtic' tradition have been recovered from Anglo-Saxon graves at Monkton, Margate, and Ozengell (Perkins 1985), while more substantial remains of a similarly built 10th century boat were found at Graveney.

The discovery of a cargo of Kentish ragstone, sent down the Medway, from the Blackfriars I wreck in the Thames (Marsden 1967) reminds us of the importance of Kent's rivers in communication and trade in the Roman period. Villas played a vital role here. Wooden stakes excavated from the bank of the Darent at Lullingstone suggest that a quay was part of the villa estate (Philp and Chenery 2006) and a wharf has been proposed for the Mount villa, Maidstone (Houliston 1999, 104). At Northfleet, little evidence of riverine trade survived beyond the remains of the quay but a few finds give a sense of the range of goods that may have been unloaded onto the quayside. Amphorae containing fish products arrived from Portugal while olive oil was shipped from southern Spain, or, in the 4th century, from North Africa. Their route into Britain is uncertain but given the distribution of these products north of the Mediterranean – along waterways and the coast – it is probable that the ceramic containers arrived through secondary trading links via the river systems of Gaul and Germany (*cf* Martin-Kilcher 2003, 82). What role London played in this trade is not clear. Products destined for Northfleet may have arrived first in London, though it is possible that goods were off-loaded *en route*, perhaps from larger seagoing craft onto the barges and lighters alluded to above. In Britain, North African cylindrical amphorae have been found generally on river-based or coastal sites (Williams and Carreras 1995, 238) which seems to preclude subsequent overland redistribution. But the importation of fancy goods was merely a useful by-product of riverine trade at Northfleet which was, otherwise, concerned with the more significant exportation of malt and ale. Oysters, too, dredged from managed natural beds along the

coasts of Essex or north Kent (see Wyles, Vol 3, Chap 4), could have been exported from Northfleet. Oysters from the Thames estuary have been found (for example) in Leicester (Monckton 1999), so long-distance trade is certainly feasible. Instructions for the preservation and transportation of oysters is given in *Apicius* (1.12; Grocock and Grainger 2006, 137), requiring the oysters to be packed in a vinegar-lined jar, though no vessels with obvious residues were noted at the villa. Adding further doubt to the possibility of exportation from the villa, the fact that no large shell dumps were recovered suggests that oysters did not form an important part of the diet of Northfleet's inhabitants and are unlikely to have arrived in significant quantity.

Economy and Industry

Northfleet was a large-scale producer of malt and almost certainly ale. These activities were carried on throughout the life of the villa and were attested by the abundant germinated grain and sprouts recovered from timber building 16812, the later eastern aisled building and the western aisled building, as well as the 4th century Roman malting oven (see Stevens and Smith, Vol 3, Chap 4). The sheer quantity of cereal evidence was exceptional and of a scale to suggest that its products were destined for the export market. The technology of malting and brewing is complicated and requires access to water and heat, equipment, such as querns or mills and tanks, and an ability to transport the finished products. The range of evidence recovered from the site appears to satisfy most, if not all, requirements by some significant margin, and probably provides the most complete picture of brewing in Roman Britain. Figure 4.7 provides a schematic view of the villa complex and how it may have related to the different phases of ale production.

At the villa, malt was made from spelt wheat. Ordinarily, the process begins with threshing and, at the villa, threshing may have been carried out in the open courtyard area. However, a feature of spelt wheat is that the grain must be malted in the spikelet and, indeed, the grain from Northfleet was germinated in this way (see Stevens and Smith, Vol 3, Chap 4). Before the construction of the malting oven in the mid-4th century, the unthreshed grain would have been soaked or steeped in water to accelerate germination or 'chitting'. The timber- or clay-lined cisterns uncovered at Northfleet, using water lifted from wells, seem eminently suitable for this. However, only two cisterns (10712 and 10887) appeared to have any means of drainage, an almost essential addition, since it was necessary to change the water regularly, perhaps on a daily basis, to prevent spoilage (Dineley 2004, 2). The other tanks could have been emptied by bucket. Alternatively, the tanks with drainage were used for steeping only, while the tanks without were used for mashing and brewing and required no changes of water. Whatever the case, the early stages of malting must have been a laborious process. The repeated sequence of steeping and draining might take two to three days, after which the grain was lifted from the tanks and spread thinly on the malting floor to be raked and turned and left for another seven or eight days (*ibid*, 2–3). A dimly-lit building, permitting a dark, warm environment, was ideal and we can tentatively identify timber building 16812 and the later eastern and western aisled buildings as serving this purpose. The chalk surface seen in the west range was a rough but practical malting floor and reminiscent of the clay-with-chalk floor that represented the remains of a 3rd century malt-house at Stebbing Green, Essex (Bedwin and Bedwin 1999, 22). The remains of two iron rakes were found at Northfleet (see Schuster, Vol 2, Chap 4) – one from a mid-Roman layer – but whether they were used specifically during malting is unknown.

The next stage required the germinated grain to be dried to arrest growth and effectively convert starch to sugar. There were various ways of doing this without an oven. Traditional methods in Scotland involve rolling hot stones in the germinated grain (Dineley 2004, 4) and this may explain the abundant burnt flint recovered from pits in the courtyard and at the eastern end of the main villa complex; the eastern pits (16816) also yielded a small amount of germinated spelt grain and could mark an area of disposal. Similar evidence was found elsewhere. It was suggested that the 12,000 fire-cracked stones recovered from ditches and pits in the enclosed Iron Age settlement at Farningham Hill in the Darent valley were used for drying grain (Philp 1984, 32). Alternatively, like the Iron Age 'kilns' at Eberdingen-Hochdorf, Germany (*ibid*), the hot stones could have been placed in the pits to transmit heat to the grain suspended above. Similarly, at Stebbing Green, shallow pits that yielded germinated grain were interpreted as the bases of ovens used for parching (Murphy 1999, 21).

At this stage, and presumably after threshing, the malt could be stored for up to a year or traded as a product. To make ale, the malt was milled. In the later 1st and 2nd centuries this was achieved by way of a water-driven or, more likely, animal-powered mill built very close to the site, identified on the basis of the millstones fragments recovered from wells, cisterns, and other features (see Shaffrey, Vol 2, Chap 9). The paucity of 3rd and 4th century millstones, in conjunction with the evidence of continued malting and brewing, suggests that the malt was taken to mills away from the villa complex, perhaps further up-river. The resulting 'grist' was mixed with water – again using the cisterns – to produce a 'mash' and create a sugar solution. The water needed to be warm and so the heated flint would have been required here, too, with traditional methods of brewing – continuing into modern times most notably with the production of *Steinbier* – suggesting that the hot stones were dropped directly into the cisterns (Dineley 2004, 4). Burnt flint was recovered from well 16731 and deposited at roughly the same time as the crop waste, though the two were not necessarily associated. The mash was subsequently rinsed to produce liquid 'wort', to which yeast was added to permit fermentation and turn the liquid into ale. Flavourings could be added at

this stage too. The hot stones used to heat the mash imparted flavour to some extent but other tastes were achieved with the introduction of herbs, such as bog myrtle and meadowsweat (Dineley 2004, 9); sedge was used in the case of Egyptian ale (Nelson 2003, 104). Pollen from well 16731 indicated that hop or more probably hemp – both are members of the cannabis family – grew in the area (see Scaife, Vol 3, Chap 3) and these plants may well have been added to the ale as flavourings. Another flavour, honey, could be added to the ale at the time of serving, perhaps mixing it in a large bowl just before serving into individual beakers or cups. Dragendorff 37 decorated samian bowls were occasionally stamped with the word *cervesa* – beer – suggesting that the form was used for this purpose, among others (Dannell 2006, 158). We know from ancient writers that ale was variable in taste and aroma with some ales being described as pungent and warming while others were sour and watery (Nelson 2003, 103–4). Evidence for flavourings of another kind was recovered from Northfleet. The charred remains of, amongst others, granary weevil (*Sitophilus granarius*) and the saw-toothed granary beetle (*Oryzaephilus suranimensis*) were found in abundance in germinated grain and other malting products (D Smith, Vol 3, Chap 3; W Smith, Vol 3, Chap 4), and it is very likely that the infested malt was brewed. Whether the brewers – and maltsers before them – knew about this is uncertain, but consumers seem to have tolerated the taste of the resulting ale, since, given the richness of the grain-pest assemblage, the insects must have been a regular occurrence.

The mid-4th century saw the construction of the malting oven. Peter Reynolds' experimental work, under the aegis of Butser Iron Age Farm, on structures commonly known as crop (or grain) dryers is almost 30 years old (Reynolds and Langley 1979). The result of that work – that the structure type was unlikely to be a crop dryer but was eminently suitable for use in the malting process – seemed conclusive. Reynolds' experiment is of particular importance for the interpretation of Northfleet's malting oven (12591) because the basis for his work was a structure from Foxholes Farm, Hertford (*ibid*, fig 1) that was almost identical in plan and size to the Northfleet example. In Reynolds' reconstructed oven, the flue and central chamber were set into the ground (*ibid*, pl iv, a) and the Northfleet structure was similarly built as the walls cut through a sequence of chalk layers. The top of the walls survived to a uniform level (2.1 m aOD) and it is likely that this records the level of the wooden floor laid across the structure and the late Roman ground surface in this area of the site. The appearance of the superstructure on which Reynolds settles, complete with 1.6 m high walls and a thatched roof (*ibid*, pl v, b), is open to question, but it nevertheless provides a reasonable model for Northfleet.

The findings of Reynolds' work, which tested, under various criteria, the effects of the heated flue and chamber on grain laid on the wooden floor above, appeared to demolish the conventional view. Moisture content of the grain increased significantly on heating and the only way that the grain could be dried to prevent germination was to lay it very thinly across the floor. That would have made drying an entire harvest completely impractical – Reynolds suggested something in the region of 700 to 1200 hours would be needed. On the other hand, the grain sprouted in a way that was ideal for brewing (*ibid*, 38–41). This view was tempered by van der Veen's research comparing the assemblages of charred plant remains from a number of 'crop dyers'. Analysis of botanical evidence from the structures suggested that they were multi-purpose, used both for the production of malt and the preparation of grain for storage (van der Veen 1989, 317).

That said, the plant remains from Northfleet appear to point exclusively to malting. The plant evidence is crucial for the interpretation of the structure type, but not isolated. A late Roman double-oven from Thurnham – both halves of the oven being near-identical to the Northfleet example – produced an assemblage dominated by spelt wheat, with lesser quantities of barley and oats also recorded. Germinated grains were common and it is almost certain that the structure was used for malting (Lawrence 2006, 115). In terms of chronology, the Northfleet malting oven, which dated after *c* AD 350 and was one of the latest structures in the villa complex, follows the general pattern. Most ovens belong to the late Roman period, although 1st and 2nd century examples are not unknown, and a transition from T-shaped forms in the 2nd century to more complex forms in the 3rd and 4th centuries is discernible (Morris 1979, table 1). The malting oven therefore represented a significant technological advance for maltsters. The structure was used to generate moisture to encourage germination. Heated subsequently, it dried the grain to arrest germination and allowed greater control of temperature, permitting variation of flavour. The grain was then ready to be soaked to produce the ale (Fig 4.7).

If the clay- or wood-lined tanks contained the ale then the drink was produced on a vast scale. Tank 15790 was the largest out of seven known tanks; a calculation taken from its width, length, and minimum depth produces a maximum capacity of 9163.2 litres. To put this in perspective, a writing-tablet from *Vindolanda* records the daily supply of 2.5 *modii* to the commander's house over a four-day period (Bowman 1994, 115–6). On that basis, a full cistern could provide at over 400 days' supply of ale. The smallest tank, 10887, produced up to 564 litres, or 26 days' supply. Three tanks belonged to the early Roman period while another dated between AD 70 and 160. Just two dated after AD 160, suggesting that brewing was undertaken on this massive scale only during the late 1st century and first half of the 2nd. It continued after that, as the malting oven suggests, but at a reduced scale, possibly as a result of increased regional competition and lost markets, or simply re-location of the key features beyond the area of excavation. Intriguingly, two clay-lined tanks dating to the 2nd and

3rd centuries were uncovered at Eynsford (Philp and Chenery 2002); one was connected to a gully containing a wooden water-pipe (*ibid*, 60), suggesting that its function was related to water-storage and drainage, though no further evidence or interpretation is offered beyond this.

Working life at the villa was not exclusively focused around malting and brewing. The estate bred cattle for traction but, more importantly, for meat and dairy products which were consumed within the villa and at Springhead. Sheep and pigs were less important and primarily bred for meat though wool and milk from sheep were useful by-products (Grimm and Worley, Vol 3, Chap 2). Of the industrial activity recorded at the villa, ironworking was of some importance, and smithing waste was seen across the villa site. A large proportion was collected from the Western Roman Complex; three complete smithing hearth bottoms, plus a number of fragments from others, were recovered from early Roman ditches, suggesting that metalworking was undertaken there from the site's earliest Roman period occupation (see Andrews, Vol 2, Chap 5). Within the main villa complex, Steadman (1913, 10) recorded a feature identified as a smithing hearth alongside iron waste in the southernmost area of the Villa Phase 3 east range extension (15746), and considered that a smith's workshop existed there. No trace of the feature was seen in the recent excavation and no further waste was collected from the area. Debris was collected from the villa complex suggesting that iron was worked there but was found mainly in late Roman ditches or post-Roman features, giving little indication as to the location and duration of the industry.

The Villa Estate

Our understanding of the building that Steadman (1913, 14) uncovered south of the main excavation area is extremely poor (see Fig 4.5 above). It was *c* 18 m south of the east range and a tramway cutting helps to place the structure approximately. We also know that it had chalk footings and *tesserae* surfaces but we know nothing of the building's date or appearance. However, it was substantial and probably served as the main house. Steadman's plan appears to show the east wing measuring 20 ft (*c* 6 m) by 70 ft (*c* 21 m) containing three rooms, an L-shaped corridor or lobby 10 ft (*c* 3 m wide) fronting the house, and a return that formed an entrance or porch. Chalk extraction and tramway construction destroyed the rest of the house but, assuming that its entrance was positioned in the centre of the front corridor and that the entrance was 3–4 m wide (apparently a standard unit at Northfleet), and that its west end was a mirror image of the east end, we can estimate the total length of the building at 130 ft (*c* 40 m). Alternatively, we can expand the entrance to 10 m. This is the width of the entrance to the villa at Farningham (Meates 1973, fig 1) and gives a revised length for the Northfleet house of 46 m. This may be the more accurate estimate because it makes the house perfectly central relative to the gate-houses. Curiously, a small fragment of masonry, recorded almost inadvertently during the recent excavation 14 m south of the courtyard wall, lies on the same alignment as the east gate-house and east wing, though appears to form part of a separate structure.

Appropriately, the villa at Farningham provides a good parallel for the plan of the Northfleet house. This comprised, in its first phase, a row-type house of ten rooms and a wing providing a further four (Meates 1973, fig 1). The wing matches that at Northfleet rather well in plan and dimension; its length of 21 m and width of 10 m (including the corridor) is very close to the size of the Northfleet wing. Extending the analogy, we might expect the house at Northfleet to have incorporated a block of rooms between the two putative wings though Steadman saw no trace of internal dividing walls or rear external wall. Still, Steadman's plan potentially allies the house with row-type houses, including winged-corridor villas (Fig 4.8). The house also bore some similarity with Eccles which, in its earliest phase (*c* AD 65), comprised a row of 12 rooms fronted by a corridor (Detsicas 1983, 120), or Folkestone, built in the early 2nd century and consisting of a block of rooms behind a corridor flanked by two wings (*ibid*, 136). Building A, the main house within the extensive villa estate at Darenth, can also be placed within this group (Philp 1984, fig 23); the development of the structure is poorly understood but occupation by AD 100 of the row-type house with wings and fronting corridor seems not unreasonable in the face of coin evidence (Detsicas 1983, 103–7). Outside Kent, we may also consider the villa at Rivenhall in Essex; the complex was built *c* AD 70–80, with building 2 comprising a range of rooms fronted by a corridor with projecting rooms at the sides (Rodwell and Rodwell 1986, fig 23).

Returning to Northfleet, we know a little of the building's internal decoration. Steadman (1913, 14) recorded abundant *tesserae* – 'as many as 200 being found in one day' – and it is likely that these formed part of a tessellated floor. If this gives the house a mainly domestic and residential function, it also suggests relatively wealthy and socially important residents. Its date is unknown but finds (see below) tentatively place its construction within the late 1st or early 2nd century. If it was built before all the other masonry buildings then this has a crucial implication for the development of the villa complex, in part explaining its layout, as the later structures are likely to have been positioned with reference to it.

The identification of the main house goes some way to fulfilling Columella's model of the ideal villa estate containing, as it should, the main house (*villa urbana*), farmhouse or bailiff's house (*villa rustica*), and storehouse or barn (*villa fructuaria*) (*de agricultura* I.vi–ix; Lewis and Reinhold 1990b, 86–90; see Fig 4.5). Of Northfleet's other known buildings, the east range appears to best fit the description of the *villa rustica*. The centrally placed entrance and range of rooms points to a

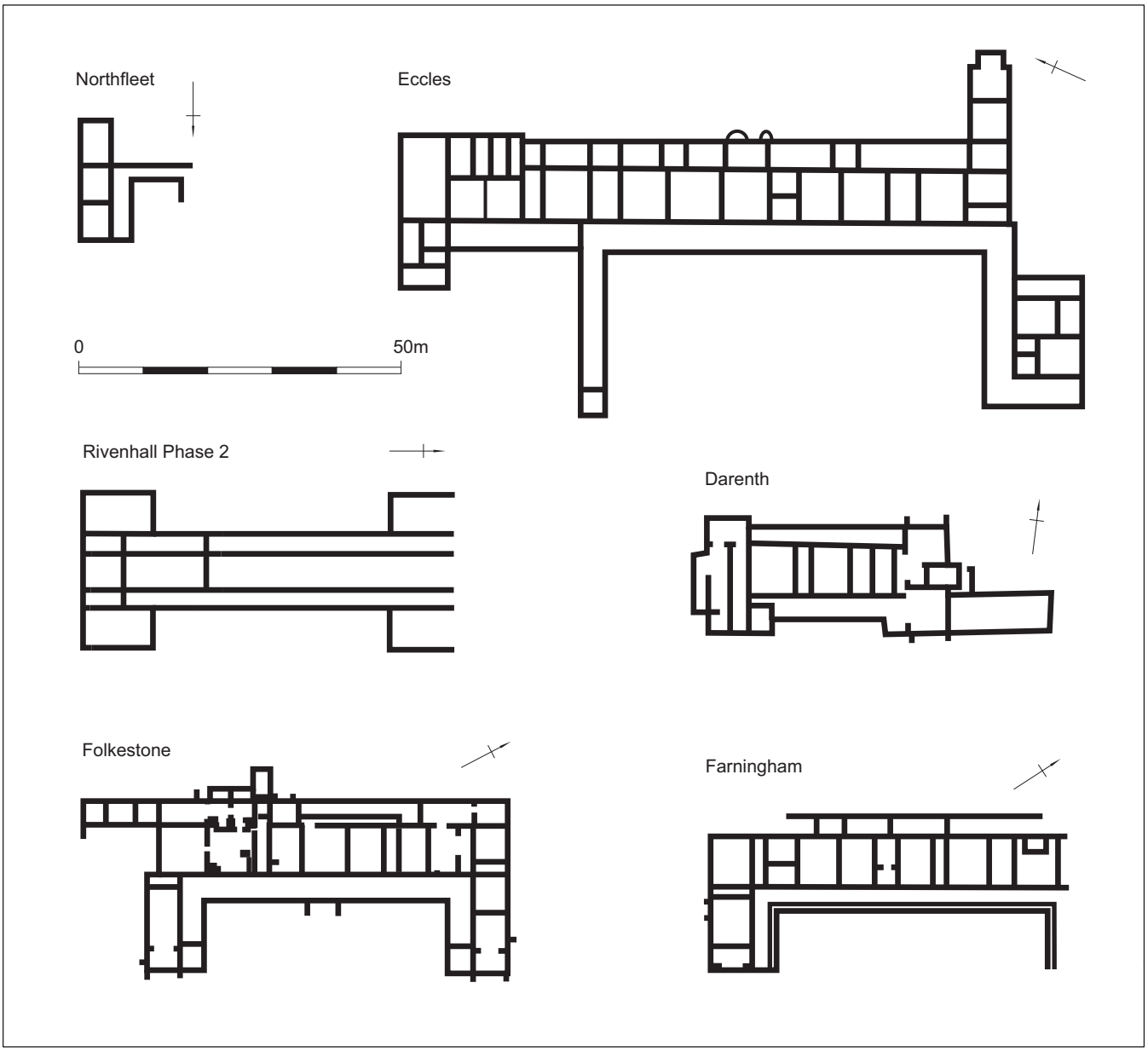

Figure 4.8 Northfleet and comparative villa plans

public aspect to the building where the bailiff (*vilicus*) could receive merchants, buyers, and officials, and conduct the day-to-day business of running the estate. The building would also have provided accommodation for the bailiff's wife, servants, and slaves. The west range, then, should be the *villa fructuaria* and, indeed, the scope for domestic occupation does seem limited. The building's second phase of development showed no addition of rooms or formal division into private and working areas, suggesting that its function remained fixed throughout its life. But it is important to stress that the east range – converted to an aisled building in the late 2nd century – also served as an agricultural building, probably a store- or malt-house, and could, therefore, have functioned in the ways suggested (as far as our understanding allows) by the term *villa fructuaria*. In addition, Northfleet's buildings were introduced at different times with the villa's earliest phase apparently comprising only the main house and timber building 16812. The tripartite division of the villa estate, therefore, may have developed gradually, only by coincidence matching Columella's ideal, rather than being a goal aspired to and planned for from the beginning. However it developed, at its most extensive phase in the first half of the 3rd century, the villa complex had moved away from a British model and took on distinctly continental characteristics. Despite the construction of the aisled buildings – a structural form that was barely recognised outside Britain (J Smith 1997, 36–7) – the complex as a whole more keenly resembled the large villa complexes with long rectangular courtyards most frequently seen in Picardy, north-east France. The positioning of Northfleet's main house behind a courtyard wall, with subsidiary buildings on the other side set symmetrically at right-angles to it, finds matches at Estrées-sur-Noyes and Warfusée (northern France). Warfusée is especially close since the courtyard wall included two gate-houses (*ibid*, 159,

fig 43). Northfleet, of course, lacked the long rectangular courtyard, but its growth would always be constrained by the riverside location.

The presence of an early Roman high status villa building at Northfleet is speculative but is well supported by finds that are otherwise awkwardly placed within the context of the enclosures and barn-like buildings revealed during the excavation. Though unstratified, a piece of white marble *opus sectile* paving, possibly Carrara (see Shaffrey, Vol 2, Chap 9), puts the site within a small group of prestigious and richly adorned villas where *opus sectile* was found, most notably Fishbourne Palace, and, coincidentally, Rivenhall and Folkestone. *Opus sectile* was also found at Southwark in a building used by the provincial administration (Crowley 2005, 91). This type of flooring is exclusively early Roman in date (Clarke 1982) so its presence at Northfleet suggests that a prestigious villa existed here during the earliest Roman phase, probably contemporary with the first timber building (16812) dating to AD 70–120. We cannot definitely place the marble piece in the main house but, given that the building resembles early Roman row-type houses and that some of these were decorated with *opus sectile*, it remains an excellent candidate. Fragments of Purbeck marble wall veneer or flooring was also found; none was *in situ*, though one was associated with early Roman pottery. The remains of oolitic limestone and bath-stone columns recovered from Northfleet (see Shaffrey, Vol 2, Chap 9) are rare finds on villa sites. Of the more significant pieces was a capital from a miniature Tuscan column (SF 11351) that stood on a low wall or pedestal (a veranda or colonnade, perhaps), and a 2nd or 3rd century column base (SF 12773) of a type also recorded at Eccles and Farningham.

These finds are hints of something rather luxurious and important though they may not have belonged together in a single phase of construction and possibly adorned separate buildings. Even so, the villa complex was almost certainly high status from the start. A clue to its early Roman wealth might be provided by the large scale malting and brewing. Just as ale making at Stebbing Green was a principal economic activity for Boxted Wood villa (Going 1999, 23) – and malting is also attested at the villas at Bancroft, Thurnham, and Great Holts Farm, near Chelmsford (Pearson and Robinson 1994; Smith and Davies 2006; Murphy 2003a) – so too did Northfleet depend on the industry for its wealth. Springhead produced its own ale and so is unlikely to have provided a significant market for the villa's brewery. Likely markets include Rochester, even London, but a military destination within the province, or even continental markets, are also possibilities. Far from being an insular drink aimed solely at unsophisticated, home-grown tastes, ale was consumed widely. *Cervesa* (so-called Celtic beer) was included in Diocletian's Price Edict of AD 301, which put it at 4 *denarii* per *sextarius* (compared with Egyptian beer, which was 2 *denarii* per *sextarius*) (Nelson 2003, 110). Moreover, that Roman soldiers in Britain were prodigious drinkers of ale (as well as wine) cannot be in doubt. Accounts preserved on writing tablets from *Vindolanda* record supplies of ale or *cervesae* (eg, *Tab. Vindol.* ii, 190, *cf* Bowman 1994); another tablet (eg, *Tab. Vindol.* ii, 182) refers to Atrectus the brewer (*cervesarius*), probably locally-based, but in any case recording trade. Usefully, ale is listed alongside barley and wheat, suggesting that beer reached *Vindolanda* as the finished product rather than as malt requiring further processing. Geoffrey Dannell (2006, 158) draws attention to the use of decorated samian vessels (Drag. 37) as mixing bowls for both wine and ale and it is worth noting that military sites have the highest proportion of decorated bowls in Roman Britain, followed, in order, by extra-mural settlements outside military establishments, large civil centres, small civil centres, and rural settlements (Willis 2005, sec. 8.2). Ale was the staple drink across all periods and sections of society – note a deposit of sprouted cereals from Culver Street, Colchester and found in a granary destroyed in the Boudican fire (Murphy 1992, 282) – but the army market was particularly lucrative.

No evidence survives at Northfleet to indicate a contractual obligation to supply beer to the army. But at least we can place Northfleet in a context that included contact with the Roman state from the late 1st century. A seal-box from colluvial layer 10031, taking the form of a *beneficarius* lance (see Schuster, Vol 2, Chap 4, Cat no 11, Pl 21; Eibl 1994), indicates the use of letters or documents, a degree of literacy within the villa, and communication organised on Roman lines, probably between the villa owners and the legionary staff of the provincial governor. This may have involved the *beneficarius consularis* himself, whose duties included the administration of the *cursus publicus* (Wilson 2002, 456), or perhaps the *frumentarius* or courier (Rankov 1987, 244). The early Roman metalled road – complete with *agger* and scoop-ditches – that linked the Western Roman Complex with the river channel no doubt saw such official traffic. This followed the classic design of Roman roads and, like the earliest roads in the emerging province, may have been built by military surveyors and engineers.

Inevitably this brings us to the question of who built and lived at Northfleet. The view in the past tended to favour continental owners. G W Meates (1987, 53), for example, regarded the East Mediterranean styled busts at Lullingstone as the portraits of Roman individuals who arrived in Britain on imperial service. More recent work has challenged the idea that Roman Conquest necessarily took the control of land and production away from the British elite, instead identifying native rulers as 'partners in the creation of Roman imperial culture'. Society and structures were transformed, but through 'negotiation' (Creighton 2006, 157). In consequence we need not imagine an estate run by the military or other high ranking Roman officials. Though undoubtedly below the grandeur and scale of Fishbourne, the high status finds return us to the proto-palace built in the AD 60s said to have accommodated Togidubnus and could similarly define British aristocracy at Northfleet.

As Creighton remarks (2006, 130), leading families had to live somewhere. A possible model for the role that Northfleet played in the landscape is provided by *Verulamium* and its surrounding villas. The Roman town was a focus for civic and religious activity, its central complex comprising (at least after AD 150) the *forum basilica*, temple and theatre, linked by road to the ceremonial complex at Folly Lane. The absence of richly adorned town-houses, among other factors, prompts Creighton (2006, 129–30) to suggest that the leading families resided out of town, perhaps at Gadebridge Park (which incidentally yielded Purbeck marble wall veneer) in the early Roman period (Neal 1974), and also Gorhambury from the 2nd century onwards (Neal *et al* 1990). Monumental and ceremonial acts conducted in town, and control of resources outside town as provided by the villa estates, reinforced the leading families' connection to and hold over the landscape and its inhabitants (Creighton 2006, 129). The kind of relationship between town and elite suggested here was depicted on a wall painting in a villa near Limoges (Gaul); gladiatorial combat, chariot racing, and wild beast hunts were shown above a label that suggested that the villa owner – a member of the local elite – sponsored the games himself (Woolf 1998, 165). Similarly, the charter of Urso, a Roman colony in southern Spain, reveals that the duties of town magistrates included setting the calendar of religious festivals and sacrifices and determining the individuals who were to lead the ceremonies (Lewis and Reinhold 1990a, 454). A similar relationship is likely to have existed between Northfleet and Springhead. Such religious duties could not have been more important at Springhead, a cult centre and temple complex, and the honour of setting and performing them was a matter for the town's elite. A ceramic life size theatre mask, imported from the Rhineland and recovered from an early Roman ditch at Northfleet, would have been worn during theatrical shows put on during religious festivals or religious processions (Beard *et al* 1998, 139–43; Marsh 1979). The rarity of such pieces in Britain suggests that the mask was more a symbol of status than merely a practical prop and provides a tantalising clue that the town's elite lived at the villa and took a leading role in civic and religious life. We cannot be certain of this since the mask may have reached the site without reference to its intended use. However, a ceramic lamp-chimney from a mid-Roman pit may be relevant here, being of a type associated with religious places; examples have been found at the Triangular Temple, *Verulamium* (Wheeler and Wheeler 1936, 190), a shrine at Higham Ferrers, Northamptonshire (Lawrence and Smith 2009), and during excavations of temples III and IV at Springhead (Penn 1960, 126). Also of potential religious significance was a badger skull from well 16731 which showed the tell-tale marks of skinning (see Worley, Vol 3, Chap 2; Pl 6); the animal's rather striking pelt could have decorated the accompanying ceremonial garb.

But while elite Britons resided at Northfleet, the shadow of Roman authority loomed large over the estate and the seal-box, road, planned buildings, and military scale of production lends weight to the idea that the estate was set up for the imperial government to supply the army. The evidence paints a picture of a local leader establishing position and status within the Roman governing society, while maintaining traditional power structures. Northfleet was occupied by the local elite but run with Roman help and oversight. The relationship that tribal leaders had with their Roman masters and British masses was the sort of balancing act that was articulated in the layout and development of urban centres, which retained a strong late Iron Age identity within the framework of the city grid and institutions (Creighton 2006). On a smaller scale, early Roman high status burials harked back to late Iron Age burial practices but displayed a keen understanding of Roman material culture (Biddulph 2005, 42). In the context of the Roman villa, being seen to retain control of food production and supply must have been fundamental. Grain went to the heart of Catuvellaunian identity; the ear of wheat was used as a symbol on the coinage of the tribe's rulers, including Cunobelin and Epaticcus. More generally, the Roman writer Strabo includes grain in the list of commodities exported to the continent in the late Iron Age (Ireland 1986, 20). For all the outward signs of Roman power and structure, the British inhabitants of Northfleet claimed control of the land but it was their relationship with the state that helped to maintain their status.

Where the inhabitants of the villa were buried is a matter of speculation as no burials certain to be contemporary with the villa buildings were encountered within the excavation area. A piece of carved oolitic limestone recovered from an upper fill of well 16516 may have been part of a sarcophagus (see Shaffrey, Vol 2, Chap 9) and potentially places the burial of an important or wealthy individual in the vicinity of the villa during the late 1st or first half of the 2nd century. Unequivocal burial evidence was found a little under 1 km ESE of the villa; an inhumation grave with a tile roof that contained the skeletal remains of a woman (Williams 1956, 266) suggests no obvious connection to the villa, though tiled cists have been recorded at Keston and Snodland (Philpott 1991, table A22), so the type of burial would not seem inappropriate. No grave goods were recovered making dating difficult but we cannot assume that the burial was later Roman (3rd or 4th century) since inhumation was current – and the majority rite – in Springhead's Pepper Hill cemetery from the mid-1st century (Biddulph 2006c). Inevitably, we must consider a walled cemetery south-east of Springhead and 2 km south of the villa as the burial place of the villa's leading family. The cemetery contained at least eight burials, including the cremated remains of two individuals interred in glass amphorae placed in a stone sarcophagus (also oolitic limestone) and two unburnt bodies buried in lead coffins housed in a stone tomb. The date of accompanying grave goods suggests that the cemetery was an early 3rd century construction although another grave, which contained a

casket and samian dishes, was consistent with a mid–late 2nd century date (Davies 2001, 164; Rashleigh 1808b, 221–3; Davies (*ibid*, 165) saw the earlier material as representing re-burial, though a late 2nd century date for the cemetery seems feasible, and so it is possible that the grave was among the earliest interments). The cemetery was large relative to the number of burials; the 20 m square walled enclosure was surrounded by an outer enclosure over 100 m square and its location at the edge of Watling Street meant that it was a striking monument to the family interred within that was visible to all entering or leaving the town (Davies 2001, fig 2; 166). Though some distance from Northfleet, an association with the villa remains plausible. Five other walled cemeteries are known in Kent – at Borden, East Barming, Lockham (Langley), Plaxtol, and Sutton Valence – and all are associated with, or proximate to, villas or other masonry buildings, such as detached bath-houses, that point to the existence of a villa estate (Jessup 1959; Houliston 1999, 168; Detsicas 1983, 151–2). Admittedly, Springhead's walled cemetery seems a little far from Northfleet's villa (and may even suggest the presence of another villa to the east or south-east of the town) but the importance of public display determined that. This was a private cemetery, contrasting sharply with the popular, overcrowded though apparently planned, cemetery at Pepper Hill, just 300 m to the south (Biddulph 2006c). In this light, Davies' (2001, 167) assumption that 'the family or group that built the private walled cemetery would have lived in a villa' seems well-justified.

What of the other inhabitants living at Northfleet? The villa complex must have been home to children; one was attested by a shoe left in well 16731 (see Mould, Vol 2, Chap 2). Another possible resident was a boy called Lucius, who was literate and handy with a stylus, and neatly wrote his name on an unfired imbrex at a local tile works (see Poole, Vol 2, Chap 6). More generally, the range of objects and features seen at the site suggest that the villa complex was also home for fishermen, iron-workers, craft-workers, brewers, maltsters, farmers, trappers, and millers, among others. A sherd from a decorated samian ware bowl depicting an erotic scene (see Mills, Vol 2, Chap 1, Fig 63, no 79) lets us into the mind of one resident. The edges of the sherd were scored and trimmed, indicating that the piece had been cut out of the original vessel. A reasonable inference is that the piece was retained because of its salacious motif, suggesting that at least one Northfleet inhabitant enjoyed collecting and using erotica.

The late Iron Age to Roman Environment and Landscape of the Ebbsfleet Valley

by Catherine Barnett and Elizabeth Stafford

The results of the analysis of a range of environmental remains have enabled a picture of the local late Iron Age, and particularly the Roman, landscapes to be built up. This section focuses on the natural environment and how people interacted with, moulded, and exploited it. More formal manipulation in the form of agriculture is examined in the following sections.

The individual sequences and detailed analyses are presented and interpreted in their local and regional contexts in Volume 3, but the broad landscape characteristics interpreted from the sediments and their contained environmental remains from Springhead and Northfleet are summarised here. The molluscan, pollen, and plant macrofossil assemblages indicate the proximity to both dry calcareous soils on the slopes of Upper Chalk and moist, base poor, and alluvial soils fringing the Ebbsfleet Valley throughout the late prehistoric to Roman use of the site. These supported contrasting ecological communities and in so doing provided opportunities for exploitation of a wide range of flora and fauna as discussed below.

The analyses of sequences found to be purely of prehistoric date are reported under the Prehistoric Ebbsfleet Principal Study. However, a number of sequences spanned part of the prehistoric period in addition to the historic and cannot be split without losing valuable information on the development of the landscape. These are therefore reported in their entirety in the chapters of Volume 3 and summarised briefly below.

The Prehistoric Context

Springhead

Useful information on the nature of the early Neolithic to early Iron Age environment at the Ebbsfleet channel edge comes from ARC ERC01 (south end: Tr 4; sections 1012–1013; see Barnett *et al* and Scaife, Vol 3, Chap 3). There, an early Neolithic (3370–3080 cal BC, NZA-28773, 4519±45 BP) peaty land surface (context 546) overlay calcareous alluvium. Both contained well-preserved pollen that demonstrates a predominantly wooded habitat. This was dominated by lime, oak and hazel on drier areas with alder carr on and along the fringes of the floodplain and reed swamp beneath. Clearance was slight at this time with only small open areas in the woodland indicated in the local area.

A number of pre-middle Bronze Age colluvial and alluvial layers have been analysed for molluscs at ARC ERC01 and ARC SPH00. These broadly show the presence of short-turfed chalk grassland and limited open scrub/woodland, with secondary woodland clearance indicated by this time. The pollen evidence also indicates that an increase in clearance and arable activity occurred in the late Neolithic–early Bronze Age which caused sufficient destabilisation of the soils to enable colluviation. Bodies of such early (pre-middle Bronze Age) colluvium were exposed at ARC ERC01 (south end: Tr 4; context 545) and underlying a middle Bronze Age burnt mound at ARC SPH00 (colluvium context 5102). The molluscs from the middle Bronze Age soil at ARC ERC01 (north end: Tr 1, sections 7431

and 7417; Zone 2 context 405/2896) are of open ground and include the rarely found *Truncatellina cylindrica* which favours extremely dry conditions, normally short dry calcareous grassland.

Subsequent channel activity cut the earlier prehistoric sediments at ARC ERC01. The channel fills, including a peat dated to the late Bronze Age/early Iron Age at 835–770 cal BC (NZA-28795, 2625±30 BP), contain a pollen spectrum that indicates substantial clearance had occurred by this time creating an open landscape dominated by grassland/pasture with some localised arable activity. Further layers of colluvium (this time partially re-worked in water) were laid down over a burnt mound at ARC SPH00 (context 5101) at the same time and their presence supports an interpretation of continuing clearance and resulting instability. By the late Bronze Age/early Iron Age the molluscs indicate that the environment near the spring at ARC SPH00 (section 7487) was of open short-grazed grassland with small areas of scrub and long grassland, which decreased once more over time. An open and well-used prehistoric landscape is demonstrated.

That a complex interplay and intercalation of colluvial and alluvial deposition at the edge of the valley and base of the slope occurred from prehistory onwards is apparent from several sequences at the water's edge. Even where alluvium dominated this was commonly formed of re-worked colluvium. Early on (pre- and early Neolithic) the alluvium was highly calcareous (eg, context 5876 ARC SPH00, section 7630) and indicates the presence of calcium-charged turbulent spring water but this input decreased over time at Springhead with waterlain deposits in the area becoming decreasingly calcareous.

Northfleet

The Northfleet Villa site is situated in the Lower Ebbsfleet Valley approximately 1.5 km downstream of Springhead. The low lying topography and proximity to the Thames estuary mean that the local environmental history of the valley bottom and the nature of past human activity contrast markedly with the upper reaches of the valley. Aside from the well-known and nationally important deposits of Pleistocene age, significant thicknesses of waterlogged alluvial and peat deposits, along with valley side colluvium, exist within the lower Valley. Sequence preservation is largely due to the fact that the valley only has minimal hinterland and the absence of major fluvial systems has resulted in the valley acting as a sump in the landscape. Overall, accretionary processes dominate, in contrast to the main Thames valley where the river has in the past eroded, and continues to erode, sediment across much of the valley floor.

The Holocene alluvial sediments in the lower Ebbsfleet valley are underlain by chalky solifluction and fluvial gravel deposits of Pleistocene age, over Chalk bedrock. The surface of these deposits formed the early Holocene topography that dictated patterns of later sediment accumulation. Reconstruction of this surface revealed a deep outer basin downstream of Northfleet villa forming a lake or deep water tidally-influenced estuary infilled by more than 10 m of fine-grained sediments. A shallower inner basin is located upstream of the villa site. The site of Northfleet villa itself is on a promontory or gravel 'spur' extending from the western slopes of the valley. This would have remained an area of higher drier ground throughout much of the Holocene. Prior to the investigations associated with the HS1 and STDR4 the only published data on the sedimentary history of the valley infill derived from the limited 1930's excavation undertaken by Burchell (Burchell and Piggott 1939) which included analysis of the pollen from a 'peaty alluvium' containing Neolithic artefacts. Two master palaeoenvironmenal sequences have been analysed in detail as part of the Prehistoric Ebbsfleet Principle Study: Borehole 7 (BH7; STDR400) in the Outer Basin approximately 160 m north of the Villa Site and Trench 9 in the Inner Basin 60 m to the north-west. Palaeoenvironmental analysis has also been carried out on the sequence from Area 4 (STDR401), 190 m to the south-west (see Bates and Stafford and Stafford, Vol 3, Chap 3).

Deposits of early Holocene age are represented in places by fluvial sands and a discontinuous unit of organic sandy silt identified in a number of boreholes and deep trench excavations across the valley bottom. These deposits represent freshwater infilled creeks, radiocarbon dated in BH7 to 8540–8240 cal BC (NZA-28766, 9122±55 BP). Pollen assemblages were dominated by tree and shrub pollen and suggest rather open scrubby deciduous woodland with birch, hazel, and an understorey of grasses and ferns, growing on the banks of the river. More closed deciduous woodland probably grew further away from the site. There is very little evidence of any human impact on the landscape at this time. A few microscopic charcoal particles noted during the pollen analysis may have come from some distance having been blown or carried into the site by wind or water. Although this could be interpreted as evidence of human activity in the catchment, for example the use of fire to create woodland clearings for grazing (Mellars 1976), it could equally be the result of natural events such as forest fires.

Evidence for an early influx of estuarine waters (the 'Lower Clay Silts') during the late Mesolithic was found in a number of sequences examined from the Outer Basin. Deposition was dated in BH7 to between 5480 cal BC and 4240 cal BC (WK-8801, 6340±80 BP and NZA-28974, 5464±35 BP). Pollen and diatom evidence suggests the local development of salt marsh and reed swamp environments in the tidally affected Outer Basin. Values of microscopic charcoal particles were quite high, including pieces of charred grass, and are evidence for local, possibly man-made, fires in the catchment. In a regional context this early marine transgression into the lower Ebbsfleet valley can be broadly correlated with Long's first phase

of estuary expansion on the Thames floodplain (Long *et al* 2000) and Stage 3 of the Bates and Whittaker model (2004).

Towards the end of the 5th millenium BC minerogenic sedimentation was replaced by peat formation in the Outer Basin, commencing 4370–4240 cal BC in BH7 (NZA-28974, 5464±35 BP). Initially the Inner Basin remained relatively dry land and it is here that significant evidence of human activity, in the form of *in situ* early Neolithic flint scatters, was identified during the investigations associated with the STDR4. These occupation horizons were, however, rapidly inundated as the wetland front expanded into more marginal areas in 3800–3640 cal BC (Trench 9, NZA-29080, 4926±35 BP and Area 4, NZA-29247, 4945±35 BP). Pollen, macroscopic plant remains, diatoms, and Coleoptera from the peat, similar to the environmental evidence from the peat at Springhead (ARC ERC01, Trench 4, context 546, see above), indicate that local freshwater alder carr environments dominated in valley bottom during the Neolithic period along with marsh/fen and an understorey of ferns and sedges. Freshwater mollusc assemblages included *Bithynia tentaculata*, suggesting that episodes of flooding occurred. Trees and shrubs continued to dominate the pollen assemblages with oak, lime, elm, ash, and hazel values suggesting that the regional vegetation was deciduous woodland during the period of peat formation. There was however, some indication of small clearances, possibly for domestic animals on areas of drier ground. A temporary decline in values of lime pollen noted in the lower part of the peat sequence from Trench 9, and commensurate with the first appearance of cereal pollen, may be related to human activity within the catchment. In a number of sequences, particularly within the more marginal Inner basin, deposits of micritic tufa containing rich assemblages of ostracods were noted within the upper part of the peat suggesting the presence locally of freshwater springs. This period of tufa formation, dated to 3640–2020 cal BC in BH7, Trench 9 and Area 4, appears to have been a relatively synchronous event across the valley bottom, occurring between the early Neolithic and early Bronze Age periods. In a wider context, the prehistoric peat in the lower Ebbsfleet valley generally occurs at similar elevations, in similar stratigraphic positions, and at similar dates to Devoy's Tilbury III peat on the Thames floodplain (Devoy 1979). The dates are also consistent with Long's proposed phase of mid-Holocene estuary contraction (Long *et al* 2000) and Stage 4 of the Bates and Whittaker model (2004).

The cessation of tufa formation is probably related to the onset of a further phase of marine incursion into the lower Valley which eventually caused the cessation of peat formation and the accumulation of a further unit of clay silts (the 'Upper Clay Silts'). Towards the top of the peat profile there is evidence locally for an increase in marsh/sedge fen environments with abundant ferns indicating increased wetness in the valley bottom. The change to minerogenic sedimentation is dated in BH7 in the Outer Basin to the latter part of the early Bronze Age at 1940–1750 cal BC (NZA-28973, 3527±30 BP), and in the Inner Basin in Trench 9 to the late Bronze Age or early Iron Age at 840–590 cal BC (GU-16006, 2605±35 BP). Analysis indicates the presence of a tidal river with mudflats and fringing salt marsh, fen, and reed swamp environments. This phase of marine transgression is mirrored at many sites previously investigated up and down the lower Thames estuary. It can be broadly correlated with Long's second phase of estuary expansion on the Thames floodplain (Long *et al* 2000) and stage 5 of the Bates and Whittaker model (2004).

As at Springhead, the regional pollen assemblages suggest that the environment beyond the valley bottom was much more open during the later prehistoric period. Woodland cover decreased significantly at the beginning of the Bronze Age and is undoubtedly related to human activity in the catchment. The landscape is likely to have comprised open grassland with arable cultivation and some stands of oak and hazel woodland. Barley, wheat, and possibly oats were being cultivated from the Iron Age onwards.

The Terrestrial Landscape at Springhead

Late Iron Age

The preservation of a series of inverted turves in late Iron Age 'Viewing Platform' / terrace 3053 (400011) and a comparable feature (400044) of Roman date provide a small glimpse of the local environment. Sadly the oxidised and calcareous nature of these soils has prevented pollen preservation, but the turves themselves indicate that the steep slopes encountered at ARC SPH00 supported short sward grassland in both periods, with thinning colluvial soils occurring in the latter.

Further insight into the locally available plant types comes from the analysis of charred plant remains, though these assemblages are necessarily biased, having been selected and used by humans (see below) and, in some cases, imported to the site from further afield. The charred assemblage (see Stevens, Vol 3, Chap 4) demonstrates that cereal cultivation was important in the area during the late Iron Age, with spelt wheat dominating the samples and emmer wheat and barley also common. Other cultivated types included oats, broad bean, flax, and pea. The associated weed seeds indicate that a range of soils was present and cultivated locally in the late Iron Age, including light dry sandy and calcareous soils as well as wetter ones that were probably seasonally flooded along the river's edge. Wild edible plant types were commonly found in the charred assemblage and provide some landscape information. Local presence of hazel and bramble in

scrub or hedgerows is indicated. Trees represented in the charcoal remains for this period include oak, field maple, hazel, ash, alder, bird cherry, and blackthorn, indicating their availability in the wider area (see Barnett, Vol 3, Chap 4).

Roman

The deposits on the slope between the Sanctuary complex and spring at ARC SPH00 (section 7750) tell us something of the immediate Roman environment. There the presence of repeated layers of colluvium with poorly developed soils in each (see Barnett *et al*, Vol 3, Chap 3) indicates that the slope was relatively unstable and prone to movement under heavy rain conditions. It also indicates that vegetation was sparse and probably of grassland – unfortunately the colluvial and therefore re-deposited nature of the sequence precludes additional environmental analysis to elucidate this further. Occasional anthropogenic discard is indicated for the slope, with mortar, charcoal, ceramic building material, slag, oyster, and mussel shells present.

Larger scale episodes of calcareous colluviation (hillwash) are also demonstrated at Roman Springhead. This is in part attributable to its topography, with the steep slopes prone to run-off, erosion, and movement once de-stabilisation had begun through widespread clearance of vegetation. This clearance was in part for agriculture in the wider area (see Stevens *et al* below) but, of course, removal of trees and scrub was also required for construction of the settlement and Sanctuary complex and for provisioning the increasingly intensive craft and food processing activities with fuel.

The molluscan evidence for the Roman period at ARC ERC01 and ARC SPH00 indicates an open environment of short (perhaps grazed) grassland with localised areas of longer grass along ditches (eg, 517/300248 and 3134/300046) and areas of trampling and disturbance. Molluscan evidence for arable agriculture in the immediate area is very limited, the only possible indication being in Zone 7 of the ARC SPH00 spring section (7487) where a restricted open fauna dominated the upper colluvial layer (5100) (see Wyles and Barnett Vol 3, Chap 3).

Despite a general decrease from the already sparse late prehistoric tree and shrub cover, an expansion of hazel pollen was noted in the Ebbsfleet channel edge alluvial and peat sequence from ARC ERC01 (south end: Tr 4; see Scaife, Vol 3, Chap 3) moving into the Roman period. It is probable that substantial use was made of hazel wood during this period at Springhead and Northfleet with the likelihood of deliberate encouragement and management by coppicing (see Barnett, Vol 3, Chap 4).

Analysis of the wood charcoal demonstrates that an extensive range of tree and shrub types remained available in the wider area in spite of evidence in the other environmental records that the area of the town, river margin, and Sanctuary complex had been largely cleared in prehistory and certainly by the Roman period. The 22 woody types identified at Springhead included not only common deciduous species tolerant of most soil and topographic conditions, such as oak, field maple, ash, elm, holly, blackthorn, and hawthorn, but also those that favour drier calcareous soils such as viburnum, beech, and yew, and some of wetland margins and marginal land such as alder and willow. One assemblage in particular provides useful landscape data: that from the linear roadside ditch 11388/300451 at ARC SHN02 represents hedgerow clearance before construction of the smithy in property 10. A rich mix of young and mature hedge types is described, including field maple, birch, hornbeam, hazel, ash, oak, pomaceous fruit, elm, and one or more members of the Rosaceae family.

In addition to small stands and hedgerows, larger areas of managed deciduous woodland, particularly of oak and hazel, are proposed for the valley sides and hilltops (discussed further by Barnett below). Although only two solely late Roman features (malting oven 12591 and layer 10737, both at ARC EBB01) contained charcoal suitable for analysis, the greater use of twiggy shrub growth there, dominantly hawthorn, might just indicate that the woodland resource was increasingly depleted and sparse around Northfleet at this time.

Crop plants comprise the majority of the Romano-British charred and mineralised plant assemblages, with spelt wheat dominant (see Stevens, Vol 3, Chap 4). However, it is interesting to note that the majority of other environmental remains indicate that arable cultivation was limited or absent in the immediate environs of the Roman town and Sanctuary complex. A wide range of wild edible and non-edible types was also identified. *Prunus* types included blackthorn and bird cherry, and bramble, elder, and bracken indicate that some low scrub was still present locally, whilst a few herbs of open woodland and hedgerow occurred, such as greater stitchwort and white bryony. The weed seed assemblage also included plants of drier calcareous and sandy soils that would have come into the town with the cereal crops.

The Channel, Spring, and Waterfront Environments at Springhead

As described in Barnett *et al* (Vol 3, Chap 3), following a rise in water levels that flooded the area exposed in ARC ERC01 (Tr 1, section 1008) and the late Bronze Age features (300010) at ARC SPH00, a compact layer of gravels was laid down in the Roman period in a deliberate attempt to consolidate and perhaps control the riverbed in the vicinity of the springs. Subsequently, a series of fine-grained and humic sediments was laid down, indicating that water flow was low in energy and that terrestrial marsh conditions began to encroach in the later Roman or Saxon times, though small-scale overbank floods continued. A series of alluvial/spring deposits over sands and gravels exposed at ARC SPH00

(section 7756) shows that, in contrast to the prehistoric spring deposits, the water here was less highly charged with calcium from local Chalk outcrops; instead fine, non-calcareous, often humic alluvium was deposited.

The waterfront sequences at ARC SHN02 (sections 13739 and 13784) were found to be composed of fine-grained sediments derived from the local loessic (Brickearth) deposits and redeposited in shallow, puddled water. Water levels were low enough to enable trampling (eg, by livestock) and the creation of archaeological layers through dumping of mixed, charcoal-rich deposits. The sequence is humic and indicates that the waterfront was well-vegetated in its lifetime. Sufficient pollen was preserved in the lower alluvium to add some detail to this picture, although the upper layers proved too poorly preserved for meaningful analysis, probably due to modern lowering of the water table. As described by Scaife (Vol 3, Chap 3), grass dominated, with plants of open grassland and pasture such as fat hen, ribwort plantain, bracken, clover, and docks common. Cereal was almost absent, indicating that there was no arable activity close to the waterfront. Sedges, pondweed, and algae represent the immediate aquatic and marsh environment.

The few waterlogged plant macrofossil assemblages preserved at Springhead came from one low lying context at ARC SPH00 and three from ARC SHN02 (see Stevens, Vol 3, Chap 4). These represent the very local water's edge environment and indicate that the edge of the Ebbsfleet River supported patches of low scrub or hedgerow, including elder and bramble, and a rich herbaceous flora including grasses, cinquefoil, buttercup, orache, common nettle, campion, and docks, several of which were also represented by charred and mineralised seeds. Species of disturbed soils were well represented, including poppy and pimpernel, and an indication of nutrient enrichment related to habitation and livestock is given by the presence of seeds of many-seeded goosefoot, mouse-ear chickweed, and henbane. The remains of cultivated plants used at the site were also identified, including domestic apple, flax, and a possible seed of fig.

At the edge of the occupied site, wet grassland overgrown with buttercups lay adjacent to marshy areas dominated by sedges, reeds, and rushes, with taxa such as marsh marigold, water-crowfoot and blinks also present. The only waterlogged tree remains found at Roman Springhead were cone bracts of birch, but the pollen from the waterfront also indicates a low presence of oak, ash, and hazel. The molluscs from the Roman to post-Roman channel fills at ARC ERC01 (section 1008 (zones 1–2); see Wyles and Barnett, Vol 3, Chap 3) also demonstrate that, although the dry land at this time was generally open with short grassland, some open woodland and scrub occurred, particularly along the edge of the river, together with areas of marsh and long grass. It is of note that, in contrast to Northfleet, there is no evidence for local salt marsh or influence of brackish water at Springhead.

The Landscape at Northfleet

The off-site sequences

Analysis of the alluvial sequences from BH7, Trench 9 (STDR400) and Area 4 (STDR401), suggests that accumulation of the 'Upper Clay Silts', both in the Inner and Outer Basins in the lower Ebbsfleet valley, continued throughout the later prehistoric and into the historic period. An organic lens in Trench 9, at +0.33 m aOD, produced a mid–late Roman date of cal AD 220–410 (SUERC-16658, 1740±35 BP). Locally the pollen, diatoms, ostracods, and foraminifera suggest that environments of middle and upper salt marsh had developed by this period. This is supported by the recovery of pollen from the goosefoot family, sea plantain, and occasional grains of thrift/sea lavender. Away from the valley bottom the landscape, as in the later prehistoric period and similar to Springhead, probably comprised open grassland pasture with arable cultivation and some stands of oak and hazel woodland. However, woodland cover continued to decrease from the early Bronze Age. By the late Roman period arboreal pollen values were 20–30%, as recorded in the sequence from Trench 9.

The on-site sequences

Archaeological evidence for the late Iron Age is quite limited at Northfleet and many later prehistoric deposits were clearly disturbed by later Roman activity. Only one late Iron Age feature (Pit 3027) produced a moderate assemblage of charcoal (see Barnett, Vol 3, Chap 4). The assemblage, which included oak, alder, wild cherry, and blackthorn-type wood, most likely derived from locally available sources and is typical of general domestic fuel.

Useful information on the local environment at the villa site during the Roman period has been gained from the palaeoenvironmental analysis (waterlogged plant remains, pollen, and insects) undertaken on the waterlogged deposits from well 16731 (Villa Phase (VP) 1–2, AD 70–150/60) and well 16516 (VP 2, AD 120–150/60). The basal sediments of the wells comprised fine grained, horizontally bedded silts derived from natural silting processes but with strong evidence of anthropogenic inputs suggesting episodic dumping of waste material (see Stafford, Vol 3, Chap 3). Consequently a significant proportion of the environmental evidence is likely to have derived from secondary sources, such as waste food products, debris from crop production, or faecal material. The pollen catchment of small features such as wells is also probably limited to the very local area around the feature.

The waterlogged plant remains, Coleoptera, and pollen analysis from the wells produced broadly similar results for the local environment in the vicinity of Northfleet Villa. The waterlogged plant assemblages (see Stevens, Vol 3, Chap 3) include species associated with wasteland and human occupation; such as common nettle and hemlock. There is also some indication of areas of rough, perhaps wet, grassland with, for example,

buttercup, clustered dock, and marsh stitchwort. Taxa such as hairy-buttercup, stinking goosefoot, grass-leaved orache, and sea purslane or spear-leaved orache, while common on cultivated ground and grassland, are more frequently found in coastal areas. More significant were frequent finds of salt marsh rush that were recovered from both wells. Coleoptera include *Geotrupes*, *Onthophagus*, and *Aphodius* dung beetles suggesting the presence of grazing herbivores and pasture (see D Smith, Vol 3, Chap 3). Several ground beetles identified, such as *Dyschirus salinus*, *Bembidion normannum*, and *B. minimum*, and the water beetle, *Octhebius dilatus*, are all associated with muddy areas or saline pools in salt marshes or along the coast.

The soil conditions at the villa site were generally not conducive to molluscan preservation. However, sparse assemblages from a number of Roman ditch contexts provide limited information on the local environment during the Roman period. The land snail assemblages have low diversity but the absence of open country taxa is notable. The fauna represented generally consist of either intermediate (*Trichia* sp., *Cochlicopa* sp.) or shade loving taxa (*Discus rotundatus*) suggesting some shade, perhaps scrub growing within or in the vicinity of the features, and disturbed ground with patches of long grass. Apart from a single shell of *Planorbis planorbis* from ditch 14755, the absence of freshwater species within these features indicates relatively dry conditions during infilling. This perhaps argues against a drainage function although this cannot be certain given the poor preservation of shell.

As with Springhead the plant remains from the wells provide some indication of hedges or scrub indicated by the presence of elder and bramble. The preponderance of local and introduced pollen in well 16731 had a 'swamping' effect on the relative pollen numbers from more regional sources. This certainly applies to the tree and shrub component which occurs only sporadically in this profile (1–2%; see Scaife, Vol 3, Chap 3). The more continuous tree and shrub pollen records are from anemophilous (wind pollinated) types, which include birch, oak, alder, and probably hazel. These are, however, in small numbers and probably come from regional sources. Sporadic/individual records of ash and lime/linden are from taxa which are poorer pollen producers and more likely to derive from the local site.

Overall, a similarly wide range of taxa is represented in the charcoal assemblages at Northfleet as at Roman Springhead, with the addition of ivy and *Rosa* sp. Neither of the introduced taxa found at Springhead (sweet chestnut and laburnum) were identified at Northfleet, however. Exploitation of a rich variety of open woodland and scrub wood for domestic/everyday fuel use is indicated for the mid-Roman period at Northfleet. Only two late Roman features were sampled so it is difficult to draw reliable conclusions. However, it is feasible that a shift in the exploitation of woodland resources happened by or during the late Roman period, since there is some evidence from the charcoal for declining mixed woodland and greater local reliance on trees typical of scrub or hedges, such as hawthorn and/or non-wood fuels such as malting waste (spelt chaff and sprouts), which were recovered in abundance in mid-Roman secondary deposits and from the late Roman malting oven (see Barnett, Vol 3, Chap 4).

Evidence of cereal cultivation was well represented in the well fills. Charred plant remains relating to spelt processing/malting were abundant in the basal fills of the well, cereal type pollen was quite high (up to 26% TLP) and Coleoptera include taxa associated with stored cereal grain. In general, charred plant remains assemblages from archaeological features across the Villa site are extremely abundant and contain weed floras remarkably consistent throughout the entirety of Roman occupation. The majority of the weed/wild taxa typically comprise weeds of arable crops or cultivated/disturbed ground. The four most consistently recovered taxa are dock, scentless mayweed, rye-grass, and wild or cultivated oat, all of which grow in a variety of soil conditions. Small leguminous taxa become more frequent in later periods which may provide limited evidence for a decline in soil fertility. The dominance of spelt remains in all of the samples suggests that the weed flora recovered is directly associated with cultivation conditions for this cereal crop. Scentless mayweed was probably the most frequently recovered weed of crop and typically grows on soils of medium or light texture; however, it can be 'locally well-established' on heavy soils and in poorly drained sites (Kay 1994, 682). There is some evidence for the cultivation of 'heavier' soils (eg, clay or wet/seasonally flooded soils) at Northfleet in the Roman period. Stinking chamomile frequently grows on heavier soils (Stace 1997, 733) and taxa such as rush, common/slender spike-rush, and sedge are all typical of wet or damp soil conditions (see Smith and Stevens, Vol 3, Chap 4).

Exploitation of Woodland and Wild Resources

by Catherine Barnett

The discussion of the landscape evidence above has provided a picture of both the local and wider environment at Springhead and Northfleet. Short grassland clearly dominated the occupied areas but a mosaic of herbaceous and scrubby wetland margins, pasture, hedgerows, and small stands of trees is also indicated. Beyond the site, arable fields and areas of mixed woodland occurred on the valley sides and hilltop, as well as on the flatter ground to the south-east of Springhead. Together these environment types supported a wide range of habitats and thus a wide range of flora and fauna was available for humans to use. Arable and horticultural crops were also heavily utilised at both sites as discussed below.

Parts of many of the plants identified in the pollen, wood/charcoal and charred/waterlogged plant assemblages have demonstrable uses as food, medicine, fibre, and scent, as well as for objects or parts of objects

(Pugsley 2003; Gale and Cutler 2000; Taylor 1981) and their exploitation might be inferred. However, more direct evidence for the use of particular plants is presented here having been drawn together from the analysis of a range of excavated materials.

Tapping and processing of birch sap to make glue has been demonstrated by Wicks (see Vol 2, Chap 1) who carried out GCMS (Gas Chromatography Mass Spectrometry) analysis of the glues and residues used to repair numerous broken pots at Springhead. As she discusses, this has some parallels in prehistoric and historic times but few large-scale examples of this practice exist. The existence of small numbers of birch trees by the edge of the Ebbsfleet River is indicated by the presence of their cone bracts in the Springhead waterlogged remains (see Stevens, Vol 3, Chap 3) and their occasional occurrence in the Springhead and Northfleet charcoal assemblages (see Barnett, Vol 3, Chap 4).

Where large seeds and nuts of edible plant types are present as charred remains, it is highly likely that they were processed and used as food. The types identified by Stevens (Vol 3, Chap 4) for late Iron Age features included hazelnuts (notably in pit 3931 at Springhead), stones of sloes (the fruit of blackthorn), wild oats, and blackberry seeds. These plant types have also been identified from other remains such as wood, pollen, and waterlogged macrofossils so their local availability can be reliably inferred. The number of wild plant food remains present increased for Roman contexts, occurring in over 50% of the charred samples. They included stones of sloe and wild or bird cherry, blackberry, and elder seeds.

Use of a wide range of wood types for fuel and structural purposes is described by Barnett (Vol 3, Chap 4). This initially took the form of collection of locally available open woodland and hedgerow species for domestic and other small-scale fuel use in the late Iron Age and early Roman periods. For example, that chosen for fuel and dumped in late Iron Age pit 3027 at ARC SPH00 included oak, field maple, hazel, ash, alder, bird cherry, and blackthorn.

The requirement for wood for structural and industrial use increased in the early and mid-Roman periods. In particular, the volumes of oak and hazel wood used, and the repeated occurrence of long, even roundwood pieces of these, and field maple, ash, willow/aspen, and hawthorn, indicates that much of this wood came from managed sources, notably hazel and oak coppice cut at 3–9 years, though occasionally a longer oak coppice rotation is indicated. This response of expansion of woodland management techniques including coppicing and perhaps pollarding, would have increased the productivity of the remaining woodland resources and maintained supply and some canopy cover in the selected areas. However, a decline in availability and increasing reliance on scrub types such as hawthorn has been tentatively suggested for the late Roman period.

The wood types selected varied with the type of structure and context. Oak timbers, not surprisingly, tended to be used for large-scale building work, including the construction of the temple within the Sanctuary complex at Springhead (ARC SPH00) and the eastern and western aisled buildings of the villa complex at Northfleet. Oak was also used to construct the bulk of the pyres used for cremations. Oak and alder roundwood were used at different times to fuel mid-Roman limekiln 10849 at Northfleet, perhaps reflecting seasonal availability or access to different sources, alder being characteristic of wetlands. On a much smaller scale, rare evidence is presented for the selection of introduced and flowering types such as laburnum, traveller's joy/clematis, and sweet chestnut, as well as coniferous yew, for religious and funerary contexts. The single piece of sweet chestnut was found on the temple floor within the Sanctuary complex at ARC SPH00 and the laburnum only in the funerary assemblage in a grave on the same site (along with clematis, elm, field maple, and other types), so it is feasible that these are from imported pieces or objects rather than planted or cultivated in the area, although both are believed to have been Roman introductions to Britain.

The assemblage of charred pomaceous fruit wood (*cf* the Maloideae family) in sunken-featured building 300384 (ARC SHN02, property 12) might indicate storage and use of this particular type of wood, whilst the use of complex small fuel mixes in part of the mid–late Roman bath-house at Northfleet (contexts 10481, 10794, 16060, 10486) lends support to a possible interpretation that particular types such as birch, ash, and buckthorn were selected to add scent or colour to the flames.

Given the use of a variety of wild plant types, there is more limited evidence for the exploitation of wild fauna. The presence of badger and weasel bone might indicate the use of pelts and deer antler is also recorded. Wild boar, hare, and a range of (water) birds as well as eel and marine fish species were consumed (see Hamilton-Dyer, Vol 3, Chap 2) but heavy reliance was placed on domestic animal husbandry (see Grimm, Vol 3, Chap 2) and to a much lesser extent on the (local) importation of marine shellfish (see Wyles, Vol 3, Chap 4).

Agriculture, Food and Drink

by Chris J Stevens, Jessica M Grimm, and Fay Worley

The evidence from the excavations has provided a unique opportunity to study and compare three types of site with regard to their agricultural and economic basis. The data produced from the excavations at Northfleet Villa (ARC EBB01), Springhead Sanctuary complex (ARC SPH00), and Springhead Roadside Settlement (ARC SHN02), as well as a previously excavated part of Springhead (Boyle and Early 1998), form the basis for the following discussion.

The archaeological evidence at the Springhead Sanctuary and Roadside Settlement sites came almost exclusively from 1st to mid-3rd century deposits, while the occupation at Northfleet Villa covers a slightly longer

period from the 1st–4th centuries. Such evidence comes in the form not just of archaeobotanical and zoological evidence, but also from associated structures and artefactual evidence such as tools, mill stones, and crop dryers.

The Exploitation of Animals in the Springhead Area

Large animal bone assemblages were analysed from three locations within the Ebbsfleet valley: Northfleet Villa (ARC EBB01; see Worley, Vol 3, Chap 2), Springhead Roadside Settlement (ARC SHN02; see Worley, Vol 3, Chap 2), and Springhead Sanctuary (ARC SPH00; see Grimm, Vol 3, Chap 2). The earliest evidence for the exploitation of animal resources was seen at Springhead Sanctuary and dates to the late Iron Age. The assemblage consists largely of butchery and kitchen waste of cattle, sheep/goat, and pig. Dogs seem to have been discarded together with the normal waste whilst horse carcasses were probably treated differently. Interestingly, adjacent pits 3010 and 3027 (dug through 'Processional Way' 400010) turned out to be very similar in every aspect, for they contained the same species in the same proportions, ages, and skeletal distributions. The contents of these 'twin pits' might reflect the waste from standardised meals.

Roman period

These assemblages are strongly focused on the utilisation of domestic mammals, almost to the exclusion of wild species. However, domestic species proportions differ between the three sites. At Northfleet Villa cattle bones are the largest component of the assemblage and beef would have dominated the meats consumed. In contrast, sheep/goat bones are the most numerous in the assemblages from the Springhead Roadside Settlement and Sanctuary sites. However, because cattle are larger than sheep, beef was probably eaten more often than mutton and pork, even allowing for the smaller size of the cattle of this period.

King (1978) and others have suggested that a higher proportion of cattle relative to sheep is characteristic of a Romanised economy. On this basis the villa at Northfleet represents a Romanised consumption pattern as might be expected from a site of this type. In contrast, the prevalence of sheep at Springhead may reflect a continuation of a 'native' diet, as has been suggested for previous excavated assemblages from Springhead (Wilson 1998). In relation to the Sanctuary site however, King (2005) points out that this might not simply reflect the continuation of Iron Age dietary behaviour by Roman cults, as the degree of selectivity (ie, age, body side) is usually much higher at temple sites compared with settlements. Furthermore, several temples in Gaul and Germany have high sheep/goat numbers that cannot be traced back to local pre-Roman customs.

The difference between a producer and a consumer site is usually indicated by skeletal element representation, the presence or absence of neonates, and age-at-death patterns. The presence of all parts of the carcass shows that cattle, sheep/goat, and pig were probably processed at all three of the major sites analysed here. No evidence was found for the import or export of particular meat joints and the presence of neonate bones indicates that cattle, horse, sheep/goat, and pig were probably bred in the Springhead area.

With respect to the age-at-death patterns, a difference can be seen. For Northfleet Villa, the data suggest that cattle were not always killed at their prime meat age as the presence of older animals indicates their use for traction and the production of dairy products. Sheep and goats were primarily used for meat with no evidence for individuals surviving over the age of eight years. However, wool and milk are also likely to have been products, with females and castrates identified in the assemblage. Pig husbandry focused on pork production. In contrast, the assemblage from the Springhead Roadside Settlement suggests that meat was primarily sourced from prime age cattle and pigs and older lambs which would most likely have been traded into the town on the hoof. These differences show that Northfleet Villa was mainly a production site with its possible consumers living at Springhead.

Although no changes in species proportions can be seen between the late Iron Age and early Roman period at Springhead Sanctuary, not everything stayed the same. With time, an increasing proportion of young lambs aged 3–10 months was selected. Legge and Dorrington (1985) noted an even stronger preference for young lambs at Harlow, Essex; these lambs probably selected from many different breeding populations and taken to the temple to be sacrificed. The authors propose an autumnal sacrifice after which the animals were consumed as no complete deposition of skeletons seems to have taken place. A similar change in ages selected was not seen at Hayling Island, Hampshire and Legge *et al* (2000) argue that there was thus continuity in at least some of the cult practices after the Conquest. Consequently, the change in the sheep kill-off pattern at Springhead may indicate a change in cult practices.

Dogs and horses are also present in the assemblages. The many dog skeletons indicate that this animal had a special significance for the people at Springhead, in particular, and Northfleet (see below). Dogs were probably used to help manage flocks or assist during hunting, whereas horses could have been used for riding and traction. Nowadays dogs and horses are no longer consumed in Britain though some evidence suggests that this was different at Iron Age/Roman Springhead. The presence of disarticulated dog and horse bones mixed with other bone material indicates that these animals were occasionally butchered. Indeed, some marks indicate that their carcasses were chopped up. Although this does not mean that humans consumed the meat (ie, it might have been given to the dogs) the possibility cannot be excluded.

Apart from the consumption of domesticated animals (including domestic fowl) there is some very limited utilisation of wild resources. There is also

evidence for the exploitation of probably locally available oysters and mussels; these in particular were associated with the Sanctuary site and perhaps relate to feasting activities there (see Wyles, Vol 3, Chap 4).

The presence of bones from corvids and raptors is not a surprise as these scavengers are commonly present in human settlements. The find of black rat bones dating to the early Roman period in the Roadside Settlement at Springhead and house mouse at the Sanctuary site shows that these species had already reached Kent by this time. Hedgehog, wood mice, voles, shrews, toads, and frogs were part of the natural background fauna.

At all three sites, special depositions of mainly complete skeletons were noted. At Northfleet Villa, the sheep bone assemblage included two individuals which had been butchered and then deposited in small pits. Springhead Sanctuary was characterised by a high number of dog skeletons, as well as (partial) skeletons of equid, cattle, sheep/goat, pig, domestic fowl, goose, dove, raven, grey heron, and skipper. The fill of the ritual shaft at an entrance to the Sanctuary enclosure is of particular interest. The high number of 'structured' or 'placed' deposits represented by skeletons and skulls, including dogs with their chains and unusual metal objects (ie, curses) points to special activities. Many other unusual depositions have been found, especially in the south of England, and various researchers have attempted to categorise this archaeological evidence of ritual behaviour in Britain in the Iron Age and Roman periods (summarised in Hill 1995; Clark 1995, 10–11; Fulford 2001, 199–201).

Dogs were predominantly used in special depositions elsewhere on other sites in the Springhead locality. Earlier excavations at Springhead revealed several partial sheep skeletons and a dog skeleton in various pits (Wilson 1998). The new assemblage from the Roadside Settlement includes a large number of dog skeletons, many of which were found near the temple (property 2). Dogs of all ages, both sexes, and different 'breeds' were used in these special deposits, though a number of them show signs of ill health. Some deposits might be the occasional burial of a natural victim or deceased beloved pet but their dominance and archaeological context suggest that others had a sacred meaning. Dogs are known to have had religious associations elsewhere in the Roman world, often linked with healing, and a similar explanation is likely for comparable finds from Britain (as discussed above).

Agriculture and Imported Plant Foods

Cereal crops

Spelt wheat is the major cereal crop seen at Springhead and Northfleet Villa, and conforms to the pattern seen for the Roman period across England as a whole. Radiocarbon dates on spelt wheat have shown that it came to this part of North Kent in the middle Bronze Age (Pelling 2003) and, as such, its arrival in this region is as early as anywhere in England. However, while spelt replaced emmer wheat over much of central and southern England during the Iron Age, for many parts of eastern England, including Kent (Stevens 2010; Giorgi 2006), Essex (Murphy 1991a; 1991b), Cambridgeshire (Murphy 2003b; Stevens 2003b; Jones 2006), and Northumberland (van der Veen 1992), emmer can be seen to have persisted throughout the Iron Age up until the Conquest. This pattern can also be seen within the late Iron Age samples from the Springhead Sanctuary site, where emmer is often almost as well represented as spelt.

There is at least some evidence from the Springhead Sanctuary to further suggest that emmer was still grown as a crop in its own right in the earliest Roman phase of the settlement, during the 1st–early 2nd centuries AD. However, in general, emmer rarely forms more than 2% of the identified cereal remains and, at such low values, it seems unlikely that it was grown as a crop at any of the sites over the following centuries, more probably surviving as a persistent contaminant of both seed corn, and by virtue of this, crop.

There is little doubt that barley of the hulled 6-row variety was utilised as a crop at all of the sites. While it appears to be a relatively minor crop this may be a product of crop processing practices. As a free-threshing crop it generally requires less processing and so produces less waste in which grain may be present, and hence subsequently charred. However, it is likely that, as seen for much of Kent and England as a whole, its status declined during this period in comparison to the Iron Age.

Free-threshing wheat is rarely recorded from either Iron Age or Roman sites and is generally believed to have been largely absent as a crop during these periods (van der Veen and O'Conner 1998). While occasional grains and possible rachis fragments were recorded from the three sites discussed in this volume, as well as at least one earlier excavation (Campbell 1998), there is little evidence, with the exception of one sample, of it being a common crop during either the late Iron Age or the Roman period at Springhead/Northfleet.

Pulse, fibre and other locally cultivated plants and crops

Limited evidence for flax in the form of both seeds and capsule fragments was recorded from Northfleet Villa, Springhead Sanctuary, and the Roadside Settlement. It seems likely that flax was grown and utilised for both seed (including linseed oil) and fibre, although the finding of seeds and capsules might tend to be more closely associated with the former.

Northfleet Villa produced limited identifications of indeterminate vetch/garden pea, and low numbers of remains of both pea and celtic bean were recovered from both Springhead Sanctuary and the Roadside Settlement. In addition, evidence for possible lentil was recorded at these two sites, as well as being found at the Pepper Hill cemetery (Davis 2006b), and is further discussed below.

The only other possible crops were represented by a single seed of beet from Springhead Roadside Settlement and a possible seed of onion from Springhead Sanctuary. The former, as discussed below, may represent wild beet that can invade crops grown in coastal areas (Hanf 1983); the latter represents an early find for Roman Britain in spite of frequent references to onion in Roman literature.

Imported and exotic species

Stone pine was recorded from two of the four sites, as well as being present at Pepper Hill cemetery (Davis 2006b). A few fragments of both cone scales and pine nut were recovered from the Springhead Sanctuary site, while a single nut fragment came from the earlier work at Springhead (Campbell 1998). It is likely that this species was imported either for altar fuel and/or for the pine nuts, though in the case of the latter it would seem unlikely that whole cones would be imported given the processing requirements (see Stevens, Vol 3, Chap 4). If dehusked kernels were imported it is not impossible that cone scales and nut shells could arrive as contaminants. However, the evidence from a single shipwreck at Toulon, France, may suggest that whole cones were occasionally imported (Kislev 1988). Stone pine has also been recovered at other sites in Kent, such as Monkton (Campbell, citing pers comm M. Robinson, 1998), Westhawk Farm (Pelling 2008), and Lullingstone villa (Doherty 1987).

Seeds of both grape and fig, as well as fruits of fig, were recovered from the Sanctuary and Roadside Settlement sites at Springhead and were also present at Pepper Hill cemetery where they appear to have been burnt as part of the funerary proceedings (Davis 2006b; see Biddulph above). While there is evidence for the cultivation of grape in 2nd–3rd century Roman Britain (Brown *et al* 2001), for the main period of occupation at Springhead (late 1st–2nd century) the climate was probably less than ideal for such pursuits. Indeed, even in the earlier, milder period, around the Conquest (Lamb 1981), Tacitus, writing at the end of the 1st century AD, notes that the climate and soils of Britain were ill suited for the cultivation of the vine and other natives of the Mediterranean (*Agricola* 12.3). It should be remembered that, while grapes are cultivated in Britain today, these comprise varieties suited to more northerly latitudes that would not have been available in the earliest post-Conquest period.

A similar argument might be proposed for lentil, probable seeds of which were also recovered from these same two Springhead sites. The crop is generally not well suited to the British climate and, while it may have been cultivated in the Saxon and early medieval period when the climate was warmer (Grieg 1991; Stevens 2004; *cf* Lamb 1981), it is generally believed to have been imported in Roman times (Helbaek 1964; Straker 1984; Davis 2006b).

It might also be noted here that wood charcoal from Sweet Chestnut and laburnum was recovered from Springhead, both species thought possibly to have been imported to the site at this time (see Barnett, Vol 3, Chap 4).

Wild foods

Finds of hazelnut were made on all of the Springhead sites, but were absent from Northfleet Villa. Evidence of other wild foods and exploitation of the local environment was only recorded from Springhead Sanctuary and Roadside Settlement, where finds of sloe, probable wild cherry and apple, along with bramble and elder, were reasonably frequent in the samples.

Crop husbandry

It is argued that the cereal crops from all four sites are likely to have been cultivated locally utilising the drier, base-rich soils as well as the possibly seasonally flooded riverine gravels (see Campbell 1998; see Stevens, Vol 3, Chap 4; W Smith, Vol 3, Chap 4). For Springhead, the fields are likely to have been located on the drier, upper slopes, the valley floor, and the flatter ground to the south-west; for Northfleet they probably extended into wetter areas, including possibly marshland. There is also some evidence at Northfleet for the cultivation of heavier clay soils, indicated in particular by stinking mayweed associated with the late Roman crop dryer/malting oven. It might be noted that the appearance of this species is generally more closely associated with the later Roman period and often with the increased use of coulters and asymmetrical ploughshares that are more suited to clay soils, although earlier Roman examples are known (Stevens 2006c; 2006d; *cf* Jones 1981).

While the crops were almost certainly cultivated locally there is a question of whether the inhabitants of each of the sites were directly involved in the growing and processing of crops. It seems probable that at least the Villa inhabitants were cultivating their own crops while differences between the assemblages at Northfleet Villa and the Springhead sites suggest that the inhabitants of Springhead were also engaged in agriculture.

In terms of tillage practice, a possible coulter was found at Northfleet Villa (see Schuster, Vol 2, Chap 4) and this might further suggest that heavier clay soils were cultivated at the site using ploughs rather than ards. For the remainder of the sites either ard or plough may have been used although it may be noted that perennial species, such as spikerush which is quite common at the Springhead sites, are more likely to persist under the ard than the plough (*cf* Behre 1981).

Concerning the time of sowing, traditionally barley and emmer are associated with spring sowing and spelt with autumn sowing (Jones 1981; Percival 1921) although Hillman (1981) remarks that autumn and spring sown varieties of emmer and spelt, respectively, may have been more common in the past than today. Historically and traditionally it is unusual to find instances where spring and autumn sowing are not both practiced.

Depending on when the crop was sown it would have been harvested in early to late summer as today. The presence of lower growing species, such as clover, scentless mayweed, and corn gromwell, implies that crops were harvested close to the ground on the lower half of the culm. Crops would probably have been harvested with reaping-hooks, an example of which was recovered from Northfleet Villa (see Schuster, Vol 2, Chap 4).

Crop processing

In terms of the processing of the crop, it was notable that small free weed seeds were generally less well represented at all of the sites than those of intermediate and larger, grain sized seeded species, and those that have a tendency to remain in the seed-head. The intermediate category comprises species, such as medick, docks, perennial rye-grass, and orache, whose seeds are released in indehiscent or semi-indehiscent fruits, spikelets, or pods which are grain or spikelet sized.

This general absence of smaller weed seeds suggests that crops were probably threshed, winnowed, coarse- and then fine-sieved, probably following harvesting in the field, before they were brought back to the settlement for storage in the spikelet, to be followed by further processing.

Malting and 'bread' making

Evidence of malting waste, also known as 'cumins' or 'comings', was evident at all of the sites. At Springhead Roadside Settlement and Springhead Sanctuary a distinction was made between samples that were likely to derive from malting waste and those more probably associated with non-beer products, for example, bread, cakes, or dough-based foods (see Stevens, Vol 3, Chap 4).

The distinction in these two types of assemblages can also be seen to be a result of the way that the crops were handled. It is probable that crops destined for malt were processed in bulk and that, after germinating the grain in the spikelet, the spikelets were then heated, arresting the germination processes and also probably facilitating the removal of the chaff and coleoptiles. The spikelets appear to have then been pounded and the chaff separated with further winnowing and sieving, along with many of the intermediate weeds, which had also been released from their appendages. The general absence of larger, grain sized weed seeds in these malting waste assemblages either implies it was not thought necessary to remove these or they were removed elsewhere. The waste from these operations comprising glumes, coleoptiles, intermediate weed seeds, and the inevitable wasted grain, was then used as a fuel, perhaps to fire malt drying ovens, although no malting ovens were identified at Springhead, they were present in the later Roman period at Northfleet.

The evidence from these sites contradicts the assertion of van der Veen (1989, 305) that assemblages relating to malting would be comprised 'almost entirely of grains which had germinated prior to charring and large numbers of detached sprouts or coleoptiles'. As argued elsewhere (see Smith, Vol 3, Chap 4; Stevens, Vol 3, Chap 4), spelt must be malted in the spikelet, after which both glumes and coleoptiles would be separated from the grain by further processing. Potentially then there are three types of assemblage relating to malt: first, the waste or 'comings', comprising mainly glumes and coleoptiles; secondly, the malt, comprising germinated grain without the coleoptiles, which is less likely to come into contact with fire; finally, malted grain still in the spikelet, as seen at Northfleet Villa (see W Smith, Vol 3, Chap 4). Two further comments are worth making here. The first is that spelt does not germinate as uniformly as hulled barley and, depending on the angle the coleoptile makes with the grain, it may not be always be easily visible. The second is that not all of the assemblages recovered from the sites are likely to be purely derived from just malting waste or routine processing for bread etc.

At Springhead Roadside Settlement activities associated with brewing were particularly concentrated in the mid-Roman period in property 2, containing a temple, and property 11, although as stated elsewhere they were by no means confined to this site and good evidence for brewing associated activities was seen both at Springhead Sanctuary and Northfleet Villa (see Stevens, Vol 3, Chap 4; W Smith, Vol 3, Chap 4). The Sanctuary site at Springhead provided evidence for a crop dryer, with a further crop dryer recorded in earlier excavations (Philp and Chenery 1997). In general these structures are most common in the 3rd–4th centuries (Millett 1990, 202) and several authors have suggested an association between crop dryers and malting (Reynolds and Langley 1979; van der Veen 1989; Millett 1990, 205). However, the Sanctuary site crop dryer was not associated with malting, while that from the earlier excavations showed little or no sign of burning. Nevertheless, a late Roman oven/crop dryer at Northfleet Villa did produce evidence for malting, (see W Smith, Vol 3, Chap 4), leading to the interpretation of the structure in which it was found as a malt-house (see Biddulph above), although no such structures were found dating to earlier periods at this site.

In view of the vast amount of evidence for malting from the various sites and the lack of such evidence from the Springhead crop dryer it seems unlikely that this and similar structures were used for malting in the earlier Roman period.

However, a substantial building was found within property 12 at Springhead that was thought to have agricultural functions, including possible drying or malting ovens (see Chap 2 and above) and it is notable that this area also contained reasonable evidence for malting, in particular in the earliest Roman period. It might be relevant to note that, in the earlier excavations to the south of the Sanctuary and Roadside Settlement, another building (on the north-side of Watling Street) was uncovered with a possible

agricultural function, including a crop dryer and a tiled platform with much evidence for burning (Detsicas 1983, 62, fig 14, building 1). A further large building to the south-west of this, originally interpreted as a bakery (Penn 1957) from its structure, appears to be a large granary with a crop dryer and later ovens (Detsicas 1983, 76, fig 14, building 18).

The evidence suggests that, in the earliest period from AD 43–120, malting concentrated in property 12 and probably also within the Sanctuary area. During the mid-Roman period the evidence for malting waste suggests at least two areas of production, at a greater level than before, centred on properties 2 and 11, with possibly some activity on the Sanctuary site.

The 'bread' or 'dough' type assemblages are characterised by a predominance of larger, grain sized weed seeds, the type often removed by hand, usually conducted just prior to milling. Interestingly, these samples were closely associated with the small ovens in the Roadside Settlement which implies that grain destined for consumption and cooking was processed and presumably milled in their vicinity.

At Northfleet Villa recovery of cereal grains was usually quite limited (see Smith Vol 3, Chap 4, Table 98), instead the samples were dominated by cereal chaff and detached sprouts. As a result it is not possible to compare reliably the relative proportion of germinated and ungerminated cereal grain, as can be achieved for many of the Springhead samples. Nevertheless, almost half of the Northfleet samples appear clearly to be derived from malting waste and it is likely that the abundant charred chaff dumps throughout the site are directly related to cereal processing, if not malting.

Only three samples were analysed from earlier excavations at Springhead town and one sample produced a similar pattern of malting waste: spelt glumes/spikelet forks and detached sprouts (Campbell 1998). With only three samples from this earlier excavation, it is unlikely that they are representative of the full range of activities related to plant remains at Springhead town, but it is noteworthy that malting debris was detected.

Organisation of processing

The frequent finds of large quantities of burnt processing waste at Northfleet Villa and the Springhead sites contrast with the smaller quantities of material recovered from the late Iron Age samples from Springhead. In this respect the Roman samples suggest the processing of larger quantities of grain, more in keeping with supplying large groups of people than smaller, individual families. The scale of operations can be further examined with relation to the evidence for millstones and querns.

A variety of millstones and rotary quernstones was recovered from all of the sites. A few saddle quern fragments were identified, mainly from the Roadside Settlement at Springhead, while the Sanctuary site produced a mortar. No saddle querns came from Northfleet Villa or the earlier excavations at Springhead (Roe 1998). Saddle querns and shallow mortars may have been more suitable for the processing of smaller quantities of food, including herbs and roots, but also might be considered to be more reflective of smaller scale operations perhaps conducted for the needs of individual families (see Shaffrey, Vol 2, Chap 9). However, the presence of many millstones and quernstones as well as some larger agricultural buildings and other structures throughout Springhead and Northfleet implies the handling of large volumes of cereals by inhabitants of the settlements.

Finds of larger millstones at a probable Roman malt-house close to a villa at Stebbing Green, Essex were associated with the grinding of malt (Bedwin and Bedwin 1999), yet the evidence for brewing at Springhead centres on the Roadside Settlement and not the Sanctuary where millstones appear more common. It has, however, been suggested that the high number of puddingstone querns from the Roadside Settlement may be related to brewing rather than baking (see Shaffrey, Vol 2, Chap 9).

Beer Making

Assemblages comprising predominantly malting waste are not unique to Springhead and Northfleet and occur on other sites in southern England and beyond but they are not commonplace. Malting has been associated with a number of different types of site but mainly with more Romanised settlements. Among Roman towns we may include those at Ilchester, Somerset (Murphy 1982; Paradine 1994; Stevens 1999) and Alcester, Warwickshire (Pelling cited in Campbell 1998; Colledge 1989), and the settlement at Catsgore, Somerset (Hillman 1982). Deposits of probable malting waste dated to the late 2nd–early 3rd century also covered large areas of the Roman settlement of Salinae at Droitwich (*contra* Vaughan 1982; de Moulins 2006; Straker 2006), associated with the town, fort, and salt working.

At Mildenhall, Suffolk, the malting waste assemblages were related to an oven situated in a large building, possibly a barn (Bales 2004), and similar assemblages to those discussed above were found in association with a building and oven at Weedon Hill, Buckinghamshire (Stevens in WA 2007a). Another assemblage, possibly associated with a malt-house oven, came from Rectory Farm close to the Roman town at Godmanchester, Cambridgeshire, with a further example associated with the Roman farmstead and villa at Great Holts Farm, near Chelmsford, Essex (Murphy 2003a; Murphy *et al* 2000).

As well as Northfleet Villa, such remains of malting waste have also been found at the Roman farmstead and later villa at Bancroft, Milton Keynes, Buckinghamshire (Pearson and Robinson 1994). Robinson (1999, 149) was one of the first to recover abundant malting

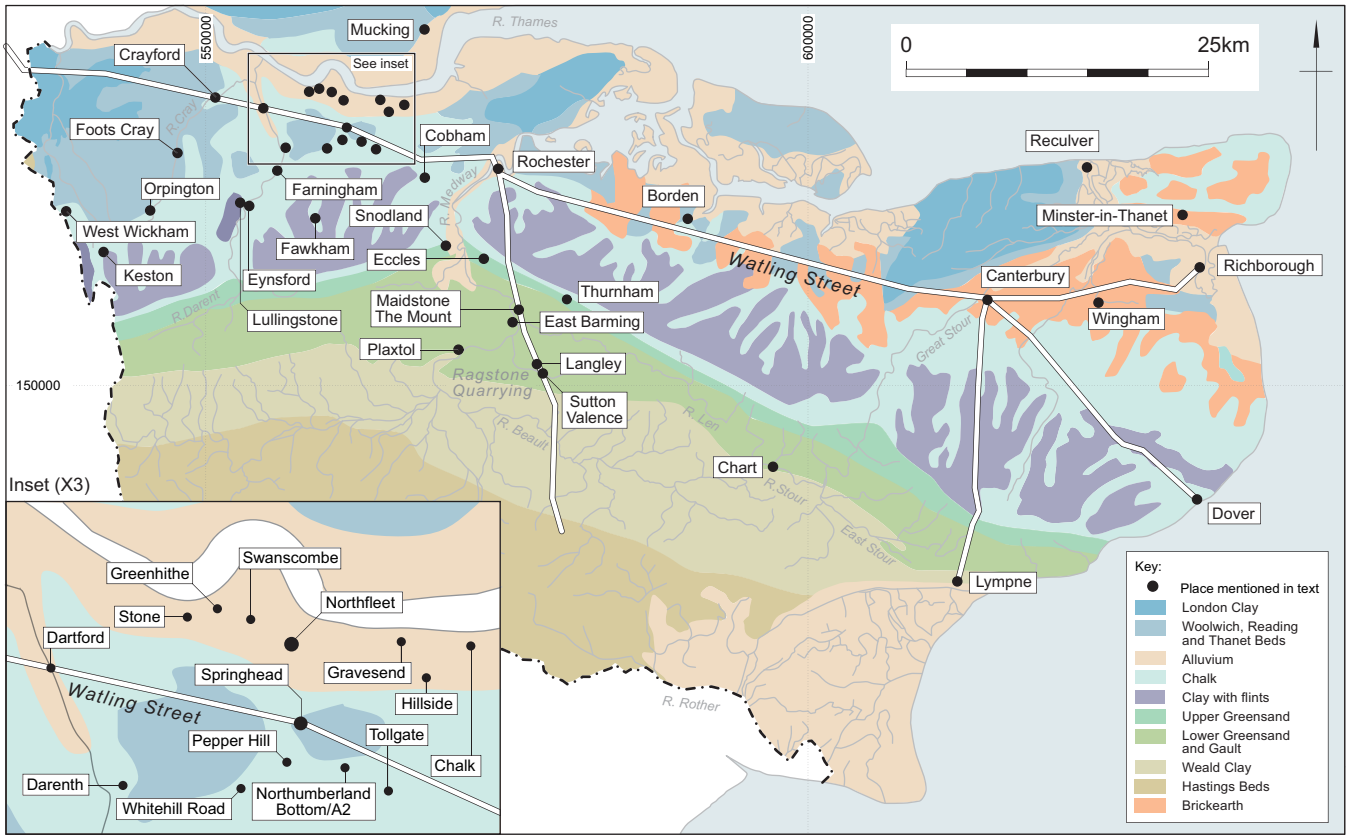

Figure 4.9 The Ebbsfleet Valley in its wider regional Roman context

evidence in Kent, with two samples at The Mount Roman villa, which were largely dominated by cereal chaff. He interpreted these as the 'burnt debris from the rubbing of parched, malted, spelt wheat in order to remove the husks and sprouts prior to grinding then brewing'. Elsewhere in Kent, limited evidence for malting was seen at Thurnham Villa (Smith and Davies 2006) to the south-east of Springhead, and the 2nd century site at Bower Road, to the south of Ashford, produced some evidence for malting (Stevens 2006c), although at neither site were the quantities remotely comparable to those seen at Northfleet and Springhead.

Similar assemblages have sometimes been found on less-Romanised rural sites, and although somewhat smaller, were relatively common on a number of sites around Cambourne, just to the west of Cambridge and east of Godmanchester (Stevens 2009).

In spite of the considerable amount of work conducted on Iron Age sites, no such assemblages of malting waste have been found pre-dating the Roman Conquest to the author's knowledge. Therefore, along with some of the sites listed above, Springhead and Northfleet represent the earliest evidence for malting in Britain. Taken together this suggests the introduction of malting to England during the 1st–2nd centuries AD. This is substantiated by preserved writing tablets dating to the earliest Roman occupation from Hadrian's Wall that refer to specialised brewers (Bowman and Thomas 1994). The Romans themselves are regarded more as drinkers of wine rather than beer and this may imply that such technologies were perhaps introduced by soldiers from other parts of the Roman province rather than Romans themselves, perhaps initially to satisfy military needs.

That the 'Romans' or at least Roman soldiers appear to have introduced malting to England does not preclude the drinking of cereal-based beer prior to AD 43. Both Tacitus and Pliny certainly refer to drinks made from fermented cereals drunk amongst the Germanic and Gallic tribes (Pliny *Naturalis Historia*; Tacitus *Germania* I: 23.1).

Given that the distribution of such evidence is not widespread we might ask why there is a concentration of brewing activity at Springhead and Northfleet Villa. The evidence certainly appears extensive enough across these sites to suggest that a number of individuals or families were engaged in brewing and that the tradition was passed on for almost 400 years, spanning perhaps ten or more generations, at least at Northfleet Villa.

One thing that most of the sites with substantial evidence for brewing discussed above have in common is that all, except Mildenhall, sit on major Roman roads, many located at the junctions of major routes, and many also associated with small towns. Because of the difficulties of transporting beer, it seems probable that, in Roman times as in medieval times, brewing was undertaken close to the point of consumption. As such we must assume that beer brewed at *Vagniacis* (Springhead) was not destined for transport along Watling Street, either to the towns to the east comprising *Durobrivae* (Rochester), *Durolevum* (Faversham/

Sittingbourne?), and *Durovernum Cantiacorum* (Canterbury), or those to the west, namely *Noviomagus* (Crayford/ Dartford) and *Londinium* (London). Rather it would seem probable that the brewing of beer arose to serve military personnel, pilgrims, and other travellers journeying along Watling Street between the ports at *Rutupiae* (Richborough) and later *Dubris* (Dover) and London. A possible use in religious ceremonies should also be considered and, in addition, it seems probable that beer played a role at markets and fairs that may have been held in and around the settlement at Springhead (*cf* de la Bédoyère 1999, 105). However, at Northfleet, where such evidence for brewing stretches into the later Roman period, given this site's location on the waterfront with easy assess to the Thames and inland Britain, it is possible that some longer distance transport took place in keeping with the general economic changes seen in this period (*cf* Millet 1990).

Roman Settlement of the Ebbsfleet Valley in Regional Perspective

by Edward Biddulph

A glance at the plans of Springhead and Northfleet reveals how vital water was in shaping both sites. They were, of course, situated along the Ebbsfleet River – Springhead at its source, Northfleet further upstream. But more than that, the river gave the town its religious essence that attracted pilgrims, traders, and settlers from across southern Britain and beyond, and permitted the villa to exploit lucrative markets for its agricultural produce. The river linked town and villa physically, but there were other connections. The local aristocracy, who acted as the town magistrates and religious officials, made the villa their country retreat; the villa, a working farm, helped to feed the town. The link is admittedly a simplification. Extensive fieldwork in the valley and immediately beyond it has revealed a network of smaller settlements that were far from isolated. This section brings this settlement pattern into sharper focus and places Springhead and Northfleet within its wider context (see Fig 4.9).

The Late Iron Age Context

The Roman Conquest of AD 43, though without doubt a monumental event, was the culmination – and most violent expression – of a period of cross-channel contact that had begun with Caesar's campaign in 54 BC and continued through and beyond Augustus's reign with trade, submission of tribal envoys or hostages to Rome, the arrival of new traditions in return, and a general outlook that more readily faced the Continent (Andrews 2001; Creighton 2006). In south-eastern Britain this was evident in, among other things, the appearance of fine ceramic tablewares and bronze vessels that brought new ways of dining and socialising (or at least the idea of them), the development of continental styles of local pottery, the circulation of coinage, and changing burial rites. The landscape also saw changes; ditch-enclosed settlements and field systems evolved while large-scale *oppida* re-drew territorial divisions and symbolised a period of social differentiation and political centralisation (Champion 2007, 120–1, 132). With the help of prestige imported goods, notably wine and gold, new inter-tribal relationships were forged that allowed powerful rulers to emerge. Caesar's well-known statement that there were four rulers in Kent in the middle of the 1st century BC gives us little clue about how the rulers related to each other and the areas over which they held power but it does suggest that the territory of the Cantiaci of the Roman period – the *civitas Cantiacorum* at Canterbury – was a convenient confederation that united a number of smaller tribal groups (Millett 2007, 140). The influence, too, of the more powerful rulers of the Catuvellauni from north of the Thames, as indicated by coins of Cunobelin, cannot be ignored, but the results of excavations along Watling Street south of Gravesend, as well as those at Springhead, suggest that a local aristocracy dominated in the region. That a settlement developed around the springs and emerged in the Roman period as a regionally important religious centre can only have been effected with the patronage and pull of the local elite.

Springhead developed in the late Iron Age with the springs as its focus. Activity at this time had a strongly religious aspect. A processional way that ran parallel with the river appeared to terminate close to the springs. The feature dominated the east side of the river and most other features were located with reference to it. An enclosure on the east side of the processional way contained post-holes and pits, implying structures and occupation, but these on the whole do not point to domestic use. A terrace and pits (some of which contained structured deposits including animal burials) further suggest a ritual focus to the area. The pull of the sacred transcended the risks of the riverside location; the area was prone to seasonal flooding, leading to attempts in the Roman period to shore-up the channel edge (see Barnett and Stafford above). The site of Northfleet villa did not see much late Iron Age occupation; the Western Roman Complex enjoyed a little activity during this time, but this was restricted to a gully and a group of pits and seemed rather peripheral (see above). Better evidence was uncovered on the east side of the modern town of Northfleet. Excavation revealed a ring-ditch, an enclosure, and chalk quarries set within a field system, dated by pottery to the 1st century BC and the first half of the 1st century AD (Philp and Chenery 1998). Quarry pits and a substantial boundary ditch were uncovered east of Springhead at Pepper Hill, subsequently the site of a Roman cemetery (Biddulph 2006c). Like that from Northfleet, the evidence suggests industrial or otherwise marginal activities and marks the limits of the late Iron Age settlement.

The area south of Springhead also witnessed minimal occupation. The Hazells Farm site, closest to Springhead, recorded evidence of a pre-Conquest pit,

while pottery of a late Iron Age character, including imported fineware, was recovered further south from the sites of Fawkham Junction and South of Station Road (Bull 2006a). Excavations 2–3 km further east of Springhead revealed much more significant late Iron Age occupation. Fieldwork at Northumberland Bottom (Askew 2006) uncovered the remains of an enclosed settlement that developed within a NW–SE aligned trackway. Pits, ovens or hearths, and burials indicated that the site was used for domestic occupation, while small amounts of cereal grains and chaff and animal bone – from animals required for meat, dairying, and traction – provide evidence for farming. The settlement was close to Springhead spatially but was by no means dependent on it. Indeed, more enclosures uncovered immediately to the north during fieldwork along the route of the A2 Pepper Hill to Cobham widening scheme (adjacent to the Northumberland Bottom site; see Fig 4.9) suggest that the settlement, developing along a trackway, was larger still (OA 2008a). Taken together, the sites were mixed in terms of status, probably representing a loose conglomeration of farmsteads and smallholdings linked by a larger centre. A grave at Northumberland Bottom that contained a single grog-tempered pedestal urn contrasts with two richly-furnished cremation burials from the A2. Four ceramic vessels and four copper brooches possibly in an iron-studded box were deposited in one grave, while the other grave contained two pots and a bronze-bound bucket with decorated plaques, plus a tin-bronze cylinder probably from a drinking horn.

A picture of dispersed late Iron Age occupation emerges in wider perspective. Pits were found at the Tollgate site, east of the A2/Northumberland Bottom sites (Bull 2006b). More substantial remains were found during excavations at Stone Castle, near Greenhithe, which revealed enclosure ditches, a ring-ditch of another enclosure, or more likely a round-house, and storage pits and a hearth. Pottery placed the settlement in the 1st century BC with the emphasis on the early part of that century (Detsicas 1966). Overall, the evidence points to a settlement pattern of small farming communities that developed around Springhead, which may have developed as a more important local tribal centre (see above). This seemingly resonates with Julius Caesar's view of *Cantium*, a region 'thickly studded with farmsteads' (*Commentarii de Bello Gallico*, 5.12). The evidence gathered along the A2 hints at another centre though, given its proximity to Springhead, the exact relationship is difficult to determine. What of the larger settlements or towns of Dartford, Rochester, and Crayford that join Springhead on Watling Street? Dartford has generally lacked late Iron Age evidence. While fieldwork has pointed firmly to the presence of a settlement, even a small town, during the Roman period (Detsicas 1983, 80; Hutchings 2001, 117), the few features and finds belonging to the late Iron Age (eg, Stevens *et al* 1999, 381) suggest a cluster of farms like those surrounding Springhead. Rochester appears to have grown from more substantial late Iron Age origins; coin moulds from the site suggest an important centre, possibly a mint (Harrison 1991, 48), and there are suggestions in its *Durobrivae* place-name of an *oppidum* (Andrews 2004, 23). Too little is known even of Roman Crayford, and its pre-Conquest evidence is far from understood. The junction of the Cray and Darent rivers – where the putative roadside settlement was located – may have held significance for late Iron Age settlers but pottery recovered so far suggests little more than a small settlement (Champion 2007, 120). The settlement was possibly the *Noviomagus* or Newmarket of the *Antonine Itinerary*, though Brian Philp (2000) has placed the town at West Wickham and off the line of Watling Street.

The Romans Arrive

The debate about the exact location rumbles on but it seems most likely that Claudius's army stepped ashore in AD 43 on the east coast of Kent, perhaps in the vicinity of Richborough (Millett 2007, 141). The route which was developed as Watling Street is thought to have been the primary land-based communication corridor in this very earliest phase and by around AD 50 had linked the east coast of Kent with London (*ibid*, 148). The absence, so far, of permanently garrisoned 1st century forts in Kent, apart from Richborough, suggests that direct military control in the years following the invasion was not required. The decades of cross-channel contact before the Conquest had embedded Roman friendly values sufficiently deeply to allow the Romans to govern indirectly through acquiescent native tribal rulers. This effectively involved the local 'landowning classes governing their territory through a series of civic institutions that were based at a central town' (*ibid*, 138).

This is not to say that the Kent of early Roman Britain was little different from that of the late Iron Age; there was certainly change, but this was supported and even instigated by the local elites. That the Roman Conquest brought changes to the Ebbsfleet valley is obvious but the significance of the earliest post-Conquest development in the valley is unclear. At Springhead, the remains of what may have been part of a large rectangular enclosure – located 100 m south-east of the springs – potentially date to the late Iron Age, though a date in the mid-1st century AD seems more reasonable based on ceramic dating (see above). Its function is uncertain, but its regular form, size, and the V-shaped profile to the ditches hints at a Roman military origin. The presence of *busta* – burials belonging to a rite that appears to have originated in the Rhineland and Danubian provinces (Struck 1993) – at Pepper Hill cemetery lends some support to the idea of limited military activity. The burials were among the earliest interments, certainly dating before AD 70, and may have been introduced with the arrival of auxiliary soldiers (Biddulph 2006c).

Metalled roads were laid from *c* AD 50 that allowed the landscape to be defined more formally. Watling

Street that connected Richborough and London and, over time, the towns of north Kent in between was, of course, central to these new arrangements. It is possible that the origins of the route, or parts of it, are found in the late Iron Age (Millett 2007, 148), but care must be taken to avoid presuming roads into existence. The North Downs Trackway, that supposed ancient route formed by the upper ridgeway of the Downs and the Pilgrims' Way along the lower terrace (Margary 1952), is something of a cautionary tale, as a pre-Conquest trackway has little evidence to support it. Iron Age settlement favoured riverine locations but, significantly, avoided the points where the route crossed the Stour, Medway, and Darent valleys (see Parfitt 2004, 18); a 35 mile (*c* 56 km) stretch of Roman road deemed to use the putative ridgeway actually fell 4 miles (*c* 6.5 km) short of it (Turner 1980, 9). Evidence for an Iron Age precursor to Watling Street remains similarly elusive. A section through the road at Rochester revealed its earliest metalled surface which sealed a dark soil layer that contained early 1st century pottery, *potin* coins, and the coin moulds (Harrison 1991, 44–5). The earliest surface from a section of the road at Canterbury was laid on top of a peat horizon that contained early 1st century continental finewares (Rady 1986, 211–3). Sections of Watling Street exposed during the recent fieldwork at Springhead provided no good evidence for a late Iron Age origin; no deposits were found to lie beneath the earliest phases of the road exposed on the west side of the Ebbsfleet while pottery from the roadside ditches generally indicated construction around AD 50–75. These interventions do not demonstrate late Iron Age use of the road but do suggest that the road was laid out within a few years after the Conquest.

Springhead's roads were part of a wider programme of road building that helped connect settlements in the area. The Hollow Way, a north–south aligned metalled road recorded at Pepper Hill, extended into the centre of Springhead. A re-alignment took the road past the early Roman 'military' enclosure, suggesting that the road was a later work but, crucially, the road appeared to define the shape of the cemetery at Pepper Hill from the start and must have been an early dated feature, probably dating before AD 50 (Biddulph 2006c). The earliest metalled trackway found at Tollgate may have been laid shortly after the Conquest; it was orientated north–south and potentially joined Watling Street a short way to the north (Bull 2006b). However, it can also be allied with NW–SE aligned late Iron Age trackways recorded in the Northumberland Bottom and A2 excavations that, if not simply starting and ending within the limits of those settlements, possibly connected with an east–west orientated routeway. It seems that the idea that informally laid trackways criss-crossed the valley to connect the myriad farming communities cannot be ruled out altogether but, on current evidence, it is unlikely that these formed the basis of Roman roads.

Watling Street gave shape to a burgeoning Springhead. The road, along with a branch road that continued north (possibly connecting with the Northfleet estate that began to stir in the later 1st century), was lined by the end of the century with a series of properties that included a temple, a 'town-house', an aisled building, and a smithy. Another road led to the springs, encouraging further structural work. And at the heart of the settlement was the Sanctuary area that grew around the edge of the Ebbsfleet (see above). The settlement's success was immediate, attracting new residents and visitors from far and wide. The emergence of a bustling, culturally mixed, community is recorded in the Pepper Hill cemetery (Biddulph 2006c). Interment began probably in the 40s AD, possibly, even, before the Conquest, but the rate of burial increased after AD 50, commensurate with the development in the town. Most of the graves during this early period no doubt represented the local population. However, grave goods, such as a Severn Valley ware tankard, a rare occurrence in the region, may have been bought into the area by a settler from the western part of the province. The small number of *busta* contained the remains of women and children and so may have represented the final resting places of the non-combatant community that accompanied the army. Other graves yielded grapes, lentils, and figs that, if nothing else, confirm that, from an early period, Springhead was outward looking and engaged with the world far beyond its settlement boundaries.

To some extent, the pattern of dispersed rural settlements and farmsteads seen in the late Iron Age continued well into the early Roman period; hillwash continued to build up at Wrotham Road, for instance, as the seasonal cycle of cultivation continued unchanged (*cf* Giorgi and Stafford 2006). However, changes to field systems suggest that the Conquest led to a degree of re-organisation in farming and production. At Northumberland Bottom (Askew 2008), the early Roman settlement was established 200 m south-east of the late Iron Age activity. The focus of the early Roman phase was an enclosure that surrounded a structure. A nearby oven may have been used to dry or germinate grain; spelt grains were found in reasonable abundance, though little of it had sprouted.

Two roads were established; these ran parallel with Watling Street and through the open countryside formed by fields and scrub and towards the more distant woodland (Giorgi and Stafford 2006). Tollgate's metalled road helped to define fields (Bull 2006b) while the level of occupation at Fawkham Junction, south of Springhead, was expanded in the early Roman period; field ditches were established or re-cut, though on different alignments to the late Iron Age system, further pointing to re-organisation (Bull 2006a). More enclosures were raised at South of Station Road (*ibid*). The settlement at Hillside, Gravesend, was well established by the late Iron Age, but was expanded considerably during the mid 1st century AD. A droveway, generally north–south oriented, divided large fields from smaller enclosures and farm buildings (Philp and Chenery 1998, 31–2). At the junction of the A2 (modern Watling Street) and the M25 motorway to

the north-west of Springhead, a rural settlement and field system developed in the early Roman period, continuing until the later 3rd century (OA 2008b). Together, the evidence suggests that the early Roman period – pottery cannot be any more precise in some of these cases – heralded increased production and the development of a minor road network that gave farmsteads access to Watling Street and allowed surpluses to be taken to available markets.

While the Pepper Hill cemetery accommodated an ethnically and socially diverse population, the local elite – the aristocracy that governed Springhead during the mid-1st century – may have been buried a short way to the east. Excavations on the A2 site revealed three high status graves, dated *c* AD 50–75, within an enclosure that included imported pottery, metalwork, and, in one, a game board complete with gaming pieces (OA 2008b). Current settlement evidence does not immediately point to a high status residence at Northumberland Bottom; indeed, the narrow HS1 excavation area immediately south of the A2 site yielded no clue that rich burials existed there, though it should be remembered that a settlement's domestic finds assemblage does not necessarily match its funerary assemblage (*cf* Biddulph 2007, 140). The burial location may mark an older, pre-Conquest, focus that was remembered after AD 43, recalling the Folly Lane enclosure outside *Verulamium*. This enclosure marked the end of a causeway and was established during the later Iron Age. It became a place of commemoration and soon after the Conquest attracted the burial of a British aristocrat who had served in the Roman army (Niblett 1999, 412–3). Like Folly Lane, the A2 enclosure was prominently located on high ground and was perhaps a place of reverence in the late Iron Age. But though the importance of the location may have been remembered with the act of burying high status individuals and subsequent lower status burials in the later 2nd century, the enclosure, unlike Folly Lane, did not appear to influence the layout of the adjacent settlement and nor could it have any bearing on the development of Springhead. No further high status burials were made at the A2 site after *c* AD 70, by which time the leading family had possibly re-located to Springhead or the villas at Chalk or Northfleet, although later burials carefully referenced the positions of the earlier ones.

Any increases in production did not immediately lead to grand statements in architecture and conspicuous display of wealth; villa estates were not established in north-west Kent until the late 1st century onwards. Northfleet villa was built after AD 70, probably *c* AD 90. The new inhabitants were no doubt attracted by the river location but the open landscape and retreating woodland made it ideal for cultivation and construction, while the development of salt marsh in the lower Ebbsfleet valley pushed the villa's location away from the Thames estuary itself (see above). The villas at Cobham Park and Lullingstone were established after AD 75 (Tester 1961; Meates 1979), while Darenth, Horton Kirby, and Orpington did not see the first stone buildings erected until the 2nd century, although 1st century occupation is evident at these sites to lesser or greater extents (Philp 1984; Philp and Mills 1991; Philp 1996). Farningham, in the Darent valley, and a masonry structure at Chalk seem to be exceptional in the region, being established relatively early, *c* AD 55–65 (Meates 1973; Johnston 1972). There is a hint of a villa at or in the vicinity of Northumberland Bottom: roof, floor, box-flue and voussoir tiles re-used within the structure of a late Roman crop dryer presumably derived from a building with under-floor heating (Askew 2006), though it is impossible to claim any more than this on current evidence. The apparent reluctance of Britons in this area to transfer their wealth to villas – or for entrepreneurial settlers from the Continent to invest in villa estates – until at least a generation or two after the invasion has not escaped comment. As Millett (2007, 152) remarks, the idea of aristocratic retreats was slow to catch on, although this was not because Britons rejected Roman cultural values (the richly-furnished mid-1st century burials found along the A2 suggests otherwise). Restrictions may have been placed on early development as a consequence of the demands of the continuing conquest of northern Britain, which depended on a rigidly-controlled supply network (*cf* Andrews 2001, 29). This may answer for development along Watling Street but is unlikely to have stopped work along the river valleys, such as the Darent and Medway. And in any case, villas were part of that supply network. The villa at Eccles in the Medway valley, built *c* AD 55, produced imitation Gallo-Belgic pottery from that time largely for export to more distant markets, perhaps under military contract (Detsicas 1974, 133). Northfleet villa was producing ale possibly for the army just a few decades afterwards.

Of course the reason for the slow uptake of villas may simply be one of fashion, as Millett hints (2007, 152). Britons were not forced into adopting continental building styles and were content initially to reside in settlements that were virtually identical to those of the late Iron Age. At Hillside, Gravesend, the post-Conquest settlement retained the sorts of timber structures and enclosure seen in the earlier 1st century, albeit set within an expanded settlement (Philp and Chenery 1998). Pits, ovens, and a rectangular timber building placed within an enclosure at Wrotham Road (Askew 2006) give no hint of the high status continental style burials located immediately to the north (although the intervening area of this site, which could contain very different structures, remains unexcavated). The inhabitants of Thurnham made a fair attempt at creating a Roman building (Lawrence 2006) but the character of the 'proto-villa' betrays the basic knowledge held by the estate owners of continental style building design. The essential knowledge and goods that showed the population to be conversant with the idea of '*Romanitas*' took time to acquire but, apart from the increased scale of production and the particular needs of the army, there was little sign that the inhabitants of north-west Kent were required to adopt those cultural ideals in any great hurry.

The countryside continued to develop in the mid-Roman period. Some villas were more than self-indulgent residences. Far from isolated hideaways of the wealthy, they were locked into networks of trade and communication and were vital links – instigators, even – in the supply of goods to towns in the region and beyond. Northfleet's position as a major producer and supplier of ale possibly to the army has been discussed elsewhere (see above). Potters at Eccles manufactured pottery and tiles for use beyond the region – the products apparently saw little local consumption (Detsicas 1983, 162, 166). One cannot help but speculate on the part that the Mount villa played when goods were sent down river, at times in the name of the provincial government, such as a consignment of ragstone (Houliston 1999, 164). The villa enjoyed a good strategic position on the bank of the river and next to the road that connected the vital quarries and ironworking zone to the south and Rochester and the Thames estuary to the north. The possibility that the villa owners served as gatekeepers of a sort is a strong one, potentially giving the inhabitants a role in government trade. We have seen in the case of Northfleet how business could be conducted between the villa owners and traders or government representatives independent of the towns; Northfleet was connected to Springhead in many ways – the town's officials may well have resided at the villa – but the presence of the seal-box possibly belonging to a *beneficarius* hints strongly at direct communication. The inhabitants of Eccles and the Mount, associated with vital aspects of supply, may similarly have enjoyed the privileged position.

If villa owners held significant authority and influence over trade networks then the inhabitants of roadside settlements like Springhead and Dartford also may have been dependent on them. Martin Millett (2007, 166) adds to this, arguing that the settlements provided the estates' workforce. The estate at Northfleet was certainly large enough to warrant a large workforce. The absence of dwellings at the Western Roman Complex, part of the estate's western hinterland and, indeed, the seemingly limited accommodation at the villa complex centre, points to a workforce drawn from adjacent settlements. The number of workers required in any case would have fluctuated during the year, the harvest, for example, representing a peak period. These extra workers could only have come from outside the estate. This, incidentally, may solve the puzzle of so-called isolated bath-houses. Rurally located detached bath-houses, apparently associated with no nearby structures, have been discovered at, for example, Hayes, Hartfield, and Orpington. They could of course sit immediately adjacent to as yet undiscovered farm or villa accommodation but it remains a strong possibility that such bath-houses were communal, serving rural workers drawn from various settlements (Detsicas 1983, 140). Northfleet's bath-house, which was initially detached, can perhaps be seen in this light.

Springhead may have provided Northfleet's workers, but a similar relationship with villas and nucleated settlements elsewhere is less clear. Most of the villas of the Cray, Darent, and Medway valleys were some distance from the larger settlements on Watling Street and, indeed, the status of some of those settlements is far from certain. Rochester is among the larger and better known settlements, and second only to the *civitas* capital at Canterbury. The town was surrounded with stone defences and evidence for a market and stone and timber structures has been uncovered (Detsicas 1983, 54–9). There are some villas immediately to the north, east, and west of Rochester, but the villas of the Medway valley seem ill-served by it, being far too distant to retain a day-to-day connection. There has been much speculation that a nucleated settlement may have existed at Maidstone – perhaps located along the road to Rochester – in the heart of the cluster of Medway villas. The evidence has not been forthcoming although the scale of rural settlement in the area lends weight to the suggestion (*cf* Houliston 1999, 158; Booth and Howard-Davis 2004, 26). The Darent is similarly problematic, as evidence for a roadside settlement at Dartford is as enigmatic as it for Maidstone. No large scale excavations have taken place within the modern town but the smaller interventions have exposed surfaces, evidence of structures such as tile and post-holes, and industrial remains including ironworking slag (Hicks 1995). Enclosure or field boundaries recorded at Princes Road brought to the excavator's mind the edge of a villa estate to the south at the Orange Tree public house (Hutchings 2003, 75), but the various cemeteries known in the area, as well as the range and quantity of finds – clustered at the intersection of Watling Street and the Darent River – potentially point to a larger settlement (Hutchings 2001, 118; Priestly-Bell and Barber 2004, 92). Pottery puts the establishment of the small town in the later 1st century at the same time as the Roman road was laid out. The picture is far from clear but, in summary, there are grounds to suggest that Dartford and Maidstone had a similar settlement pattern that comprised a range of farming communities supported by a larger, nucleated, settlement. The pattern is more evident at Springhead which not only supported the villa estate at Northfleet but also farms (and villas?) at Northumberland Bottom, Hillside, Fawkham Junction, and the A2/A282/M25 junction, among other sites.

Despite the range of sites, the settlement pattern that emerges during the 1st and 2nd centuries is rather a bland one where the settlement types encountered, with a few exceptions, are ill-defined and inexactly separated. Pottery provides a useful means of separating settlements (*cf* J Evans 2001; Booth 2004) with samian, in particular, providing an excellent index; the proportion of decorated samian tends to increase with settlement status, with major urban centres and military sites enjoying the largest proportions. Probably as a result of their religious and industrial importance, Northfleet and Springhead are well placed, with 12% and 14% of their respective samian assemblages being decorated. This may also reveal something of the connection between the two sites, with Northfleet

benefiting from the supply of pottery to the town. The figures stand in stark contrast to the rural settlements at Northumberland Bottom and Tollgate where no decorated samian was recovered. That one out of ten samian vessels from Hillside, Gravesend, was decorated (Philp and Chenery 1998, 30) may point to that settlement being larger in size or role than others nearby. Clearly more work of this type is required. Pottery offers great potential for ordering settlements, especially where there are gaps in settlement plans and knowledge of structures as a result of small and scattered interventions.

If the first 200 years of the Roman period in north Kent largely saw an extension of late Iron Age rural settlement patterns, albeit punctuated by the grand architectural statements represented by towns and villas, then the 3rd and 4th centuries witnessed a sparser settlement pattern and maybe something approaching an agricultural revolution. Across the region, settlements of the earlier Roman period ceased to be occupied or were adapted to serve different functions by the later period. The rural settlements at Whitehill Road (Bull 2006a) and Fawkham (Philp 1963, 62) were abandoned by the end of the 1st century. The settlement at Stone was not occupied after the late 2nd century (Detsicas 1966). The latest pottery from Hillside dates up to AD 220 (Philp and Chenery 1998, 32) while the dating of the putative villa at Chalk does not appear to extend beyond 300 (Johnston 1972). Tollgate was not occupied after 250 (Bull 2006b). Springhead experienced a similar chronology. Properties along Watling Street and its branch road had fallen into disuse by the early 3rd century; the waterfront and the temple in property 2 saw a late 3rd century decline, although some temple and road use continued into the 4th century (see above). The later 1st to mid-3rd century evidence at Northumberland Bottom included structures, enclosures, and roads. After 260, activity was focused around a crop dryer, ovens or kilns, and boundary ditches. The limited evidence for crop processing evidence in the early Roman period was replaced by rich samples of charred grain from 4th century features (Askew 2006). Northfleet tells a similar story. Activity in the Western Roman Complex was much reduced in the late Roman period but occupation continued at the main villa site where one of the aisled barns was converted to domestic use. The site saw increased crop processing in the 4th century and its crop dryer – or, rather, malting oven – signals a period of innovation and consequent efficiency-gains relating to brewing. This phenomenon is not reserved just for the Ebbsfleet valley. At Thurnham, the villa was re-modelled and extended in the 2nd century but, by the late 3rd century, the boundaries were out of use and the bath-house abandoned and the use of the main house was significantly altered. Environmental evidence from late Roman features that indicates woodland regeneration is a further sign of withdrawal from parts of the estate (Giorgi and Stafford 2006). However, the estate continued to produce crops on a large scale, and in the mid-4th century a malting oven or crop dryer was built (Lawrence 2006). The changes seen at Northfleet and Thurnham reveal changes in land organisation, perhaps even ownership. Lawrence suggests that the villa at Thurnham had been consolidated into a larger estate, hinting at the emergence of super estates that intensified production and concentrated the role of certain sites to chiefly an economic one. If so, it is tempting to ascribe this change to the requirements of the military community in Kent. New forts were built in the late Roman period, such as Lympne, while others, for example Richborough and Dover, were re-built. That said, Millett (2007, 180) reminds us that the army population in Kent remained small during this time, perhaps no more than 2000 men. The chronology of developments both in civilian sites like Northfleet and Thurnham and military sites was extended, making it impossible to assign changes to any one particular event.

Coin evidence gives Northfleet a terminal date of 380. The date is shared by the villas at Farningham, Cobham, and Horton Kirby. However, Northfleet is likely to have continued to receive pottery after this date, perhaps into the 5th century. This must mark another change in the nature of occupation. New coins arrived in the region after 380 – they appear at Lullingstone, Eccles, and Darenth – so the absence of coins at Northfleet cannot be due to the vagaries of coin issues. The latest Roman period horizon at Northfleet comprised quarries and demolition deposits, suggesting that here occupation was largely insular and removed from wider agricultural demands, although this did not preclude the inhabitants from retaining trade links.

Chapter 5
Saxon, Medieval, and Post-Medieval Landscape

by Alan Hardy and Phil Andrews

The HS1 investigations at, or in the immediate vicinity of, Springhead and Northfleet produced evidence for both settlement and burial of early–mid-Saxon date in an area where no features and very few finds of this period had previously been identified despite relatively extensive evaluation and excavation. The dates ascribed to these features span the late 5th/early 6th to the early 8th centuries, though some elements can only be assigned a broad early–mid-Saxon date. It is likely that together they represent sporadic rather than continuous activity over a 200 year period, probably reflecting shifting settlement within the Ebbsfleet valley and surrounding area. Dating relies almost entirely on the finds assemblages, supplemented where possible and appropriate by radiocarbon dates.

This chapter provides a description and discussion of the Saxon settlement and cemeteries excavated during the HS1 excavations, along with a discussion of the wider environment and land use at this time. The limited evidence for late Saxon, medieval, and post-medieval activity is also described and discussed here. The mid-Saxon mill and associated features are dealt with separately in Chapter 6. The finds, human bone and environmental data area presented in Volume 4.

The Early to Mid-Saxon Settlement Evidence

A total of 11 sunken-featured buildings (hereafter SFBs) was identified in the overall Springhead/Northfleet area, along with a modest number of discrete features considered to be broadly contemporary by virtue of artefactual or scientific dating and/or spatial association with the SFBs (see Fig 5.1). A broad date range for the settlement of between the late 5th century and the late 6th or early 7th centuries is suggested, although how many SFBs were in existence at any one point is debatable.

Springhead

Two SFBs were identified in different parts of the Springhead site, one isolated (although this may reflect the limits of excavation), the other with several probably associated features (Fig 5.2). Pottery (predominantly organic-tempered wares) and radiocarbon dating indicate a 6th or first half of the 7th century date for both SFBs and the associated features.

SFB 5809

The feature lay close to the springs (Fig 5.2) and within the rear part of the abandoned Roman Sanctuary complex. The pit was sub-rectangular in plan, measuring 3.60 m by 2.40 m by 0.25 m deep. Two post-holes (5904 and 5812) were identified within the pit, one at either end, both measuring approximately 0.30 m wide and 0.35 deep (Fig 5.3; Pl 5.1). The fills of the post-holes (5813, 5905) and of the pit (5845) were a largely undifferentiated very dark greyish–brown silty loam, and this produced a moderate assemblage of finds including a complete double-sided composite comb (SF 754; see Allen, Vol 4, Chap 4), pottery (comprising both locally made organic-tempered ware and quartz-tempered ware from Essex), and animal bone. SFB 5809 was sealed directly beneath a substantial build-up of medieval and later colluvium and it appears that the top of the Roman deposits formed the contemporary ground surface, though no certain Saxon horizon was identified.

SFB 127

The feature was recorded during the watching brief at the extreme south-east end of the area, on a gentle north-facing slope at a height of *c* 15 m OD (Fig 5.4). The sub-rectangular pit measured 3.8 m by 3.10 m by 0.10 m deep. Two post-holes (119, 123), each approximately 0.20 m wide by 0.30 m deep, were identified at the ends. Two other post-holes of similar size (117, 121) were also identified, the former possibly representing a re-building at the north-west end of the SFB, the latter in the eastern corner. A fifth shallow post-hole (125) was situated along the south-western side. A total of 68 sherds of pottery were recovered from its fill.

Other features

Approximately 5 m to the north of SFB 127 was a sub-rectangular pit (105), probably comprising two intercutting pits, measuring 4.0 m by 3.0 m and up to 1.2 m deep (Fig 5.4). The sides generally sloped at *c* 45° and there was a 0.25 m deep post-hole (114) in the base at the southern end. The lower fills appeared to comprise re-deposited or slumped natural brickearth (106, 108), sealed by a charcoal-rich soil (109) which contained a relatively large quantity of pottery and other finds probably representing occupation debris. This is turn was sealed by a further deposit (111) representing a mixture of refuse disposal and natural silting. Samples of carbonised grain and hazelnut shell from this layer

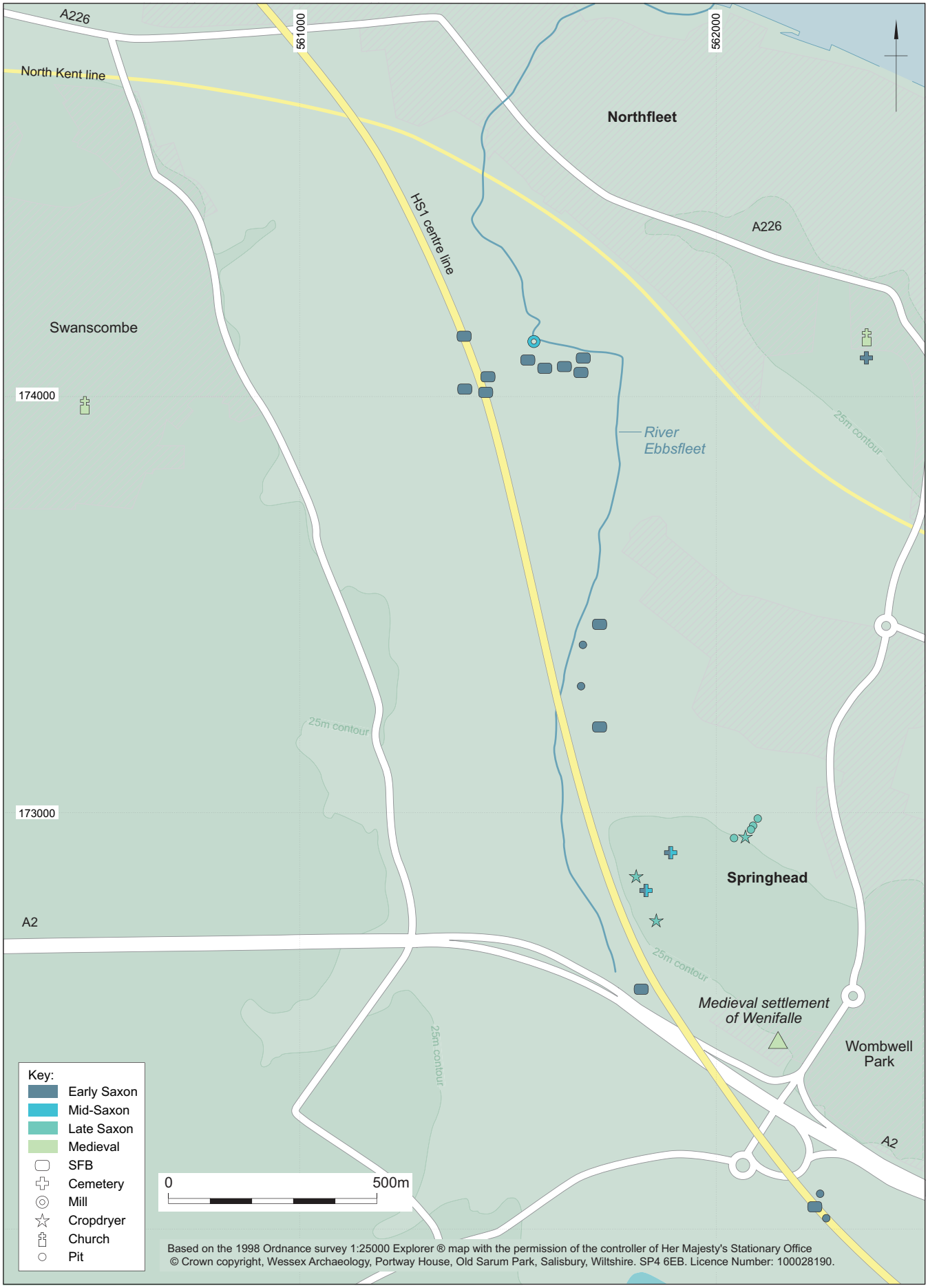

Figure 5.1 Location of Saxon and medieval sites in the project area

Plate 5.1 Saxon SFB 5809 (ARC SPH00). Looking west

provided radiocarbon dates of cal AD 500–630 (NZA-27432, 1510±30 BP) and cal AD 530–640 (NZA-27431, 1501±30 BP) respectively. The post-hole in the base of the pit suggests that the pit was originally dug for a purpose other than rubbish disposal, though what this was remains uncertain.

Less than 5 m to the east of SFB 127 and pit 105 was a shallow gully (102) averaging 0.3 m wide by 0.1 m deep, which extended for at least 15 m, running approximately north–south (Fig 5.4). It may have been a drainage feature or perhaps held a fence, though no post- or stake-holes were identified in the base. A further 70 m to the south-east of gully 102 was a small, isolated pit (113) 1.6 m in diameter and 0.3 m deep (not illustrated). This had a flat bottom and contained probable hearth debris, represented by burnt clay and charcoal, along with pottery and a very small quantity of animal bone.

Two small pits, both situated towards the northern end of the site (Figs 5.2 and 5.5), have been assigned to the late 5th/early 6th century and are likely to be broadly contemporary with the SFB evidence. Pit 2868 was only partly exposed but was probably bowl-shaped, with a maximum recorded diameter of 1.45 m and a depth of 0.25 m (Fig 5.5). From the estimated 50% that could be excavated came an iron Visigothic Estagel-type brooch dated to the late 5th/early 6th century (SF 564; see Schuster, Vol 4, Chap 3, Fig 4, 2 and Pl 5), sherds from a minimum of two pottery vessels, and a few bones of cow and dog.

Pit 2874 was situated approximately 125 m to the north of pit 2868, adjacent to the Ebbsfleet, and was bowl-shaped, oval in plan, measuring 1.3 m by 1.0 m and 0.3 m deep (Fig 5.5). It cut Roman deposits which filled the east side of the Ebbsfleet channel (2871). Pit 2874 contained a notable finds assemblage that included a Roman brooch (SF 563), a shale spindle-whorl, and a copper alloy bucket handle (SF 542).

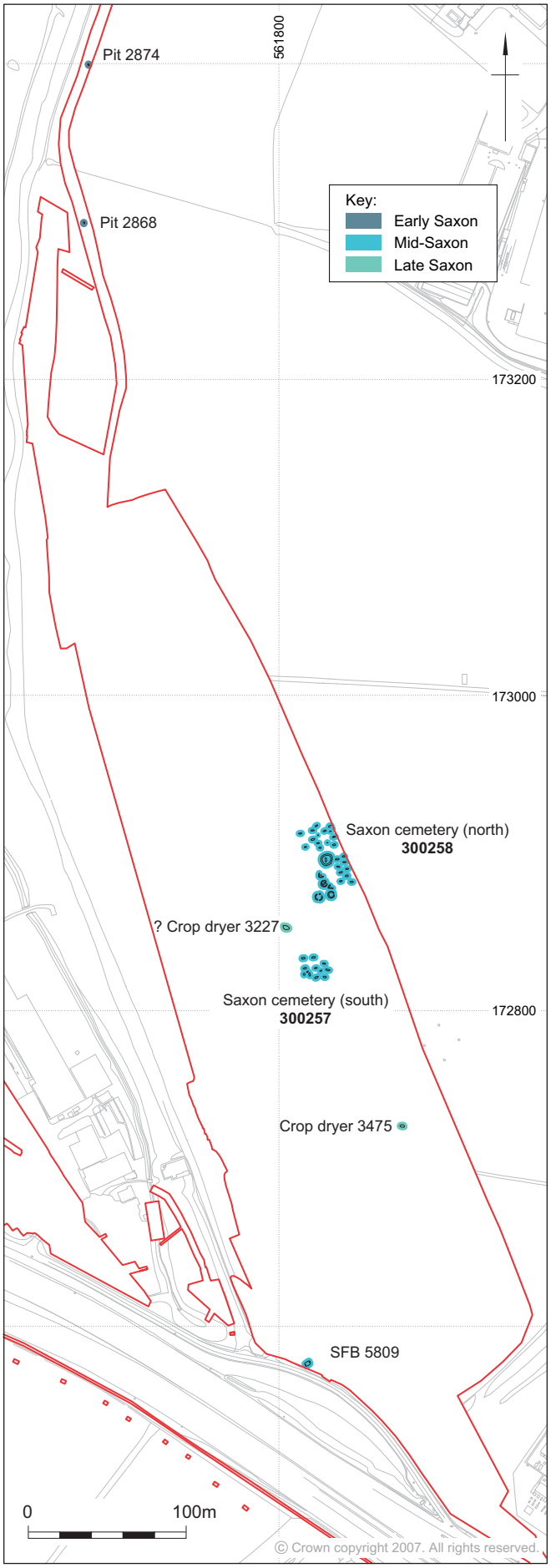

Figure 5.2 Saxon settlement and cemeteries at Springhead

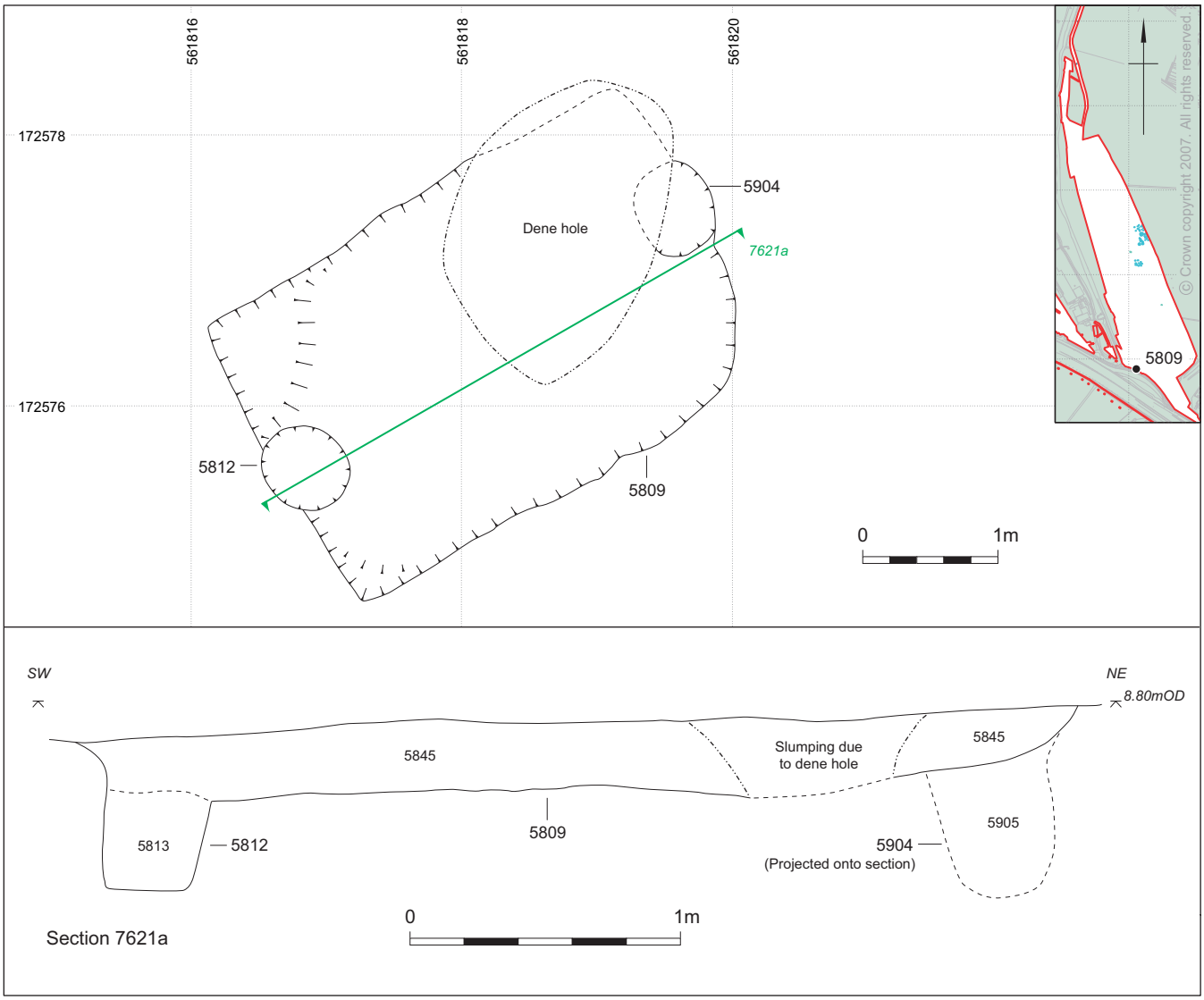

Figure 5.3 SFB 5809

Northfleet

A total of nine SFBs were identified, five in the vicinity of the villa complex, and four in two investigated areas to the west (Fig 5.1).

SFB 16635

The feature (Fig 5.7; Pl 5.2) was immediately to the south of the villa Phase 6 wall 10099 and was defined by a shallow flat-bottomed pit (10180), oriented west–east and measuring 3.20 m long by 2.40 m wide and 0.24 m deep, cut into the silty sand natural (10002). A structural post-hole was identified at either end of the pit; the western post-hole (10589) was cut into the base of the pit; the eastern post-hole (10564) was situated just beyond the eastern pit edge. Both were approximately 0.33 m wide in diameter and between 0.6 m and 0.7 m deep. Both their fills were indistinguishable from the pit fill indicating that they were removed before the pit fill accumulated.

The single pit fill (10536/10537) consisted of a brownish–grey sandy silt, which contained a varying proportion of flint nodules and mortar fragments, higher along the north side of the pit (presumably erosion from the Roman wall 10099).

Identified in the top of the pit fill was a sub-circular depression (10533), filled with a mix of burnt silty clay and charcoal (10534, 10566). This was radiocarbon dated to AD 420–570 (NZA-27437, 1564±30 BP), and probably represents the opportunist use of the subsidence depression over the SFB as the seat of a fire. Finds from the SFB pit fill itself (10536) included pottery, animal bone, and flint. Residual Roman ceramic building material (CBM) was also found. Other finds included two nails, one lead weight (SF 11581), and one lead spindle whorl (SF 11582).

SFB 16636

The feature was approximately 14 m west of SFB 16635, situated clear of any villa building footprint on the edge of an infilled Roman enclosure ditch (16803; Fig 5.7). It was defined by a shallow pit (10154), oriented WNW–ESE and measuring 3 m long by 1.8 m wide and between 0.06 m and 0.15 m deep, with a flattish base. Definition of the feature in plan was unclear, but it is likely that the width would originally have been around 2 m.

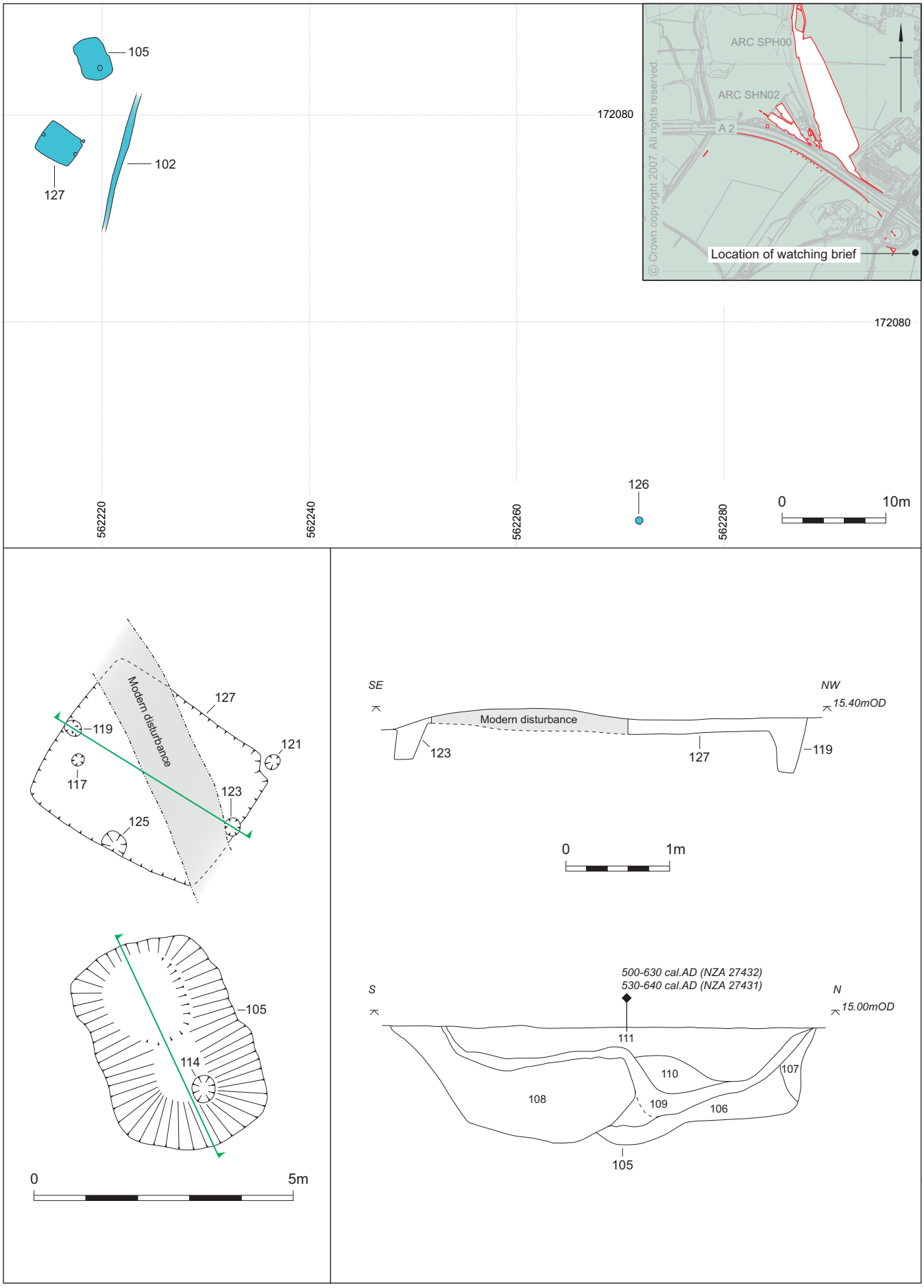

Figure 5.4 SFB 127 and pit 105

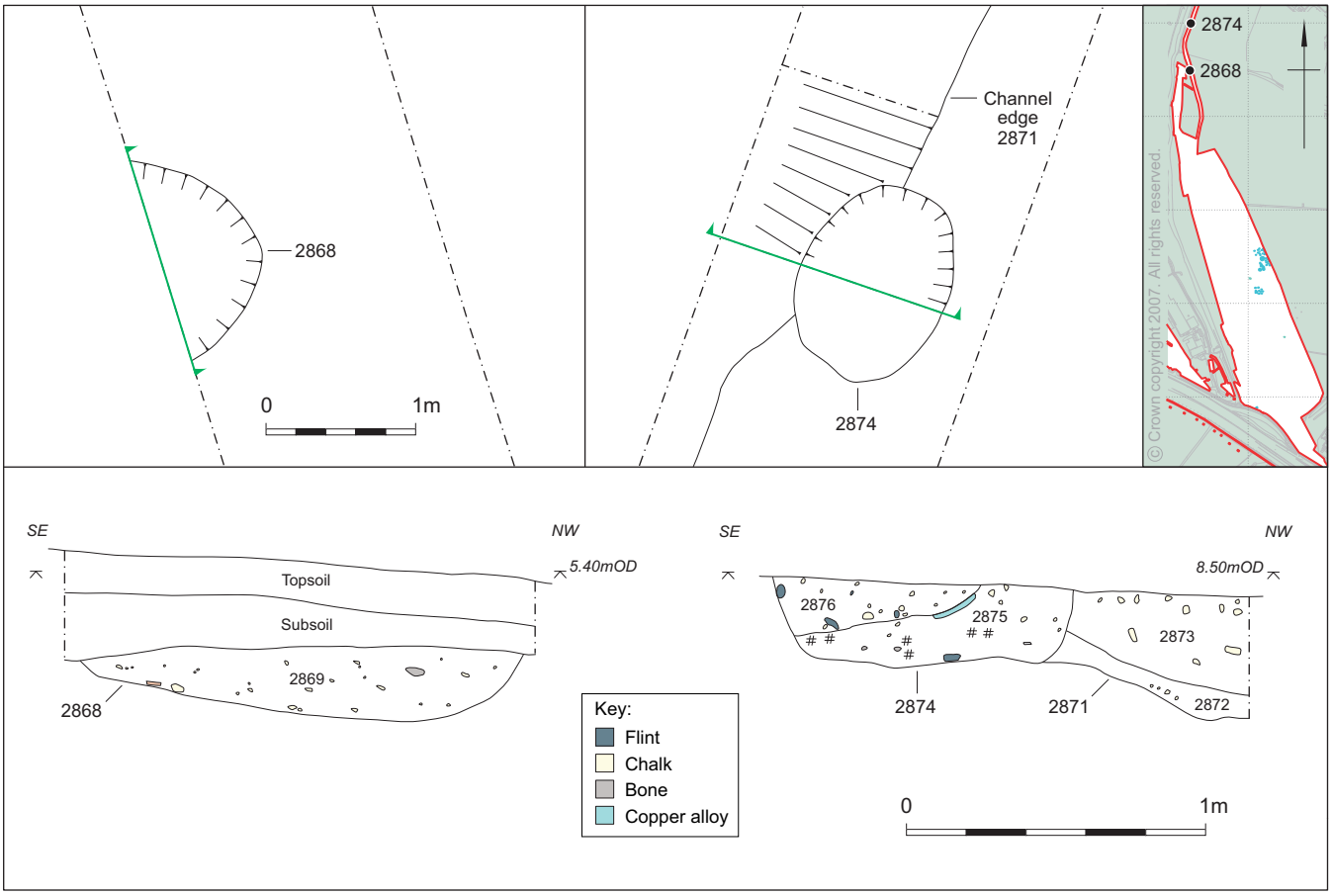

Figure 5.5 Pits 2874 and 2868

Two structural post-holes were identified, both positioned outside the pit edges. To the south-east, post-hole 10316 was close to the pit edge and measured 0.20 m in diameter and 0.44 m in depth. Post-hole 10319 was situated beyond the south-east corner of the SFB pit and measured 0.20 m wide and was 0.36 m deep. It may be of significance that a soil-mark of approximately the same diameter as post-hole 10318 was recorded (but not excavated) beyond the north-east corner of the SFB pit. A series of five stake-holes was identified around the south-west corner of the SFB pit, averaging 0.06 m in diameter and 0.10 m in depth.

The fill of both the SFB pit and the associated post-holes and stake-holes was a fairly homogeneous dark brown sandy silt/clay (10371). Finds comprised a substantial quantity of 5th–6th century pottery along with animal bone. A bone toggle was recovered (SF 11067), along with a nail and residual Roman CBM fragments.

SFB 16637

The feature was in the area of the eastern extension of the villa, clear of any Roman structural footprint (Fig 5.7). The structure was defined by a shallow flat-bottomed pit (10326) measuring 4.00 m by 2.72 m and 0.24 m deep. Three structural post-holes were identified, all within the SFB footprint (10355, 10328, 10357), while a further – possibly structural – post-hole (10353) was also identified in the south-east corner of the SFB pit. The fills of all three post-holes consisted of mid-grey silty sand.

All three post-holes were respected by the accumulated infill of the pit indicating that the post-holes (or at least their bases) were *in situ* while this process was underway. The primary pit fill (10372) was a mid-orangey–grey silty sand with infrequent gravel and charcoal inclusions. The secondary fill (10322) was a greyer silty sand, again with infrequent gravel and charcoal inclusions, along with small fragments of CBM and animal bone. Finds from the lower fill included 5th–6th century pottery, animal bone, and both burnt and unburnt stone.

SFB 16638

The feature was approximately 20 m south-west of SFB 16637 and 16 m east of SFB 16635, cut into infilled Roman Phase 2 enclosure ditches (principally 15749) in the open area to the east of the main villa building complex (Fig 5.7). The structure was defined by a shallow rectangular pit (10271), oriented WNW–ESE, flat-bottomed, and with steeply sloping sides, measuring 3.10 m long by 2.50 m wide and 0.20 m deep.

Two structural post-holes (10276, 10350) were identified, both within the SFB pit footprint and positioned along its central axis. Both the SFB pit and the post-holes contained similar dark brown silty clay fills (10272/10274), indicating that the posts had been removed before infilling began. A significant quantity of

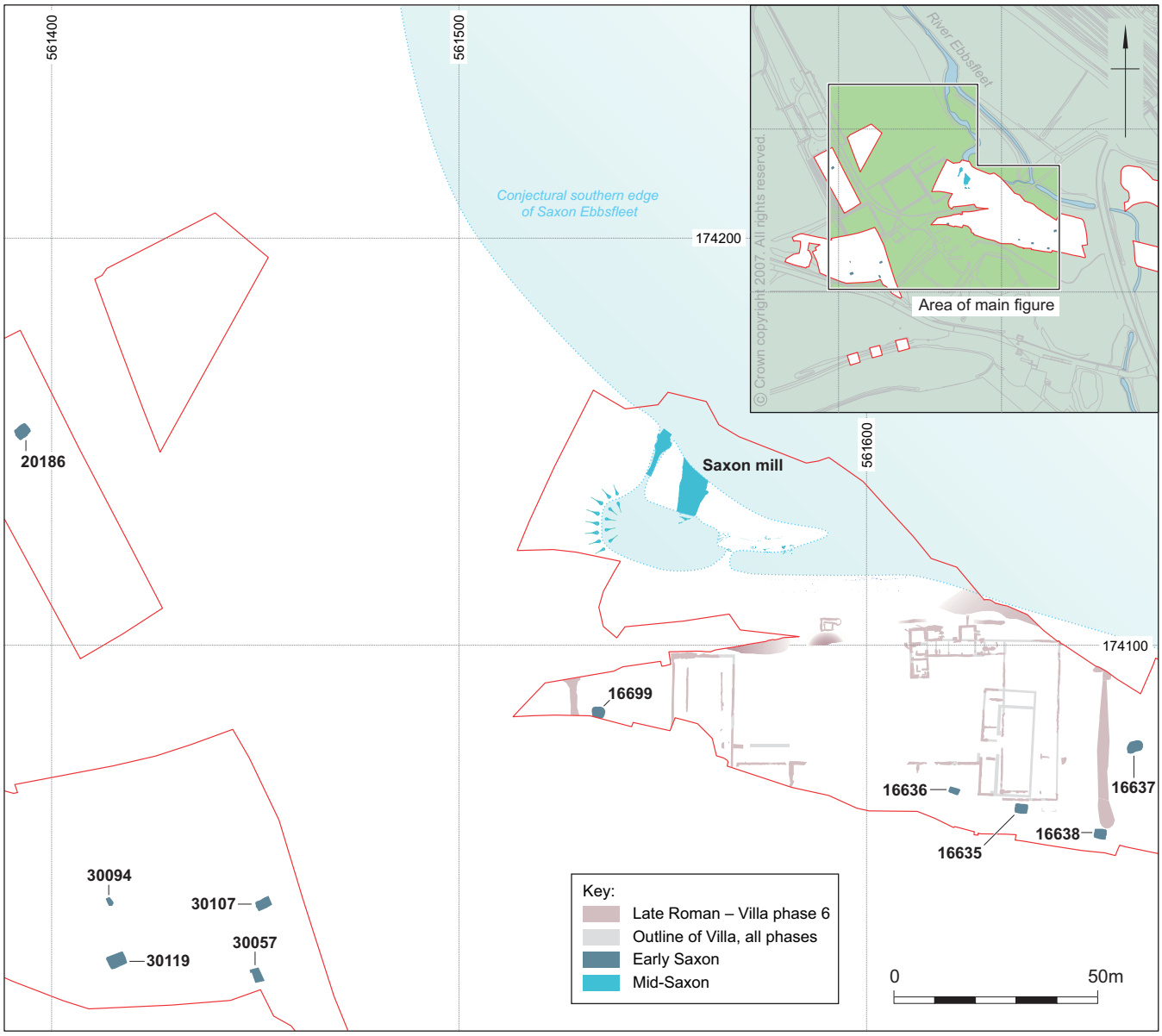

Figure 5.6 Location of Saxon features in relation to Northfleet Roman Villa

5th–6th century pottery, animal bone, and flint were recovered from fill 10272/10274, along with amounts of residual Roman CBM, glass, and metal. This is no surprise given the fact that the SFB was dug into the fills of the Roman enclosure ditches. Recovered from the later fill (10272) was an antler spearhead (SF 11525, see Vol 4, Chap 4, Pl 8).

SFB 16699

The feature was partly exposed at the western edge of the site beyond the area of the western range of Roman buildings (Fig 5.7). The structure was defined by a sub-rectangular shallow flat-bottomed pit (10809) dug into the natural silty sand. It was oriented NE–SW and measured 3.40 m long by 2.75 m wide and 0.20 m deep. One definite structural post-hole was identified (15090) at the east end of the building. Another similar post-hole (10935) was located south-west of 15090.

Plate 5.2 Saxon SFB 16635 (Northfleet). Looking west

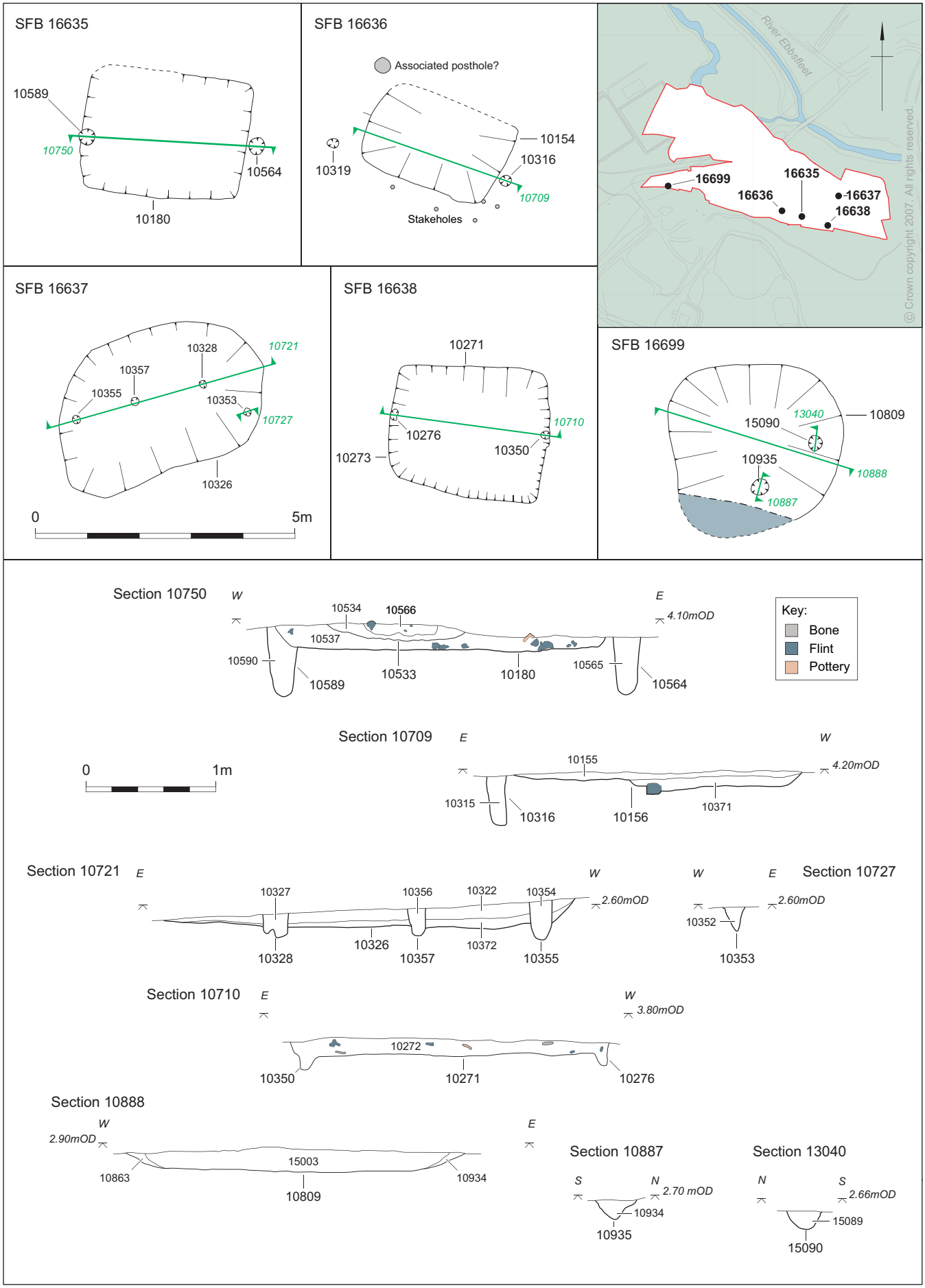

Figure 5.7 Plans and sections of the SFBs around the Roman villa

The fill (15003) of the SFB pit was similar to that of the post-holes, indicating simultaneous infilling. A substantial quantity of finds from the fill were recovered, including pottery, animal bone, fired clay, daub, and iron slag along with burnt and worked flint, and residual CBM fragments.

Western Roman Complex (Sports ground Site)

To the west of the villa area, on the site of the Western Roman Complex (Chap 3; see Fig 5.6), Saxon activity was limited to a single SFB (20186), orientated NE–SW and situated to the north-west of the main area of Roman activity.

SFB 20186

SFB 20186 was sub-rectangular in plan and measured 3.90 m in length by 3.25 m in width and 0.27 m in depth with a flattish base and steeply sloping sides, apart from at its south-western end which sloped more gently (Fig 5.8). Two post-holes were cut through the base of the structure, one at the south-western end (20244) and another at the north-western (20242). The structure had three fills (20200, 20205, 20210), which produced a single sherd of residual Thameside/ Upchurch grey ware.

Area 6

Area 6 (see Fig 5.6), originally comprising Trenches 3971TT and 3972TT, was later expanded to form a full excavation area, revealing three SFBs, in addition to a scatter of small features, possibly associated by virtue of contemporary pottery in their fills.

SFB 30057

The eastern part of the feature was partly revealed in the southern part of Trench 3971TT and the rest was fully revealed in the area stripping (Fig 5.8; Pls 5.3–4). The structure was defined by a sub-rectangular pit (30058) oriented NNW–SSE and measuring 3.2 m long by approximately 2.9 m wide and 0.5 m deep. Some uncertainty exists over the plan definition of the SFB pit in the evaluation trench, which means that its width can only be estimated.

Three structural post-holes (30092, 30093, and 30103; Pl 5.4) were identified across the western end of the pit, all of similar dimensions (*c* 0.25–0.30 m in diameter and 0.40–0.50 m deep). Linking the post-holes and cut into the base of the pit was a shallow, narrow gully (30063) which continued along both long sides of the pit. Given the uncertainty over the definition of the eastern end of the SFB pit, the continuation of this feature around the entire perimeter of the pit base can be suggested, if not confirmed, with reasonable confidence.

The primary fill of the pit was a thin spread of disturbed natural silty sand (30059) with chalky inclusions, interpreted on site as trample generated during the building of the structure. This was overlaid by a 0.20 m deep layer of dark grey silty sand (30060), containing charcoal inclusions. The upper fill of the pit was a 0.30 m deep layer of mid-brownish–yellow silty sand (30061) with charcoal flecks and occasional residual CBM fragments.

Plate 5.3 Saxon SFB 30057. Looking east

Plate 5.4 Detail of post-hole 30103 in Saxon SFB 30057

Along the north side of the pit was a linear feature (30064), averaging 0.30 m wide and filled with a light yellow–brown silty sand, which was stratigraphically later than all but the latest pit fill (30061). At the west end this feature increased in size to surround the north-west post-hole 30092. It may represent a re-building episode. No structural post-holes were identified in the evaluation trench of the eastern part of the SFB pit, although a sub-circular depression containing chalk flecks and charcoal was noted, possibly defining the location of a post-hole – the eastern counterpart to post-hole 30092. Finds from the SFB pit fills included 5th–6th century pottery, animal bone, and fired clay. It was noted that the proportion of pottery decreased in the upper fill (30061). A pottery loomweight (SF 30937) and an incomplete copper alloy plate brooch (SF 30938) were also recovered. The style of the brooch dates it cautiously to the early decades of the 6th century (see Schuster, Vol 4, Chap 3).

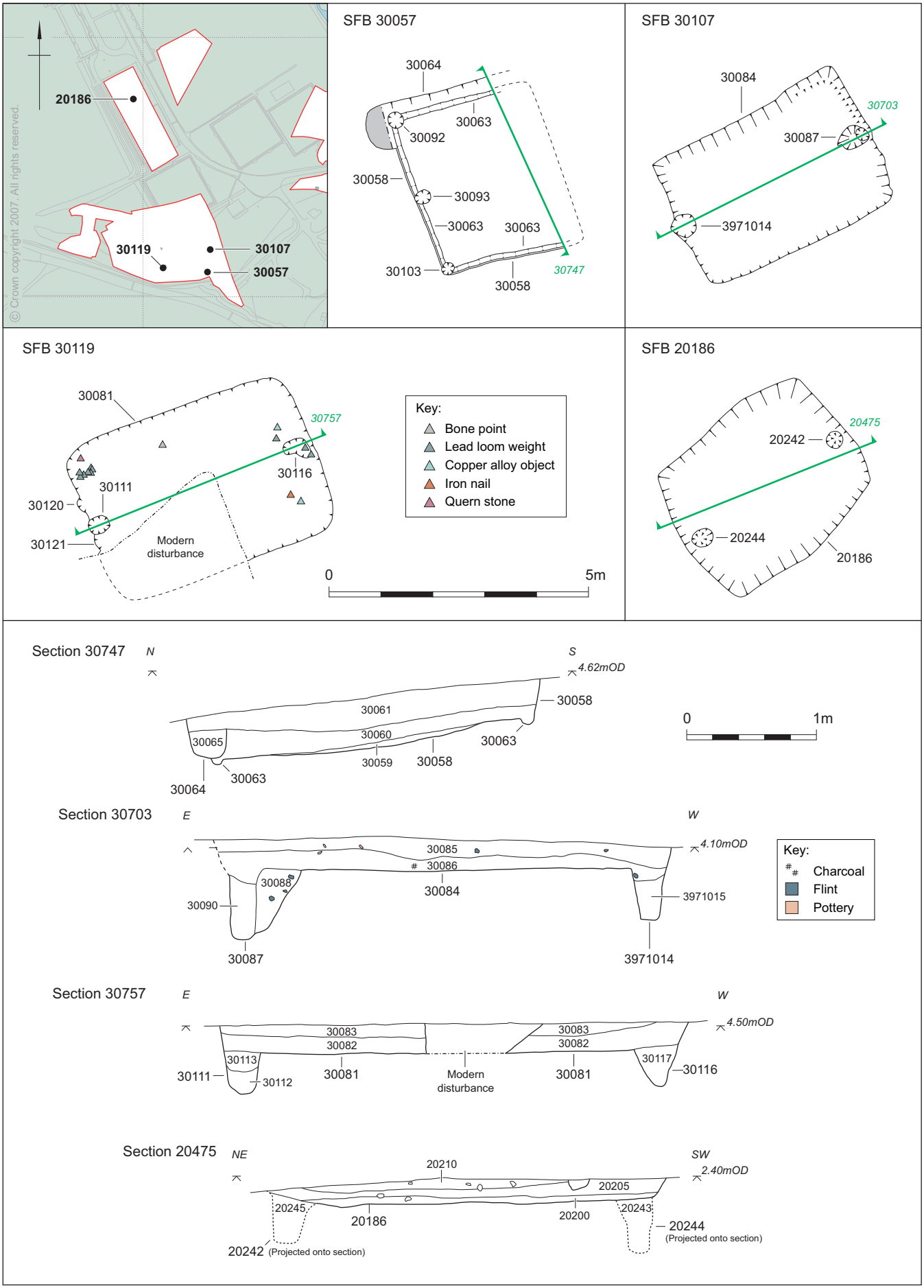

Figure 5.8 Plans and sections of the SFBs in Area 6 and the Sports ground (Western Roman Complex)

SFB 30107

The feature was situated approximately 15 m north of SFB 30057. It was defined by a NE–SW oriented sub-rectangular pit (30084), measuring 3.90 m long by 2.80 m wide and 0.30 m deep (Fig 5.8). Two structural post-holes were identified (30087, 3971014), centrally sited along the west and east ends respectively and, in both cases, set against the pit side. A series of possible steps was identified in the south-western quadrant of the pit, cut into the pit side and possibly indicating an access to the base of the pit.

Two fills of the SFB pit were identified; the primary fill (30086) was a greyish–brown sandy silt, with numerous charcoal flecks. The fill encroached into the upper part of post-hole 30087, suggesting that the post had been removed before the infilling began. The fill from the post-hole (30090) was radiocarbon dated to AD 430-600 (NZA-27442, 1537±30 BP). The secondary fill was a mid-orange/brown sandy silt (30085) with charcoal flecks. Finds from the fills (excluding residual Roman CBM and glass) included a modest quantity of pottery, animal bone, and a double-sided bone comb (SF 30919).

SFB 30119

The feature lay close to the east side of Trench 3972TT, approximately 30 m west of SFB 30057. The structure was defined by a sub-rectangular pit (30081) oriented NE–SW and measuring 4.50 m long by 3.20 m wide and 0.25 m deep (Fig 5.8). The south-west corner of the pit had been destroyed by modern activity although this did not materially affect understanding of the stratigraphy.

Two structural post-holes (30111 and 30116) were identified within the pit, at the mid-point of the west and east ends respectively, and measuring approximately 0.40 m in diameter and 0.40 m deep. A possible post-setting was identified at either side of post-hole 30111, cut into the pit side (contexts 30120, 30121). These did not extend below the base of the SFB pit and are most likely secondary braces for the structure's south-west end. No evidence of corresponding features was identified at the eastern end.

The primary fill of the pit (layer 30082) comprised a mid-grey sandy silt with abundant charcoal flecks. Charred grain from the lower part of this deposit was radiocarbon dated, giving a date of cal AD 390–540 (NZA-27537, 1606±30 BP). The stratigraphic position of this layer indicates that the date could well represent an occupation range. Layer 30082 was overlaid by a mid-grey brown sandy silt (30083), with a similar abundance of charcoal flecks. Finds recovered from the fills included a substantial quantity of pottery and animal bone, along with burnt flint and fired clay. A total of nine lead possible loomweights (see Schuster, Vol 4, Chap 3) were recovered from the base of the lower fill (30082), including a group of seven (SFs 30927–33) from the north-west corner and two others from elsewhere in the pit (SF 30934, 30944). Other finds included a quern fragment (SF 30946) and two bone pinbeaters (SFs 30943, 30947).

Other features

Pit 30094 (not illustrated) was approximately 11 m north of SFB 30119 and was defined by a sub-ovoid pit, oriented NW–SE, measuring 2.40 m long by a maximum of 0.40 m deep, with steeply sloping sides rounding to a flattish base. The width of the feature ranged from 1.4 m to 1.1 m. No structural post-holes or other related features were found within or in the vicinity of the pit. Pottery and bone was recovered from the fills, along with a copper alloy loop (SF 30926).

A possible hearth and adjacent fire pit (30009 and 30015; not illustrated) were identified approximately 5 m north of SFB 30057. Further north, immediately west of SFB 30107, the upper fill of a probable prehistoric ditch (397103) produced intrusive fragments of 5th–6th century Saxon pottery.

The Mid-Saxon Cemeteries

Two Saxon inhumation cemeteries were found at Springhead (ARC SPH00), lying within 30 m of each other on the high ground on the east side of the valley (see Fig 5.2). They have been treated as separate entities in the grave catalogue below though they may belong to a single cemetery comprising two (or more) spatially distinct grave groups. The cemeteries occupied what, in effect, was a small spur, at *c* 27 m aOD, with the ground falling away steeply on the west side and much more gently on the east. One cemetery (300257; Fig 5.9) was fully excavated and comprised ten burials and two probably associated features. This group lay within an area measuring approximately 20 m by 15 m, towards the north-east corner of an earlier, late Iron Age enclosure, of which the ditches, or more probably the banks, may have survived as low earthworks. The second cemetery (300258; Fig 5.19 below) lay to the north of this and was only partly exposed, the remainder lying to the east and outside of the excavation area. Subsequent non-HS1 excavations have shown that the excavated part represents somewhere between a quarter and one-third of the area occupied by the cemetery (WA 2008). However, this more recent work has also shown that the density of graves increased to the east and that only around 15% of the cemetery population was excavated in the HS1 investigations. A total of 26 graves was recorded in this group during the HS1 work, though it is possible that a further two or three graves went unrecognised (see below). This cemetery included a small number of burials enclosed by penannular or ring-ditches, all of which lay on the west edge of the cemetery.

The graves themselves were sometimes extremely hard to identify, particularly in the larger of the two cemeteries, most having been backfilled with clean natural deposits comprising brickearth or sandy gravel which characterised this part of the site. Indeed, it is quite likely that two or possibly three graves were not found, all lying within certain or probable penannular ditches (3839, 3849, 3850), despite a careful search. In these cases, no grave cuts could be

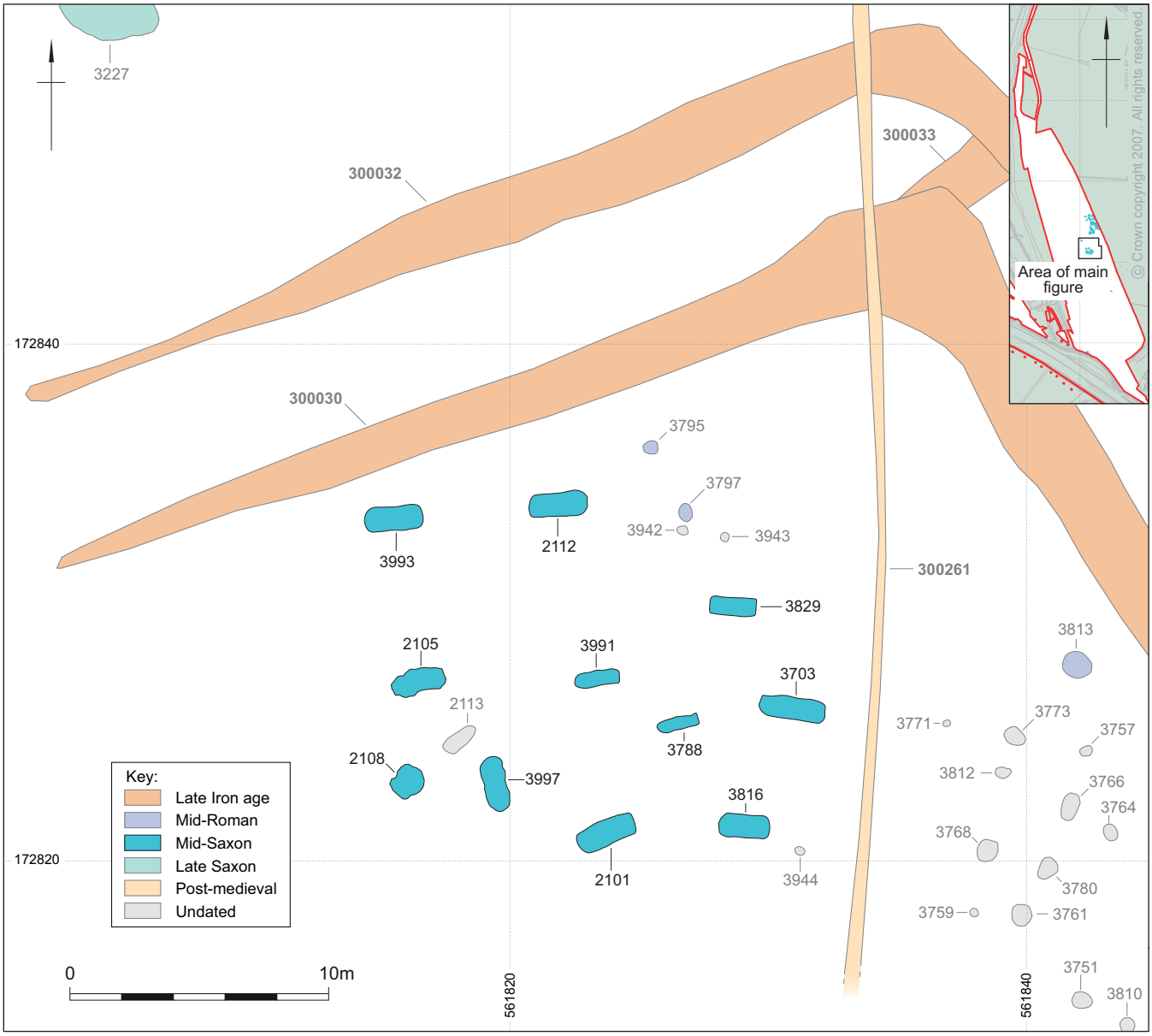

Figure 5.9 Saxon cemetery 300257

distinguished, no bone survived and no grave goods were present.

A particularly intensive metal-detector survey was undertaken across and in the immediate vicinity of the two cemeteries. Where anomalies were apparent but no grave cut could be discerned the area was rigorously hand-cleaned and reduced in plan until any objects and the associated grave were identified. Where graves were more obvious, the metal detector was used to identify the presence of metal grave goods. In such cases, every effort was made to ensure that the grave was fully excavated on the day it was exposed in order to pre-empt raids by nighthawks. It is certain, however, that part of at least one spearhead was lost in this way and possibly objects from a second grave. Seven out of the ten individuals in cemetery 300257 were accompanied by grave goods, and 18 out of the 26 individuals in cemetery 300258, in each case approximately two-thirds of the total recorded.

In general, it appears that the graves were sub-rectangular with flat bases, although on the field plans they often appear more irregular as a result of the difficulty in determining the edges. Similarly, the sides as excavated are sometimes irregular, though originally were probably near vertical. Several of the graves, particularly those dug in the softer, sandier areas, were relatively shallow and had suffered some truncation as a result of medieval and later cultivation, as well, in some cases, by over-machining, but this appears to have resulted in little damage or disturbance to the burials themselves.

Two graves were aligned approximately north–south, one (3997) in cemetery 300257 and one (3948) in cemetery 300258, the latter within ring-ditch 3848 (see discussion below). The remaining graves were all aligned approximately east–west. Orientations have been estimated for all but one of the burials, usually based on the axis of the grave rather than the skeleton which, in

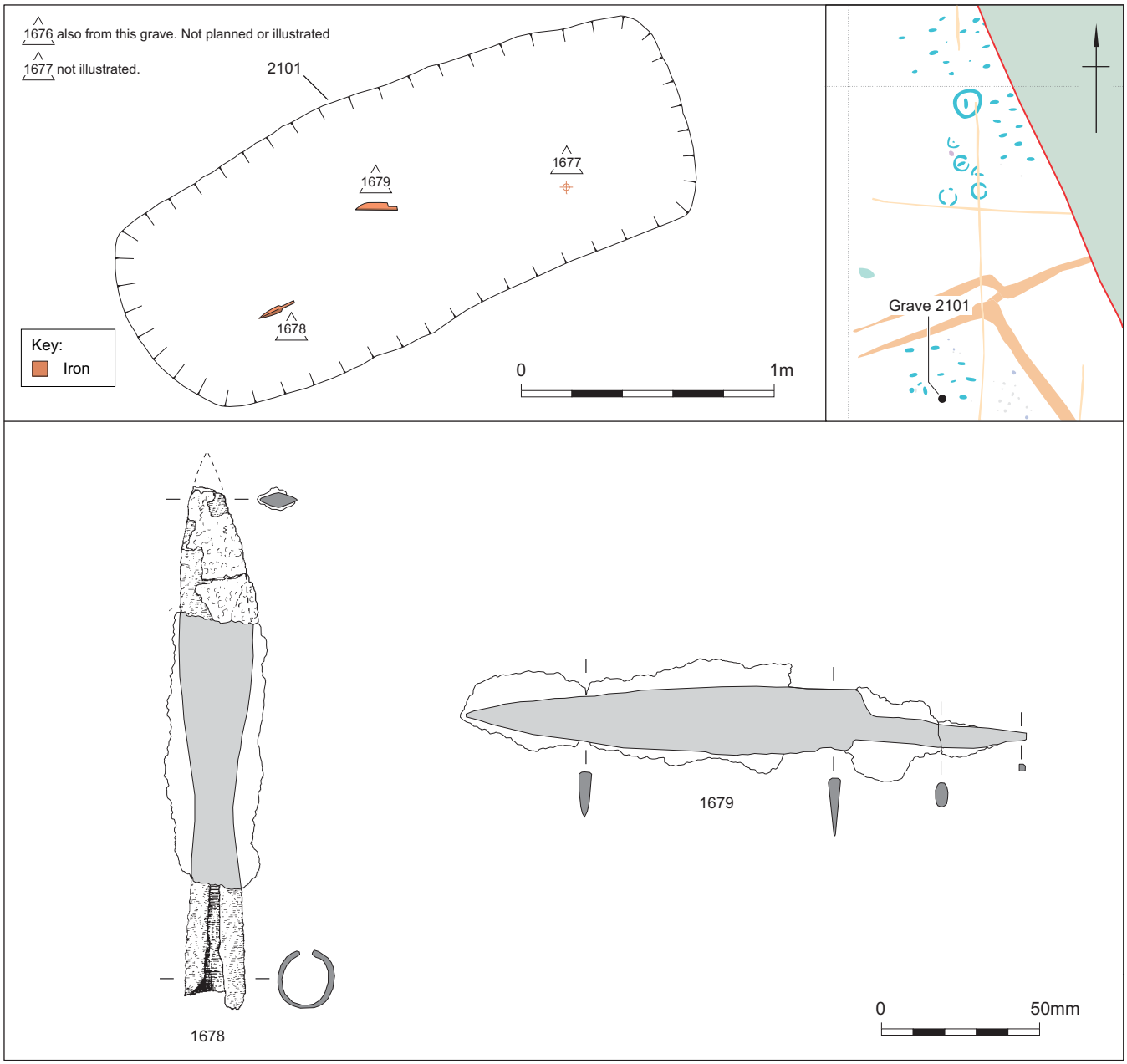

Figure 5.10 Saxon grave 2101

most cases, were poorly preserved. Orientations are given in degrees east of OS grid north. In cemetery 300257 the east–west burials were between 69° and 101° with the average at 85°, in cemetery 300258 the northern group were between 66° and 90° with the average at 77° and the southern group (excluding those within penannular ditches) between 71° and 100° with the average at 81°. The two east–west burials within penannular ditches were at 74° and 96° respectively. The poor preservation of the skeletons often made the positioning of the bodies difficult or impossible to discern but, where sufficient did remain, all appeared to be lying in a supine, extended position with the arms by the sides. In only two or possibly three examples was there any indication that the body had been buried in a coffin.

The poor preservation of most of the human skeletal remains can be attributed to the acidic nature of the brickearth, sands, and gravels in this area. Three graves (2101, 3703, 3829) in cemetery 300257 contained no surviving bone and one (3788) had only tiny unidentifiable fragments. In cemetery 300258 three graves (2776, 2786, 2841) contained no surviving bone and five (2522, 2629, 2640, 2649, 2827) had only small fragments. Nevertheless, six out of the ten individuals in cemetery 300257 could be broadly aged, and 18 out of 26 in cemetery 300258, though in only six cases, all from cemetery 300258, could the sex of the individual be suggested on the basis of skeletal data (McKinley, Vol 4, Chap 5).

A description and grave catalogue is presented here, while a discussion of the cemeteries is provided below. A full catalogue of the Saxon grave finds is presented by Schuster (Vol 4, Chap 3), where the grave goods are listed in numerical order irrespective of their location in one of the two grave groups identified below.

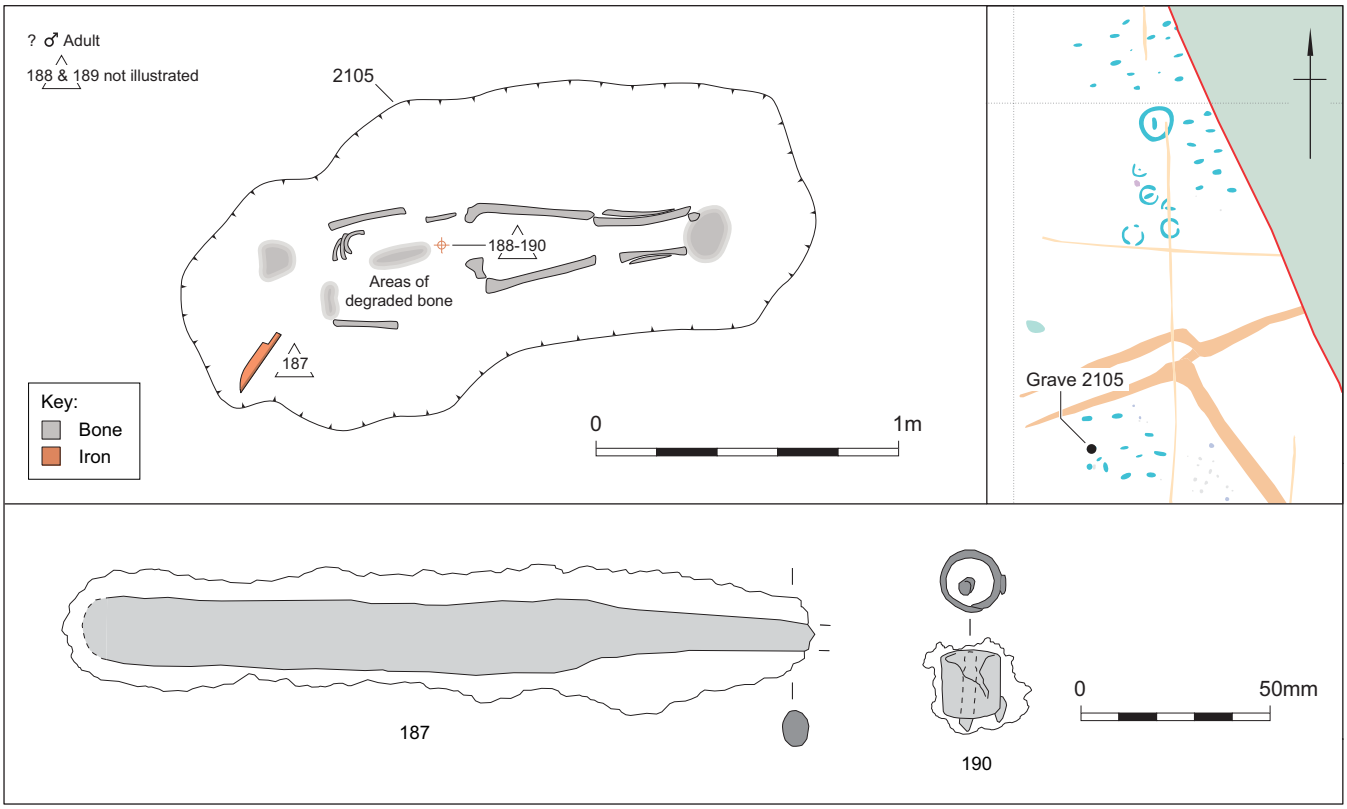

Figure 5.11 Saxon grave 2105

Cemetery 300257

Grave 2101 (Fig 5.10)
Length 2.35 m; Width 1.00 m; Depth 0.30 m; Orientation 69°. This well-defined grave contained no surviving skeletal remains. An iron knife (SF 1679) with traces of wood and copper alloy, perhaps part of a sheath, lay in the hip area, and an iron spearhead (SF 1678) lay to what probably would have been the right of the skull, with a ferrule (SF 1677) near the feet. The latter is likely to have been the ferrule at the end of the shaft and, if so, indicates a length for the spear of approximately 1.3 m.

Grave 2105 (Fig 5.11)
Length 2.10 m; Width 0.85 m; Depth 0.15 m; Orientation 78°. This relatively shallow, quite poorly defined grave contained the remains of an adult (possibly male) aged *c* 18–35 years placed in a supine, extended position with the head to the west. The burial was accompanied by an iron knife (SF 187; tip missing) to the right and at 45° to the skull, with two small fragments of iron in the hip area perhaps part of a belt fitting (SFs 188 and 189); in the same area was a ferrule (SF 190), possibly part of an ox goad or staff.

Grave 2112 (Fig 5.12)
Length 2.30 m; Width 0.90 m; Depth 0.50 m; Orientation 87°. This well-defined and relatively deep grave contained the remains of an adult aged over 40 years, probably placed in a supine, extended position (though this is uncertain from the little that survives) with the head to the west. An area of brown staining (not illustrated) approximately 0.10 m above the base of the grave may represent the remains of a coffin lid or a wooden cover, and corresponds closely with the position of the body. The burial was accompanied by an iron knife (SF 194; poorly preserved) in the left hip area and an iron spearhead (SF 1680) which lay to the left of the feet with the point resting against the east end of the grave.

Grave 3703 (Fig 5.13)
Length 2.60 m; Width 0.85 m; Depth 0.25 m; Orientation 101°. This was the largest grave in this cemetery and only grave 3903 in cemetery 300258 was (slightly) larger. There was a step along the north side, probably an original feature of the grave rather than a result of over-excavation. Grave 3703 contained no surviving skeletal remains, but an iron spearhead (SF 1648) lay on the left side of the presumed position of the skull at the west end of the grave. It might be noted here that only one of the five graves in the south-east half of this cemetery contained human bone, presumably a reflection of locally very poor preservation conditions.

Grave 3788 (not illustrated; see Fig 5.9)
Length 1.60 m; Width 0.50 m; Depth 0.25 m; Orientation 78°. This grave contained a few scraps of long bone of an infant or juvenile aged *c* 2–10 years, insufficient to determine its position or orientation. A shelf along part of the north side may reflect over-excavation rather than having been an original feature of the grave. There were no grave goods.

Grave 3816 (not illustrated; see Fig 5.9)
Length 2.00 m (base 1.50 m); Width 0.90 m; Depth 0.25 m; Orientation 95°
This grave contained the remains of an infant or juvenile aged *c* 4–6 years, but there was insufficient to determine the position

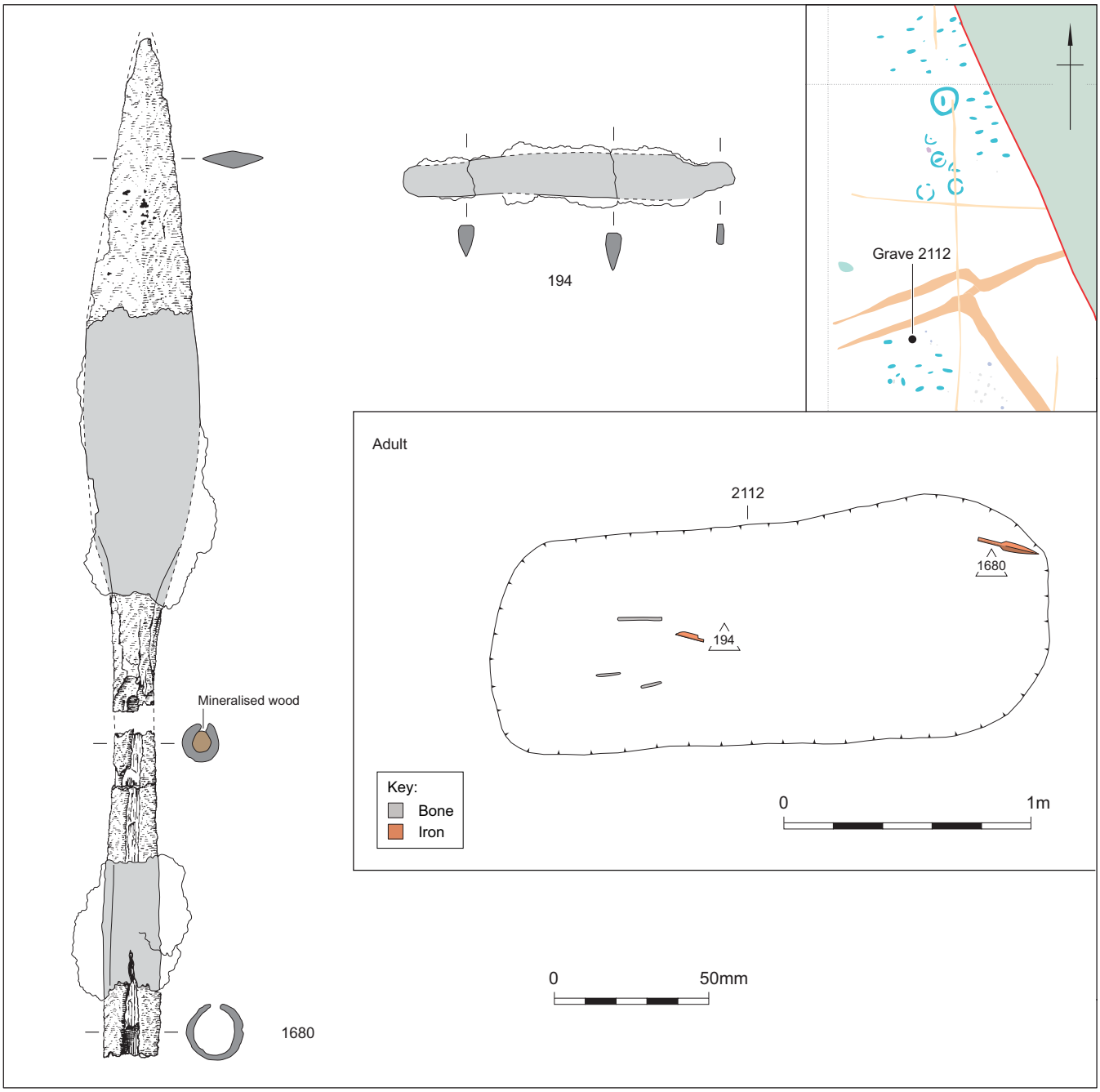

Figure 5.12 Saxon grave 2112

of the body other than to show that the head lay at the west end. There were no grave goods.

Grave 3829 (Fig 5.14)
Length 1.80 m; Width 0.70 m; Depth 0.50 m; Orientation 95°. This well defined and relatively deep grave contained no surviving skeletal remains. An iron knife (SF 1649) lay in the presumed area of the hips.

Grave 3991 (Fig 5.15)
Length 1.75 m; Width 0.60 m; Depth 0.10 m; Orientation 80°. This shallow grave, in the centre of the cemetery, contained the remains of a subadult or adult aged over 13 years. There was insufficient to clearly determine the position of the body other than to show that the head lay at the west end. The grave goods comprised a silver disc brooch with gold foil panels and garnet settings (SF 1667), a copper alloy pin (SF 1668), and two glass beads (SFs 1671 and 1672), all found together on the left side of the chest. An iron knife (SF 192; highly corroded) lay in the area of the hips.

Grave 3993 (Fig 5.16)
Length 2.30 m; Width 0.90 m; Depth 0.20 m; Orientation 85°. This grave contained the remains of an adult (possibly female) aged over 20 years placed in a supine, extended position with the head to the west. A copper alloy buckle (SF 207) lay in the centre of the waist, with an iron spearhead (SF 1674) immediately to the left overlying the elbow and an iron knife (SF 1673) to the right. If not disturbed, then the angle at which the spearhead lay suggests that any shaft would have to have been no more than approximately 0.5 m in length in order for it to have fitted in the grave.

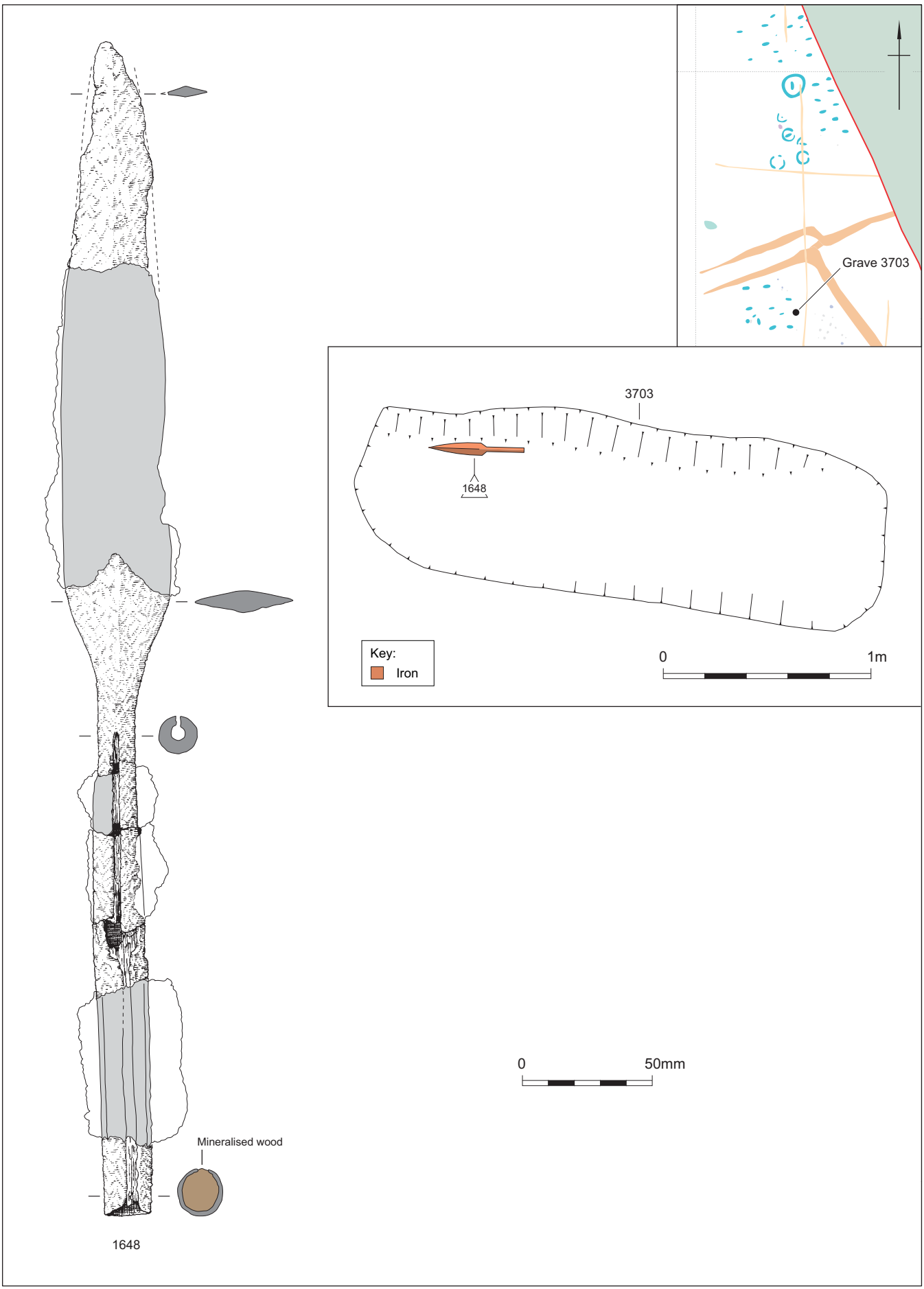

Figure 5.13 Saxon grave 3703

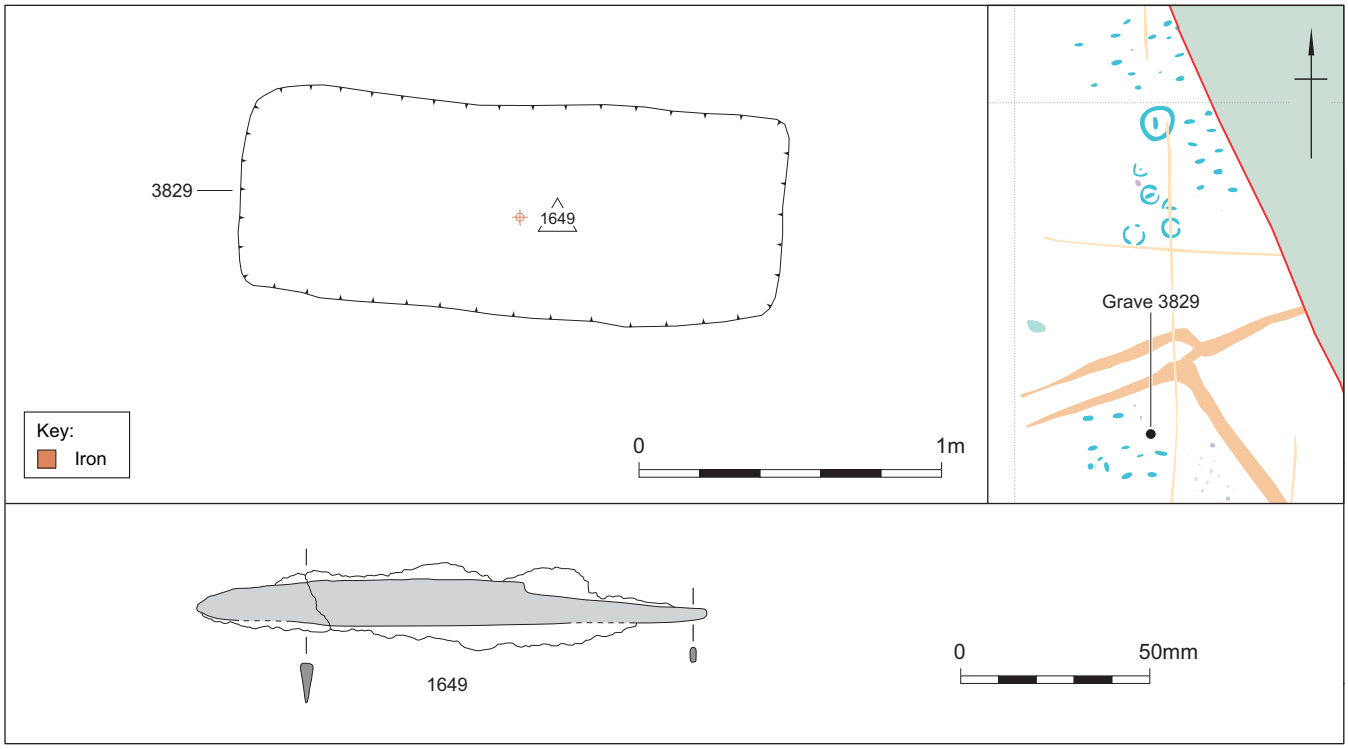

Figure 5.14 Saxon grave 3829

Grave 3997 (Fig 5.17)
Length 2.15 m; Width 0.85 m; Depth 0.12 m; Orientation 163°. This was the only grave aligned north–south in the cemetery. It lay towards the south-west corner close to 'grave' 2108 and grave 2115 which contained two animal burials. Grave 3997 contained the remains of an adult aged over 25 years probably placed in a supine, extended position with the head to the south, though the poor survival of bone makes both the position and orientation uncertain. A copper alloy lace tag (SF 193) lay in the presumed area of the feet.

Other features
'Grave' 2108 (diameter 1.30 m; depth 0.10 m) was a shallow, sub-circular feature which lay on the south-west edge of the cemetery adjacent to 'grave' 2115 (not illustrated, see below) and close to the only north–south aligned grave (3997) in this group (Fig 5.18). The fill was darker than the other graves and it is reasonably certain that the full extent of the 'grave' was established. It contained the poorly surviving remains of what was interpreted in the field as a femur and some other unidentified bone, the material representing an adult aged over 18 years. The bones lay east–west towards the centre of the feature, with the femur head at the west end, but there is no evidence that this 'grave' had once contained an entire body, even had this been interred in a crouched position.

Grave-shaped feature 2113 (length 1.50 m; width 0.60 m; depth 0.13 m), aligned approximately NE–SW, lay 1.0 m to the north-west of north–south grave 3997 and may have formed part of the same group of features as 'graves' 2108 and 2115 (not illustrated; see Fig 5.9). However, this is uncertain and feature 2113 contained no human bone or other finds, had a rather irregular base and was filled with dark greyish brown gravelly silt.

'Grave' 2115 (length 1.05 m; width 0.55 m; depth 0.13 m) was a north–south aligned sub-rectangular feature (not illustrated) which lay on the south-west edge of the cemetery between grave 3997 (also aligned north–south) and 'grave' 2108 immediately to the west. Like 'grave' 2108, the fill of 2115 was darker than the other graves. It contained two animal burials, a sheep, and a young pig, apparently carefully placed in the grave, the sheep on the west side and the pig on the east side. This 'grave' contained no dating evidence, but it seems very likely that it post-dated the cemetery as the relatively well preserved animal skeletons are both considered to be of probable post-medieval date (J M Grimm, pers comm).

Cemetery 300258

Two groups of graves might be distinguished within the excavated part of the cemetery, in addition to those associated with penannular ditches and a ring-ditch which lay on the south-west edge (Fig 5.19). These comprised a northern group of 14 graves showing what might be described as a dispersed layout though possibly within north–south rows, and a southern group of nine graves which appear more clearly to fall within two parallel north–south rows. These two groups lay to the north and east respectively of grave 3903 which was enclosed by a ring-ditch, though any such groupings should be tempered by a reminder that cemetery 300258 has only been partly excavated during the HS1 investigation and that subsequent, complete excavation, whilst broadly confirming this layout, has revealed other groupings (this is discussed further below).

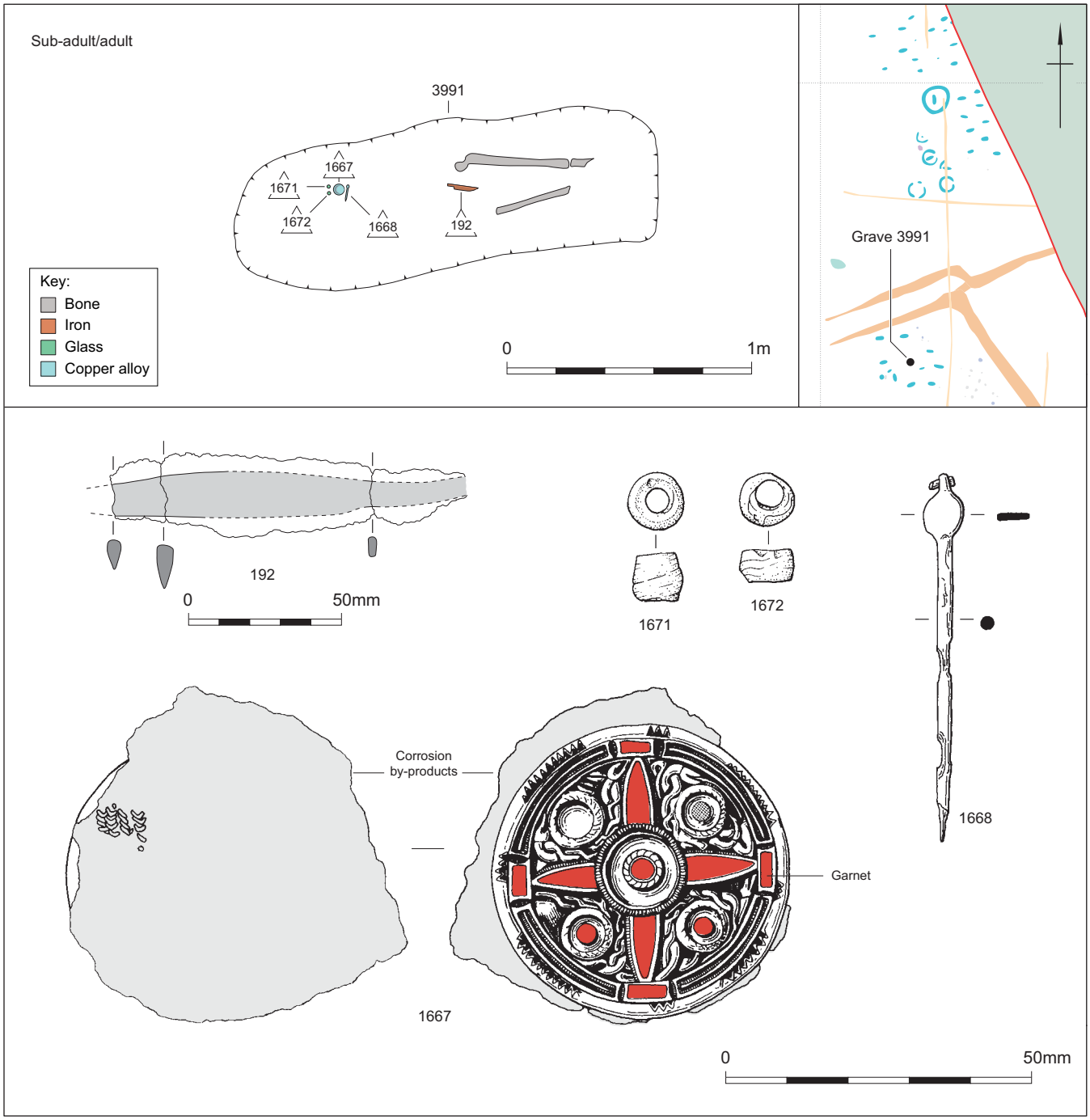

Figure 5.15 Saxon grave 3991

Grave 2121 (Fig 5.20)
Length 1.85 m; Width 0.70 m; Depth 0.25 m; Orientation 66°. This grave, within the northern group of burials, contained a subadult aged *c* 15–18 years placed in a supine, extended position with the head to the west. An iron spearhead (SF 1682) lay on the left side of the skull and an iron seax (SF 1681a) tang towards the west, by the upper part of the left arm. From the same area came a knife (SF 1681b).

Grave 2129 (Fig 5.21)
Length 1.95 m; Width 1.00 m; Depth 0.25 m; Orientation 67°. The actual width of the grave may have been closer to 0.75 m, but its edges were difficult to define and it is possible that it was over-excavated. It contained a male adult aged over 40 years apparently placed in a supine, extended position with the head to the west. However, there was evidence to suggest that the upper arms were splayed with the hands drawn in at either side of the waist. An iron spearhead (SF 278) lay alongside the upper part of the left arm and two sceattas (SFs 273 and 274) were found together on the left side of the waist, perhaps originally contained within a purse. These coins are likely to have been deposited *c* 685–690, certainly no earlier, and provide a secure *terminus ante quem* for this burial which lay on the northern edge of the cemetery.

Grave 2134 (Fig 5.22; Pl 5.5)
Length 2.15 m; Width 0.75 m; Depth 0.20 m.
This grave, also on the north edge of the cemetery, contained a subadult or adult aged *c* 15–20 years. From the surviving bone it appeared that the body was placed in an extended

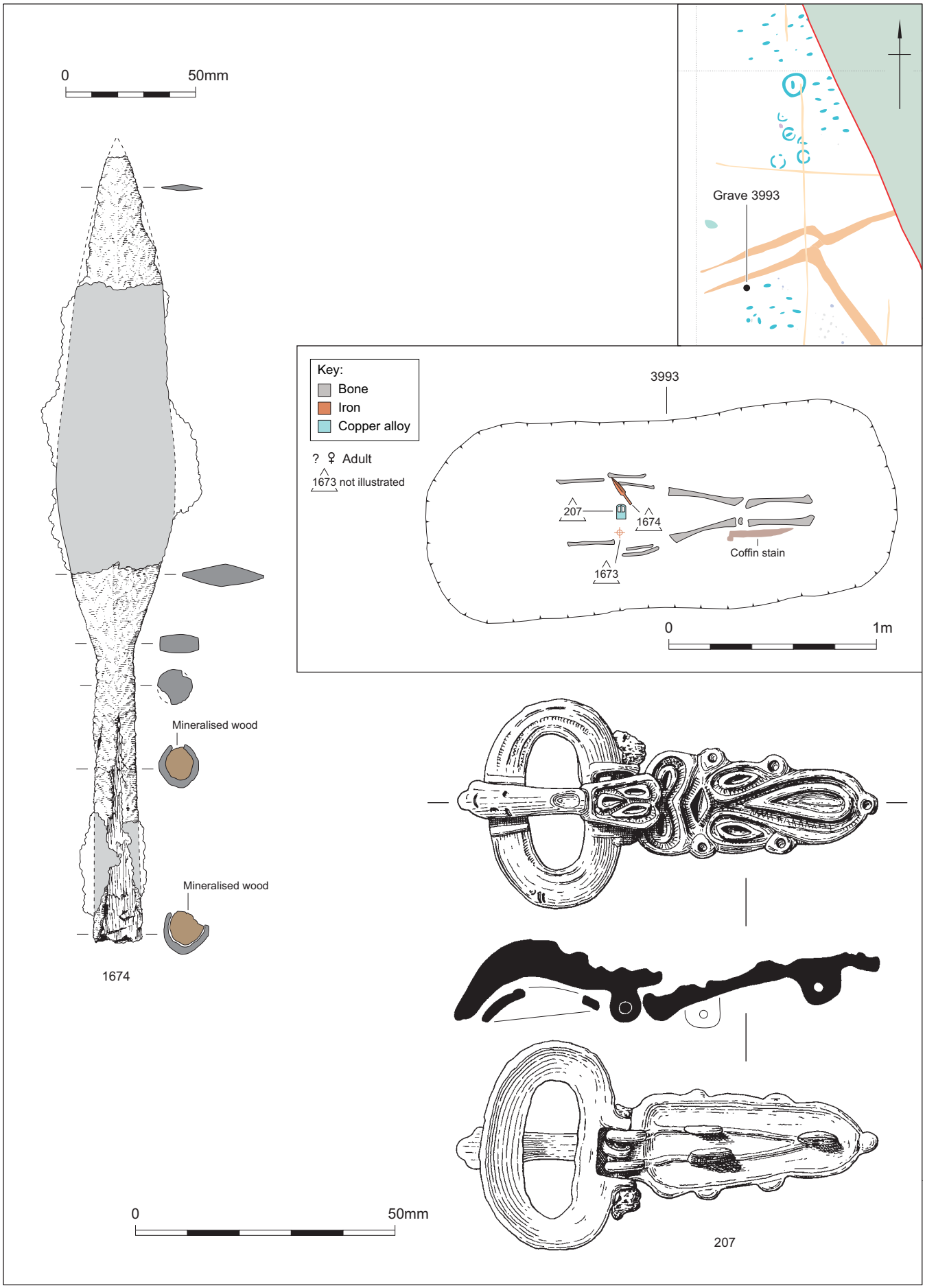

Figure 5.16 Saxon grave 3993

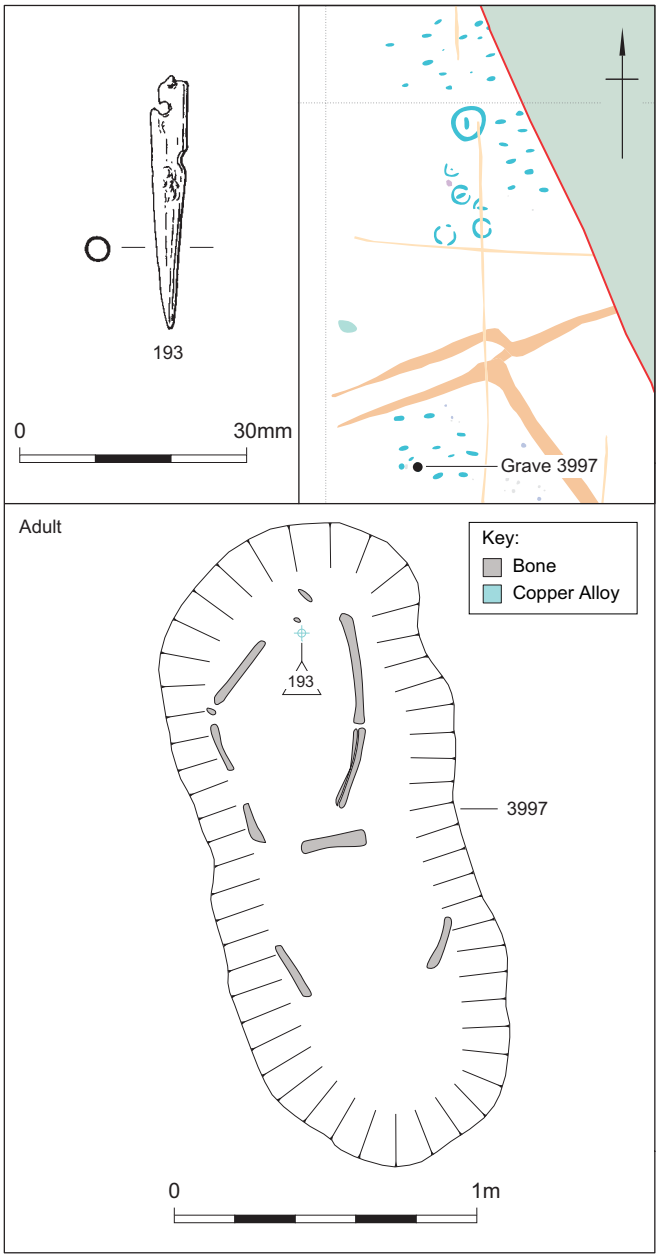

Figure 5.17 Saxon grave 3997

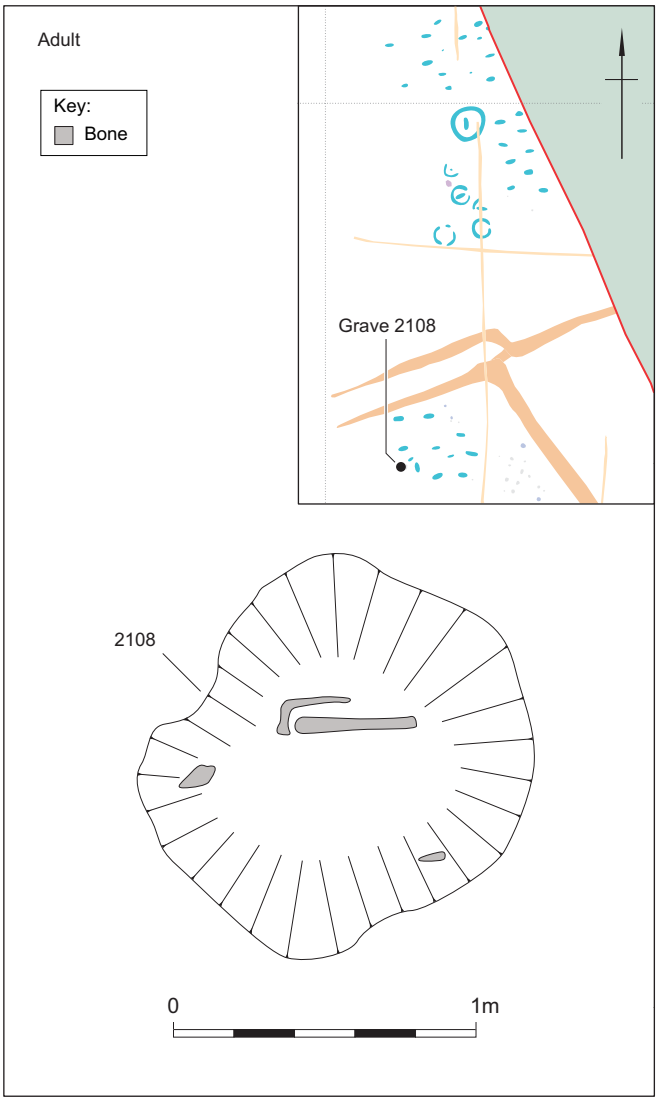

Figure 5.18 Saxon 'grave' 2108

position, perhaps lying on its left side, with the head to the west. An iron spearhead (SF 279) lay on the left side of the skull and an iron seax (SF 283) across the waist at an angle of 45° and with the tang towards the south-west. Two small fragments of iron may have been scabbard or belt fittings associated with the seax and a small fragment of copper alloy (SF 282), probably a vessel mount, lay towards the bottom of the left leg.

Grave 2522 (Fig 5.23)
Length 1.90 m; Width 0.65 m; Depth 0.20 m; Orientation 85°. This well-defined grave at the north-west corner of the cemetery contained an adult aged *c* 18–25 years. From the surviving bone it appears that the body was placed in a supine, extended position with the head to the west. An iron spearhead (SF 395) had been placed on the chest with the point immediately below the neck.

Grave 2616 (Fig 5.24)
Length 1.10 m; Width 0.45 m; Depth 0.08 m; Orientation 83°. This grave lay within the northern group of burials. Only the teeth and a few scraps of bone survived of the individual, indicating a juvenile aged *c* 6–8 years with the head to the west. Five beads (SFs 429, 430, 431, 467, and 656) and three silver rings (SFs 432, 468, and 470) together with silver wires (SFs 469) lay in the neck area and are likely to have belonged to a necklace.

Grave 2620 (Fig 5.25)
Length 2.50 m; Width 0.95 m; Depth 0.12 m; Orientation 77°. This was one of the largest graves recorded and lay towards the north-west corner of the cemetery. It contained a male adult aged *c* 25–35 years in a supine, extended position with the head to the west. An iron spearhead (SF 415) lay on the right side of the skull and an iron seax (SF 414), along with the remains of a scabbard, by the waist below the left arm, with an iron knife (SF 454) next to it. In the same area at the waist was an iron buckle, two belt plates, and three belt fittings (SF 462) also of iron. A further three belt fittings (SF 433), apparently

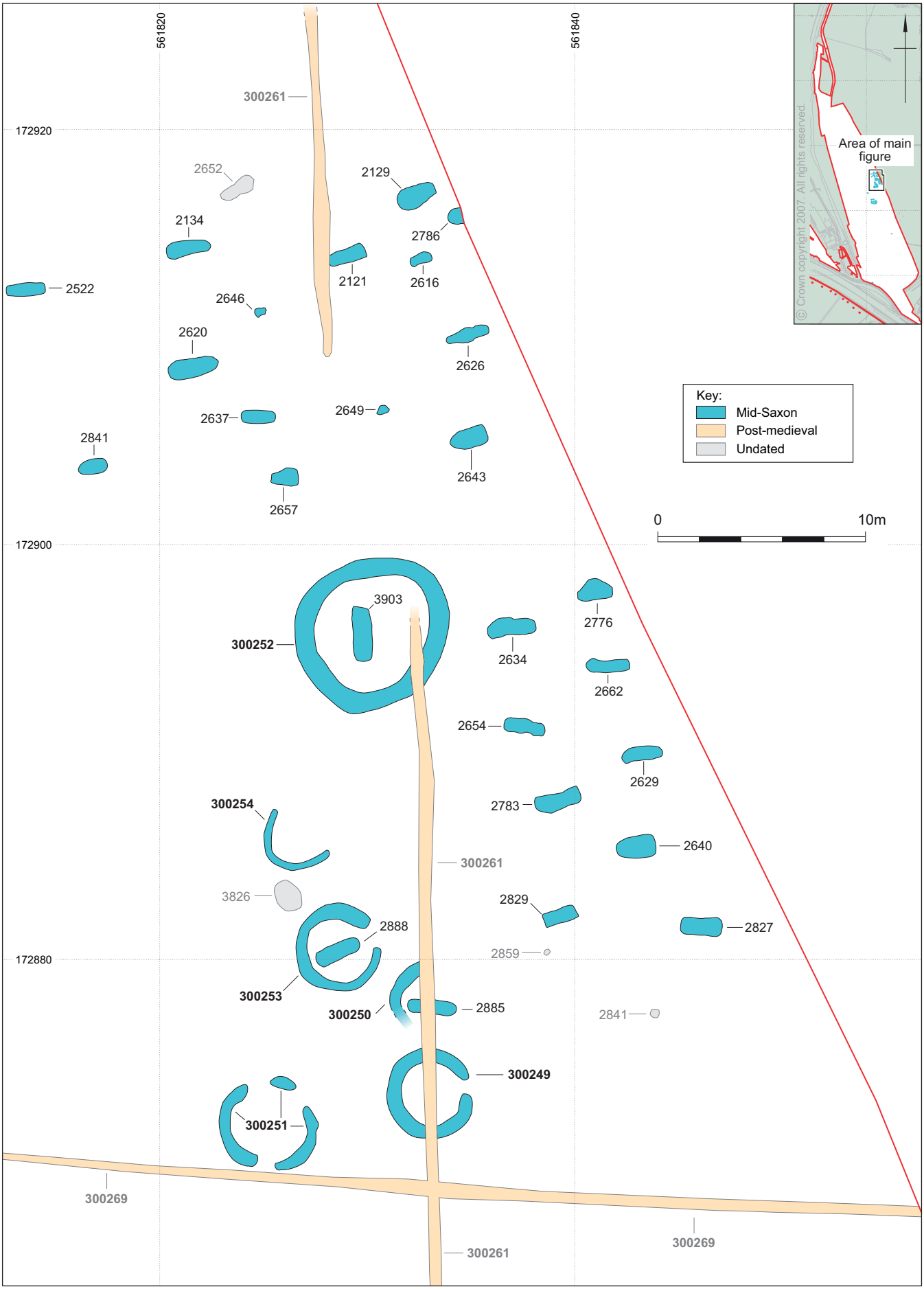

Figure 5.19 Saxon cemetery 300258

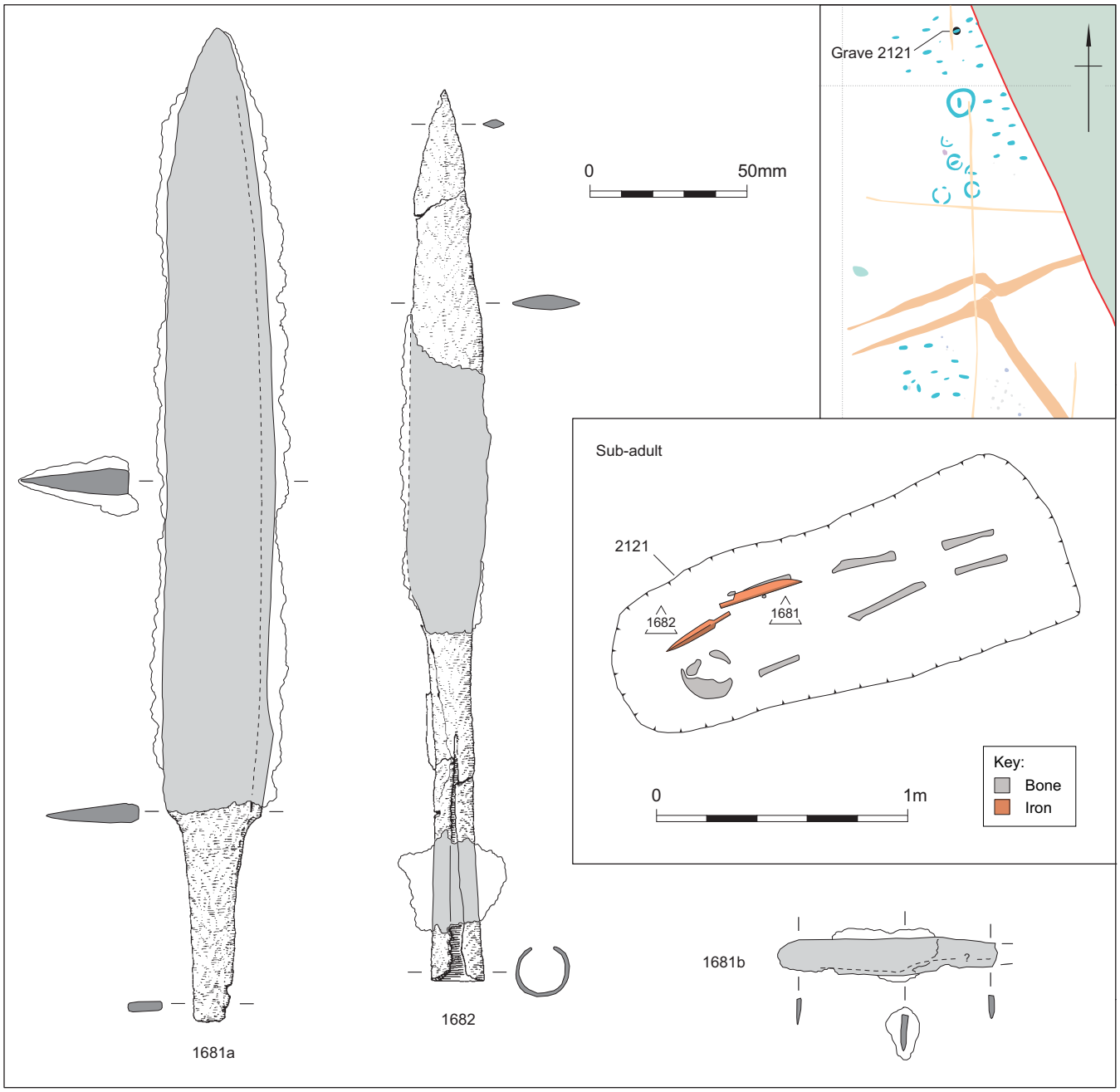

Figure 5.20 Saxon grave 2121

part of the same group of objects, were of copper alloy. Just to the right of the centre of the waist was an iron strike-a-light (SF 443).

Grave 2626 (Fig 5.26)
Length 2.15 m; Width 0.70 m; Depth 0.10 m; Orientation 72°. This was a shallow, irregularly-shaped grave within the northern group of burials. The excavated plan reflects the difficulty of defining the edges of the grave in the sandy natural deposits in this area and it may have been over-excavated at the east end. The grave contained a few teeth of a juvenile aged *c* 8–10 years, the location of which indicated that the head lay to the west. A single bead (SF 438) lay in the neck area suggesting that it was part of a necklace, and an iron cramp (SF 453) lay just below what was probably the waist area and to the side of the presumed position of the left leg. A cattle horn core came from the same area as the cramp, though whether this had been deliberately placed in the grave, was incorporated in the backfill or was possibly a later, intrusive element could not be established.

Grave 2629 (Figs 5.27–8)
Length 1.90 m; Width 0.70 m; Depth 0.20 m; Orientation 81°. This irregularly-shaped grave was difficult to define in the sandy natural deposits in this part of the site. It lay within the southern group of burials, and contained a short length of badly decayed long bone along with fragments of a single tooth; the latter could provide no ageing data, but its location indicated that the head lay to the west. Close to the tooth was a penannular silver ring on which was a melon bead (SF 426), with a red bead (SF 425) close-by and traces of associated mineralised organic material. Below this, in the area of the neck, was a pair of silver pins (SFs 448 and 449) linked by silver thread (SFs 450 and 451). An iron knife (SF 445) lay

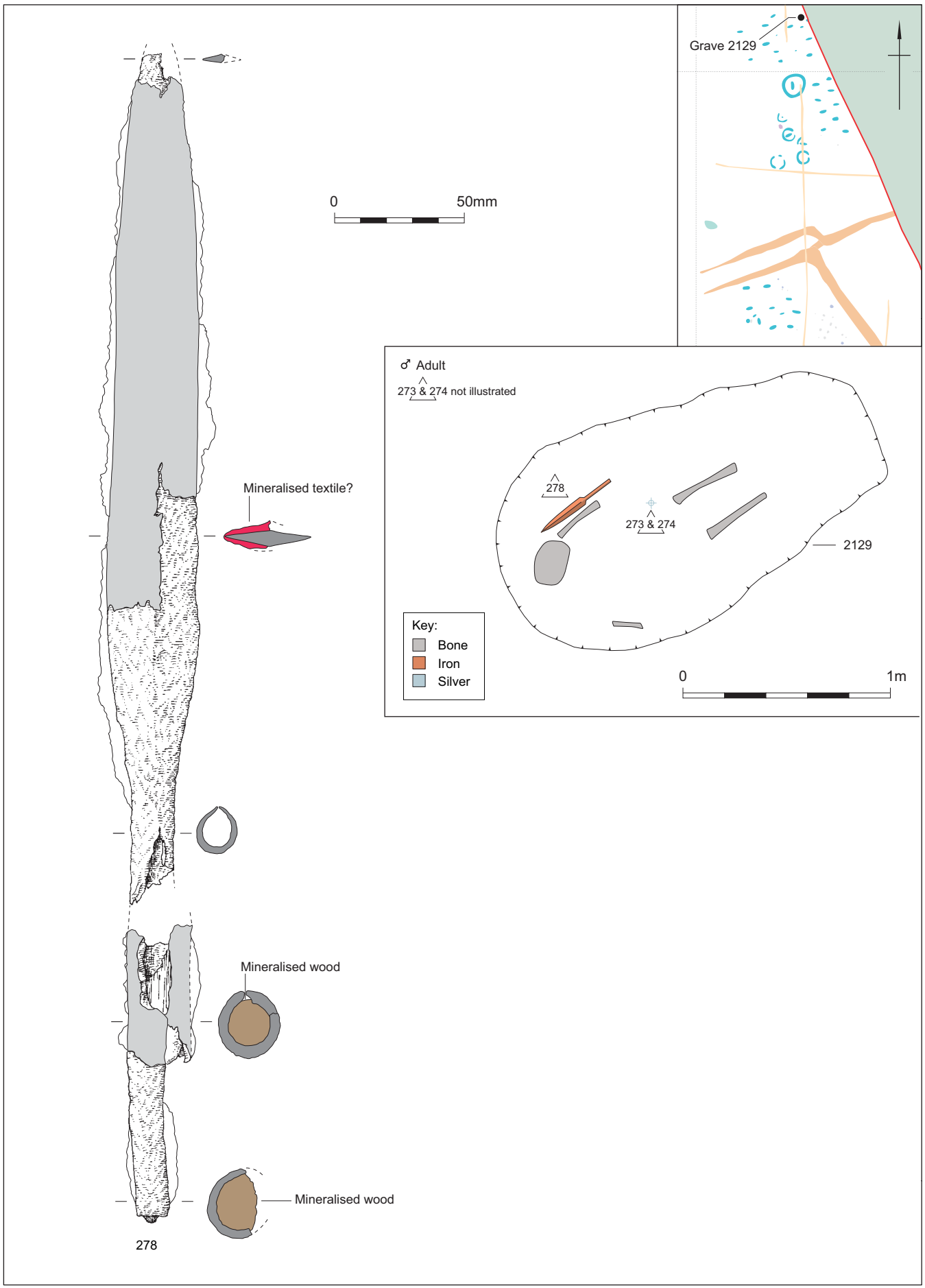

Figure 5.21 Saxon grave 2129

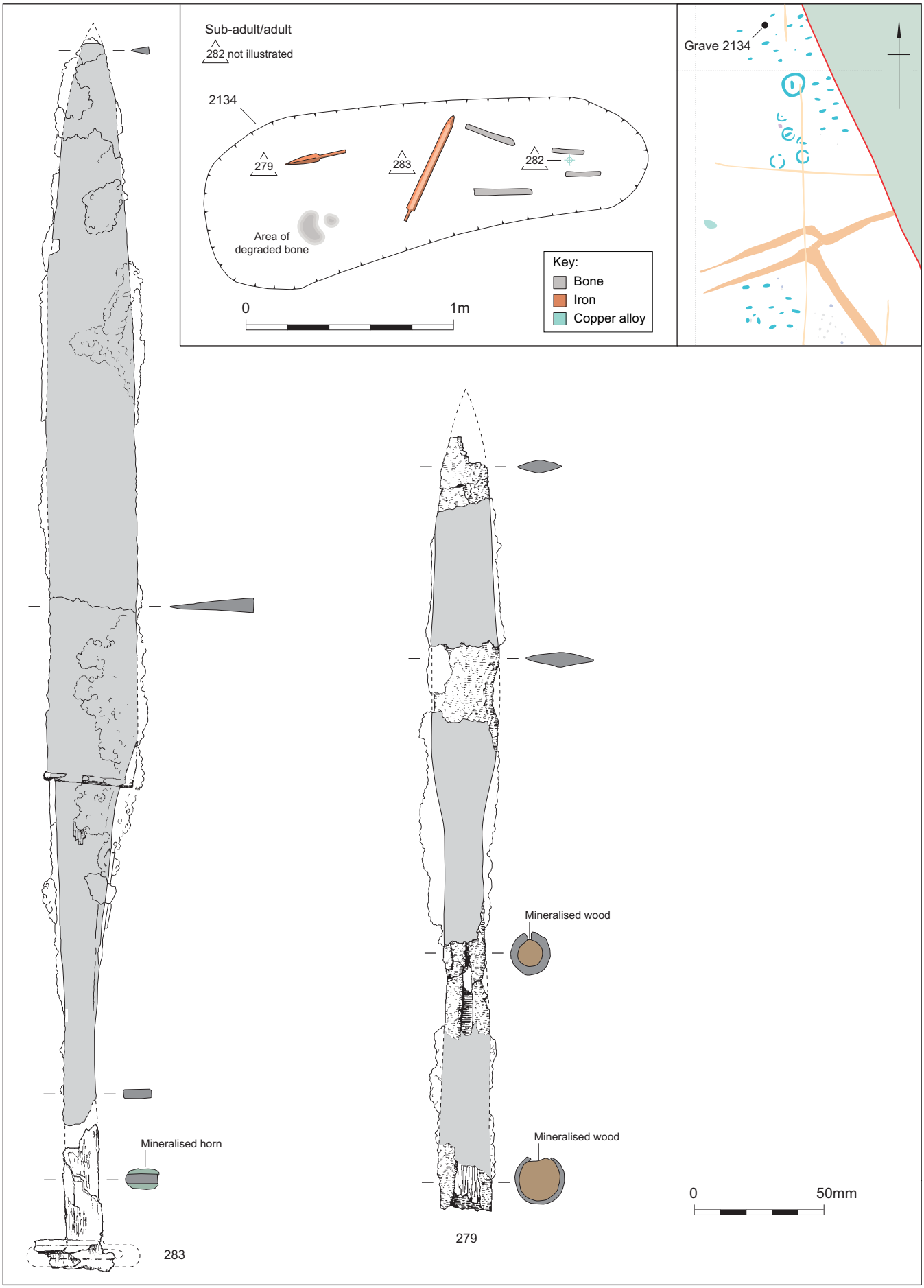

Figure 5.22 Saxon grave 2134

Plate 5.5 Saxon grave 2134 (ARC SPH00). Looking north-west

across the middle of the waist area and an iron chain (SF 446), *c* 0.45 m in length, extended from this at the end of which was copper alloy workbox (SF 417; Fig 5.28) lying over the presumed position of the knees. Close to the workbox was a copper alloy bracelet (SF 444).

Grave 2634 (Fig 5.29)
Length 2.35 m; Width 0.80 m; Depth 0.13 m; Orientation 79°. This grave lay at the north-west corner of the southern group of burials, adjacent to the ring-ditch containing grave 3903. Grave 2634 contained a subadult or adult aged over 13 years, but it was impossible to determine the position of the body from the small amount of surviving bone. An iron knife (SF 463) lay across the waist area with an iron buckle and two iron belt plates (SF 9462) on what is presumed to have been the left side of the body.

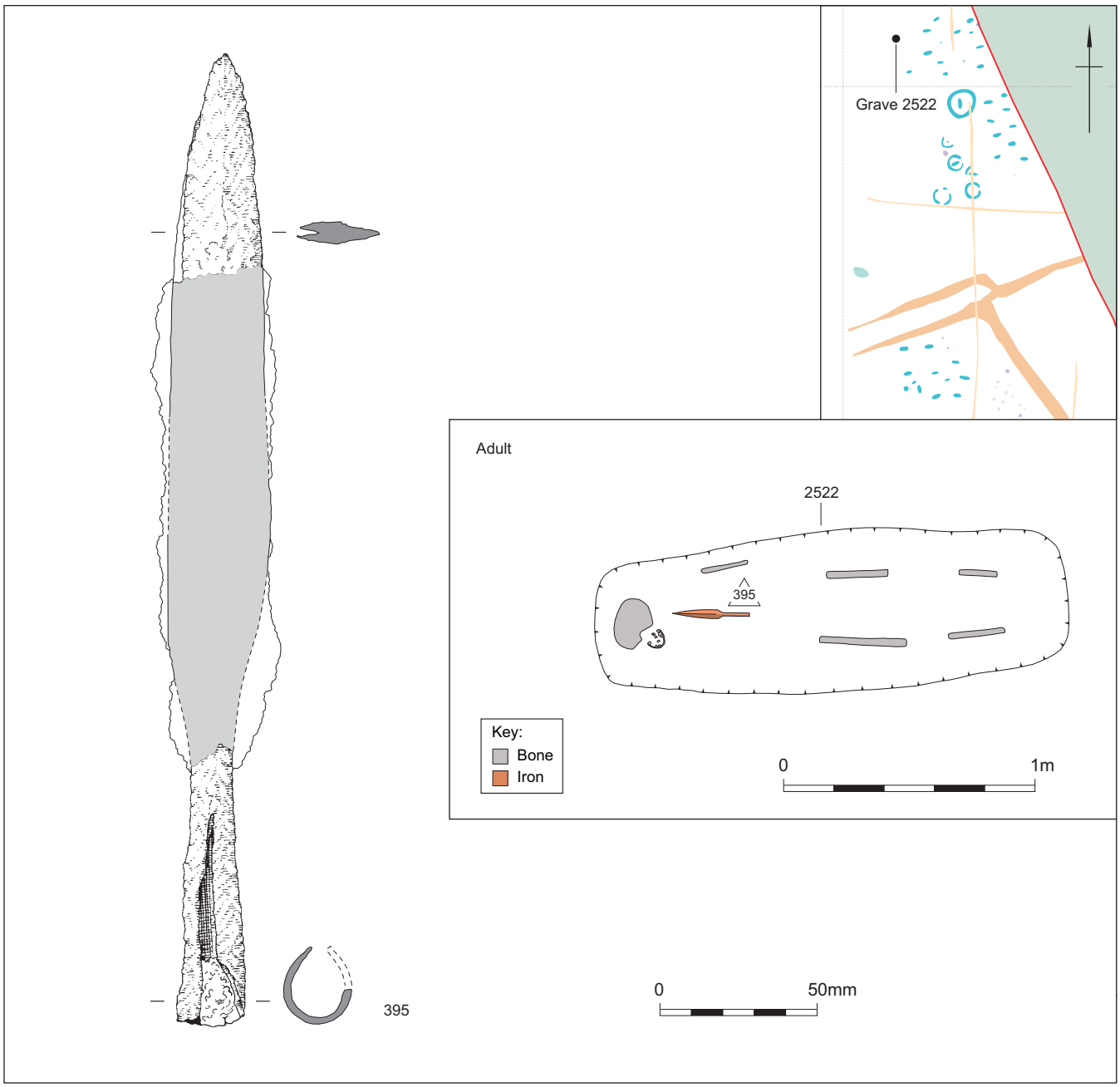

Figure 5.23 Saxon grave 2522

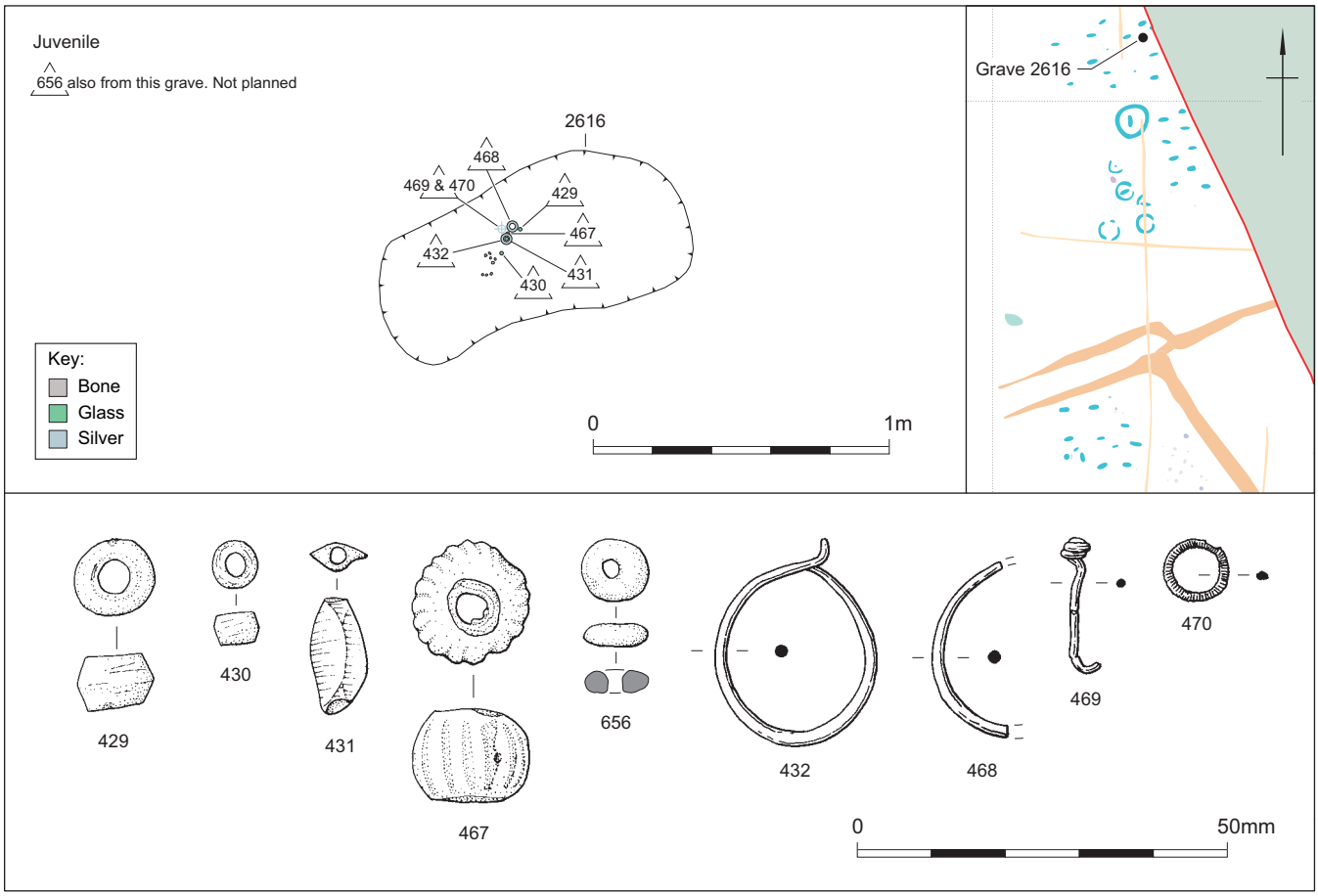

Figure 5.24 Saxon grave 2616

Grave 2637 (Fig 5.30)
Length 1.65 m; Width 0.65 m; Depth 0.05 m; Orientation 90°. This poorly-defined grave within the northern group of burials contained a juvenile or subadult aged *c* 10–14 years, but insufficient bone survived to determine the position of the body. An iron knife (SF 456) lay next to what is presumed to have been the right side of the waist.

Grave 2640 (Fig 5.31)
Length 1.90 m; Width 1.05 m; Depth 0.05 m; Orientation 78°. This lay within the southern group of burials and was quite difficult to define. Only a few fragments of teeth survived, but this was sufficient to indicate the presence of two individuals, one a juvenile aged *c* 6–7 years, the other an infant aged *c* 4–5 years, each with the head to the west. The two groups of teeth lay close together and were collected as one during excavation but, from their positions, it is clear that an iron knife (SF 441a) and the socket from a spearhead or arrowhead (SF 441b) lay alongside what would have been the upper part of the right arm of one of the individuals. Grave 2640 contained the only double burial recorded in either of the cemeteries.

Grave 2643 (Fig 5.32)
Length 1.85 m; Width 0.95 m; Depth 0.15 m; Orientation 72°. This grave lay on the southern edge of the northern group of graves. The northern edge of the grave was difficult to define in the sandy natural deposits and has probably been over-excavated. Part of the skull and a fragment of lower limb bone indicate an adult aged *c* 20–35 years with the head to the west, though the body position is uncertain. Along the left side of the body was an iron sword (SF 413a) and part of a spearhead (SF 413b).

Grave 2646 (not illustrated; see Fig 5.19)
Length 0.55 m; Width 0.35 m; Depth 0.05 m; Orientation 67°. This grave within the northern group of burials had been truncated during machine stripping, a reflection of the very soft sandy natural into which it had been dug. The surviving bone indicated a juvenile aged *c* 5–10 years, though there was insufficient to determine the body position or orientation. There were no associated grave goods.

Grave 2649 (not illustrated; see Fig 5.19)
Length 0.60 m; Width 0.40 m; Depth 0.05 m.
This grave, like 2646 to the north-west, had been heavily truncated during machining. It contained the poorly surviving remains of a femur of a juvenile aged *c* 5–10 years. This provided no certain information on the body position and orientation, and there were no associated grave goods.

Grave 2654 (not illustrated; see Fig 5.19)
Length 2.00 m; Width 0.70 m; Depth 0.05 m; Orientation 100°. This grave lay on the eastern edge of the southern group of graves. The grave was clearly defined but of very shallow depth. It contained an adult aged *c* 18 and 30 years laid in a supine,

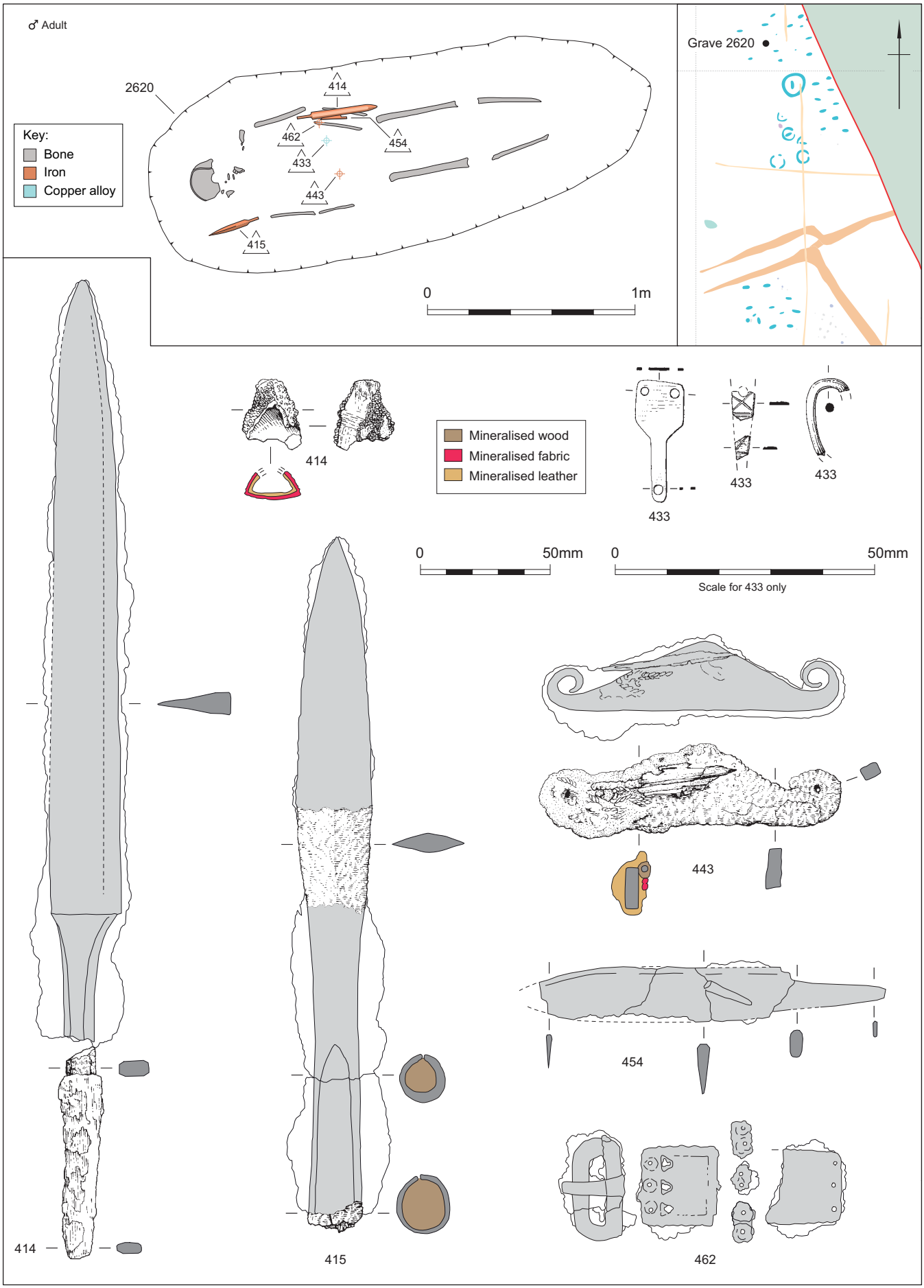

Figure 5.25 Saxon grave 2620

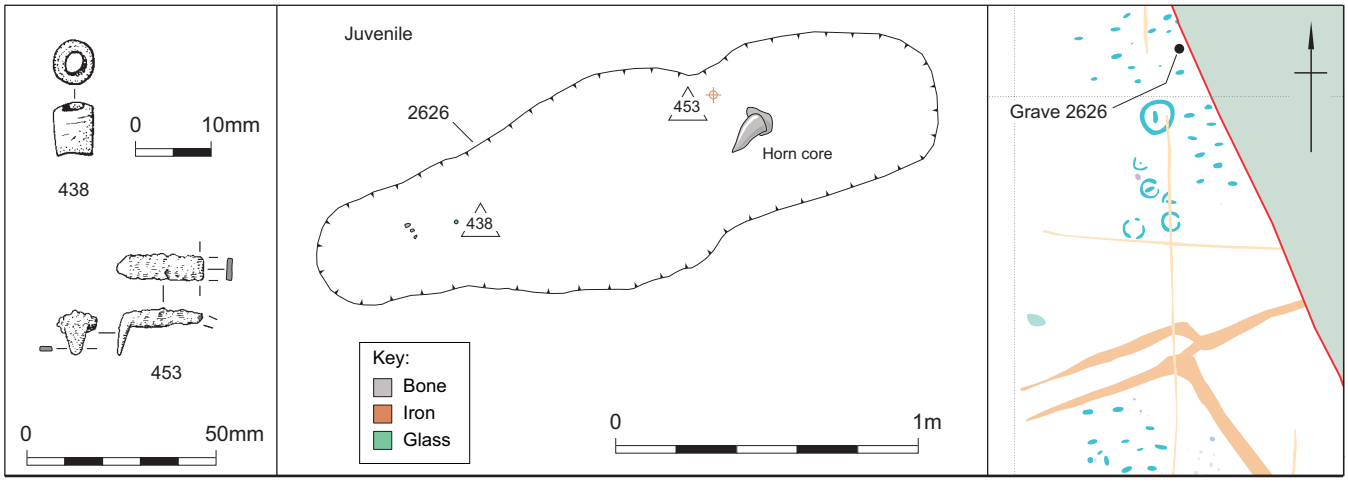

Figure 5.26 Saxon grave 2626

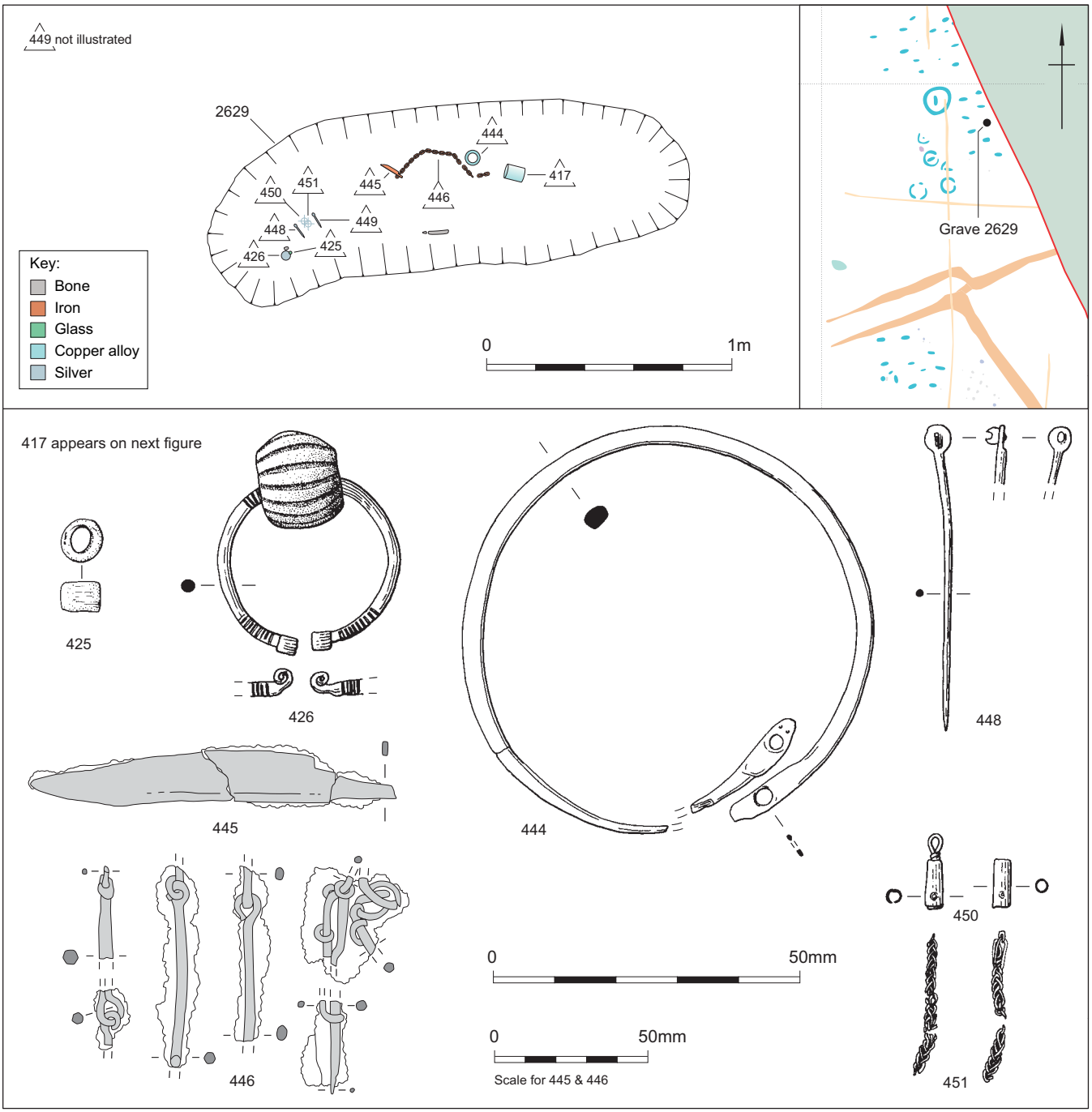

Figure 5.27 Saxon grave 2629

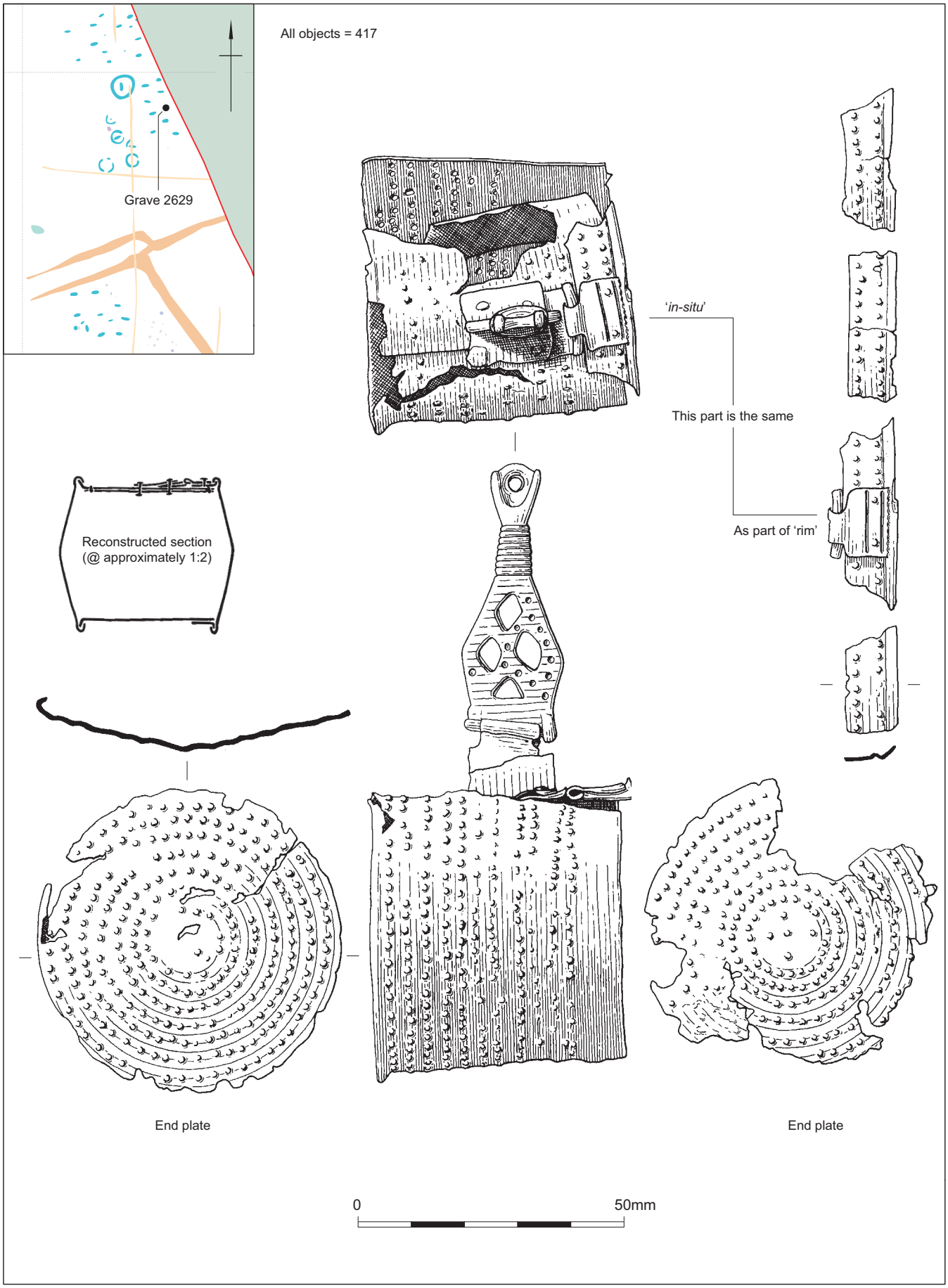

Figure 5.28 Copper alloy workbox (SF 417) from Saxon grave 2629

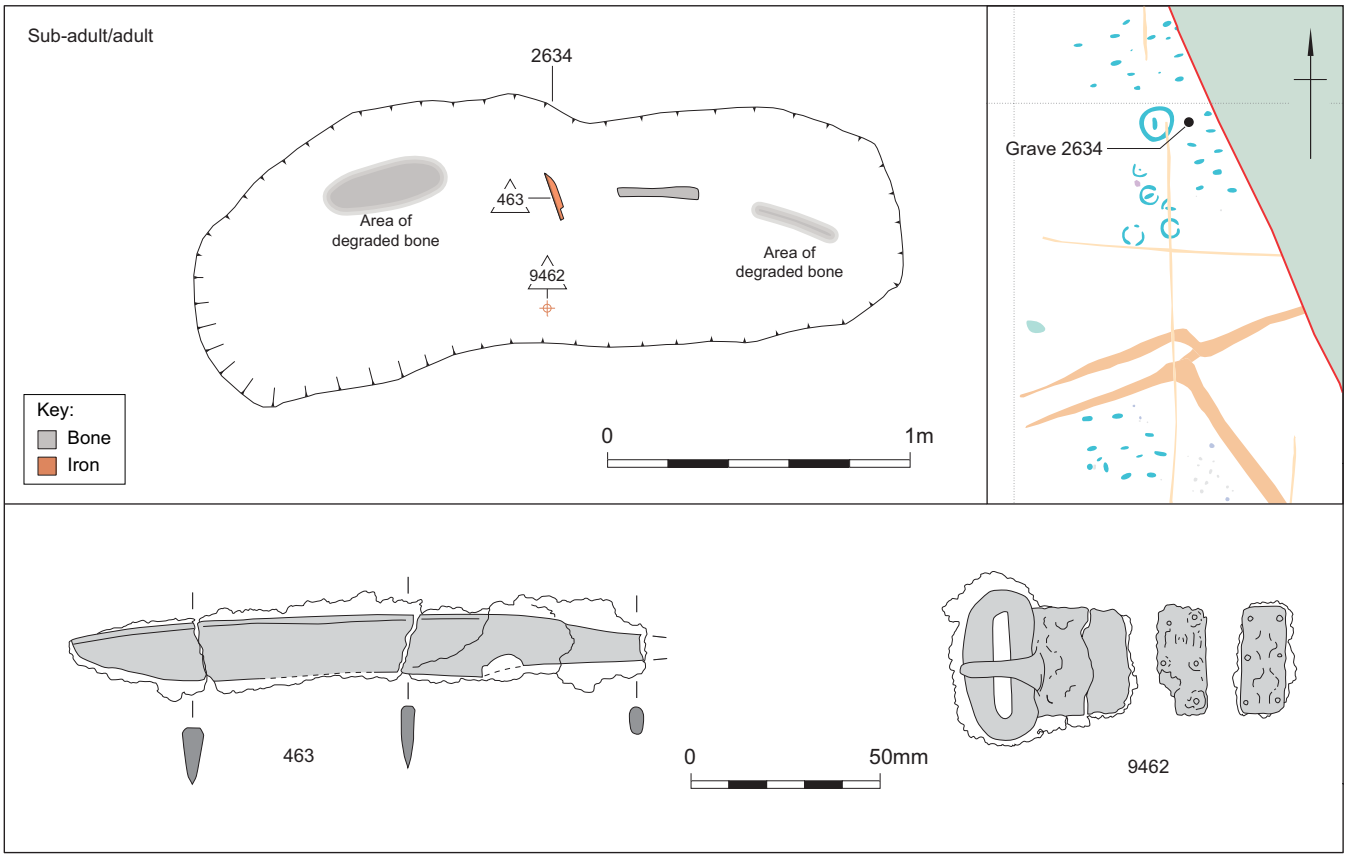

Figure 5.29 Saxon grave 2634

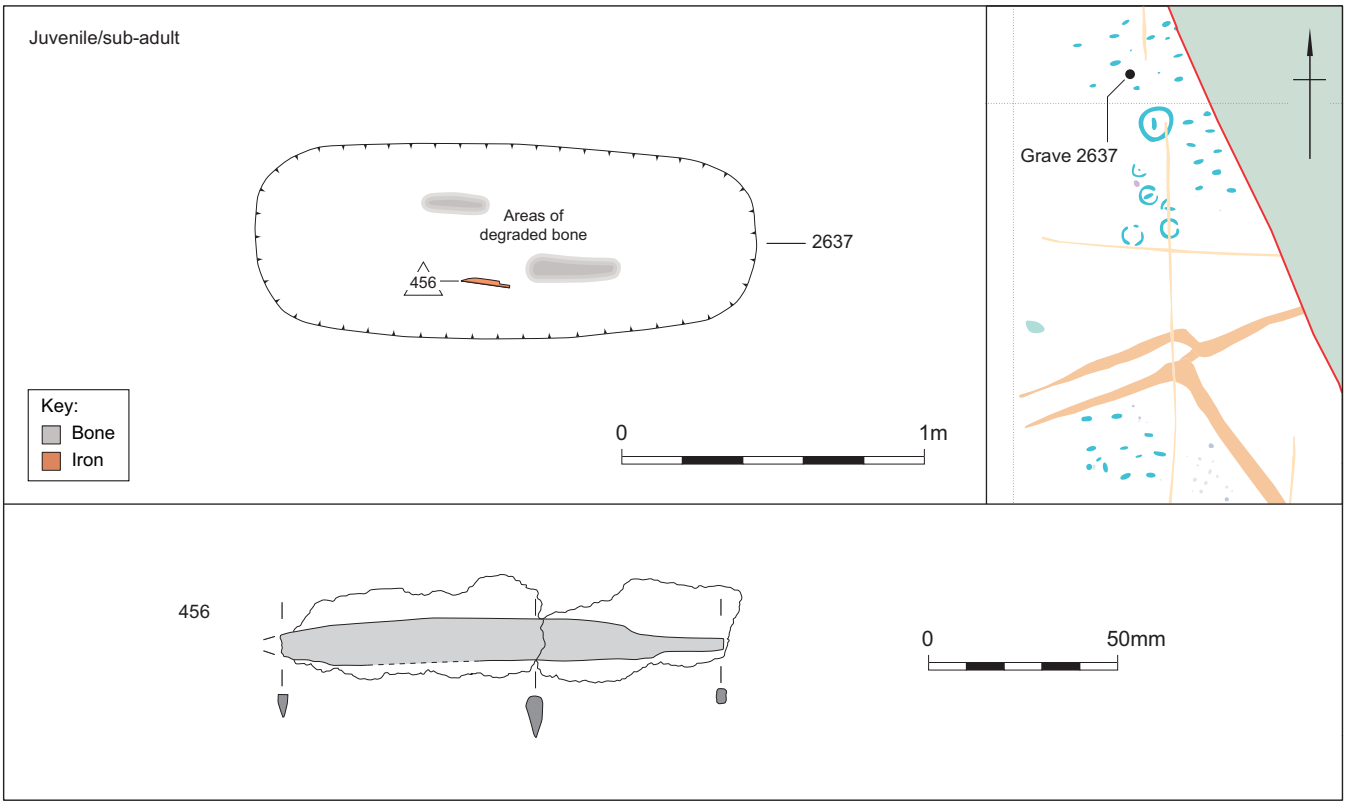

Figure 5.30 Saxon grave 2637

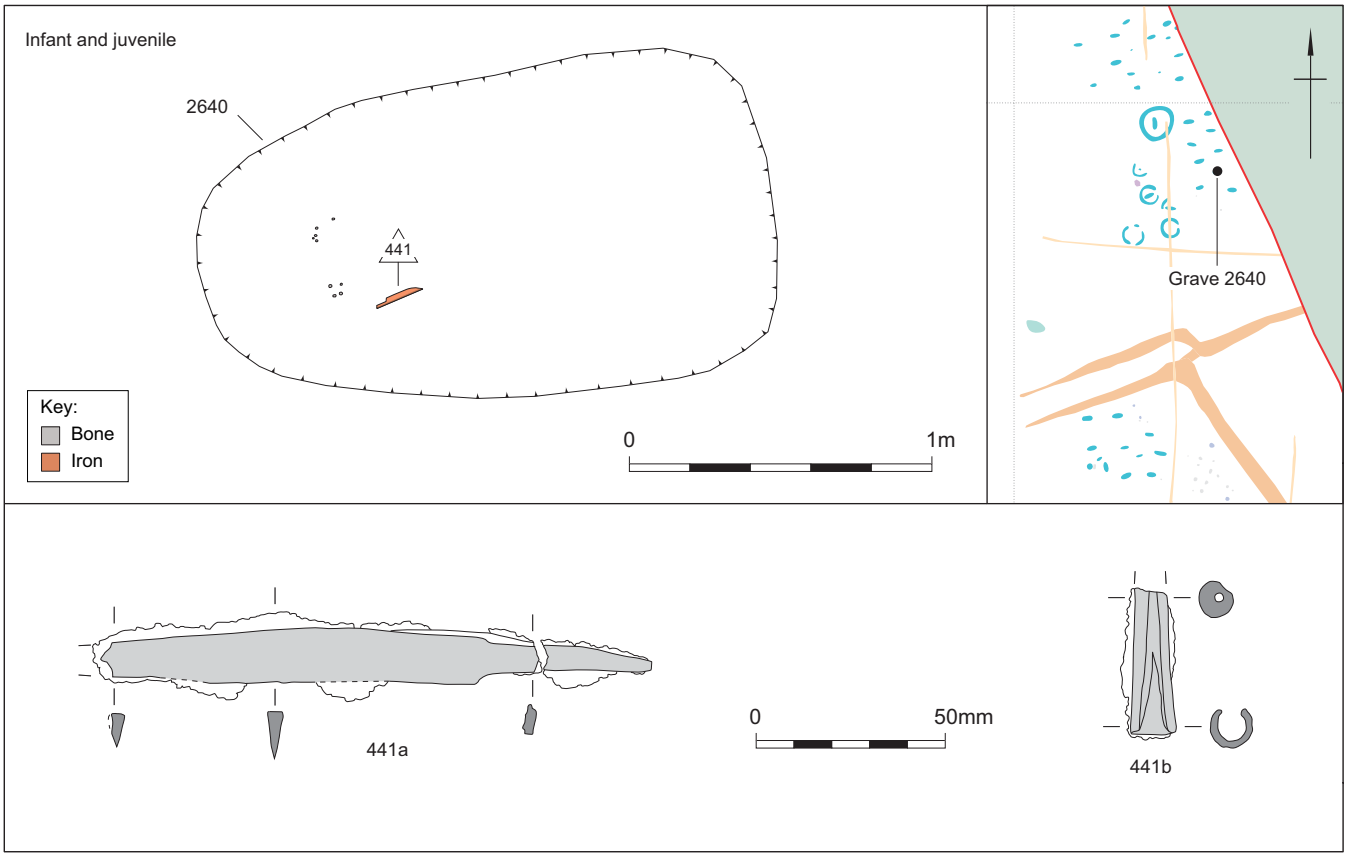

Figure 5.31 Saxon grave 2640

extended position with the left leg slightly flexed and the head to the west. There were no associated grave goods, but a small patch of iron corrosion was noted by the right elbow during excavation. There is a slight possibility that grave goods may have been illicitly removed from this grave by night hawks and this is discussed further below.

Grave 2657 (not illustrated; see Fig 5.19)
Length 1.35 m; Width 0.80 m; Depth 0.10 m; Orientation 84°. This grave lay on the southern edge of the northern group of graves. It was truncated and difficult to define but contained a subadult or adult aged over 15 years. From the surviving bone it was difficult to determine both the position and orientation of the individual. There were no associated grave goods.

Grave 2662 (not illustrated; see Fig 5.19)
Length 2.10 m; Width 0.55 m; Depth 0.15 m; Orientation 90°. This well-defined grave lay within the southern group of burials and contained a subadult or adult aged *c* 15–20 years laid in a supine, extended position with the head to the west. There were no associated grave goods.

Grave 2776 (Fig 5.33)
Length 1.70 m; Width 1.00 m; Depth 0.15 m; Orientation 82°. This grave lay on the northern edge of the southern group of graves. The northern edge of the grave was difficult to define in the sandy natural deposits and has probably been over-excavated. There were no surviving skeletal remains, but an iron knife (SF 508) lay on the left side of the presumed waist area.

Grave 2783 (Fig 5.34)
Length 2.25 m; Width 0.80 m; Depth 0.15 m; Orientation 73°. This grave lay on the western edge of the southern group of graves and contained an adult (possibly male) aged *c* 20–30 years. Although poorly preserved the burial appears to have been laid in a supine, extended position with the head to the west. An iron stud (SF 494) of indeterminate form lay in the centre of the waist and an iron knife (SF 513) to the right of this with the tang towards the east end of the grave. By the left shoulder were the remains of a socket of a spearhead (SF 511), the blade having been removed by nighthawks.

Grave 2786 (not illustrated; see Fig 5.19)
Length 0.70+ m; Width 0.75 m; Depth 0.15 m.
This lay within the northern group of burials. Only the west end of the grave was exposed within the excavation area and no bone or grave goods were present in the excavated part.

Grave 2827 (Fig 5.35)
Length 2.00 m; Width 0.80 m; Depth 0.20 m; Orientation 94°. This grave lay on the southern edge of the cemetery. The grave contained some poorly surviving skull fragments which indicated that the head lay at the west end, but no other human skeletal material was present. However, a twisted silver wire ring (SF 525) and four associated beads (SFs 524, 526, 527, and 529) lay close together on the right side of the chest area, a set of iron shears (SF 522) wrapped in fabric lay on or just above the waist, and an iron knife in a leather sheath was found (during conservation) corroded to the upper side of the shears. A copper alloy disc brooch (SF 531), gilded and set with

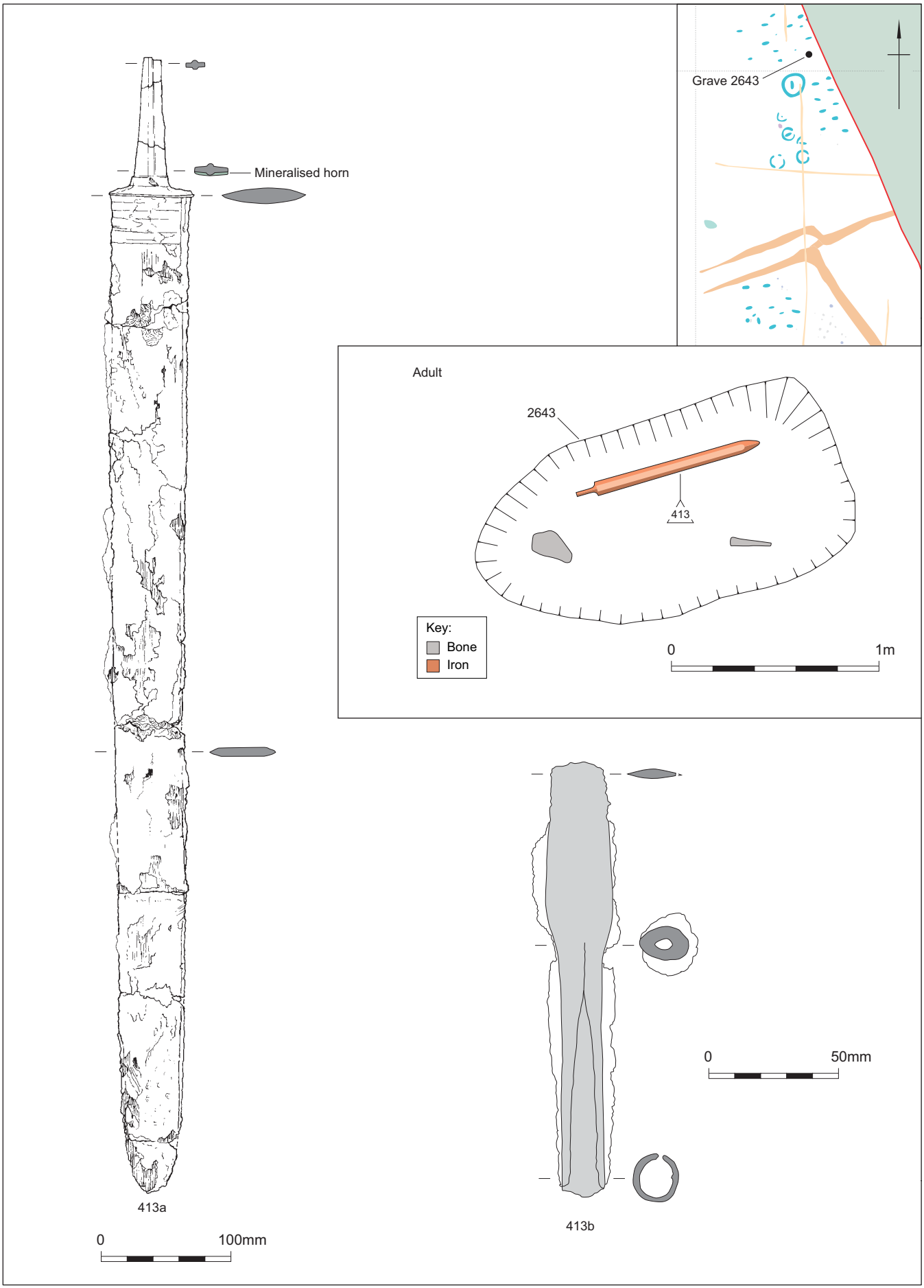

Figure 5.32 Saxon grave 2643

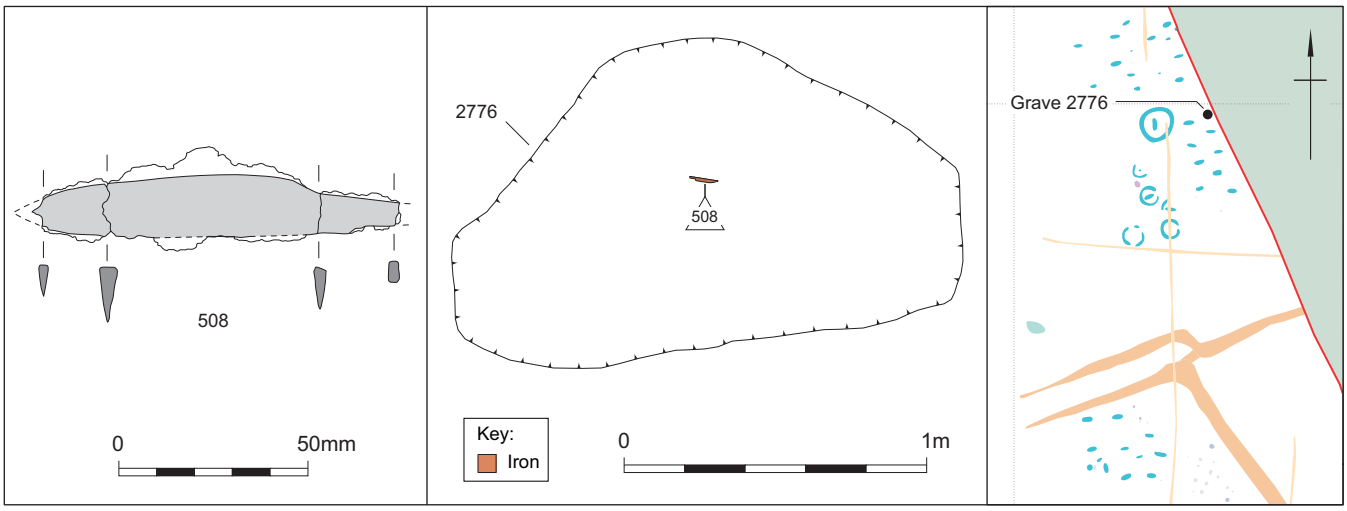

Figure 5.33 Saxon grave 2776

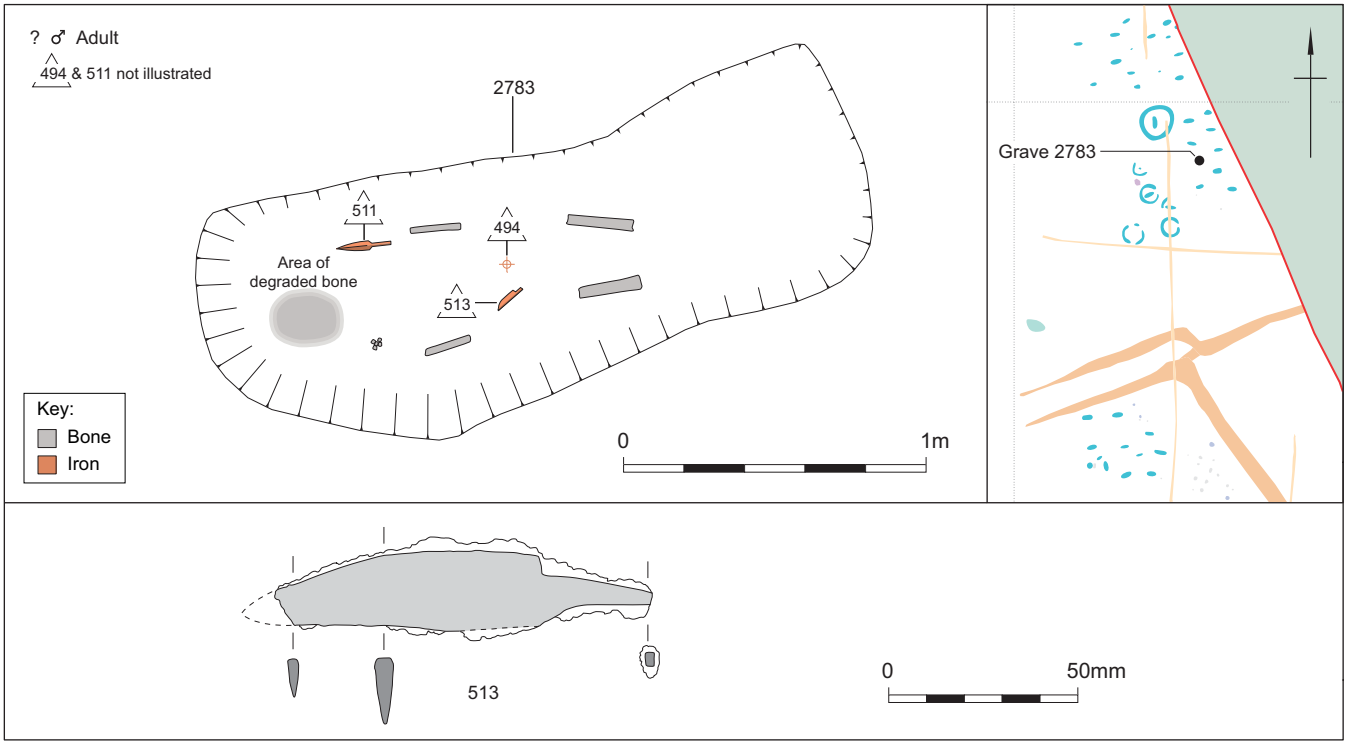

Figure 5.34 Saxon grave 2783

garnets, lay just below the waist area on the left side. Approximately one-third of this brooch was missing and it appears that it was incomplete when placed in the grave. A Roman brooch (SF 553; not illustrated) was also recovered from the fill of the grave.

Grave 2829 (Fig 5.36)
Length 1.60 m; Width 0.65 m; Depth 0.25 m; Orientation 71°. This grave lay at the south-west corner of the southern group of burials, and contained a juvenile aged *c* 7–9 years. The head lay to the west and the surviving remains suggest that the body was laid in a supine, extended position though this is uncertain. Five beads (SFs 9550–9554) lay in the neck area suggesting that they belonged to a necklace.

Grave 2841 (not illustrated; see Fig 5.19)
Length 1.4 m; Width 0.75 m; Depth 0.15 m; Orientation 80°. This grave lay towards south-west corner of the northern group of graves. It contained no surviving skeletal remains and was devoid of grave goods.

Grave 2885 (Fig 5.37)
Length 2.35 m; Width 0.70 m; Depth 0.50 m; Orientation 96°. It is almost certain that this grave was enclosed by a small ditch (300250; see Fig 5.19) of which only the north-west quadrant survived, sufficient however to indicate a diameter of *c* 3.3 m. It is assumed by analogy with others in the group, all of similar size and all lying together at the south-west corner of the cemetery, that the ditch was penannular, with the entrance on

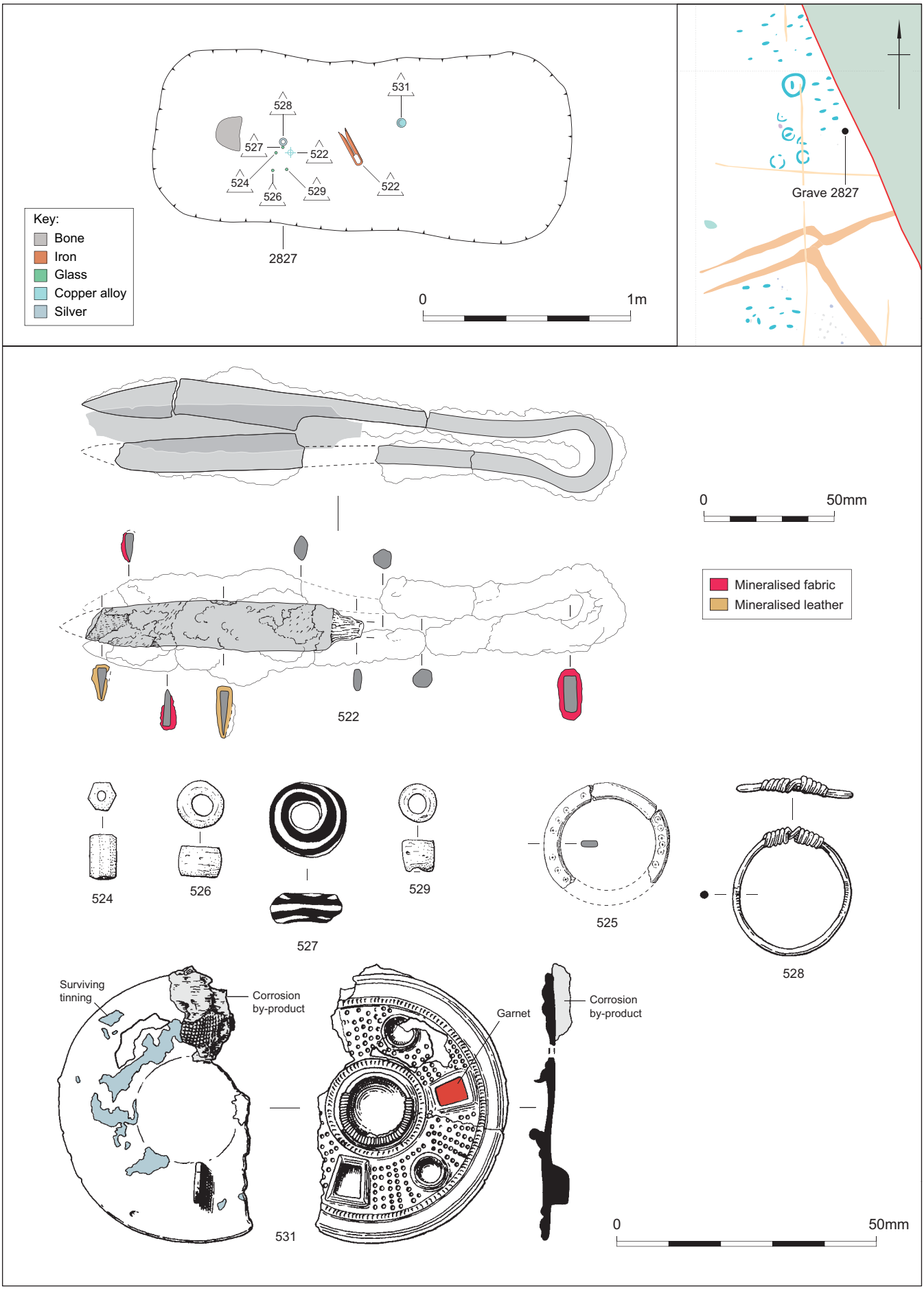

Figure 5.35 Saxon grave 2827

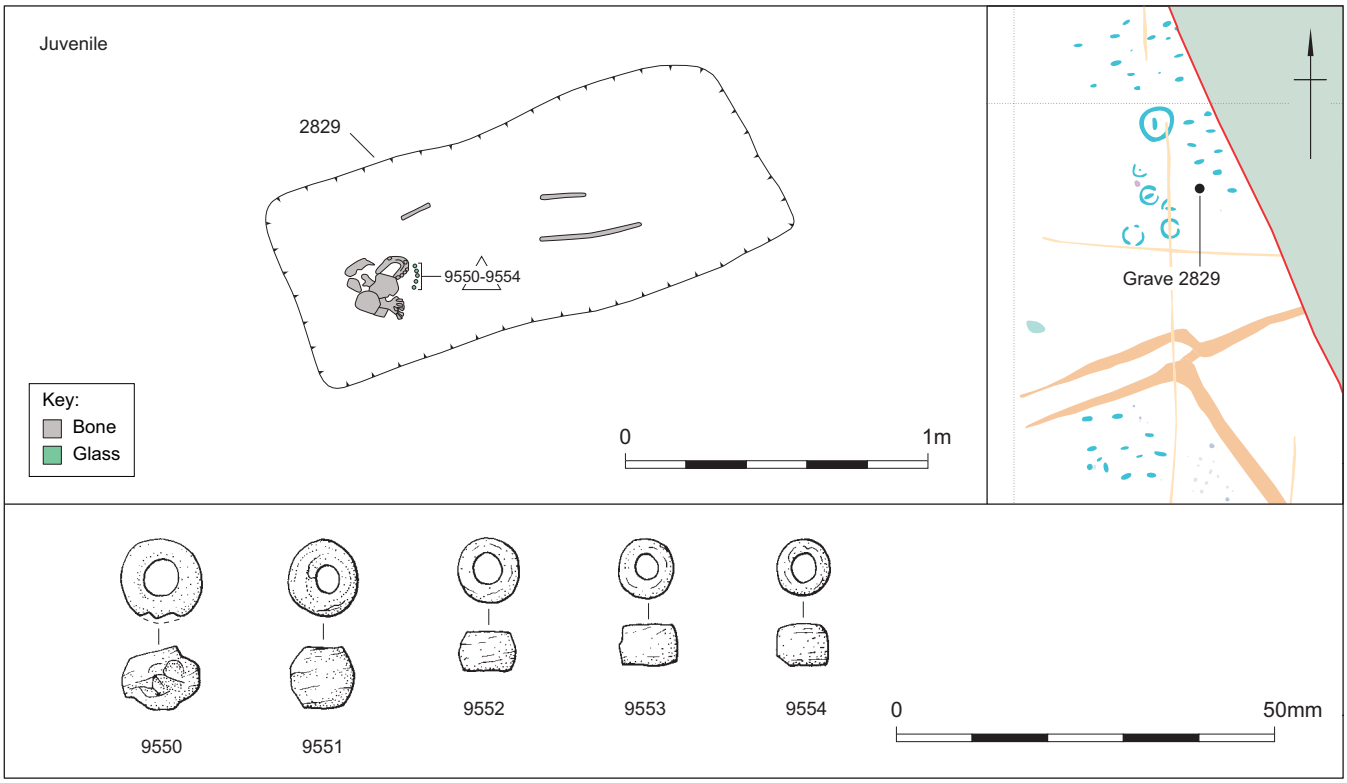

Figure 5.36 Saxon grave 2829

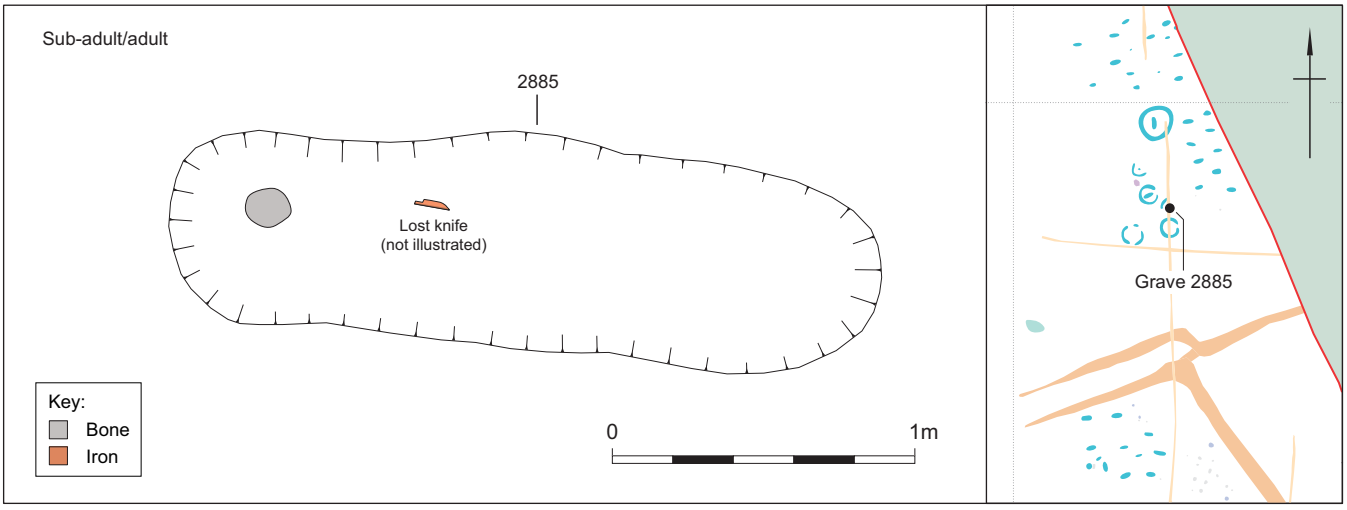

Figure 5.37 Saxon grave 2885

the east side. Although the surviving ditch was very shallow (0.60 m wide and a maximum 0.15 m deep) the greyish–brown fill made it quite easy to see, in contrast to the associated grave which was relatively deep (the deepest recorded in either of the cemeteries), but extremely difficult to define. It had been backfilled with redeposited natural comprising a mixture of gravel and brickearth and was only found through a combination of metal detecting and careful level reduction by machine of the area. The grave contained a subadult or adult aged over 13 years with the head at the west end, but there were insufficient remains to indicate the burial position. An iron knife (subsequently lost) lay on the left side of the waist area.

Grave 2888 (Fig 5.38)
Length 2.25 m; Width 0.80 m; Depth 0.18 m; Orientation 74°. This grave lay immediately to the north-west of grave 2885 and was enclosed by a penannular ditch (300253; see Fig 5.19) which had a 1.0 m wide entrance in the north-east side and a diameter of *c* 3.5 m. The ditch was well defined, 0.70 m wide and 0.20 m deep, and filled with a mid-reddish–brown silty gravel. However, the grave, like 2885, was extremely difficult to define and was also only found through a combination of metal detecting and level reduction by machine. The depth of the grave, although recorded as 0.18 m, was certainly deeper as this was the depth from the level at which it was first seen. The grave contained a subadult or adult aged *c* 15–20 years buried

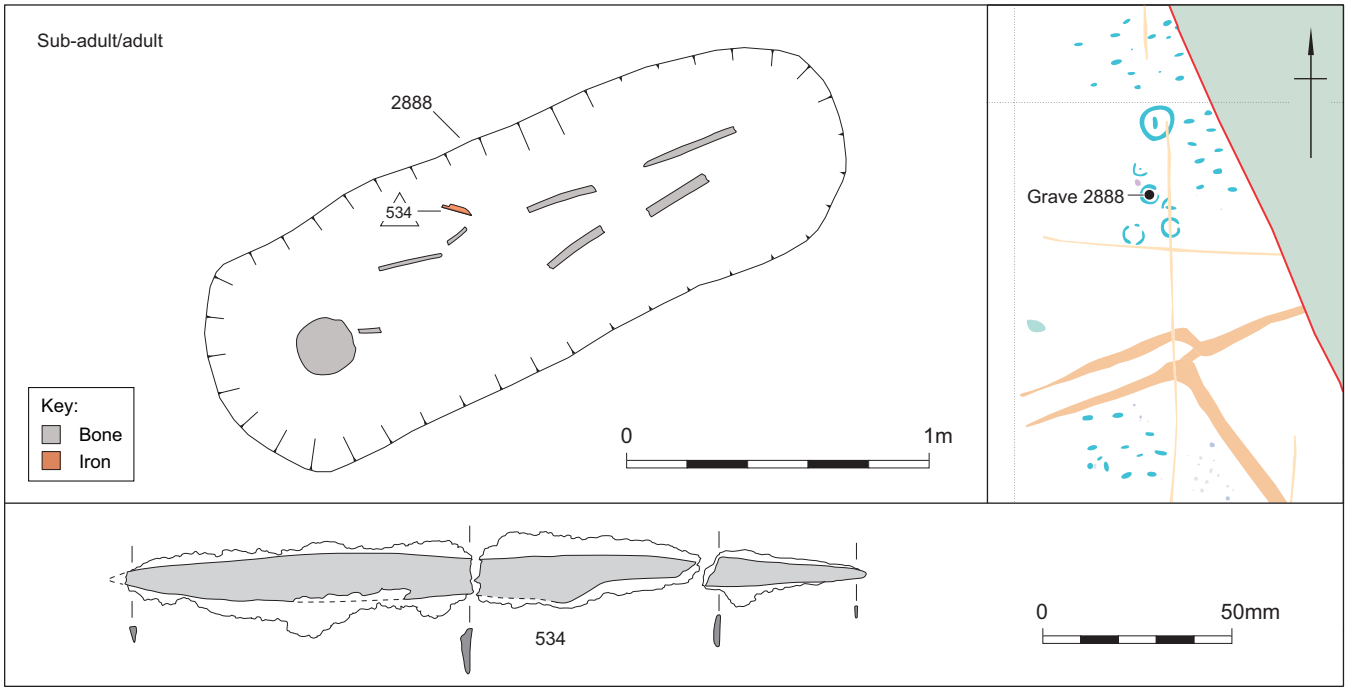

Figure 5.38 Saxon grave 2888

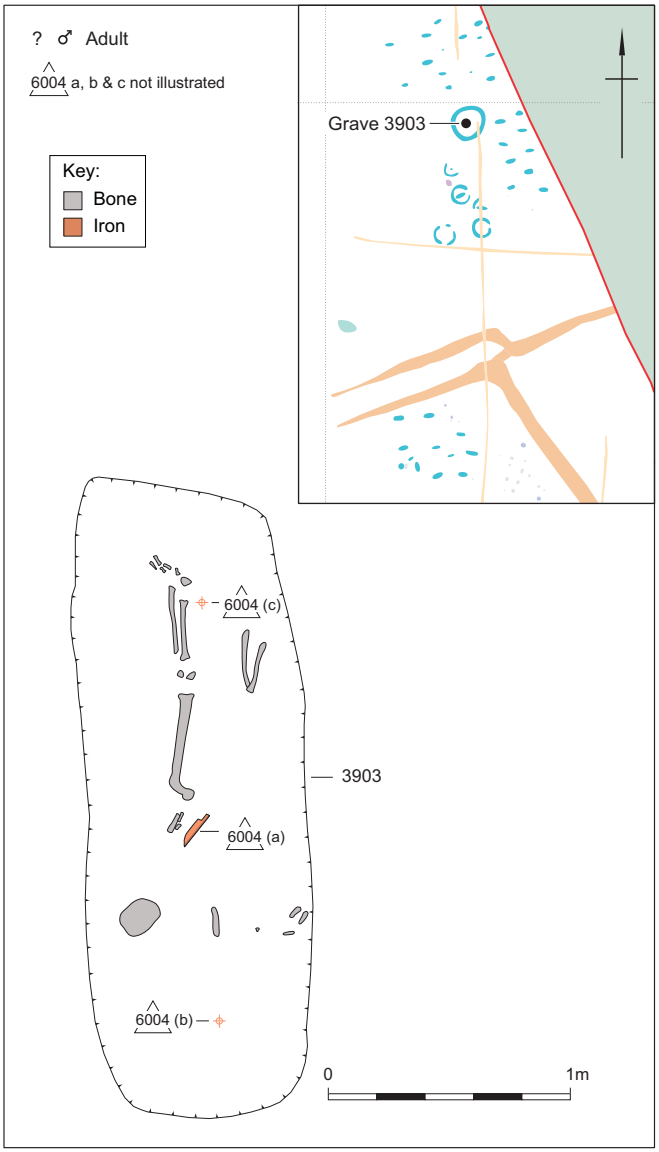

Figure 5.39 Saxon grave 3903

in a supine, extended position with the head to the west. An iron knife (SF 534) lay on the left side of the waist.

Grave 3903 (Fig 5.39)
Length 2.60 m; Width 0.90 m; Depth 0.20 m; Orientation 177°. This grave lay within an oval ring-ditch (300252; see Fig 5.19) measuring approximately 6.4 m by 5.4 m (the longest dimension being north-east to south-west), at the northern end of the group of ring-ditches on the western edge of the cemetery. The grave was the only example aligned north–south in this cemetery and lay slightly west of the centre of the ring-ditch, the only certain example without an entrance. The ditch was approximately 1.0 m wide and 0.35 m deep and filled with dark greyish–brown sandy silt containing much gravel. The grave contained an adult (possibly male) aged *c* 30–55 years buried in a supine, extended position with the head to the south. The fragmentary remains of an iron knife (SF 6004a) lay in the waist area, with single, smaller, unidentified fragments of iron (SFs 6004b and 6004c) in the head and feet areas respectively, possibly parts of a spearhead and associated ferrule.

Other features (see Fig 5.19)
A very shallow and relatively narrow gully (300254) formed an arc representing just over 50% of the projected length of a possible pennanular ditch, which had an estimated diameter of *c* 3 m. The location makes its interpretation as a penannular ditch surrounding a burial reasonably likely, particularly given the similar but shorter surviving length of ditch 300250 identified around grave 2885 to the south-west (see above). However, no evidence for a central grave was found within the area enclosed by gully 300254.

Three segments of what was probably a penannular ditch (300251) lay on the south-west edge of the cemetery. This had a diameter of 4.3 m and three 'entrances', that facing north-east probably an original entrance, the other two perhaps a

reflection of the complete truncation of shallower parts of the ditch. The surviving segments were up to 0.50 m wide and 0.20 m deep and filled with orange–brown silty sand containing a moderate amount of gravel. No evidence for a central grave was found.

Penannular ditch 300249 lay to the south of grave 2885 and east of ditch 300251. This had a diameter of 3.7 m and an ENE facing entrance. The ditch was well defined, up to 0.70 m wide and 0.20 m deep, and was filled with greyish–brown silty sand containing occasional gravel. Despite an intensive search (following the removal of the fill of post-medieval ditch 300261) no grave goods survived. As has been noted above, the failure to identify a central grave (if such existed) is likely to reflect the mixed nature of the brickearth and gravel natural deposits in this area which would have been used to backfill the grave and has made the definition of cuts in this part of the site very difficult.

Late Saxon and Medieval Features

Springhead

Late Saxon

Only two features (3227 and 3475) have been assigned to the late Saxon period, both located on the crest of the slope above the springs (Fig 5.40). The dating, however, allows for the possibility that they may actually have belonged to the later mid-Saxon period, though both post-dated the two mid-Saxon cemeteries (300257 and 300258) in the same area (see above). Features 3227 and 3475 lay approximately 140 m apart and their exposed position has led to the suggestion that both were crop dryers, though they differed in form and in the nature of their fills. It is likely that these features belonged to a small late Saxon settlement lying immediately to the east (see discussion below).

The larger of the two, 3227, comprised a shallow, sub-oval, flat-bottomed pit measuring approximately 4.2 m by 3.4 m and 0.5 m deep (Fig 5.40). It was filled mainly with a homogeneous dark soil (3190) which contained some fragments of fired clay, but there was no evidence of *in situ* burning or scorching of the pit sides and base, and the fired clay had no wattle impressions which might indicate that it was once part of a dome or cover. These factors, and its size and shape, make interpretation of this feature as a crop dryer uncertain, although it did contain a moderate quantity of charred grain and charred weed seeds (see Stevens Vol 4, Chap 8). Dating evidence is provided by a silver denier of Charles the Bald (838–877; SF 1266) and by a small assemblage of pottery, some of which had been burnt. An early medieval date is considered possible for this pottery (see Mepham Vol 4, Chap 1), but it seems improbable that the coin was residual and it is likely, therefore, that feature 3227 should be assigned to the second half of the 9th century.

The second feature, 3475, was an oval pit measuring 3.0 m by 1.5 m by 1.0 m deep (Fig 5.40). It had near-vertical sides at the east end and a slightly rounded bottom. Towards the west end the bottom sloped fairly evenly up to the surface, this end probably forming the stoke-hole, with the chamber at the east end. The sides were lined with a thick layer of clay containing flint cobbles and showed some evidence for *in situ* burning, though this was insufficient to enable dating by TRM (thermo-remnant magnetism). The lower fill of the chamber area included one layer (3979) made up almost entirely of burnt daub with numerous wattle impressions, most probably deriving from a collapsed dome or superstructure. At the surface of the east end was a substantial deposit of flint cobbles (3498) with more in the top of layer 3477; these cobbles are also likely to have derived from the superstructure or pit lining. Partly underlying daub layer 3979 and extending across the lower part of the stoke-hole area was a thin black layer (3481) which comprised charcoal and large quantities of burnt cereal grain and burnt weed seeds. The evidence in this case, both from the structure and the fills of the pit, is strongly suggestive of it having been a crop dryer, though it lacked any clearly defined stoke-hole, flue, and chamber. No finds other than burnt daub came from the fill, but the type of cereal grain (free-threshing wheat) indicates a post-Roman date and this was confirmed by a radiocarbon determination of cal. AD 770–900 (NZA-27370, 1179±30 BP) obtained from one of the grains (see Barnett Vol 4, Chap 7). This date would place crop dryer 3475 broadly contemporary with the suggested date of feature 3227.

Medieval

Several features have been assigned to a phase covering a broad 12th–14th century date range, to which may be added a small assemblage of coins and other metalwork of similar date (Fig 5.41). It is unlikely that all of the features were contemporary and their location on either side of the Ebbsfleet, which formed a (later) parish boundary, makes it equally unlikely that they were all associated with the same settlement.

Perhaps the most significant feature was a trackway (400160) which was recorded over a distance of almost 150 m on the west side of the Ebbsfleet (Fig 5.42; Pl 5.6). It was a maximum of 5 m wide and comprised a chalk consolidation layer which lay directly above Roman and, in some places, alluvial deposits, with one or more gravel surfaces laid on the top. The gravel survived rather patchily and the surface was characterised by the presence of a series of generally shallow wheel ruts. For much of its length the trackway ran parallel to the edge of the Ebbsfleet but, to the north-west, it turned to the west and rose up the gentle slope of the valley side. Its extent to the north-west is unknown, the chalk and gravel surfaces having been truncated by the construction of glasshouses, but it is possible that it joined and re-used the surfaces on the Roman branch road. Its relationship with ditch 100 which cut this road (see below) is unknown, though the limited amount of dating evidence might indicate that the trackway was the later of the two features, perhaps laid across the infilled ditch which was very narrow at

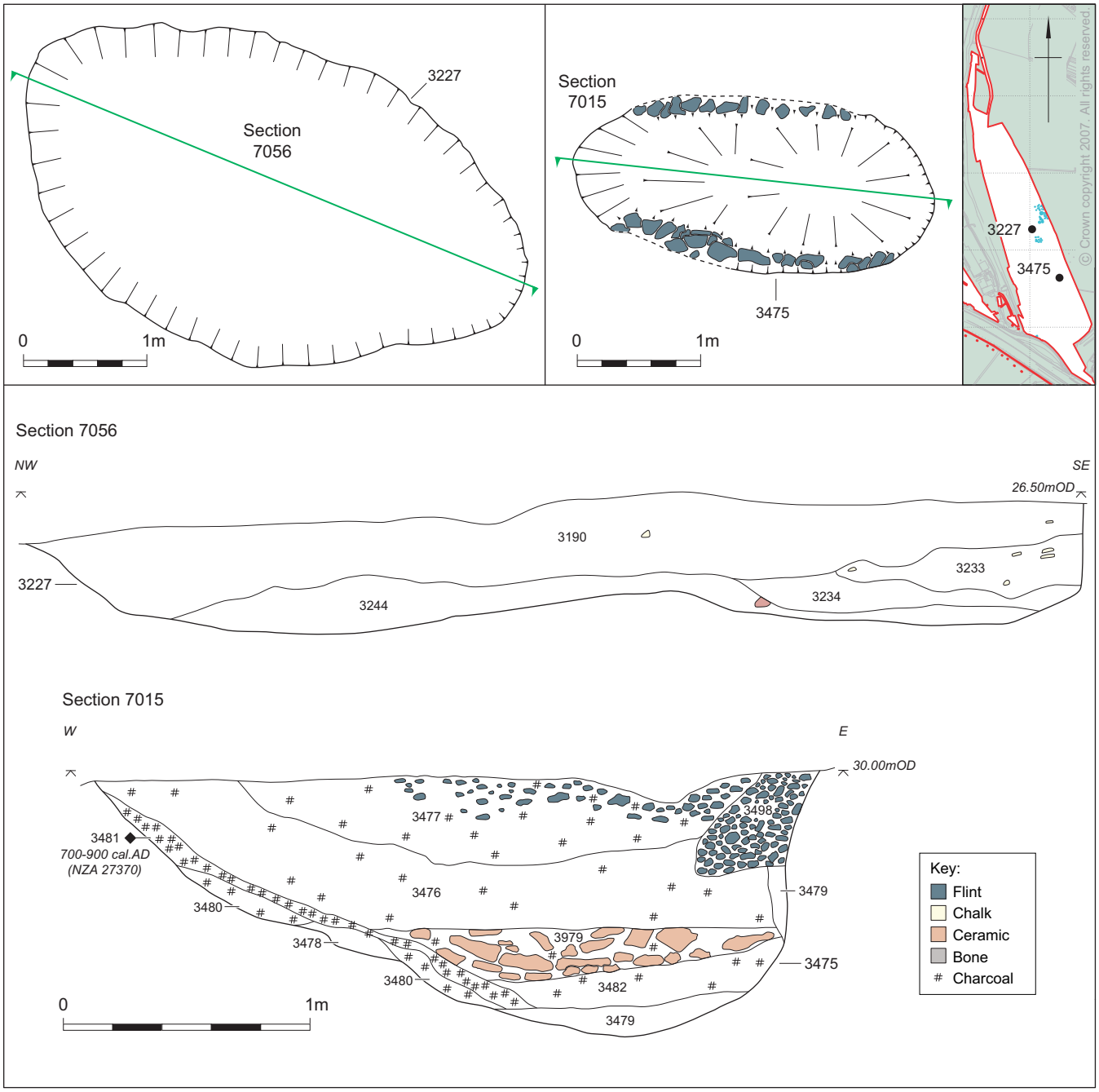

Figure 5.40 Late Saxon crop dryers 3227 and 3475

this point. The extent of the trackway to the south-east is also uncertain but it was traced as far as the Roman temple in property 2 where the chalk and gravel surfaces petered out, perhaps truncated in this area. What was probably a ditch (300353) along the south side at this end continued for a further 70 m, extending beyond the limit of excavation (Fig 5.42). No medieval or later pottery came from the trackway, the associated ditch to the south, or from any deposits in the immediate vicinity. However, a number of horseshoes was recovered from the surface of the trackway which, on typological grounds, have been assigned a probable 14th century date (it might be noted that no horseshoes were found on any of the Roman streets).

Ditch 397504 ran SW–NE and corresponded closely with the existing boundary between Springhead Nursery and the field to the north-west (Fig 5.42). This ditch was *c* 6.50 m wide and 1.25 m deep with an open U-shaped profile, with no evidence for re-cutting. It was filled with a homogeneous mid-orange–grey sandy clay loam with occasional chalk and gravel lenses. Apart from a few sherds of residual Roman pottery there were five medieval sherds of probable 13th century date, all derived from a single vessel. There were no post-medieval or modern finds and this suggests that the ditch was a medieval rather than later feature.

Approximately 60 m to the north-east of ditch 397504 were parts of what may have been the same feature, represented by two lengths of ditch (100/219; see Fig 5.42). They were, however, on a slightly different alignment and both had been heavily truncated by the construction of glasshouses. Ditch 100 was only 1 m

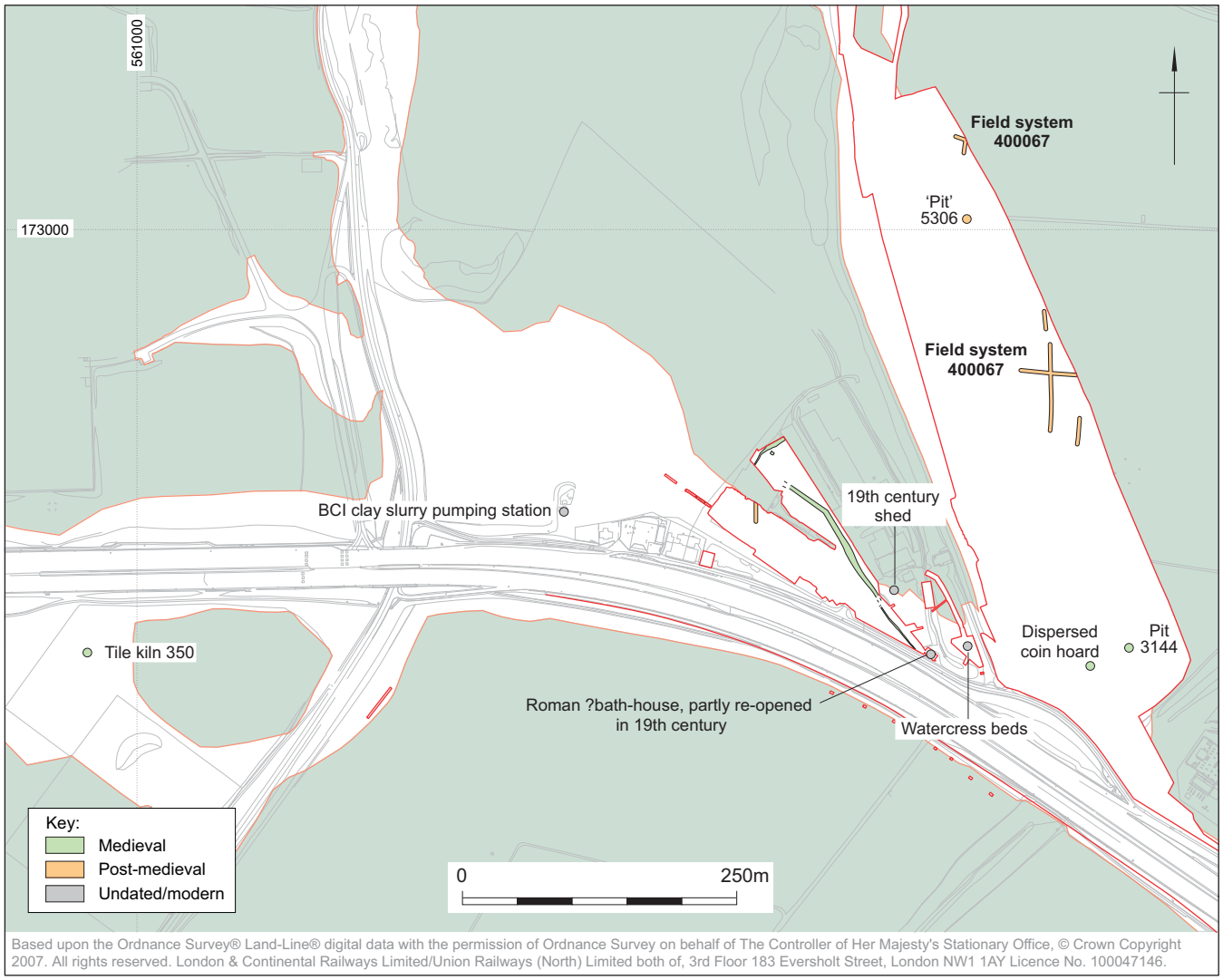

Figure 5.41 Medieval and post-medieval features at Springhead

wide and cut the Roman branch road, whereas ditch 219 was up to 5 m wide and rather more sinuous, perhaps created in part by water run-off where the ditch joined the Ebbsfleet channel. No dating evidence was recovered from either of these sections of ditch, but a medieval or later date is considered likely.

Adjacent to ditch 100 was pit 121, a sub-rectangular feature measuring 3.50 m by 2.30 m and surviving to a depth of 0.40 m (Fig 5.42). Its function is unclear, but it contained a small quantity of medieval pottery. A small pit or scoop, 10306 (not illustrated), at the north-west end of the area has also been dated to the medieval period.

An apparently isolated tile kiln (350) was partly uncovered during landscaping works associated with the construction of a new road interchange 750 m to the west of Springhead Nursery (Figs 5.41 and 5.43). Tile kiln 350 was aligned approximately east–west and was built on a slight promontory at *c* 33 m aOD, the ground surface sloping down fairly gently to the west and more steeply to the south and east. Approximately one-third of it was exposed in plan and section, part of it having been removed during machining with the remainder inaccessible beneath the edge of a cutting for a new

Plate 5.6 Waterfront area at Springhead (ARC SHN02) showing medieval chalk trackway 400160 in centre. The dark soil in the centre background (with foundations in place for new glass houses) reflects the extent of the former Ebbsfleet channel in this area. Looking north

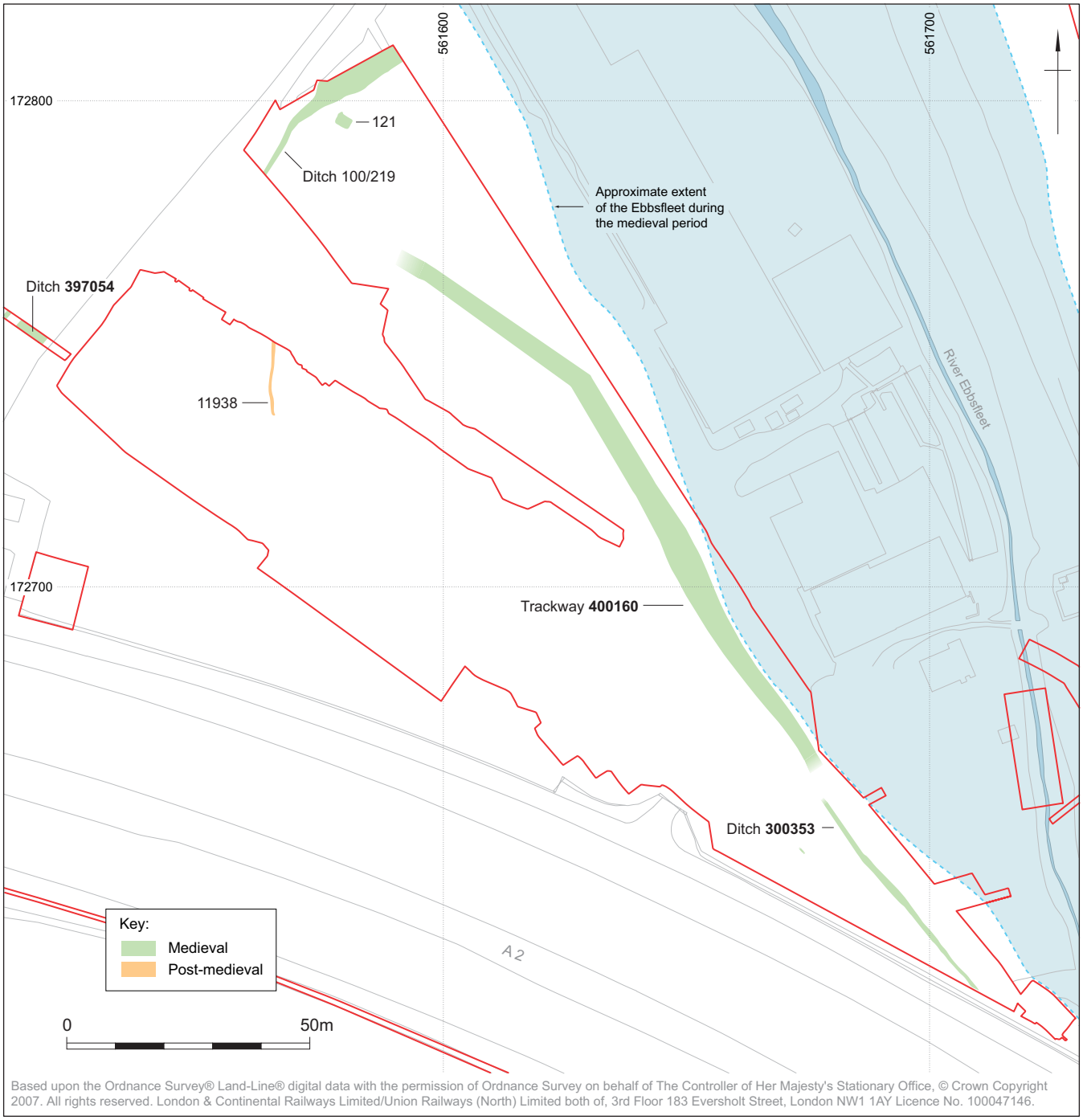

Figure 5.42 Detail of medieval and post-medieval features in ARC SHN02

road. No associated features were identified though the nature of the construction works meant that it was possible that other, more ephemeral, remains went unrecognised or lay outside the area subject to investigation. It was clear from what could be recorded that kiln 350 was dug into the pre-existing ground surface and that part of the stoke-hole, flue, and chamber had been revealed. The plan and section published here incorporates reconstructed elements based on this layout. At the east end was the stoke-hole, sub-circular or oval in plan and perhaps 0.50 m deep, filled with a mixture of sand and ash (362) overlain by burnt sand (352), unburnt sand (353), and tile debris (355), the upper layers extending into the flue. In the base of the slightly narrower, 'waisted' flue was a further deposit of sand and ash (364) overlain by burnt sand and some tile debris (363).

Above this was a substantial 'stack' of roof tiles (354: 27 'courses' were recorded), some oxidised and the remainder reduced, overlain by further tiles (357) and chalk blocks and flint nodules (356), the latter probably representing the remains of the collapsed flue arch. The south-east corner of the chamber was exposed at the west end, with two square post-holes – one smaller (366) and one larger (365) – probably holding posts which formed part of the arch between the flue and chamber. From the small area that was exposed it was clear that the chamber was rectangular (or square), but it is

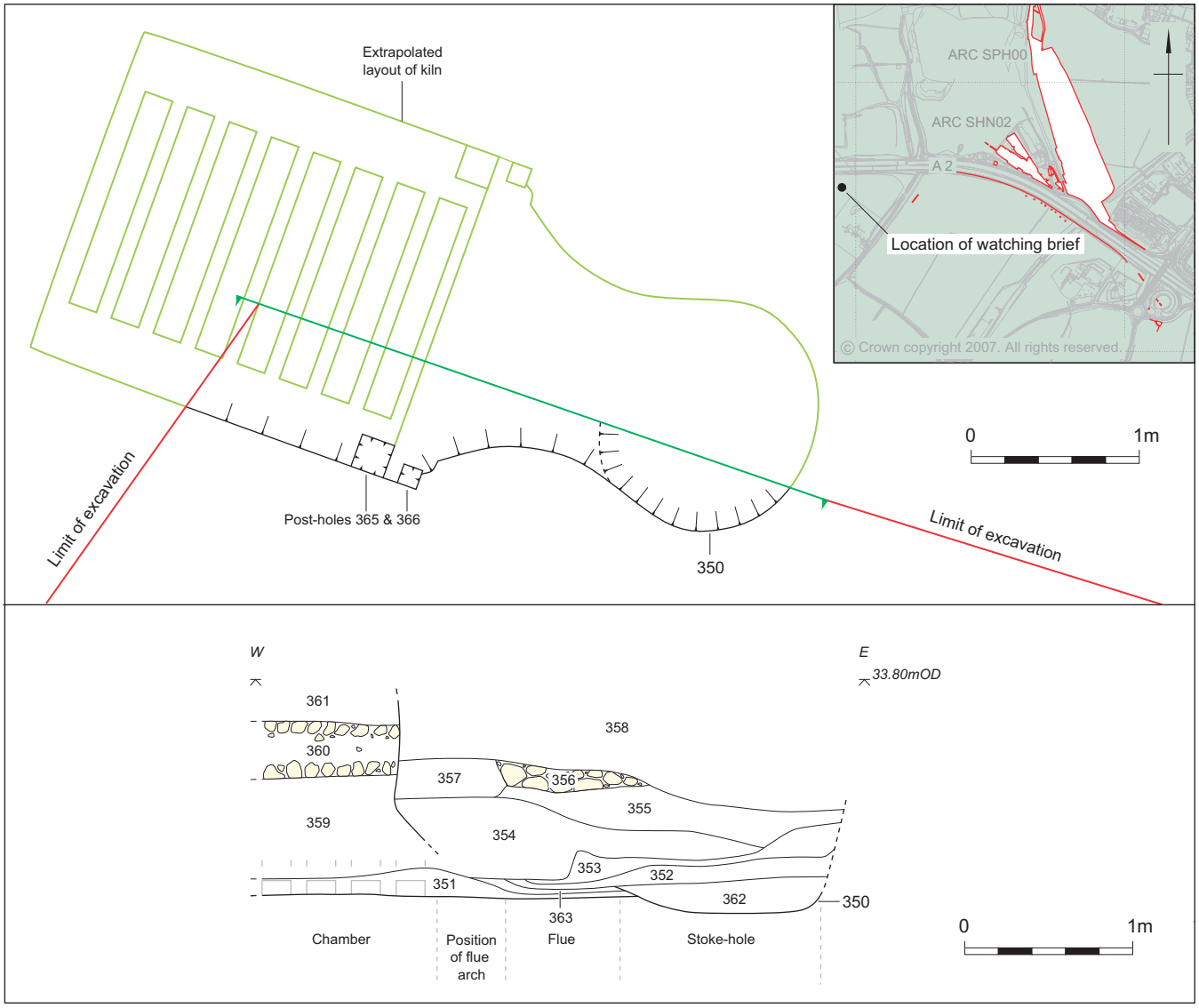

Figure 5.43 Medieval tile kiln 350

uncertain what the walls were built of and what the internal arrangements were. In the base was an ashy layer (351), similar to the basal layers in the stoke-hole and flue. This was overlain by a thick deposit of tile debris (359) which was in turn sealed by two layers of chalk blocks separated by further tile debris (360), the chalk blocks most likely representing part of the collapsed sides or roof of the chamber. The quantity of tile present and the 'stacked' arrangement apparent in layer 354 suggests that, when the kiln was abandoned following its final firing, the contents were disturbed but not removed, perhaps a result of there having been an accident during firing and the tiles not being suitable for their intended use. A late medieval or possibly early post-medieval (14th–early 16th century) date is likely for kiln 350, based on the nature of the kiln as well as its products. The fabric of the tiles was a fine sandy silty micaceous clay containing quartz sand and lesser quantities of a dark rock, probably iron (see Poole, Vol 4, Chap 4). It is probably of significance in terms of this discovery that a field named 'Tilers Field' is recorded in the vicinity of Springhead (Penn 1966, 70) though its precise location is unknown.

A single, small pit (3144) was identified on the crest of the slope towards the southern end of the site (see Fig 5.41). However, from the subsoil approximately 50 m to the south-west of this a dispersed group of four pennies and a halfpenny dating to the first half of the 15th century was recovered by metal detector. It is suggested that they may possibly represent the contents of a pilgrim's purse (see Kelleher, Vol 4, Chap 2), either lost or deliberately buried.

Finally, during the excavation of a substantial trench for electricity cables, a group of horse bones was found at a depth of *c* 2 m on the crest of the slope towards the northern end of the site. The mostly disarticulated (though not butchered) remains represent parts of at least three individuals and lay in what appeared to be a pit (5306; see Fig 5.41). Pit 5306 was irregularly shaped, measured 1.90 m by 1.30 m, had vertical sides and was excavated for a further 0.80 m below the base of the cable trench, but continued deeper than this. No other finds came from the sandy fill, which was not clearly differentiated from the surrounding natural deposits in this area. However, a radiocarbon determination of cal. AD 1440–1530 (NZA-28179; 372±25 BP) was

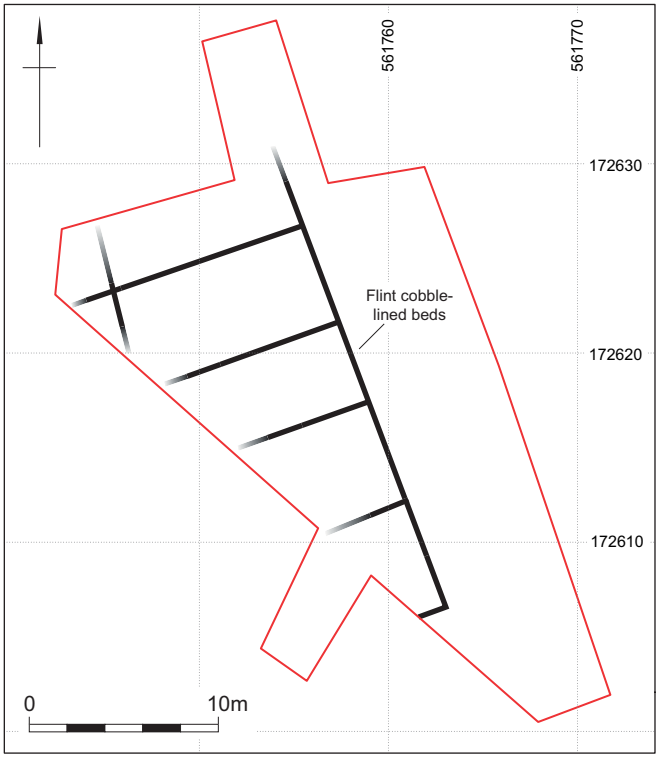

Figure 5.44 Post-medieval watercress beds

obtained from a scapula (see Barnett Vol 4, Chap 7). It seems likely that this pit (which had not been recognised after machine stripping of the surface) was a dene hole, perhaps opportunistically used later for the disposal of parts of several horse carcasses.

Northfleet

Allowing for the inevitable damage to the post-Saxon deposits caused by the machine stripping of trenches and areas, enough was exposed and recorded across the area to clearly indicate that, after the two episodes of demolition/salvage of the mill in the first half of the 8th century, the area was almost completely abandoned.

The only economic activity that this area appeared to sustain was fishing and this may be supported by the remains of what appears to be a basketry fish trap (19441) to the north-east of the mill tailrace (not illustrated). Cut into deposits dating much later than the mill, it comprised worked timbers and degraded wattlework. The damaged assembly contained rectangular section oak battens made by hewing halved poles flat. These battens were then pierced with many small holes into which very small rods were inserted and woven together. The stems appear to have been a mix of one year old hazel and alder (see Barnett, Vol 4, Chap 8). The whole assembly was then possibly anchored by stakes and later much damaged by scouring.

Of interest with these remains was a broken perforated oak disc (19401) which contained a series of holes of different sizes arranged in concentric rings, some containing pegs, set around a large central hole. This may have been the collar at the entrance to the fish trap, a device to allow the fish or eel to enter the basket through the central hole, but not to escape again, a device common to basketry fish traps worldwide, and so very difficult to typologically date.

Another small area of collapsed wattling (19408; see Chap 6, Fig 6.9) was exposed along the north side of the mill bank, approximately 20 m east of the mill. It was seen to be overlying layer 11509, and as such is therefore post-Saxon in date.

Post-medieval and Modern Features

Springhead

A small number of post-medieval and more modern features were recorded at various locations in the vicinity of Springhead (see Fig 5.41). At Springhead itself, several field boundaries of probable post-medieval date were identified on the higher ground to the east, while a group of features concentrated around the head of the Ebbsfleet are likely to have been associated with the watercress industry that was established there at the beginning of the 19th century (see discussion below). Other structures recorded prior to demolition but not described further here (details in archive) include a 19th century brick shed at Springhead Nursery and a Blue Circle Industries (BCI) clay slurry pumping installation on the north side of the A2 approximately 250 m to the west of the nursery.

Several narrow, shallow ditches or gullies aligned either north–south or east–west lay on the higher ground in the north-eastern part of ARC SPH00 (see Fig 5.41). These ditches formed part of a rectilinear field system (400067) that extended over a considerable area, with further elements being identified to the east during subsequent excavation in 2005 outside of the HS1 land-take area (WA 2006). As a result of truncation by recent deep ploughing it was not possible to establish the overall dimensions of any of the fields, although it might be noted that two of the north–south ditches lay approximately 25 m apart. The ditches remain undated, but one of them cut two of the ring-ditches belonging to 7th–8th century cemetery 300258 (see above) and on this basis it is thought that they were part of a late medieval or early post-medieval field system, though an earlier medieval date cannot be ruled out. Certainly, none of the more recent field boundaries depicted on 19th century and later maps correspond with the recorded layout of earlier ditches.

A series of unmortared 'dwarf walls' constructed largely of flint nodules were found at a depth of approximately 1.2 m below the existing ground surface on the east side of the Ebbsfleet close to its former source (see Fig 5.44). These 'walls' lay at *c* 5.4 m aOD, sealed by 19th century and later infill, and were aligned approximately north–south or west–east. They appeared to form a series of adjoining rectangular beds, each measuring approximately 12 m by 5–6 m, and are

believed to be post-medieval watercress beds (see discussion below). A line of at least five beds was recorded running approximately north–south, reflecting the course of the Ebbsfleet at this point, with others to the west closer to the existing channel. The 'walls' generally survived to a maximum height of no more than 0.20 m and were approximately 0.30 m wide. They lay on or just above the gravel of the riverbed, surrounded by a dark homogeneous soil that produced almost exclusively Roman metalwork and pottery, a deposit likely to represent surviving Roman material in the bed of the Ebbsfleet.

Table 5.1: SFB dating summary for SFBs at Springhead and Northfleet

SFB no.	Site	C14 date cal AD	Occupation (O) Post-occupation (P)	Pottery date range
5809	Springhead		P	550–650
127	Springhead		P	550–650
16635	Northfleet Villa	420–570	P	–
16636	Northfleet Villa		P	450–600
16637	Northfleet Villa			–
16638	Northfleet Villa		P	400–600
16999	Northfleet Villa			–
30057	Northfleet Area 6		P	450–700
30107 (3971016)	Northfleet Area 6	430–600	O	450–700
30119	Northfleet Area 6	390–540	O	450–700
20186	Northfleet Sports ground		P	450–700

Northfleet

The archaeological record of the Northfleet site is a clear indicator of its continuing isolation in the medieval and post-medieval periods. The upper stratigraphy of the area displays a continuation of the slow alluviation of the area. It appears that, in the absence of the influence of tidal action, the Ebbsfleet River redefined its course through the area. Structure 11584 (see Chap 6, Fig 6.9) was revealed to the east of the mill, oriented NW–SE and lying (*in situ*) along the southern edge of the post-medieval peat-filled channel, in what had been the backwater of the Roman quayside and later the Saxon mill leat. The structure comprised one elm and three oak planks, all displaying saw marks, set on edge and supported by a total of six oak piles, two along the south side and four along the north side. The total length of the structure was 3.35 m. The function of the structure is difficult to determine, but it could represent a simple revetment of a short stretch of the Ebbsfleet bank, perhaps to facilitate the loading or unloading of a small boat, or even provide a rudimentary fishing platform. The presence of clay pipe fragments in deposits surrounding the structure confirms the post-medieval date implied by the saw marks.

Discussion of the Saxon Settlement

In 1848 archaeologist C R Smith was alerted to the site of the construction of the new London to Dover railway just south of Northfleet. Remains of brooches, bones, and pottery were being unearthed. Smith welcomed the opportunity to uncover more about the little understood Saxons but, in his report on this early Saxon cemetery, Smith pointedly remarked on the difficulties caused by this unplanned and reactive sort of archaeological investigation, carried out in the midst of a huge construction site. 'Working under those constraints' he said 'was not the process most favourable to antiquarian research' (C Smith 1848, 236).

One hundred metres to the south and just over 150 years later, the process has been repeated, this time in advance of rail and road building, and this time with vastly more sophisticated and integrated pre-planning by the archaeologists and civil engineers. However, some problems faced by Smith in 1848 are even now unavoidable – excavations prompted by linear infrastructure developments inevitably provide 'letterbox' snapshots of buried landscapes and settlement patterns.

While single, very compact, sites like that of the mid-Saxon mill and its pond, can be thoroughly investigated and – in themselves – well understood (see Chap 6), the dispersed nature of early Saxon rural occupation and activity will almost always be incompletely revealed, and the confidence with which conclusions are drawn must inevitably be qualified. Such was the character of the early Saxon settlement pattern in the Ebbsfleet valley, on the basis of the archaeological evidence recovered from Northfleet and Springhead; probably incomplete, but nevertheless allowing worthwhile discussion and cautious conclusions on this problematic period.

Distribution and Chronology

A total of 11 sunken-featured buildings was revealed, spread out along the Ebbsfleet for a distance of over 3 km (see Fig 5.1 above). Despite the varied geographical constraints of the different sites, and the varied investigative strategies from complete excavation to watching brief, it is clear that this evidence represents low density occupation. However, does it represent a sizeable group of people settling in one area, albeit in a dispersed fashion, for a few years, or a smaller group, perhaps only an extended family, resident for some decades, but occasionally adding a new building or removing an old one, and slowly 'migrating' across the landscape? As Table 5.1 shows, and as is detailed by Mepham (see Vol 4, Chap 1), little precision is possible in the artefactual dating assemblage, but the tentative conclusion – supported to a degree by the radiocarbon dating – is that the settlement represented by the SFBs found in the vicinity of the villa, in Area 6, and in the Western Roman Complex site, can fit within a 5th–6th century framework, whereas the pottery evidence from Springhead possibly suggests a slightly later date range, from mid-6th to the mid-7th centuries.

Some support for seeing a slight chronological distinction in the Northfleet and Springhead SFBs can

be construed in the evident chronology of the nearby Saxon cemeteries. The first, situated south of Northfleet church within 100 m or so of the SFBs found on the villa site and exposed initially during the building of the railway in 1848, has been dated to the late 5th and 6th centuries (Richardson 2005, Vol 2, 59–60; see below). In contrast the two Springhead cemeteries (see below), are dated to a range beginning in the early 7th century.

Continuity of Occupation

The degree in which one might see continuity of settlement form and location and landscape exploitation, between the end of the 4th century and the 7th century is a perennially contentious one, both in the specific terms of north and west Kent and the estuary, and indeed in the broader context of lowland England as a whole.

Why were the incomers settling on the site of the villa at Northfleet? There appears to have been a gap – possibly of at least 50 years – between the end of the Roman occupation and the beginning of the Saxon occupation. If there was a noticeable gap between the villa ceasing to be occupied as such, or least an end to the villa as a functioning household, and the construction of the SFBs, what was it that made the incomers settle here?

The apparent reoccupation of the Roman site might be a misleading impression generated by the circumstances of excavation – because that is where the excavation took place. All of the SFBs of the three groups under study were situated broadly along the same terrace of elevated ground to the south of the Ebbsfleet channel, between approximately 4 m and 5 m aOD. The pottery recovered from them points to dispersed, short-lived, and contemporaneous settlement. Aside from their coincidence of position, there is no indication that some of the SFBs were deliberately sited here because it was the site of the villa *per se*. Taking the evidence as a whole it seems much more likely this area was occupied because it was a suitably dry area of ground within easy reach of the river – the same rationale perhaps as influenced the settlers in Area 6 or the Western Roman Complex sites, or indeed the Springhead SFBs. In the recent review of Saxon archaeology in Kent, Welch stresses the important – if mundane – fact, that incoming 5th and 6th century settlers would be attracted to sites endowed with accessible resources and access to communication channels and water, just as the Romans were (2007, 194). The site of a villa, even after a few decades of dereliction, would still represent a conveniently cleared settlement platform.

In considering the nature of the early Saxon evidence, the later presence of the mill, and the implication that there was probably a high status involvement in its construction and operation, makes it tempting to retrospectively ascribe elevated status or special qualities to the early settlement. While it is not out of the question, it is important to remember that it is almost certain that none of the SFBs at Northfleet or at Springhead co-existed with the mill. The mill's construction is dendrochronologically dated to the winter of 691–2 (see Chap 6). The Saxon pottery from the villa site, Area 6, and the Western Roman Complex site points to a period of occupation probably ending no later than the early 7th century, and even the latest probable limit of the occupation upstream at Springhead was the mid-7th century. However, the cemeteries at Springhead provide a potential chronological overlap, beginning in the early 7th century and continuing until the start of the 8th century, indicating that there was almost certainly continuous shifting settlement in the valley at this time.

The Character of the Early Saxon Settlement

Permanence of settlement or permanence of structural elements within settlements were not common characteristics of early Saxon settlement. Compared to what had gone before this was a semi-nomadic society, in marked contrast to the static culture of Romanised Britain. There, wealth and status were rooted in land ownership and the productive arable capacity of that land, and was displayed in conspicuous and static consumption, investment in public buildings, and the holding of public offices.

The laying out and maintenance of carefully demarcated fields and property boundaries seems to be a consequence of the nucleation of settlements. Where there was ample land and no competition, and a greater reliance upon low density pastoral subsistence farming rather than organised cereal farming, there was no need to expend effort in demarcating land boundaries (Miles 2005, 183), or maintaining them. Apart from one small gully at Springhead – which was probably part of a small domestic enclosure – no evidence was found for any field system defined by ditches contemporary with the early Saxon settlement at either Northfleet or Springhead.

The 'ownership' of land did not represent status or identity; status derived from the portable wealth of livestock (principally cattle) and was displayed with personal adornments and personal influence within a kin or tribal group. The disinterest of these incomers in adapting to any remnant of the 'Roman' way of life they found is less of a puzzle when one considers, as Barnwell suggests, that the settlers were themselves (or just one or two generations removed from) immigrants from the northern fringes of the Roman Empire on the Continent, and so had never become too familiar with, or adapted to, Roman civic society in their homeland (Barnwell 2003, 6).

Structural characteristics of the SFBs

Hundreds of SFBs have been discovered in the last few decades across lowland Britain – indeed many early

Saxon sites are only stratigraphically visible by virtue of the ubiquitous 'SFB pit'. The degree to which efforts were initially directed towards categorising SFB 'types' has, arguably, distorted their interpretation and inferred too much regimentation in their building, giving the impression of the prospective SFB builder in 6th century England choosing from a precise but limited catalogue of permitted building options. The more SFBs are uncovered the more it is clear that individual preferences, skills, and the availability of resources (both human and material) probably played a larger part than is apparent in the form of the SFB, regardless of the intended or actual function or functions of the building. Tipper's review (2004) of the corpus of SFBs in the archaeological record has examined many of the traditional tenets of accepted wisdom and has found some of the assumptions regarding the form and function of these structures do not stand up under more informed modern examination, supported by much more evidence.

The two SFBs found at Springhead and the group of five SFBs found on (or close to) the Roman villa site at Northfleet highlight an issue that Tipper addresses (*ibid*, 64–92), namely the variety of structural layouts within the basic SFB form and the implications both for interpreting the form of the individual buildings and, arguably, their intended or actual functions.

One of the two at Springhead displayed a familiar layout of a sub-rectangular pit and two substantial post-holes but the other was more complicated in its layout and less substantial in its build. At Northfleet, five SFBs were revealed in the overall footprint of the main villa complex, broadly lying along the higher ground to the south of the main Ebbsfleet channel at the time. The pit of each was dug into the silty sand natural and, consequently, all were relatively well defined as rectangles with rounded corners and near vertical sides. As a group these five SFBs were of slightly more modest dimensions than those found in Area 6 to the west, or the two at Springhead.

Two of the five (16335 and 16638) displayed the conventional layout of a sub-rectangular pit with a deep post-hole at either end. In the case of the former, one of the post-holes was situated outside the pit. The other three SFBs displayed some further variations. SFB 16636 had a single post-hole centrally positioned at one end and one offset post-hole at the other end. This seems illogical as a support (whether for a roof or a floor) but, if the recorded (but unexcavated) soil-mark on the other side of the pit (see Fig 5.7 above) is considered to be a corresponding post-hole, one can envisage that one end of the building had an 'A' frame construction, possibly designed to allow a more unobstructed access. SFB 16637 displayed two gable end post-holes and one central post-hole, all within the pit footprint. By contrast, SFB 16699 displayed just one structural post-hole and a possible replacement, both situated within one end of the pit.

Looking at the group of three SFBs on Area 6, two (30107 and 30119) displayed the 'conventional' two-post arrangement, although a possible 'step' was recorded in the pit side of the former. In sharp contrast to these two was SFB 30057. Although it was not completely exposed, the pit displayed an arrangement of three post-holes along one end, all within the pit, and structurally incorporated with a narrow beam-slot extending around all four sides of the pit. The beam-slot seems most likely to have supported shuttering around the edge of the pit; with no evidence of a sunken floor surface, the shuttering was presumably intended to consolidate the space under the suspended floor, and prevent erosion of the sides.

Lined SFB pits are not common but examples are known from a number of sites – for instance SFB 12 at West Stow, Suffolk (West 1985, 20; fig 59) and GH110 and 205 at Mucking, Essex (Hamerow 1993, Vol 2, 13; figs 64 and 71), where traces of pit lining were noted by the excavator or inferred from the straight sides of the pit. In both these cases, as with SFB 30057 in Area 6, there is no obvious structural reason why they should be lined while others nearby are not. The lining would presumably prevent erosion of the sides but to infer that this indicates that the sunken pit was in use (as a working area) is difficult to accept given the absence of any indication of a floor surface, whether artificial or trampled.

Could the presence of a pit lining be seen as an indicator of a specialised function for the building, possibly implying greater status for its occupants? At West Stow, SFB 12 contained not only the largest assemblage of finds of any of the SFBs on that site, but also the most 'female' assemblage, on the basis of the total of six bone combs, loomweights, and a girdle hanger (West 1985, 20). By comparison, the distinctive feature of the recovered finds from the pit fills of SFB 30057 was the largest animal bone assemblage by far from any of the 11 SFBs under study (see Grimm and Worley, Vol 4, Chap 6). Apart from the expected domestic animals, seven of the SFBs contained occasional fragments of red deer bones in their fills, but SFB 30057 alone produced 31 antler fragments and at least three fragmented red deer skulls. Such a concentration is notable – was this evidence of a 'special deposit'?

A 'special deposit' is a term coined to define the apparently deliberate burial of human or animal remains in other than a formal burial context and for reasons other than basic or routine rubbish disposal. It is a phenomenon recognised for some time in post-Roman settlements of north-west Europe and seems to have associations with buildings – either their construction (as in a 'foundation deposit') or abandonment/demolition ('termination deposit'). In a recent examination of the evidence by Hamerow (2006) the difficulty of distinguishing a 'special deposit' from routine rubbish disposal or an abandoned bone cache is acknowledged (*ibid*, 2). It is suggested that termination deposits are comparatively widespread in Saxon settlements (*ibid*, 28), although this may be simply due to the fact that the pit of an abandoned SFB is an ideal repository

Table 5.2 Comparative dimensions of SFBs at Springhead and Northfleet

SFB	Site	Length (m)	Width (m)	Depth (m)	Subsoil	No. principal post-holes	No. subsidiary post-holes
127	Springhead	3.8	3.1	0.10	Sandy silt	2	2+
5809	Springhead	3.6	2.4	0.25	Sandy silt	2	none
16635	Northfleet Villa	3.2	2.4	0.24	Sandy silt	2	none
16636	Northfleet Villa	3.0	1.8	0.06	Sandy silt	2	5
16637	Northfleet Villa	4.2	3.0	0.24	Sandy silt	3	none
16638	Northfleet Villa	2.8	2.2	0.20	Silty clay*	2	none
16999	Northfleet Villa	3.2	2.9	0.20	Sandy silt	2	none
30057	Northfleet Area 6	3.4	2.4	0.52	Sandy silt	3	none
30107 (3971016)	Northfleet Area 6	4.2	2.4	0.34	Sandy silt	2	none
30119	Northfleet Area 6	4.4	3.2	0.40	Sandy silt	2	none
20186	Northfleet Western Roman Complex	3.9	3.2	0.27	Sandy silt	2	none

* Roman Phase 2 ditch fill

for *any* deposit of material, whether casual or deliberate, routine or ritual; SFB pits are often almost the only substantial negative features on an early Saxon settlement site. The deposit within SFB 30057 could represent an antler worker's waste deposit, and there are good parallels, for instance at Abbots Worthy, Hampshire (Riddler 1991, 45–50). However, at least one red deer skull had shed its antlers and antlers were present on the skulls of the second and third individuals (see Grimm and Worley, Vol 4, Chap 6). This suggests that the assemblage does not represent primary antler working waste. So if the three deer skulls seem unlikely to represent rubbish, they may then be some 'special deposit', but whether they represent a foundation deposit, or a termination deposit, or some other expression of ritual sentiment, it is impossible to say.

In no case with any of the 11 SFBs was there any clear evidence that the base of the pit was used as a floor during the life of the building. However, the grouping of finds in the base of some of the SFB pits could support the contention that underfloor storage was possibly one function of the sunken feature of these buildings. In SFB 30119, the group of lead loomweights from one corner of the pit (see Fig 5.8) could well have been placed there, rather than discarded. However, it is accepted that the term 'special deposit' could also be applied to these artefacts.

While the interpretation that the floor of an SFB was the base of the pit may have been largely discarded in recent years, the very shallow depths of some SFB pits (even allowing for later plough truncation) has encouraged alternatives to storage to be considered. SFBs 16636 and 127 are the most obvious examples in the group of 11 under study, with a pit depth as little as 0.06 m (see Table 5.2). An air gap – even a very shallow one – under a wooden floor would make for a much warmer and drier interior.

Considered as whole, it is notable that there is virtually no evidence of re-building of any of the SFBs (except possibly at one end of SFB 30119). The life of an SFB would clearly be dependent upon a number of variables, and lifespan estimates are correspondingly varied, ranging from 10 to 50 years (Hamerow 2002, 31). The absence of evidence of either re-building, or other infrastructure elements, or long-term rubbish disposal, suggests that a lower figure is likely. This reinforces the idea that the occupiers were essentially a transient population and that the settlement was relatively short-lived.

Structural parallels

Table 5.3 catalogues the variation in dimensions of the SFBs from a number of sites of varying size across central and southern England. The range of variation in size and depth of the Northfleet/Springhead SFBs fits comfortably within that of other sites, although none approach the scale of the large examples at Mucking, directly across the River Thames, or Pennyland in Buckinghamshire.

Material culture

Aspects of the finds assemblages recovered from the fills of the SFBs and associated features shed light on both the settlement's chronology and its character. It is understood that finds assemblages recovered from SFB fills are usually representative of post-use deposition, after the SFB has been abandoned and the superstructure removed (Tipper 2004, 102–3). This may be primary deposition – material deposited directly into the SFB pit (or more commonly secondary deposition) where the material accumulates in a midden – which is then periodically cleared and dumped in a convenient pit. That there was little or no difference in the pottery from the lower SFB fills compared with the upper fills (apart from the degree of fragmentation) supports the contention that the site was short-lived, with (in terms of the pottery) occupation and abandonment of the SFBs being essentially contemporaneous.

The animal bone assemblage has some distinctive features; it is notable that the proportion (among the domesticated animal assemblage) of cattle bones is greater at Northfleet than at Springhead – and at

Table 5.3 Comparison of 5th–7th century SFB dimensions

Site	No. of SFBs	Geology	Length (m)	Width (m)	Depth (m)
Abbots Worthy (Hampshire)	5	Chalk	2.50–3.10	1.75–2.75	0.11–0.95
Barrow Hills (Oxfordshire)	45	Gravel	2.80–6.50	2.10–4.45	0.11–1.03
Bishopstone (Sussex)	3	Chalk	3.70–4.40	2.70–4.00	0.40–0.90
Mucking (Essex)	207	Gravel	2.18–7.47	1.70–5.40	0.10–0.90
Pennyland (Buckinghamshire)	13	Gravel	3.00–6.40	2.30–4.30	0.10–0.60
Old Down Farm (Hampshire)	6	Chalk	2.40–3.76	1.70–2.90	0.20–0.72
West Heslerton (Yorkshire)	130	Various	1.65–6.59	1.01–5.40	0.07–1.19
West Stow (Suffolk)	69	Sand	2.40–5.8	2.00–4.90	0.15–1.10
Higham Ferrers (Northamptonshire)	12	Various	2.30–3.97	2.14–3.04	0.09–0.43
Northfleet/Springhead	11	Sandy silt	2.80–4.40	2.20–3.20	0.06–0.52

(based on Tipper 2004, table 21, and Hardy *et al* 2007, table 5.2)

Springhead the relative proportion of pigs is greater than at Northfleet. This may reflect the different environments with a increasing percentage of woodland in the upstream areas. This is in contrast to other comparable sites both north and south of the Thames (see Grimm and Worley, Vol 4, Chap 6). The high percentage of pigs may point to the proximity of extensive woodland although this is clearly not the case in the vicinity of the SFBs at Northfleet. However, the environmental indicators suggest the presence of an increasing percentage of woodland just a kilometre upstream, in the vicinity of Springhead and its hinterland.

The evidence from a number of sites in recent years that suggests that a high relative proportion of pig (compared to cattle or sheep) within a settlement's bone assemblage is an indicator of high status (Hamerow 2002, 131). The settlers' meat diet was supplemented by small quantities of hare, red deer, roe deer, and wild boar as well as domestic fowl. Fowling and fishing activities were undertaken as well. The results appear to have formed only a minor element of the diet although there was no systematic sieving programme to recover smaller fish bones so the hand-retrieved assemblage may give a misleading impression. Despite the preponderance of pig in the animal bone assemblage, overall there was no strong environmental evidence to suggest that any part of the settlement at Northfleet or Springhead could be construed as a 'consumer' site, as opposed to a 'producer' site.

The proximity of some of the SFBs to the villa complex and the Springhead temple complex inevitably led to some contamination of the Saxon evidence with residual Roman material. Aside from the obvious – the tile fragments, for instance – there were more ambiguous items. Initially the spelt wheat from the SFBs was (reasonably) suspected of being residual. However, radiocarbon dating clearly indicates that the incomers opportunistically continued to cultivate spelt for some time (see W Smith and Stevens, Vol 4, Chap 8).

A significant assemblage of finds was recovered from two small pits at Springhead. The Visigothic brooch (SF 564) from pit 2868 is the only example so-far recorded from Britain (see Schuster, Vol 4, Fig 4, 2 and Pl 5), whilst one of the pots was a bowl with a particularly distinctive and unusual decoration of thumbnail imprints. The contents of the feature, particularly the animal bone, indicate that it was not a grave, but its function and any associations are not clear. No other contemporaneous features were recorded in the immediate vicinity.

It is also of some interest that further sherds of the highly distinctive thumbnail-impressed pottery found in pit 2868 have come from the surface of several features 500 m or so to the south-east, although the features themselves are all of late Iron Age or Roman date (including late Iron Age enclosure ditch 300030; see Chap 2). These features lay on the valley side or on the higher ground above, and no thumbnail-impressed pottery has been identified from the immediate vicinity of the springs.

Historical context of the settlement

Analysis of the early Saxon cultural and political situation in eastern Kent continues to try to answer the basic questions – invasion or infiltration, how and by whom and from where? It has been suggested that the incomers took over eastern Kent 'in full working condition' (Hawkes 1982, 75), with many of the Roman regions and centres of authority or economic power retaining their administrative power and function (Yorke 1990, 27). However, it must be stressed that this seems to have applied (if at all) only in eastern Kent, which was virtually an island – both in the literal sense (Hawkes 1982, 71), as well the cultural and political sense. Western Kent (wherein lie the sites under study) was not incorporated into the kingdom of Kent until sometime in the 6th century. The separateness of Western Kent was later emphasised by the establishment of its own bishopric at Rochester (*ibid*).

Documentary material relating to this period and this area is restricted to the 'history' of the arrival on the coast at 'the shore called *Ypwines fleot*' (this is just possibly the Ebbsfleet of this study, although it is usually taken to mean the Ebbsfleet near Ramsgate) of mercenary brothers Hengist and Horsa. The two were Frisians or Jutes or Saxons, depending on the commentary. Initially contracted as mercenaries by the native king Vortigern, the story tells how they soon changed their loyalties and became the advance guard for an invasion of Saxons. Based entirely on an oral tradition, it is argued that it embodies the somewhat

complex way in which Kent went from being a Roman province to a Saxon kingdom while managing to retain its basic administrative structure intact (Yorke 1990, 26–7). More recent views tend to suggest that the story was essentially a piece of imaginative reconstruction, using a mix of local legend and half-remembered facts to give legitimacy to the later Saxon dynasties.

Unfortunately the archaeology of early Saxon settlements themselves – and the sites in this study are no exception – are frustratingly imprecise in terms of clarifying the identity of the occupants. Were they Jutes, Frisians, Saxons, Angles, or residual Britons? Cemetery archaeology has contributed much – and a large amount of information has come from the concentration of cemeteries and burials found in an area centred on the Darenth Valley. Analysis of the grave goods suggests that the earlier settlers were Saxons and Angles from the Elbe region in the early 5th century (Welch 2007, 234). However, it is clear that the picture deriving from grave goods is swiftly muddied by the introduction of Kentish made copies of continental styles of fitting, and the mixing of ethnic styles generated by intermarriage and changing fashion. The goods of the dead can only say so much about the living.

The impression given by the artefactual resource has been further complicated by accumulating data from the Portable Antiquities Scheme, derived in the last few years almost exclusively from metal-detected finds. The new finds are essentially casual losses, not deliberate depositions (as grave goods), and the proportions of (for instance) different brooch types appears to be at variance to those from graves, a distinction which offers a new perspective on the identity of those who lost them (Richardson, pers comm 2007). In conclusion Welch's recent review of current thinking firmly champions the concept of the advent of populations in the 5th and 6th centuries: 'Migration was a reality for protohistoric and early historic periods across continental Europe' (2007, 201). However, he accepts that their ethnic or tribal derivation may remain beyond solution by traditional archaeological signatures, and further developments in DNA analysis (and resources to apply them) may in time offer a radical new key (*ibid*, 201).

Discussion of the Saxon Cemeteries

In the discussion below, the two Saxon inhumation cemeteries recorded at Springhead as part of the HS1 and subsequent investigations are considered together, except where points relate specifically to one or the other. Certainly, there does not seem to be any chronological, cultural, or sociological differentiation between the two, including the recently excavated larger part to the east (WA 2008), and, as noted above, they may represent spatially distinct burial groups within a single cemetery. Small and relatively self-contained cemeteries, probably in existence for only a short time, are rare in Kent, though a 7th century example was found recently at Mount Pleasant on the Isle of Thanet (Riddler 2006). The Springhead cemeteries represent an important discovery in west Kent where there are four times fewer cemeteries known compared with the larger, eastern part of the county (19 as opposed to 77 examples; Richardson 2005, Vol 1, 59), but they are neither the first nor the earliest cemeteries to have been found in the vicinity of the Ebbsfleet valley.

At Northfleet, at least 26 burials probably belonging to a single, mixed-rite cemetery were encountered at various times between 1847 and 1901, most if not all in the area of high ground known as Church Fields to the south and west of the parish church (*ibid*, Vol 2, 59–60, site 198). This cemetery has been dated to the late 5th and first half of the 6th centuries, and was most likely associated with the settlement represented by the SFBs at the Northfleet villa site (see above) which lay towards the valley bottom approximately 0.5 km to the west. At Betsham, just over 1 km to the south of Springhead, an inhumation burial accompanied by a spearhead and a green glass bowl was found in 1928 (Richardson 2005, Vol 2, 74, site 244), but is not closely dated.

At Springhead itself, a disc brooch (?copper alloy) with incised and punched decoration, recorded in 1848 (Dunkin 1848, pl xl), probably dates to the 5th or very early 6th century, and there is a reference to a Saxon pot, said to be similar to the cremation vessels from Northfleet, being found during railway construction around the same time in the mid-19th century (Richardson 2005, Vol 2, 74 site 243). Also recorded from Springhead is a copper alloy Kentish square-headed brooch, dated to the first half of the 6th century, found during earthmoving in 1984 (French 1984).

The 19th century finds at Springhead have been interpreted as possible evidence for a cremation cemetery but there have been no further discoveries to substantiate this and the brooches may represent stray losses, as does a 6th century small-long brooch found close to the springs in the HS1 excavations. Therefore, the HS1 cemetery provides the first unequivocal evidence for Saxon burial at Springhead, probably dating to the second half of the 7th century, later in date than the previous finds made both here and at Northfleet and possibly contemporary with the mid-Saxon mill at Northfleet (see Chap 6). A later 7th century date would place it alongside a very small number of so-called 'Final Phase' cemeteries in west Kent whose use is confined to this period, notably Polhill (Philp 1973; 2002) on the edge of the Darent valley to the west and Holborough (Evison 1956) in the Medway valley to the east. In neither of these two cases has any associated settlement been identified.

The location of the HS1 cemetery has features characteristic of many other Saxon cemeteries in Kent and further afield in that it lay on relatively high ground, close to the brow of a slope at the end of a ridge, near to a routeway (Roman Watling Street), freshwater (the springs), and what later became a parish boundary (the Ebbsfleet). However, in this case the cemetery lay just beyond the crest of the slope, facing the north and the Thames Estuary rather than south and the Ebbsfleet and

not, therefore, visible from what is thought to have been contemporary settlement in the valley bottom. Richardson (2005, Vol 1, 69–70) has remarked that cemeteries with north-facing aspects are less common than those facing south though perhaps, at Springhead, the steepness of the south-facing slope precluded burial taking place here.

The smaller of the two cemeteries (containing 10 burials) was fully exposed, lying towards the north-west corner of a probably still extant late Iron Age enclosure, but only the western part of the larger cemetery lay within the excavation area. On the basis of subsequent excavation (in 2007–8; WA 2008) it is clear that only between a quarter and one-third of the area of this cemetery has been investigated as part of the HS1 works. Furthermore, there is an increase in the density of burials to the east such that the overall number of graves in the cemetery is approximately 160, those excavated in the HS1 works (26 graves) representing around 16% of this total. In the case of the larger cemetery, any overall conclusions regarding dating, phasing, layout, presence of grave goods, etc, must await publication of the remainder, but some of these aspects are discussed here.

The evidence from the excavated burials indicates a period of use covering the second half of the 7th century but the first burials could have been made a decade or two earlier and the latest at the beginning of the 8th century. Future study of the material from the remainder of the larger cemetery is likely to clarify this. The grave goods provide the principal means of dating the burials, with the available evidence indicating that the two cemeteries are likely to have been broadly contemporary. The objects have been briefly catalogued and discussed above (but see also Schuster, Vol 4, Chap 3) and certain classes can be highlighted which have a particular chronological significance.

There is rather more evidence for the latest use of the cemetery and relatively little for its beginning, though it might be noted that there are two Kentish disc brooches (graves 2827 and 3991, in the larger and smaller cemeteries respectively) but no pendants which are generally seen to replace disc brooches in the mid-7th century. The wearing of single, Kentish disc brooches is seen in the late 6th and early 7th centuries in east Kent, though it is by no means certain that female dress fashions in the east penetrated west Kent. Nevertheless, there is an example of a single, Kentish disc brooch in a grave at Polhill (this cemetery dated to the second quarter of the 7th–8th centuries), which is thought to have been old when it was buried (Philp 2002), and this may also have been the case for the two Springhead examples, particularly that in grave 2827 which was incomplete. Other than this, it is the absence of certain types of object that occur in 6th century contexts elsewhere which has been used to support a date in the 7th century for the establishment of the cemetery at Springhead.

The two sceattas dated to *c* 685–700 provide the best evidence for later burial, both coins being in fresh condition and coming from a single grave (2129) on the north-west periphery of the cemetery. Coin-dated graves are rare, and there are only six with sceattas recorded up to 2005 (Richardson 2005, Vol 1, table 5), with a small number of less certain, older examples and two very recent discoveries noted. The workbox from grave 2629 is also a class of object rarely found and these are generally ascribed to the second half of the 7th century. There are several other objects from graves at Springhead which are more commonly found with burials assigned to the 7th rather than the 6th century. These comprise silver rings and beads (grave 2616), lace tag (grave 3997), and shears (grave 2827) – all more common in the second half of the 7th century – and seaxes (grave 2620, and perhaps also 2121 and 2134, all of which lay together on the north-west periphery of the larger cemetery). In addition to certain types of grave good, the presence of graves surrounded by ring-ditches, of which there are possibly as many as six examples at Springhead, is also a characteristic of some cemeteries of the 7th and early 8th centuries, with few ring-ditches assigned an earlier date. Richardson (2005, Vol 1, 116) has noted that the larger diameter, sometimes annular ditches often pre-date the smaller, usually penannular examples, and this may also have been the case at Springhead. The location of the ring-ditches, apparently confined to the western edge of the cemetery, also supports a relatively late date for these elements, as does the paucity of grave goods from the associated graves, reflecting the general trend of a decrease in number and a much more restricted range of items being deposited from the end of the 7th and during the course of the first half of the 8th century.

Within both cemeteries the graves were widely and apparently randomly spaced, a characteristic of early rural cemeteries. However, closer scrutiny shows what appears to be some evidence for the ordering of graves in north–south rows. This might suggest that graves were marked or still visible when other interments were made and perhaps, therefore, that burial took place over a relatively short period. In the smaller cemetery three north–south rows might be discerned, each comprising three graves, but the evidence here is somewhat tenuous. Rather more convincing is the evidence from the larger, northerly cemetery, which may be divided into a northern group with four possible rows (each made up of between two and four burials) and a southern group with two rows (of four and five burials respectively), the ring-ditches lying to the west of the latter group.

Burial orientation was sometimes difficult to determine from the poorly surviving skeletal remains but, where this could be established, it appears that virtually all lay approximately west-east. However, one of the burials in the smaller cemetery was oriented approximately north–south (or possibly south–north) and that within the largest ring-ditch in the larger cemetery was aligned approximately south–north (see above). Richardson (2005, Vol 1, table 31) recorded only one grave oriented north–south in his sample of 275 7th/8th century graves and so the two examples at

Springhead appear unusual in this respect. It might be noted, however, that five out of 26 burials at the Southampton Stadium site were aligned south–north in a cemetery of similar date to that at Springhead (Birbeck 2005, 30). One other feature of note was the shallow pit (2108) adjacent to the north–south grave in the smaller cemetery which contained human bone, apparently deliberately placed rather than casually re-deposited, but the significance of this is uncertain.

All bodies, as far as could be determined from the limited surviving skeletal remains, were placed in an extended, supine position but there is insufficient evidence to be certain. Very little evidence for coffins was recorded, represented by probable coffin stains in two or perhaps three graves, but this lack may reflect adverse soil conditions and the shallow depth of the graves, as well as the possibility that coffins were pegged rather than nailed together. At Polhill and Holborough coffins were recorded in 13% and 25% of the graves respectively and, in general, it is clear that the use of coffins became more frequent after the beginning of the 7th century (Richardson 2005, Vol1, tables 42 and 44). Therefore, the apparent lack of coffins at Springhead may be misleading, as may the absence of any internal grave structures which, though of probably 7th century date, appear to be largely confined to the Isle of Thanet (*ibid*, Vol 1, 119).

There were no obvious patterns amongst the burials in terms of age or gender though the evidence for the latter, based on the skeletal remains, is very limited. Furthermore, the incomplete excavation of the larger cemetery is likely to have some bearing on any such conclusions that might be drawn. Nevertheless, a grouping of six immature individuals in the northern part of this cemetery could reflect deliberate zoning. Furthermore, one point of interest is that grave 3903, within the largest ring-ditch, contained a possible male which was perhaps the oldest individual amongst the cemetery population so far identified.

Analysis of the human bone from the ten graves in the smaller cemetery identified one (2105) that was possibly male and one (3993) that was possibly female, the former accompanied by a knife and the latter by a spear, a knife, and a copper alloy buckle. Where the assemblage of grave goods accompanying the burials appears to be gender specific (Geake 1997) a tentative sex has been assigned. The skeletons in graves 2101, 2112, and 3703 are assumed to be male on the basis of the weapons (all spears) accompanying the burials. The skeleton in grave 3991 is assumed to be female on the basis of the disc brooch which accompanied it. Of the 13 graves comprising the northern group in the larger cemetery, two contained skeletons identified as male (graves 2129 and 2620), the former accompanied by a spear and two sceattas, the latter by various items including a seax, a spear, and an iron buckle with associated fittings. Four other skeletons in graves containing weapons (comprising a sword, a seax, and three spears) are assumed to be male (graves 2121, 2134, 2522, and 2643), and a skeleton in a grave containing silver rings and beads is assumed to be female (grave 2616). Of the nine graves in the southern group within the larger cemetery, one contained a probable male (grave 2783) accompanied by a knife and a spear. The skeletons in two graves were accompanied by a workbox (grave 2629) and a disc brooch (grave 2827) respectively and on this basis they are assumed to be female. The skeleton in grave 3903, within the largest ring-ditch, has been identified as a possible male, this accompanied by a knife.

Overall, therefore, the osteological evidence indicates two males, one probable male, two possible males and one possible female. The nature of the grave goods might indicate another seven males and four females.

Twenty-eight of the 35 burials could be aged, and these comprised 11 adults, eight adults/subadults, one subadult/juvenile, six juveniles, one juvenile/infant, and one infant. A high proportion of juveniles were present in the northern group within the larger cemetery but, because of the incomplete excavation of this cemetery, the difference cannot be considered as significant. Incomplete excavation may also explain the virtual absence of infant burials which might be confined to other part(s) of this cemetery.

Grave goods were present in 26 of the 36 graves at Springhead (excluding the one only partly excavated), representing a figure of 72%, close to Richardson's (2005, Vol 1, 137) overall period total of 70% for single graves in Kent (percentages by date are not given). The majority of graves contained only one or two objects though three had four different types, one containing a male skeleton (grave 2620) and two assigned a female gender on the basis of the grave goods (graves 2629 and 2827). Weapons accompanied the bodies in 11 (30%) of the graves, closer to Richardson's figure of 28% for the 6th/7th century than the 40% total for the 7th century, though it should be noted that the figure declines to 2.6% in the 7th/8th century and this is may be of some relevance with regard to Springhead.

Six of the graves of the northern group in the larger cemetery at Springhead contained weapons, with just one example in the southern group, and four in the smaller cemetery. Eight of the graves contained a spear, one contained two spears, and in one or possibly two graves a seax was also present. The two other graves contained a seax and a sword respectively, the latter representing the only grave good present. The numbers here are too small to make reliable comparisons with Richardson's totals from Kent as a whole, but they do broadly tally with his percentages for the 7th/8th century of 84% (spears), 4% (swords), and 4% (seaxes), swords perhaps being under-represented and seaxes over-represented. Of particular relevance is the absence of shields at Springhead, for Richardson records none from any grave securely dated to the last quarter of the 7th century or later, though shields are relatively common in graves assigned a more broad date range covering the second half of the 7th century (Richardson 2005, Vol 1, table 53).

Where age could be determined, all weapons accompanied adults or adults/subadults, as expected for this period, but of particular note is one skeleton identified as a possible female with a spear (grave 2783). Whilst female burials with spears are not unknown, they are rare (Geake 1997, 68–74). There is a theory that the weapons buried, even with males, are done so symbolically to denote rank, and it could be argued that this was also the case with the possible female accompanied by a weapon here.

Discussion of Late Saxon and Medieval Activity

Springhead

The two possible crop dryers excavated at Springhead probably belong to a small late Saxon rural settlement lying immediately to the east, outside the HS1 land-take area. Excavations at this site in 2005 revealed a concentration of several ovens and large pits which have also been assigned a late Saxon date, although no structural remains were identified (WA 2006). This settlement may have been a precursor to the late 11th–late 12th century settlement recorded approximately 250 m to the south-east in earlier excavations (see below) and probably represents an individual part of the shifting late Saxon–medieval occupation of the upper part of the Ebbsfleet valley.

It is probable that the pit (3144) and at least some of the medieval metal finds from the eastern side of the Ebbsfleet (ARC SPH00) at Springhead relate to this small, nearby settlement, which was known as *Wenifalle* from the late 12th century. The name means 'a leap or tract of fallen trees blown by wind' or 'windy field' (Wallenberg 1934, 107). This lay close to the western edge of the parish of Northfleet and excavations at the Pepperhill electricity substation found field boundaries, paddocks, and slight structural remains which have been assigned to three phases spanning the late 11th–late 12th century (Hardy and Bell 2001, 17–19). From the documentary evidence *Wenifalle* continued into the 13th and 14th centuries; recent work to the north of the substation site (OA forthcoming) has revealed archaeological evidence suggesting that the later medieval settlement may have extended (or possibly migrated) further to the north, along the Northfleet road. Though later depopulated, the settlement ultimately survived as a farm (Wingfield Bank) until the 20th century.

The medieval features on the west side of the Ebbsfleet are less easy to interpret but perhaps they relate to a further settlement or farmstead in the vicinity of the springs. Certainly the most interesting feature here is the trackway, as clearly some effort has been put into its construction, with the horseshoes and wheel ruts providing clear evidence of its use by horses and carts. One explanation for its existence may be that it provided easy access to the springs, an important and readily available source of fresh water for both domestic use and for watering animals.

Northfleet

In the late Saxon and medieval periods, the virtual absence of evidence of any human activity – never mind occupation – in the vicinity of the site of the Saxon mill and the Roman villa at Northfleet is striking. It seems that, apart from the occasional fisherman, the area became a deserted landscape of pasture, threaded by fresh water streams and tidal creeks. In contrast to the evidence of late Saxon sea level rises in the estuary (Sidell *et al* 2000, 17), the upper deposits in the mill pond and the mill undercroft show that a relatively dry spell endured into the later Saxon period, during which the tide no longer routinely filled the area and fresh water organic layers began to develop in the undercroft (see Chap 6, Fig 6.7, context 12525).

The Ebbsfleet Valley in its Historical Context

The historical context of the Ebbsleet Valley during the mid-Saxon period is discussed in depth in Chapter 6, in relation to the Northfleet tidal mill. The later historical context of the Ebbsfleet valley is as an element of Northfleet manor, its earliest known mention being in *Domesday*, stating that the Archbishop of Canterbury held Norfluet (Northfleet). It comprised 6 *sulungs* (1200 to 1500 acres [*c* 486–607 ha]), with land for 14 ploughs (*c* 420 acres [*c* 170 ha] of arable). The demesne, the part of the manor usually kept by the lord for himself, had *c* 60 acres [*c* 24.3 ha] of arable. The 36 villagers had 10 ploughs (*c* 300 acres [*c* 121.4 ha] of arable), and there were seven slaves, a church, a mill worth 10 s, a fishery, 20 acres [*c* 8.1 ha] of meadow, and woodland to render 20 swine. The manor's value before the Norman Conquest was £10 and at the time of the Survey it was £27.

By the medieval period the stretch of Roman Watling Street between Dartford and Rochester had fallen out of use as the main thoroughfare and was replaced by a new route that ran from Dartford via Swanscombe to Northfleet, Strood and Rochester (now the A226). The survey of the history of this road undertaken by Hiscook argues that, whereas in the Roman period the natural crossing point of the Ebbsfleet was at Springhead (*Vagniacus*), by the 13th century the Ebbsfleet had silted up sufficiently for a new road route – linking the settlements along the south coast of the estuary – to be realised by a bridge and a causeway carrying the road across the Ebbsfleet valley to the south-west of Northfleet (Hiscook 1968, 228). This probably reflected the more localised nature of social organisation and trade; travellers from London to Dover usually went by river to Gravesend and thence by road. Hiscook suggests that the existence of the Long Ferry at Gravesend ferry by 1293 (from a lawsuit of that year) shows that

Gravesend was probably linked at this time by the new road across the Ebbsfleet leading to Watling Street at Dartford (*ibid*). A stone bridge was built in 1634, replaced by a brick bridge by the end of the 18th century.

Discussion of Post-medieval and Modern Activity

The series of adjoining stone walls at Springhead probably represents the remains of 19th century watercress beds though their precise function and date are unclear. They may have been designed to control the flow of water and their location close to the springs might suggest that they belonged to an early phase of development. If so, they may have been abandoned and infilled relatively early, most likely early in the second half of the 19th century, as there appear to be no later maps, illustrations, or photographs which show watercress beds in this location, though there were beds in the Ebbsfleet channel immediately to the west.

Previous research has supplied much information on the history and development of the Springhead and Kent watercress beds and it is known that watercress cultivation was begun by William Bradbury after he founded Springhead Gardens in 1805 (Eve 1998; Penn 1966). This saw the first use of artificial beds in Britain and arguably the beginning of the watercress industry. At Springhead, the clean and relatively warm water, the gentle slope, and the substrate of gravel overlying chalk with soil on top, provided the ideal conditions for its growth. There are no maps which show in detail the layout of the watercress beds either at Springhead or further downstream, but it appears that at Springhead this began as a simple linear system and developed, possibly as early as 1839, into an irregularly shaped by-pass bed (Eve 2000). The HS1 excavations at Springhead were unable to shed any further light on this development, partly because the watercress beds lay largely outside the area of investigation and partly because the impacts in areas where they might have been anticipated were of insufficient depth to expose any surviving remains. The watercress industry continued to flourish at Springhead until the early 20th century, when large-scale chalk quarrying in the vicinity led to a reduction in the flow of springwater. This resulted in a scaling-down in the area of cultivation, perhaps once again concentrated in the immediate vicinity of the springs, but eventually the beds were abandoned altogether and reverted to reed marsh or were infilled as part of the development of Springhead Nursery from the 1930s.

As part of the expanding watercress business, Springhead Gardens were developed as a tourist attraction from the 1830s by James Silvester and his successors, with considerable rivalry arising between the landowners on either side of the Ebbsfleet (Penn 1966). Amongst the early attractions were gardens, a tea shop, a small museum displaying Roman artefacts found during construction of the watercress beds (see Dunkin 1848; Penn 1966, 71; J Smith 1997, 61–6), and a bath-house. The latter was discovered in 1814 or before when digging foundations for a hut and a cottage was subsequently built over the site. It is tempting to equate this bath-house with what has tentatively been interpreted as a bath-house in property 2 adjacent to Watling Street (see Fig 5.41 above and Chap 2). The discovery that the latter had been partly excavated and the presence of mid–late 19th century pottery on the floor lends some credence to the possibility that this was the building on display to visitors a century and a half earlier and referred to in a visit of 1849 as 'a Roman building just laid open' (Penn 1966, 68). Apart from this, no other remains of the 19th century pleasure gardens were encountered, largely because they lay outside the area of excavation and elsewhere because more ephemeral traces of paths and other garden features appear not to have survived subsequent development of the nursery.

The Saxon and Medieval Environment and Landscape

by Elizabeth Stafford and Catherine Barnett

Direct evidence for the environment of Springhead and Northfleet during the Saxon and later periods was sparser than for the Roman period. The bulk of the information comes from analysis of alluvial deposits in the valley bottom at Northfleet associated with the Saxon tidal mill, supported by the analysis of the off-site master sequences (BH7 and Trench 9, STDR400). Elsewhere the sedimentary sequences at Springhead and on the slopes around Northfleet tended to be dominated by minerogenic alluvial and colluvial deposits. The absence of waterlogged organic remains, together with the paucity of well dated stratified archaeological remains in these locations, unfortunately limited the potential for analysis. Frequently only a broad post-Roman date could be assigned to a large part of these sequences. The exception to this was an organic deposit identified in the channel sequence at the Ebbsfleet River Crossing (ARC ERC01) dated to the mid-Saxon period.

The Saxon Landscape at Springhead

Useful data was gained from the upper layers of the channel sequence in the northern area of ARC ERC01 (Tr 4) at Springhead. There, a body of humic alluvium (context 493) and peat ('the Upper Peat', complex 494) has been dated to cal AD 650–770 (NZA-28866, 1318±25 BP), placing them in the mid-Saxon period. Pollen analysis of these layers (see Scaife, Vol 4, Chap 7) provides clear evidence for an increase in arable activity in the local region at this time, with cereal pollen being common. A single grain of hop or hemp from context 493 may also result from local cultivation (for general information on cultivation of hemp see Dark 2000). Contrasting with the earlier alder herb fen environment

of the Ebbsfleet valley, the floodplain became more open, of rich fen herb character in the mid-Saxon period. Diatom preservation at Springhead in general was extremely poor, but the only two samples suitable for meaningful analysis came from the humic alluvium, context 493, in this section (see Cameron, Vol 4, Chap 7). They show that in the late Roman or Saxon periods, fresh water, non-planktonic, shallow water diatoms dominated the channel. No nutrient enrichment (eutrophication) that is associated with the input of large amounts of organic waste from intensive human settlement and livestock grazing within the catchment is indicated in the assemblage.

Analysis of molluscan assemblages from the post-Roman colluvium infilling the upper part of the channel sequences in the southern area of ARC ERC01 (Tr 1) shows that they are dominated by open country species. The majority of the open country shells are *Vallonias*, with *V. excentrica* being dominant. *Pupilla muscorum*, *Helicella itala*, *Vertigo pygmaea*, and *Truncatellina cylindrica* are also present. This suggests an environment of very open, probably short turfed, grazed downland or areas of trampling, rather than arable agriculture in the immediate vicinity during the Saxon and medieval periods (see Wyles, Vol 4, Chap 8).

The Saxon and Medieval Landscape at Northfleet

The off-site sequences

Analysis of the off-site alluvial sequence in BH7 and Trench 9 (STDR400) indicates a marine transgression and the deposition of the Upper Clay Silts, associated with environments of middle and upper salt marsh, continued in the valley bottom into the post-Roman period (see Bates and Stafford, Vol 3, Chap 3). However, towards the top of the Upper Clay Silt unit there is evidence, in both sequences, that salt marsh was gradually replaced by freshwater reed swamp, with some areas of open water. The Upper Clay Silts are generally overlain in the valley bottom by a laterally extensive fresh water peat unit (the 'Upper Peat'), suggesting a further episode of negative sea level tendancy. Radiocarbon determinations suggest peat accumulation commenced during the middle or late Saxon period. The base of this unit in BH7, at +0.88 m aOD, was dated to cal AD 710–940 (NZA-28620, 1196±30 BP) and to cal AD 650–810 (GU-16003, 1290±35 BP), at +0.72 m aOD, in Trench 9. There is no evidence for further marine incursion in these sequences following the Saxon period. However, it is possible the upper parts of the sequence at these locations have been truncated by modern disturbance. The Upper Peat in both BH7 and Trench 9 was sealed by varying thicknesses of modern made ground. Pollen evidence from the Upper Peat suggests locally fresh water marsh and sedge fen environments. The pollen data suggests that some woodland was still extant in the area (arboreal pollen <10%), but that the landscape was largely cleared; proxy pollen evidence for pasture and particularly arable fields increases in the Saxon period (see Scaife, Vol 4, Chap 7).

The on-site sequences

Useful information on the nature of the local environment in the vicinity of Northfleet Villa during the Saxon and medieval periods is derived predominantly from alluvial deposits associated with the mill wheelhouse and mill pond in the low-lying area immediately north of the gravel spur (see Stafford, Vol 4, Chap 7). These alluvial deposits largely comprise bluish–grey minerogenic silt clays. Very few contexts could be truly described as organic, although many contained small quantities of organic detrital material and occasional woody fragments. The taphonomic problems associated with dating material from such deposits, which are re-worked by their very nature, has resulted in much of the dating relying on stratigraphical relationships. Sequences for palaeoenvironmetal analysis have been targeted where sedimentary relationships with archaeological remains could be clearly demonstrated.

Evidence of tidal conditions

Information on changes in salinity levels within the deposits derive from analysis of ostracods and foraminifera (see Whittaker, Vol 4, Chap 7) and diatoms (see Cameron, Vol 4, Chap 7). Generally the assemblages are relatively diverse and despite the homogeneous appearance of the lithostratigraphy in places, show some variation through the profiles. Overall the evidence from the base of both the mill pond and wheelhouse indicates initially the presence of a tidal creek and mudflats. This is suggested by the occurance of brackish ostracod species such as *Leptocythere porcellanea* in the base of the mill pond (the lower part of context 12205), also common in the BH7 samples, and the abundance of marine plankton in the wheelhouse (context 12538).

Over time, the mudflats exposed at low tide appear to have become vegetated by encroaching salt marsh vegetation and experienced increased silting. The agglutinating foraminifera in particular, which build their shells (tests) from grains of sediment, are an important ecological marker species for low, middle, and high salt marsh. All three recorded in the sequences (*Jadammina macrescens*, *Haplophragmoides* sp., and *Tiphotrocha comprimata*) are herbivores and detrivores living both on the surface (epifaunal) and in the substrate of the water body (infaunal) and are widespread on middle to high salt marsh. The diatom samples were initially dominated by brackish water epipelic species that live in or attached to sediments in the water (*Nitzschia navicularis*, *Diploneis didyma*) and planktonic marine-brackish species (*Cyclotella striata*). This evidence suggests the site of the mill was clearly tidal for at least medium and high water spring tides.

Higher up the sedimentary profiles the diatom assemblages indicate a period where fresh water input increased. This is seen by an increase in the number of fresh water diatom species and a decline in brackish and

marine species, associated with slightly darker more humic laminations within the clay silts in the mill pond (context 12205, at +0.88 to +1.06 m aOD). In the wheelhouse deposits of organic and peaty detritus accumulating within and adjacent to the penstocks (contexts 12532 to 12535, at +0.56 m to +0.85 m aOD) were initially dominated by brackish water aerophile diatoms (air-loving). The overlying, more minerogenic layers (12526 and 12525, +0.84 m to +1.06 m aOD) contained high numbers of fresh water diatoms and in particular opportunistic early colonisers are common such as *Fragilaria* spp. with wide salinity tolerance (but with optimal growth in fresh waters). These non-planktonic, shallow water, fresh water diatoms included *Fragilaria brevistriata* and *F. pinnata*, often associated with less stable conditions and rapidly changing environments. A more diverse group of fresh water diatoms from more stable habitats were present, albeit in small numbers, in the slightly organic layer 12525 (*Amphora libyca*, *Caloneis schumanniana*, *Cocconeis disculus*, *C. placentula*, *Cymbella minuta*).

Broadly, the deposits indicating increased fresh water influence occur at similar elevations to the 'Upper Peat' in the off-site sequences (BH7; +0.74 to 1.01 m aOD and Trench 9; +0.71 to 1.2 m aOD), and may be related to a general period of marine regression dated to the mid–late Saxon period (see above). The evidence for a regression in the Ebbsfleet valley contrasts somewhat with the evidence presented for changing river levels on the Thames floodplain at this time. For the outer Thames estuary, present evidence of sea transgression between AD 800 and 1000. In ventral and east London the River Thames appears to rise in the post-Roman and medieval periods (Sidell *et al* 2000, 17), although a brief period of regression has been suggested between the mid-10th and late 12th centuries at Thames Court in central London (*ibid*). The regression in the Ebbsfleet valley may well be related to very local factors and as such may not be entirely comparable to the sequences from the Thames floodplain. As previously stated, the Ebbsfleet valley has, in the past, acted rather like a sump. In the absence of a major fluvial system, accretionary processes have tended to dominate. It is possible that accumulation of the 'Upper Clay Silts' reached a point where the valley was simply choked with sediment, inhibiting the flow of tidal waters into the upper reaches. The pollen profiles from both Springhead and Northfleet provide evidence for a reduction in woodland cover and an increase in arable activity during this period that may have resulted in significant increase in the amount of colluviation and sediment run-off into the channel system (see Scaife, Vol 4, Chap 7).

Human interference related to the building of sea-walls and land reclamation cannot be entirely ruled out as a mechanism for environmental change during the mid–late Saxon period, although on social and economic grounds it is thought unlikely and there is no direct archaeological evidence for this. Furthermore, evidence from the on-site sequences at Northfleet shows a further phase in marine incursion after the period of peat/organic silt formation. The upper part of the alluvial sequence in the mill pond and wheelhouse was not dated but it is likely that deposition occurred sometime during the medieval period and may be related to the period of increased storminess and flooding that affected the whole of the eastern seaboard *c* 1250–1450. This event was not apparent in many of the sequences examined during either the evaluation or the excavation stages in the valley bottom and deposition may have been very localised and restricted to former creek systems in the Outer Basin. Historical records suggest marsh land in the Thames Estuary and north Kent was being embanked and drained immediately after the Norman Conquest, and it is possible that sea banks downstream of Gravesend, at Sittingbourne and on the Cliffe Marshes, date to this period (Spurrel 1885). Historical records suggest, however, that by the late 13th century the Ebbsfleet River had silted up sufficiently to allow a bridge or causeway to be built close to its confluence with the Thames at Stonebridge (see above). This enabled a direct route for passengers disembarking from the Long Ferry at Gravesend to rejoin Watling Street at Brent, Dartford (Hissock 1968, 255).

Mention in historical records of flood protection measures in place in the Ebbsfleet valley dates to the post-medieval period when the low lying marshes close to the confluence of the Ebbsfleet and Thames frequently flooded at high tides. The embanked London Road which dissects the valley east–west close to Robins' Creek and probably followed the line of the earlier causeway provided protection for a large part of the valley bottom marsh land. Sluice gates on the bridge at the junction of London Road and Stonebridge Road controlled the flow of both tidal water from the Thames and fresh water from the Ebbsfleet River. (Hasted 1797, Vol 3, 302–18).

Vegetation and land use

Onsite pollen data providing information on the vegetation for the Saxon and medieval periods are largely based on a sequence through the fills of the mill wheelhouse (see Scaife, Vol 4, Chap 7). This is supported by data from waterlogged plant remains (see Stevens, Vol 4, Chap 7) and insects (see D Smith, Vol 4, Chap 7) from a range of alluvial deposits associated with the mill.

Overall the environmental evidence suggests a relatively open landscape prevailed in the vicinity of the mill during the mid–late Saxon and medieval periods. The range of tree taxa present in the pollen assemblages from the mill wheelhouse is diverse, however, total pollen numbers are generally small. The lowest values (arboreal pollen <10%) are associated with accumulation of organic deposits (12532–5, 12525) and may be related to increased woodland clearence in the catchment for agricultural purposes. Oak is the most important tree (to 19%) with higher values in the basal context 12538 and upper levels of context 12524. This similarly applied to alder. The latter is, however, a high pollen producer (anemophilous) and the values obtained do not reflect any substantial local growth. There are

occasional occurrences of birch, pine, and elm. These are interpreted as pollen derived from the region as a whole. Lime, ash, beech, and willow are not generally well represented in pollen spectra and may be of more local origin. Hazel is the dominant shrub with highest values in organic deposit 12533 at 28% and it is suggested that there was local growth. Spruce occurs in the upper part of the alluvial profile in context 12524 and is likely to be of medieval date. Being non-native, this occurrence is attributed to planting of exotics probably within the near region. In recent years there have been an increasing number of records of this conifer from the late historic period after its introduction into parks and gardens (Scaife 2000). Juniper is similarly an unusual record for this late period. This pollen may have originated from natural growth of juniper on calcareous soils of the chalk interfluves and North Downs or similarly from introduced planting.

Grasses are the dominant pollen taxa in all samples examined from the wheelhouse. This pollen may derive from various habitats from arable, pastoral, and local fen. Ribwort plantain and a range of other taxa: buttercups, medicks, vetches, docks, and Asteraceae types, are strongly indicative of important areas of local grassland. As seen in the Roman period, the waterlogged plant remains provide evidence for rough grassland, which was possibly grazed, with some patches of barer wasteland. The samples provide less evidence for disturbed soils than seen in the Roman period, and it might be assumed that the level of activity associated with settlement, for example middens and trampling by animals, was lower in the Saxon and later periods. Grazing is most clearly suggested by the presence of a limited number of *Onthophagus* and *Aphodius* 'dung beetles' which are associated with animal dung, often lying in open pasture. Marsh land, with brackish water and salt marsh, is well presented in the environmental assemblages. Reed swamp taxa include sedges, reedmace, or bur reed. Evidence of standing water comes from pondweed, water starwort, and duckweed (*Lemna*).

Exploitation of Woodland and Wild Resources in the Saxon Period

The wood charcoal assemblages at Springhead and Northfleet (see Barnett, Vol 4, Chap 8) for this period are less numerous than those analysed for the Roman period. However, they provide a useful record of selection of woodland resources for mainly domestic scale fuel use within the early Saxon sunken-featured buildings and late Saxon crop dryers. Tree types exploited at this time included field maple, alder, silver/downy birch, hazel, ash, hawthorn, bird cherry, hornbeam, dogwood, holly, blackthorn, and oak. A wide range of available tree and shrub taxa from open woodland, scrub, and hedgerows were therefore collected with no focus on any particular types apparent at this time.

Substantial quantities of waterlogged wood have been recovered from Northfleet, in the main associated with the Saxon mill (see Chap 6). Their analysis demonstrates the requirement for large volumes of mature oak timber, a sensible choice in construction since oak is hard and durable, even under wet conditions, as well as capable of providing the large pieces required. Large numbers of oak, hazel, and field maple roundwood were also identified, often cut at 2–5 years old for wattle rods and 8–10 years old for supports and sails. This indicates the continuation of deliberate management by coppice rotation in Saxon Kent. Some use was also made of ash, birch, willow/aspen, and alder in construction, all locally available types as indicated by the wood charcoal and pollen. The selection of a few other types for specific purposes are also recorded such as a yew peg associated with a beam (context 19147) (see Barnett Vol 4, Chap 8).

The charred plant assemblages, apart from occasional fragments of hazelnut shell, did not produce any real evidence for the collection wild plants during the Saxon and medieval periods. This is due, amongst other things, to the small number of samples available (see Smith and Stevens, Vol 4, Chap 8). Given the diversity of the environments within the vicinity of the Ebbsfleet valley, comprising salt marsh and fresh water marsh, with woodland, pasture, and arable on the higher ground, it is likely that a similar range of plants were exploited to the Roman period.

The presence of bones of hare, deer, wild boar, and wild birds attests to the practise of hunting and wild fowling in the Saxon period at Springhead and Northfleet, although game is likely to have made only a very limited contribution to the diet. The occurrence of red deer skulls with attached antlers in the sunken-featured buildings suggests that they were of some importance at the site and were probably raw material for antler working (see Grimm and Worley, Vol 4, Chap 6).

As in the Roman period, there is some evidence for the exploitation of coastal resources during the Saxon period. A small assemblage of oyster shell was analysed from a mid-Saxon crop dryer at Springhead. There appears to be little or no change in the location, nature, management, and exploitation of the oyster beds between the Roman and Saxon periods. The shells probably derived from a managed natural oyster bed in shallow waters along the open coast of North Kent, the Thames Estuary, or Essex. They were probably fished with a dredge net of a fixed size and there is no indication of any selection procedure. The marine shells appear to have only augmented, rather than formed a significant part of, the Saxon diet. A pattern of a slow disposal process of this group of shells resulting in a mixture of worn, flaky, stained, and broken shells can be discerned. There is no indication that the shells were disposed of from an area used for food preparation or consumption (see Wyles, Vol 4, Chap 8).

Agriculture, Food and Drink in the Saxon Period

by Wendy Smith and Elizabeth Stafford

Springhead

Of the seven samples fully analysed for charred plant remains from this period (see Stevens, Vol 4, Chap 8), early Saxon pits 105 and 2868 both produced indeterminate emmer/spelt glume bases, which suggests that there was continuity in the use of glume wheats. A tentative identification of rye was made from SFB 127, as well as a single rachis node of an indeterminate hexaploid free-threshing wheat.

Celtic bean or horse bean, an indeterminate fragment of either cultivated plum or wild sloe, and hazel nutshell fragments were the only other economic plants recovered other than cereals. In all cases, only small quantities of these crops were recovered. The weed flora is also quite limited, with the exception of the assemblage from late Saxon crop dryer 3475. Weeds typical of arable crops were recovered from this crop dryer, including fat hen, which was particularly dominant, but also corncockle, stinking mayweed, perennial rye-grass, vetches/wild pea, brome grass, and wild/cultivated oat.

Although crop dryers at Springhead suggest large-scale cereal crop processing was taking place at this site, both late Saxon crop dryers appear to have primarily produced charred grain. There was no evidence of sprouted grain and/or detached sprouts, so it unclear whether the ovens were used for malting or parching (drying) before storing grain. Certainly parching or drying grain increases the yield of flour and makes milling easier, as grain with a high moisture content is likely to turn to paste when milling.

Northfleet

Only two samples from 5th/6th century deposits and nine from 6th/7th century deposits were analysed for charred plant remains from Northfleet and, therefore, it is somewhat difficult to draw any conclusions about the data patterns in terms of continuity or change from the Roman period from this relatively small assemblage (see W Smith, Vol 4, Chap 8). Spelt wheat clearly continues in use, possibly locally cultivated, into the 5th/6th century at Northfleet based on spelt grain from SFB 2971013 at ARCBBO dating AD 400–580 (NZA28203, 1601±30 BP) (Barnett, Vol 4, Chap 7). Barley is particularly dominant in 6th/7th century samples, and this may suggest that this crop becomes more important locally in the Saxon period. Notably, rye was not recovered from any of the Saxon charred plant deposits at Northfleet, while Celtic bean or horse bean was recovered in both phases of the Saxon period. A few hazel nutshell fragments were also recovered, although whether these are the waste from food or accidentally came in with wood fuel is not clear. It is quite clear that the charred plant assemblages are not as rich or as well preserved as those from the Roman period at Northfleet. Although this can be viewed as a decline in activities related to arable agriculture (especially cereal crops); the pollen evidence strongly suggests that in the Saxon period the landscape remained cleared.

The pollen assemblages from the mill wheelhouse (see Scaife, Vol 4, Chap 7) contains an abundance of cereal and arable weeds, probably derived from secondary sources such as local crop processing. Cultvation of wheat/barley and rye are indicated and associated pollen of segetals included spurrey, goosefoots and oraches, poppy, and black bindweed. Cereal pollen attained the greatest importance in the organic deposit 12535, along with hemp. Whilst the latter could also be derived from hop (which has morphologically similar pollen grain to hemp), it is most likely to be from hemp which was widely cultivated during the Saxon and medieval periods

Charred free-threshing wheat grains and rachis nodes were recovered from early Saxon deposits at Northfleet (W Smith, Vol 4, Chap 8). As a crop, free-threshing wheat (bread wheat and/or rivet wheat) was not widely adopted in England until the Saxon period, although it remains uncertain if it was a major crop in this instance. It may simply be an intermediate variety of spelt/ free-threshing wheat, which is now rare or extinct.

Of particular note for the mill wheelhouse are beetles indicating the presence of rotting grain such as the 'granary weevil' (*Sitophilus granarius*), the 'saw toothed grain beetle'(*Oryzaephilus surinamensis*), the 'rust red grain beetle' (*Laemophloeus ferrugineus*), and 'the small eyed grain beetle' (*Palorus ratzeburgi*). These species occurred in some numbers in the samples from the wheelhouse and are likely to have been part of the insect fauna of the mill (eg, Freeman 1951; Hunter *et al* 1973; Munro 1940; Pattinson 1958; Tebb 1968).The close proximity of the tidal mill could easily result in major changes in grain storage practices at Northfleet, with a move toward storage of milled flour rather than raw grain or spikelets. Notably, crop dryers were only recovered at Saxon Springhead. The establishment of the mill at Northfleet may also suggest more centralised processing of cereal grain rather than small-scale domestic processing; possibly also linked into feudal control of cereal crops for rent and/or taxation. Certainly laws prohibiting hand milling and requiring tenants to use their Lord's mill are known from the medieval period (eg, Holt 1988).

The Exploitation of Animals in the Saxon Period

by Jessica M Grimm and Fay Worley

Animal bone assemblages dating to the Saxon period were recovered from several SFBs at both Springhead and Northfleet, the mill at Northfleet, and a possible crop dryer at Springhead, the majority of material coming from Northfleet (see Grimm and Worley, Vol 4, Chap 6). The overall proportions of animals differ compared with those from the late Iron Age and Roman periods. Although the staple diet at Northfleet is still beef, pork now comes second, followed by mutton. This

pattern is almost identical to that identified at Mucking Saxon settlement in Essex (Done 1993), but shows reversed significance of ovicaprids and pigs from several other settlement sites in southern and eastern England. The Saxon diet was supplemented by small quantities of hare, red deer, roe deer, and wild boar as well as domestic fowl and fish.

Assessing husbandry practices from these small assemblages is not easy and was only possible for the larger assemblage from the mill at Northfleet. The data obtained for cattle suggests that they were not only kept for meat but also contributed milk and were used for traction. The latter is supported by evidence of pathological lesions including individuals suffering from spavin and osteoarthritis. Cattle were probably bred and processed on the site. The evidence for sheep/goat suggests that these animals were raised for meat, milk, and wool. There is no evidence that sheep or goats were bred on site. They might have arrived on the hoof rather than as dressed carcasses or meat joints. Pigs were kept on site and would have provided meat. Evidence for this comes from the presence of all regions of the skeleton and neonatal individuals. Linear enamel hypoplasia on pig teeth indicates that pig husbandry may have been stretched, causing nutritional deficiency during the animals' first winters.

Horses and dogs were present in the Saxon assemblage. Contrary to observations in the Iron Age and Roman assemblages, no butchery was identified on their bones and it is likely that they were kept as working animals rather than considered as a food. The disarticulated nature of the equid bones suggests that their remains were not generally given any special treatment, but rather disposed of with the refuse from other domestic stock. One use of the horses and dogs may have been in hunting (see above).

Chapter 6
The Mid-Saxon Mill at Northfleet

by Alan Hardy, Martin Watts, and Damian Goodburn

A completely unexpected discovery made during the investigation of the Roman villa wharf surroundings were the substantial timber remains of a mid-Saxon tidal mill and associated features including a spillway, revetments, and sluice gates, all dating to the end of the 7th century (Pl 6.1). Well-preserved by the deep silts of medieval and post-medieval alluviation, the survival of a high proportion of the mill structure (far more than any other contemporary example in the UK) has allowed intensive investigation of its design and construction.

The Evidence

by Alan Hardy and Damian Goodburn

The Nature of the Excavation

The area was originally investigated by means of evaluation trenches, part of the ongoing work on the northern part of the villa complex. The existence of the mill was completely unforeseen and, initially, it was not clearly recognised as such. However, eventually the entire site of the mill building itself, along with the line of the mill pond spillway were excavated; limitations of resources and time precluded total excavation of the mill pond area and thus some Saxon timber structures within the area of pond and the causeway to the south were only partially investigated.

Location of the Site of the Mill and the Pond

The mill was approximately 40 m north of the site of the west range of Northfleet Roman Villa, on a sandbank defining the southern edge of the Ebbsfleet channel on a north-western curve (Fig 6.1). Between the sandbank and the villa was a depression, forming a tidally inundated backwater, which, during the life of the villa, was revetted and wharfed along its southern side and utilised as a loading station for shallow barges. This tidal backwater was adapted to serve as a tidal mill pond. The sandbank between the backwater and the channel thus defined a platform approximately 60 m long and up to approximately 12 m wide at the point where the mill was constructed.

Plate 6.1 General view of the mill from the west

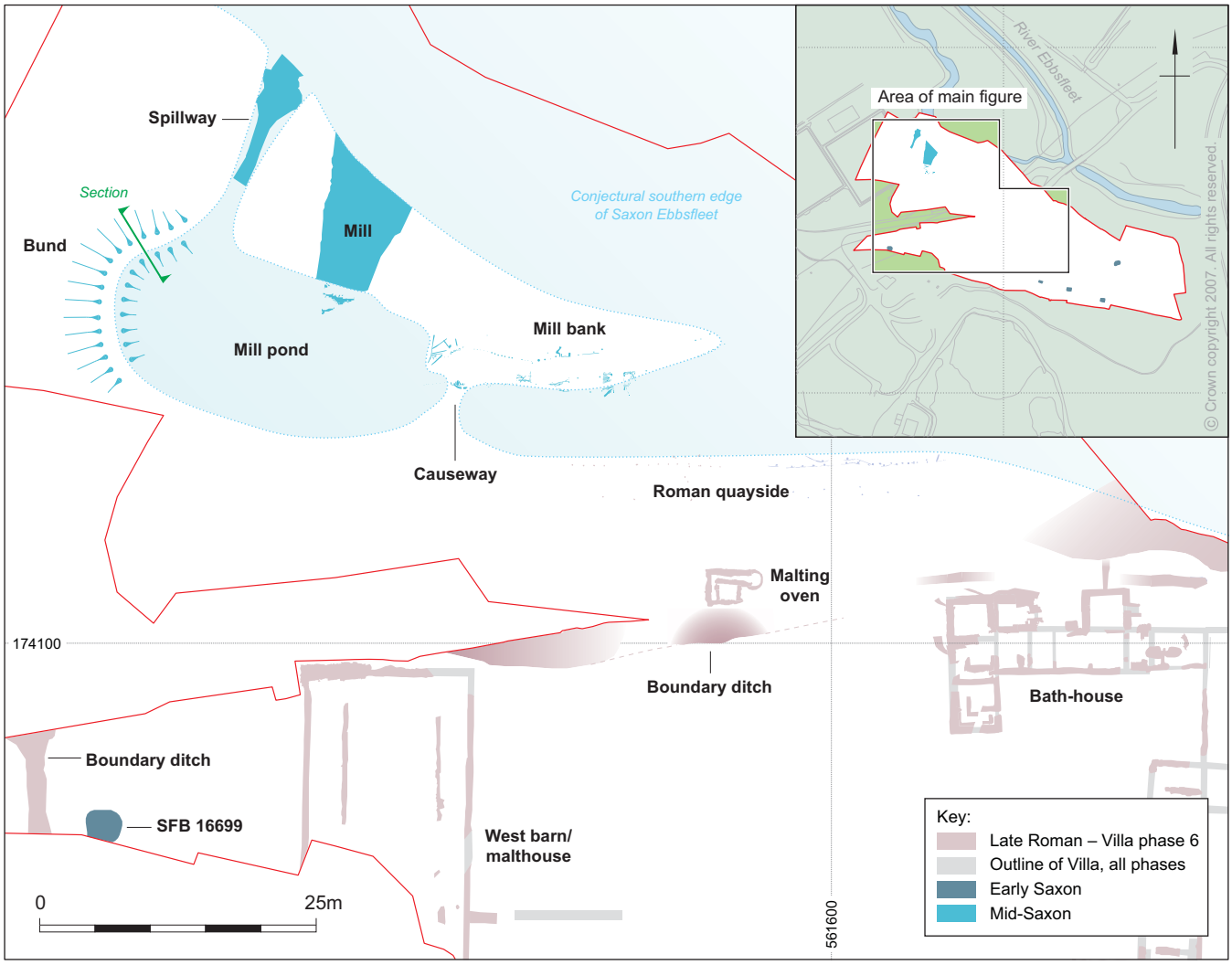

Figure 6.1 The Saxon mill and pond in relation to late Roman activity

The Mill Structure

The undercroft construction cut

The construction cut (12158) for the mill undercroft was identified in the northern part of the area, oriented NE–SW and effectively bisecting the sandbank that separated the main channel from the backwater at this point (Fig 6.2; Pl 6.2). The construction cut was generally flat-bottomed and moderately steep sided, measuring approximately 6 m wide by 9 m long and up to 1.5 m deep. At its southern end the two sides of the cut curved in to give a fairly narrow span of approximately 3 m across the mid-point of the pentroughs (conduits to carry the water to the wheel). At the mid-point of the undercroft the cut widened to *c* 5 m, and at the northern end of the tail-race the cut was up to 7 m wide.

The mill dam

The mill dam comprised two parallel revetments set across the construction cut, approximately 3.2 m apart and constructed of planks on edge and piles. The space between the two revetments was filled with sandy silt (19118) and the two pentroughs were housed into the surviving upper edges of both revetments. A fragmented near-complete wooden bowl made of hornbeam (SF 12771; see Vol 4, Chap 4, Fig 8.2) was recovered from this deposit: was this casually discarded, perhaps debris from the construction gang's meal break, or was it a ritual 'foundation' deposit? Interestingly, a broken wooden bowl was recovered from mill pond deposits at Tamworth, Staffordshire, associated with the phase 3 (9th century) mill, although no potential ritual association is ascribed to its presence (Morris 1992, 104–7).

The southern revetment was formed by three upright piles (19149, 19158, 19162) all *c* 1.3 m long by 0.25 m wide, comprising split logs with roughly pointed ends (Fig 6.3). These were driven into the natural sandy silt (12505). Against the north side of the piles was set a plank wall 3.65 m long, comprising planks laid on edge. The lowest (19163) measured 3.43 m by 0.40 m by 0.13 m. Two housings were cut into the plank to accommodate the pentroughs (see below), although one was evidently cut too wide, with the ensuing gap being filled by an insert (19667; Fig 6.3).

Overlying plank 19163, and between the two pentroughs, planks 19152, 19157, 19177, and 19184, each averaging 0.10 m thick, carried the wall up between, and to either side of, the two pentroughs.

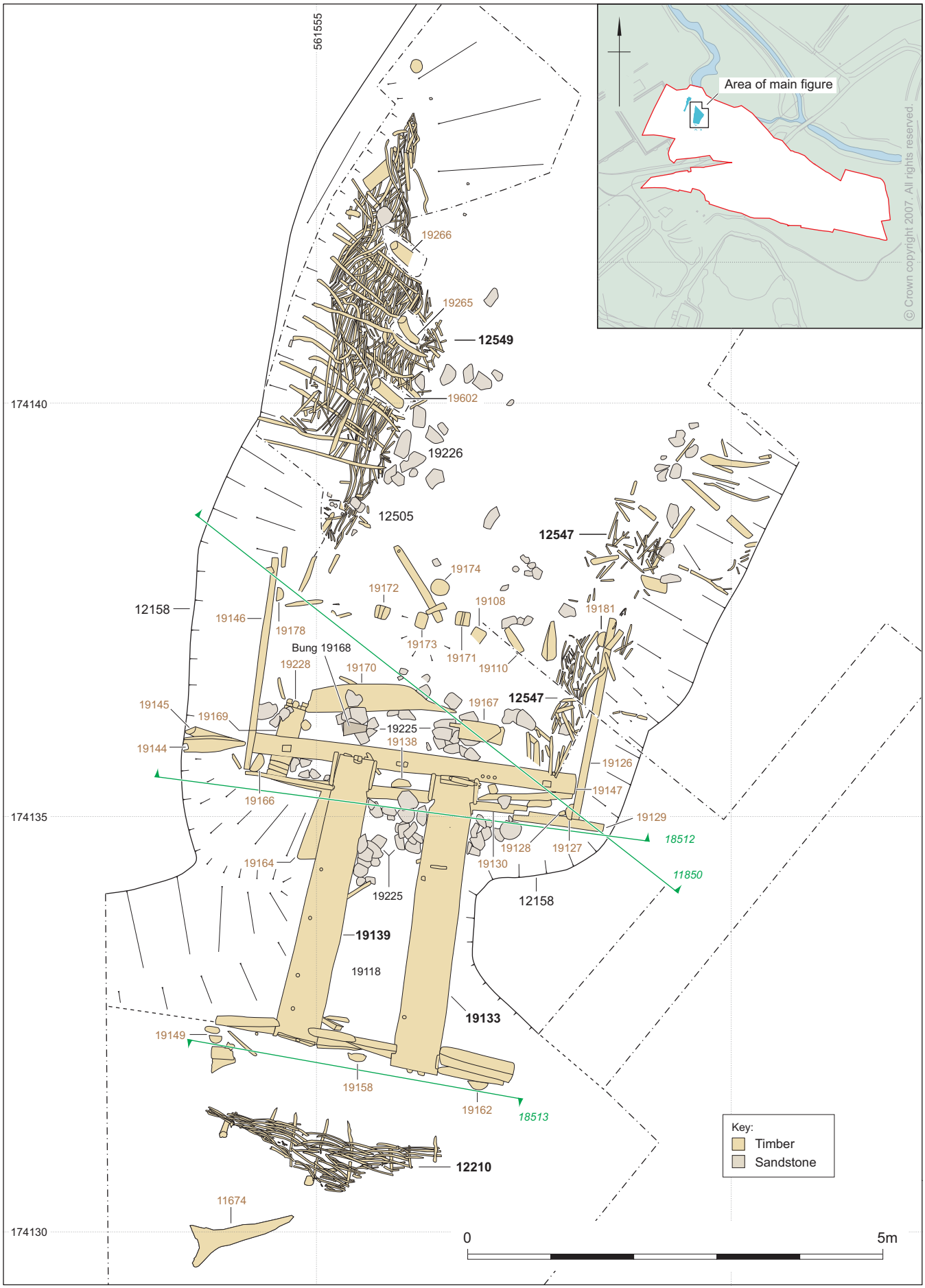

Figure 6.2 Plan of mill and tailrace

Plate 6.2 The tailrace and undercroft from the contemporary Ebbsfleet channel

Plate 6.3 The debris screen in the mill pond

Plate 6.4 The mill dam and pentroughs from the mill pond

A third plank (19161) was evident at the eastern end of the wall. None of the planks was fixed to the uprights; they would have been held in place by the pressure of material behind (to the north of) the wall.

The northern revetment displayed a similar construction style, of planks and uprights (Fig 6.4). The central upright (19138) comprised a halved log, measuring 1.8 m long, as did the two corner uprights (19127, 19166) both of which were approximately 1.5 m long. The faces of both were turned to face out against the two side walls of the undercroft (see below). A further shorter upright (19128: 0.5 m long) was driven in against the western side of 19127 to give added support. The main plank (19130), measuring 3.40 m long by 0.45 m wide by 0.21 m thick, extended from the western end, and was augmented at its eastern end by plank 19129, measuring 1.00 m long by 0.48 m wide by 0.10 m thick. The two planks were joined by an edge-halved scarf joint secured by a single peg (see Fig 6.27b below).

At the western end a further plank (19142) defined the surviving height of the revetment wall. That the original height of the wall was higher was indicated by the height of the uprights, the housings cut into both sides of both pentroughs, and the impression of a plank edge in the top of pentrough 19139 (see Fig 6.6 below).

The area between the north and south plank revetments was filled with a sandy silt deposit (19118) (Fig 6.2). To achieve a more stable bedding surface for the pentroughs, a layer of rubble (19225) overlaid this material against the northern revetment, and more of the same material was dumped between the two pentroughs once they were installed in place. Fine adjustment of the positioning of the western pentrough may have been achieved by the insertion of an offcut plank (19164) under the body of the pentrough before the pentrough was buried (Fig 6.2). Burying the pentroughs would have stabilised them and helped to prevent them drying out and warping.

The debris screen and 'Y' shaped pile

A wattle screen (12210) was exposed approximately 1 m south of the pentrough inlets (Fig 6.2; Pl 6.3). The screen's flattened triangular shape is probably the result of erosion of that part which had projected above the water level. The sails of the screen projected 0.25 m below the weavers, the lowest of which was at approximately 1 m aOD; this level represents the bottom of the pond and suggests that the pointed ends of the rods were driven into the silt below. The bases of the rods were sharpened, implying that the screen was first pushed into the pond bed, then the top was tied back to three supporting stakes. A 'tie-twist' was identified at the screen's western end.

Immediately south of the screen a substantial 'Y' shaped pile (11674) was revealed (see Fig 6.25 below).

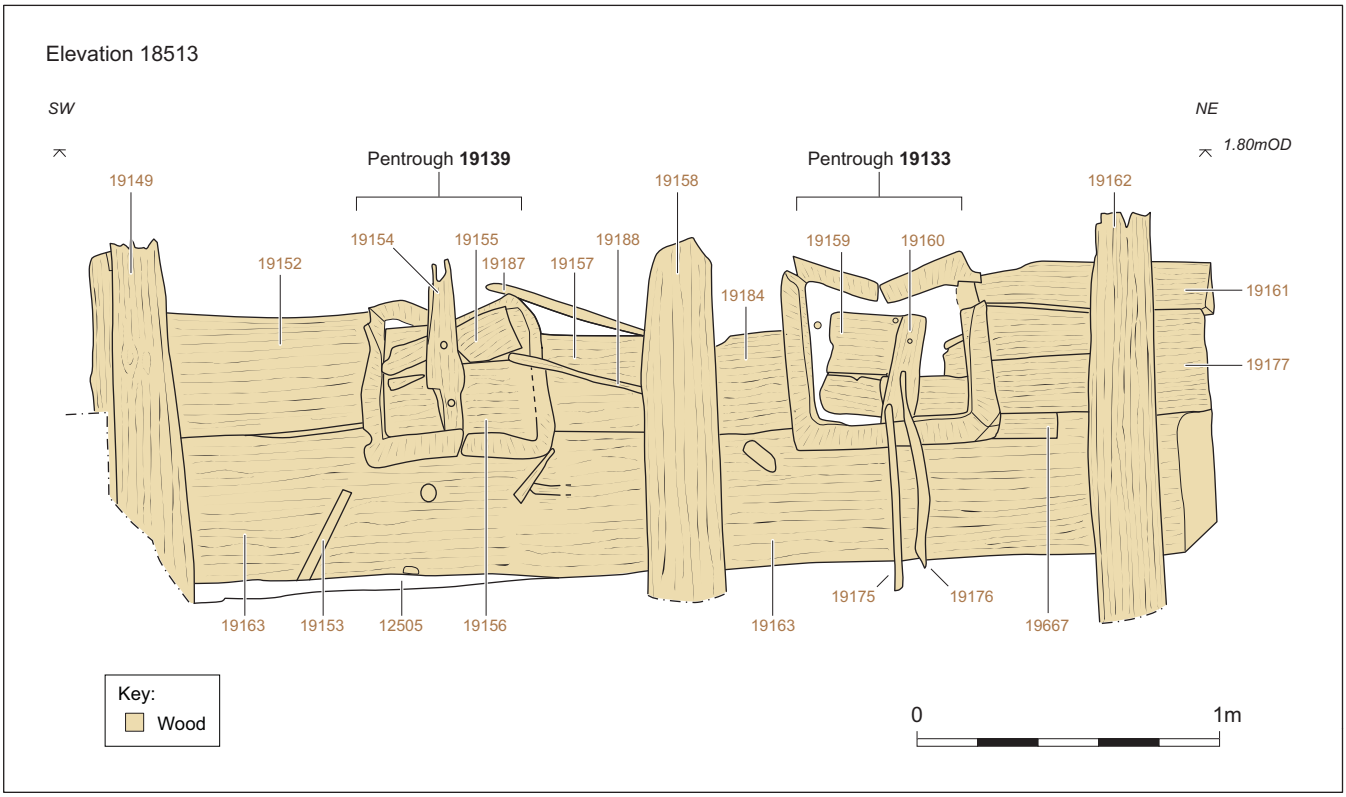

Figure 6.3 Elevation of the mill dam and pentrough inlets

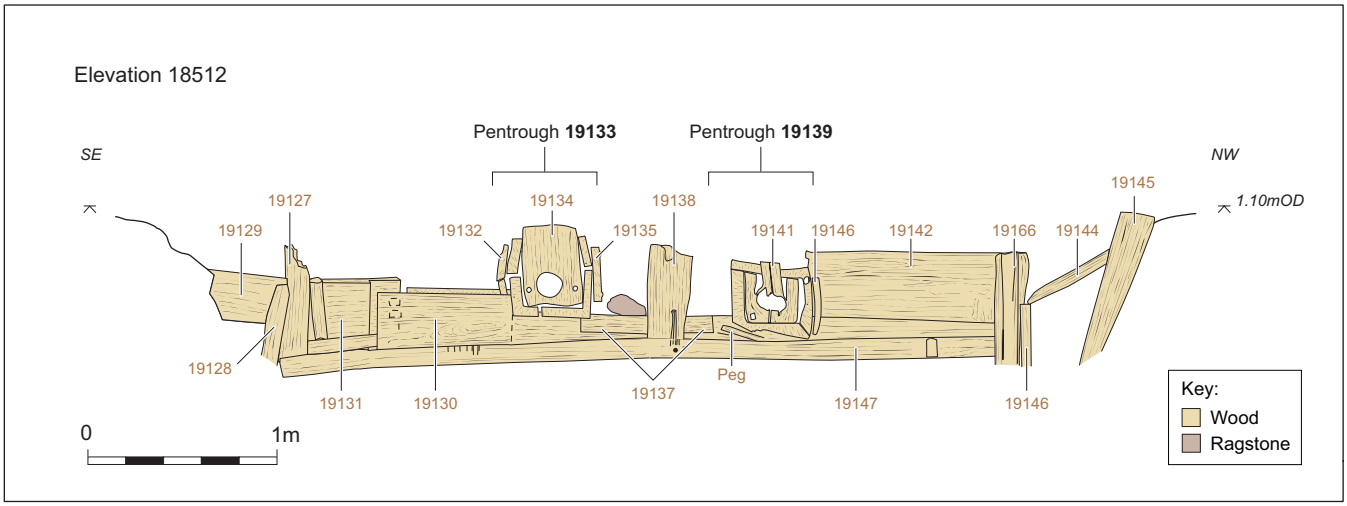

Figure 6.4 Elevation of the mill dam and pentrough outlets

It was partly upright, suggesting that although pushed over, it was probably in its original location. The pile was *c* 1.80 m long with a diameter of 0.20 m and a span at the top of *c* 0.60 m. The crutch of the 'Y' had been worked (or worn) to form a flattened zone approximately 150 mm wide. The function of this pile is uncertain but it may have formed part of the mechanism to control the pentrough inlet sluice gates. This theory is explored further below.

The pentroughs

The two wooden pentroughs were each housed into the two dam revetments to achieve a fall of approximately 0.50 m at an angle of a little less than 10° (Pl 6.4). Both pentroughs were constructed by splitting a large trunk and hollowing out the inside of both halves (see Goodburn below), with one end shaped to achieve a venturi at the outlet (to increase the velocity of the water jet at this point).

Pentrough 19133 (eastern)

The pentrough comprised two half sections (19133 and 19136), together forming a tapering box 3.6 m long (Figs 6.3–5). Traces of moss, acting as a sealant, were found between the edges of the two halves. At each end of both sides angled slots were cut into the pentrough sides forming shallow tongue-and-groove slots to house the planks of both the north and south walls (see Fig 6.27, b, below).

The inlet end of the pentrough measured 0.65 m wide by 0.64 m high (internally 0.47 m by 0.45 m). A rebate was cut into the end, pronounced on the lower

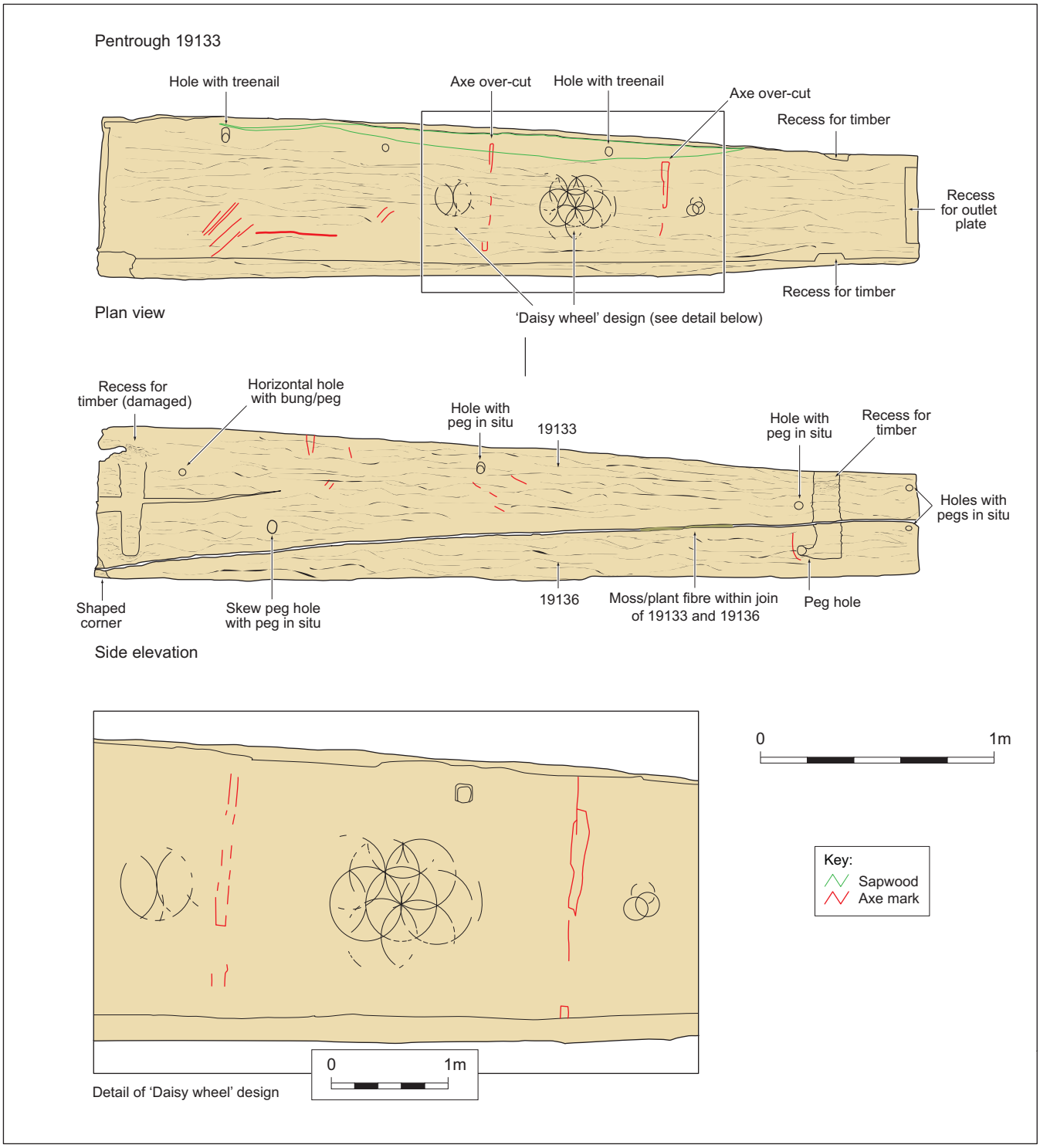

Figure 6.5 Pentrough 19133 plan and elevation, and detail of daisy-wheel

sides but vestigial on the base and at the top of the sides. The top edge of the pentrough was cut back to the depth of the rebate (see Fig 6.3 and Pl 6.2). This was designed to house a sliding sluice gate represented by board 19159, which was approximately 0.20 m thick and pegged to a vertical bar (19160), measuring 0.35 m by 0.18 m by 0.10 m. Comparison with a similar structure on the western pentrough (see below) indicates that bar 19160 would have originally extended above the pentrough and formed part of the sluice control. Two thin withies (19175 and 19176; Fig 6.3) were found in a vertical position against the eastern pentrough sluice gate 19159. These may also have been part of the opening mechanism (see below).

The outlet end of the pentrough measured 0.45 m by 0.42 m, with the end recessed by approximately 0.05 m; the lower edge of this recess displayed a pronounced 'lip' to act as a housing for the end plate (see below), and a sub-circular hole *c* 0.18 m in diameter was cut into the face. The end plate (19134; Fig 6.4) comprised a single 75 mm thick plank measuring 0.47 m by 0.32 m. A slightly tapered circular hole measuring 0.13 m in

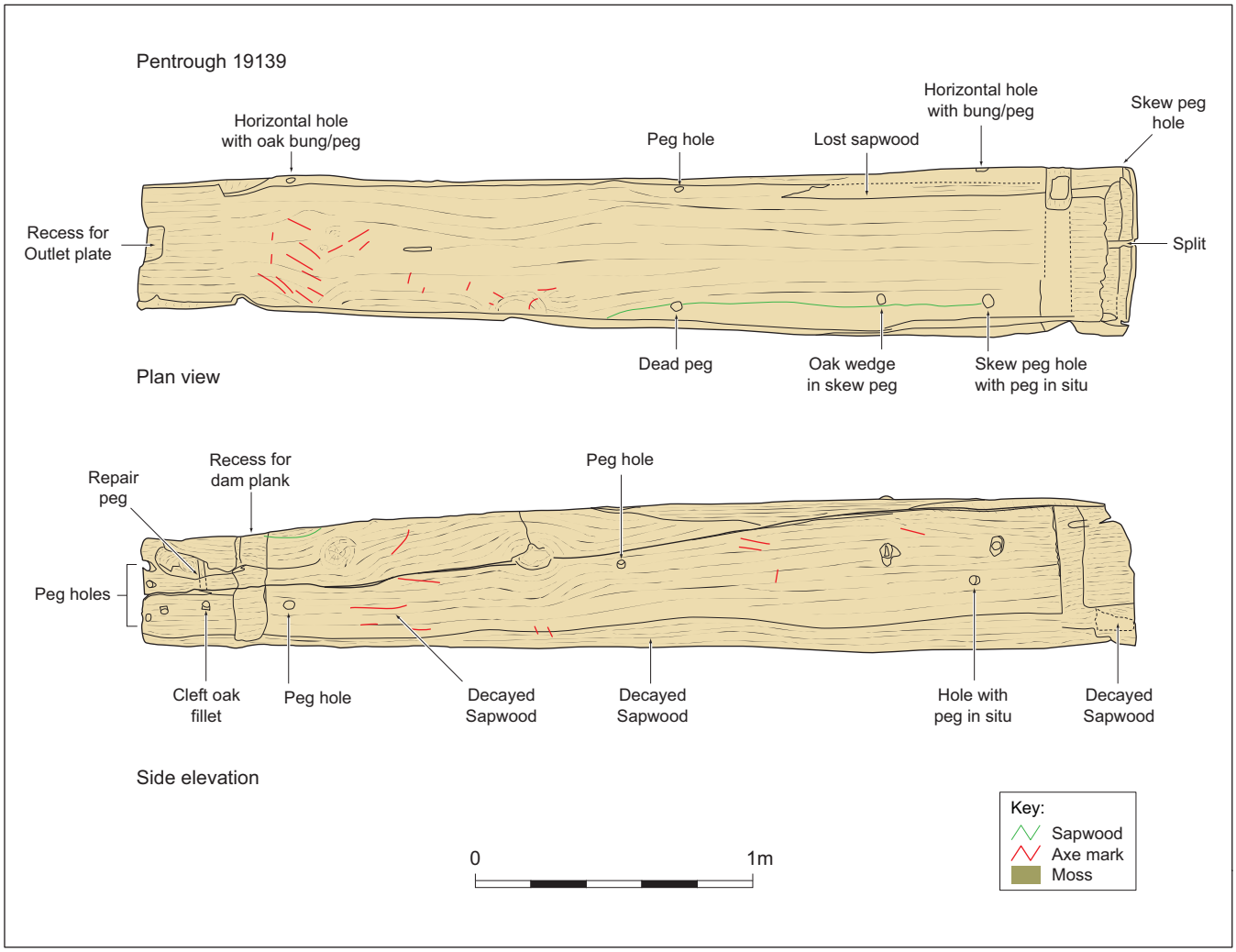

Figure 6.6 Pentrough 19139 plan and elevation

diameter was cut through the plank so that, when it was fixed to the recessed end-face of the pentrough by two oak pegs, the end-plate hole matched that in the end of the pentrough body.

Two brace plates (19132 and 19135) were fixed (each by two pegs) to either side of the outlet end of the pentrough, to prevent the two pentrough halves separating (Fig 6.4; Pl 6.5).

Pentrough 19139

The pentrough comprised two re-joined half sections of a single log, hollowed out, pegged, and finished in the same fashion as the eastern pentrough (Figs 6.3, 6.4, 6.6). The dimensions of the inlet were a maximum of 0.48 m wide by 0.42 deep (c 0.42 m by 0.37 m internally) although the western pentrough had suffered more serious collapse than its counterpart. Within the rebate at the inlet was a sluice gate (boards 19155, 19156), pegged to an upright bar (19154) measuring 0.50 m long (Fig 6.3). A rounded slot was evident in the top of bar 19154, measuring 0.03 m by 0.10 m, the remains of an aperture originally drilled through the bar. This is interpreted as a part of the sluice control.

Two withies, 19187 and 19188, found by the western pentrough sluice gate, may have been served a similar function to those found by the inlet of the eastern pentrough. Another possibly associated withy (19153) was found against the lower part of the dam under the western pentrough sluice gate.

The pentrough outlet (see Fig 6.4) was fashioned in the same way as that of 19133, although the face plate (19141) included a locating peg that slotted into a housing in the top edge of the pentrough. Some collapse of the plate had occurred (due to pressure on the protruding locating peg), resulting in the distortion of the aperture, although a maximum diameter of 0.13 m was recorded. In contrast to the face plate of pentrough 19133, this plate was held in place by four treenails drilled through the sides of the pentrough into the sides of the face plate. One of the treenails showed evidence of re-use. On the western side of the pentrough, the two treenails anchoring the face plate also anchored a brace plate (19166). An oblique third hole drilled though this brace plate may imply that it was re-used, or may just represent a mis-directed drill hole.

The undercroft

The undercroft represents the central part of the mill which would have contained the driven water wheels that were attached by vertical shafts to the millstones on

Plate 6.5 The pentrough outlets. Looking north-east

Plate 6.6 Excavating the undercroft: note the dislodged bung (19168) just north of sill-beam 19147. Looking west

the milling floor above (Figs 6.2 and 6.7; Pls 6.2 and 6.6). Also accommodated within the undercroft would have been a mechanism to raise and lower each water wheel and shaft assembly to alter the gap between the upper and lower millstones on the milling floor.

The undercroft was represented by the lower beams and planks defining three sides of a sub-rectangular area measuring 2.4 m long by 4.0 m wide. Across the base of the undercroft, immediately to the north of the pentroughs, was an axe-squared sill-beam (19147) set on the undercroft floor but not attached to any other surviving part of the mill structure. The beam measured 3.97 m long by 0.27 m wide by 0.11 m thick (see Fig 6.20 below). Two socket joints were evident, both *c* 70 mm square and cut through from top to bottom of the beam. The eastern socket was 0.43 m from the end of the beam, and its counterpart was 0.37 m from the western end. Slight axe marks across the underside of the beam *c* 90 mm to the east of the western socket possibly show where the socket was originally (mistakenly?) intended to be. The centres of both sockets were slightly south of centre on the beam.

Two groups of augered peg-holes were also evident on beam 19147. A group of four were situated *c* 1 m from the east end of the beam, slightly south of centre. Three of these were drilled through the timber, one containing the base of a broken oak roundwood peg. The western hole was blind and *c* 30 mm deep. A second pair of two holes were situated *c* 2.2 m from the eastern end of the beam. The eastern of these contained an upstanding peg, 30 mm in diameter, projecting *c* 30 mm below the beam and 180 mm above it. The peg was of yew, a very hard wood, and the top and sides of the peg had been facetted.

Although not fully revealed, the base of the undercroft was defined by the truncated firm sandy silt natural (12505). A thin accumulation of gravel and sand (19221) above 12505 was itself overlaid by a layer of ragstone rubble (19225), which served to consolidate the undercroft base and reduce the erosive effect of the water (Fig 6.7). The level of the working base of the undercroft was approximately 0.29 m aOD. No evidence was found within the base of the undercroft of any fixed lower bearings to house the two vertical shafts that would have carried the drive from the horizontal water wheel up to the millstones on the floor above.

Two planks (19126 and 19146) defined either side of the undercroft (Fig 6.2). The former, to the east, measured 2.41 m by 0.44 m by 0.08 m, the latter measured 2.76 m by 0.36 m by 0.09 m. Each was supported by two driven piles, one that also secured the end of the northern dam revetment (19127 and 19166 respectively), and one at the northern end of the plank (19181 and 19178 respectively) each approximately 1.1 m long. Originally the plank walls would have extended to the full height of the undercroft, revetting the re-deposited silty sand and clay (12539) backfilled from the original construction cut. The 148 annual rings and sapwood of plank 19146 gave a precise dendrochronological date indicating that it was cut in the winter or early spring of AD 691–2 (see Tyers, Vol 4, Chap 7, Sub-group 11668). The plank shows no sign of previous use, thus providing an accurate building date for the mill.

The remains of wattle panelling was evident within the undercroft, particularly on the eastern side (see Fig 6.2, context 12547), and was presumably intended to prevent the turbulent water around the water wheels from undermining the undercroft sides. If similar wattling was ever deployed on the western side of the undercroft it may well have been removed when trying to rectify the problem of the subsidence of that side of the mill.

The absence of any revetting piles securing beam 19147 indicate that it was not intended to undergo any lateral stresses and that its stability came from the superstructure attached to it. However, there is evidence that an *ad hoc* repair to this part of the mill structure became necessary; a re-used and worm-eaten plank (19169; see Fig 6.25 below), displaying a complex series of joints and housings across its surface, had been driven under the western end of beam 19147, and it was anchored in place by a stake (19228) driven into the subsoil at its northern end. The evidence suggests that the south-western side of the mill suffered from subsidence – possibly caused by water-erosion – and

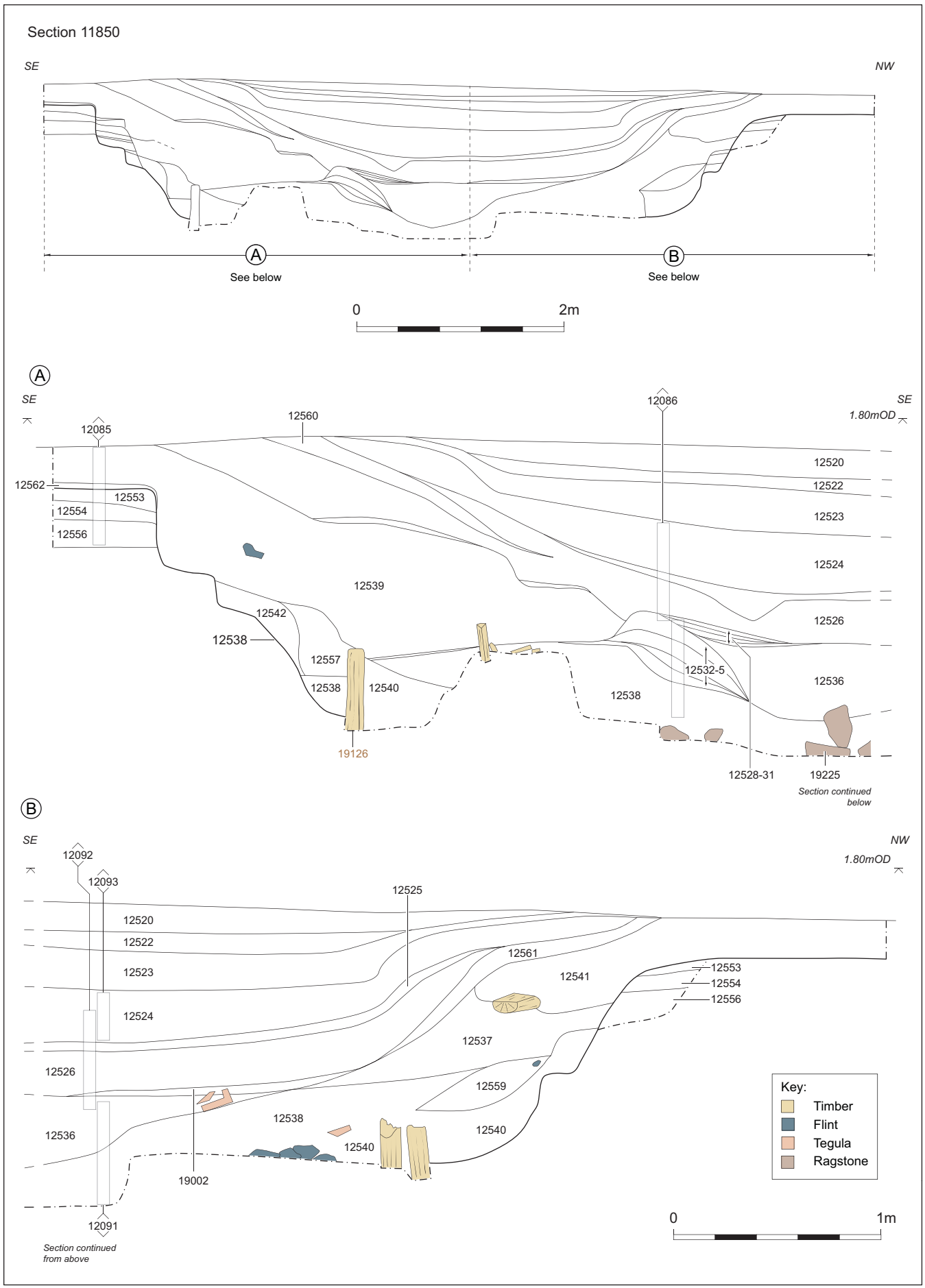

Figure 6.7 Undercroft stratigraphy

plank 19169 was used to try to stabilise the structure. This erosion, apparently restricted to this part of the undercroft, supports the contention that both water wheels turned in a clockwise direction. The clockwise motion would tend to drive the water into the south-west corner of the undercroft, increasing any erosion at this point, in contrast to the gentler flow against the south-eastern side of the undercroft.

A group of four vertical piles was situated in the centre of the undercroft, approximately 1.8 m north of the pentrough outlets (Fig 6.2). Two of the piles (19171 and 19172) were 0.10–0.16 m in section, and 1.50–1.60 m long (approximately half the length exposed above the undercroft floor). Both were driven into the subsoil and then packed around with reinforcing flint nodules (these were the only two piles associated with the mill that were reinforced in this way). Both displayed axe-cut tenons on their exposed ends. The levels of the tops of the two piles were 0.94 m aOD and 1.07 m aOD. The function of these piles is not clear, but it is suggested that they may have been part of the mechanism for adjusting the gap between the millstones (see below).

Between piles 19171 and 19172 were two more driven piles (19173 and 19174), measuring 1.60 m and 1.80 m long respectively. The tops of these piles were at 0.55 m and 0.60 m aOD respectively, at least 0.35 m below the tops of piles 19171 and 19172.

A number of other structural timbers were located in the area of the undercroft (19108, 19110, 19167 (see Fig 6.25 below), and 19170), all probably elements of the undercroft structure or, in the case of the latter two, the superstructure, but none was *in situ*. Further worked timbers, also not *in situ*, were recovered from just beyond the western side of the undercroft, including 19144 and 19145, the former comprising a short (*c* 1 m long) pile, with squared bridle joint cut into the end (see Fig 6.25 below). It is reasonable to suggest that this piece (along with others like it) would have been driven into the ground on either side of the undercroft trench, to locate the long sill-beams of the overlying mill superstructure.

Just north of the open lower end of pentrough 19139, a well preserved tapering bung (19168), made of hazel, was found on the undercroft floor (see Fig 6.2; Pl 6.6). It was presumably driven into the outlet aperture to prevent any water coming through, possibly when this pentrough went out of use.

In addition to structural elements, a number of wooden objects were recovered that relate to the milling machinery. Two partially complete oak water wheel paddles were recovered (see below). The most complete example (SF 12774, Fig 6.23 below) was found on the floor of the undercroft (19226) at the southern end of the tailrace (see below). The less complete example (wood sample 12129 – not illustrated), was recovered from the area of wattling (12549) along the west side of the tailrace (see below). Also found on the surface of the undercroft floor 19226 was a carefully shaped and hooked peg of yew (12772, Fig 6.23 below).

The tailrace

The tailrace was defined by the widening of the channel to the north of the undercroft (Fig 6.2). Its base was represented by a continuation of the rubble layer (here recorded as 19226) overlying the sandy silt natural (12505). Each side of the race was battered to approximately 45° and reinforced with a wattle screen. On the western side, an alignment of six evenly spaced piles (including 12602, 19265, 19266) averaging 0.20 m in diameter, were set vertically along the base of the batter; it is probable, but not certain, that they were driven through the *in situ* wattle screen. The surviving height of the piles varied but it is suggested that they originally supported a jetty projecting over the tailrace at a height corresponding to likely level of the mill floor (see reconstruction Fig 6.15 below). No similar line of uprights was recorded along the eastern side of the tailrace.

The better preserved wattle screen (12549), on the western side of the tailrace measured 4.8 m long by 1.8 m wide, and displayed a style of construction using a simple open weave of vertical sails and horizontal rods, although a small area of additional wattling at the northern end of this side displayed sails set at a 45° angle. Additional upright stakes were set against the screen, possibly to anchor it more securely to the battered side of the channel.

The tailrace was traced for a maximum distance of *c* 6.5 m from the north end of the undercroft to the edge of the NW–SE peat-filled channel of medieval date. Little of the eastern wattle screen (12547) survived to the north of the undercroft although it appeared to be designed and constructed in a similar way to screen 12459.

The Pond

Construction of the pond

The pond was created by exploiting an existing phenomenon, that of the natural flooding of a backwater south of the main channel at high tide, a topological feature which had also been exploited when the Roman wharf was constructed (see Chap 3). Despite some post-Roman silting of the area, it must have been clear to the prospective mill builders that, by trapping the water in the backwater at high tide, a head of water would be available (once the tide had ebbed sufficiently) to drive a mill built across the sandbank that separated the backwater from the main Ebbsfleet channel to the north (Fig 6.1).

The west end of the pond was defined by the natural small islet at the west end of the flooded area that had been augmented and partially revetted during the Roman period (see Chap 3). To the south, the pond edge was defined by the rising ground of the natural terrace. The east end of the sandbank upon which the mill was built was consolidated with wooden stakes and reinforced against natural erosion from the main stream

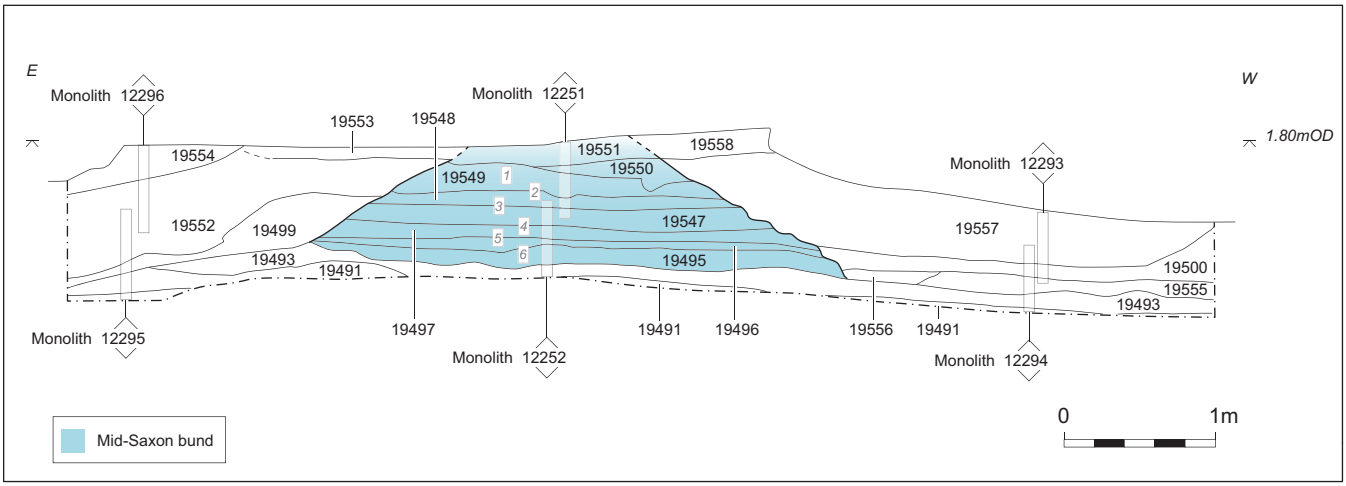

Figure 6.8 Section through bund

by means of revetments made of wooden stakes clad with wattle screens.

To prevent the water running back eastwards out of the pond area as the tide ebbed a dam incorporating a sluice gate was constructed. This doubled as a bridge/causeway, giving access on foot to the mill from the south bank. To enable the mill to be maintained and/or the pond to be drained and/or dredged as necessary, a spillway was constructed at the western end of the pond, running into the main channel downstream of the mill.

The bund

The western bund was identified in section to the south-west of the mill structure (Figs 6.1 and 6.8). A full sequence of samples was taken from these deposits; their geoarchaeological analysis is detailed elsewhere (see Stafford, Vol 4, Chap 7). Stratigraphically the earliest deposit exposed was a firm light yellowish silty sand (19491) at a slightly uneven level of 0.85–0.90 m. To the east of the bund (that is, within the footprint of the mill pond) this layer dipped down to at least 0.70 m aOD.

Layer 19491 was overlaid by 19493, a yellowish grey/brown sandy silt. A flint blade (SF 12784) was recovered from this layer. Layer 19493 was overlaid by a humic sandy silt (19495) and an alluvial silty clay (19496). To the west a layer of alluvial silting (19555) and a water disturbed interface (19556) respected the edge of 19495. Layer 19496 was overlaid by a brownish–black peat (19497), averaging 0.15 m in depth, itself respected on the western side by further alluvial silting (19500). At a level of 1.25 m aOD a layer of olive grey silty clay (19547) overlay the peat and was itself overlaid by a further 0.12 m deep layer of peat (19548).

On the eastern side of the bund, respecting layer 19548 and overlying all deposits beneath, was a deposit of yellowish–grey silty clay (19499). A single fragment of Roman pottery was recovered from this deposit. Sealing layer 19548 was a sequence of dumped deposits of light greyish silty clay with occasional lenses of sandy silt (19549, 19550, 19551), which produced a single piece of Roman CBM.

On the western side of the bund, a deep layer of pinkish–grey silty clay (19557) overlay deposit 19500 and respected layer 19550. Its upper level was at approximately 1.70 m aOD and it was overlaid by a layer of loose light yellow silty sand (19558), possibly the result of erosion of the western side of the bund.

To the east of the bund, within the pond footprint, the dumped deposit 19499 was overlaid by alluvial silting layers (19552 and 19554). The upper level of these deposits was at *c* 1.60 m aOD, suggesting that they must represent the silting up of the pond after it had gone out of use. Overlying 19552 was a layer of fine silty sand (19553), apparently the eastern counterpart of erosion deposit 19558.

The northern revetments

Evidence was found of lines of piles or stakes along the southern side of the mill bank (Fig 6.9). These represent both the consolidation of this area as a means of increasing the area of useable dry ground immediately east of the mill itself and reinforcement of the sides of the bank against erosion caused by the tidal action.

The northerly line of timber stakes was 26.3 m long, broadly oriented west–east, and comprised six different groups. The westerly group was of six stakes (12280), averaging 0.05 m in diameter, and spaced *c* 0.20–0.40 m apart. They appear to have been driven into position through and into existing deposits (see below) and no evidence was found to suggest they supported any wattle screen. To the east of this group was an alignment of very closely spaced and relatively substantial stakes (12224). Ten stakes were recorded in a distance of approximately 1.3 m. It is suggested that this group, along with group 12223 to the south, supported a timber walkway within a north–south oriented causeway.

To the east of group 12224 the stake-line was continued approximately 1.2 m by a further five stakes (19623) each approximately 0.05 m in diameter and spaced *c* 0.30 m apart. A further group of seven stakes

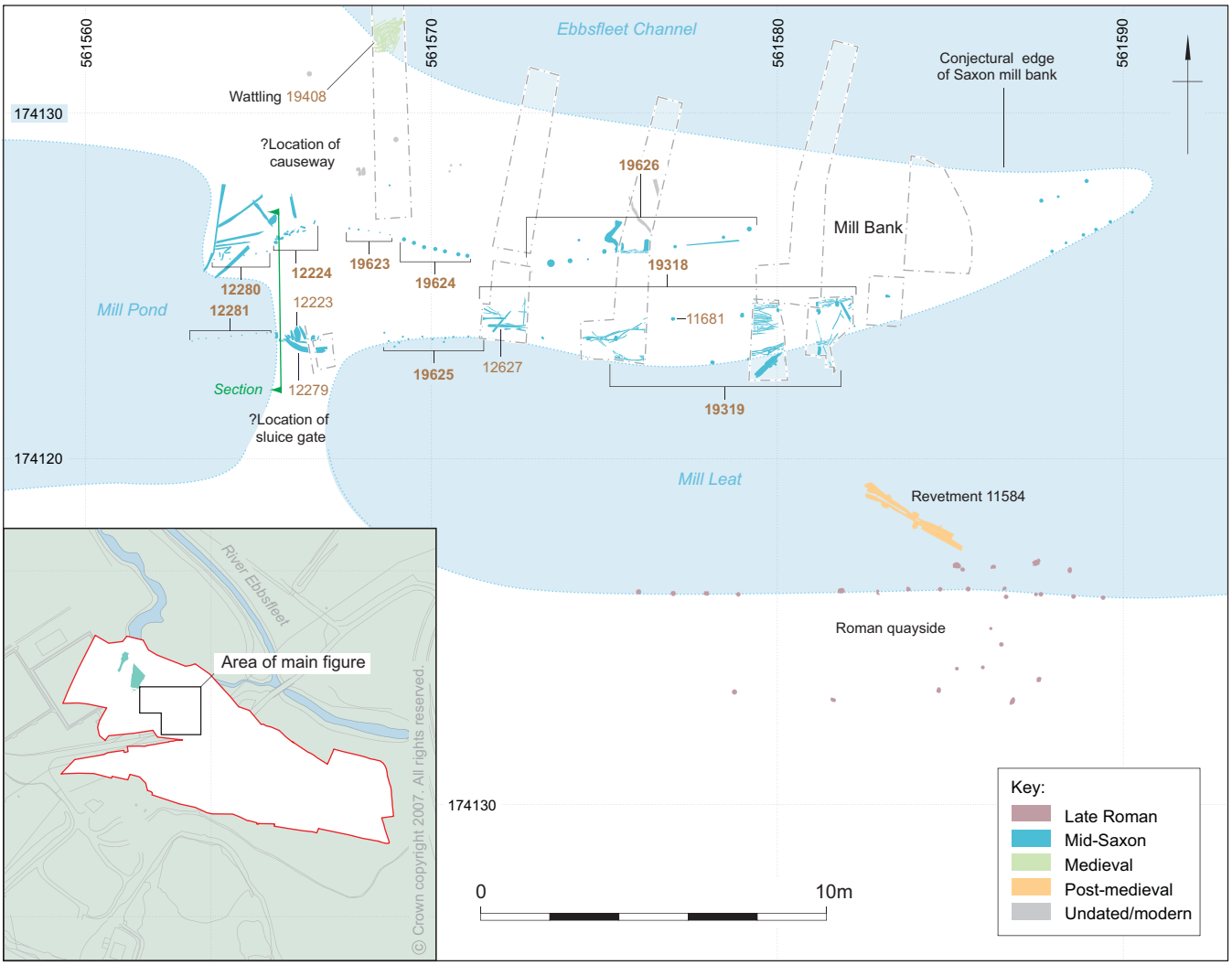

Figure 6.9 Plan of northern revetments and causeway

(19624), each *c* 0.10 m in diameter continued the line a further 2 m. Groups 12224, 19623, and 19624 were all driven into layer 11589, a natural component layer of the bank.

A sequence of 14 stakes (19626) extended to the east of stake group 19624 and were seen to increase in average length to the east, being driven into the natural gravel beyond the eastward extent of the alluvial deposit 11589. Finally three more stakes were recorded in plan approximately 8 m east of 19626.

A second stake-line was identified to the south, broadly similar in character and size to the northern line. The western end (12281), a total of 2.2 m in length, was defined by a line of seven stakes, averaging 0.05 m in diameter and surviving to a length of up to 0.70 m each. They were driven into the layer 11589 to a maximum depth of 0.70 m aOD. To the east of 12281 seven closely spaced stakes (12223) formed a similar structure to 12224 to the north. Two of the timbers showed signs of burning, suggesting that they had been salvaged from another structure.

There followed a group of 19 stakes averaging 0.05 in diameter and extending over a distance of approximately 2.9 m, recorded in plan (19625) but not revealed by excavation. These stakes did not define a clear line and may not, therefore, have been associated with any wattling at this point. Beyond group 19625 was a series of 12 stakes (19318), averaging 0.50 m in diameter, and extending over a distance of approximately 10.8 m. Where sections were exposed the stakes were seen to be driven through wattle screening. As with the northern stake-line, the length of the stakes increased beyond the eastern extent of layer 11589, and the further stakes were driven well into the natural gravel layer of the stream bed.

To the south of stake group 19318 a further alignment of six stakes secured to wattle screening was identified (19319), appearing to represent a re-definition of this revetment edge. Beyond group 19318 to the east, a further three stakes, together aligned NE–SW, were recorded in plan, but not closely investigated. A comparable extension to group 19319 to the east (in this case of six stakes) was also recorded but not closely investigated.

Taking the revetment construction as a whole, comprising the two full lines of stakes and including the modification of 19319, the whole appears to represent a consolidation of the northern side of the 'backwater', minimising the natural process of erosion on the south edge of the mill spur and defining a northern edge to the

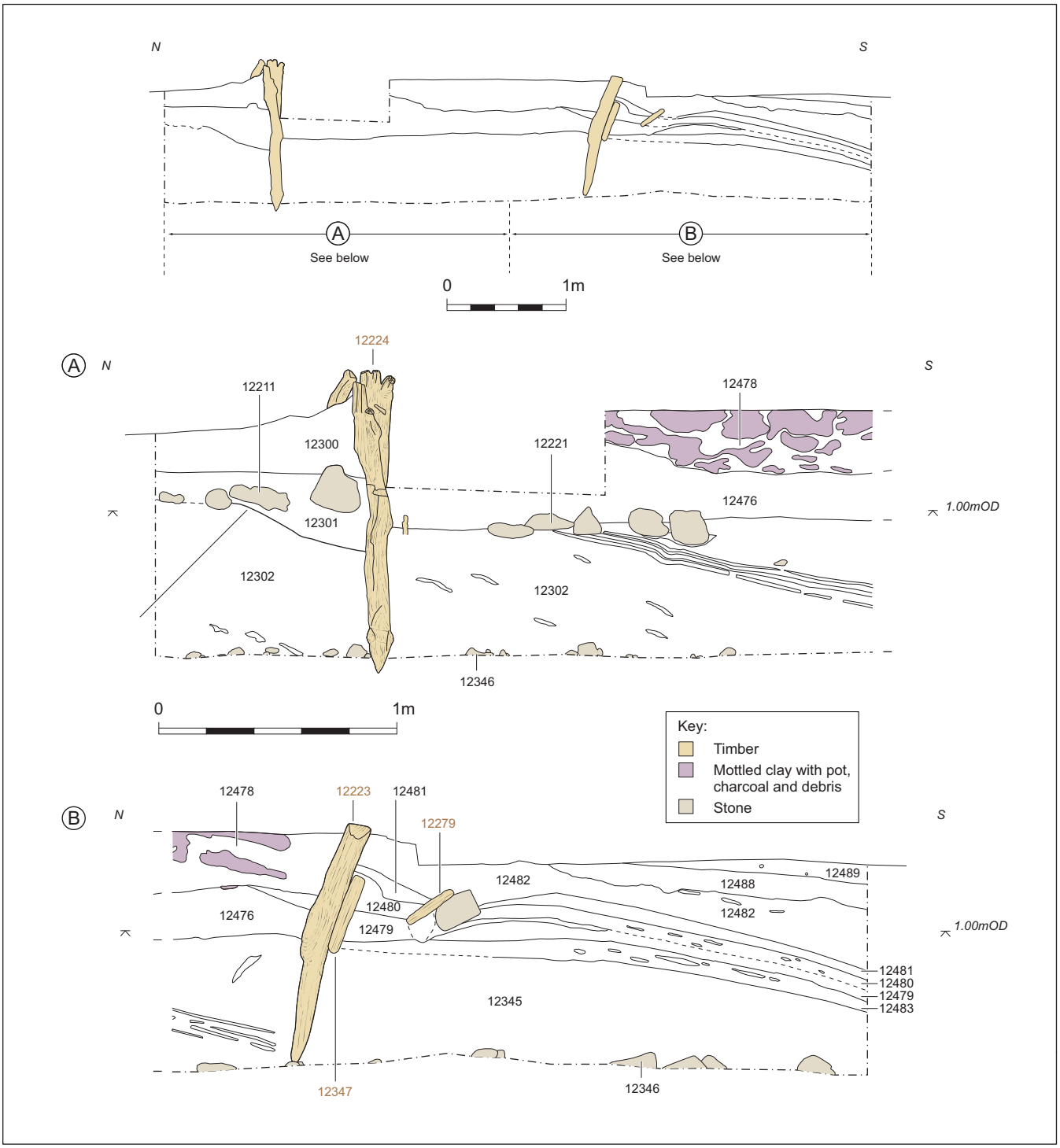

Figure 6.10 Section through causeway revetments

mill leat; the southern side of the leat was defined by the rising ground to the south of the Roman wharf and consolidated by the surviving structure of the Roman wharf itself.

Significant erosion would not be a major problem except at the eastern end of the mill bank, exposed to the main Ebbsfleet stream, and this is where reinforcing wattlework was identified in the revetments.

The sluice gate

No clear evidence was found of a sluice gate, which must have existed to hold the water in the pond while the tide ebbed, although elements of the stratigraphy and surviving timbers suggest where this is most likely to have been situated (Figs 6.9 and 6.10). The absence of surviving structural evidence for the sluice gate or the possible timber covering of the causeway across the dam is probably due to their relative ease of salvage. In both cases the (presumably) timber elements would have been substantial, highly re-useable, and easily recoverable (unlike, for instance, the buried pentroughs of the mill itself).

The section in Figure 6.10 illustrates the sequence of construction of this part of the pond and revetments and

Plate 6.7 The curved timber 12279 *in situ*. Looking south

suggests the possible location of the sluice gate. The earliest exposed deposit was layer 12346, a surface of flint and rubble that is considered to be the bed of the backwater at the time of the use of the Roman wharf. The surface was sealed by an alluvial clay layer 12302/12345, the surface of which was at approximately 1 m aOD, and is thought to represent the level of this area at the time of the mill's construction. Overlying the surface of 12302 was a layer of flint rubble (12211), possibly lying in the base of a shallow north–south cut (19635) which was recorded as extending northwards and cutting into the alluvial clay of the mill bank. Layer 12211 was sealed by a layer of clay with some organic lenses (12301) which is suggested to be a consolidation dump forming part of a north–south causeway. This material was banked against the north side of Structure 12224, a closely spaced arrangement of substantial and roughly worked stakes of varying lengths which was incorporated into the west–east line of revetments (see above). The stakes appeared to be intended to support a timber north–south walkway rather than just act as a revetment or consolidation to the south side of the mill bank, as the stake-lines to the west and east of this area were intended to do. Overlying layer 12301 was a layer of silty clay (12300) which was at least 0.35 m deep – this layer was the same as 11589, the consolidation layer of the east end of the mill bank (see below). Driven into layer 12300 to the east and west of structure 12224 were lines of relatively insubstantial short stakes (12280 to the west, 19623 to the east; Fig 6.9; see above).

To the south of Structure 12224, layer 12221 was overlaid by two dumps of mottled clay, layers 12476 and 12478, which contained re-deposited Roman pottery and bone. These deposits extended from Structure 12224 for a distance of approximately 2.6 m and abutted a similar series of substantial and crudely worked wooden stakes (12223; see above). Set horizontally on edge against the south side of structure 12223, and at a level of approximately 1 m aOD was a plank (12347; Fig 6.10). South of this the stratigraphy above layer 12345 was again different, being a series of clay layers (12483, 12479, 12480, and 12481). Embedded within these deposits was a curved plank (12279) displaying a series of possible joint holes (Pl 6.7; see below). A radiocarbon date recovered from this timber gave a calibrated date of cal AD 575–660 (NZA-27631, 1423±30 BP; see Barnett, Vol 4, Chap 7). The function of this timber is unclear; the fact that it was lying at an angle (ie, not horizontal) argues that it was not carried to this point by flood water or the flow of the stream and may indicate that it derived from a structure close by and was discarded when the structure was dismantled. Its stratigraphic position suggests that at least layer 12481, and possibly 12480, formed after it was deposited.

The sluice gate itself would probably have been built into such a causeway (arguably on the upstream side) and it is tempting to suggest that it may have been positioned between structures 12223 and 12224. However, such a suggestion ignores the revetment stake-lines continuing to the east from both pile structures 12223 and 12224 (see above). The only way such stake-lines can be accommodated in this scenario is by suggesting that they line either side of a long narrow leat. Two aspects argue against this. One is that there is no need for a long narrow leat – this would hamper the filling of the pond by the incoming tide. Secondly the entire line of stakes would need to be lined by wattle screening all the way along rather than just the eastern end, as is the actual case.

An alternative scenario, which arguably better accommodates the lines of revetments even if the actual location of the sluice gate is less certain, is that the northern stake-line, along with structure 12224, represents the first consolidation of the natural edge of the mill bank, behind which are deposits 12301 and 12300. A second revetting line, in this case lined with wattle screens, is installed to the south (possibly to provide more useable area on the top of the mill bank itself), and lines up with the second piled structure 12223. Beyond structure 12223 and to the south of the timber wheel fragment the interleaving silty clay and organic silty clay deposits slope downwards. These deposits are all consistent with episodic wet and dry deposition episodes, much later than the deposits at a similar level OD to the north, and accumulating after the demise of the mill. In other words, this part of the section to the south of structure 12223 could be situated just to the west of the location of the sluice gate.

The height of the leat base appears to have sloped down to the main channel in the east. At the suggested position of the sluice gate the height of the leat base was at approximately 1.0 m aOD, some 0.60 m above the base of the Roman backwater at 0.40 m aOD. Approximately 13.5 m to the east the base of the Roman channel defined by rubble and CBM lay at approximately 0.4 m and was sealed by a sequence of

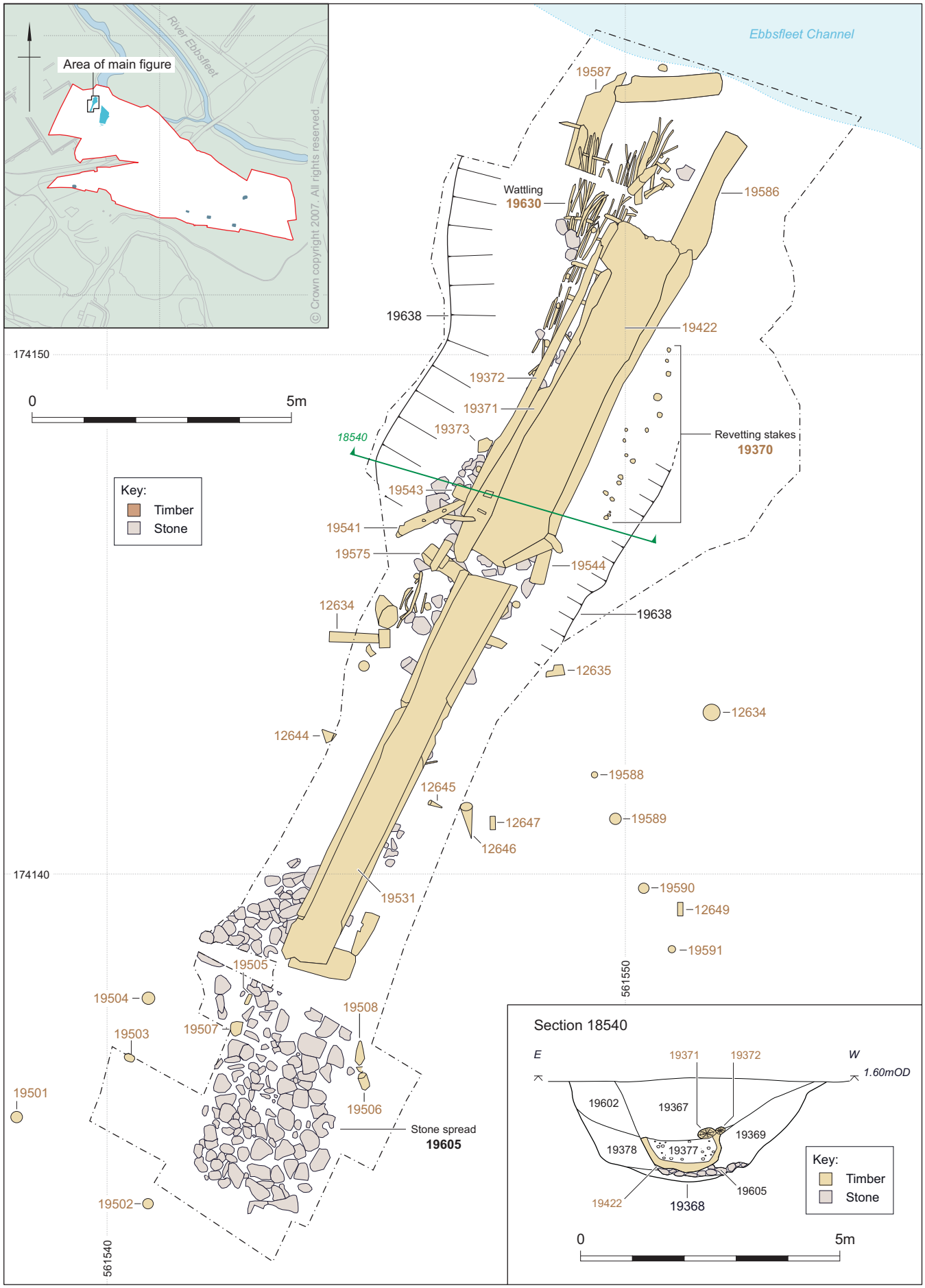

Figure 6.11 Pond spillway: plan and section

Plate 6.8 The mill pond spillway. Looking north

thin silting layers 1258–4, laying against the southern edge of the latest stake-line 19319 (Fig 6.9). These appear to have formed from material leeching through from the reconstituted bank material to the north of the revetment and their existence supports the contention that, at least when the mill leat was constructed, the channel bottom was at the same level as it was during the Roman period.

The stratigraphy of deposits to the south of structure 12223 was not extensively examined. Immediately to the south of structure 12223 the level of the post-Roman silt (12345) remained at *c* 1 m aOD (Fig 6.10). At the furthest extent of the section the level of the surface of layer 12345 was at *c* 0.7 m aOD and continuing to slope down to the south. A small test pit excavated suggested that at a point approximately 6 m south of 12223, a surface of a layer of flint cobbles was evident at a height of approximately 1.4 m aOD. This may represent a bank extending north from the southern bank of the backwater, thereby creating the southern part of the causeway/dam. Inconclusive though this evidence is, it is consistent with the contention that the likely position of the sluice gate was somewhere between structure 12223 and the bank to the south.

The spillway

To the north-west of the mill, a spillway or bypass sluice (19223) was revealed, running for a distance of approximately 12 m, north-east from the pond down to the main stream channel (Fig 6.11, Pl 6.8). The main function of the sluice was to allow the water to flow from the pond back to the main channel without flowing through the mill. An additional function may have been to act as an overflow in the event of a particularly high tide.

The sluice comprised an open timber chute with wattle revetting on either side. Most of the sluice was of a single phase, although there is some evidence that the level of the northern end of the northern chute may have been raised after initial construction. Alternatively the initial trench was dug too deep at the northern end, and had to be infilled before the chute's installation.

The channel as excavated comprised a 'U'-shaped cut (19368), not clearly detected in plan but identifiable in section, measuring *c* 1.5 m wide by 0.7 m deep at its southern (upper) end and 3.5 m wide by 1.0 m deep at its northern (lower) end, where the battered sides of the trench were at a shallower angle. Within the cut, surviving areas of wattling were identified (19630), representing a reinforcement of the battered side of the cut.

A layer of flint rubble (19605) was laid down along the base of the channel, acting as a consolidation of the channel bottom. Over this was set a wooden trough, two elements of which survived *in situ*: 19422 to the north and 19531 to the south. The former measured 3.50 m long by a maximum of 0.75 m wide and 0.25 m deep and comprised a single split trunk roughly worked into a vertically sided, flat-bottomed trough. Trough 19531, also a single split trunk, measured a maximum of 4.10 m long by 0.55 m wide by 0.41 m deep. The basal spread of flints within the construction cut continued approximately 3 m to the south, to the southernmost point of the construction cut. The northern (lower) end of the slope of the overflow channel was not fully excavated although the level of the bottom of trough 19422, when compared to the estimated natural water levels at the time, suggest that it would not have extended any further to the north. A re-used and jointed short chocking timber (19575) was revealed under the north end of trough 19531, showing where fine adjustments were made to the angle of the trough.

Once bedded on the rubble surface the troughs were stabilised by a number of stakes driven in along either side. Other stakes located at various points along the line of the channel (for instance 19501–8) at the south-western end, and the line of stakes along the eastern side of trough 19422, represent general consolidation of the sandbank material on either side of the overflow. Finally the construction cut was backfilled on either side of the troughs (Fig 6.11, Section 18540, contexts 19369, 19378, 19602). At one point two parallel poles (19371 and 19372), anchored by stakes (19373 and 19543), had been set along the upper edge of trough 19422, possibly acting as a rudimentary walkway. Beyond the north end of trough 19422, in addition to the vertical stakes mentioned above, two relatively

substantial timbers (19586 and 19587) consolidated either side of the cut.

There is no evidence to suggest that the wooden troughs were covered when in use. Section 18540 shows the accumulated silt infilling (19377) of the trough (19422) overlaid by a distinctly different silty clay material (19367) which levels up the entire section, and could represent a deliberate levelling of the site after the sluice had gone out of use.

Levels taken on the interior base of the surviving timber chutes indicate a fall from approximately 1.20 m aOD to 0.30 m aOD. The angle of the slope appeared to be consistently around 10–12°. To function, the spillway would have required a sluice gate at its southern end. No evidence of this was found, although it may well have been situated immediately to the south of the end of trough 19531.

A line of six stakes was revealed in plan, extending away from the line of the channel to the south-east (12635, 19588, 19589, 19590, 12649, 19591). These did not appear to be substantial enough to be anything other than a fence-line.

The Mill Abandonment/Demolition

The abandonment of the mill was clearly accompanied by two episodes of dismantling – had the superstructure been allowed to decay and disintegrate naturally one would expect that the undercroft would have contained a considerable quantity of timber from the superstructure (see discussion below for a full account). The stratigraphic evidence indicates that, at first, the valuable and re-usable elements of the mill machinery were salvaged, along with the accessible and useful elements of the superstructure. In a second episode, the upper elements of the undercroft planking and roof were salvaged but not the inaccessible lowest level of timbers; structural piles were axe-cut, leaving the bases *in situ*. The fact that the pentroughs were left in place is a strong indicator that in use they were at least partially buried under the material of the dam and were too heavy and difficult to move.

The stratigraphy of the deposits in the undercroft

The removal of the water wheels and the cessation of a turbulent and scouring flow of water through the undercroft allowed the process of accumulation of deposits to begin immediately (Fig 6.7). The earliest post-use deposit within the undercroft was a silty clay (12538/12540), sloping in from the east and west side of the undercroft respectively and meeting over the exposed rubble layer – the floor of the working undercroft. Recorded as coming from 12536 but, actually, from the central part of this layer (12538), was a small weathered fragment of quern or lava millstone (SF 12759). Approximately 25 kg of small, weathered, and essentially undatable pieces of lava were recovered from post-Roman alluvial contexts across the entire site. That any may represent fragments of Saxon millstones cannot be ruled out (see Shaffrey, Vol 2, Chap 9).

Deposit 12538/12540 represents silts leeching through the walls of either side of the undercroft and accumulating over the floor. When the mill was in operation such material would have been flushed away by the action of the water wheels. On the eastern side of the undercroft, identified layer 12538 was overlaid by a sequence of four thin lenses of peaty material within a silty matrix (12532–5). These were seen to extend towards the eastern pentrough outlet and appear to be the result of episodic 'pulses' of water carrying organic material/leaf litter overflowing through the disused pentrough from the pond.

To the east these lenses were partially overlaid by thick deposit of dumped mixed clay (12539), appearing to represent the collapsed backfilled material from outside the undercroft sides, released when the shuttering was salvaged. To the west of the peaty lenses the hollow in the centre of the undercroft was levelled up with a similar deposit (12536) which contained occasional fragments of Roman CBM. This is interpreted as being the result of the same salvage operation although the interface with the underlying silty layer (12538/12540) was disturbed, probably by trampling. A dumped layer of redeposited clay (12537) – similar to 12536 and 12539 – extended up over the western side of the undercroft.

Overlying the top of the central dump of clay (12536) was a further accumulation of peaty lenses (12528–31), the result of a continuation of the overflow 'pulses'. A very thin layer of organic silty clay (19002) was recorded extending from the later lenses across the surface of layer 12536.

A finely laminated layer of mid-blue–grey clay (12526) overlaid these deposits; the same material extended as an accumulated silting of the pond to the south and appears to represent the first general infilling of the undercroft after the final episode of demolition/salvage. Within layer 12526 lenses of blue–grey silty clay with organic and sandy inclusions (12560 and 12561) appear to represent a flooding event of the degraded contemporaneous ground surface on either side of the undercroft. Overlying layer 12526 was a thin organic silty clay (12525) which represents a possible topsoil forming in a dryer interlude.

The fact that the re-deposited material is dumped over the initial post-use silting indicates that at least two episodes of demolition occurred with a definite time gap between them.

Later Saxon or medieval deposits within the undercroft

The gradual infilling of the undercroft continued with alluvial deposits 12524 and 12523, which both showed evidence of a later (probably medieval) marine incursion (see Chap 5) and a sequence of subsequent dryer episodes denoted by thin peaty layers 12522, 12521, and 12520 (Fig 6.7).

Discussion

Background

by Martin Watts

Horizontal-wheeled mill technology

The term 'horizontal wheel' is used to define a water wheel that turns in a horizontal plane and a 'horizontal-wheeled mill' is one in which the upper of a pair of millstones is turned directly by a water wheel to which it is connected by a shaft which rises vertically through the centre of the lower, fixed millstone. The origins of both horizontal and vertical water wheels are the subject of continuing debate; from a detailed analysis of classical texts, Michael Lewis has suggested that the earliest water powered devices of both types date from about 240 BC, with the horizontal water wheel appearing in Byzantium and the vertical water wheel originating in Alexandria (Lewis 1997). A number of writers have suggested that vertical water wheels represent technology superior to that of horizontal water wheels, which Curwen (1944, 144), considered to be 'essentially an instrument of peasant-culture, being just a mechanised quern'. The potential output of a horizontal-wheeled mill is in excess of that of a hand-driven quern, however, and its mechanical simplicity, small scale and relatively low power, make it both economical and simple to operate, with few controls (Harverson 1995, 117). In this respect, horizontal-wheeled mill technology is highly appropriate to small scale local and communal use. Archaeological evidence confirms that both horizontal and vertical water wheels were in use in the British Isles during the early medieval period, although in England the documentary record indicates that, by the end of the 12th century, English manorial watermills all had vertical wheels (Holt 1988, 118).

The earliest documentary sources for the terms applied to the parts of horizontal-wheeled mills are contained in early medieval Irish law tracts found in the *Senchus Mór*, a compilation of the early 8th century, which summarises laws that probably date back to the 6th century. These terms have been discussed by a number of scholars (for example, Curwen 1944, 139–40; Lucas 1953, 29–33) and examined in some detail by Gearóid MacEoin (1981, 13–19). The importance of these tracts, which deal with the construction, ownership, water rights, and terminology of early medieval Irish mills has recently been highlighted by Rynne (2000, 4–6) and Kelly (2003, 16–24). While these sources provide the technical terminology for the component parts of early medieval horizontal-wheeled mills the interpretation of some terms is still a matter of debate. In general, they refer to the water supply and its control, and the millstones and mechanical assembly. No comparable documentary sources exist for early medieval England but the parts of a horizontal-wheeled mill have been tabulated by Philip Rahtz, based on a range of published sources and a preliminary reconstruction of the Tamworth mill (Rahtz and Bullough 1977, appx 1).

There are several methods of delivering water to a horizontal water wheel, the three principal forms being an open chute or trough; a closed flume or pentrough; and a drop tower or *arubah* penstock (Moog 1994, 40–3). Both the open chute and closed pentrough forms are found in northern Europe, the latter being represented at Ebbsfleet. The *arubah* penstock is largely confined to arid regions and comprises a vertical masonry pit in which water is stored and delivered under pressure onto a water wheel through a nozzle at the bottom. Mills with open chutes develop less torque than those with closed troughs and penstocks and are generally considered to be less efficient (Hawksley 2002; Cresswell 1993).

Colin Rynne (pers comm 2007) has suggested that the term *flume* may be used specifically for early horizontal-wheeled mill chutes in order to distinguish them from more recent examples. Certainly the term *chute* is inadequate, implying an open trough rather than a tapering pipe through which water is delivered under pressure, which is more typical of the form found in early medieval mills and at Ebbsfleet. Of the more modern terms, *pentrough* is also appropriate, being defined as 'a trough, channel or conduit … to convey water from head formed by a pen [pond] to place where force is applied, as in a water-mill' (*Oxford English Dictionary* 1989). The term *penstock* is generally used for a sluice or floodgate for restraining or regulating the flow from a head of water (*ibid*).

Comparative material and sites

The archaeological evidence for watermills in the mid- and late Saxon periods in England is at present both slim and conflicting. During the excavation of a high-status Saxon site at Old Windsor, Berkshire, in the 1950s, a large and sophisticated mill was identified, with evidence of three vertical water wheels, fed by a leat from the Thames. After this mill was destroyed by fire in the late 9th or early 10th century it was superseded by a smaller mill with a horizontal water wheel (Wilson and Hurst 1958, 183–5). However, the potential of the Old Windsor site to provide a comparison with Ebbsfleet is limited as it has yet to be interpreted and reported in detail. The most significant and fully reported site of a horizontal mill in England, before the discovery of the Ebbsfleet mill, was that made at Tamworth, Staffordshire, in 1971. Here the remains of two phases of a horizontal-wheeled mill were excavated, the later overlying the earlier. Part of a timber revetment that formed the end of the mill pond and some structural timbers and a boarded floor that defined the undercroft of the mill were found, as well as a single paddle from a horizontal water wheel, a steel bearing, and numerous millstone fragments (Rahtz and Meeson 1992). Timbers from the later mill structure have been dated by dendrochronology to the middle of the 9th century (Baillie 1980, 62–3; 1982, 193–5). Archaeological excavation has provided evidence for the use of both horizontal and vertical water wheels at a small number of other Saxon sites but, with the exception of Tamworth

and the foundations of a late Saxon or Viking period horizontal-wheeled mill identified at Corbridge, Northumberland (Snape 2003), these have yet to be analysed and reported in detail (see the summary in Watts 2002, 74–82). The Ebbsfleet mill, however, is of particular significance in that no other English site has produced an *in situ* pentrough. The identification of a possible timber trough or troughs submerged in deep water in the River Tyne close to the early medieval mill site at Corbridge, Northumberland, needs to be investigated further (Snape 2003).

By far the largest corpus of archaeological evidence relating to early medieval watermills with horizontal wheels comes from Ireland. To date about 100 sites have been identified, of which 42 have been dated by dendrochronology and radiocarbon, with dates ranging from the early 7th to the 14th centuries (Murphy and Rathbone 2006, 26). McErlean has suggested that there was an initial early phase of mill building in the first half of the 7th century which includes two tide mill sites (McErlean and Crothers 2007, 10). Subsequently, a small number of mill finds has been dated to the early 8th century, but the greatest concentration of dated sites falls between about 770 and 880, the period during which the Tamworth mill was also built (Baillie 1980). While the majority of Irish sites are inland, the earliest securely dated example is the first phase tide mill at Nendrum, on the shore of Strangford Lough, Co Down, which has been dated by dendrochronology to 619–621. The second phase mill at Nendrum, which is one of the most complete to have been excavated in Ireland, was built in *c* 789 (McErlean and Crothers 2007). The vertical- and horizontal-wheeled mill sites at Little Island, in Cork harbour, timbers from which have been dated by dendrochronology to *c* 630, have also been interpreted as tide mills (Rynne 1992a). The sites at Nendrum and Little Island, together with Northfleet, provide a growing body of evidence for the use of salt water as well as fresh water for powering early medieval mills.

The Design and Operation of the Northfleet Mill

by Martin Watts and Alan Hardy

The design and construction of the tidal mill at Northfleet must have been based upon experience and an understanding of the mechanical requirements. However, in terms of the completeness of survival, and its design and construction, the mill at Northfleet is in many respects unique in the archaeological record of north-west Europe. Consequently there are surviving elements that can only be explained in terms of their mechanical plausibility, on the reasonable assumption that the form and shape of every fabricated element would have had a function and a logic behind it. At the time of writing, building a replica of the Northfleet mill to test these possibilities is not an option. While such a replica could assess the mechanical plausibility of the mill as interpreted, only when more complete examples of early medieval tide mills are discovered will the truth of these mechanical puzzles possibly be revealed.

Unsurprisingly, not all the mechanical puzzles evident at Northfleet have resulted in consensus among the three authors. Those technical aspects that are most 'speculative' in their interpretation are therefore included in a separate section: 'Technical Issues'.

Mill building – construction and layout

The use of piles or posts to support a mill building is implied by an early 11th century Italian reference cited by Rahtz and Bullough (1977, 21), and horizontal-wheeled mill buildings raised on posts are found in Romania (Ruşdea 1979). At Northfleet the floor of the undercroft was made up with packed rubble stone to reduce the effect of scour, both from tidal action and that created by the turbulence generated by the water wheels. At Tamworth the wheelhouse or undercroft floor was boarded (Rahtz and Meeson 1992), and at Corbridge re-used Roman masonry was found packed between the timber base plates or sills (Snape 2003).

The horizontal sill timber (19147), which spans east–west across the upstream end of the undercroft (see Fig 6.2 above), sat on the clay surface and retained a number of significant features. In other early medieval horizontal-wheeled mill excavations this timber usually supported the downstream end of the pentrough, being notched to allow the trough to be located and wedged in place. At Northfleet neither pentrough bore directly on this timber, both being supported on the planks on edge of the north face of the mill dam, positioned slightly upstream of the sill. This indicates that the undercroft, the dam, and pentroughs were constructed and installed before any of the milling components or the water wheel assembly, of which sill-beam 19147 was a part. As Goodburn says below, the weight of the baulks from which the pentroughs were made was such that as much of the hollowing and shaping as possible would have been done at the felling site. The daisy-wheel scribed onto the top of one of the pentroughs could suggest that the water wheels were marked out and made at the felling site as well. Given the apparent lack of woodland in the vicinity of the mill site, it may not going too far to suggest that the construction gang probably arrived at the site with the mill in 'kit' form.

In assembling the milling machinery, it would be important to position each water wheel so that it was in the optimum position in three axes relative to the fixed pentrough. By moving the sill-beam itself, it may thus have been easier to test the water flow through the pentroughs and adjust the position of the two wheels to achieve maximum efficiency of operation. Similarly, it is quite possible that a number of endplates of different bores were tried on each pentrough. The best two – that is the two that provided the most efficient flow of water (established by trial and error) onto the paddles of the water wheels – were then pegged permanently onto the ends of the pentroughs.

The pegs that were driven into beam 19147 (of which one survived *in situ*) are interpreted as the location/pivot

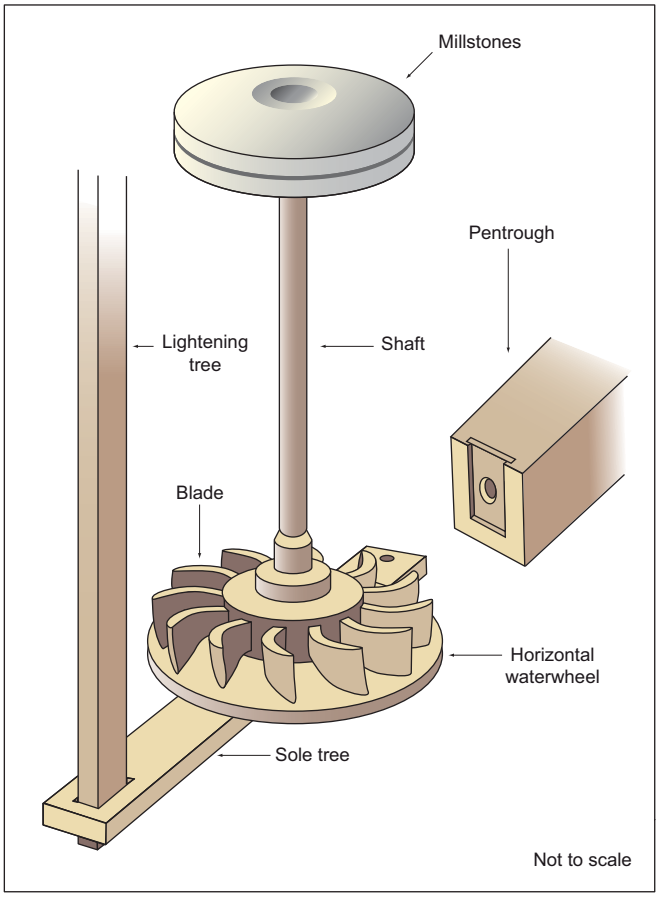

Figure 6.12 The terminology of horizontal mill components

points for the ends of two *sole trees*, the horizontal timbers that carried the bottom bearing of the water wheel and vertical shaft assembly (see Fig 6.12). The positions of these pegs (of which only one on each side would have been in use at any one time) relative to the ends of the pentroughs and the likely positions of the waterwheels, indicate that the sole trees were set at an angle to the sill-beam. The reason for this is unclear.

Two interesting, and problematic, features found in the undercroft are the vertical squared piles (19171 and 19172) located on the downstream side, both of which have tenons cut on their tops (see Fig 6.2 above and Fig 2.22 below). These tenons are almost directly in line with the downstream ends of the pentroughs and the tops of the piles are also at slightly different levels, reflecting the difference in the heights of the pentroughs. The positioning and setting of these timbers in post-holes packed with stones was clearly carried out with some deliberation but their exact function is unclear and no comparative evidence from other horizontal-wheeled mill excavations has been found to suggest what their original purpose may have been. Some possible solutions to this puzzle are examined below.

The water wheels and paddles

The different types and constructions of horizontal water wheels have been illustrated and defined by Wilson (1960, 4) and further classified by Moog (1994, 11–13). Their relative efficiencies have been analysed and discussed by Hawksley (2002, 87), who suggests that a peak efficiency of about 46% is possible with an open-paddled wheel of similar form to those known from early medieval Ireland, working with water supplied under pressure from a closed trough. While at Northfleet the shallow angle of the pentroughs might have been interpreted to suggest that they could have been used to feed vertical water wheels, fragments of two scoop-shaped paddles were found (for paddle forms, see Moog 1994, 48). Both are of oak, the less well-preserved example (19062) having been hewn from a naturally curved piece of timber, the twisted grain of which must have made cutting it to shape a challenge. The better-preserved example (SF 12774; see Fig 6.23 below) was found on the lowest level of the mill undercroft floor surface. It is about 170 mm in length with a maximum width of 110 mm, tapering to 40 mm towards the end that would have been mortised into the hub. The paddle wall is about 25 mm thick at the scoop-shaped end. A timber peg with a facetted head has been driven vertically though the wall of the shaped end section, its function being presumably to hold a horizontal board to 'close' the bottom of the scoop. There are remains of similar pegs in the second example. The use of two shaped timber components to form a single paddle is a feature that has not been recorded elsewhere. The early Irish examples and those found at Tamworth and Nailsworth, Gloucestershire, which are undated, but pre-1300, (Rahtz and Meeson 1992, 100–5) were all cut from single pieces of wood.

The position of the shaped head of the peg through the paddle wall suggests that this was the top and therefore the water wheel from which the paddle came would have rotated clockwise, when viewed from above. From the evidence of the pegs in the sill-beam (19147, discussed further below), it appears that both water wheels at Northfleet were set up to run clockwise. This would have resulted in the upper millstones turning in the same direction, reflecting the *diesal* or sun-wise turn, the importance of which for prosperous milling has been emphasised by both Curwen (1944, 143) and Lucas (1953, 12). The other known English examples of horizontal water wheel paddles, one from Tamworth and the fragments found at Nailsworth, are of different shapes, but all came from wheels that rotated clockwise.

It is difficult to estimate the diameters and construction of the water wheels at Northfleet from the excavated evidence. The Tamworth wheel was reconstructed on paper with a diameter of 1.22 m, which is larger than the early Irish examples. The Moycraig wheel is 0.99 m in diameter (MacAdam 1856, 1) and that from Mashanaglass 1.0 m (Fahy 1956, 22–6); reconstructions of wheels from remains found at Drumard and Killinchy suggest they were both about 0.90 m in diameter (Baillie 1975). The average overall length of the paddles found on a number of sites in Ireland, England (Rahtz and Meeson 1992, 100–5), and Scotland (Maxwell 1954–6, 231–2) is about 420 mm, including the section that was tenoned into the hub.

The maximum diameter of the Northfleet wheels, which is dictated by the size of the undercroft and the

positions of the pentroughs, appears to be about 1 m. However, the size and shape of the surviving water wheel paddles and the geometrical scribing on the pentrough possibly indicate that a smaller water wheel may have been used.

The geometric scribings on the top of one of the pentroughs are unique in this context and may be explained in a number of ways. It is proposed (see Smith below) that in this context they may well represent rudimentary engineering drawings, laying out the geometry for the marking out of the water wheel hubs, the intersection points on the daisy-wheel providing an accurate template for setting out 12 equidistant points on the circumference of a circle of about 0.3 m diameter. This dimension could thus be that of the diameter of the hub of the water wheel, and it compares closely with the recorded diameters of two early Irish examples, Moycraig (305 mm) and Mashanaglass (292 mm; Fahy 1956, 22, 25). If the evidence of the daisy-wheel is accepted as a template for setting out the paddles of a water wheel for the Ebbsfleet mill, then it appears that a water wheel (or wheels) with only 12 paddles was constructed. While it is perhaps relevant to note that the Tamworth wheel was originally reconstructed on paper with 12 paddles, based on the single example found (Rahtz and Meeson 1992, 143), the written report suggests that the Tamworth paddle was 'one of 12 or more' (*ibid*, 100). Some of the early Irish examples have been precisely calculated: the Moycraig wheel had 19 paddles (MacAdam 1856) and those from Mashanaglass and Cloontycarthy had 23 (Fahy 1956; Rynne 1998). It is of interest, and possibly significant, that both these figures are prime numbers. At Nendrum an oak wheel hub associated with the first phase, early 7th century mill, probably had 18 or 19 paddles (McErlean and Crothers 2007, 157–8). Although no hub was found associated with the water wheel of the second phase late 8th century mill at Nendrum, three scoop-shaped paddles were excavated within the wheelhouse and a reconstruction based on careful measurement shows the later water wheel as having 24 paddles (*ibid*, 168). The evidence from early medieval Ireland and more modern examples from mainland Europe (Moog 1994, 12) indicates that a number greater than 12 was usual, particularly where scoop- or spoon-shaped paddles were used. If there were too few paddles, the distance between them became too great for the water to act efficiently on them (McErlean and Crothers 2007). From the evidence available, however, it must be concluded that the water wheels at Northfleet were not of comparable design or size to those found at Nendrum and other sites in Ireland.

The two paddles found in the undercroft at Northfleet show no clear evidence of how they may have been attached to a hub. Most of the other early medieval paddles have tenons which were either wedged or pegged into the hub, sometimes with as many as three pegs (Fahy 1956, fig 6). While the inner end of the better of the two paddles found at Northfleet does not appear to have broken, its rounded shape suggests it would be difficult to fix it securely, even with wedges, into a hub. However, as noted above, the Northfleet paddles were made of two components, the scoop-shaped section being pegged to a horizontal board. It is feasible, therefore, that a circular board, or radial arms, could have been fixed to the hub, and the shaped paddles pegged to it. If the wheel only had 12 paddles, then it may have been of comparatively small diameter, perhaps no more than 0.50–0.60 m. This might further imply that the millstones were rather smaller in diameter than those found elsewhere. It is perhaps relevant to note that the earlier wheel at Nendrum was of smaller diameter than the later one, which may suggest that the diameter of horizontal water wheels was increased and a greater number of paddles fitted later in the early medieval period, in order to increase both their power output and their efficiency. This is likely to have been the result of practical experience. It is suggested therefore that the seemingly low efficiency of the Northfleet mill and possibly the small diameter of its water wheels may indicate that it was at the forefront of the technological expertise available at the end of the 7th century in England.

The millhouse

The undercroft was a small open-ended box, about 2.4 m north–south (upstream–downstream) by 4 m east–west, as defined by the downstream face of the dam, the shuttered sides, and the open end of the tailrace. This seems relatively small and narrow by comparison with other examples, for example Tamworth (second mill, mid-9th century) about 4.2 m by 4 m; Corbridge about 3.9 m by 3.2 m; Wharram Percy, North Yorkshire, perhaps 3.5 m by 3.2 m (Watts 2005, 223). Interpretations of the size of the upper house or milling chamber at these sites have tended to be made by simply projecting the plan of the undercroft upwards. At Tamworth a possible extension or annexe was conjectured on the upstream side of the mill (Rahtz and Meeson 1992), but at none of these sites was any clear evidence found of the overall extent of the upper house. At Northfleet, the milling floor would have been at least the size on plan of the undercroft, presumably with a floor or platform extending to the south, over the buried pentroughs, to give ready access to the sluice gates at the mill pond ends of the pentroughs.

The absence of any evidence of cut features defining the footprint of the upper milling chamber suggests that its structure rested on sill-beams spanning the undercroft. The walls around the millstone floor may have been formed of wattlework with a covering of daub set between posts or studs, as is typical of 'hall' buildings of this period. However, were this so, one might have expected to see fragments of daub in the early post-demolition deposits within the undercroft. The absence of such material may indicate that the walls of the upper milling chamber were clad with timber boards – a more expensive method, but then this was an important building. It is worth noting that structural integrity would be needed only up to the floor level on which

the millstones were located above the undercroft, so that any vibration generated by the millstones in action would not necessarily be a significant problem to the superstructure.

The millstones

It is probable that the lower millstones, or bedstones, were located at floor level, rather than being raised on a timber framed structure – a *hurst* – as some reconstructions of Saxon mills have suggested (for example in one reconstruction of the Tamworth mill; see Rahtz and Meeson 1992, 141). The basic function of a hurst frame is to raise the millstones above the floor level in a mill with a vertical water wheel so that the gearing driving the millstones can be accommodated and enclosed and the timber bridge, by which the upper stone is raised or lowered during milling, can be supported. While in some areas of Europe modern horizontal-wheeled mills do have millstones set on a raised section of floor or a low hurst (for example, in Romania, see Ruşdea 1979, figs 12 and 16), there are also many examples where the stones are at floor level, as on Shetland, where they were set on clean clay or timber boards (Anon 1886, 806). At Tamworth shaped pieces of clay were found, with grain impressions, on which the lower millstone was bedded and levelled (Rahtz and Meeson 1992, 89–92), and the shape of the lower stone from Drumard, Co Derry, (Baillie 1975, 29) also suggests it could also have been bedded on clay.

In a horizontal-wheeled mill the action by which the upper stone was raised and lowered during milling, to control the texture of the ground product (known as tentering or lightening) is achieved by raising and lowering the entire water wheel, vertical shaft, and upper millstone assembly, which turns on a basal bearing set into a horizontal timber, the sole tree. In its simplest form a vertical timber, the lightening tree, is connected to the outer end of the sole tree and passes through the milling floor, where its elevation can be adjusted, often quite simply by the use of a wedge or peg. At Northfleet, the probable positions of the sole trees indicate that the upper ends of the lightening trees would have been positioned on the downstream side of the millstone floor (see below).

The Landscape of the Mid-Saxon Mill

Having focused tightly on the mill and pond mechanics, attention needs to be broadened to include the immediate area. While it is apparent that the existing landscape was exploited and (minimally) modified to accommodate the mill and pond, it still leaves unanswered the question of what else, if anything, stood within this somewhat bleak landscape.

In the immediate vicinity of the excavated mill structure there must have been both some sort of storage facility and a residence, if only temporary, for the miller. Given the restricted size of the mill bank to the east of the mill undercroft (albeit that it was enlarged during the mill's construction) and the total absence of any subsidiary structures on it, it seems most likely that at least the miller's residence, and quite possibly the storage facility too, lay outside the area of investigation. The causeway indicates that any associated structures probably lay to the south, on the higher, and reliably drier ground. The impression of the site being purely a functional one is further emphasised by the total absence of any domestic detritus on, or in the vicinity of, the bank.

What was the broader landscape context of the mill? The Tamworth mill (1st phase) has been dated to, or just prior to, the mid-9th century, (a century and a half after the Northfleet mill). In the context of the interpreted contemporaneous features, the Tamworth mill was situated on the likely course of the River Anker, at the south-eastern corner of the outer defences of the royal centre, which date from after the mid-8th century (Rahtz and Meeson 1992, 5). Its situation meant that it was closely associated with and protected by the royal residence, and would have been clearly visible from the position of the inner royal enclosure some 200 m to the north-west.

However, while the horizontal mill at Tamworth can be used as a technological comparison, it is less clear that its geographic position and settlement setting can inform the context of the Northfleet mill. The Tamworth mill was constructed some time after the royal centre was developed, suggesting that it may have been the product of the evolutionary process whereby the royal centre became more of a permanent residence.

With no evident contemporaneous structures near the mill at Northfleet, it appears to have been a somewhat isolated element in the landscape, itself a combination of low-lying salt marsh, interspersed with slightly higher levels of coarse grassland dotted with shrubs and occasional trees, the whole threaded by the tidal Ebbsfleet channel and a network of tributarial creeks (see artist's reconstruction in Pl 6.9). The only agricultural activity appeared to be low intensity grazing; it was indeed an isolated industrial site.

The Milling Process

The pond

The pond above a tide mill would provide the motive power so knowing the likely capacity of the pond is essential to understanding how much milling could be done within each tidal cycle. It is apparent that the decision to site the mill at this point must have been heavily influenced by the existing landscape of the derelict Roman waterfront (see Chaps 3 and 4). The most attractive aspect of this landscape was that the area to the south of the sandbank was something of a tidal backwater. In the 2nd century the natural bank at the west end of the backwater was re-inforced and raised, enabling a wharf to be constructed along the south bank in a sheltered area, out of the main Ebbsfleet stream, but still within easy reach of it. Shallow-draft vessels could

Plate 6.9 Artist's reconstruction showing the mill in its landscape at the end of the 7th century (P Lorimer)

be moored, loaded, and dispatched downstream. It seems likely that the Roman wharfage revetments were, by the late 7th century, still accentuating the ponding effect and offering an opportunity to create a viable mill pond with the minimum of effort. To do this required the re-inforcement and expansion of the bank on which the mill would be built to give more usable space and to resist erosion. In addition an access across the backwater to the south was required which would also provide the location for a sluice gate to control the tidal flow into the pond.

Calculations show (below) that the milling time available with a pond of this capacity was between 2 and 2.5 hours. There is no evidence that the pond extended any further than was revealed by the excavation and the high and low levels of the pond are determined by the pentrough inlet levels. The only way the tidal water supply to the mill could have been directly supplemented was by the fresh water stream of the Ebbsfleet. This would have to have been diverted from its main channel upstream and fed into the pond by its own conduit. The point of diversion would have to be where the stream level was significantly higher than the minimum height of the pond (1 m aOD); such data as there is suggests that point would have been somewhere in the vicinity of the eastern end of the villa complex. No evidence of any conduit was found.

The water supply, tidal operation and water control

The operation of a tide mill is restricted to one relatively short, but predictable, working period within each tidal cycle of about 12 hours 25 minutes (half a lunar day of about 24 hours 50 minutes). Water is admitted through an open sluice into a pond or reservoir as the tide rises, a sluice gate being closed at high water to impound it. The level and amount of water that can be stored in the pond therefore depends not only on the area of the pond but also on the height of the tide and that of the sill of the tidal sluice. At high tide, and for a given period on both sides of high water, the water wheel of a tide mill is wholly or partially submerged. As the tide ebbs on the downstream (tail water) side of the mill, the wheel becomes exposed and, when the tail water level is suitably low, a sluice gate controlling the flow of water onto the wheel can be opened to start the mill (see schematic reconstruction in Fig 6.13).

The builders of tide mills usually chose sites with a moderate tidal range, in creeks and estuaries sheltered from destructive waves and storms of the open sea (D Jones 1986, 125). Spain has suggested (2002, 20) that coastal inhabitants' experience of any four years' tides would teach them a level which would endure without regular flood damage but that weather conditions such as low pressure and strong winds could produce unpredictably high water levels. On the basis of the evidence of the mill structure, the average tidal range at Northfleet contemporary with the functioning mill appears to have been between a low point at or lower than the base of the undercroft at 0.3 m aOD and a high point at (or possibly slightly higher than) 1.5 m aOD; the top of the inlet or the highest pentrough. The high tide level of the Thames at London in the 1st century AD is

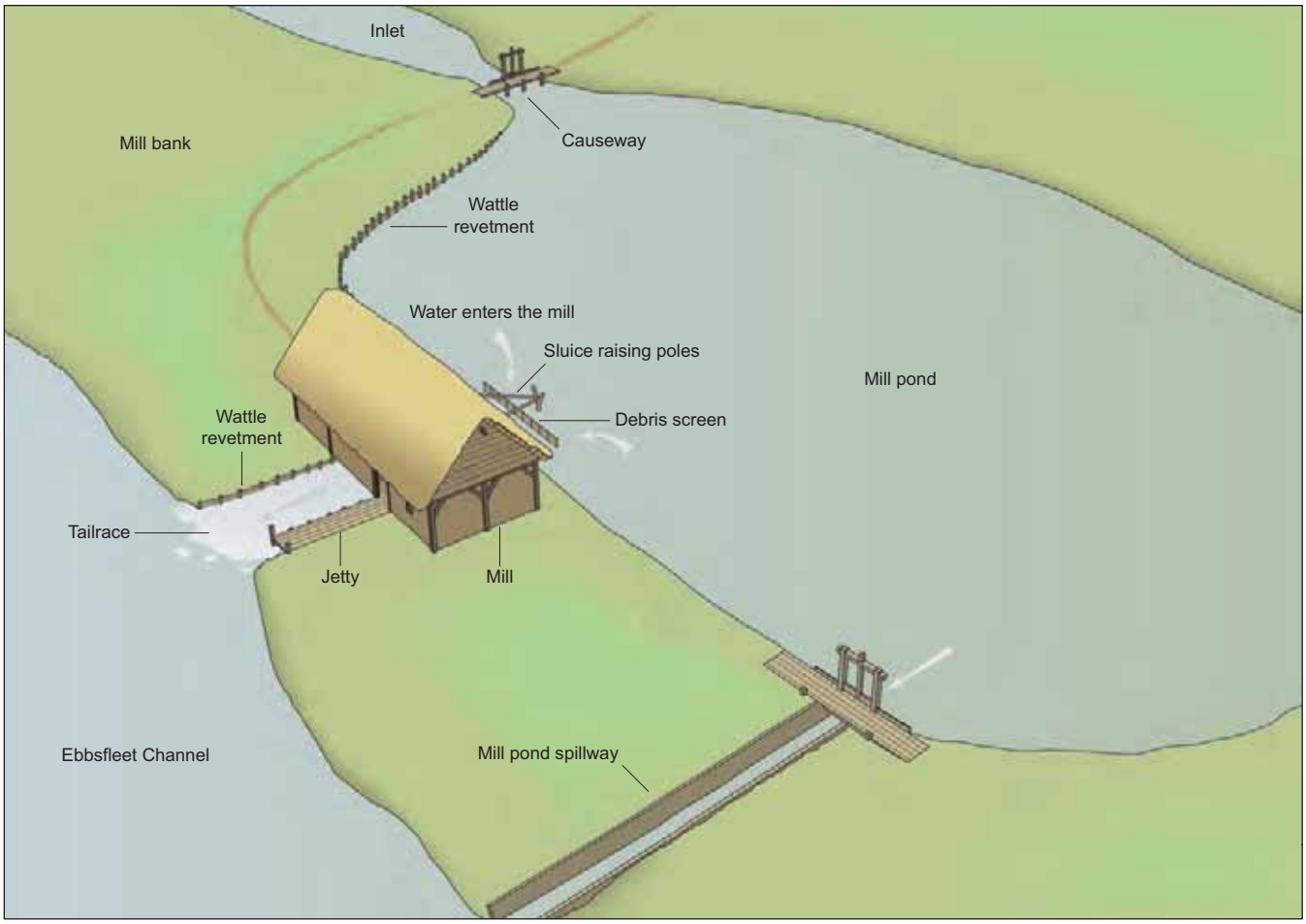

Figure 6.13 Schematic view of the mill and pond, looking south-east

estimated to have been at +1.6 m aOD, but by the 3rd century tidal regression meant that high tide barely exceeded the 1st century low watermark (Spain 2002, 20, 26). In the late Roman or early post-Roman period, however, sea levels began to rise again. This has been proposed as one of the reasons that coastal settlements on the eastern shores of the North Sea were abandoned, due to loss of land, with the people from those areas migrating westwards, settling in south-eastern England around the creeks which lead into the Thames (Drewett *et al* 1988, 254).

The borehole data from a number of sites within the study indicate that in the late Saxon period there was a significant accumulation of peat in the vicinity of the mill and pond, suggesting a tidal regression. On the basis of the evidence there is no reason why this process could not be due to the natural developments of the landscape of the valley, as suggested by Stafford (Chap 5), but could there be man-made factors involved?

The raised causeway of the Dartford to Northfleet road, where it crosses the Ebbsfleet valley, is known to have existed in the 13th century, a period of extensive embankment construction along both sides of the estuary. However, it has been suggested (Cracknell 2005, 82) that the mid- and later Saxon period may have seen early attempts to prevent encroachment of the sea by the building of embankments. Cracknell cites Spurrell's survey of 1885, although that does not identify any of the embankments he visited (which were principally in the vicinity of Higham, to the east), as being earlier than medieval in date (Spurrell, 1885, 302). It appears therefore, as though the hypothesis of Saxon embankment building along the estuary awaits physical evidence.

If, therefore, the tidal regression was a natural process, in the context of the short life-span of the mill, any early manifestation of such a regression would have been almost certainly too insignificant to be a factor in its demise, and we should probably look to a more immediate cause for its end.

The tidal range and the mill stratigraphy

The issue of the tidal range in this part of the Thames estuary in the post-Roman period has been a contentious one, complicated by the many contributory factors and the difficulty in quantifying them. However, what is clear is that the constructed elements of the mill, the spillway, and the pond were designed to make the most of the available water as provided by the tidal range at this point. The maximum height of the water surface in the pond must have been significantly lower than the ground level of around 1.7 m aOD. It is suggested that, under typical tidal conditions, it was probably at the level of the upper edge of the higher of the two pentrough inlets, approximately 1.5 m aOD. The lowest usable water level in the pond was approximately 1 m aOD. This was the lower edge of the inlet end of the pentroughs.

Table 6.1 Comparative figures for output, speed and power of 18th–20th century horizontal-wheeled water mills, compared with estimated figures for the mill at Northfleet

Location	*Output kg/hr, texture*	*Grain/ product*	*Trough type*	*Stone diameter (m)*	*Speed rpm*	*Power kW*	*Source*
Palestine	70–150	?	A	1.12	60–180	7.2	Cresswell 1993
Crete	13	oatmeal	C	?	100–150	0.75–1.5	Rahtz 1981
Crete	?	?	C	?	120	1	Calvert 1972–3
Portugal	1.8–21.4	flour	C	?	60–100	?	Viegas 2002
Spain	43	corn = flour	C	1.22	50	0.5	Bruce 1884–5
Morocco	15, fine 66, coarse	wheat, barley, or maize	C	0.75	120	0.4	Cresswell 1993
Atlas Mountains	24–28 7–8	barley wheat	C	0.78	?	<0.75	Harverson 1995
Peru	12.5	wheat	C	'small'	?	<0.75	Gade 1971
Caucasus	1.3–13	maize, wheat	O	0.45–1	40-80	?	Kozmin 1917
Sweden	5	flour	O	0.72	?	?	Cresswell 1993
Orkney	19	oatmeal	O	?	?	?	Fenton 1979
Shetland	13.5	oats/bere	O	>0.76	50-110	<0.75	Dickinson and Straker 1934
Shetland, Foula	15.4 4.5	meal	O	?	?	If good If not	Tulip 1968
South Europe	10–15	?	O	?	?	?	Moog 1994
South Africa	3.6	wheat	O	?	?	?	Wilson 1960
Northfleet, Kent	*14.5*	*wheat?*	*C*	*c 1.0 m*	*65*	*0.40*	Hawksley, pers comm 2007

Trough types: A – arubah; C – closed (pentrough); O – open (chute)

The structural elements of the mill undercroft, in particular the sill-beam directly under the pentrough spouts, and the pentrough outflows themselves, allow the OD height of the water wheels to be calculated with some precision. Calculating on the basis of the eastern pentrough (where the issue of possible subsidence is not significant) the bottom of the water wheel must have been at a level of approximately 0.6 m aOD. The width of the recovered water wheel paddle of *c* 0.11 m suggests that, when complete, the wheel would have been approximately 0.15 m deep. The bottom edge of the spout of the pentrough outflow must therefore have been at a height of at least 0.75 m aOD.

The *theoretical* maximum milling time would be governed by the length of time that the water wheels were clear of the ebbing/returning tide. The *actual* milling time would be governed by the available water and the permitted rate of flow through the pentroughs.

Estimates of the pond capacity and the flow rates through both pentroughs suggest an available maximum milling time of *c* 2.5 hours (with both wheels working). The milling could not begin until the water level in the undercroft dropped below the bottom of the water wheel. Therefore estimates of the low tide level can be made on the basis that the 2.5 hours milling time must have been sufficient to allow the water level to drop from 0.6 m aOD – the underside of the waterwheel – to its low tide point, and rise again. If it takes six hours to go from high tide to low tide, then, a period of 2.5 hrs (the milling time) and a low tide point of 0.4 m aOD will give a sufficient period of clearance for the water wheel.

Product and output

As mentioned above, the provision of two pentroughs and two water wheels, each driving a set of millstones, may have been simply to maximise the output of the mill, by making best use of the tidal water level when the pond was full. The two sets of millstones could therefore have been used for milling the same product, or alternatively for two different functions which might be carried out at the same time, such as shelling grain and grinding, or grinding a staple cereal and also malt, for brewing. It is difficult to explore such possibilities further without some knowledge of what crops may have been processed. Small quantities of spelt cereal chaff and a single grain of wheat were found in the samples taken from the pentroughs, and wheat, barley, and rye are all indicated from pollen analysis (see Scaife, Vol 4, Chap 7), but none of the evidence gives a clear idea of what was being milled. It cannot be ruled out that the two sets of milling plant were held and operated by different people for different purposes (as was the frequently the case for multiple-wheeled mills in the medieval period), although the restrictions of tidal working perhaps preclude this. The control of the tidal sluice and mill pond level, and the operation of two sets of milling plant would seem to suggest that some form of regular management was needed. The earliest documentary reference to a miller in England appears in a 10th century will (Whitelock 1968, 6–7) and only six millers are identified in *Domesday Book*, less than 1% of the total number of mills listed (Darby 1977, 272), but the regime of tidal mill operation could feasibly have required a miller, resident at least part-time, at Northfleet.

It has proved extremely difficult to calculate the potential output of the Northfleet mill from the evidence available. A wide range of variables needs to be taken into account when considering the output and performance of water-powered grain mills, for example: the amount and head of water available; the efficiency of its delivery onto the water wheel; the condition, dryness,

Table 6.2 Estimated performance of horizontal-wheeled tide mill at Northfleet, Kent

A. Eastern milling unit, orifice 140 x 130 mm

	Water level aOD (m)	Head above nozzle (m)	Jet velocity (m/s)	Flow rate (l/s)	Head above wheel (m)	Output power (kW)	Rotational speed (rpm)	Grain ground (kg/hr)
1	1.7	1.11	4.67	43	1.38	0.26	65	9.5
2	1.6	1.01	4.45	41	1.28	0.23	63	8.4
3	1.5	0.91	4.23	39	1.18	0.20	60	7.3
4	1.4	0.81	3.98	37	1.08	0.18	58	6.4
5	1.3	0.71	3.73	35	0.98	0.15	55	5.5
6	1.2	0.61	3.46	32	0.88	0.13	52	4.6

B. Western milling unit, orifice 120 x 80 mm

	Water level aOD (m)	Head above nozzle (m)	Jet velocity (m/s)	Flow rate (l/s)	Head above wheel (m)	Output power (kW)	Rotational speed (rpm)	Grain ground (kg/hr)
1	1.7	1.11	4.67	23	1.38	0.14	65	5.1
2	1.6	1.01	4.45	22	1.28	0.13	63	4.5
3	1.5	0.91	4.23	21	1.18	0.11	60	3.9
4	1.4	0.81	3.98	19	1.08	0.09	58	3.4
5	1.3	0.71	3.73	18	0.98	0.08	55	2.9
6	1.2	0.61	3.46	17	0.88	0.07	52	2.4

In calculating the output power, the efficiency is estimated at 45% in accordance with model experiments carried out (Hawksley 2002). This may be considered a little high for the late 7th century but, even if a figure of 33% is used, the result is not very different. The amount of grain ground is based on a figure of 36.5 kg/kW.hr – the metric equivalent of one horsepower being required to grind one bushel per hour. This figure is based on barley, wheat, or rye, which have a heavier bushel weight than oats (information and calculations by G J Hawksley, April 2007)

and type of grain; the size, weight, and speed of rotation of the upper millstone; and the requirements of the customer – what is being ground, and how finely or coarsely it is milled. Figures of power and output from modern horizontal-wheeled mills vary widely although the general consensus indicates that less than 0.75 kW (1 horsepower) is available from a simple horizontal water wheel (see, for example, Hunter 1967, 458; Harverson 1995, 124). Some comparative figures, taken from a wide variety of 18th–20th century sources concerned with horizontal-wheeled mills, are given in Table 6.1. Cresswell's analysis of a number of sources led him to suggest that a horizontal-wheeled mill with a simple open chute would grind 15–25 kg/hour, whereas a mill with a penstock would produce 70–150 kg/hour (Cresswell 1993, 195). He also considered that output was related to the weight of the runner stone, among other factors, noting that a stone of 50 kg in weight yields about 5 kg of flour an hour and a stone 7–15 times heavier would yield 100 kg an hour (*ibid*), although more power would be needed to turn a larger millstone. The difference in output between grinding coarsely or finely can be as much as 1:5, according to research carried out on a Faeroese horizontal-wheeled mill in the 1950s (Jones, pers comm 2003). In 20th century Morocco 20–40 kg of flour was necessary for 4–5 days consumption for a domestic group (Cresswell 1993, 192), an amount which could be produced on a single pair of millstones in a few hours.

The evidence from Tamworth and some of the early medieval Irish sites suggests that the millstones were of about the same diameter as the water wheel, so working on a maximum wheel/millstone diameter of about 1 m, the two wheels at Northfleet may have achieved an output in the region of about 14.5 kg/hour. It should be noted, however, that this is an optimum figure and output would have decreased rapidly as the pond level fell (see Table 6.2).

A final consideration is that the scale of output may not have been of vital importance at Northfleet; if the mill provided enough meal or ground products to supply the specific community that it was built to serve, without the manual effort of grinding by hand using a quern, then it would have fulfilled its purpose and would probably also have represented a significant status symbol for its owner.

It is interesting to look at Tamworth in this context. There is little evidence from the investigations so far undertaken to suggest that Tamworth was a commercial or economic hub, or that it had a substantial population in the early 9th century (Rahtz and Meeson 1992, 3), which suggests that the construction of the mill was not instigated primarily by economic factors. The demonstration of status, and association with advanced technology may have been the more important motivators (Zaluckyj 2001, 221).

The Longevity of the Mill

Having invested a substantial amount of energy and resources into its construction, it is notable that there is no sign in the archaeological record of a significant lifespan. The construction date of AD 691–2 can be determined with some confidence. That the sapwood present in various structural timbers is not appreciably decayed strongly suggests that a lifespan of no more than 30 years would be a reasonable estimate (Goodburn pers comm). Possible reasons for its modest lifespan can be summarised as technical or mechanical failure,

natural decay of a timber structure in a hostile environment, regional environmental change, and political events.

There is no evidence that the mill suffered a catastrophic mechanical failure. If such were the case, one might expect evidence of at least an attempt at repair. However, gradual structural failure seems to have been a problem. The insertion of the scrap piece of timber (19161; see Fig 6.3 above) under the western end of the undercroft wall seems to indicate steady erosion of the deposits under the western side of the mill, leading to subsidence of the western pentrough. This seems to have resulted in the western spout delivering water too low for the water wheel. A possible attempt to accommodate this problem is considered further below. Ultimately, however, the problem may have rendered the western mechanism unusable, and the presence of a bung (19168; see Fig 6.2) by the western pentrough outlet may have been an attempt to prevent the waste of valuable pond water running away down a redundant pentrough.

The operation of a tidal mill in this setting was reliant on a very narrow window of opportunity within the tidal cycle. A modest increase or decrease in the tidal range could render the mill useless, either because the water wheels were no longer clear of the water for long enough or because a lower high tide provided insufficient water in the pond. The environmental evidence (see Stafford, Vol 4, Chap 7) seems to suggest that the second possibility, the shortage of water caused by the lowering of the tidal range, may have been a factor.

The relatively gentle ingress and outflow of the tide into the pond and out through the mill must have made the progressive silting up of the pond an issue. The stratigraphy of the deposits at the southern edge of the pond opposite the mill displays an interesting sequence (see Stafford, Vol 4, Chap 7, Fig 14). The deposits that are interpreted as the Roman and Saxon stony layers, part of the wharf, and the causeway respectively, are overlaid by dumped silty clay layers, which themselves are overlaid by late Saxon peat. These dumps could represent attempts to dredge the pond basin, and preserved the water flow, particularly in front of the pentrough inlets.

However, the demise of the mill may also have been triggered by factors other than declining efficiency due to a lack of water, or to a subsiding pentrough, or to a surfeit of silt. As is suggested below, the precise build date of the mill, and its estimated date of demolition coincide well with a relatively short (for the period!) spell of secure kingship in Kent (under Wihtred), coupled with a constructive relationship between the king and the church. The political context of the Ebbsfleet valley is considered further below.

The Dismantling of the Mill

The stratigraphy makes it clear that the structure was neither abandoned to decay and disintegrate naturally, nor was it summarily destroyed, but methodically taken apart. Care was taken in the first stage of demolition to dismantle the structure and salvage the machinery and re-usable elements of the superstructure. Also dismantled and salvaged, possibly at this stage, were the pond sluice gate and the spillway sluice gate. At the end of the initial stage of dismantling, the principal mill elements still left in place included the undercroft shuttering, the mill and pond dam revetments, and the two pentroughs. In addition the two wooden troughs of the spillway remained in place. All these would have required substantial earth moving and/or physical effort to extract from their emplacements (each pentrough, for instance, would have weighed around 750 kg). With the pentroughs being buried in clay it would have been a massive effort to remove them. They are the most common find, apart from basal structural timbers, on early medieval Irish mill sites for the same reason. After an interval, identifiable by the stratigraphy in the undercroft (see above), most of the wooden shuttering on either side of the undercroft was removed, presumably also for salvage, and the undercroft depression was left to silt up naturally.

Technical Issues

In trying to reconstruct the remains of a partially complete machine with no close parallel to act as a model, a repeated problem has to be faced. If it can be reasonably assumed that every recovered element of that machine must have had a specific function, and if the mechanical requirements of such a machine are known, then there is an obligation to advance hypotheses to accommodate those elements within the machine. In such circumstances a single interpretation is rarely the only possible alternative but the validity of the exercise remains.

Water control

The flow of water into the pentroughs was governed by a sluice gate at the upper end of each pentrough where the form and arrangement of rebates and housings suggest that the gates moved up and down. The gates would therefore need to have been held in place in the rebates and, once the pond had filled up to some degree, this could have been achieved by water pressure alone. However, when the pond level was too low the gates must have been held securely in the rebates by mechanical means. Two withies were found leaning against the eastern pentrough inlet (see Fig 6.3 above) and three others were located close to the western inlet. It is suggested that the gates were held in place against the pentrough rebates by withies or thin saplings sprung between them and the securing posts of the debris screen. Such a device would hold the gates against the rebates while allowing them to slide up and down.

There had to be some means of opening and closing the pentrough sluice gates in a controlled and graduated way and ideally this would be possible from within the

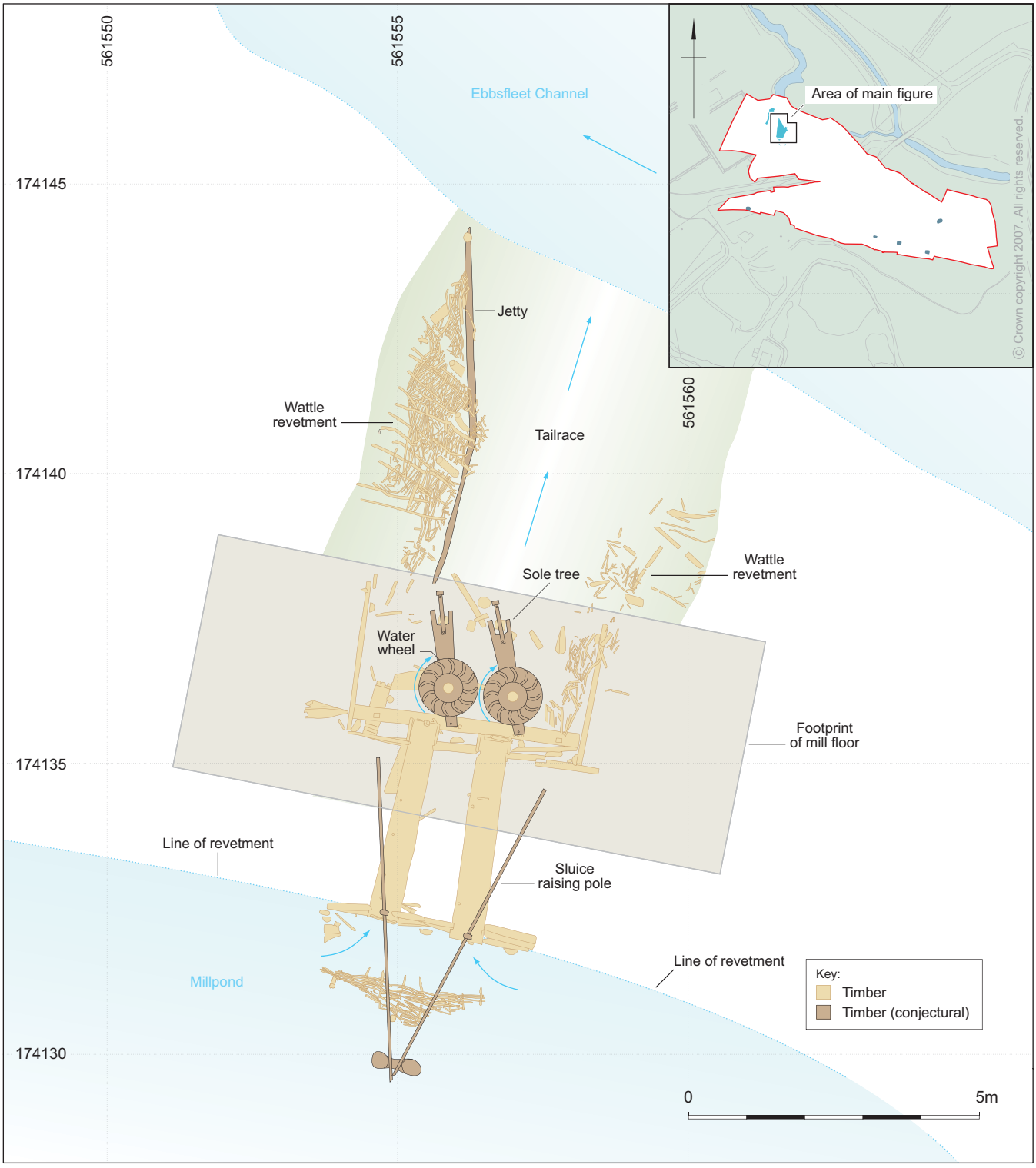

Figure 6.14 Conjectural footprint of mill, water wheels, sole trees, and sluice lifting mechanism

millhouse. The evidence suggests that both gates incorporated an upright spar with an aperture, perhaps around 75 mm in diameter (see Fig 6.3, context 19154). It is suggested that for each gate a pole was inserted through the aperture, with one end resting in the crutch of the 'Y' shaped pile (context 11674, see Fig 6.2 and Fig 6.24) to the south of the debris screen and the other extending into the millhouse through an aperture in the wall. The gate could therefore be raised and lowered from within the mill by lifting and lowering the pole, its far end pivoting on the crutch of the Y-shaped pile (see suggested reconstruction in Figs 6.14 and 6.15).

The millstone adjustment

It had to be possible to both vary the distance between the upper and lower millstones and, at times, to separate them altogether, an action known as lightening or tentering. Starting the upper millstone turning before it was brought closer to the fixed lower stone was essential, to reduce the stress on both the shaft and the water

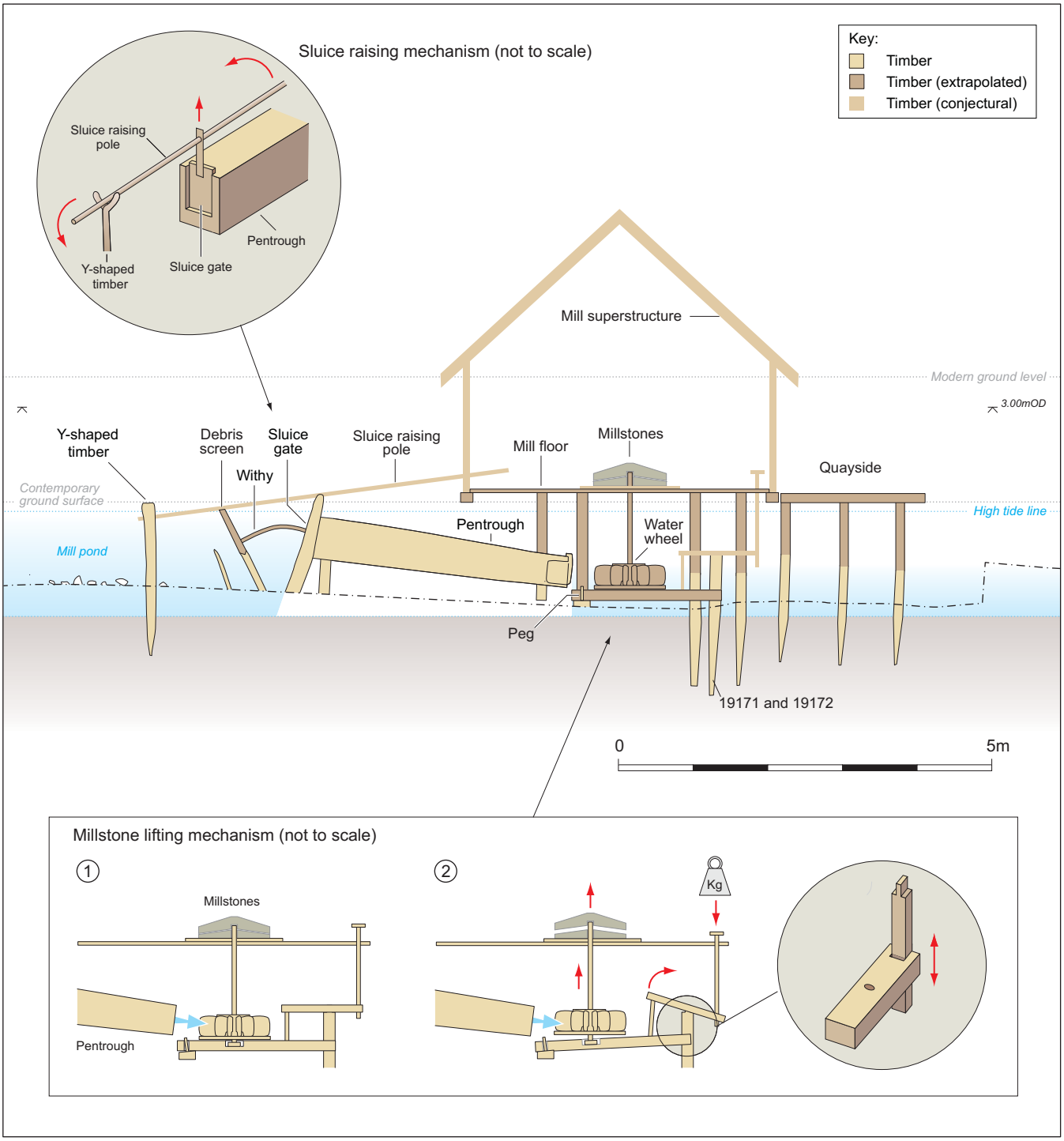

Figure 6.15 Conjectural reconstruction elevation of mill, showing possible lightening mechanism

wheel when the millstones started grinding. Ideally this adjustment should be easy to make and readily variable. The different milling requirements, for instance a wide gap for de-husking, a narrow gap for meal production, would also require an ability to increase and decrease the milling gap between the stones. Similarly, as the available head of water decreased, so would the driving force transmitted up the shaft. Increasing the distance between the two stones would allow them to continue milling even with reduced power (and stop the mill literally grinding to a halt!).

Alternative 1

It is suggested that the function of the two tenoned uprights (19171 and 19172), situated within the undercroft and downstream of the two pentroughs, was associated with the adjustment mechanism; the schematic elevation (Fig 6.15) shows how this could have worked. Each tenoned post would be surmounted by a balance beam, the upstream side of which was linked by an upright to the end of the sole tree. The downstream side of the balance beam would support an upright extending up though the milling floor. There is a

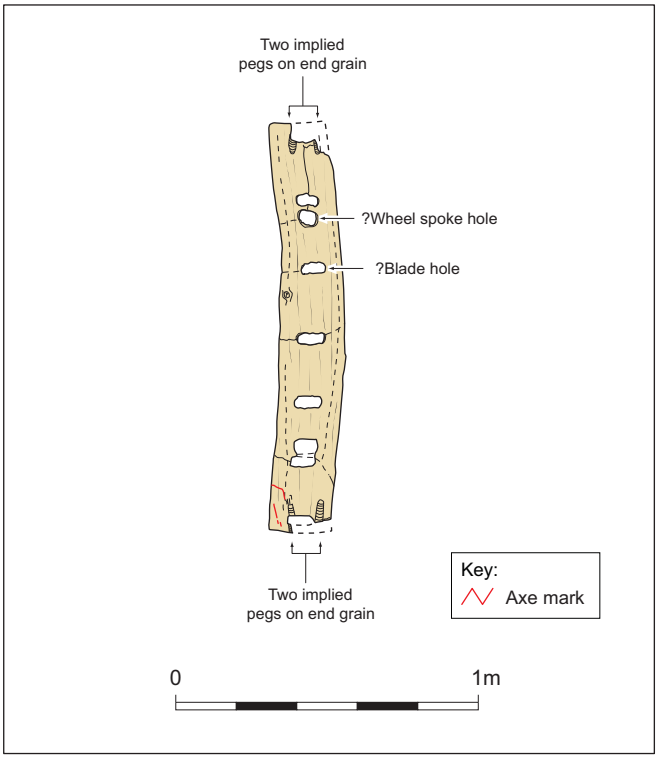

Figure 6.16 Curved timber 12279

possibility that at least some elements of this lever system were made of iron (see below). By applying pressure to the 'pedal' protruding above the milling floor, the distance between the two millstones could be varied conveniently and with very fine control.

Another intriguing aspect to the posts 19171 and 19172 is their (approximately) square section. This may be related to the need to stabilise the downstream end of each sole tree; a bridle joint at the end of the sole tree would anchor the timber to the tenoned post, while allowing a degree of vertical movement.

It is possibly significant that the tenoned top of the western post (19172) is lower than that of the eastern post 19171, apparently matching the lower level of the subsided western pentrough. A plausible explanation for this is that the sinking pentrough, 19139, rendered the water outlet too low to direct the water onto the western wheel with efficiency. The wheel was lowered in attempt to maintain its viability but, in doing so, it meant altering the length of the lever mechanism to hold the downstream end of the sole tree at a lower height. If the linked mechanism was made of iron the simplest solution may have been to reduce the height of the post.

It is accepted that this hypothesis implies a degree of mechanical complexity not recorded elsewhere, either in contemporary horizontal-wheeled mills or later Saxon and early medieval ones; nevertheless its plausibility remains valid, in the absence (so far) of an experimental replica.

Alternative 2

The level of the shoulders of the tenons is above that of the working positions of the water wheels and the tenons are also in line with the ends of the pentroughs rather than the centre lines of the water wheels, which are the same as those of the sole trees. It is possible that these posts provided locations for the downstream ends of two horizontal timbers that spanned from a lateral beam that ran parallel to and above the sill timber (19147), which may have provided primary support for the millstone floor and vertical wheel shaft assemblies. Such horizontal timbers could also have served to steady the vertical shafts that connected the water wheels to the upper millstones, their positions being close to, but not in line with, these shafts.

Alternative 3

The two tenoned piles may have provided locations for horizontal timbers or levers that controlled timber boards which acted as jet deflectors, to alter or divert the water flow onto the water wheels. Such devices were used in more modern times in horizontal-wheeled mills (Moog 1994, 41–2) and a possible early medieval example has recently been excavated at Kilbegly, Co Roscommon (Rynne, pers comm July 2007). The ability to remotely alter the angle or intensity of the jet of water striking the water wheel would undoubtedly be useful in a tide mill working on a diminishing head of water, although arguably this could also be achieved (and perhaps more easily) by controlling the pentrough inlet sluice gates.

The curved timber 12279

The curved timber segment (12279), excavated at the probable location of the tidal sluice, was provisionally identified as a section of the ring of a vertical water wheel (Fig 6.16). It is 0.22 m wide by 0.04 m thick and 1.35 m long, with seven regularly spaced mortises and two further holes. It is feasible that the regularly spaced mortises held shaped float boards and that the two more widely-spaced, squarer mortises indicate the locations of the outer ends of radial arms that supported the ring. It is difficult to reconstruct on paper a water wheel from this fragment, particularly as the original curvature of the timber appears to have altered. It could, however, have formed part of a ring 1.5–2 m in diameter. A comparable timber component from an early medieval vertical water wheel has been identified in Dasing,Germany (Kind 2007, Abb. 7, 381).

If not part of a vertical water wheel, it is possible that this timber could have been part of a mechanism, perhaps a large, spoked wheel to give a mechanical advantage for operating the tidal sluice gate, although this seems an unlikely sophistication and exactly how it may have worked is a matter of conjecture, no comparable examples being known.

Characteristics of the Woodwork in the Mill

by Damian Goodburn

The developments in the investigation of post-Roman woodworking in lowland England has enabled an understanding of its essential character, which has come

to be defined under old English-based term of 'treewrightry' – structural woodworking (Bosworth 1898, 1013; Goodburn 1999). The late Saxon treewright's repertoire included the widespread use of roundwood, cleft, and hewn larger timber, dressed with narrow and broad-bladed axes, but with little concern for the squareness or close regularity of timbers, and the sparing use of nails and a range of simple joints largely cut with axes. One of the key questions we must pose for the analysis of the mid-Saxon Northfleet woodwork is whether the classic late Saxon treewrights' tools and techniques were already in use as early as the late 7th century. Another question might be, is there any indication of Roman or possibly native British practice evident in the fairly large and well-preserved assemblage – an assemblage that includes some moderately complex work with everything from large timber to small roundwood.

The mill is not only a well preserved example of mid-Saxon woodwork or 'treewrighting', but is also a very early example of English engineering, currently the earliest known. The approach used in the construction of the mill contrasts strongly with Roman engineering as exemplified in the water-lifting machines found recently in London (Blair *et al* 2006), and yet the mid-Saxon mill builders have demonstrated that treewrighting and mechanical precision can go together when required. The molinological aspects of the mill are dealt with above; here we are concerned with the mill as a very rare example of mid-Saxon woodworking.

Plate 6.10 Splitting (cleaving) an oak log with wedges to replicate half log piles used in the mill

The pentroughs

The two tapering rectangular section baulks of oak, destined to be the pentroughs, were each cut from one log, then split longitudinally, following the twisting grain. It would appear that a large, tapering, square-section beam was hewn first using the notch and chop method, which left some relict lines of narrow axe marks at the base of what had been grooves. Many axe stop and incut marks were recorded on both pentroughs with narrow axe marks *c* 65 mm wide and *c* 80 mm wide (see Figs 6.5 and 6.6 above). The largest broad axe stop marks were found on the originally flat upper surface of pentrough (19133) with a total width of 315 mm, and many others were found with a slight curve and width of 240 mm. Thus, it would appear that at least two different felling or Wheeler 'type 1', narrow bladed axes were used followed by a very broad bladed tool(s) that must have been of the 'T-axe' form (Wheeler 1927, 22). The fine striations or 'signature marks' that denote individual tools were not visible in the slightly eroded, coarse-grained oak of the pentroughs.

Allowing for post-depositional compression, the pentroughs are of very square cross-section for Saxon timbers and must have been marked out with a line and plumb bob. This type of hewing, to fairly accurate square cross-sections, is rarely seen in Saxon woodwork as a whole, including that from Northfleet. Based on personal experience it is likely to have taken at the very least a day, possibly two, to shape the outside of a single pentrough, with two people working at the same time when possible.

It seems most likely that the tapering timber baulks were then carefully split in half using wedges (most likely wooden as they did not leave many clear pressure marks; see Pl 6.10). This splitting operation was carried out with great skill to ensure that only one split developed with a clean break that could be re-joined with minimal trimming after the hollowing of the interior. The cleaving process may have taken only a couple of hours for two people or longer if the grain was interlocked appreciably (as it was for the knotty western pentrough, 19139). This approach of cleaving and re-joining hollow structures has been seen applied to a solid log late Saxon well-lining in the City of London and a massive, hollowed log well-lining found near Tonbridge Castle in Kent, and may have been more widespread in the early medieval period than has been previously realised.

Considerable efforts were made to clean and examine the insides of the two pentroughs but it was found that the inside surfaces were abraded by the water flow in use and subsequent slight decay. However, detailed tool mark studies of Saxon dugout boats, dugout well linings, and the practical experience of building replicas of several dugout boats (Goodburn 1989; Goodburn and Redknap 1989) suggests the most likely method used to hollow the pentrough halves was controlled splitting and notch and chop hewing. No trace of using fire for

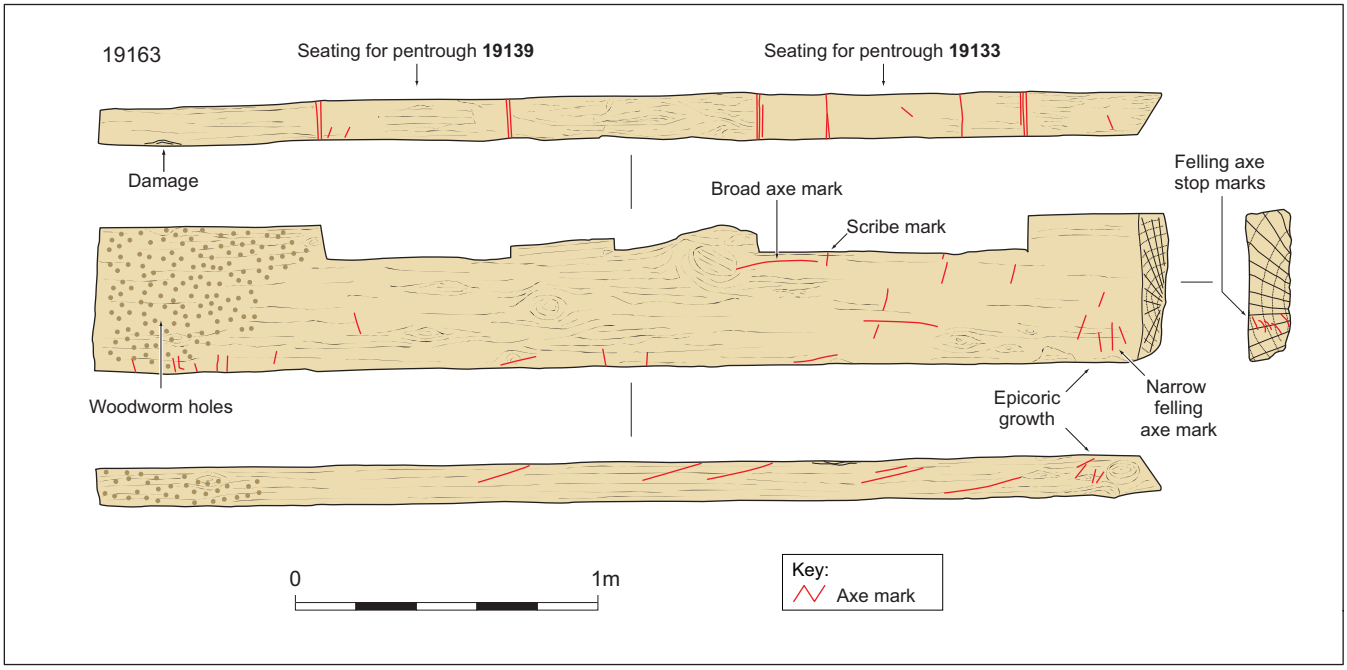

Figure 6.17 Southern basal mill dam plank 19163

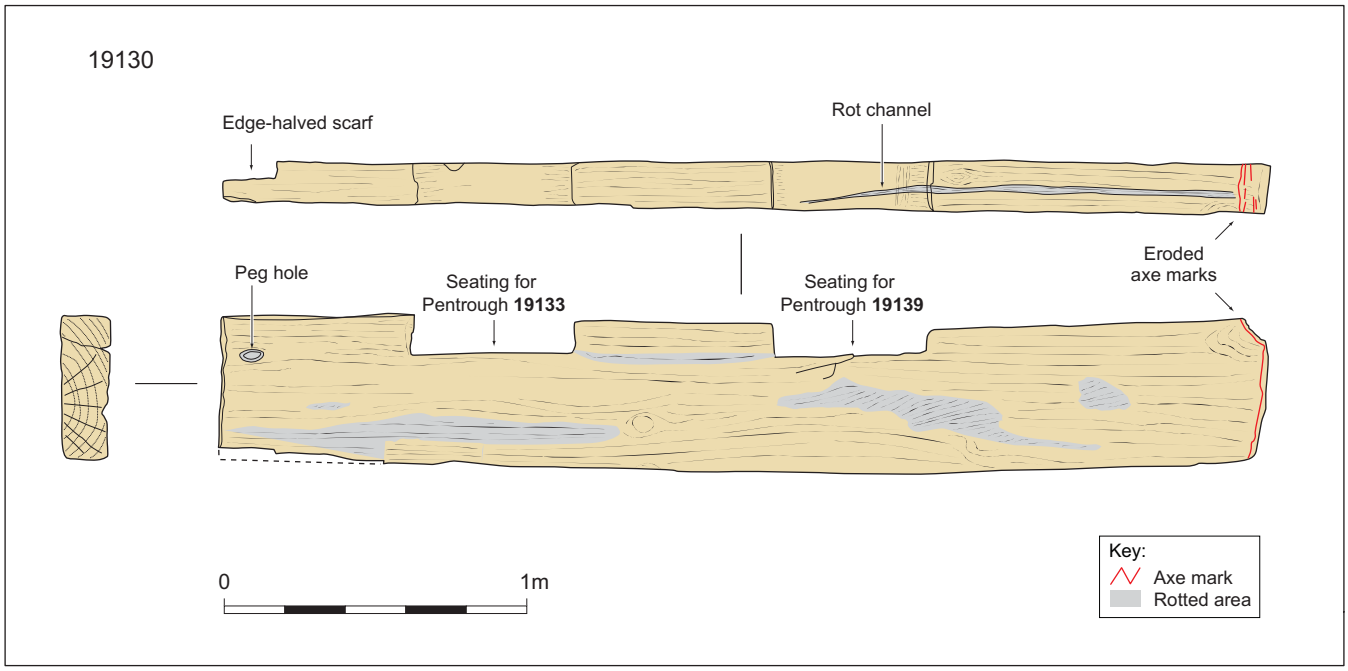

Figure 6.18 Northern basal mill dam plank 19130

hollowing was found. The rough hollowing was presumably followed by smoothing using adzes and axes. The pentroughs must have been carefully marked out in plan first to avoid damage to the intended sides and ends. Once hollowed and smoothed the pentrough halves were re-united, no doubt with some minor trimming, and a little packing out with slivers of oak in the case of the western pentrough (19139). Traces of moss were also found in the split seam in the eastern pentrough (19133); this was commonly used for waterproofing in some forms of Saxon planked boat building as it expands on contact with moisture (Goodburn 1991c) and it would have worked in this manner in the pentrough joins. The pentrough halves were then secured by 30 mm diameter skew pegs of hazel (see Barnett, Vol 4, Chap 8). Most of the pegs had oak wedges driven into their ends to increase their tightness.

This process of making the pentroughs was rather complex and laborious compared to the simpler method used for some other excavated early medieval mills where a tapering dugout trough was simply capped with a separate plank (Watts 2002, 69). Based on personal experience of making replicas of four early medieval oak dugout boats of broadly similar size to the Northfleet pentroughs, it is estimated that it would have taken approximately three or four days for two or three fit, experienced treewrights to hollow each half pentrough.

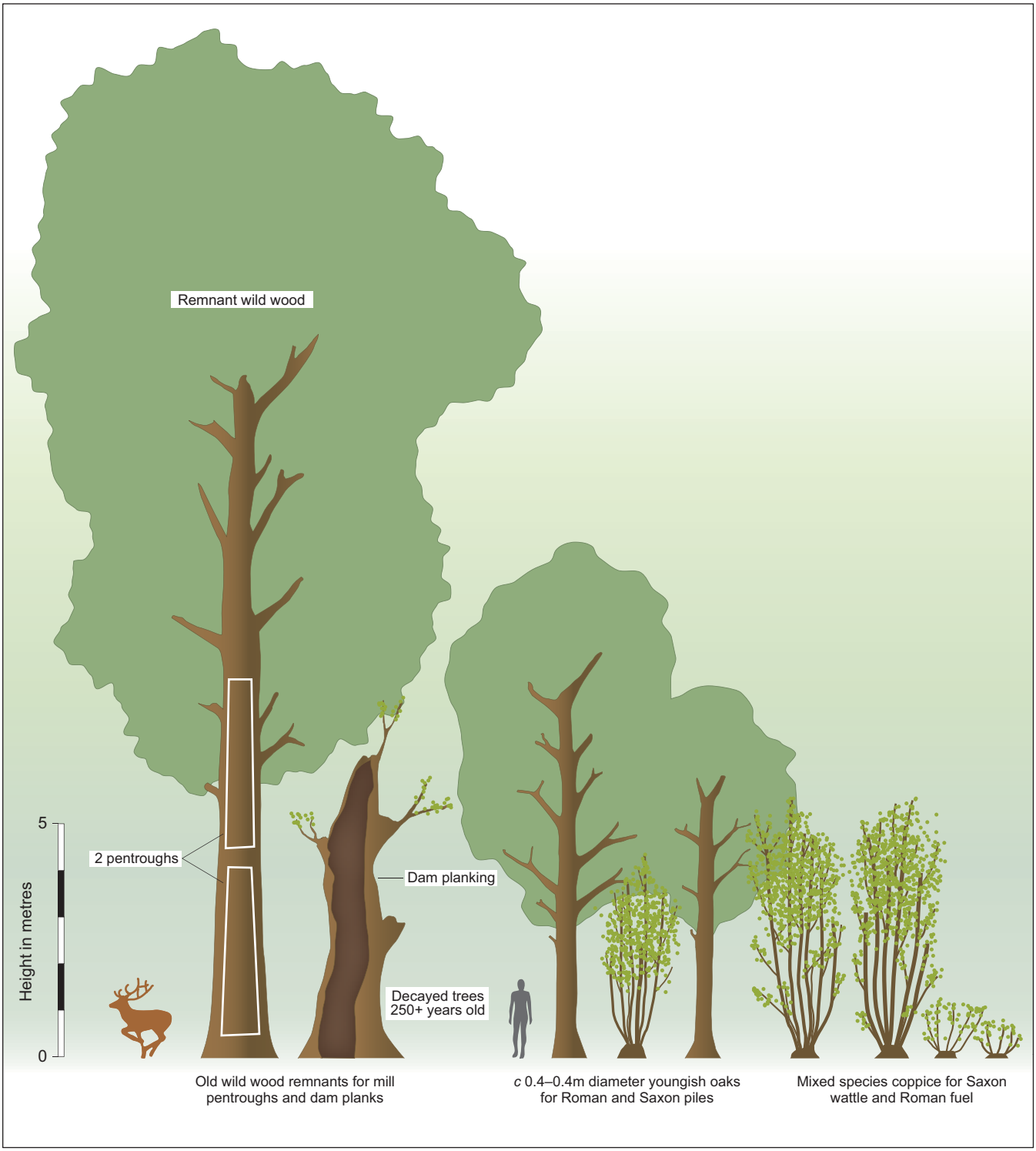

Figure 6.19 Parent trees for Northfleet Roman and Saxon timbers

Given the arduous nature of the work it seems likely that the task was spread over some time, perhaps a month in the winter or early spring of 691–2. Leaving the completion of the task until later in the spring or summer would have risked the development of substantial drying splits and distortion as the half-pentroughs started to season.

Evidence for moving and adjusting the pentroughs

The pentroughs, made of fresh oak timber, were very heavy and awkward items to move during and after shaping. The parent log for the larger (western) pentrough at *c* 1.15 m DBH (Diameter at Brest Height) and just over 3.5 m long would have weighed over 2 tonnes, as a hewn baulk *c* 1.3 tonnes, and after hollowing the fresh weight would have been around 0.75 tonnes. Because of the weight it is likely that much of the initial shaping would have taken place at the felling site. The treewrights provided a set of 30 mm holes through the sides of the pentroughs *c* 0.5 m from each end. These holes are in line with each other and it seems likely that they were used to insert a pair of iron

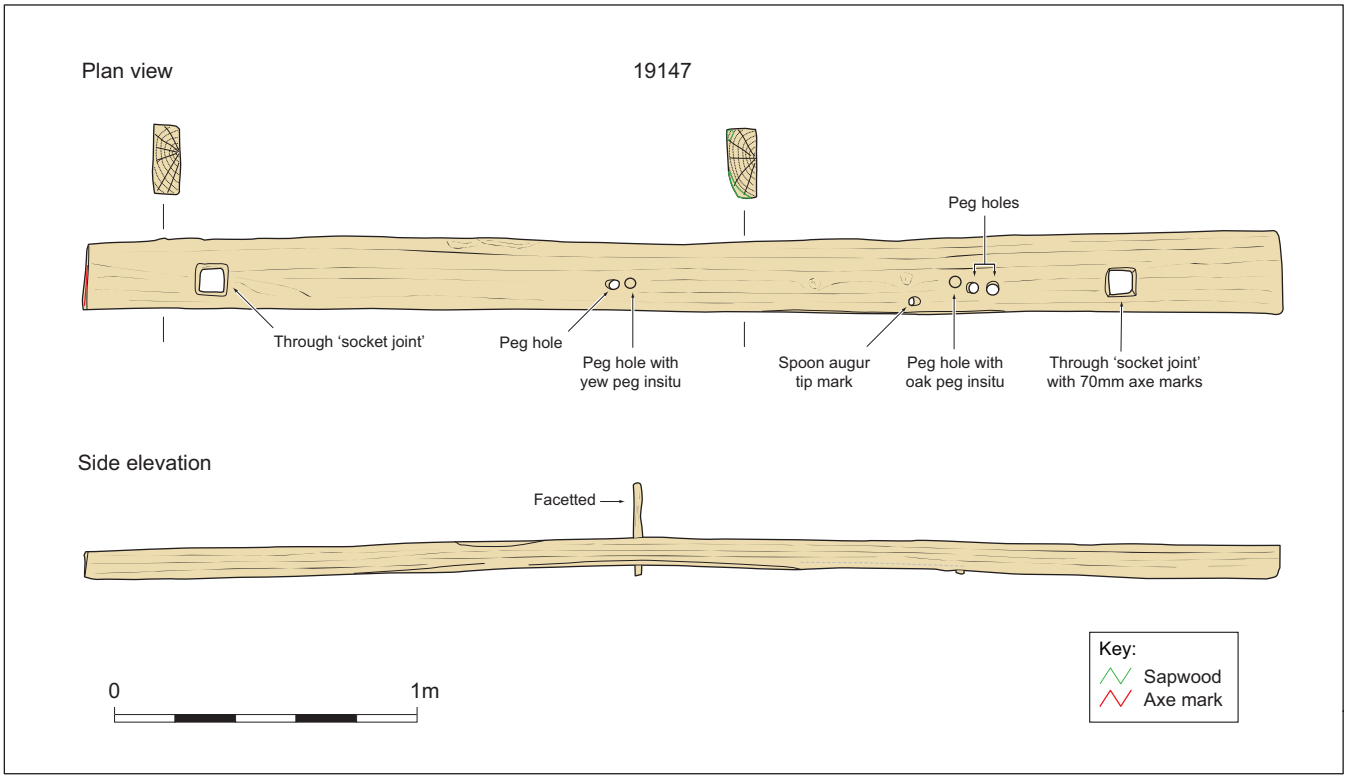

Figure 6.20 Undercroft sill beam 19147

bars to provided hauling, lifting, and manoeuvring attachment or pivot points. Once at the mill site the pentroughs were probably dragged into position over skids and final adjustments were made with chocking pieces (for instance timber 19164). Before being buried in the clay of the mill dam, the hauling holes were sealed.

As traces of what appear to have been charring were found on the lower side of pentrough (19133) it is possible that the old parent oak was scorched during some form of woodland clearance operation or by accident when brash may have been burnt. Live oak trees will only scorch rather than burn in woodland fires in our climate due to the sap content and lack of inflammable resin.

The pentrough inlets

These sluice gates were left *in situ* when the complex was abandoned. They were made of radially-split oak boards which only survived *c* 17 mm thick but may have been *c* 25 mm originally. The boards were of slow grown, wildwood-type timber. The boards had been edge joined with small pegs and one displayed a redundant nail-hole (Fig 6.3). These features and the form of the thin boards suggests that they were probably cut down from barrel head pieces, a source of board much re-used in Saxon structures across England (Stainer 1990; Goodburn 1999). Clearly, as trade containers, they could have travelled some distance before being re-used.

The mill dam planks

The upper mill dam revetment had radially-cleft upper planking set on edge (contexts 19161 and 19152, etc), similar to the side planks of the undercroft. The basal planks of the dam on the upstream and downstream sides were made differently, by splitting a large oak in half and splitting and hewing the halves down to thick planks (contexts 19163, 19129 and 19130; see Figs 6.17–18, and Figs 6.3–4 above).

The basal planks were made from an old dying wildwood oak, probably one of very few in the area at the time (Fig 6.19). The largest planks (19163: Fig 6.17 and 19130: Fig 6.18) showed very clear signs of wood-borer damage and ancient rot patches that were in the parent tree before it was felled and hewn to shape. This evidence is very rare in Saxon period woodwork and must imply one of two circumstances, or possibly a combination of the two. Either large oaks were very scarce in the locality or they were reserved for special uses such as ship building which, at the time required very large high-quality oak stems for the radially split boards.

It is important to emphasise the significance, in the context of the direction of the whole excavation, of these clear signatures of early medieval work ('treewrighting') in the form of a range of tool marks, both narrow and very broad axe marks, and the method of conversion of the basal dam planks. At an early stage in the excavation (before the confirmation by radiocarbon dating or dendrochronology), they signalled the possibility that at least one of the timber structures could be early medieval in date when all the surrounding structures on the site were suspected to be Roman. As a result of this, further excavation was undertaken, eventually resulting in the complete uncovering of the mill.

The undercroft sill beam 19147

One of the largest surviving structural elements of the mill was the east–west beam (19147) set just under the

north, or undercroft, ends of the pentroughs. It was 3.97 m long by 0.27 m wide and *c* 0.11 m thick (Fig 6.20). The beam was quite carefully hewn and had neatly squared ends. The structural role of this timber appears to have been to provide anchorage for the upstream end of the sole trees, each carrying one water wheel, and also to provide support for vertical timbers that must have helped to hold up the mill floor. This is indicated by the presence of a nearly square 'socket joint' (sometimes these are loosely called 'mortises') *c* 0.30 m from each end. Traces of an axe stop mark 70 mm wide was found inside one of the joints. The use of such a comparatively large tool to cut such a joint is typical of Saxon treewrighting (Goodburn 1999). Typically it is found that the tapered end of a whole timber fitted in the socket rather than a medieval or Roman style shaped tenon.

The surfaces of the beam had been eroded by the water flow to the extent that no tool marks survived except faint partial axe stop marks on the end grain. It had been hewn to a boxed heart section from a cleft half log of fast grown oak. Even with surviving wane it only contained *c* 45 rings. The parent tree was moderately straight with few knots and a DBH of *c* 0.35 m. Oaks of this form and growth habit are quite likely to have come from a managed woodland where some coppice stems were singled out to grown on for larger timber. In this case the east end appears to have been the butt end with curving grain. The beam tapered down a little at the west, towards the crown.

The undercroft planking

The west and east side planking of the undercroft was cleft from very slightly curved grain logs down to about 1/16th diameter sections and then extensively hewn to straighten them, achieving moderately regular planks (Fig 6.21). The patterns of narrow axe marks show clearly on plank (19146) that much of the waste was hewn away by cutting grooves and splitting off excess material. This was followed by broad axe smoothing across the grain that did not quite remove traces of the earlier phase of work.

The tenoned piles (19171 and 19172)

The very thin tenons on the tops of both piles had been remarkably accurately carved with wide bladed edge tools but were lacking peg-holes and were cut on the skew to the faces of the timbers (Fig 6.22). The tool marks showed that the piles had been carefully hewn, with both narrow bladed and broad axes, from cleft 1/4th or 1/8th sections split from a large, fairly slow grown oak. The grain of the timber was somewhat wavy and knotty and had several small borer holes in the heartwood (*c* 1.5 mm diameter) which had been cut by the axes used to make both piles. Neither pile had any traces of sapwood. The characteristics of the timber are both so similar to each other and the large mill dam plank (19163) that it is suggested that they almost certainly came from the same large and somewhat sickly parent oak.

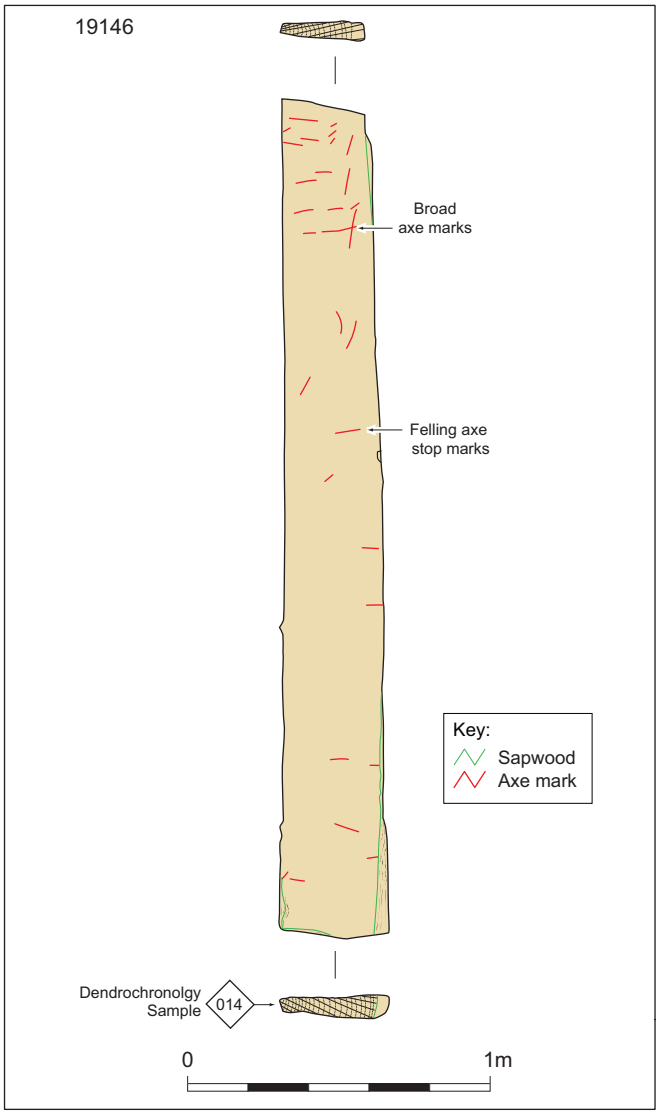

Figure 6.21 Undercroft plank 19146

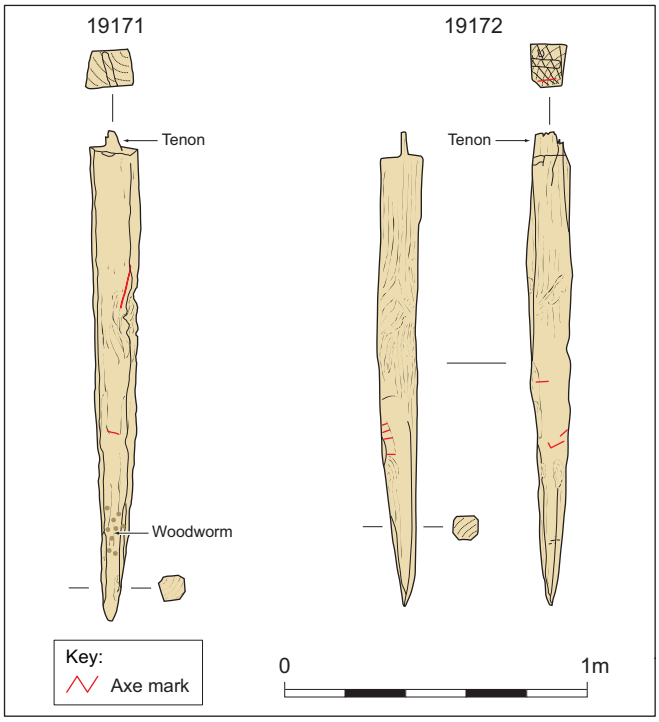

Figure 6.22 Tenoned piles 19171 and 19172

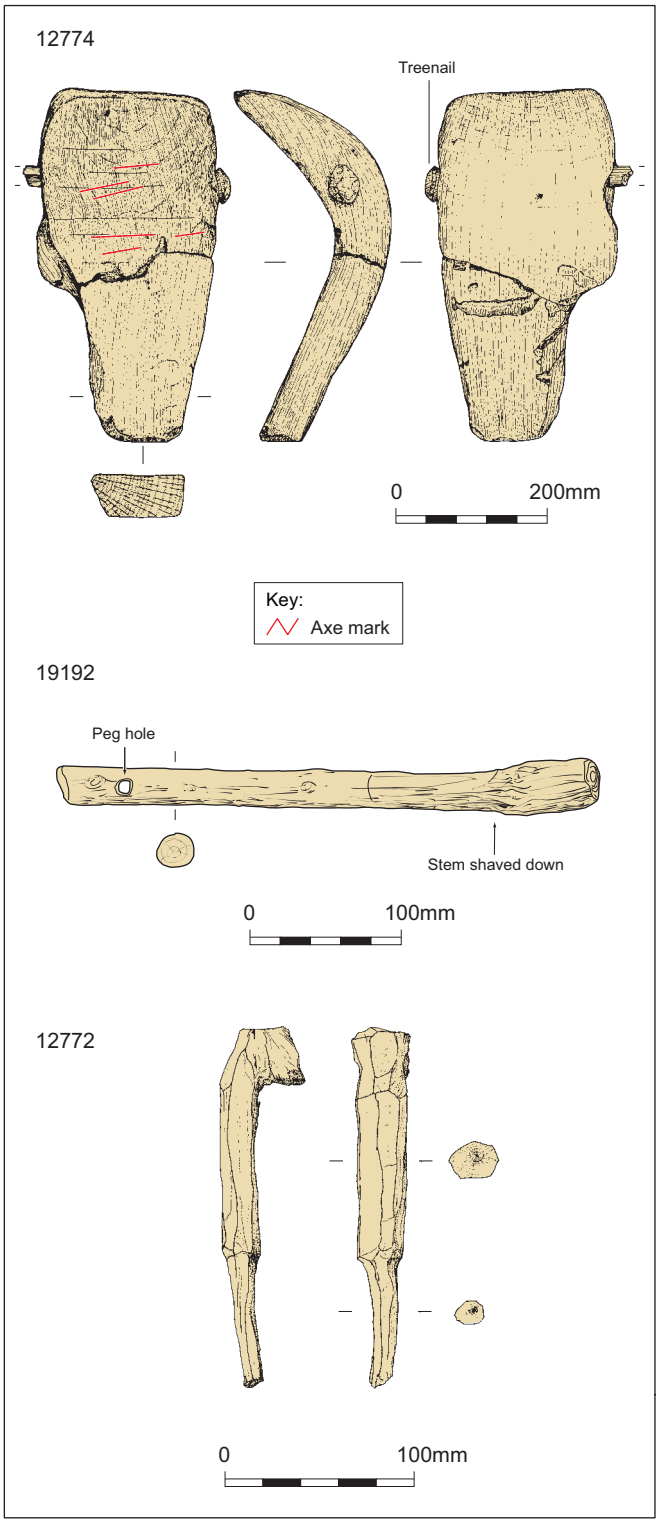

Figure 6.23 Mill machinery: Paddle SF 12774, yew handle or lynch pin of yew 19192 and handle SF 12772

The waterwheel paddles

Both the paddles were made of oak which appears to have been cleft and hewn to form a billet for carving. The most complete of the two, paddle SF 12774 (Fig 6.23) was carved out of a straight grained radially split piece while the more fragmentary paddle end (12129; not illustrated) was carved out of a tangentially faced section with grain grown naturally to the right hooked shape. The latter timber seems to have included the point where a branch was diverging from a main stem. Although the curved grain billet may have been more difficult to carve it was probably stronger than the straight grained example, which would have been cross-grained at the scoop end. The tool marks on the better preserved example 12774 comprised stop marks *c* 70 mm wide on the inside of the hook which seem to indicate that a small axe or adze was used for the bulk of the carving.

The daisy-wheel geometry

During the recording work several small interlocking circles became apparent in the upper surface of pentrough 19133, cut by a 'race knife', which is a narrow in-raking blade used for marking and grooving timber (Goodburn 1994; Pl 6.11). More complex designs were also found, scribed with a compass, but they were so fine they could not be adequately shown by photography. A tracing at a scale of 1:1 was made of the markings, showing the interlocking daisy-wheel (see detail Fig 6.24 and Fig 6.5 above). The use of compass drawings for designing later medieval and early post- medieval timber framed buildings has been researched extensively by Laurie Smith of the Carpenters Fellowship who concurs with the interpretation of the designs as a probable tool for laying out mill machinery elements and has contributed the notes below.

The Northfleet mill pentrough compass geometry by Laurie Smith

The compass geometry is an extraordinary survival because it reveals a hitherto missing link in the evolution of compass geometry in England. Although fragile and incomplete, the construction is clear enough to be re-constructed with certainty (Fig 6.24). The geometry is simple, a central circle with six further circles drawn to identical radius around its circumference. The arcs of the six peripheral circles intersect each other at 12 points, six outside the central circle and six exactly on the central circle's circumference, within which they generate the familiar daisy-wheel pattern.

The setting out and cutting of the water wheel hub would require precise measurement. The daisy-wheel is scribed into the flat surface of the pentrough (19133). With the hub timber placed on the centre of the design a plumb bob can then be aligned to each 'petal' of the daisy-wheel, enabling a line to be scribed to mark the position of each socket.

The daisy-wheel is a sophisticated geometrical calculator that requires just one dimension for the radius of the central circle; everything else being drawn to the same divider setting. The process eliminates the need for complicated arithmetical calculation and measurement because geometry is a spatial rather than dimensional language. Using dividers ensures that the geometry is drawn to the finest line possible which guarantees that the cardinal points of intersection are all precision locations, a necessity for what is clearly the skilled engineering of a wooden machine.

Plate 6.11 Part of the geometrical design scribed on pentrough 19133

The scribed designs are the earliest English engineering drawings known and appear to give a unique insight into the designing of mill machinery at a very early period. The accuracy of the design is in sharp contrast to the usual approach to building treewrightry where every element may vary in shape and accurate angles are unknown. It implies that the mill builders were perfectly capable of adopting precision processes where necessary and confirms that they were experienced in mill construction. Such specialist skills and experience suggests that they were itinerant, in the same way as were medieval masons.

Miscellaneous structural pieces

A pile with a bridle jointed top (19144)

This short oak pile timber, found close to the west side of the mill undercroft, had an axe cut bridle joint on its top end (Fig 6.25). The timber was fairly carefully hewn from a cleft half log to a boxed halved cross-section and was 0.84 m long by 0.22 m wide but 0.06 m thick. The original function is again unknown but a role as a foundation beam support would be possible. Later such timbers are well known in timber building footings in Germany and Scandinavia (eg, Schmidt 1994, 110).

The re-used jointed timber (19169)

This very worm eaten timber was reused as a chock to level up and support the west end of beam 19147. It was hewn from half a log of willow to a 'D'-shaped cross-section and then most of the curved face hewn away in the middle to form a recessed area (Fig 6.25). Both wide and narrow axe marks survived in places. The upstanding ends were also grooved cross-wise and each thin edge bore three peg- or treenail holes. Its original function remains unknown, but was almost certainly unrelated to the working of the mill.

A tenoned beam fragment (19167)

This timber was the jointed end of a structural oak beam found on the undercroft floor. It had been roughly cut off a longer timber with an axe and the jointed end had originally been cut into a reasonably regular tenon set at

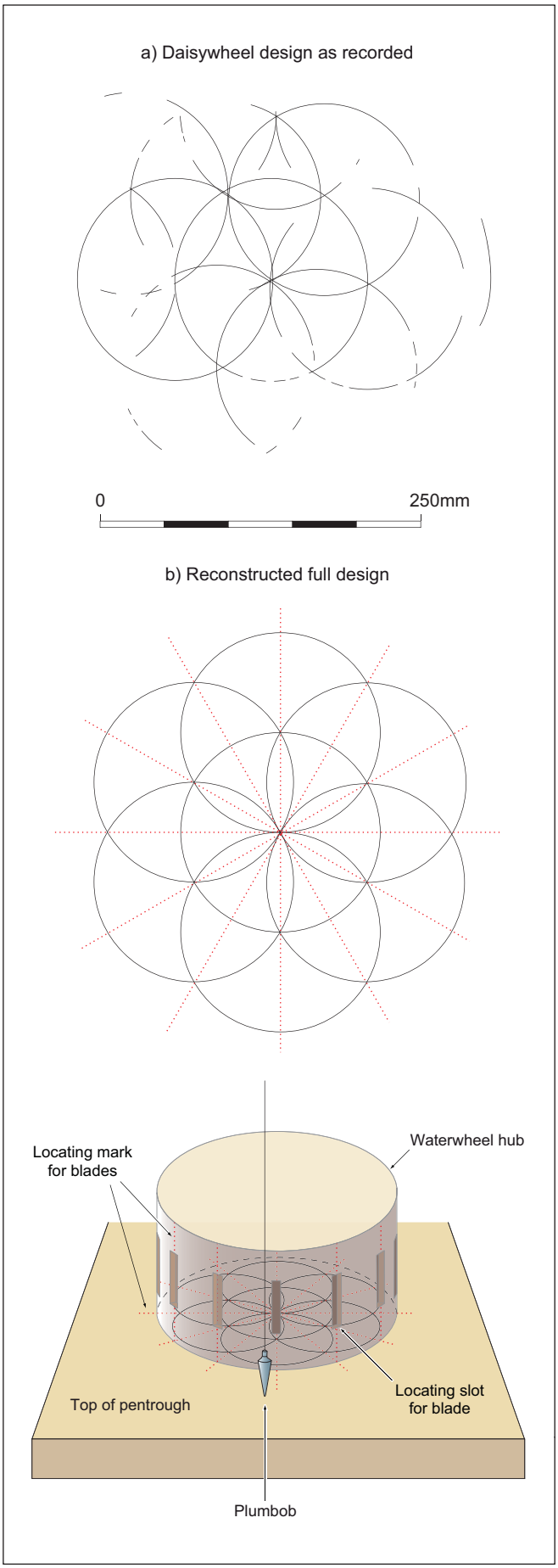

Figure 6.24 The daisy-wheel pattern and how it may have been used in marking out a water wheel hub.

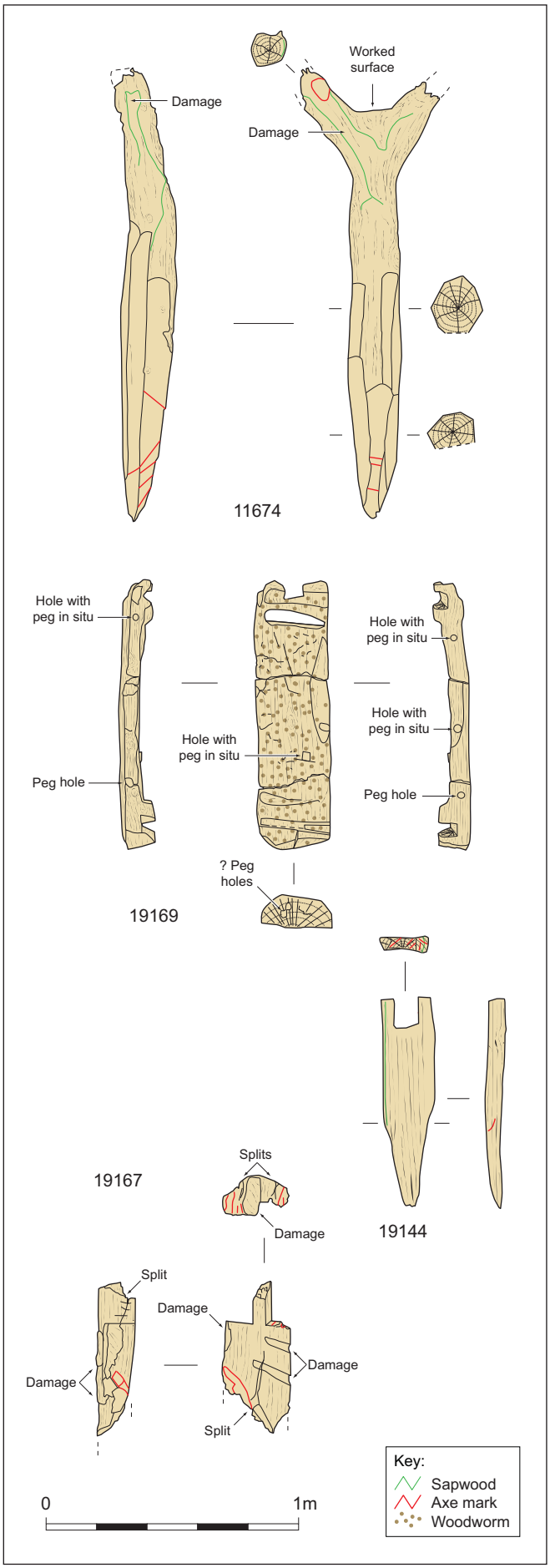

Figure 6.25 Miscellaneous structural timbers

a slight skew to the faces (Fig 6.25). Narrow axe marks could be seen on the end grain around the tenon showing that it had been cut out with an axe. The tenon was damaged but still extended *c* 160 mm and was 50 mm thick. How this timber articulated with others in the building from which it came is uncertain. As long narrow mortises are unknown at this time or indeed until *c* 1180 (Milne 1992), it is probable that the 'tenon' was cut to either sit in a groove of some type or to function as a tusk tenon. It is likely that the fragment derives from the mill superstructure.

The tailrace wattlework

In places the hazel wattlework (12549; Fig 6.2) looked as if two thicknesses had been used and in at least one area rods could be seen wound around a sail. Such evidence shows that it was the end of a hurdle and indicates that the wattlework was largely or entirely woven as panels elsewhere. The bulk of the weave used appears to be plain, working single rods around single sails, but evidence was also found of the insertion of secondary sails to extend the weave upwards and deepen the hurdle panels. The sails were whole stems *c* 35–50 mm in diameter and the rods were whole stems *c* 18–35 mm in diameter (see Barnett, Vol 4, Chap 8).

The spillway (Fig 6.11)

Erosion of the surfaces of the troughs (19422, 19531) means that tool mark preservation is poor but some clues to the methods used to make the troughs were found. A roundwood peg up to 36 mm diameter was seen piercing what had been the base of trough 19422. It is possible that this peg was a thickness gauge inserted to a regulated 100 mm depth from the outside face of the trough log. When those hollowing the trough revealed the end of this peg they would have known that the base was at the desired thickness. The use of such gauge holes is documented in Saxon dugout boats from the region, such as the Clapton boat (Marsden 1989). However the crudity of the carving precludes them being re-used boat hulls. A similar object, interpreted as a thick walled dugout trough or possible boat was found at Murston, near Sittingbourne, on the edge of an existing lagoonal pond next to the sea wall (McGrail 1978). The Northfleet spillway trough may therefore suggest that the Murston object could be part of another tidal mill.

Timber conversion techniques

The tool mark evidence recorded for timbers of mid-Saxon date at Northfleet fall into clear patterns. The evidence for hewing techniques shows that timbers were first scored and the waste chopped off with a narrow bladed axe probably of Wheeler's general purpose type 1 (Wheeler 1927, 20). There appear to have been two blade widths of *c* 65 mm and *c* 80 mm. This finds broad parallels in the more numerous late Saxon evidence for the City of London corpus and overlaps with the unpublished evidence from Barking and the Stratford Box site (Goodburn pers obs). The later stages of hewing

were clearly carried out with much broader bladed tools which generally left incomplete stop marks from *c* 140 mm to 200 mm wide. This is in keeping with those recorded in the Barking and Stratford Box assemblages as well other unpublished mid-Saxon assemblages (R Darrah pers comm). However, the finding of broad axe marks over 310 mm wide on the top of pentrough 19133 (see Fig 6.5) proves the existence of exceptionally wide, thin bladed broad axes earlier than had been thought. These marks must have been made using early 'T'-shaped broad axes, well known from late Saxon contexts in the region (Goodburn 1991c, 108; 1999; 2001).

Nearly all the larger timbers had been worked down from cleft log sections implying the widespread use of wedges and mauls and skill in reliably cleaving timber through reading the grain patterns. There are no traces of the use of saws for cutting across or along the grain nor the use of standardised rather straight timber sections which implies the widespread use of marking lines, squares, and rules. Mid-Saxon woodwork from Northfleet is fundamentally different to that of the Roman period – as indicated by the Roman evidence on this site and in the City of London corpus – in its character and the range of tools and techniques used.

All of the piles were worked in the same way. The split face was trimmed flat and fairly straight and the waney, curved face hewn with two flats as to create a ridged or 'crowned' face in which all of the bark and much of the sapwood had been removed. This was done with considerable care in most cases and even broad smoothing axes were used as shown very clearly on pile (19138) from the south side of the undercroft (Fig 6.26).

The versatility of the mid-Saxon woodworker is evident in the mill remains. Notwithstanding the complexity of the mill structure it is quite feasible that only two different metal-edged tools – a narrow bladed axe and a broad bladed axe (Pl 6.12) – would have been necessary to cut and shape the planks and piles of the mill structure. In contrast the adjacent Roman villa complex required many more tools, such as planking saws, and a much more organised infrastructure for its timber construction.

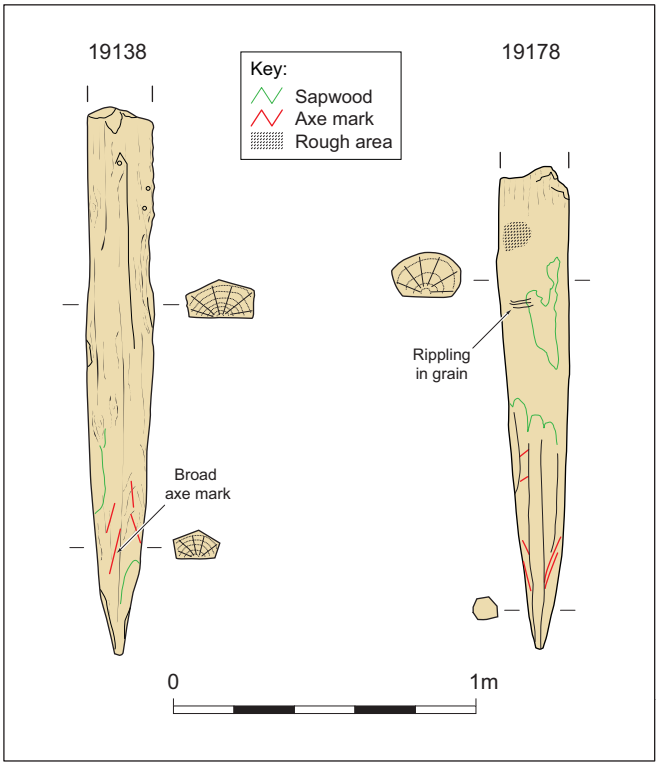

Figure 6.26 Cleft log piles 19138 and 19178

Plate 6.12 Smoothing an oak beam with a replica Saxon T axe, as used to create planks and piles for the mill

Joining timbers

No iron nails were used in the mid-Saxon work but they were relatively common finds in Roman contexts. The Saxon equivalent was the headed wooden nail or 'treenail' often used with a wedge, effectively forming a wooden rivet. Clearly drilling tools were needed and partly drilled holes show that spoon bits were used. The range of joints used in mid-Saxon woodwork at Northfleet is typical of what we have come to expect in treewrightry, with a predominance of simple axe cut forms sometimes fastened with treenails. Figure 6.27 depicts a graphic summary of these joints, including tongue and groove, edge housing, rebates, laft joints, through-socket joints (sometimes loosely called mortises), bridle or clasping forms, edge-halved scarves,

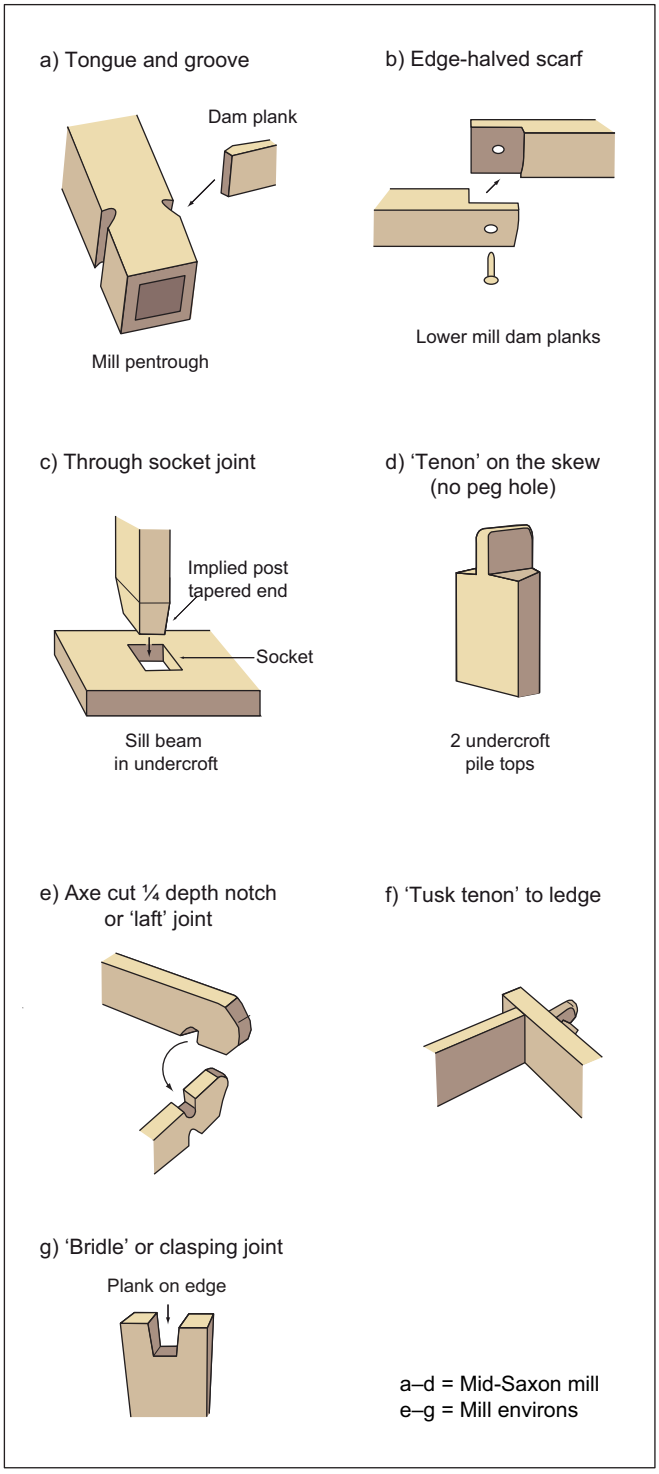

Figure 6.27 Saxon woodworking joints displayed at the mill and the environs

and trimmed natural crotches. This range of joints is radically different to those found at Roman Northfleet and in other Roman assemblages in the region (see above).

Conclusion

Saxon woodworking techniques, as demonstrated on the mill, indicate a fundamentally different approach to the process of working wood in manufacture or construction than in the Roman period. No clear evidence of a continuity of woodworking techniques or tools from the Roman period at Northfleet was found in the analysis of the mid-Saxon woodwork, with the exception of the basic narrow bladed felling axe which appears to have been a broadly similar tool in both periods. The woodworking technology evident in the mill is typical of the new approach of Saxon 'treewrights'. However, although the machinery of the mill may have been the distinctive and precise work of a specialist millwright, it seems most probable that this specialist woodworker was an itinerant, directing a team of local 'treewrights' during the building of a particular mill.

The Historical and Political Context of the Mill in the Ebbsfleet Region in the Late 7th Century

by Alan Hardy and Martin Watts

From a high point of political power, coherence and regional influence in the late 6th century under Aethelberht, Kent embarked on an increasingly unsettled period lasting through most of the 7th century, gradually coming under pressure from the north in the form of the East Saxons and the north-west in the form of Mercia. A key part of Kent's inherent weakness was its essential duality, a factor exacerbated by its geography.

Middle Saxon kingship in West Kent

Trouble came to West Kent in 676 with the destructive invasion by Aethelred of Mercia, and for a time the see of Rochester was abandoned (Blair in Lapidge *et al* 1999, 28). According to Bede: 'Aethelred, … with his wicked soldiery, profaning churches and monasteries without fear of God or respect to religion … destroyed the city of Rochester, Putta's see, the bishop being absent at the time' (Bede IV, 12, 226). Yet within a few years Mercian power in Kent appeared to falter, as raids from Caedwalla of Wessex and Sigehere of the East Saxons represented calculated opportunism – taking advantage of Kent's weakness and disunity. The regnal divisions in Kent re-surfaced but in so doing they prompted a growing native resistance to the interference from outside. West Kent fell under the rule of Swaefheard, backed by the East Saxons, while East Kent was ruled by Oswine; he was a native of the kingdom but, being supported by Aethelred, was also tarnished by his perceived disloyalty (Zaluckyj 2001, 130; Yorke 1990, 30).

By 691 Oswine was removed and Wihtred, the brother of the previous (legitimate) Kentish king, Eadric, became 'joint' ruler of the kingdom with Swaefheard. Within two years Swaefheard was dead and Kent was again a single kingdom ruled by a single king. Wihtred ruled with considerable confidence until his death in 725. It is in the nature of mid-Saxon kingship that unity and stability in a kingdom depended much more upon individuals and personality, rather than institutional authority. So it was that the kingdom was inherited by his three sons Aethelberht, Eadberht, and Ealric, and again split into two. Aethelberht was based in

the wealthier East Kent, Eadberht in West Kent; nothing is known of the fate of Ealric. Stability evaporated in both parts of the kingdom and it was not until the ascendancy of Offa in the mid-8th century that order returned, albeit under an uncompromising Mercian authority (Kelly 1999, 270). A revolt against this Mercian control was firmly suppressed by Offa's son Coenwulf, and it was not until the third decade of the 9th century and the collapse of Mercian power that Kent shook off one outside controller, only to be newly dominated by another, this time the West Saxons under their king Ecgberht.

Aside from the royal and political twists and turns of the 7th and 8th centuries, the cultural and commercial influences on West Kent were quite distinct from those of its eastern counterpart. The geographical situation of Kent encouraged a distinct tribal identity in its eastern part. Confined by the sea, the Thames estuary and, to the west, the obstacle of the Weald, it is perhaps no surprise that the continental influence, both in terms of culture and politics, was so strong. The arterial route of Watling Street which had bound the two parts together in the Roman period was much less important. By contrast Northfleet and the Ebbsfleet valley were a lot closer and more accessible to the territory of the East Saxons across the Thames and the burgeoning focus of *Lundenwic*, than to East Kent and its focus of Canterbury.

The church in West Kent

The geographical divide should also be minded in regard to the establishment of the church and the subsequent evolution of coherent centres, whether royal or religious or a combination of both. The establishment of the infrastructure of the Church in Kent was a rapid process and the founding of the bishopric of Rochester for Justus in 604, less than 30 miles [*c* 48 km] from Augustine's already established see at Canterbury, served to recognise the separateness of the two kingdoms (Blair in Lapidge *et al* 1999, 396).

Very rapidly, the mutually beneficial links between the secular rulers and the developing Church were formed. The converted kings gave the Church their secular authority and support and the administrative sophistication of the Church consolidated and re-inforced the kings stability. The monastic concept of the 7th century Church, developing in their minsters powerful and secure centres combining religious, industrial, and administrative resources, was very attractive. Blair (2005,75) highlights the spread of large and prosperous minsters in the 7th and 8th centuries in the south and east of England, and a concomitant lack of small local churches (in contrast to, say, the Irish model) as a illustration of the 'top-down' imposition of the Church into society. Until their wealth became so great that it encouraged their own diminution in the later 8th century, the minsters were major influences on the economic and social development of the hinterland of Kent.

Whose mill?

So under whose authority and by whose command was the mill constructed? Was it a gift, or was it a statement of power, and who controlled its operation? In the context of the character of Kentish society in the late 7th century, there can be only two candidates, either a member of Kentish royalty or the Church, or a combination of both. It is striking that the dendrochronological dating of the Northfleet mill allows its construction and use to be placed with some precision into the historical context of western Kent, and it may be more than coincidence that the mill's relatively short working life closely parallels the reign of Wihtred, from *c* 691 to 725 (Yorke 1984, 8–9) and the archbishopric of Berhtwald, 692–731. Wihtred was Kent's last strong king and his long reign is considered remarkable for the successful preservation of Kentish independence and the firm alliance between state and Church through his collaboration with Archbishop Berhtwald (Brooks 1984, 78).

The centres of power in the mid-Saxon period belonged to the church or the king. As Reynolds (2003, 103) says there is a clear contrast between the relative transience of high status secular sites and the permanence of church sites. Ecclesiastical estate centres were the first static centres of authority to evolve in post-Roman Britain. In the light of recent research and data on the structure of mid-Saxon society, Blair has looked in detail at the characteristics of both high status secular settlement ('royal *vills* or palaces') and minsters or early churches (Blair 2005, 246–87). The roots of the latter were in classical Mediterranean culture, fixed and structured, where the authority and power resided primarily in the institution as manifested in the structure, and not in its presiding head official. By contrast, royal estates, although in some cases centred on surviving Roman villa estates, were still essentially temporary; their authority resided in the person of the king, not the royal estate itself.

The term 'royal *vill*' or 'royal palace' has become a convenient (although in some senses ambiguous) term to denote a mid- or late Saxon royal residence, in the context of the nature and practices of contemporary kingship. In the absence of a fully developed dynastic or administrative structure, a king had to continuously move about his kingdom, exercising his rule and reinforcing his authority – literally showing his face. A royal residence could be occupied by a king and his retinue for a matter of weeks or at most a few months at a time. While occupied, the royal residence would make considerable demands upon the surrounding area for supplies. The establishment of a mill on an estate implies the capability to produce food for a large retinue at short notice. In the context of the beneficent traditions of Saxon kingship, the facility to be able to offer unrestricted feasting was very important. Such was the importance of the feast in Saxon culture that the king had to ensure the ready availability of all the necessary supplies. As Hagen says: 'The king could not have his

status compromised by attending a feast at which the supplies were insufficiently lavish' (2006, 409). When the king and his retinue moved on, the focus went with him, probably leaving behind no more than a skeleton staff in residence.

The principal functions of a royal centre – (temporary) residence, food-render collection, and formal assembly and feasting – do not necessarily require any substantial permanent infrastructure. Thus a 'royal centre' may leave no more substantial archaeological signature than a few post-hole defined footprints of one or more timber halls and possibly a few pits. Blair (2005, 279) suggests we may have under-estimated the degree to which natural locations could be used for royal gatherings with a minimum of infrastructure required (and therefore a minimal archaeological footprint for us to find).

A major factor that could affect the existence of any 'royal' site was the longevity of the royal personage. As power lay with the individual, and automatic dynastic succession was yet to be regarded as incontestably the norm, when the ruler died there may well be abrupt and deliberate changes in the successor's routine. One ruler's favourite residence may not have lasted beyond his or her demise. Evidence of just such an event may have been found recently at Higham Ferrers in Northamptonshire (Hardy *et al* 2007), where a large and extensive Mercian estate centre was suddenly and completely destroyed at the end of the 8th century.

The construction of a watermill may thus be seen as evidence of a high status or royal site, an aspect of 'traditional' Saxon itinerant kingship. However, it could also be suggested that a watermill would effectively be one of the first *static* industrial sites of the post-Roman era and, as such, represents an early indicator of a society beginning to coalesce into fixed settlements. Pottery making or metalworking required built facilities but these could still be relatively transient installations. A mill was tied to a precise site by virtue of the geography of the site. Its construction represented a substantial investment, implying confidence in a stable future ('future' in this context might be measured by nothing more than the expected reign of the current monarch), and the authority to maintain the mill's security.

A mill within an estate was a valuable fixed economic asset, arguably a secular equivalent to the fixed religious asset of the Church. Blair argues that both could and did acquire 'spheres of influence' by the 10th century to the point where they both became tradable commodities (Blair 2005, 494–5).

Where did the mill fit into the socio-political arrangement at the time? Brookes' extensive study (2007) leads him to conclude that, while there is still a case for equating some aspects of territorial division to those of the Roman landscape, a more critical determinant for the spatial organisation of estates was the environment contained within each. It was important for an estate to control land that would supply all its needs, that is, woodland, meadow, arable, pasture, access to water, and access to trade routes (*ibid*, 55). This characteristic of estate components is not at all peculiar to Kent and can be found in other lowland areas, for instance Hampshire and the Upper Thames (*ibid*, 93). In the context of the Ebbsfleet valley, the site of the mill could fit into a landholding centred on the estate (later manor) of Northfleet, based close to the site of the church, and extending south across the Ebbsfleet channel.

However, there is some evidence beginning to emerge to suggest there may have been a centre of some status to the south of the Ebbsfleet channel. Excavations recently completed at Springhead Park have uncovered potentially significant additional remains including the rest of the cemetery investigated in this project (see Chap 5). Some of the 120 graves newly excavated have produced high status finds provisionally dating as late as the end of the 7th century.

Milling in mid-Saxon Kent

Although the location of mills is inferred from place-names in Saxon charters and boundary descriptions from the early 8th century, the earliest known documentary reference to a (water) mill in England dates from 762, when Aethelbert, king of Kent, granted an exchange whereby the minster of Saints Peter and Paul at Canterbury gave half-use of a mill at Chart to the royal vill at Wye in return for pasture rights in the Weald for their tenant at Chart (Sawyer 1968, S25). Kelly argues that this could infer that 'mill technology was pioneered on ecclesiastical estates rather than by royal vills' (Kelly 1995, 44–7). However, the gift of a mill (or use thereof) could be passed in the other direction. A '*molina in torrente qui dicitur Holanbeorgesburna*' (by Holborough, Kent) was given by the king to the bishop of Rochester in 838 (Rahtz and Bullough 1977, 18–19), and a mill at Chart is mentioned in 814 '*carra de feno capientia cum uno molina*' (Birch 1885, no. 343; Sawyer 1968, S173) and again in AD 843 '*alteraque molina in loca qui dicitur noðfueðing*' (Sawyer 1968, S293). From the 9th century on there is an increasing number of references to mills in charters and place-names (Grube 1934, 147) and evidence which suggests that dams were built both to impound water in ponds and to divert water into artificial courses from natural ones. It is possible that the reference to a mill fleet '*mylen fleotes*' in a coastal inlet or creek near Reculver, Kent, in a charter of 949 may be to the site of a tide mill (Sawyer 1968, S546; Rahtz and Bullough 1977, 24). By the middle of the 11th century the use of water power was well established in England, for *Domesday Book* records over 6000 mills, of which 356 were in Kent (Darby 1977, 361).

Minchinton (1978, 341) found evidence for 18 medieval and post-medieval tide mill sites around the north and east coasts of Kent between Northfleet and Dover. At Northfleet, the later medieval tide mill was

close to the mouth of the Ebbsfleet River, near the Thames. In the early 16th century it was a manorial mill, the property of the Archbishop of Canterbury, and it continued in use until the mid 19th century (A Stoyel, pers comm).

The origins of the Northfleet mill design

It is clear that in a number of technical respects the design of the Northfleet mill appears to differ markedly from broadly contemporaneous examples in Ireland. Even from the incomplete material evidence available, aspects like the size, shape, and fixing of the water wheel blades, or the function of the two tenoned piles in the undercroft, or the construction of the pentroughs, do not have any obvious parallels in the design of the Irish mills and there are also clear mechanical differences with the later Tamworth mill. It appears that the Northfleet builders were using quite different methods to meet the same technical problems. One possibility is that the Northfleet mill was a 'one-off' – an attempt to put some half-understood ideas seen elsewhere into practice. It could have been an experimental prototype, one that perhaps did not succeed. In the absence of a working replica of the mill, the technical viability or otherwise of its design can only be speculated upon.

However, it cannot be assumed that the design of the Northfleet mill was native to Kent. An alternative possibility is that the mill builders used a design developed in an estuarial environment suited to exploiting a low energy tidal resource. As cultural, demographic, and technical trends had been flowing from the Continent into the east and south-east coast of England for the previous two or three centuries, it is reasonable to look across the North Sea to a similar environment, where the idiosyncratic design of the mill may have evolved in the similar environment of the post-Roman north-west Europe. The lack of identified remains of such mills in the coastal areas of north-west Europe may be simply be due to a lack of excavation opportunity or a lack of recognition – the existence of the Northfleet mill was completely unsuspected and it was not recognised as a mill until well into the excavation. It is possible to suggest, therefore, that the Northfleet mill design and the Irish mill design came from separate design pedigrees, and we see a later convergent evolution of those designs in the 9th century Tamworth mill.

Conclusion: a unique discovery?

The Northfleet mill may be the only one of its kind discovered in Kent (so far), but it is almost inconceivable that it was the only one of its kind built in Kent. It is worth emphasising again that its discovery was completely fortuitous, there was no evidence or suspicion of its existence prior to the excavation,and its identity was only fully realised well into the excavation. So far, only a handful of mills dating to the post-Roman period have been identified, and yet *Domesday* mentions 356 in Kent alone. If the fate of the Northfleet mill after it stopped milling is at all typical, then there is no reason why the remains of other Saxon tidal mills may also lie under the accumulated silts of the creeks on both sides of the Thames estuary.

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by Susan Vaughan

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This volume, the first of four, describes the results of excavations at Springhead and Northfleet in the Ebbsfleet Valley, Kent, undertaken in advance of construction of High Speed 1 (formerly the Channel Tunnel Rail Link).

The Roman 'small town' or roadside settlement at Springhead (*Vagniacis*) developed from modest Late Iron Age origins into a religious centre almost unique within Roman Britain, probably attracting pilgrims from a wide area. In addition to the previously known and excavated temples, a major mid-2nd century AD sanctuary complex including a temple, ancillary buildings and a ritual shaft, has been discovered, focused on the springs and pool (reconstructed above) at the head of the valley where the Ebbsfleet rises.

Another temple, along with a range of timber buildings, were also recorded; these included an aisled barn, a blacksmith's forge, a bakery, and a possible brewing complex within individual properties lining Watling Street and the riverside branch road leading to Northfleet villa. As well as the major Pepper Hill cemetery to the south of the town (and reported under Section 1 of High Speed 1), three smaller cemeteries were also identified on the periphery of Springhead.

Downstream at Northfleet, a large part of a Roman villa complex, including the Ebbsfleet waterfront, a detached bath-house, and much of the agricultural surroundings, was investigated. Saxon remains throughout the Ebbsfleet Valley included sunken-featured buildings belonging to possibly three separate settlements, two inhumation cemeteries, and most significantly, at Northfleet the preserved remains of the earliest recorded horizontal-wheeled tidal water mill in Britain, its construction tree-ring dated to the end of the 7th century AD.

All four volumes: ISBN 978-0-9545970-7-8

Volume 1: The Sites (ISBN 978-0-9545970-3-0)
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ISBN 978-0-9545970-3-0

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