Medieval Rural Settlement and Infrastructure Archaeology Across Europe

Edited by
Carenza Lewis, Neil Christie,
Gareth Davies and Aidan O'Sullivan

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Front Cover: Early medieval settlement enclosure and fields excavated at Roestown 2, Co. Meath, Ireland, in 2005–06 in advance of work on the M3 motorway scheme. *(Photograph by Archaeological Consultancy Services (ACS) Ltd and Studio Lab; reproduced by permission of ACS and Transport Infrastructure Ireland)*

Back Cover: Reconstruction drawing of the late 8th- to early 9th-century farm of Sint-Denijs-Westrem – The Loop in Flanders, showing a child playing as adults are storing this year's harvest in pits to secure a seed stock for next year. *(© Yannick De Smet, DL&H and Ghent University)*

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Key organisations

Medieval Settlement Research Group (MSRG)

The Medieval Settlement Research Group (MSRG) (https://medieval-settlement.com) is a long-established, internationally recognised, multi-disciplinary organisation dedicated to advancing understanding of medieval rural settlements and landscapes between the 5th and 16th centuries AD. Founded in 1986 from the amalgamation of two groups focussed on deserted and moated medieval rural settlements, the MSRG brings together archaeologists, historians, geographers and related specialists to facilitate collaboration and knowledge exchange. Its core aims include promoting research on villages, hamlets and farmsteads, encouraging pan-European perspectives, and supporting studies that range from individual sites to broad landscape-scale analyses. The group disseminates findings through its annual journal, *Medieval Settlement Research*, which publishes peer-reviewed articles, fieldwork reports, reviews and bibliographies. MSRG also organises spring and winter seminars, provides small grants for research and conference participation, and contributes to national policy discussions on the recording, preservation and excavation of medieval rural sites.

In 2020–22, the MSRG ran four online seminars on the impact of infrastructure archaeology on medieval rural settlement studies in 16 countries across Europe: this volume publishes 15 of these papers, extended, updated and fully referenced, with an added introduction and concluding overview by the volume editors who are all members and current or former officers of the MSRG.

Ruralia

Ruralia (https://ruralia2.ff.cuni.cz) is an international European association dedicated to the archaeology of medieval and post-medieval rural settlement and rural life. Founded in 1995, Ruralia promotes comparative, interdisciplinary research on rural environments from Late Antiquity and the early medieval period through to the early modern era, addressing topics such as settlement forms, economy, landscape use, buildings, social organisation and daily life. Its central activity is a biennial international conference, each focused on a specific thematic topic, bringing together researchers from participating European countries to share current work and advance cross-border archaeological understanding. Conference papers undergo peer review and have been published in dedicated volumes every two years since the first Ruralia conference in Prague in 1995. Ruralia is formally registered in the Netherlands and provides a key European platform for scientific exchange in rural archaeology, strengthening collaboration across disciplines and regions.

European Archaeological Council (Europae Archaeologiae Consilium, EAC)

The European Archaeological Council (https://www.europae-archaeologiae-consilium.org) is a Europe-wide network of representatives of national bodies responsible for managing archaeological heritage. Established in 1999 as an international non-profit organisation under Belgian law, it brings together heads of national archaeological services to strengthen cooperation, develop shared standards, and exchange information. The EAC focuses on supporting the effective management and protection of archaeological heritage across Europe, particularly through monitoring the implementation of the Valletta Treaty and facilitating structured collaboration among heritage agencies. Membership is open to national authorities from Council of Europe countries, and today the EAC represents heritage managers from 30 European states. Its work includes publishing guidance

documents, hosting annual thematic symposia, and convening specialist working groups that address transnational challenges in archaeological management. The EAC also collaborates closely with organisations such as the European Association of Archaeologists and maintains observer status within Council of Europe heritage committees.

European Association of Archaeologists (EAA)

The European Association of Archaeologists (https://www.e-a-a.org) is a major pan-European, membership-based, non-profit organisation founded in 1994 in Ljubljana, Slovenia. It brings together professional archaeologists, students and other interested individuals from across Europe and beyond, with over 12,000 registered members from around 120 countries having participated across its history. Its mission is to promote archaeological research, encourage the exchange of information, support the management and interpretation of Europe's archaeological heritage, and uphold ethical and scientific standards in archaeological practice. A central activity is its large and influential Annual Meeting, which attracts thousands of delegates each year for sessions on archaeological research, theory, fieldwork and heritage management. The EAA also publishes the *European Journal of Archaeology*, the newsletter *The European Archaeologist* and a monograph series that disseminates current scholarship.

Author biographies

John A. Atkinson

John Atkinson is currently Chairman of GUARD Archaeology Limited, an archaeological services company he co-founded in 2011. He has worked in commercial archaeology for over 30 years and was formerly Deputy Director of Glasgow University Archaeological Research Division (GUARD). John has undertaken significant research projects such as the Ben Lawers Historic Landscape Project and the Scottish Bloomeries Project and published widely on his research interests including Scottish rural settlement and early industries during the medieval and post-medieval periods.

Paul Arthur

Paul Arthur was until retirement in 2025 Professor of Medieval Archaeology at the University of Salento and President of the Italian Society for Medieval Archaeology (SAMI). His research focuses on settlement systems, ceramics, economic history, and societal and environmental change and its impact. He has conducted numerous excavations, field surveys and studies in Britain, Italy, Turkey, the Sinai Peninsula and Ukraine and published widely on medieval rural settlement. After recently concluding major excavations at the castle and town walls of Lecce, his current projects, with a particular focus on the Byzantine period, include mapping medieval settlement in Salento and excavations at Lombard and Byzantine Oria.

Floris Beke

Floris Beke is an archaeologist at RAAP Belgium, an archaeological contractor. He obtained his master's degree in Archaeology from Ghent University in 2009, specializing in the archaeology of North-west Europe. Over the past 15 years, he has led numerous archaeological investigations in Flanders, primarily focusing on large-scale, rural, multi-period sites. In addition to his focus on medieval archaeology, his interests extend to the landscape potential of sites. In 2024, he published a synthesis of 25 years of archaeological research on linear infrastructure projects in Flanders, evaluating both methodology and knowledge potential and comparing the results with surrounding regions.

Neil Christie

Neil Christie is Professor of Medieval Archaeology at the University of Leicester, UK, where he has been based since 1992. His specialisms relate chiefly to late Roman and early medieval archaeology, notably in Italy, but he has also worked on and led excavation and survey projects in Spain, Turkey and England, including a major project centred on the early to late medieval historic townscape of Wallingford in Oxfordshire. Key research themes cover urbanism, defence and transitions in the landscape. He has a long association (as Secretary and Reviews Editor) with the UK's Medieval Settlement Research Group and the Society for Medieval Archaeology.

Wim De Clercq

Wim De Clercq is Professor of Historical Archaeology at Ghent University and leads the Historical Archaeology Research Group within the Department of Archaeology. For more than a decade, his work and that of his team have focused on Roman-period and medieval rural settlement and building traditions in Flanders, alongside landscape-archaeological research on maritime access and the outer harbours of Bruges in the medieval period. Since 2024, he has served as Principal Investigator of the project *Lost villages of the river Scheldt*, which investigates drowned late-medieval villages in the river's intertidal zone near the estuary in The Netherlands.

Gareth Davies

Gareth Davies is Technical Director at SLR Consulting and an Honorary Research Fellow in Medieval Archaeology at the University of Nottingham. A member of the Chartered Institute for Archaeologists and a fellow of the Society of Antiquaries of London, Gareth's former roles have included Director of Archaeology at the York Archaeological Trust, Chairman of the Sedgeford Historical and Archaeological Research Project in Norfolk and member of the MSRG Committee. An experienced field archaeologist, Gareth's research interests focus on the development of social complexity in the settlement landscapes of early medieval Britian and north-west Europe, and how excavation and survey methods can help inform these debates. He has published widely on settlement investigations in the Midlands and East of England and was co-chair of the MSRG infrastructure archaeology seminar series.

Ewoud Deschepper

Ewoud Deschepper obtained his PhD on early medieval rural settlement at Ghent University in 2022, since when he has been studying medieval village formation in south-western Flanders (Belgium). He currently works at SOLVA, the inter-municipal service for southern East Flanders, where he continues his work on medieval villages, rural settlement and landscape through the combination of archaeological, historical and place-name evidence. He is secretary of Forum Vlaamse Archeologie, an interest group aiming to improve the public outreach of archaeology in Flanders.

Zdravko Dimitrov

Zdravko Dimitrov is Associate Professor in Department of Antiquities in National Institute of Archaeology and Museum by the Bulgarian Academy of Sciences (NAIM-BAS) Sofia, Bulgaria since 2001. He has directed more than ten rescue excavations along infrastructure projects in modern Bulgaria as well as research excavations of Roman towns Ratiaria, Bononia and sanctuaries in Rhodopes. He has been Mellon Fellow from Jordan (ACOR 2009) and Greece (ASCSA 2011) and held a Paul Getty Foundation Stipend for Algeria for 2012.

Paweł Duma

Paweł Duma is an Assistant Professor at the Institute of Archaeology, University of Wrocław (Poland) and is the Polish national representative for the Ruralia Association. His research focuses on historical archaeology, particularly medieval and post-medieval rural communities, material culture and social practices connected with death, including execution sites and burial customs. He has directed and participated in numerous excavations in Silesia and has published widely on gallows sites, funerary archaeology and the archaeology of everyday material culture.

Jesús Fernández Fernández

Jesús Fernández Fernández is currently a Ramón y Cajal research fellow at Oviedo University, an Honorary Research Associate at UCL's Institute of Archaeology, and a professor-tutor at the National University of Distance Education (UNED), where he teaches and explores topics ranging from the history and archaeology of medieval societies to heritage studies and the dissemination of historical knowledge. He has directed numerous academic initiatives and fieldwork at medieval sites, with a particular interest in the material culture of rural settlements and peasant communities. Since 2012, he has been leading the award-winning La Ponte Research Centre and Ecomuseum in Asturias (Spain) and serves on the executive board of MINOM-ICOM (International Movement for a New Museology).

Johan Hoorne

Johan Hoorne has more than 20 years' experience in contract archaeology. In 2012, he co-founded the archaeological contractor De Logi & Hoorne, which focuses on rural archaeology in the western part of Flanders, and covers all chronological periods. Since 2007, he has managed the large-scale archaeological project of The Loop, near Ghent, which features a diverse and extensive multi-period site, including an early medieval settlement and two settlements and a windmill dating to the high medieval period. In his spare time, he is chairperson of Forum Vlaamse Archeologie.

Andrej Janes

Andrej Janes is consultant conservator archaeologist at the Croatian Conservation Institute, Division for Archaeological Heritage, in Zagreb. He has written extensively on Croatian archaeology and has been involved with infrastructure archaeology projects for many years, with a key paper published in 2019. He is a member of Ruralia, the international association for the archaeology of medieval and post-medieval settlement and rural life in Europe and is its national representative for Croatia.

Aline Kottmann

Aline is employed at the State Office for Cultural Heritage Management in Baden-Württemberg, where she has worked since 2018 in 'Operational Archaeology', with responsibility for excavations with a primary focus in medieval archaeology. She is member of the board of the German Society for Medieval and Post-medieval Archaeology (DGAMN). Her research interests are in cultural landscapes and the reconstruction of production facilities using archaeological approaches.

Mette Svart Kristiansen

Mette Svart Kristiansen is associate professor at Aarhus University. Her main research area is medieval and early modern rural settlements. She has published research internationally and nationally, lately as head of the research network Medieval Rural Denmark. She was formerly head of excavations at

the Øresund coast-to-coast link with Copenhagen County Council and on the subway in Copenhagen with Copenhagen Museum. She is the national representative for Denmark for Ruralia.

Carenza Lewis

Carenza Lewis is a medieval archaeologist and Professor of Public Engagement with Research at the University of Lincoln, having formerly been archaeological investigator with the Royal Commission on the Historical Monuments of England, research fellow at Birmingham University, and director of Access Cambridge Archaeology at Cambridge University. A member of the MSRG since 1986 and of TV's *Time Team*, she has researched and published widely on medieval rural settlement, since 2005 directing community excavations in >100 currently occupied medieval rural settlements in England and from 2019–23 leading a major project introducing this approach in more than a dozen rural settlements in the Netherlands, Czech Republic and Poland. A former president of the Society for Medieval Archaeology and of the MSRG, she currently chairs the European Archaeological Association Advisory Committee for the Public Benefits of Archaeology and is the UK national representative for Ruralia.

Petr Lissek

Petr Lissek is the director of the Institute for Preservation of Archaeological Heritage of North-West Bohemia. He studied archaeology at the University of West Bohemia and led many rescue archaeological research projects in the region. He specialises in medieval and mining archaeology.

Gabe Moshenska

Gabriel Moshenska is Professor of Public Archaeology at UCL Institute of Archaeology. His research interests include the history of archaeology, the archaeology and heritage of 20th-century conflict, and the public understanding of the past. His publications include *Material Cultures of Childhood in Second World War Britain* (Routledge, 2019) and, as editor, *Teaching and Learning the Archaeology of the Contemporary Era* (Bloomsbury, 2024). He is currently researching the archaeology of buried books, archaeological themes in horror fiction, and the history of Egyptian mummy unrolling parties.

Richard Newman

Richard was until retirement in 2025 the local authority heritage curator for East Yorkshire responsible for historic environment services, following similar roles in Lancashire and Cumbria. He began his archaeological career in south Wales in the early 1980s and has been a member of the MSRG since the late 1980s with research interests focused on medieval and post-medieval settlement and landscapes. He has worked as both a contract archaeologist and a local authority curator, holding senior posts at Wessex Archaeology, Lancaster University Archaeological Unit and Wardell Armstrong. In the 1990s, he project-managed the archaeological responses to major schemes including Wessex Water pipelines, the Newbury Bypass, the Second Severn Crossing English Approach Roads, and in 2017–19 managed archaeological investigations conducted for the East Anglia One cable trench project.

Petr Netolický

Petr Netolický is the Head of the Applied Research Unit at the Department of Archaeology, University of West Bohemia, which focuses primarily on endangered archaeological sites and interconnects field activities with an educational heritage and archaeology program. He specialises in medieval, post-medieval and building archaeology.

David Novák

David Novák is the Deputy Director of the Institute of Archaeology of the Czech Academy of Sciences in Prague, serving also as the Head of the Department of Information Resources and Landscape Archaeology. He graduated at the University of West Bohemia in Pilsen, where he also defended his doctoral thesis focused on medieval and early modern manorial residences and their role in the landscape. He is responsible for the Czech national research infrastructure for archaeological data. His research interests include FAIR data management, GIS applications and landscape archaeology. He is involved in a number of projects in open science and digital humanities.

Aidan O'Sullivan

Aidan O'Sullivan is Professor of Archaeology and Head of UCD School of Archaeology, University College Dublin. His research interests focus on early medieval Ireland in North-west Europe, wetlands archaeology and environments globally, and experimental archaeology, and he is co-director of the UCD Centre for Experimental Archaeology and Material Culture (CEAMC). He was co-PI of the INSTAR-funded *Early Medieval Archaeology Project* (EMAP), 2007–2015, and is currently co-PI of the Taighde Eireann/Research Ireland COALESCE-funded *Early Medieval People and Things* (EMAP) project, exploring the materiality of life in early medieval Ireland, AD 400–1100.

Edith Peytremann

Edith Peytremann is currently a Professor of Medieval Archaeology at the University of Tours, France, having previously worked for many years at the National Institute for Preventive Archaeological Research (INRAP). She is a leading researcher on settlements in France in the Middle Ages, on which she has written extensively. Edith is a member of Ruralia and has been the national representative for France. She is the co-president of the French Association of Merovingian Archaeology.

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Tibor Ákos Rácz is assistant professor of the Institute of Archaeology at the Pázmány Péter Catholic University, Budapest, archaeologist of the Ferenczy Museum Centre and head of the Community Archaeology Association in Hungary. He has conducted extensive research into the birth of the Hungarian village system in the High Middle Ages and dedicated several studies to analysing the effects of crucial political events (conquest of the Carpathian Basin, Hungarian state foundation, Mongol invasion) on contemporary life and material culture. He is the national representative for Hungary for Ruralia.

Edit Sarosi

Edit Sarosi is head of the Department of Ancient History in the Aquincum Museum of the Budapest History Museum and was until 2022 head of the Excavation Project Office in Budapest History Museum. She was inspector of archaeology at the Cultural Heritage Protection Office between 2004 and 2017 and earned her PhD in Medieval Studies at Central European University in 2013. She is interested in medieval rural landscapes of Hungary, and especially studies of medieval and early modern settlement and land management practices. She has published widely including a monograph on deserted villages and emerging market towns in the Great Hungarian Plain 1300–1700 and a chapter on Kecskemét in the *Hungarian Atlas of Historic Towns*.

Rainer Schreg

Rainer Schreg holds the chair of Medieval and Post-medieval Archaeology at Bamberg University. His research – besides his interest in the archaeology of ceramics – has a strong interdisciplinary focus on environmental and social history, critically examining the archaeology of village formation, crises, sustainability and resilience in medieval societies. His work includes studies on medieval deserted settlements in Southern Germany, and extends to international projects such as environmental archaeology in Crimea and investigations of pre-Columbian and colonial sites in Panama. He holds a strong interest in the meaning of archaeology in modern societies, communicating his insights through his academic blog 'Archaeologik'.

Barney Sloane

Barney Sloane is currently National Specialist Services Director at Historic England, with responsibility for their archaeologists, scientists and building conservation specialists. His professional career began in commercial archaeology before a period as a Research Fellow at the University of Reading, after which he joined English Heritage, later to become Historic England. His interests focus on medieval archaeology and history, particularly funerary archaeology and the impact of plague in England in the 14th century. He is a former President and currently Honorary Board Member of the European Archaeological Council, and chaired the working group on Public Benefit in Development-led Archaeology.

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Mag. Dr. Eva Steigberger is currently Head of Department of Archaeology, Federal Monuments Authority Austria, responsible for all legal matters of archaeological interventions in Austria. She started her career in commercial archaeology, began her work for the Federal Monuments Authority in 2007 in archiving and after a period as a research assistant at the Austrian Academy of Sciences, Institute for the Study of Ancient Culture, joined the Authority full-time first responsible for Styria, since 2017 as Dept. Head of Department and since end of 2025 as Head of Department of Archaeology. She is a member of the European Archaeological Council (EAC).

Rónán Swan

Rónán Swan is Head of Archaeology and Heritage at Transport Infrastructure Ireland (TII), a major commissioner of archaeological work in Ireland over the past 25 years. A graduate of University College Dublin, he holds a master's degree from Southampton University and postgraduate diplomas from Trinity College Dublin and University College Cork. He previously served as Head of Archaeology at the National Roads Authority and has over 30 years of postgraduate archaeological experience in the private and public sector. Rónán is a former board member of the Discovery Programme and former chair of the Royal Irish Academy's Standing Committee for Archaeology.

Claudia Theune

Claudia Theune was from 2007 until retirement in 2024 Full Professor of Historical Archaeology at the University of Vienna. She studied prehistory and early medieval archaeology at the Universities of Marburg and Bonn, completing her doctorate in 1988. In 2001, she completed her habilitation at Humboldt University in Berlin. Her research interests include archaeology of the Middle Ages and modern times, especially early medieval forms of representation, medieval ways of life in remote areas such as the Alps and conflict archaeology of the 20th century. Claudia was formerly President of Ruralia.

Pavel Vařeka

Pavel Vařeka is the Head of the Department of Archaeology and associate professor at the University of West Bohemia in Pilsen. He has conducted extensive research in medieval and post-medieval archaeology and has published numerous studies on settlement, deserted and inhabited villages, rural housing, and material culture. He carried out extensive rescue research on a whole village in North-West Bohemia, which was demolished due to coal mining (Libkovice). In recent years, he has also focused on contemporary archaeology, which he has been developing in the Czech Republic and beyond. He is currently leading a research project in Kyrgyzstan on settlement transformation in the long-term perspective and the archaeology of the forced Soviet collectivisation of nomads.

Elena Vasileva

Elena Vasileva is Assistant Professor of History and Archaeology in the Department of Medieval Archaeology of the National Archaeological Institute with Museum, Bulgarian Academy of Sciences in Sofia, Bulgaria, and since 2019 has been NAIM-BAS Assistant Scientific Secretary. Her research interests are in the late medieval Balkans, including cultural characteristics, contacts and exchange within the Ottoman empire, and jewellery, settlements, funerary customs and cemeteries. Since 2003, she has led more than 30 field archaeological surveys, and, since 2018, has been a participant in the Joint Research Programme 'Research and interpretation of the archaeological cultures on the territories of Bulgaria and Serbia'.

Gerben Verbrugghe

Gerben Verbrugghe works as a spatial planning consultant for a local authority in Western Flanders. In this role, he bridges the gap between historical and modern development, applying his expertise in village structures into modern local governance and land-use strategies. He obtained his PhD on rural settlement landscapes in the County of Flanders and the impact of Flemish incomers in South Wales from Ghent University in 2020.

Foreword

This volume provides a fascinating and extremely valuable insight into the way in which our understanding of medieval settlement has been transformed across Europe by archaeology occasioned by large-scale infrastructure projects – such as motorways, pipelines, high-speed rail, airports, energy corridors, and urban development. The authors and editors are all to be congratulated for what has clearly been a major undertaking.

One impact of the implementation of the 1992 Valletta Convention, requiring archaeological investigation to be carried out in advance of development, has been a revolution in knowledge and understanding of medieval rural settlement archaeology. Infrastructure-led archaeology has, at scale, opened windows onto previously unstudied landscapes, offering otherwise impossible opportunities. Yet the resulting surge in excavations has also created systemic challenges to coherent synthesis, such as insufficient post-excavation funding, consequent publication backlog and uneven regional coverage. It has also, in some places, revealed continuing fragmentation between commercial and academic sectors. Nonetheless, as the 15 regional assessments in this volume amply demonstrate, infrastructure archaeology remains one of the most powerful engines for generating new knowledge about medieval Europe.

Key revelations emerging from this important review are numerous; a few can be highlighted here.

In terms of understanding, it seems clear from the assessments that what we might term early medieval (i.e. of 5th- to 10th-century date) rural settlements – previously elusive because of ephemeral construction and lack of documentary visibility – have been uncovered in unprecedented numbers. The early medieval period, long relatively poorly represented archaeologically, now emerges as far more complex, varied and densely occupied than once assumed.

The understanding of later medieval settlement studies is, by contrast, hampered. Later medieval settlements (11th–16th-century date) are often still inhabited today and infrastructure projects typically avoid current settlements, creating something of an information bias. This is problematic given their value for understanding increasing nucleation and the development of planned layouts, the intensification of agriculture and craft production, and especially shrinkage, desertion, and crisis patterns of the 14th and 15th centuries.

Beyond this, methodologically, infrastructure projects have been proved to be extremely valuable because they tend towards 'randomised' samples of sites across landscapes. As a result, they can provide exposure of marginal or specialist sites (charcoal kilns, woodland industries, quarries, peat extraction, pottery fields) and reveal regional variation invisible in research-driven projects. This characteristic of infrastructural archaeology should be embraced and built into research designs and should be connected into a parallel and linked increase in strategic use of digital technologies at landscape scale (Lidar, geophysics, aerial survey).

The surveys in this volume also illustrate lack of, or long delays to, final publication and archiving of the findings, without which the step-change in transformation will be held back. Among reported pressures/weaknesses are lack of mandated funding for synthesis and analysis; commercial pressures to complete fieldwork quickly; patchiness or lack of archives and data standards; and weak integration between universities and commercial archaeologists

Also of considerable interest within this volume are the comparative insights across different states and regions. Central and eastern Europe stands out as having obtained the most dramatic knowledge gains in the last quarter-century, when compared with western and northern European states. Many of the latter on the other hand, are creating genuinely useful models for data aggregation and synthesis which can be adopted or adapted by others. Working together across borders should therefore benefit everyone.

As a whole, and taking pan-European analytical themes, it is – for the first time – becoming possible to explore patterns and characters of medieval settlement; specialisations within them; seasonality and transhumance; and the sheer diversity of landscape and settlement forms, longevity and crisis.

Perhaps the greatest contribution of this volume is the emerging suite of recommendations, drawn as they are from the experiences of archaeologists working in a wide variety of circumstances. These relate to scientific outcomes from mandatory analysis, synthesis, archiving, and publication; open, standardised data systems and standards (GIS, databases, digital archives); strengthened controls where competitive archaeological markets exist; cross-disciplinary collaboration; and, arguably the most important of all if we are to continue to benefit from Valletta, engagement with the public whose shared past this all is.

Demonstrating as it does the value of development-driven archaeological investigation, this volume is full of useful and important insights which I firmly believe will stand the test of time.

Barney Sloane

National Specialist Services Director, Historic England

Hon. Board Member, European Archaeological Council

Introduction: Exploring the impact of infrastructure archaeology on medieval rural settlement remains across Europe

Carenza Lewis, with Neil Christie, Gareth Davies and Aidan O'Sullivan

Introduction

This volume explores the impact of infrastructure archaeology on rural medieval settlements across Europe, from Bulgaria in the east to Ireland in the west, from Scotland in the north to Italy in the south. But, in many respects, it starts in Malta. This is because it was the European Convention on the Protection of the Archaeological Heritage, signed in 1992 in Valletta, Malta, that led to the transformation across Europe of the quantity and quality of infrastructure-led archaeology. Development of the continent's infrastructure since then has been driven by many factors, but the stipulations of the so-called Valletta Convention ensured that these developments have been preceded by a vast amount of archaeological investigation over the last 35 years. However, while the impact of these excavations – either on archaeological sites themselves, or on our knowledge and understanding of the past – has been explored for some topics or periods in some countries (e.g. Bradley *et al.* 2015), these have rarely encompassed medieval rural settlement, despite the demonstrated potential for data from development-led archaeology to significantly advance understanding of aspects of this subject (e.g. Rennes *et al.* 2018). (See Darvill *et al.* (2019) for a detailed survey of the impact, scale and range of developer-led archaeologies in England.)

This volume brings together experts in medieval rural settlement and archaeologists in cultural resource management and planning across 15 different European countries to review the ways in which the threats to buried archaeology have affected medieval rural settlement remains. It aims to review what new discoveries have been able to tell us about that past, and to consider what needs to be done to ensure the best return (to knowledge and understanding) on investment (infrastructure funds spent on archaeology) now and into the future.

Development, archaeology and the 1992 Valletta Convention

Construction in the present for the future has long been liable to encounter remains from the past. However, it was not until the second half of the 20th century that growing awareness of the massive scale of destruction being inflicted on the archaeology by post-war reconstruction, rising urban populations, economic expansion and infrastructure modernisation led to the recognition that existing approaches to heritage 'protection' were inadequate – at best relying on reactive last-minute, *ad hoc* 'rescue' excavations desperately attempting to record archaeological features a few metres ahead of advancing construction machinery and, at worst, forced to accept wholesale loss of irreplaceable heritage (Heighway 1972).

Ultimately, this led to the hugely impactful *European Convention on the Protection of the Archaeological Heritage (Revised)* signed on the 16 January 1992 in Valletta, Malta. This act, commonly referred to as the Valletta Convention, came into force in May 1995 and represented a pivotal shift in heritage legislation across Europe. It was adopted by nearly all member states, being ratified, for example by Bulgaria in June 1993, France in July 1995, Norway in September 1995, Ireland in March 1997, Cyprus

in April 2000, Germany in January 2003 and Denmark in November 2005.[1] Now, significantly, the principles of the Valletta Convention are largely followed in all EU countries.

The Valletta Convention reframed archaeological preservation as an integral component of planning (including in rural contexts) and introduced the 'polluter pays' principle whereby the developer (i.e. the organisation financing the development) should cover the costs of mitigating or minimising damage to any encountered archaeological remains. The Valletta Convention requires the presence or likelihood of archaeological remains – encompassing any sites, structures or materials, whether already known, suspected or entirely unexpected – to be identified or anticipated as early as possible in the planning process, before construction begins. Archaeological remains identified, at any stage, must be assessed and either avoided through redesign of the proposed development or, if this is impossible or unjustifiable, excavated and recorded so that, while the actual site may be lost, knowledge of what was there is preserved for posterity.

As importantly, ratification of the Valletta Convention by the many EU member states (and the use of similar principles elsewhere) led to the widespread development of specialised archaeological teams largely funded by developers to cooperate with planners and engineers to integrate archaeological investigation and recording into project timelines, with (in principle) adequate funding for comprehensive investigation, rigorous methodology and prompt publication of findings. The teams carrying out these archaeological investigations – variously termed 'rescue', 'preventative' or 'development-led' – might be employed within state departments, museums, universities or private commercial companies.

Valletta was timely, since the economic booms experienced in the 1990s and early 2000s across many parts of Europe, along with political changes such as the disintegration of the USSR and the accession of a large number of new states into the European Union, were accompanied by an array of manifestations, including population growth, urban expansion in terms of suburban housing, retail parks, business parks and leisure centres, the creation of new settlements and an expansion of existing ones through new housing, plus a fuller internationalisation of trade. The experience of 'boom' was not, of course, consistent across all of Europe. Many territories in fact saw an economic depression in the early 1990s (as in France) or weaker growth, or else struggled in face of slow recovery or reconfiguration of state structures, such as following the end of Communism in Poland (post-Solidarity) and in Czechoslovakia in 1989 (the 'Velvet Revolution'), or following war and conflict, notably the Bosnian War of 1992–95. More recently, the 2008 financial crash reduced expenditure on development in many states, and in the 2020s the economic effects of the Covid-19 pandemic and the war in Ukraine have put further pressure on investment for development.

Infrastructure archaeology

This volume on medieval rural settlement focusses on infrastructure (whose definition is discussed further below) archaeology because, compared to other development-led archaeology, infrastructure projects (such as roads, pipelines, airports, windfarms, etc.) typically cover very large areas, are more likely to range across open countryside where smaller or lost medieval rural settlements may be present, and often offer very little scope for adjustment if archaeological remains are found, making it particularly destructive. But, the scale and character of infrastructure archaeology also provide unique opportunities to investigate previously undisturbed parts of the landscape, to discover entirely new sites in places where none had previously been known, and to carry out excavations that would never otherwise have taken place. Much development-led archaeology (such as for housing or commercial developments) tends to affect land near inhabited settlements

[1] https://www.coe.int/en/web/conventions/full-list?module=signatures-by-treaty&treatynum=143

(today's cities, towns, villages, etc.), but 'extended' infrastructure archaeology is much more likely to affect open countryside: linear works such as building major roads or installing gas pipelines can require, in effect, random archaeological sampling across tens, or even hundreds, of kilometres.

State investment in infrastructure has been a prominent feature of the decades since the Valletta Convention, including roads (new, modified, expanded), railways, shipping and air transport; infrastructure also encompasses business, industrial and leisure parks or districts, services for water, energy and communications, management of refuse or supply chains, and much more. More recently, responses to climate change and the transition to a greener economy have instigated other new, often highly visible, infrastructure developments, such as flood defences, reservoirs, wind farms and solar parks.

Medieval rural settlement and infrastructure archaeology

The creation of major new motorways, the redesigning or broadening of existing roads and railways, the laying of new energy pipelines, the setting-up of wind farms, and the works to carve out new industrial or retail parks with the concomitant needs for related services, have seen vast tracts of the landscape cut through and large areas of land stripped back. Knowing how many medieval settlements are found, when and where they existed, and what they were like, has the potential to transform our understanding of life in the medieval countryside across Europe; of the origins and development of the landscape we live in today; and of the development of the sorts of 'everyday' settlement – villages, hamlets, farms and so on – that were the homes of nearly all those who lived in those landscapes before us.

As the many contributions in this volume show, infrastructure programmes have indeed revealed evidence for a rich array of medieval activity in these landscapes, from former villages to farmsteads, from late antique villas to medieval manors, from field systems to managed woodlands, wetlands and parklands, from burial grounds to ritual monuments, even encompassing (rather appropriately) ancient infrastructure, such as road networks and water-management systems. Some of these sites are multi-period, with phases of activity spanning the prehistoric to early modern periods, while even exclusively medieval sites can span a millennium or more, and many sites generate very high numbers of finds. By way of example, in southern England, a major project in the 1990s–2000s was the construction of what came to be called the High Speed 1 rail line (HS1), formally opened in November 2007, extending 109.9 km (68.3 miles) to link London with the Channel Tunnel and costing £6.84 billion to build (equating to £51 million per mile!).[2] In the complex planning of the HS1 route or 'corridor' there were conscious efforts to avoid encroaching on historic and/or archaeological sites (achieved through consultation with Historic England, county archaeologists and academic staff), but 'new' sites were inevitably encountered as the line cut through good farmland and pastures, valleys and slopes, linking up existing stations and adjoining roads. Over 70 sites were subject to geophysical survey, field-walking, buildings analysis and/or open-area excavation; over 1,000 trial-trenches were undertaken. A search of the project gazetteer indicates that more than 30 medieval rural sites were encountered.[3] An array of major archaeological organisations, including Museum of London Archaeology, Wessex Archaeology and Oxford Archaeology, and various sub-contracted organisations, were involved in survey and/or excavation and/or in post-excavation: 'At the peak of the archaeological fieldwork, there were over a hundred archaeologists working along the route, carefully excavating and recording the activities of our ancestors. In fact, when construction officially started in 1998, there were more

[2] https://en.wikipedia.org/wiki/High_Speed_1

[3] Abbotts Court, Broomfield Farm, Cheekborough Farm, Crossness Farm, Cudhill, Dampfield Farm, Dampton, Ebbsfleet Village, Faversham Road, Foxhall, Great Leyborough, Halstow's Grange, Highnest Farm, Kingston, Landspring, Little Ekerds, Milton Ridge, Northwich Fields, Old Bouverie, Patenorne Farm, Pepper Hill Farm, Perry Court, Ridgeway Farm, Shorne Lane, Stokes Farm, Swanscombe Village, Tilden Farm, Thornhill Farm, Upton Farm, Westcourt Farm and White House Farm.

archaeologists on site than construction workers' (Helen Glass in HS1 Limited 2011: 7). This quote alone highlights how important – for archaeological knowledge, for the profession, and for the public – such infrastructure projects can be.

Ensuring development-led discoveries advance understanding of the past

The HS1 example above shows the demands of infrastructure archaeology for excavation and processing of its findings, but it does not tell us how much of the work eventually makes its way to full reporting and publication. As various of the contributors to this volume highlight, many of the larger archaeological projects undertaken across Europe as part of infrastructure programmes still await (or indeed lack any or proper funding for) full publication, let alone wider academic study and synthesis. This apparent lack of interest in the outcomes of the archaeological investigations risks undermining the principle that developers should be paying for them.

However, the high value of synthesis is evident in those instances where it has taken place. A decade ago in the Netherlands, the *Valletta Harvest* project initiated by the Dutch Cultural Heritage Agency (RCE) set out to evaluate what large-scale, development-led archaeology since *c.* 1995 had actually added to our understanding of the medieval origins and development of nucleated villages. Despite formidable obstacles in bringing together a vast amount of evidence of variable quality from very disparate sources, the results were successfully published in 2018 as *Village Formation in the Netherlands during the Middle* Ages (Rennes *et al.* 2018). The authors showed that synthesis of the mass of new archaeological data was able to significantly refine and advance our understanding of medieval settlement development in the Netherlands: it showed there was no single standard pathway to nucleated village formation; that many villages evolved from previously loosely dispersed settlements; that settlement continuity was less stable than previously assumed; and that local factors and human agency mattered more than top-down planning. The authors also noted that, while development-led archaeology had dramatically expanded the evidence base, archaeological data alone could not fully explain the development of medieval rural settlement patterns. Most importantly, the very existence of this volume helped make the case for the value of development-led archaeology for advancing knowledge and understanding both in the Netherlands and more widely across Europe.

The aims of this volume

Taking inspiration from the Dutch initiative, the present volume aims to examine how the threats and opportunities of infrastructure archaeology for medieval rural settlement have been met in 15 different European states. Our focus is wider than in the above-cited *Village Formation*, not only because our volume covers 15 countries, but also because we allow the authors in each country to focus on whatever themes within medieval rural settlement suit their data, not just on the origins of the nucleated village. Conversely, the analyses here cannot be as comprehensive as the Dutch survey because they do not include a bottom-up 'harvest' of all data, and they also focus on infrastructure archaeology alone, not all development-led archaeology. Additionally, in the interests of accessibility, achievability and cost for an unfunded venture, we asked authors to observe a tight limit of *c.* 6,000 words.

The chapters in this volume are based on papers given to a series of four transnational seminars held across 2021–2023, hosted by the Medieval Settlement Research Group (MSRG) and organised by Professor Carenza Lewis as the then President of the MSRG. The seminars were organised as online events, with invited experts from different European countries each given the same brief: to review the impact of large infrastructure projects on medieval rural settlement, in terms both of a)

the threats posed by such developments, and b) the advancement of knowledge and understanding achieved by investigations occasioned by these developments.

The first seminar, in April 2021, covered Ireland, Scotland, Wales and England; the second (October 2021), Belgium, Denmark, the Czech Republic and Germany; the third (October 2022), Spain, France, Italy and Croatia; and the final session (March 2023), Austria, Bulgaria, Hungary and Poland. Each set of papers was followed by an informal panel discussion, with invited panel members who reflected and probed on issues and results highlighted by speakers. Panel discussants included Helena Hamerow, John Blair, Christopher Dyer, Heleen van Londen, Eva Svensson, Mark Gardiner, Catarine Tente, Neil Christie, Sam Turner, Tomas Klir, Claudia Theune and Miklos Takas. Questions from the online audience added further to the lively discussions. Each seminar was recorded and all recordings are available online.[4] The quality of the seminar contributions, and the evident value of the insights provided by speakers and discussants, demonstrated the desirability of formal publication that would benchmark achievements to date and, by synthesising the full range of insights, not only elicit and characterise the wider contribution made to our understanding of medieval rural settlement by infrastructure archaeology, but also identify where difficulties remain and what practices are likely to work best to mitigate these.

Defining terms

In a volume spanning 15 different countries with many distinctive historical trajectories, heritage structures, academic frameworks and first languages, it is important to be aware that the key terms that define the focus of the volume – medieval, rural settlement, infrastructure – may be conceived and used differently in different chapters. Here, we offer here some broad definitions for those key terms and note how their use may vary.

Medieval

The medieval period is defined in this volume as broadly encompassing the millennium from the 5th to 16th centuries AD. This period is particularly important to understanding both the past and its place in the world today, because it connects the world of Late Antiquity that is very unfamiliar to most people, with the early modern world whose features are much more familiar to people today and with which they can more easily connect. For example, few members of the wider public may be familiar with what a Roman temple or villa was or looked like, but most will have an idea of what a church or a manor house was.

In reading this volume, it is important to recognise that the term 'medieval' can embrace different timespans in different parts of Europe. In some regions, 'medieval' is only used for the period after AD 1000: in southern Europe, the period as late as the 8th century might still be referred to as the Late Antique or Byzantine rather than medieval, while in Scandinavia 'Iron Age' often continues to be used until the early 9th century. In many regions, the names of dominant cultural groups are used to define eras of the earlier medieval period – thus Avar (*c.* AD 560s–820s) in Hungary, Frankish (*c.* AD 480s–980s) in France, Byzantine (*c.* AD 530s–750s) and Lombard (*c.* AD 560s–770s) in Italy, and Viking (from the 9th to 11th centuries) in Scandinavia. In some instances, longer periods are broken down into more short-lived eras, such as the Merovingian (AD 480s–750s) and Carolingian (AD 750s–880s) Frankish periods. In others, shorter periods are wrapped up into broader terms such as the Migration period (generally covering the 4th to 7th centuries AD in Europe) or the Anglo-Saxon period (covering the 5th to 11th centuries in England). The complexity of these often rapidly changing geographies of power, and lack of consensus whether political or cultural identity is in any

[4] https://medieval-settlement.com/events/past-events/ under 2022 and 2023.

case necessarily directly reflected in archaeological remains, encourages the use of broader period labels such as 'early medieval' and 'late medieval'. In this, the 11th century is widely used to divide the 'early medieval' from the 'late medieval', with 'high medieval' used sometimes to additionally distinguish the period between the 11th and the 13th centuries. But readers may find that the terms 'early', 'high' and 'late' medieval are thus not used consistently across the chapters in this volume, reflecting practice in different countries. To compensate, we have encouraged (but not imposed) the use of dates rather than period names where possible.

One value of this volume is showing how interest in some regions or countries has focussed more on the early or late medieval period, and how infrastructural archaeology has prompted fuller recognition of the longer medieval span and its settlement forms. Each chapter will give voice to chronologies and archaeological emphases in their respective 'Middle Ages'.

Rural Settlement

The term 'settlement' within the context of medieval rural settlement studies refers to places of secular domestic habitation, excluding specialised types such as monasteries and castles. With some variation, the adjective 'rural' is used for settlements which were predominantly directly reliant on exploitation of the countryside, such as crop cultivation, livestock management, rural craft and industry (e.g. pottery making, charcoal burning), extraction (e.g. stone quarrying snd mining, peat cutting) and so on. The definition of *rural* settlement excludes urban centres, where the majority of residents did not make their living directly from the land, relying instead on activities such as manufacturing, trade and commerce; however, it is recognised that most rural communities were integrally interconnected with urban communities and their commercial networks. The division between rural and urban is not always clear-cut, either during archaeological excavation or in the past. In some regions, urban settlement was entirely absent in some periods and thus all settlement was rural, while many settlements changed their status over the course of the medieval period, transitioning from rural to urban or from urban to rural, sometimes more than once. In some studies, settlements may be defined as towns which would be categorised as villages in other areas, periods or academic contexts. Accordingly, in this volume, we have avoided seeking to impose strict definitions of 'rural' and 'urban'.

Rural settlements thus include unenclosed and enclosed villages, hamlets, farmsteads and informal settlements, where most rural people lived, as well as some specialised and elite sites, such as mills, sheilings, seasonal settlements, manorial sites, raths, ringworks and so on. Rural settlements range from arable villages or pastoral farms to granges, mining villages and woodland charcoal-burning sites, which may be linked to activity by lords (secular or ecclesiastical) or peasants as independent collectives, or extensions of family-led farms and hamlets. All these form part of the rural settlement pattern of medieval Europe.

Some rural settlements may have been inhabited for just a generation or so, others for centuries, others again episodically. Some eventually became permanently deserted, whereas others are still inhabited today. Some sites include the cemeteries where the dead from the settlement were interred as cremations or inhumations; in that regard, some contributors here include reference to burials and cemeteries. Some of those of early medieval date contained furnished burials with grave-goods, others of later medieval date are usually associated with a church. In this volume, the term 'settlement' (unless specified otherwise by the author) excludes specialised places such as monasteries or castles; however, we do want to highlight something of the landscape that sustained the communities whose settlements we study, including features such as fields, woodlands, drainage ditches, boundaries, extraction sites, roads and so on.

Infrastructure

The term 'infrastructure' refers to the physical and organisational structures essential for societal operation. Today, this includes installations for transportation (such as roads, railways, airports, ports), utilities (including for processing, storing and/or supplying water, energy, refuse, etc.) and communication (telecommunications, internet), as well as public institutions (schools, hospitals, prisons, etc.), extraction works (mining, quarrying, etc.) and even recreation facilities (golf courses, theme parks, ski lifts, etc.). While infrastructure developments are often perceived as linear (e.g. roads, railways or pipelines), others are area-based (e.g. wind farms, reservoirs, refineries, energy plants, industrial estates) and require extensive land stripping or intrusive insertions. Modernization linked to infrastructure can also threaten inhabited places and historic buildings through alteration or demolition.

Infrastructure projects are typically of high social value and high strategic importance, and so are usually publicly funded via government grants, sometimes combined with private investment. Much recent infrastructure development in Europe has been funded by European Union grants. Compared with localised or private building projects, infrastructure schemes are typically large-scale, high-budget and time-sensitive. Their strategic importance also sets infrastructure projects apart: because they are considered nationally or regionally critical, planning and funding may be prioritised, approvals may be streamlined, and changes of route or location to avoid sensitive sites may not be countenanced. These factors make infrastructure development a greater and more persistent challenge to archaeological preservation than most other forms of construction. And yet, paradoxically, these same factors also mean that infrastructure development provides opportunities to find and investigate new and unknown sites.

Conclusion

Given the long and often intense history of settlement, land-use and resource exploitation across Europe, it is inevitable that archaeologies of many diverse periods, types and scales will be encountered in excavations prompted by infrastructural works. Rural settlements of the medieval millennium and their landscapes, might be expected to be well represented in such encounters.

Infrastructure development presents both a threat and an opportunity for the study of medieval rural settlement, as succinctly expressed in this volume by Tibor Ákos Rácz and Edit Sárosi in their review of infrastructure archaeology in Hungary:

> 'While, on the one hand, large-scale projects of this kind represent a major challenge for archaeology, on the other hand, they also offer opportunities to expand scientific knowledge, improve research methods, involve and raise public awareness towards archaeology, and inform us of past cultures on a scale impossible before.'

This volume seeks to explore this paradox, reviewing the processes, the impacts and the legacies of archaeology prompted by infrastructure development on the condition, knowledge and understanding of medieval rural settlement across Europe. The chapters in this volume review what has been done, what has been found, and what it has told us in 15 different countries, with the final synthesising chapter distilling the overarching insights transnationally and offering recommendations for the future.

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Infrastructure archaeology and medieval rural settlement in Austria

Claudia Theune and Eva Steigberger

Introduction

In Austria, a number of infrastructural projects are underway that are having a major impact on archaeological sites and structures, including medieval rural settlements. In this paper, we take a closer look at these investigations, measures and processes. These projects relate to traffic construction work (road and railway construction, including tunnelling) as well as to digital or energy infrastructure measures (e.g. wind farms or electricity and telecommunications lines), industrial estates on the outskirts of towns, and tourist infrastructure, such as cable car construction or the expansion of ski resorts in the high mountains. The Federal Monuments Authority is involved as a state authority in many, but not all, of the projects.

In Austria, all archaeological interventions, whether excavations, archaeological or geophysical surveys, are organised, managed and carried out by the Federal Monuments Authority as a state authority on the basis of the *Austrian Monuments Protection Act*. Apart from a few exceptional cases, the Authority does not carry out any excavations itself.

The Federal Monuments Authority regularly publishes updated guidelines – drawn up on the basis of the *Monuments Protection Act* – on archaeological interventions, which can be made mandatory as a requirement in the permit for excavations or surveys. These guidelines relate to the method of excavation and the detailed documentation that is required. The Authority issues all permits for archaeological excavations and prospections work and monitors compliance with the guidelines and in terms of documentation.

We begin this paper on the scale and impact of infrastructure work in Austria by presenting the legal framework and describing the specific conditions. We then illustrate the practical implementation of the aforementioned legal framework and insights into medieval settlements in Austria through discussion of some case studies. Threats and opportunities for the archaeology of rural settlements are also addressed. A summary concludes the article.

Legal basis

The Republic of Austria is a federal nation with nine states. Many legal matters are addressed at the state level, while other laws apply nationally, among which is the *Monuments Protection Act*. This act was first issued in 1923, but amendments have occurred at various points since, including a new one which came into force on 1 September 2024.[1]

The research, protection and care of Austria's material cultural heritage is of central importance, as is the communication of the social significance of this task to the general public. As a federal authority, the Federal Monuments Authority is responsible for the official enforcement of this mandate and takes responsibility for the preservation of the monument stock (see Steigberger 2016;

[1] https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10009184

Theune and Steigberger 2023). These laws are primarily based on European principles, such as the Valletta Convention of 1992, which was ratified by Austria in 2015. UNESCO guidelines and directives are also mandatory, particularly for World Heritage sites in Austria.[2]

It is important to note that the *Austrian Monuments Protection Act* does not contain an end point in terms of historical time for the definition of a monument. Archaeological remains from all epochs of human history, including contemporary history, can be classified as worthy of protection under the *Monuments Protection Act* if they are of 'historical, artistic or other cultural significance' and 'their preservation is in the public interest'. Such monuments fall under the jurisdiction of the Federal Monuments Authority and, in the case of archaeological monuments, under that of the Department of Archaeology of the Federal Monuments Authority. In the new updated version of the *Monument Protection Act* (effective as of 1 September 2024), some provisions have been added that are intended to strengthen the protection of monuments. This concerns, for example, the obligation to preserve historical (including medieval) buildings; the procedure for ensuring legal protection is also to be simplified. Whereas in the past, accessing sites with a metal-detector was exempt from the requirement for authorisation (whereas excavation, even if minimally invasive, was not exempt), access with metal-detectors or other aids is now prohibited or requires official authorisation.

In addition to the main office of the Federal Monuments Authority in the capital Vienna, there are branch offices in all the federal states, each of which is usually staffed by a single archaeologist; only in the densely populated regions of eastern Austria, particularly in Lower Austria, are two trained archaeologists employed. In the cities of Vienna, St Pölten, Wels, Hall in Tirol and Graz there is also a city archaeologist who is employed by the respective city administration.

Archaeological excavations are commissioned by the parties responsible for the excavations – landowners or other investors – and approved by the authorities. The excavations or surveys themselves are not carried out by the Federal Monuments Authority, but by commercial archaeological companies (or research institutions) in which both archaeologists and anthropologists or conservators/restorers work. Both the archaeologists of the Federal Monuments Authority and the archaeologists of contract archaeology companies and universities are trained in all periods of archaeology, because they must be able to professionally excavate and document all archaeological periods in their daily routine. Only universities have archaeologists who specialise in medieval and post-medieval periods. The staff at universities in Vienna, Innsbruck, Graz and Salzburg are particularly worthy of mention here.

Approval of all excavations, geophysical surveys and archaeological surveys is required. Federal Monuments Authority currently issues around 700 authorisations for excavations each year, around 50% of which take place in the densely populated eastern province of Lower Austria.

According to the guidelines of the Federal Monuments Authority, it is important to ensure that the excavations cause the least possible loss of substance. Archaeological interventions should only cover those areas that will be destroyed by construction work, for example. It is not necessary to completely excavate low-lying layers; they can remain unexcavated. This approach minimises the impact on the archaeological substance. The basic principle is that an archaeological site is best preserved if it remains protected and undisturbed in the ground.

Extended and sometimes extensive excavations become necessary when construction work is planned, be it new roads, railway tracks, underground tunnels in cities or through the alpine landscape, pipelines for gas, electricity, and telecommunications, tourist infrastructure, or the

[2] https://whc.unesco.org/en/statesparties/at

development of new residential and commercial areas in villages and towns. In order to ensure awareness of archaeological monuments and sites during the planning phase, eight state laws on spatial planning stipulate that these must be designated in the zoning plans. This means that they are taken into account in the authorisation procedures of building authorities and the state.

Larger projects are subject to environmental impact assessments, which include an assessment of the protection of historically, culturally, or archaeologically significant landscapes, sites and archaeological monuments in the planning phase, in accordance with international conventions or national legislation. Corresponding procedures are known from many countries. If archaeological sites are already known in the planning area or there is a well-founded presumption that there are archaeological sites there, geophysical prospections, surveys or excavations are conducted if necessary. In addition, aerial archaeological inventions are carried out, sometimes with special aerial flights and, of course, the evaluation of historical maps and Lidar data.

As in some other European countries, the excavations are financed by the 'cost by cause' principle. In the case of infrastructure projects, for example, the Österreichischen Bundesbahnen (Federal Railway), gas-pipeline companies, road-construction entities (Asfinag) or other large companies pay for the excavations. However, the funding usually only covers the excavations in accordance with the guidelines of the Federal Monuments Authority and a first conservation treatment of the finds as well as the compilation of a report for the Federal Monuments Authority, which is then published in the *Fundberichte aus Österreich*. Further archaeological analyses are not financially covered. Sometimes popular scientific booklets are also financed. For this reason and because of the many large infrastructural projects there are a large number of excavations. The infrastructural projects often last several years and produce very large quantities of finds and an infinite amount of archaeological data; in the medium term – namely, within the term for which funding must be available – these data can rarely be analysed unless appropriate conditions are stipulated in environmental impact assessments (Krenn 2012). This situation can be seen as a threat to knowledge, and this threat exists for sites from all archaeological periods, including medieval. In some cases, archaeological complexes can be analysed, for example as part of master's theses or dissertations or through third-party funded projects, such as the dense settlement throughout all epochs of the Laßnitz Valley in Styria by Fuchs in a multi-volume series between 2011 and 2024 (Fuchs 2011–24). However, much of the excavated material remains unanalysed and unpublished.

We must stress therefore that both national and state legislation must be taken into account, which initially only guarantees the obligation to excavate, but not to carry out a comprehensive analysis, which represents a complex and not always satisfactory situation in terms of knowledge of archaeological and historical structures and developments.

It should be added that geophysical prospection or surveys can be undertaken in advance of major excavations. As a rule, such significant excavations or surveys are carried out to a high archaeological standard and professionally by commercial archaeological companies. This should be distinguished from excavations carried out by colleagues at universities, for example. These tend to focus on specific long-term research questions. There are also a number of interested amateurs who repeatedly walk over known sites and collect finds, sometimes with metal–detectors; as mentioned, such inspections must now be authorised, otherwise they are illegal.

Guidelines for archaeological interventions in Austria

All archaeological interventions, whether excavations or surveys, must follow a specific protocol.[3] For about 13 years, the Federal Monuments Authority has released so-called guidelines for archaeological interventions, which are revised and modified at regular intervals. All excavations in Austria should follow these guidelines; in some cases a different documentation is possible. The excavation should always be carried out according to the stratigraphic method; each stratigraphic unit must be documented separately. This documentation includes a graphic survey with a total station, a description using forms and photographic documentation, as well as databases on the finds and various lists and concepts for the further conservation and storage of the finds, for which 'Standards for the conservation treatment of archaeological finds' are also to be drawn up.[4]

A report of the excavations with the main results and plans is published annually (digitally) in the *Fundberichte aus Österreich* and is accessible to the public.[5] The implementation of these guidelines for archaeological interventions ensures that the method of excavation itself, the surveying and the verbal and photographic documentation are always the same and therefore comparable throughout Austria. It can be stated that the quality of the excavations has greatly improved as a result.

Archaeological inventory

As required by law, the Federal Monuments Authority is continuously carrying out an archaeological inventory, i.e. a census in which all known archaeological sites are recorded. This is based on older excavations, find reports, surveys and site visits, aerial photo analysis, and Lidar analysis. In principle, a broad dataset of archaeological sites is known. The aim of the archaeological inventory is to compile an archaeological register of monuments and GIS-based mapping of all known or accessible archaeological sites and listed archaeological monuments. The Federal Monuments Authority maintains a database for this purpose – HERIS (Heritage Information System)[6] – which contains all archaeological sites and monuments in Austria. In the meantime, these entries are no longer just noted as a point on a map, but are marked on the exact plot or location. This facilitates the further planning of major infrastructural construction measures for all involved stakeholders. These data from the Federal Monuments Authority are gradually being transferred to the federal states as part of the regional planning procedures, which publish it in public map services on their websites. They are, therefore, also visible to the general public.

Apart from the larger infrastructure measures that have to undergo an environmental impact assessment procedure and in which the Federal Monuments Authority is involved *ex officio*, there is also a statement produced by the Federal Monuments Authority for every zoning plan amendment or change in spatial planning or reference made to the published GIS data. Nevertheless, it can happen that large-scale construction projects that are not automatically reported to the Federal Monuments Authority still take place, about which the few employees of the Federal Monuments Authority are unaware. Frequently, therefore, construction projects can occur in which archaeological features – including medieval hamlets and villages – are destroyed without archaeological excavation. This can be seen as a threat to archaeological remains in rural areas, but is not prevented in the current legislation.

[3] https://www.bda.gv.at/dam/jcr:311e0b74-72ea-4e28-97a1-779e4ceed928/230209_Publikation_Richtlinien_Arch%C3%A4ologie_A4_BF.pdf
[4] https://www.bda.gv.at/dam/jcr:02851248-cc7d-436e-b0da-89186f088348/Standards_fuer_die_konservatorische_Behandlung_von_archaeologischen_Funden.pdf
[5] https://www.bda.gv.at/themen/publikationen/fundberichte-aus-oesterreich.html
[6] https://denkmalapp.bda.gv.at/

Figure 1. Physical map of Austria. *(© Shutterstock)*

Geographical parameters in Austria

When evaluating threats to rural settlement landscapes from infrastructural measures, it is important to consider the topography and geography of the nation. Austria is a small nation of approximately 84,000 km², with an east–west extension of just under 600 km between Lake Neusiedl in the east and Lake Constance in the west. However, the north–south distance is relatively small; in some places it is less than 100 km (Fig. 1).

Austria is located in the Alps. Around 55,000 km² are within the Alpine region, which comprises just under 65% of the country's area. This means that two-thirds of the territory lie in an alpine zone, which in turn means that all these areas must be considered marginal or remote. Only 32% of Austria's land area is lower than 500 m above sea level. In terms of distribution by elevation, 56% of the population live in areas below 400 m above sea level, 28% in areas between 400 m and 600 m above sea level, and 10% in areas between 600 m and 800 m above sea level. In contrast, only 6% of Austrians live at altitudes of more than 800 m above sea level.

Overall, Austria is characterised by rural areas, which extend across the foothills of the Alps and across the basin landscape, as well as throughout the Alpine regions. In addition to the capital Vienna in the east of the country with around 2 million inhabitants, there are only a few larger cities, such as Graz (around 300,000 inhabitants), Linz (*c.* 210,000 inhabitants), Salzburg (*c.* 160,000 inhabitants), Innsbruck (*c.* 135,000 inhabitants) and Klagenfurt (*c.* 105,000 inhabitants).

The foothills of the Alps and the basin landscapes are mostly forest-free and largely fertile fields and meadows where agriculture, viticulture and livestock farming are practised. A large part of the densely populated areas (which has been true since prehistoric times) is set in the eastern parts of the country, Lower Austria, where 37% of the known archaeological sites in Austria are located.

General threats to archaeological sites

Austria is characterised by an immense amount of land consumption and a very large amount of ongoing sealing of the soil surface, which is often associated with major infrastructure measures. This sealing of the soil surface currently amounts to between 15 ha and 25 ha per day in Austria. Land consumption is particularly high in the east of the country. Most excavations take place here in the regions with the most favourable settlement conditions. The sealing of the soil surface, which primarily affects the outskirts of smaller and larger towns, takes place in order to build commercial estates, usually with large car parks. In addition, the sealing of the soil surface affects open agricultural land when roads and motorways are built, the railway network is expanded, and when wind farms and photovoltaic systems are built – even in the high mountains. It should be noted that very extensive infrastructure measures also take place undertaken in the Alps – especially in ski resorts – in the course of the development of tourism. This has resulted in the immense loss of existing natural environments, landscapes, flora and fauna, as well as of medieval settlement structures. This sealing of the soil surface is certainly a threat to the medieval rural structures in Austria.

Further general threats are posed by extensive arable farming. The use of deep ploughing can destroy archaeological structures in the soil. Viticulture also has a massive impact on soil formations.

Archaeological research on medieval rural settlements

Archaeological interest in and knowledge of medieval settlements has been based on a wide range of research since the middle of the 20th century. Since the 1970s, there has been targeted research on medieval deserted settlements that remains a core effort and is relevant to the aforementioned archaeological inventory (Felgenhauer-Schmiedt 2023; Theune 2023). Through countless site visits and surveys in rural areas, around 2,500 deserted settlements in Lower Austria, Burgenland, and Styria have been recorded in the so-called *Wüstungsarchiv*, now the *Digital Deserted Medieval Villages Archive* (*DeVill*). Extensive information on the deserted sites has been collected through geographic and archaeological site surveys and stored in an (analogue) database (Scharrer-Liška *et al.* 2024). Among other data points, the size, dating and important written and archaeological data are listed, as are characteristic ceramics or other small finds that may have been recovered many years ago. The extent of these settlements is marked on topographical maps. Thanks to this multitude of data, entire deserted settlements can be recorded, at least superficially, in relation to wider medieval rural settlement landscapes. Thus, even back in the 1970s, a systematic landscape archaeological approach was attempted, which today provides valuable information on rural medieval structures.

A project to digitise this analogue database and make it publicly accessible has now been completed.[7] The project received additional input from targeted aerial surveys and from aerial archaeology, which is strongly represented in Vienna, as well as from digital elevation models (Lidar), which are available in Austria in high resolution and over a wide area. Geophysical surveys also provide useful new information. Historical maps, archival sources from the Middle Ages and especially the modern era, and research into toponyms can provide further information, although it is always necessary to scrutinise whether they date back to the Middle Ages. The systematic search of Lidar data, in particular, reveals hitherto unknown medieval village structures, meaning that a number of deserted villages have also been newly discovered. As an example, the use of aerial archaeology and Lidar data led to the discovery of two deserted villages near Mittendorf. The dimensions of the Drösing deserted settlement (Lower Austria) with its parcel structure and the site of the church could be determined from 19th-century maps. Excavations in parts of the deserted settlement confirm that these details on the historical maps can be traced back to the Middle Ages (Theune 2012) (Fig. 2).

[7] https://devill.oegm.or.at/

Figure 2. Habsburg Empire – Cadastral maps (Franziszeischer Kataster). The deserted settlement of Drösing; motte-and-bailey castle on the east the triangular village complex is in the west, the parcels of the farms are marked in yellow, the church site is in the south-east and is marked in green (parcel number 450) and the village in the west. *(© Bundeseich- und Vermessungsamt)*

However, it should be noted that only a few medieval settlements have been comprehensively excavated to date. The central reference point for a completely excavated settlement remains the deserted village of Hard, north of Vienna, which was excavated in the 1970s as part of a research project at the University of Vienna. It is a cul-de-sac village with 10 farmsteads, at the northern end of which there is a representative manor house, the finds from which are quite distinct from those from the other farmsteads (Felgenhauer-Schmiedt 2008).

Additional rural settlements that could be recorded in full are associated with a military infrastructure site that is itself historic: these are 42 villages with around 7,000 inhabitants that were resettled to

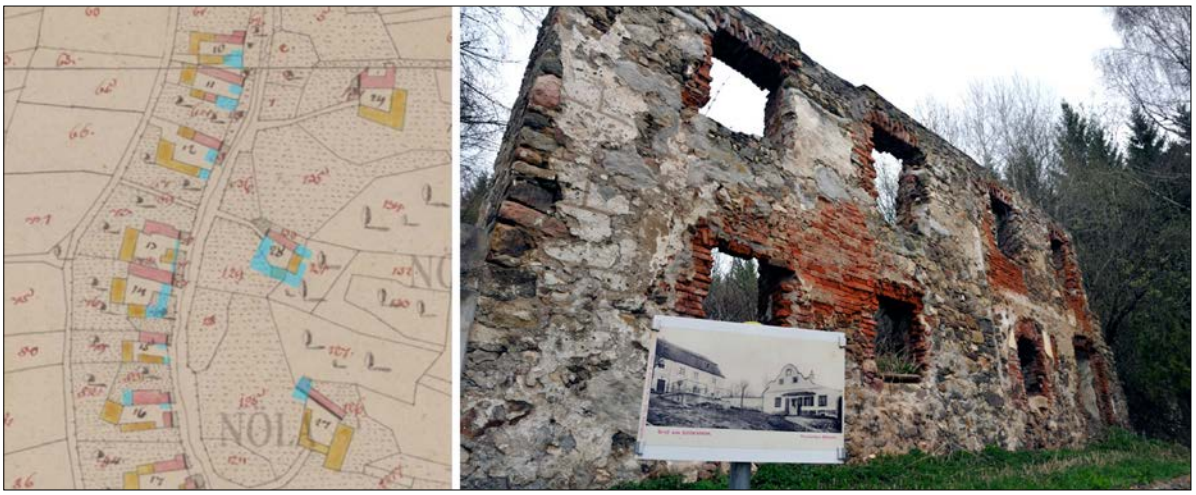

Figure 3. Allentsteig military training area. Left: Söllitz, based on the cadastral map and the transformations prior to 1938–9; red = residential buildings, yellow = buildings with an economic purpose (barns, stables), blue = new buildings after 1823. *(Source: Franziszeischer Kataster, Söllitz Mappe 667/04, 06, 1823; © Land Niederösterreich (NÖLA); interpretation and layout: Thomas Kühtreiber, Gábor Tarcsay, Michaela Zorko).* Right: Farmhouse in Döllersheim current status. *(© Claudia Theune)*

make way for the Allentsteig military training area established by the National Socialists in 1938. The area covered approximately 160 km². Many of the villages are still standing, albeit in ruins, not least because the buildings were once considered as targets for shooting practice. A recent small research project focussed on the development of post-medieval settlement structures and the question of the dynamics of village structures from the Middle Ages to the 19th/20th century, with four villages being analysed as case studies (Kühtreiber *et al.* 2014). The role of winter livestock stabling through the construction of stables and barns in the development of multi-winged farmsteads was significant. In addition, social differentiation of the village community could be recognised through farmsteads in the narrower sense and small houses on the outskirts of the settlement and through the formation of courtyard façades fronting onto the street and the neighbourhood through the re-orientation of residential buildings as well as the addition of storeys and new windows, possibly as an 'urban' element in the villages, from the late 18th century onwards (Fig. 3).

The main excavations for current linear infrastructure measures, which have also affected medieval structures, have taken place in the greater Vienna area. The projects are often multi-lane roads that require a large amount of land (Krenn 2012). As is the case everywhere, the routes pass wholly or partially over archaeological sites from prehistoric times to medieval deserted sites or post-medieval sites. Some of the sites are already known from the aforementioned archaeological inventory or the *Wüstungsarchiv/Deserted Villages Archive* (*DeVill*). Villages that exist today are taken into consideration in the planning of the routes so that they are not affected or impacted. This means, however, that the only subsurface features excavated and recorded are deserted sites, i.e. villages that did not persist beyond the late medieval or early modern periods. As is the case everywhere, only sections of the settlements or other archaeological sites are recorded – due to the nature of the project, the archaeological investigation ends at the boundary of the route.

Early medieval settlements are quite rare. The early medieval settlement of Pellendorf (Kühtreiber 2020) was excavated in 2003–05 as part of the construction of the Nordautobahn (A5) motorway connecting Vienna with the Czech Republic (Fig. 4). A particularly high density of artefacts was found dating from the 7th to 10th/11th centuries. With around 130 features, including 33 complete or almost completely preserved structures, numerous deep storage pits (some with secondary animal

Figure 4. Aerial photograph of the excavations at the Pellendorf deserted settlement before construction work on the A5 motorway. *(© Gottfried Artner)*

skeletons), several exposed oven features and two separate burials located within the settlement area, the site is one of the largest known rural settlements of the Early Middle Ages in Lower Austria. Three phases of activity can be distinguished in the 7th/8th century and the 9th/10th century. The pottery finds from the 7th to 9th century show close links to the Moravian region, which is now part of the Czech Republic. In the 9th/10th centuries, the first western influences can be recognised in the form of graphite pottery. In addition, the archaeobotanical and archaeozoological finds obtained during the excavations make it possible to draw conclusions about the economic and environmental conditions in this border region. The settlement at Pellendorf is one of the few that has been comprehensively analysed and published.

Several deserted settlements, from the High Middle Ages and the Late Middle Ages were discovered during the construction of the S1 motorway (2007–09), Vienna's eastern bypass. Although these archaeological interventions have provided insights into medieval deserted settlements, only sections of the settlements were documented due to the extent of the construction work. Two of them are Dieteresdorf and Aczesdorf (Krenn 2012).

The Dietersdorf deserted settlement can still be recognised on 19th-century maps. In total, 256 settlement features were excavated. Due to extensive and intensive agriculture employing deep ploughs, the former ground surface of the settlement was no longer preserved and only buried objects could be documented. One must, therefore, acknowledge the great loss of medieval structures caused by modern agricultural practices. Most of these may have been pit houses, but it could also have been possible to identify ground-level houses.

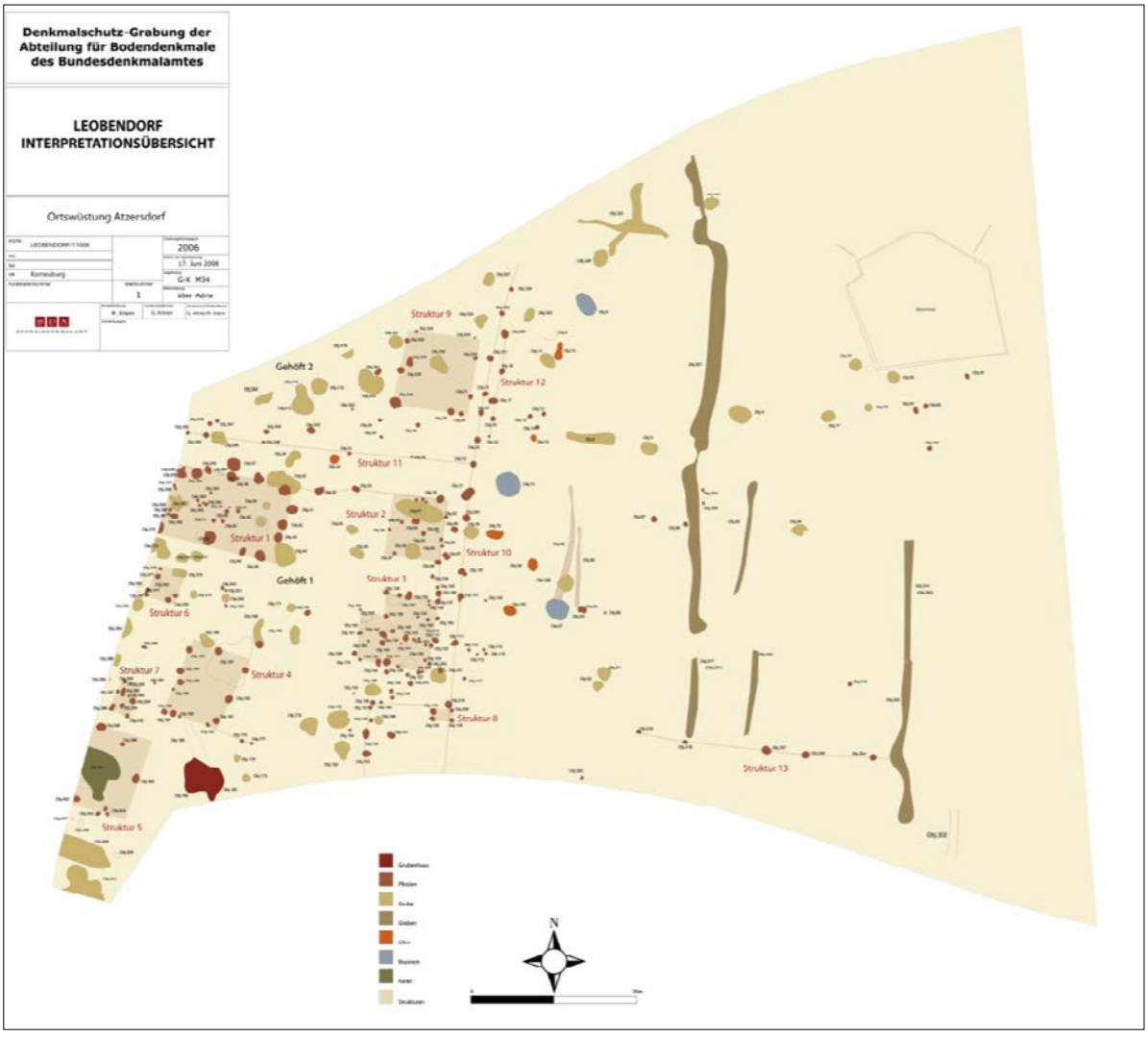

Figure 5. Interpretive plot of the deserted village of Atzersdorf. *(© Martin Krenn, Gottfried Artner)*

The Atzersdorf deserted settlement was excavated in 2006. Some of the findings are of interest in terms of new insights into medieval deserted settlements. Based on specific features, parcel boundaries could be determined and thus three house parcels could be recorded. Also of significance is a north–south running ditch, which delimited the village and at the same time offered defensive protection (Fig. 5). Such village enclosures have rarely been excavated in Austria; some are known from aerial photographs. However, a large number of them are now known from Germany. Furthermore, three wells are associated with the village. There is hardly any evidence of rural handicrafts.

These three excavations have revealed sections of the settlements and some details, such as parcel boundaries or enclosures, but not the exact size of the settlements and their economic structure, apart from what can be for sure presumed to be agriculture.

Examples of excavations of rural settlements carried out in the course of infrastructure measures as part of settlement expansions and industrial estates in the vicinity of existing towns and villages come from Salzburg or Mitterretzbach on the border with the Czech Republic, and Breitenfeld near Gänserndorf to the north of Vienna.

In Mitterretzbach, excavations became necessary when human graves were discovered during the construction of an expansion of a residential area. It was only then that the Federal Monuments Authority were called in and several plots of land covering an area of approximately 7,000 m² were archaeologically investigated. It has become known that archaeological finds had already been encountered beforehand in the area. It can, therefore, be presumed that medieval (and prehistoric) settlement structures were destroyed unknowingly during the first house constructions (Nowonty 2015: 12). The area has been inhabited since the Neolithic period and various pit houses and ground-level houses from the Early and High Middle Ages have been uncovered. A detailed chronology has shown that pit houses still predominated in the Early Middle Ages, while ground-level dwellings and various agricultural outbuildings were erected from the High Middle Ages onwards. However, all of these settlement layers were probably already destroyed by the vineyards that were cultivated previously and only buried features have survived. Interestingly, evidence of various crafts such as metalworking and bone- and textile-processing has been found.

The Breitenfeld deserted settlement, which dates back to the Late Middle Ages, had to be excavated because an industrial estate was being developed here in 2017. The structures of a settlement were already known from aerial photographs. The arrangement of these structures supports the presumption that the Breitenfeld deserted settlement was probably a hamlet or street village. It is also possible to recognise the course of a stream bed, now dried up, along which the former village was located. Two lines run parallel to the rows of houses and there is probably also a surrounding ditch. A so-called *Erdstall* (souterrain gallery) was also found in the deserted area, which can be found in many places in Austria and in Bavaria as well. Souterrain galleries are artificially created caves, which usually have an entrance near a house and are often dated to the Middle Ages. Souterrain galleries can have a wide variety of shapes and are often characterised by an irregular floor plan, narrow and low corridor cross-sections, small chambers and sometimes circular passages. A conclusive interpretation of these structures has not yet been put forth (Cichocki 2020).

The sites described above are mainly located in the basin landscapes of Austria. There are also large infrastructure measures taking place in the Alpine region. The Koralm Tunnel is intended to optimise the railway route between Graz and Klagenfurt and shorten the travel time between the two cities to 45 minutes. It has a length of over 30 km. The extensive construction work on both sides of the tunnel in Styria and Carinthia (2000s–2010s) is being monitored archaeologically and archaeological structures dating from the Neolithic to the Early Middle Ages have been discovered (Fuchs 2011–2024). There are similar projects on the railway routes between Vienna and Graz (Semmering Base Tunnel) and in the area of the Brenner Base Tunnel.

The list of infrastructure measures must be complemented by construction projects related to tourism, in particular those related to winter-sports facilities in the ski resorts, since two-thirds of the country belongs to the high alpine Alps. We know that the Alps were regularly traversed and used for economic purposes as early as the Bronze Age, so that this region has always been settled, albeit in remote areas (Theune 2013; 2018). Cows, sheep and goats have been kept and dairy products produced on the snow-free summer pastures since the Bronze Age, but especially in the Middle Ages and also during the post-medieval Little Ice Age. A second important point for the (medieval) utilisation of the Alps should be highlighted: central regions of the high Alps in the Tauern have an enormous wealth of minerals, such as salt, copper, gold and silver, but also precious stones and others. Many of these deposits have been known since prehistoric times and developed and mined. Gold mining in particular was practised intensively in the Middle Ages, e.g. in the Gastein Valley (Theune 2013). Underground mining took place in both winter and summer, as the temperature beneath ground surface of the mountains is always a constant 8°C. In addition, transport by sledge in winter across snow is much easier than in summer with pack animals.

Figure 6. Obertauern in the state of Salzburg. In the background, the Zechnerkar mountain massif with numerous wide ski runs; on the right the lower part of the massively shaped eastern slope of the Seekarspitze; the lake on the left is the artificial Schönalm reservoir, further to the right below the (natural) Hundfeldsee lake; in the background Obertauern *(© Claudia Theune)*

A third aspect is also important with regard to the medieval usage of the Alps. As previously noted, the Alps have never been an insurmountable border and have always been traversed. Numerous paths lead through the Alps that connect the northern Alpine regions of Central Europe with Italy. In the Middle Ages, numerous traders used these routes for the important trade with Venice. Another important group of travellers were pilgrims who visited holy places in Italy, such as Rome. For these different groups of people, hostels were built in the mountains where they could stop for a rest. Some of the hostels had chapels attached (Theune 2018; Prinzinger 1867; see also Erb and Boscardin 1974 for an example from Switzerland).

Since the 1970s, more and more ski resorts have been developed in the Alpine region and ski slopes as well as hotels and guesthouses have been built. The construction of ski slopes has significantly changed the landscape, as can be clearly seen in the example of Obertauern (Fig. 6). In addition, in recent years - also due to the anthropogenic climate change – artificial reservoirs have been created in which water is stored for artificial snow-making in winter (Fig. 7). Original topographical features in such massively altered mountain regions can only be guessed at using old maps and old photographs. The destruction has impacted both the natural and the medieval cultural landscapes, since the massive expansion of ski resorts has effaced the sites of mountain pastures and inns, for example. In contrast to the major road or railway construction projects mentioned above, there are hardly any environmental impact assessments and, therefore, no archaeological excavations

Figure 7. Photographs showing the massive transformation of the landscape through the construction of the artificial reservoir at Gargellen on the Schafberg in Vorarlberg in western Austria; top left 2012, top right 2020, bottom left 2020, bottom right 2021. *(© Andreas Picker)*

to the extent that would be desirable. As a result, many archaeological sites, including medieval sites, have been destroyed. Only numerous surveys, prospections and research excavations provide information about the diverse use of the Alps in the Middle Ages.

Conclusion

In conclusion, it can be stated that numerous medieval settlements have been affected and, in some cases, threatened by infrastructure measures. In the case of major infrastructure measures, excavations have at least documented the former structures. In the last 10 years, the specific excavation methodology itself and the comprehensive documentation have considerably increased the quality of the excavations. The publication of the most important results in Austria's archaeological reports means that at least the excavations are known. However, detailed analysis and publication cannot always be undertaken. Most of the data are, therefore, available on digital data-carriers and the finds are stored in large repositories. As described above, some new insights into the medieval settlements and work sites both in the lowlands and in the Alpine regions have been gained through archaeological investigation, but comprehensive analyses framed by specific research questions are rare. This is the case, for example, in relation to the questions of internal village structures, such as markets; the entire network of medieval settlements; crafts in rural areas; and the areas used for agriculture (Felgenhauer-Schmiedt and Kühtreiber 2013; Krause and Kühtreiber 2014; Nowonty 2018; Theune 2023).

In terms of comprehensive research on medieval settlement structures, numerous smaller investigations unrelated to the large infrastructure measures have been carried out that are

extremely valuable. It should be noted that, in existing rural settlements in particular, such investigations have taken place in only small or restricted areas or have taken the form of buildings archaeology research.

Overall, the immensely high level of the sealing of the soil surface in Austria has resulted in a major change to and reduction in the size of the historical cultural landscape. In recent years, another threat to archaeological sites has emerged, namely anthropogenic climate change, which will have a much greater impact in Austria than in other European countries.

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Infrastructure archaeology and medieval rural settlement in the former County of Flanders (western Flanders, Belgium)

Ewoud Deschepper, Wim De Clercq, Floris Beke, Johan Hoorne and Gerben Verbrugghe

Introduction

The County of Flanders was one of the most powerful polities in medieval western Europe. Its dense urban network, its manufacturing industries and its high-performing agriculture at the same time are causes and expressions of the power and wealth of the medieval County. Consequently, its territory is rich in medieval archaeological heritage, both in its cities as in the countryside.

This paper examines the evolution and characteristics of development-led archaeology and its impact on medieval archaeology in modern-day Flanders (Belgium), which encompasses much of the medieval County (Fig. 1). More specifically, in modern administrative terms, the provinces of West- and East-Flanders historically belonged to the County. Focusing on the archaeological impact of large infrastructure projects, this paper considers only those beyond Flanders' modern-day cities. Due to the dynamic changes in rural habitation during the 13th century specifically and the consequent difficulties in identifying late medieval settlements archaeologically, this chapter focuses on the Early and High Middle Ages (AD 450–900 and AD 900–1200, respectively). Three case studies illustrate the diversity of large-scale infrastructural archaeology in the region and are contextualised within Flanders' legal and organisational archaeological framework. We conclude with reflections on positive and negative trends, and suggestions to enhance the scientific merit of current archaeological practice.

The legal framework for development-led archaeology in Flanders

Between 1970 and 1993, Belgium developed into a federal state consisting of three communities (based on language and culture) and three regions. The regions are entrusted with jurisdiction over territorial matters, encompassing spatial planning, environmental policy and immovable heritage, including archaeology. Despite the establishment of the regions through the state reform of 1980, the transfer of authority for undertaking archaeological work to the regions only occurred following the subsequent state reform of 1988–89. The centralised National Excavation Service, officially inaugurated in 1963, was dissolved in 1989. In 1991, Flanders established the Institute for Archaeological Heritage and, in 1993, the initial legislative framework was established (De Clercq 2017a: 53–55; Wouters 2012). Although not directly prompted by the 1992 Valletta Convention, since Belgium only ratified it in 2010, this framework structured archaeological heritage management 'in the spirit of Malta' (De Clercq *et al.* 2012: 29; Wouters 2012: 23–24). This entailed the application of certain guiding principles of the Valletta Convention by various government entities, albeit to varying extents and with differing interpretations. Nonetheless, this gradual process led to the increased integration of archaeology into the development process, with the 1993 Decree serving as the *de facto* inception of preventive, development-led archaeology in Flanders.

However, in reality, a mature development-led system took several years to materialise. Over time, the Flemish Institute for Archaeological Heritage underwent multiple reforms, ultimately evolving into the current Flanders Heritage Agency. These reforms entailed significant changes in the agency's

Figure 1. Administrative organisation of Belgium and LP trajectories in Flanders.
(Geographical data: ESRI; NGI; UGent and KCG. LP data: © Stichting RAAP)

jurisdiction and responsibilities, notably shifting focus from internal research to a greater emphasis on heritage management, policy formulation and facilitation. Concurrently, the increasing volume of archaeological activities was managed through a liberalised market for archaeology, in which private or commercial archaeological contractors assumed an increasingly prominent role.

In 2016, the 'Archaeology' chapter of the revised 2013 Immovable Heritage Decree came into effect (agentschap Onroerend Erfgoed 2024a). Its primary provision stipulates that preventive archaeological research is mandatory to obtain a building permit, but contingent upon the surface area of the overall project and of the extent of soil disturbance.[1] Presently, these thresholds stand at 3,000 m² and 1,000 m² for developments outside designated archaeological areas, and 300 m² and 100 m² within such areas.[2] In essence, archaeological research has become an integral component of the broader development process.

The archaeological trajectory in the context of development-led archaeology

The development-led archaeological trajectory starts with an initial assessment phase, wherein the presence and characteristics of archaeological heritage on the area to be developed are evaluated, alongside the potential impact of development on such built or buried heritage. This assessment phase typically involves a sequential progression from desk-based research to fieldwork, including techniques such as coring or trial-trenching, as deemed necessary. Subsequently, the archaeologist/

[1] In addition, there is a possibility for archaeological research originating from scientific concerns.
[2] The protected archaeological areas mainly concern historical city centres and prehistoric site complexes. In addition to the general surface thresholds, the law recognises certain exceptions. The two most important ones concern, firstly, developments by natural persons located outside of residential or recreational areas. In those cases, the threshold is raised to 5,000 m². Secondly, when the building permit only involves relief changes in agricultural areas for which less than 40 cm of the upper top soil will be removed, no archaeological assessment is necessary.

archaeological contractor determines appropriate courses of action based on the results of this assessment. The most prevalent measures are either a determination that 'No further measures are required', indicating the absence of archaeological heritage or its non-endangerment by the proposed development, or a recommendation for 'Excavation', albeit typically limited to specific areas within the development zone. This selection is guided by the assessment outcomes and the anticipated impact of the development. Since the full implementation of this regulatory framework in 2017, every year an average of 3,000 of these assessment reports are submitted and around 250–300 excavations are started (De Ketelaere and Geuens 2023: 102–103).

A crucial aspect of this legislative framework is the delegation of decision-making authority to the archaeologist designated by the developer. Flanders Heritage Agency merely accepts submitted reports, without providing structured feedback as an inherent part of the process (see further on this below). Archaeologists must be 'licensed' by Flanders Heritage Agency to submit legally-binding reports as part of the administrative process to receive building permits. This status is contingent upon meeting specific criteria (see below). Two license categories exist: type 1, permitting invasive research, and type 2, restricted to conducting desk-based assessments. Licenses may be obtained by individuals (i.e. independent archaeologists) or by companies/institutions.

Infrastructure archaeology and medieval rural settlement

Since the mid-1990s, archaeology in Flanders has undergone a strong transition towards a development-led framework, which has been formalised and reinforced by the 2013/2016 Decree. This integration of archaeology into spatial planning policies and processes has resulted in a notable expansion of archaeological operations, both in terms of the overall number of operations conducted and the extent of areas surveyed (De Clercq *et al*. 2012; Deschepper and De Clercq 2021; Deschepper *et al.* 2025: 90–107). Presently, archaeological research is primarily conducted by private contractors and is no longer influenced by academic research agendas. Furthermore, it can be recognised as being mainly driven by contemporary economic considerations and spatial planning. Initially, this shift led to a random distribution of research activities across the landscape; however, it has become evident that these economic motives also possess an inherent logic that influences the spatial distribution of archaeological data (see below).

The significant increase of data generated and gathered from such investigations has enabled vital archaeological baseline studies on rural settlement and landscapes of the medieval period in the former County of Flanders (e.g. De Clercq 2017b; Deforce *et al.* 2020; Deschepper 2022; Verbrugghe 2020). This has fundamentally reshaped our understanding of the distribution, character and evolution of medieval rural settlement. While the significance of archaeological research conducted during the 1970s to early 1990s should, of course, not be underestimated, it is only through this modern period of development-led archaeology that medieval rural archaeology has truly matured into a distinct subdiscipline equipped with extensive datasets (Fig. 2).

Archaeological research in Flanders is characterised by small-scale archaeological operations. Three-quarters of early and high medieval rural settlements have been discovered through excavations that encompass less than 15,000 m² (1.5 ha) (Deschepper and De Clercq 2021: 40; Verbrugghe 2020: 102–104; Deschepper *et al.* 2025: 97–103), while for the Early Middle Ages, half of the known settlements have been discovered through excavations covering less than 7,000 m² (Deschepper and De Clercq 2021: 40). However, the average surface area of an early medieval farmyard in western Flanders amounts to 1,300 m² (Deschepper 2022: 220) and one of high medieval date generally covers 2000 m² (Verbrugghe 2020: 136). This does not even take into account the often-extensive ditch systems that are characteristic of the medieval countryside in western Flanders from the 8th century onwards.

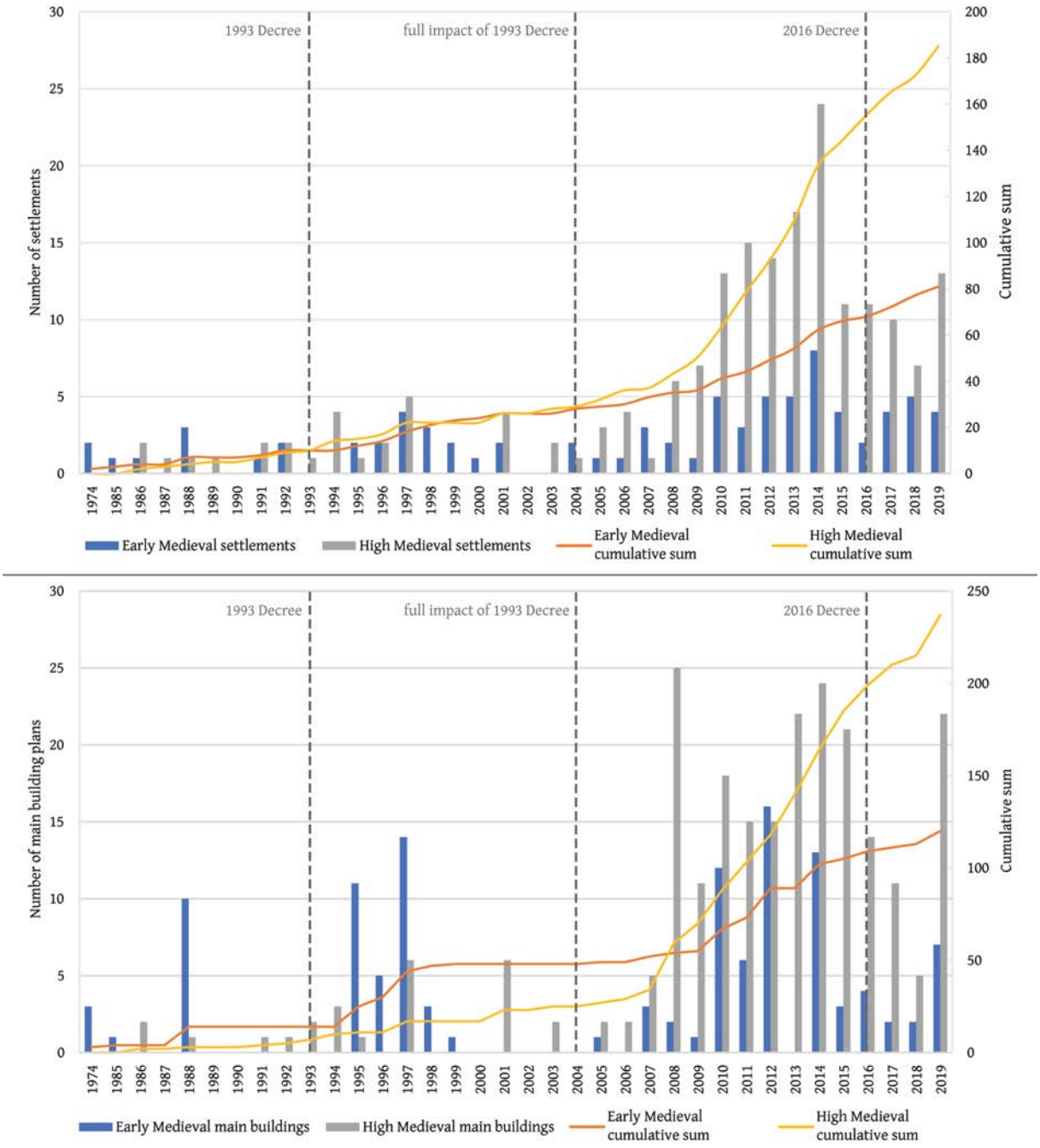

Figure 2. Number of discovered early and high medieval settlements (above) and main buildings (below) per year, in the provinces of West- and East-Flanders (Belgium), between 1974/1985–2019
(© UGent)

These figures show that the size of archaeological operations in Flanders generally is too small to gain a sufficiently developed understanding of a settlement's morphology, function, chronology and evolution, let alone of its relationship to and socio-economic and environmental context(s) and role(s) in the wider landscape. The small excavation surfaces are a direct result of Flanders' dense and spread-out spatial structure, characterised by expansive infrastructural networks, low-density developments and high population density. All this highlights the importance of large-scale infrastructure works, since these provide rare opportunities to study rural settlement and landscape on a larger scale.

In this context, we define two types of large-scale archaeological research resulting from infrastructure works: large-scale, open-area projects (LSOAPs), which see excavation over an area that exceeds 1.5 ha; and linear projects (LPs), which feature the investigation of long, linear trajectories in the context of, for example, the construction of motorways, railways or gas pipelines.

The logic of archaeological excavation in Flanders

The current organisation of archaeology in Flanders means that, generally, the same areas in the landscape are continuously being targeted by development; these are either areas within or on the edge of existing settlement and infrastructure (e.g. to develop housing estates) or large areas of previous farmland (e.g. to develop business parks). In other words, these are areas that are accessible and suitable for modern-day occupation. 'Marginal' areas (by present-day economic standards), such as river and stream valleys, forests and poorly accessible areas, are generally not developed and thus not archaeologically assessed. This potentially leads to a biased distribution pattern of newly discovered and investigated sites throughout the landscape. Furthermore, excavation measures are generally only imposed when complexes of 'substantial' remains (such as a settlement or burial presence) are encountered during assessment. Low density-sites or so-called off-site phenomena (e.g. charcoal-burning pits or field systems) are generally not deemed 'excavation worthy' since the costs of archaeological excavation and related processing of materials, to be paid by the developer, is not deemed to justify the knowledge gained from these 'low-density' sites.

These practices do, of course, risk encouraging circular reasoning and confirmation biases, since the same types of sites and the same landscapes are consistently targeted. In contrast, LPs provide a more unbiased sample of human activity throughout the landscape because their trajectories are generally determined by the inverse of these modern economic motives: LPs tend to avoid already built-up areas and economically valuable areas in order to reduce cost (In 't Ven and De Clercq 2005: 225–6; Beke *et al.* 2024). Therefore, LPs form an important supplementary dataset to assess patterns of human activity: they give insight into landscapes of varied dates that are, in the current legislative framework, difficult to assess archaeologically. Furthermore, because of the area-wide topsoil stripping, they also offer a view into the zones in between settlement and burial clusters.

The impact of LSOAPs and LPs: case studies

The Loop, an ensemble of fragmented archaeological operations (LSOAP)

The village of Sint-Denijs-Westrem is located just south-west of the city of Ghent (province of East-Flanders). Under the Dutch rule of Belgium (1815–30), a military training ground was established here, which was later turned into a small airfield and in 1985–86 into an expo centre. Since 2007, the site has seen gradual redevelopment led by the city of Ghent together with other partners. Ultimately, this should lead to a new city district called 'The Loop'. Because the site has been undergoing a piecemeal reconversion, every individual development phase (e.g. road construction, construction of big-box stores, etc.) requires an individual permit and thus an individual archaeological research project. While the scale of the Loop project makes this one of the largest archaeological investigations in Flanders (adding up to over 350,000 m² of trial-trenching and over 200,000 m² of excavation), its fragmented nature means that these numbers have accumulated through more than 40 individual archaeological operations carried out over the course of more than 15 years (Hoorne 2017: 67). These operations have been undertaken by different institutions and contractors, under changing legislation and changing archaeological practice, all of which adds to a disjointed end output.

The results of these many archaeological operations on The Loop have been rich and varied, bringing to light a multi-period human occupation, ranging from the Neolithic up to the Second

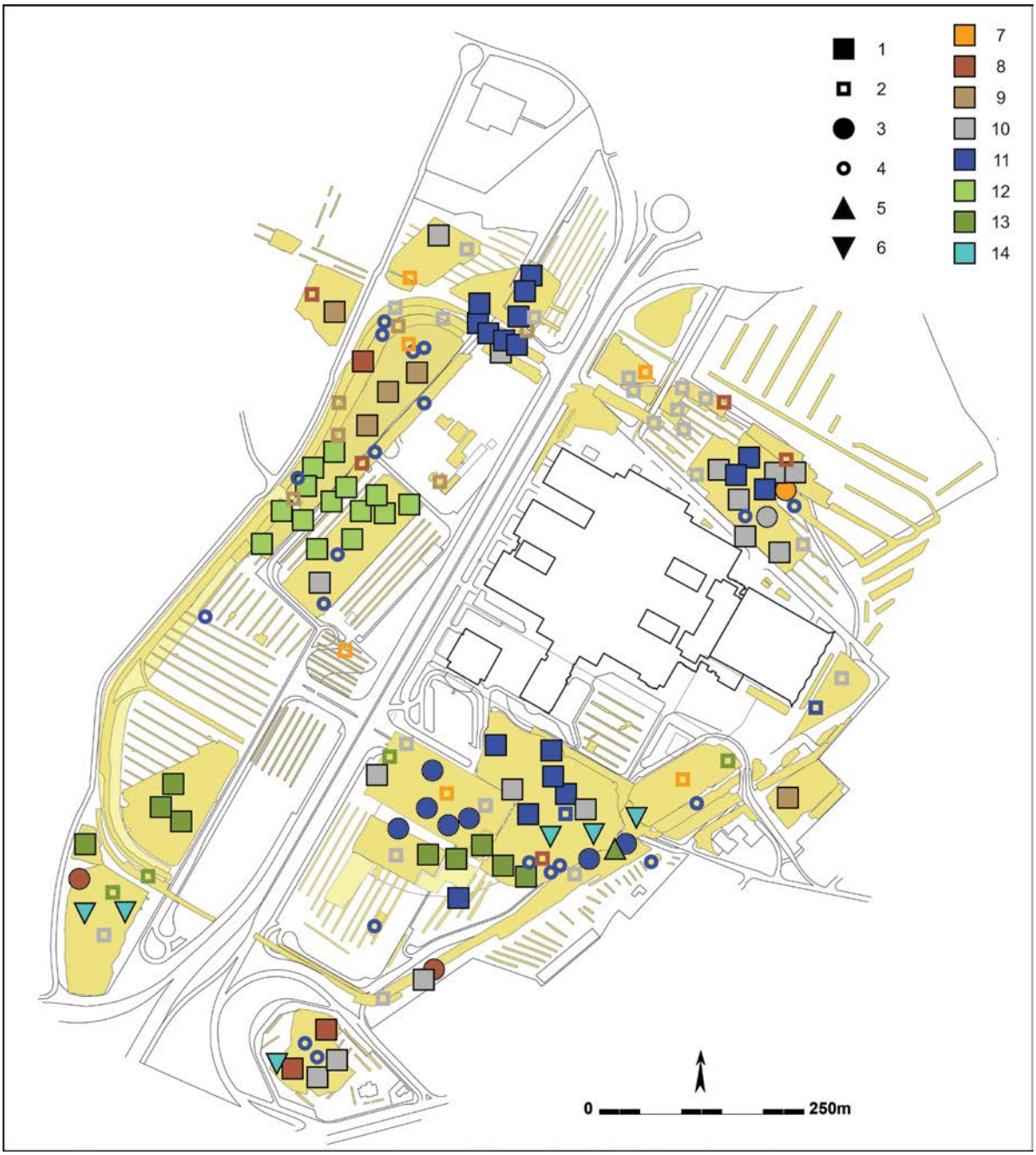

Figure 3. Archaeological research on The Loop, state of the art 2025. Yellow: archaeological operations. 1: farmyard (group); 2: isolated settlement feature; 3: burial field; 4: isolated burial; 5: windmill; 6: remains of military encampments; 7: Final Neolithic; 8: Early-Middle Bronze Age; 9: Late Bronze Age; 10: Iron Age; 11: Roman period; 12: Early Middle Ages; 13: High Middle Ages; 14: 17th–18th centuries. *(© DL&H)*

World War (Fig. 3). This time-depth and variety, together with the scale of the investigations, have the potential to offer unprecedented insights into long-term changes in human settlement and landscape exploitation. However, the fragmentation of the archaeological research, together with the long time-frame over which it has been and is being carried out, means that, to date, there is no complete overview of this archaeological activity, nor has the high potential of these datasets been exploited, in part given the time demands to process and analyse all the finds generated from

Figure 4. Bird's-eye view of the early medieval rural settlement of Sint-Denijs-Westrem – The Loop, during the 7th century. The settlement is one of the few early medieval settlements in Flanders that has seen complete excavation.
(© Yannick De Smet, DL&H and Ghent University)

the project work. With regard to the medieval period, so far only the early medieval occupation has seen any good level of in-depth research (Hoorne *et al.* 2021; Deschepper *et al.* 2024). This showed that occupation consisted of a small rural settlement, encompassing one or two farms every generation, that was present on this location for *c.* 250 years. The extensive application of dendrochronology to the site's multiple wells allowed the construction of a detailed chronological framework, which in turn made it possible to study settlement morphology and system, and changes in material culture, in great detail.

This renewed research involved the integration of data from the individual archaeological campaigns. This was already challenging, since, over the course of more than a decade of research, registration methods and standards had changed considerably. The most obvious difficulty was that plans, descriptions and databases could not be easily matched due to differences in file types and degree of registration detail. Nevertheless, this study succeeded in reconstructing the development of the settlement at the level of individual farmsteads and of the settlement as a whole, and in revealing changes in land cover throughout the settlement's history. Most importantly, both the structural and environmental evidence could be embedded in a robust and highly detailed chronological framework based on dendrochronological analyses (Figs 4–6). Together with the large scale of the overall archaeological operation this makes The Loop a valuable 'type-site' for studies of early medieval rural settlement in the region.

Figure 5. Bird's-eye view of the early medieval rural settlement of Sint-Denijs-Westrem – The Loop, around the middle of the 8th century. A large D-shaped ditch system and a palisade surround the farm, suggesting a change in the socio-economic status of its inhabitants.
(© Yannick De Smet, DL&H and Ghent University)

This first case study highlights some of the challenges in generating knowledge through development-led archaeology in Flanders. These are the direct result of the way in which Article 6 of the Valletta Convention has been operationalised in Flanders. This article states that the party responsible for the destruction of archaeological heritage should fund the necessary archaeological research. As discussed, in Flanders, it has been decided to transfer this cost to the developer alone and to create a free-market structure for archaeological research (De Clercq *et al.* 2012). Developers thus have no requirement or incentive to pay for more than just the legal minimum, i.e. to cover the research on their own development. Archaeological contractors accordingly need to compete to be cheaper and faster, since developers generally will appoint a contractor based on cost and proposed duration of the archaeological operation. From the archaeological point of view as well, there are no structural incentives to 'go the extra mile', because such will increase costs. There are legally defined minimum requirements for fieldwork, but these focus on fieldwork and less on post-excavation analysis and research. In addition, the law only requires a basic descriptive technical report to be submitted within two years of fieldwork completion. A 'race to the bottom' is the result, with the quality of archaeological data sadly as the victim.

Evergem–Kluizendok: illuminating an 'invisible' medieval landscape (LSOAP)

As a second useful example we can cite a large-scale archaeological trial-trenching campaign and excavation carried out between 2005 and 2007 prior to the construction of a new dock in the

Figure 6. Bird's-eye view of the early medieval rural settlement of Sint-Denijs-Westrem – The Loop, during the first half of the 9th century. The ditch system has disappeared and the settlement has returned to its previous 'material signature'.
(© Yannick De Smet, DL&H and Ghent University)

harbour area of Ghent. This research is known under the site name Evergem – Kluizendok. An area of *c.* 1,300,000 m² was evaluated, during which several clusters of mainly Roman-period archaeological features were recorded (Fig. 7). Based on the results of this campaign, an area of 150,000 m² was excavated (Laloo *et al.* 2009). Besides one Neolithic pit and one pit and two wells dating to the Iron Age, most of the features and structures belonged to a large Roman-period rural settlement, which was abandoned during the second half of the 3rd century AD. The next phase of human occupation on site dates to the 10th century and solely consists of *c.* 30 charcoal kilns.

Besides the study of the Roman settlement, the excavation allowed a reconstruction of changes in land use and resulting dynamics of woodland cover and composition across the late Roman to early and high medieval periods, i.e. when the site was not inhabited (Deforce *et al.* 2020). This was possible because, after abandonment, the former Roman wells only gradually silted up and, as such, acted as small sedimentary basins and ecological traps. A peaty layer was formed in several well infills, for which radiocarbon dating established formation during the 5th to 10th or even the 11th–12th centuries. The absence of cultural indicators in these upper fills (e.g. pottery, evident markers of plant cultivation) confirm that these accumulated naturally and across time after the abandonment of the Roman settlement.

Pollen analysis on samples from the well fills shows that woodland cover was at 40–60% during the Roman-period settlement phase (Deforce *et al.* 2020). After its abandonment, the importance

Figure 7. Aerial photograph of one part of the excavations at Evergem – Kluizendok. The earth heaps of the preceding trial-trenching campaign are clearly visible
(© UGent)

of woodland increased again, to *c.* 90% or higher, indicating a completely forested landscape. In the 10th century, however, the presence of charcoal kilns shows renewed human activity here and in the area. In the corresponding parts of the pollen diagrams, the share of woodland declined and the actual composition of this woodland changed: the proportions of late successional and shade-tolerant trees declined, while those of light-demanding trees increased. This indicates a more open woodland, which definitely can be related to the felling of trees for charcoal production. This extensive re-occupation of the site occurs within the context of the so-called 'Great Clearances' period of the 10th–12th centuries, which saw large-scale land conversions from forest to arable in the County, linked to population growth and urbanisation (Verhulst 1995).

These results accord with those of other investigations in north-western Europe, where woodland regeneration is observed at the end of the Roman period and during the Early Middle Ages. For northern Belgium, information on the evolution of the vegetation during this period had previously been largely lacking. The only regional study was historical (Verhulst 1995) and, as a result, could only offer a coarse chronology and no detailed information on changes in woodland composition during regeneration. The study of the Roman well infills at Evergem – Kluizendok thus importantly fills this gap. The high chronological resolution obtained via radiocarbon dating also shows the different successional stages of this spontaneous reforestation; in other words, direct, long-term and high-resolution evidence on landscape changes during the 1st millennium AD was obtained for a region where such environmental evidence is scarce. This achievement was made feasible through comprehensive sampling for environmental evidence during fieldwork, followed by the subsequent storage of these samples. Their publication was undertaken more than a decade after the conclusion of excavation activities, within an academic framework distinct from the development-led trajectory of archaeology.

Twenty-five years of linear projects in Flanders

In 1997–98, the construction of the vTn-natural gas pipeline, which stretches over almost 230 km across Flanders, was the first linear infrastructure project of this scale in the territory that saw the systematic integration of archaeological research (In 't Ven and De Clercq 2005). The positive outcomes of this effort significantly influenced subsequent decisions to implement archaeological monitoring on similar infrastructure projects, leading to the assessment of comparable projects as standard practice in Flanders.

Twenty-five years since the vTn-project, the excavation results from 21 LPs carried out have been inventoried, systematically compared, and analysed for the first time (Beke *et al.* 2024) (Fig. 1). Combined, these LPs cover a total distance of 720 km and they brought to light over 659 archaeological sites spanning from prehistory to the Second World War; of these, 165 (15% of the total) date to the medieval period. This figure is similar to that for both the Bronze and Iron Ages (16%) and the Roman period (18%), despite the fact that these chronological periods are either twice as long (Bronze and Iron Ages) or half as long (Roman). This suggests intrinsic differences in the nature and distribution of the archaeological record between these periods. Compared to the Roman era, for example, the Middle Ages here feature a more or less equal proportion of habitation sites (Roman: 31% vs medieval: 29%), but a much lower percentage of burial sites (28% vs 1%). In contrast, sites marked by field systems and resource extraction/artisanal production are more numerous during the medieval period (respectively, Roman: 14% vs medieval: 24% and Roman: 6% vs medieval: 14%) (Beke *et al.* 2024: 75/85).

Possible explanations for these discrepancies include a stable and overall longer-term occupation of medieval sites and different land-use patterns during the Middle Ages compared to earlier periods,

prompted especially through the emergence of towns and villages (i.e. concentrated settlement). Most of these are still inhabited today and, as such, they are generally avoided or far less impacted on by linear infrastructure works. The limited number of cemetery sites recognised can be explained in the same vein. Churchyard burial predominated after the 9th–10th centuries, with most of these located in currently inhabited villages that are avoided by LPs. The high proportion of off-site phenomena, on the other hand, links to the fact that the structure of the current landscape in Flanders was to a large degree created during the high and late medieval periods. In other words, 'marginal' areas which have been targeted by LPs were also 'marginal', off-site areas during the Middle Ages; it is there that we find field systems, resource extraction, artisanal/craft production, and forests and heathlands. One notable example is the high medieval clay extraction and pottery production attested on the *cuesta* of Oedelem-Zomergem, located between Bruges and Ghent (De Groote 2022).

Compared to earlier chronological periods, the medieval centuries feature a notable surge in the number of ditch systems that have been discovered during LPs. This confirms historical and open-area archaeological evidence indicating the expansion into and conversion of previously less-intensely occupied landscapes during the Middle Ages, and more generally of a growing importance of ditch systems to delineate plots and settlements (Deschepper 2022: 164–8, 276–8; Verbrugghe 2020: 149–51; Verhulst 1995). The cumulative data recovered show that this spatial expansion and reconversion did not occur at random. Specific economic activities, such as charcoal production, peat extraction and pottery production, were set or concentrated in different parts of the landscape, generally linked to the presence and availability of natural resources needed for these tasks. In relation to the previously mentioned example of pottery production on the *cuesta* Oedelem-Zomergem, this activity was present here because of the clay outcropping that is inherent to the *cuesta* landscape.

However, it should also be recognised that the nature of almost one-third of medieval sites found during LPs could not be determined, chiefly due to the relatively small width of the investigation trenches. More generally, the application of absolute dating methods proves to be essential in assigning features and structures secure medieval dates, as is especially true for early medieval features and structures, which were only recognised thanks to radiocarbon or dendrochronological dating. The previously discussed case study of The Loop is a perfect example of this.

Discussion: the importance of quality, knowledge and expertise

The advent of development-led archaeology in Flanders during the first two decades of the 21st century significantly expanded the number of archaeological operations carried out each year, generating a notable increase in data and many important resultant knowledge gains. Additionally, this emergence of development-led archaeology went together with that of a private archaeological industry: these companies now employ over 300 persons and are an integral part of the development and construction industries. The introduction of the 2016 legislation especially led to a significant boom of the sector, that has since settled down. One of the most important effects of this quantitative growth and maturation of archaeology as a self-reliant economic sector is that opportunities for public outreach have grown significantly. Consequently, the societal impact of archaeology has grown exponentially. For example, the region-wide, multi-day archaeological event *De Archeologiedagen* (Archaeology Days), organised yearly since 2018, now draws over 31,000 visitors (Archeologiedagen 2024).

While these developments are highly important, several problems remain, of which only a number can be discussed here. The first, exemplified by all three case studies, is that while development-led archaeology in Flanders brings to light often rich and multiple archaeological data, there is no automatic or rapid conversion of this evidence into new scientific insights. This essential aspect of

archaeology is unfortunately not structurally embedded into the current legislation. In 2018, the Flemish Government created a yearly project grant to allow for in-depth archaeological research, with a maximum subsidy of €200,000 per project (agentschap Onroerend Erfgoed 2024b). While these grants have the potential to be a valuable tool for this conversion of data into knowledge, the budget available only allows to fund six to eight projects per year. This is certainly not enough to keep up with the amount of data that has been generated over the past two and more decades and continues to be created every year. Although academic research serves as an alternative avenue for knowledge generation, several challenges impede the systematic accumulation and dissemination of knowledge within academia. In the context of this paper, a major barrier is that there exists no structural infrastructure for data- and knowledge-transfer between academia and development-led archaeology, so that the former are more or less condemned to play catch-up in terms of data, while the latter cannot benefit fully from the latest scientific insights.

As noted, the competitive nature of the current free-market organisation of development-led archaeology in Flanders puts pressure on individual archaeologists and contractors to be as time- and cost-efficient as possible, which endangers quality of research and leaves little room for training, knowledge production and outreach. Especially in such a system, expansive, structured and consistent quality control is essential; and while there is a *Code of Goede Praktijk* (Guide of Good Practice) that sets minimum requirements (as required by the Valleta Convention, Article 3), in practice quality control falls short.

In Flanders, this quality control has been delegated to Flanders Heritage Agency. In 2019, legislation changed so that assessment reports were no longer evaluated individually based on their intrinsic reasoning, but on whether or not they conform to the *Code van Goede Praktijk* (Ribbens and De Groote 2020: 15–16). This favours a 'check-list approach' to archaeological assessment. Furthermore, only a selection of assessment reports is evaluated; most are tacitly accepted (Ribbens and De Groote 2020: 18; Ameels and Geuens 2022: 13). Fieldwork practices and technical reports are equally not sufficiently or structurally good enough when held up to the quality standards set. These aspects of development-led archaeology are, within the current legislation, intrinsically tied to licence status: they are the sole responsibility of the licensed archaeologist. Receiving a licence depends on a small number of 'flat' criteria: having a minimum of one year of field experience over the last ten years, and having the necessary infrastructure to temporarily store archaeological finds after fieldwork. For a company/institution to be licensed, the experience criterion differs slightly, whereby they have to employ at least one person with three years of fieldwork experience. Archaeologists wanting to be licensed also need to follow basic training on the *Code van Goede Praktijk* and to keep their licence they have to follow at least one training every two years (agentschap Onroerend Erfgoed 2024c).

Since 2019, formal evaluation of this licence consists of an audit of the licence-criteria, the training-criteria and of research quality (Ribbens and De Groote 2020: 14; agentschap Onroerend Erfgoed 2024c). In practice, this involves the evaluation of assessment reports and excavation reports, and fieldwork visits by Agency personnel. When quality deficits are observed, informal procedures are preferred as a reaction (De Groote and Ribbens 2021: 24–26), such as coaching through feedback sessions or sending a notice of misconduct.[3] If no adjustments are made, a formal evaluation is started. After several infractions and/or no adjustments made after recurring feedback, archaeologists can temporarily or permanently lose their licence. Table 1 shows the occurrence of these different quality control measures per year, as reported by Flanders Heritage Agency, in relation to the amount of licensed type 1 archaeologists and the number of

[3] These notices ask the offender to cease and correct the infringement, and to not repeat it in the future.

Table 1. Figures on quality control measures in the Flemish archaeological sector, as carried out by Flanders Heritage Agency, in relation to the total number of licensed type 1 archaeologists and the number of fieldwork operations started, 2019–2022.
(After Ameels and Geuens 2022; De Groote and Ribbens 2021; De Ketelaere and Geuens 2023; Ribbens and De Groote 2022)

	Formally evaluated licensed archaeologists	Licensed type 1 archaeologists	Feedback sessions with licensed archaeologists	Notices of misconduct	Feedback on fieldwork	Fieldwork operations started
2019	0	229	21	9	Not yet monitored	1247
2020	0	248	0 (< Covid-19)	11	Not yet monitored	1294
2021	2	274	2	5	96	1315
2022	0	282	0	1	Not communicated	1144

archaeological operations started.[4] These figures, together with the fact that only a selection of reports is evaluated, show that effectively there is no quality control of archaeological operations and reports in Flanders.

A final problem to highlight is that the current licence criteria do not give credit to expertise, whether it be regional, chronological or with regard to material culture. This is arguably very problematic since such expertise is essential throughout archaeological practice to ensure quality, depth and rigour. When such is absent, inevitably mistakes will be made and opportunities missed. Given the destructive nature of archaeology as a science, this is unacceptable.

Conclusion

Development-led archaeology in Flanders is at a crossroads: although known site numbers, landscape coverage and data quantities have all risen significantly, upholding data quality is being hindered by competitive market dynamics that induce serious time and budget constraints, the *de facto* absence of quality control and a neglect of expertise.

Prioritising stricter quality control and recognising and valuing expertise at both individual and contractor levels are realistic as well as essential starting-points to a solution to these challenges. These measures would (partially) mitigate competitive pressures, as the playing-field would be

[4] In addition to these quality control measures, every year a number of formal charges are booked. These primarily relate to excavation without permit or contrary to the *Code van Goede Praktijk*. There is no information on the total number of these charges.

levelled; in turn, this would allow resources to be invested in fieldwork, research, analysis, training, knowledge transfer and public outreach. Another important aspect would be the implementation of structural opportunities for knowledge transfer between academia, the private archaeological sector and other stakeholders. This would lead to mutual reinforcement and would further enhance collaboration.

These measures could all be embedded within the current legislative framework, but will naturally require efforts from all stakeholders. Waiting for policy changes is one option, but it might be more productive to adopt a proactive, bottom-up approach. Drawing from the successful establishment of public outreach in Flemish archaeology, where bottom-up work by diverse stakeholders led to institutional change and a widespread recognition of the importance of public outreach (Danniau *et al.* 2020), similar initiatives should be undertaken to elevate the importance of quality, expertise and knowledge transfer. Furthermore, positive signals are coming from Flanders Heritage Agency: for example, currently, the chronological chapters (e.g. those for the Roman period, early medieval period, etc.) of the *Onderzoeksbalans Archeologie* (Archaeological State of the Art for Flanders) are being updated, with a focus on formulating research questions for development-led archaeology. Importantly, this reflects a (renewed) recognition within policy and management structures of the value of question-driven research.

In conclusion, development-led archaeology in Flanders has greatly enhanced our understanding of many periods of rural settlement, including medieval, by greatly expanding the numbers of known sites and by shedding light on landscapes that were previously poorly known. For example, we can now trace the emergence of enclosed farms during the 8th century and their predominance from the 10th century onwards, the expansion of rural occupation throughout the early medieval period, but especially from the 10th century onwards, and the connected decline of the 'natural' landscape, and we start to gain insight into the processes of village formation that equally started in the late 9th–10th centuries. However, the current legislative and free-market contexts that structure development-led archaeology also generate diverse problems. In our opinion, solutions to fix this should start with stricter quality control, proper recognition of archaeological expertise and structural opportunities for knowledge transfer. The archaeological sector should not rely on future policy changes, but should take proactive steps to implement these measures. The evolution of public outreach within Flemish archaeology, achieved through bottom-up approaches, serves as clear evidence that change is feasible through grassroots efforts.

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The impact of infrastructure archaeology on knowledge and understanding of medieval rural settlement in Bulgaria, with case studies from Vidin region

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Introduction: the legal framework for development-led archaeology in Bulgaria

Bulgaria, like so many countries, has experienced many infrastructure projects over the last 25 years, particularly since EU accession, including many transport and pipeline infrastructure developments, as well as a range of other large programmes (Vagalinski 2019; Kecheva 2018). These projects have impacted many archaeological sites. Investigation of any archaeological remains likely to be impacted by development (including infrastructure) has been required since 1989, based as in most European states on the principles of the Valletta Convention (*European Convention on the Protection of the Archaeological Heritage (Revised). Valletta, 16.1.1992. European Treaty Se*ries – No. 143 1992) which Bulgaria ratified in 1993 (*Европейска конвенция за опазване на археологическото наследство (нова редакция). Издадена от Министерството на културата. Обнародвана в ДВ. бр. 70 от 10 Август 2004 г.* 2004). To date, by far the greatest number of infrastructure-led investigations have been in southern Bulgaria where the economy and population are most concentrated, while fewer have been in northern Bulgaria (although this area sees more research-led archaeology) and fewest occurred in the Black Sea region (Vagalinski 2019, fig. 2).

Bulgaria is currently one of the few European states that does not currently allow private/commercial companies to conduct archaeological investigations required by this framework (Vagalinski 2017; Gurova 2018, 107). This has not always been the case: in the period immediately after 1989 organisations from the private sector were allowed to carry out archaeological investigations (Cholakov and Chukalev 2009, 716; Cholakov and Chukalev 2011, 89–90), although the state was the main source of funding for infrastructure-led archaeology (Cholakov and Chukalev 2009, 716). Problems developed, however, when over-runs of costs or time led contractors to renege on agreed requirements, or to limit support for post-excavation work. Some sites were even deliberately destroyed in order to save on the costs of excavation, especially those which could be publicly presented as holding up the development of much-needed new infrastructure in the economically difficult early post-communist years. High-profile *causes célèbres* included a late Roman villa settlement at Arnautito (sited along the Trakia Highway running from Sofia to the Black Sea) where in 2003 the planned excavations had to be halved in scale (Vagalinksi and Raycheva 2021).

In 2009, the *Cultural Heritage Act*, reinforced by a 2011 Decree (Vagalinksi and Raycheva 2021) placed management of the 'polluter pays' process of mitigating the impact of proposed development on archaeological remains under the centralised control of the National Archaeological Institute and Museum (NAIM) at the Bulgarian Academy of Sciences (BAS) in Sofia (Kecheva 2018; Vagalinski 2017). The 2009 Act enshrined four key principles (Vagalinski 2019). First, that archaeological sites revealed in, and objects originating from, the territory and the territorial waters of the Republic of Bulgaria are public state property. Second, the resources needed for rescue fieldwork should be provided by the contracting authority providing investment for the initiative. Third, any projects where data indicate the presence of archaeological sites must carry out preliminary archaeological investigations to determine whether these sites will be affected or damaged, and must conduct rescue excavations

on any sites confirmed during these investigations, prior to the start of construction works. Fourth, the commissioned archaeologists should monitor construction works once underway and if any hitherto unidentified archaeological sites are uncovered the construction work shall be stopped and archaeological investigation carried out (Vagalinski 2019, 1–2).

The workflow for this process (Vagalinski 2017) is for an assessment of potential environmental impact to include cultural and archaeological heritage using data from the national archaeological information system – *Archaeological Map of Bulgaria* (Kecheva 2018) – as well as legacy data, grey (unpublished) literature, remote-sensing imagery, and information held by regional and local museums. This assessment will include recommendations for further actions. This is followed by partial investigation (usually 10%) of the full extent of any identified sites with an option of full archaeological excavation of a defined area where merited; this is typically required for 'visible above ground' archaeological sites, such as burial mounds. Areas of artefact scatters lacking known features are monitored during construction (Kecheva 2018). NAIM-BAS requires annual reports to be provided on all archaeological field activities (whether carried out as research or in advance of development); it then checks field documentation and will archive all records (Vagilinski 2018, fig. 1). New discoveries are presented annually in an exhibition intended to ensure transparency (Vagilinski 2018, 34–5) and added to the *Archaeological Map of Bulgaria* (Kecheva 2018) in order to inform future desk-based assessments.

Permits for any archaeological fieldwork (led by development or research) are issued by the Bulgarian Minister of Culture, on the recommendation NAIM-BAS's Director in their capacity as the head of the Council of Field Archaeology. All archaeological surveys and excavations must be conducted by professional archaeologists, licensed by NAIM-BAS and listed in their register. Private archaeological organisations are now prohibited from carrying out archaeological investigations, with all archaeological investigation (whether led by research or development) conducted by state institutions, such as museums, universities or staff from NAIM-BAS (Vagalinksi and Raycheva 2021). Proposals for archaeological investigation are not subject to competitive tender since the results are considered of public benefit, with costs instead calculated using a 'price list' for archaeological research – a system intended to provide transparency, ensure public support and guarantee adequate funding (Vagalinski 2018, 34).

Major infrastructure programmes under this system have included the Nabucco gas pipeline project in 2011 (covering 30 km² of Bulgarian territory), which involved six teams and a total of 36 archaeologists; the South Stream gas pipeline project in 2012 and 2013; and a number of transport infrastructure (such as highways and railroads of national importance) projects between 2014 and 2017 (Kecheva 2018). In the five years between 2011 and 2016, more than 170 km² were covered by such programmes, leading to identification of more than 500 archaeological sites with precise data collected in the field, detailed reports compiled and standardised data added to the noted 'Archaeological Map of Bulgaria' archaeological information system (Kecheva 2018).

Infrastructure archaeology and the investigation of rural medieval settlement sites in Bulgaria

Notwithstanding Antoniy Tankov's 2017 survey of archaeological sites and historical buildings in the Shiroka Planina in southern Bulgaria, which included 17 villages (Tankov 2017), medieval rural settlement sites do not feature strongly in published archaeological surveys and reports. Few are included at all in the *Bulgarian e-Journal of Archaeology* (Българско е-Списание за Археология), let alone in relation to infrastructure-led development. Before the 2009 Act, urban and related suburban sites were considered to be worst-affected by controversies arising from archaeological development

requirements, but this was ascribed to their high visibility, located as they were in areas of higher population (Vagalinksi and Raycheva 2021), rather than because rural sites fared better. In the years since 2009, 'regular' (i.e. non-rescue, mostly research-led) excavations on medieval sites in North Bulgaria (Vagalinski 2019, fig. 8) have been driven by long-established interest in historic Bulgarian capitals such as Pliska (Filzwieser *et al.* 2019); these of course focus essentially on urban, not rural, settlement.

A 2011 review of *Archaeology in Bulgaria 2007–09* (Cholakov and Chukalev 2011) shows that 254 medieval sites (early and late) were excavated between 2006 and 2010, making this the second-most common period to be investigated. Nonetheless this figure is considerably lower than the 612 investigated sites dating to the antique/classical period (Cholakov and Chukalev 2011, 84). For both periods, settlements (ranging from villages to farms) were by far the most frequent type of site excavated (Cholakov and Chukalev 2011, fig. 5). Sites of medieval date were mostly investigated by archaeologists specializing in this period, but these have attracted little international research interest; while archaeologists from Greece, Poland, the Czech Republic, Germany, France, Great Britain and Japan have worked on prehistoric and classical sites, no foreign teams have been involved with medieval (or post-medieval) sites (Cholakov and Chukalev 2011, 87).

The 2011 review included summaries of 18 of the 750 or so sites investigated in 2007–09 (Cholakov and Chaukalev 2011), including some investigated in advance of major infrastructure projects. Most of the excavations reviewed in 2011 were research excavations rather than development-led, and most were of Thracian or classical date (understandable, perhaps, given the wealth of these burial complexes). Medieval sites relating to rural settlement include traces of 9th-century settlement near the village of Izvorovo, which overlay an early Byzantine fortress tentatively identified as the late Roman documented site of Castra Rubra, Harmanli municipality (Cholakov and Chaukalev 2011, 725–6). Here, the published summary highlighted a medieval pottery assemblage that was interpreted as evidence that several ethnic groups had been present within the settlement established after the demise of Castra Rubra, and contributed to discussions about the transition between the antique period and the medieval in southern Bulgaria. Another medieval settlement site, located near the modern-day village of Zlatar, 10 km east of the medieval Bulgarian capital Great Preslav, proved to be a metalworking centre dating to the early 10th century (ibid., 729–30). Near the modern town of Nessebar, rescue excavations focused primarily on cemeteries of Classical (5th–4th centuries BC), Hellenistic (4th–2nd centuries BC) and medieval (8th–14th centuries AD) periods, and also recorded more than 20 other archaeological structures, identified as medieval pits, workshops and ovens that appear to relate to rural settlement (ibid., 734). In the Karaach Teke area near Varna, long-term excavations exposed nearly the entire plan of a 310 m^2 medieval monastery considered to be 'a missionary outpost actively involved in the conversion of the local population to Christianity' (ibid., 736–7); however, investigation of this complex does not appear to have extended to looking for any nearby settlements where this 'local population' might have lived and worked.

Case studies of medieval rural settlements impacted by infrastructure developments

The above summary hints at the *potential* of infrastructure archaeology to advance knowledge and understanding of medieval rural settlement in Bulgaria, but also shows how limited this impact has mostly been. Presented here are three recent case studies in which archaeological investigation in advance of infrastructure development has identified and excavated new material in the Vidin region in north-west Bulgaria, which can add much to current knowledge of early to late medieval rural landscape and populations.

Early medieval settlement and late medieval cemetery at Gramada

One of the most significant recent infrastructure projects affecting archaeology in Bulgaria has been the Bulgartransgaz gas pipeline connecting Azerbaijan to Central Europe. Also known as Turkish Stream, this major part of Europe's gas transmission network passes through Bulgaria, Serbia and Hungary, with its longest section on Bulgarian territory, running for more than 500 km from the border with Turkey, northwards to the Provadia region and then westwards (along the former route of the so-called South Stream) to the Serbian border at Vrashka Chuka, in Vidin region. In effect, this pipeline, built in 2018–20, slices through all of northern Bulgaria. En route, the Bulgartransgaz construction works have identified and impacted more than 100 archaeological sites and have provided a unique chance to study a range of diverse sites and habitats, to document those previously unidentified, and to promote and initiate new interdisciplinary research and archaeological excavations.

Within the Vidin region, 17 sites were surveyed during rescue excavations along the Turkish Stream route (Popov 2020). Gramada is the largest of these and comprises a multi-period site in the Gladnika locality *c.* 30 km from Vidin, with remains from prehistory, the Thracian period, Antiquity and the Middle Ages (Dimitrov *et al.* 2020a, 44–60). The apparent reason why this particular location was continuously (or repeatedly) inhabited is the presence of a permanent water spring which is the only source of water in this micro-region. Archaeological investigations were conducted by a large team supervised by Zdravko Dimitrov and Stefan Alexandrov from NAIM-BAS over an area of over 100 acres in fields near the modern town of Gramada. Seven months of fieldwork were conducted by the NAIM-BAS team and the Regional Museum of History-Vidin, as per a contract with Bulgartransgaz EAD. The site was designated as site No. 13/1012.

Pre-medieval activity at Gramada included late Neolithic settlement, dated by radiocarbon analysis to 5500–5350 BC. This extended along the entire length of the investigated area, but most structures had been destroyed by occupation of later date. Features of middle Bronze Age date included dwellings with traces of floor plaster, mortar and heating installations, dated by pottery and radiocarbon analysis to the 19th–18th centuries BC (Alexandrov *et al.* 2020, 894–9; Dimitrov *et al.* 2020a, 44–60). A late Bronze Age Thracian urned cremation cemetery, dating to the 14th–12th centuries BC (Dimitrov *et al.* 2020b, 24–6), is thought to have been associated with a settlement in the central part of the site, largely destroyed by Roman and medieval constructions. One pit of early Iron Age date (11th–10th centuries BC) was found on the same site. However, the most substantial pre-medieval remains were those of a large *villa rustica* complex dated to the 3rd–4th centuries AD: excavated features included two whole stone buildings, a small wall possibly relating to a third building, remains of a fenced boundary, refuse pits and a cemetery with 32 cremation burials and 10 inhumations.

For the medieval period, the archaeological investigations revealed an early medieval rural site which included a number of features interpreted as dwellings and dated by associated pottery to the 9th–10th centuries AD (the period of the First Bulgarian State) (Dimitrov *et al.* 2020a, 44–60). These appeared to belong to a settlement located around the spring. In its eastern sector lay one badly damaged stone structure, whereas the western sector contained a well-preserved, semi-sunken structure (Fig. 1). Remains of another sunken-featured structure (medieval dwelling No. 2) were found in the southern part of the site, although this had been damaged by ploughing in the 20th century which, had truncated the sub-surface remains and scattered several stone blocks previously located in the north-west corner.

The form of these insubstantial early medieval sunken-featured structures (Fig. 2) is very interesting: square in plan and about 80 cm deep, they possessed above-ground-level walls of a light wattle-

Figure 1. Whole preserved semi-dugout medieval dwelling structure No. 2 from 9th–10th centuries in the western sector of Gramada site (sq. B 71).

and-daub construction plastered with earth and river clay. No evidence was recovered for any roof structure, suggesting that either the roofs were constructed of thatch or similar organic materials or, possibly, that the structures were not roofed. Evidence for the interior layout of these dwellings is important. Floors were made of rammed earth, and the west end of dwelling No. 2 a pile of rough stone blocks (Fig. 3) appeared to represent a makeshift hearth used for heating and cooking. There were no other features in the interior, although a limited range of artefacts recovered within the structure included quern-stones for grinding wheat and some pottery fragments. It is not clear for how long these house structures were active, but they may have been quite short-lived, perhaps lasting for as little as a generation or so.

Relatively little research has been carried out into medieval rural settlements anywhere in the Bulgarian Danubian Plain, especially for the early medieval period. After the end of the Late Antique period (i.e. the very end of the 6th century), invading Avars destroyed the well-structured

Figure 2. Cross-sections and interior of the well-preserved medieval semi-dugout (sunken-featured) dwelling No. 2 at Gramada.

Figure 3. Detail of the hearth in the well-preserved medieval semi-dugout (sunken-featured) dwelling No. 2 at Gramada, constructed using rough stones and chromel quernstones.

and organised Romanised communities along the Danubian Limes and the nature of the resultant rural landscape is challenging to find. Consequently, the 9th–10th-century houses at Gramada constitute highly interesting new data about the form of rural settlement in this period in north-western Bulgaria. That said, it remains difficult to ascertain whether this compact complex of sunken-featured structures belonged to Slavic tribes that settled in the Danubian Plain during the

Figure 4. Aerial view of Christian necropolis at Gramada dating to the late 14th–early 15th centuries.

First Bulgarian State (late 7th–early 11th century) or to other ethnic groups, not least because no contemporary cemetery associated with the early medieval settlement was traced along the course of the gas pipeline system.

Although no cemetery contemporary with the early medieval settlement was found at Gramada, investigation within the pipeline easement did reveal a Christian cemetery dating to the late 14th–early 15th centuries. In terms of area and number of features (Fig. 4), this constituted the most significant medieval discovery at Gramada. The cemetery lay in the central sector of the site, almost entirely overlying the Roman *villa rustica*: all of the graves were dug into this layer and some even cut through the Roman walls. This cemetery dates to the late period of the Second Bulgarian Kingdom – namely the period of the Vidin Kingdom ruled by Tsar Ivan Sracimir (1371–96) – but with some of the graves possibly extending into the early 15th century. Although not fully explored, it appears likely that this cemetery extends beyond the area within the pipeline easement, which was the only area that could be investigated under the terms of the Bulgartransgaz infrastructure development.

Nonetheless, 140 graves were uncovered. The burial ritual in all the excavated graves is unmistakably Christian: all individuals were supine, extended with legs straight, with the head oriented to the west and the feet to the east. The graves are arranged in relatively straight rows, mostly between 1–1.5 m apart. Thus, it is evident that this late medieval cemetery had a planned layout and use. The lifespan of the settlement that this cemetery served must have been at least 3–4 decades, if not longer, based on evidence from coin finds, stratigraphy and the extension of the cemetery down the slope south-east from the spring.

All of the grave structures are in simple burial pits (Fig. 5), but dug deep into the ground, indicating that careful attention was paid to the burial process. The grave construction is generally uniform, with the deep cuts sometimes cutting not only into the Roman layer, but even reaching the Thracian layer. They had a distinct elongated, rectangular shape and mostly lack any other features; only rarely were stones or bricks from Roman buildings found in the cuts, some of which might have been incorporated in the grave fills by chance rather than deliberately. No traces of coverings were found over the burial pits.

Figure 5. Grave structure in simple burial pits at Gramada (Grave 74).

The cemetery contained individuals of all ages from children to older adults. Some of the graves contained more than one individual: most often these are women with children. These raise the possibility that there might have been an epidemic or other great cataclysm (such as famine or raid/military attack) in which several individuals died simultaneously. Of interest are also several graves of pregnant women. The most common artefacts found in the graves are silver ornaments (earrings and prependilia) (Fig. 6) and silver coins (aspers and dinars), which include coins of the Bulgarian Tsar Ivan Sracimir (1356–96) and the Wallachian voivodes Vladislav I (1364–77), Vlaicu Voda, his brother Radu I (1377–83), and Radu's son Dan I (1383–86) (Figs 7 and 8). Both numismatic finds and the characteristic silver ornaments allow the necropolis to be closely dated to the last years of the Vidin Kingdom.

The finding of many coins of the Wallachian voivodes in the Vidin region provides useful insights into the course of historical events in the region. From 1365 to 1369, Vidin (Bdin) was under the rule of the Hungarian monarchs (Lajos I) and Tsar Ivan Sracimir was in captivity in the land of present-day Croatia. After 1369, with the help of his Wallachian allies, Tsar Ivan Alexander of Tarnovo (1331–71), the father of Ivan Sracimir, liberated Vidin and reinstated Sracimir to the throne. Hence, the large number of coins post-dating this restoration in the graves of the people buried in the Gramada cemetery not only dates the Gramada cemetery to the 1370s onwards (quite likely extending into the early years of the 15th century), but also indicates that they traded with the central city of Vidin in the period after 1369.

The infrastructure-led excavations along the Bulgartransgaz pipeline have produced a huge amount of new archaeological data, which is especially important in a region that has been rather poorly studied. From the perspective of medieval rural settlement studies, the early medieval settlement semi-sunken-featured buildings dating to the 9th to 10th centuries at Gramada represent the first finding of a rural settlement of this date and type in the region and shows how short-lived these could be and how ephemeral their remains are. For the late medieval period, Gramada is the first large, rich cemetery in the territory of the Vidin Kingdom to be studied archaeologically and has thrown light on the historical and cultural context of rural communities in this area in the 14th and 15th centuries, providing evidence for the trading links of rural communities in this area at this

Figure 6. Grave-goods from the late medieval cemetery at Gramada, including silver coins (aspers and dinars, Bulgarian king Ioan Sratsimir (1356–96) and Vallachian voyvodas) and ornaments (earrings and prependilia).

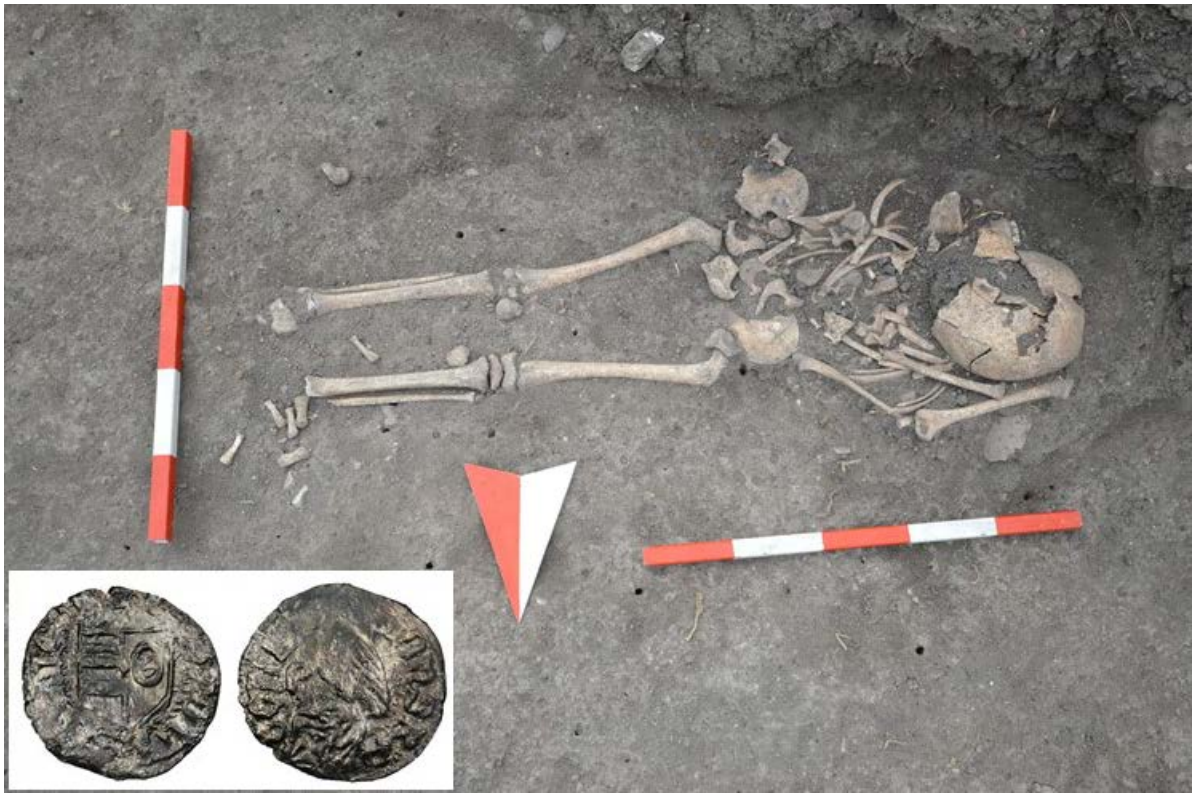

Figure 7. Grave 115 (Gramada) with a coin of Vallachian ruler Radu I (1377–1383).

Figure 8. The centre of the cemetery at Gramada, showing graves 22 and 31–35.

time. If the dates of the cemetery are indicative of the lifespan of the as-yet-undiscovered settlement where the deceased had lived, then Gramada shows that some later medieval rural settlements, like their earlier medieval predecessors, existed for little more than a century or so.

A medieval and post-medieval rural settlement at Vrashka Chuka

One of the few medieval rural settlement excavations to be published in a dedicated paper was discovered in 2019 by a NAIM team led by Elena Vasileva near Vrashka Chuka (Fig. 9) in the Vidin region during construction of the Balkan Stream gas pipeline (Vasileva 2023). Site 1/1000 was a multi-period complex spanning the Bronze Age, early Iron Age, Roman and medieval periods. Medieval discoveries included a small number of unstratified finds of 13th- to 14th-century date suggesting a nearby settlement of that date (ibid., 204), as well as a much larger number of finds and several features which provided clear evidence of settlement dating to the Ottoman period (15th–17th centuries). Two dwellings, partially defined by limestone blocks and natural rock outcrops were excavated, along with two metallurgical furnaces containing iron slag and numerous pits. The best-preserved dwelling measured 7.3 m by 3.8 m, but both dwellings were sufficiently insubstantial to be interpreted as temporary or seasonal units. A very large number of metal objects were nonetheless recovered, including an impressive range of items of personal adornment including rings, earrings and ear pendants, pendants, pierced coins and belt fittings, made using complex techniques including filigree and granulation (ibid., 202).

Although recognising that only a small area was excavated, the archaeological evidence, combined with limited historical records, suggested that a settlement, possibly quite small, was present in the 13th–14th centuries, which grew in the 15th century to become more intensively populated (perhaps large enough to constitute a village) in the 16th century. The large number of 15th- to 17th-century artefacts recovered suggest a well-connected settlement, possibly due to its position

Figure 9. Aerial photograph of Site No. 1 near Vrashka chuka. *(© Miroslav Anchev)*

near a road to the border zone and/or its role as a production centre (Vasileva 2023, 212). Factors in its subsequent abandonment included population migration or site destruction by the Kardschalis during the rebellion of Osman Pazvantoğlu in the late 17th century (ibid., 207). After this, finds of coins and tokens suggested the location may have continued to be used on a seasonal basis associated with a local fair, until this moved in the early 20th century to the town of Kula (Adlje), 13 km away from Vrashka Chuka (ibid., 205).

A late medieval rural settlement near the village of Turnyane

In 2020–21, a previously unknown rural settlement of late medieval date (Fig. 10) located about 300 m east of the village of Turnyane in the Vidin region (Site Number 7) was identified, recorded and investigated in connection with the construction of the I-1 road (E-79) (Vasileva *et al*. 2020; 2021). The archaeological investigations were directed by Dr Elena Vasileva and carried out by archaeologists and archaeology students from the National Institute and Museum of Archaeology in Sofia, Sofia University, Veliko Tarnovo University, experts from the National Institute of Morphology, Pathology and Anthropology, and the National Museum of Natural History in Sofia.

Geomagnetic survey carried out in 2020 along 172 parallel profiles covering a total length of 30,450 m and an area of 30 acres identified 47 features. More were found in the following year during excavation, with a total of 351 features investigated altogether, including 85 cut features identified as pits, 25 cut features identified as dwellings, 11 thermal structures (identified as kilns and hearths) and three surface structures (identified as dwellings). These derived from a complex that included

Figure 10. Aerial photograph of Site No. 7 near the village of Turnyane. *(© Velislav Bonev)*

cremation cemeteries of early and middle Bronze Age date, a small area of settlement of late Iron Age date, a larger area of settlement of 14th- to 17th-century-AD date and a large inhumation cemetery with finds dating to the 15th–17th centuries AD.

Features of late medieval date included sunken-featured and above-ground dwellings, ovens, hearths and pits. The sunken-featured dwellings were cut a sizable 2.5–3 m deep below the contemporary ground level with irregular oval, rectangular and square shapes, averaging 7 m wide by 8 m long. Where hearths were present, these were open, and usually located in the central part of the dwelling. Construction pits for wooden supports were found both in the central areas and along the walls of the structures and were up to 80 cm deep. In some of these sunken-featured dwellings, two ground levels were found, made of either rammed earth or clay screed. This is indicated by the numerous pieces of floor plaster found. One unit (structure 69) was interpreted as an outbuilding or industrial building, indicated by multiple finds of iron agricultural tools, ceramic bread-baking vessels (bowls), etc. Other finds from dwellings comprised numerous ceramic fragments, including imported majolica, animal bones, metal objects of daily life, coins and occasional bone finds.

The floors of three above-ground, clay-built buildings were identified, averaging 4.5 m by 5 m and represented by large, badly burnt patches of destruction including plaster, charcoal and ash. Walls were built using a post-and-beam construction style. Judging from the numerous burnt lumps of clay (plaster) with negative imprints of wooden structures, lath-and-plaster walls were constructed by interweaving poles with a diameter of 1 cm–3 cm between the vertically arranged posts. Heat-affected features were noted in two of the structures, with cereal seeds found in one of these. Finds

included iron objects related to domestic life, coins, pottery fragments (some severely deformed by secondary burning) and daub, as well as bones of large and small animals.

Of the kilns/ovens studied, two were used for firing pottery, with the remaining nine having domestic functions. These are dome-shaped, oval structures with a dome height of about 50 cm from the base of the plaster to the top. The ceramic kilns are dome-shaped, two-chamber buildings with circular pre-firing pits. The ceramic vessels were produced using clay extracted from pits studied at the site and were decorated with parallel incised lines and white engobe slip painting in a style dated to the early Ottoman period (15th century). Ceramic production in this period was similar across the region and unique vessel shapes are rare, so it is likely that the vessels produced on this site were for local use only rather than wider commercial activity. Ceramic production aimed to meet the needs of the local population, as did the raising of domestic animals and other agricultural activities.

Different types of pits were recognised, generally over 3 m deep and up to 2.5 m in diameter. These were used for storage, for refuse disposal, for 'cult' or ritual purposes, and for the extraction of clay for pottery production. The openings and bottoms of these pits are circular and almost uniform in diameter, their walls are concave and they are mainly spherical, pear-shaped or barrel-shaped. The animal bones (mostly articulated or in anatomical order) found in the so-called cult pits belong, according to osteological analysis, to large and small ruminants, pigs, dogs and birds. Eggs were found in some of the pits, which may be of cultic character since eggs were used in various rituals in the later Middle Ages (Vasileva and Vladova 2024).

Geomorphological and archaeometric analyses confirmed other pits were created from extracting clay, which was sandy with quartz impurities. Archaeometric study of vessels from the site is inconclusive, but shows that the ceramic material was fired at temperatures from 300°C to above 700°C. Most likely the maximum firing temperatures were below 600°C for medieval cooking and storage vessels, and above 700°C for the tableware vessels. Laboratory experiments with different types of hand-formed and wheel-thrown vessels are underway, and will be subjected to non-rametroscopic examination.

Many finds recovered from the settlement (of which more than 1,500 were inventoried) included coins, arrowheads, tools (including chisels, awls, scrapers and knives), weights, fragments of copper vessels, pottery, jewellery, belt fittings, pectoral crosses, medallions and fibulae. Documentary analysis connects the excavated settlement to the place recorded in the Ottoman registers and maps of 1530 under the name Tiryani, located in the kaza Vidin, which was established near Tarnyane in the 15th century on land that had not been occupied since the Iron Age.

A large cemetery was present in the north-eastern part of the site, with two graves set outside the cemetery boundaries. In total, 141 graves were identified, all inhumations and Christian in character, aligned in a west–east direction. Grave cuts were of rectangular or trapezoidal shape, with the deceased supine with lower limbs extended and upper limbs in a range of positions. Radiocarbon analysis of human osteological samples provided dates ranging from 1470/80 to 1637/39 AD, which is consistent with the material found in the other structures examined and allows us to infer that the cemetery was directly associated with the settlement. Interestingly, one building (Structure 92) was identified within the cemetery area, although its function and the reasons for its presence in this area are not entirely understood. The settlement represented by Site Number 7 must have had a church, but no evidence for this was found in the easement within which excavations could take place, with all identified structures being residential in nature. Most likely, the church was located outside the boundaries of the road under construction, since the medieval necropolis also extends beyond these boundaries.

Figure 11. Three unattributed images of standing buildings which may give an indication of the appearance of 'dugout' sunken-featured domestic medieval buildings excavated in Bulgaria.

In summary, the multi-period settlement excavated near Tarnyane in advance of road construction provided extremely valuable information on all recorded chronological periods, but is of particular importance for the Middle Ages because there are very few discovered and excavated settlements from this period in Bulgaria and little is known about their appearance and use (Fig. 11). The presence of clay suitable for vessel manufacture may explain the choice of location for the medieval settlement. Pottery manufacture here indicates the community was self-sufficient and possibly engaged in commercial production. The excavated settlement continued until the 17th century, which appears likely to be the date when the population relocated to the site of the present settlement of Tarnyane.

Discussion

Reviews in 2017 and 2019 by Lyudmil Vagalinski, Director of NAIM, noted the strengths and limitations of the current system overall in managing the threats to archaeological sites posed by infrastructure development in Bulgaria and exploiting their potential to advance knowledge (Vagalinski 2017; 2019). Strengths included the effectiveness of the pyramidal, centralised state-managed system for maintaining standards of both fieldwork and reporting, and in providing transparency with regard to public expenditure, including by fixing costs, maintaining national records and digital maps, and putting on annual exhibitions showcasing major discoveries. The creation of the digitised *Archaeological Map of Bulgaria* was considered to be a major achievement made possible by this centralised system (Kecheva 2018; 2024). However, it was observed that rescue excavations (i.e. including those in advance of infrastructure development) have been far more common in South Bulgaria than in the north (Vagalinski 2019: fig. 8a), which was not the case for regular (i.e. research/curiosity-led) excavations (Vagalinski 2019: fig. 8b); meanwhile the Black Sea region lagged well behind in both. There is thus a regional bias in the impact that infrastructure archaeology is having on understanding past landscapes and settlement, including those of the Middle Ages.

In reality, the greatest threat to archaeology in Bulgaria (especially Thracian and classical) now comes from illegal treasure hunting and looting, but there are other identified issues that are more pertinent to infrastructure archaeology. These include lack of funding, and discontent among large private and public investors regarding the requirement to pay for archaeological works, generating periodic attempts to change the system and reduce developers' obligations (Vagalinski 2019). Poor planning by developers can lead to archaeological work being commissioned relatively late within building schedules, increasing tension between developers and archaeologists and leading construction companies to attempt to blame archaeologists for delays (Vagalinski 2019). More optimistically, however, it seems that robust push-back including the effective use of media for public

engagement has reduced this problem. It is still considered that allowing private organisations to carry out archaeological excavations is highly undesirable, since this might not only lead to cost-cutting undermining standards, but also potentially provide a smokescreen for illicit activity by looters and treasure hunters (Vagalinski 2019).

In considering the impact on medieval rural settlement studies of infrastructure archaeology in Bulgaria, it is clear from the three case studies above that linear infrastructure projects have impacted a number of smaller rural settlements, mostly previously unknown, which have been encountered within the easements of linear works. On excavation, features within these rural sites have mostly proved to be insubstantial and so unlikely to be sufficiently well-preserved or visually impressive to merit mitigatory measures that would leave these remains preserved *in situ*. These sites are thus destroyed, either partially or in their entirety. While Bulgarian heritage legislation is effective in ensuring that any such remains are excavated and recorded before they are built over, they rarely feature in academic reports and scientific journals. It is not clear whether this is because few medieval rural settlement sites ever existed within infrastructure easements (which tend to avoid larger settlements, including those of known medieval origin); or because the insubstantial or poorly preserved archaeological features that characterise many of these settlements are missed during fieldwork; or because the sites that *are* identified and excavated are considered unworthy of dedicated papers, monographs or press releases. Whichever is the case, any of these reasons creates a feedback loop in which lack of knowledge of (or interest in) medieval rural settlement archaeology reduces the likelihood of medieval rural settlement remains being identified, understood and appreciated when they *are* encountered, as has been noted: 'At this stage of archaeological research in Bulgaria, a settlement of a similar character [i.e. rural settlement] and from this period [i.e. medieval] has not yet been investigated, so it is difficult to make a proper comparison' (Vasileva 2023: 212).

More positively, however, the three case studies presented above show very clearly that there is considerable potential for infrastructure archaeology to advance knowledge of medieval rural settlements in a number of ways. First, they show that infrastructure-led investigations *can* discover previously unknown medieval rural sites: infrastructure archaeology is making significant additions to the corpus of known medieval rural settlements. Second, it is also adding significantly to the number of such sites that have been subject to excavation. Third, careful excavation is developing archaeologists' knowledge of what these sites look like and their awareness of how insubstantial the remains of some medieval rural settlements may be. Fourth, each investigation opens up new questions, one example being the whereabouts of the larger, permanent settlement presumed to have existed somewhere in the vicinity of the seasonal settlement near Vrashka Chuka. Fifth, discoveries from infrastructure-led investigation pave the way for the development of new ideas about medieval rural landscape and settlement in Bulgaria, to help tackle questions such as the density, pattern and complexity of settlement in the medieval period, or how sites of different size, function and duration related to one another, to the landscape in which they existed, and to the historical events that affected them. This is particularly important in a country like Bulgaria, where the current level of knowledge of medieval rural archaeology is low and there has hitherto been little interest in this subject from researchers engaged in curiosity-led fieldwork, who (as noted above) are mostly interested in sites of earlier date or urban character. A synthesising overview of all the sites where archaeological evidence for medieval rural settlement has been encountered, which includes an assessment of our current state of understanding about the origins and development of rural settlement in the medieval period, would be transformative.

Conclusion

In conclusion, Bulgaria's cultural heritage legislation provides a comprehensive framework for protecting archaeological sites affected by infrastructure construction. The legal requirements for identification, excavation, recording and publication are well defined and the centralised system for managing this process is effective, albeit requiring effort to maintain in the face of conflicting interests. Infrastructure developments in Bulgaria have encountered a number of rural medieval sites, including settlements that were hitherto unknown (and thus unexpected) and associated cemeteries. The physical remains have in most cases been destroyed by the subsequent infrastructure works that led to their discovery, but archaeological excavation in advance of this has generated new knowledge that would otherwise not have been gained. This has added significantly to our understanding of a subject which, with occasional exceptions (e.g. Tankov 2017), has received little attention.

These infrastructure-led medieval rural settlement-related discoveries would have more impact if their results were more widely disseminated. Increasing public awareness of the links between abandoned rural settlement sites and the places which people inhabit today has potential to increase public support for archaeological investigation. Furthermore, increasing knowledge amongst archaeologists would help ensure medieval settlement remains encountered during archaeological fieldwork in the future (whether occasioned by development or research) would in turn fulfil their potential to advance knowledge of what should be recognised as an important element of this region's history: the evolution of rural settlements and their landscapes.

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Infrastructure archaeology and medieval rural settlements in Croatia

Andrej Janeš

Introduction

The volume of archaeological excavations which encompass settlement sites from the medieval to post-medieval periods in the territory of present-day Croatia has increased significantly in the past 20 years. Even though excavations of medieval sites have been conducted since the middle of the 19th century, those were mostly focused on churches and cemeteries, primarily in the territory of the medieval Croatian state (Petrinec 2009: 555–90). In the area of northern Croatia, investigations centred exclusively on early medieval cemeteries (Jarak 2006: 192–6; Janeš and Hirschler Marić 2019: 385). However, in the last two decades there have been some targeted sondage excavations of medieval settlements in the area of Podravina, yielding useful new information on the settlements dating to between the 6th to 14th centuries (Sekelj Ivančan 2010).

Changes in method, but mostly in the scope of archaeological research on medieval settlements in Croatia, were effected through the implementation of the European Convention on the Protection of the Archaeological Heritage ('Valletta Convention') following its ratification in 2004. Consequently, procedures for investors during construction works that encountered archaeological sites were determined. Although certain procedures had already been encompassed within the national legislation,[1] it was through the ratification of the Convention that archaeology became an active participant in the planning of infrastructure and construction works (Sirovica 2016: 248). Since the Convention came into force in 2005, there has been an increase in the number of rescue projects during and related to large-scale infrastructure works (primarily for motorways, expressways, bypasses, gas pipelines, oil pipelines, hydro-power plants, and windfarms).[2] As a result, large numbers of sites with settlement elements dating from the Middle Ages have been found and sampled through excavation, either on a partial or even a substantial level. Accordingly, research on medieval settlements in Croatia can be divided into two major periods: work prior to 2004/05 and studies since then.

It should also be stressed that the scale or depth of such research in the territory of present-day Croatia is dependent on different geographical characteristics, as well as on the development of the archaeological profession in each separate region. Thus, in northern and eastern Croatia in the period leading up to 2004, intermittent research, mainly consisting of trial excavations, included a total of 42

[1] *Act on the Protection and Preservation of Cultural Goods* (Official Gazette 69/99). Article 45, paragraph 1: 'If in the course of executing construction or any other works performed on the surface or below the surface, inland, in the water or at sea, an archaeological find or finds are discovered, the person executing the works is bound to stop the works and notify the competent authority of the find without any delay.' Article 46, paragraph 2: 'In the cases referred to in Article 45, paragraph 1 of this Act, the cost of archaeological excavation and research, and the cost of preventive conservation of movable archaeological finds, as well as the cost of conservation of the site are born by the investor.' The currently valid Act is based on the *Law on the Protection of Cultural Monuments* from 1965 (Official Gazette 32/1965 with additional amendments), which was the basic law for the protection of cultural heritage in socialist Yugoslavia. This law also prescribed the obligation to report archaeological finds and sites, the regulations for archaeological activities, as well as supervision over the said works. In addition, it included obligation for developers to finance an archaeological excavation in case the construction was taking place at a registered archaeological site, and also required cooperation between regional departments for the protection of cultural monuments and local planning and zoning departments (Sirovica 2016: 251).

[2] The regulations for conducting archaeological research are defined by the *Ordinance on Archaeological Research* (Official Gazette 30/05, amended in 2010, OG 102/2010).

sites with medieval settlement elements, comprising a combined area of 30,685 m² (Sekelj Ivančan 2021: 68). By contrast, there was an almost complete absence of investigations of medieval contexts in the coastal area of Croatia, particularly in Istria[3] and Dalmatia.[4] Crucially it was the implementation of the new regulations that has led to the increase in numbers of recorded and excavated medieval settlement sites, primarily due to rescue excavations on the routes of motorways and gas pipelines – the so-called 'linear infrastructure'. The number of sites with settlement elements dating from the Middle Ages that have been investigated since 2005 stands at 136, their total area measuring 2,782,050 m² (Sekelj Ivančan 2021: 68).[5] Besides these linear infrastructure findings, research has been undertaken on so-called non-linear infrastructure, such as at quarries, while in coastal regions excavations have occurred on agricultural land turned over to cultivation of vines and olives, i.e. Mediterranean agricultural crops.

This article presents examples of the types and range of archaeological research conducted during infrastructure projects in Croatia which have revealed traces of medieval rural settlements. The projects are divided into linear and non-linear types, depending on their purpose. Individual examples from different parts of the Middle Ages, from early to late, are offered, and some from the early modern period. In this way, we aim to demonstrate the significant impact infrastructure projects have had on the study and understanding of medieval settlements of diverse types in the territory.

The Legal Framework

Rescue archaeological investigations within present-day Croatia are conducted in accordance with the *Act on the Protection and Preservation of Cultural Heritage of the Republic of Croatia* (Official Gazette 145/2024). Pursuant to Article 35, paragraph 2, archaeological investigations are to be undertaken prior to construction works and any interventions prescribed by protective measures within archaeological zones, sites, and areas containing individual archaeological finds. In accordance with Article 40, paragraph 1, the financial responsibility for rescue archaeological investigations lies with the investor.

The implementation of archaeological investigations, as well as their adherence to professional standards and legal provisions, is overseen by the Conservation Departments of the Ministry of Culture and Media, which are territorially competent for specific counties (regional administrative units).

Archaeological excavations in Croatia may be conducted by both public institutions (such as museums and research institutes) and licensed private archaeological companies.[6] Investigations necessitated by large-scale infrastructure projects are typically funded through public resources, most often via public companies tasked with the execution of such projects. These resources are generally sourced from the national budget or secured through European Union funding mechanisms. Private investment is primarily limited to small-scale construction projects, such as residential buildings, or medium-scale developments including hotel construction or quarry expansions.

[3] A rare example of an excavation of a medieval settlement on the Istrian peninsula is that at the site Stari Gočan conducted by the Archaeological Museum of Istria in 1951–52 (Marušić 1958: 212).

[4] Excavation of an urban character settlement in Bribirska glavica forms one rare example of a systematic settlement excavation in Dalmatia. At the location Dol, along with the remains of a Franciscan monastery, several medieval houses were excavated (1968–77) (Gunjača 1968: 238; Zekan 1996: 20).

[5] Note that this is the total area of the explored sites, which are mostly multi-layered, with the data taken from preliminary reports in which the specific areas of medieval activity are not directly expressed (Sekelj Ivančan 2021: 70).

[6] Since the end of the Second World War, approximately 80 to 85 museums have been active in the territory of Croatia, including seven specialised archaeological museums. In addition, there are 20 conservation departments dedicated to the protection of cultural heritage, two public research institutes, three university departments of Archaeology, and around ten private archaeological companies.

Until 2010, the allocation and coordination of funding for major infrastructure-related archaeological investigations were managed by the Ministry of Culture, with the majority of fieldwork conducted by public institutions. Since 2010, a public procurement system has been established, enabling both public institutions and private companies to participate in competitive bidding for the implementation of archaeological research.

Projects on linear infrastructure: motorways and expressways

Since 2005, on the routes of planned motorways in northern and eastern Croatia a series of major construction works has taken place, accompanied by a great number of archaeological works. Perhaps the largest amount of archaeological data collected came during the construction of the A5 Beli Manastir – Osijek – Svilaj motorway (from the border with Hungary to the border with Bosnia and Herzegovina),[7] from 2005 to 2011, 2014/2015 and 2023 (Wiewegh and Kezunović 2006a: 8-9; 2006b: 47–8; Filipec *et al*. 2009; Balen 2009). As valuable and insightful were archaeological excavations along the route of the A11 Zagreb – Sisak motorway, from 2008 to 2010, and in 2022 (Burmaz and Vojnović 2009: 243–5; Vujnović and Burmaz 2010d: 273–7), as well as along sections of the D10 and D12[8] expressways in northern Croatia, from 2010 to 2013 (Vujnović and Burmaz 2010a: 167–8; 2010b: 231; 2010c: 231–3).[9] Each of these major projects revealed numerous sites with medieval settlement elements, enabling scope for a better understanding of the medieval landscape across the country. On the A5 motorway, work through eastern Slavonia alone saw a total of 36 sites with traces of previously unknown medieval settlements discovered and examined, which makes up over a quarter of the researched sites of this type (26%).[10] On the A11 motorway route, five medieval sites were sampled and three on the corridors of both the DC 10 and DC 12. This relative abundance of medieval settlement activity is evident when we take into account the fact that the percentage of such sites encountered in the A5 motorway project is almost matched by those traced in works on bypasses and gas pipeline routes in the territories of northern and eastern Croatia. Publications related to the medieval settlement sites are extremely heterogeneous, with the majority consisting of reports and preliminary reports, but with few sites and their assemblages completely scientifically analysed. According to the released statistics, around one-third of the sites have been comprehensively expertly and scientifically analysed (see Sekelj Ivančan 2021: 68) (Fig. 1).

Excavations on major infrastructure projects have encompassed settlement sites dating from the period of the Great Migrations and Early Middle Ages to the High and Late Middle Ages and post-medieval period (5th–17th centuries). Given the rather restricted previous research, the evidence and finds gathered are exceptionally important since most of the explored sites have provided new information on the settlement distribution for the area between the Sava and Drava Rivers, on the layout and organization of these settlements, and on their material cultures and lifeways.

[7] The A5 motorway is a part of the European road route E73, i.e. a part of the Pan-European Corridor Vc (Budapest–Sarajevo–Ploče).

[8] Originally planned as the A12 and A13 motorways, following the Sv. Helena–Vrbovec–Križevci–Koprivnica–Gola border crossing and Vrbovec–Bjelovar–Virovitica–Terezino polje border crossing routes respectively (both arms leading towards Hungary).

[9] It should be stated that there is a history of rescue archaeological excavations on planned motorway routes in Croatian archaeology even before 2005. In 1949, curators from the Archaeological Museum in Zagreb conducted a rescue excavations at Gradina near Mrsunjski lug during construction works on the Zagreb–Beograd motorway (Vinski and Vinski Gasparini 1950). The first rescue excavation on a motorway route in the period after Croatia gained independence, during which the remains of a medieval settlement were discovered, was carried out by the Conservation department from Zagreb at the site Zbelava–Pod lipom on the A4 Zagreb–Goričan (Bekić 2014: 199–210).

[10] The data come from the latest preliminary report on archaeological excavations of medieval settlements in northern Croatia (Sekelj Ivančan 2021: 67–134).

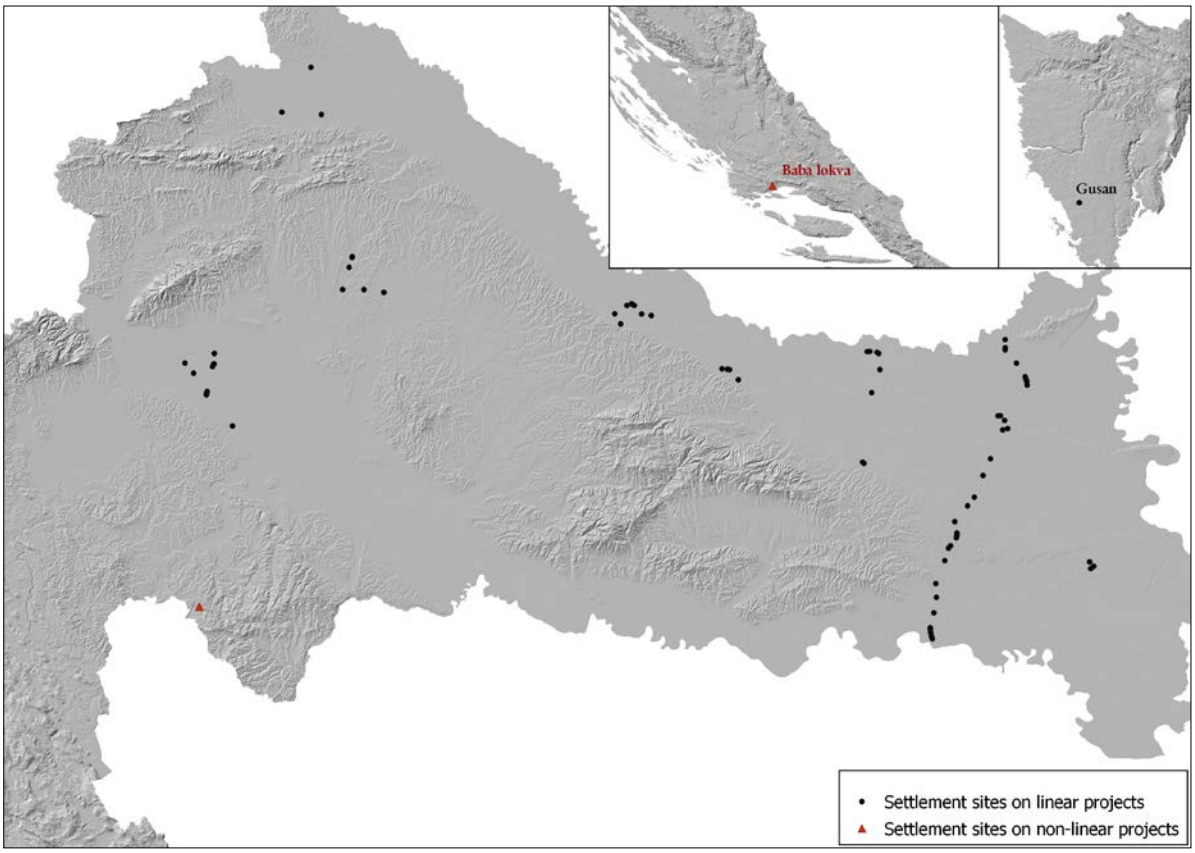

Figure 1. Map of medieval/post-medieval settlements in Croatia researched as part of infrastructure works. *(Map by A. Janeš)*

For example, excavation at the site of Kaznica – Rutak on the A5 motorway route (section Sredanci – Đakovo)[11] uncovered the remains of a medieval settlement, including traces of three houses, one temporary dwelling and 30 pits. The three houses belong to a type of sunken-featured structure, with a regular square layout, a built-oven in a corner and posts to support the roof structure. Researchers noticed that the structures were arranged in pairs, two houses were set close to one another, as well as a house and a temporary structure. These were situated around a fairly large, but empty space in which pits with waste/debris, mostly pottery, were found. The excavation report's authors identify this as a typical open-type Slavic settlement dating to the 8th and 9th centuries based on the ceramic evidence (Šmalcelj Novaković and Hršak 2017: 131–65); however, such sites are rare in Croatia and this adds important new information for the Late Avar Period in the former territory of southern Pannonia.

On the route of the same motorway (section Đakovo – Osijek), part of a high-medieval, open-type settlement was excavated at Josipovac Punitovački – Veliko polje (Fig. 2), marked by a total of 14 pits, which were arranged into four groups consisting of either two or three pits. Groups of pits were set between 40 m and 44 m apart, and they appear to represent residential and working structures (Janeš 2009: 235–6, 239). In those pits or sunken areas interpreted as relating to residential units, remains of fireplaces were found. Stake-holes in one indicate that the dwelling was of a semi-sunken, tent-like type. Presumably, the structures were not dramatically larger than the excavated pit areas which suggests the need for more facilities and work spaces beyond the houses in order to meet the inhabitants' needs. Other structures seem to have been used for food preparation (Janeš and

[11] The rescue excavation was conducted by the Museum of Đakovština, from autumn 2005 until spring 2006 (Šmalcelj Novaković and Hršak 2017: 131).

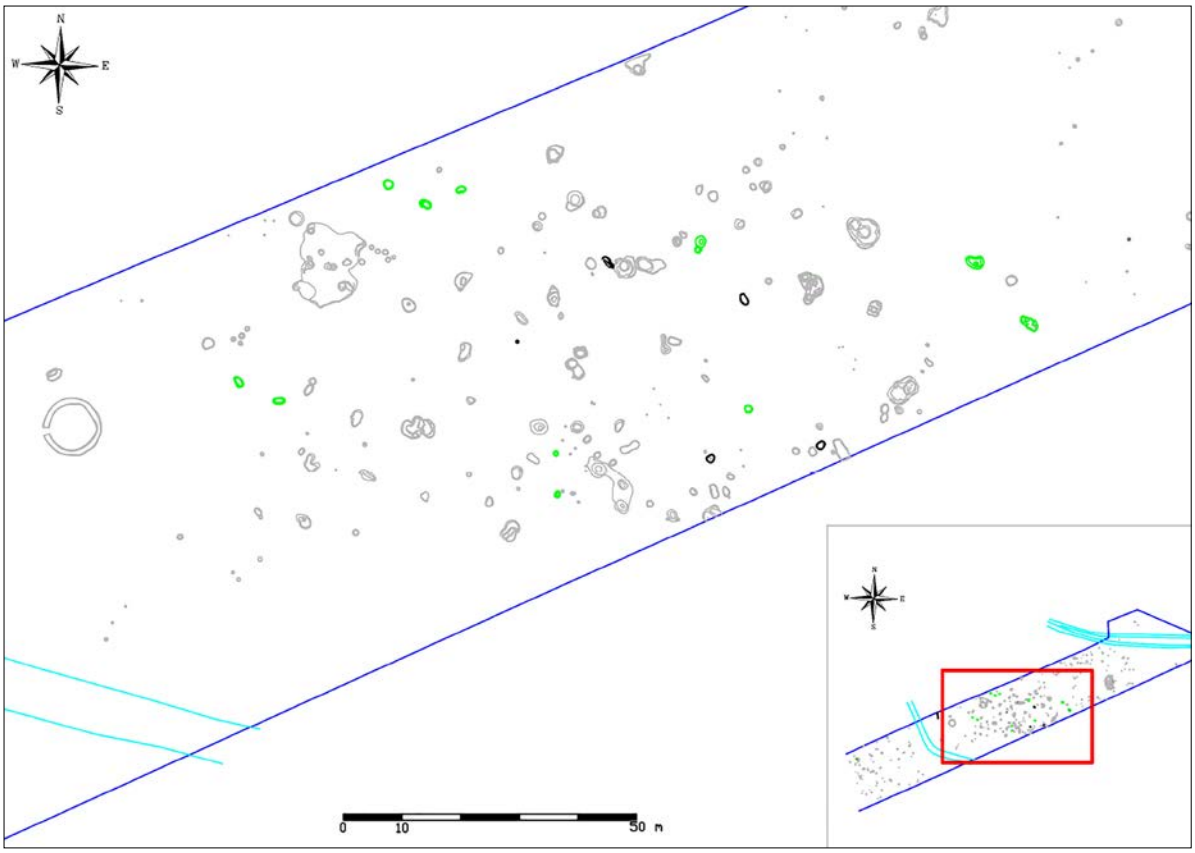

Figure 2. High-medieval settlement features at Josipovac Punitovački – Veliko polje I site.
(After Janeš and Hirschler Marić 2019: 386, Fig. 2)

Hirschler Marić 2019: 386). Based on the finds, the site belongs to the 10th–12th centuries, although a few structures also persisted into the 13th century (Janeš 2009: 239). Sites with structures and pits organised in a similar fashion, scattered in smaller groups set around 40 m apart, were investigated in the zone and shown to relate also to the High Middle Ages, and to the same type of open and dispersed settlements (Janeš and Hirschler Marić 2019: 390); in some cases, they seem to have been habitats of short duration (Bunčić 2012: 207). They can be ascribed to the *Einzelhofsiedlung* type of settlement, wherein dispersed groups of structures were used for dwelling and for farming, presumably belonging to one (extended) family. Some remains, however, likely relate to temporary habitats or working sites (Janeš and Hirschler Marić 2019: 392).

Excavations of large areas have also traced a good number of settlements which are attributed to the Late Middle Ages (14th to early 16th centuries), and which appear structurally different to those from the previous period in being more compact and showing a greater degree of arrangement of structures (both houses and stores) into clusters. A lower degree of spatial organisation has been observed in settlements of similar date identified in eastern Slavonia compared to those within Hungary and Czechia, whereas greater spatial organisation can be observed in (some) villages established during the 15th century and lasting into the post-medieval period. Also recognised is a change in the housing format, with sunken and semi-sunken dwellings being replaced by above-ground units constructed using various techniques, such as the log-house (*Blockbau*) and the wooden-frame technique (*Fachwerkbau*) (Janeš and Hirschler Marić 2019: 392).

The settlement at Stari Perkovci – Sela, situated on a mild elevation 500 m away from a stream, offers a good example of a late medieval site excavated during the A5 motorway project (Fig. 3). Its structures

Figure 3. Late medieval settlement of Stari Perkovci – Sela.
(After Janeš et al. 2017: 339, Fig. 2)

Figure 4. 3D reconstruction drawing of a late medieval house from Stari Perkovci – Sela, in Slavonija, Croatia. *(© Marin Mađerić).*

stretched across two low hills, with a floodplain between them. The investigations determined the presence of 20 separate units, which can be interpreted as structures (both houses and stores), 21 wells and 65 hearths and fireplaces (Janeš *et al.* 2017: 343). The 20 units were classified into five types. Type 1 comprised single-roomed, semi-sunken structures with no traces of post-holes. Type 2 were multi-spaced, semi-sunken structures consisting of one or more pits near the post-holes supporting the roof structure. Type 3 was formed by multi-roomed, above-ground structures with a cellar and a surrounding plot (Fig. 4). These represent the most complex building form at the site since they feature several pits: the deepest pit, with vertical walls and steps on one side, represents the cellar. Otherwise, several rows of posts existed which either carried the roof structure or formed a fence around the house. The majority of the defined units, however, belong to Type 4, an above-ground building with a cellar, marked by posts that supported the roof structure and pits or cuttings with level floors which functioned as cellars. Type 5 is characterised by structures consisting of a few posts, which probably represent enclosures used as garden plots or cattle/animal pens. The Stari Perkovci village can be seen as being established in the first half of the 14th century, as part of the Angevin colonization, but already abandoned at the start of the 15th century (Janeš *et al.* 2017: 344–5). The by-then failed village is mentioned in *The Register of the Požega Sancak* from 1579, as is the *mezra* (temporary settlement, abandoned village or agricultural area) named Gašparovica, located nearby (Sršan 2001: 209).

Several similar settlements were also excavated on the projected A5 motorway route. All were established towards the end of the 13th or during the 14th century, but abandoned in the first half of the 16th century owing to the Ottoman invasion, such as Beketinci – Bentež (Minichreiter

and Marković 2013: 216–18) and Stari Perkovci – Debela šuma (Filipec and Šiša-Vivek 2007: 70). Furthermore, traces were investigated of settlements founded during the 15th century and abandoned at the end of the 17th century, such as Josipovac – Selište (Filipec and Karneluti 2009: 30) and Josipovac – Verušed (Filipec *et al.* 2009: 33).

In north-western Croatia, in the region of Turopolje, during works for the A11 motorway a medieval village settlement was excavated at Velika Gorica – Šepkovčica, part of which was situated by a stream. Dating from the 9th century to the first half of the 13th, work revealed that structures of the 11th and 12th centuries were composed of a large pit or sunken area framed by four or six post-holes and an area defined by holes alone. One zone comprised a large area lined with posts and divided into smaller rectangular areas within, presumed to represent above-ground structures with raised floors (Bugar 2008: 181–2). The second phase of occupation belongs to the 13th to 15th centuries and is characterised by a greater concentration of post-built structures (Bugar 2008: 192; Antonić 2019: 381), which confirms the prevalent late medieval trend of above-ground houses, stables and storehouses with pits, hearths and wells (Antonić 2019: 381–4). A T-shaped ditch, which was interpreted as a place for herding cattle, was also investigated (ibid: 385).

A wealthier household, detached from the centre of a rural community, excavated on the route of the DC10 expressway, belongs to a rare type of settlement. This was a landed property measuring 50 m by 60 m, situated in the southern part of a present-day village at Buzadovec – Vojvodice. It consisted of a large residential structure (a longitudinal house with three rooms) with a cellar, a separate farm building and a cattle pen. No traces of wooden posts were found related to the house, however, and its tripartite layout is presumed on the basis of the length of the cellar, which measures a full 20.99 m, while the surrounding accompanying structures were defined by lines of post-holes or elongated cuts. A working area consisting of several pits was traced in the northern part of the settlement. The site was occupied from the 13th to 15th centuries (Tkalčec 2013: 79, 85).

Projects on linear infrastructure: gas pipelines

Excavations on the routes of gas pipelines, water-supply systems or various other pipelines have yielded traces of settlements dating from different phases of the Middle Ages, although data and results from these are often far more modest owing to the scope of research, which has been determined by the very nature of the said infrastructure. Examples of such include a 10th- to 12th-century site at Donji Miholjac – Prinčevac (Višnjić 2013a: 31–2) and a presumed rural unit dated to the 17th century at Donji Miholjac – Farkaševci (Višnjić 2013b: 65–6), both represented by a single pit.

On the other hand, work on a gas pipeline route in Istria traced remains of a settlement dated to the 8th–10th centuries, relating to a fortified space 32 m long and 25 m wide, demarcated by a stone-built boundary wall 1.0–1.4 m thick; the site's interior was divided into smaller built units, with walls 50–60 cm thick, constructed in the drywall technique using larger and smaller flat stones, but with larger blocks in the foundations. A stone oven was found in one of the interior structures (Janko 2011: 399–401).

Projects on non-linear infrastructure

Rescue archaeological excavations have also been carried out on non-linear area infrastructure sites. Among these, work in the area of the exploitation field of the gravel quarry on the Brekinjova kosa hill near the village of Bojna in Banija stands out.[12] The archaeological site is situated on the

[12] The excavations in 2011 and 2015 were undertaken by a commercial archaeological company and from 2016 to 2021 by the Croatian Conservation Institute.

Figure 5. Defensive features of the early medieval settlement at Bojna – Brekinjova kosa.
(© J. Maslać, CCI Archive)

top of the hill, a western spur of Trgovska gora, and consists of two separate plateaus. Along with an excavated early medieval (7th- to 9th-century AD) cemetery, other features were uncovered, notably a massive cutting for the wooden palisade, which will have protected the contemporary compact settlement on the plateau on its southern and eastern sides (Krmpotić 2018: 318) (Fig. 5). Interestingly, the burials of the cemetery were inserted among apparent house structures (Krmpotić 2019: 324).

In clearance of land for planting olive trees in the hinterland of Trogir, in the north-western part of the Kaštela field/plain, remains of a dwelling belonging to the former hamlet of Baba were discovered. Excavations carried out in 2007 and 2008 uncovered the foundations of a rectangular structure built in drystone technique and measuring 30 m^2 (Burić 2008: 439–41; 2009: 527–9). The remains represent a common type of a single-room house, usually cut into the bedrock or soil. Its bottom part contained a fill consisting of small amorphous stones. It is presumed that it had a gable roof consisting of a wooden structure covered with straw or some such material, giving it a tent-like appearance (Burić *et al*. 2013: 6). Based on the finds, the dwelling was in use from the late 14th century until the beginning of the 17th century (Burić *et al.* 2013: 5). The results of this research are of great significance since very few rural (late) medieval settlements have previously been explored in the area of Dalmatia.

Conclusion

Prior to the application of the European Convention on the Protection of Archaeological Heritage, before 2004, the scope of research of the sites with medieval settlement elements in the territory of present-day Croatia was exceedingly small. The level of research was mostly influenced by interest within the archaeological profession itself, which, in terms of the Middle Ages, was primarily focused on the early medieval period, and above all excavation of cemeteries (Petrinec 2009: 560–1, 576–7), though in the area of Dalmatia religious buildings from the same period were also of interest. Such foci were determined by the ideas of the evolving Croatian national identity during the 19th century and the early 20th centuries (Bilogrivić 2014: 207–14). As the new Yugoslav State with a socialist system was established in 1945, so the archaeology of the Early Middle Ages took off, especially with regard to that of the Slavic migration, which was considered as pivotal in shaping the origins and past of the Yugoslav nations and was expressed in the idea of 'brotherhood and unity of Yugoslav nations and nationalities'. By contrast, the Middle Ages were viewed as being marked by a highly divergent development of individual entities and peoples which constituted the modern Yugoslav federation (Novaković 2021: 120–1).

Only following the implementation of the Convention after 2004 did both the number and the scope of rescue archaeological excavations increase, leading to a dramatic increase in the number of discovered and excavated sites with traces of medieval activity. Indeed, the increase was nearly a hundredfold, which was reflected in the large amount of data and finds collected during the excavations. This sector of archaeology is also showing a leap in quantity, just as with the rest of the profession (Novaković 2019: 9). For the first time in the history of Croatian archaeology, rescue work, most notably through infrastructure projects, saw large areas of medieval settlements being excavated, with sites spanning periods from the 6th until the 17th centuries, as well as remains of settlements which persisted into the early modern period.

However, a disparity in the number and scope of excavations caused by different regional characteristics can still be observed. Knowledge about the medieval settlements – whether villages, hamlets, farms or fortified sites – of northern and eastern Croatia has been immensely enriched by the large amount of data collected during rescue archaeological excavations, especially on the routes of various motorways. Highlights include the exploration, for the first time, of a Slavic settlement dating from the Late Avar period. Investigation of rural sites of the High Middle Ages, i.e. the period of integration into the medieval Hungarian Kingdom, have revealed characteristics of open settlements of the dispersed type which are known in the territory of inner Hungary and which, in Croatia, persist into the 13th century. A novel trend in settlement organisation known from Central Europe during the late 13th and early 14th centuries, the so-called compact type of settlements, was ascertained at the sites. Furthermore, patterns in the establishment of rural settlements during the 15th century have been recognised, even though the disappearance of some villages and farms can be traced from the beginning of the same century. Finally, of exceptional significance for the study of rural landscapes and exploitation, but also in terms of the historical development of the area between the Sava and Drava Rivers, is the recognition that various settlements persisted even after the Ottoman conquest and some continued until the end of the 17th century.

Noticeable is the contrast with the Adriatic area of Croatia, where infrastructure works have not encountered medieval sites to any large degree. Nevertheless, even the small number that have been sampled archaeologically has produced valuable results, such as better understanding of early medieval rural settlement in Istria, and of late medieval housing and households in the area of Dalmatia.

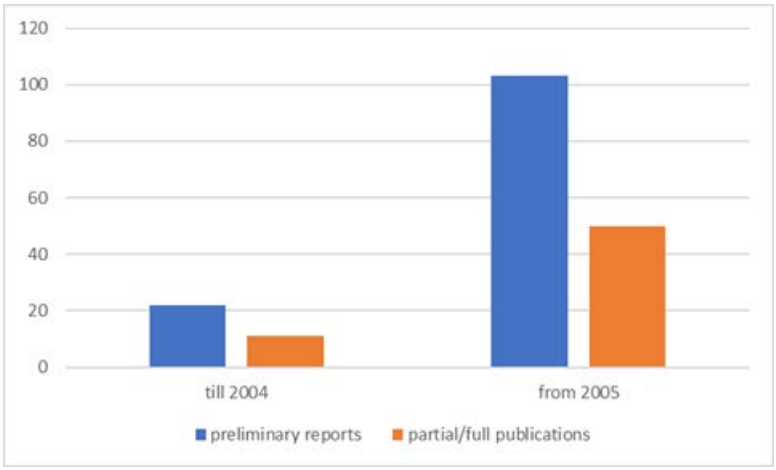

Figure 6. Published excavation of medieval settlements in continental Croatia.
(After Sekelj Ivančan 2021: 69, sl. 1)

The magnitude of some of the excavated areas explored within the infrastructure projects in particular is reflected in the abundance of data and finds generated. However, it must be noted that the post-excavation analyses of these and related site and finds publications are often well behind schedule. Of course, the amount of data and materials collected during rescue archaeology greatly exceeds those from systematic research-driven excavations and those carried out purely for scientific purposes (Novaković 2019: 16). This is quite noticeable in the field of medieval archaeology and rural settlement research. Without the results of rescue archaeological excavations on the routes of motorways and gas pipelines, our knowledge about the origin, development, appearance, functioning and disappearance of settlements in the territory of present-day Croatia would certainly be almost non-existent. However, such projects have created an imbalance due to the 'backlog' in analysing and processing the finds and site data and generating publications (both scientific/academic and for public consumption). This problem that Croatian archaeology is facing has already been noticed in other European countries. The data released so far for the area of northern (and eastern) Croatia show a radical difference in the numbers and total area of the sites excavated before and after the year 2004/05 (Fig. 6). However, when it comes to publications of the finds and sites mere preliminary texts prevail (expert/technical reports, short works or interims), while complete publications of sites, or even of individual finds, are very much still in the minority (Sekelj Ivančan 2021: 69, fig. 1).

The introduction of digital technologies, such as cameras, and various measurements taken with geodetic instruments, has led to the creation of substantial digital datasets. Although the actual process of documenting archaeological excavations has been sped up and made more precise, and the data have become better structured and standardised, there is a price to be paid in the later stages of archaeological work. To illustrate this phenomenon, it is enough to observe how many data have been collected and published. Clearly, if we wish to combat this 'data deluge' successfully, we not only need novel and quicker tools, but a lot more than that – new ways of examining data (Novaković 2019: 19; *n.b.* there are currently no GIS databases for medieval sites for Croatia). All this is particularly noticeable when it comes to the research of medieval rural settlements in the territory of present-day Croatia.

As summarised above, rescue archaeological excavations associated with large infrastructural projects have prompted a colossal breakthrough in the research of medieval rural settlements in the territory of Croatia, since, without them, our knowledge of the sites themselves, whether village or isolated farm, and our understanding of the processes of settlement formation and design and of

land-use across the territory during the Middle Ages would be extremely low and rudimentary, and it would in no small way depend on other related fields, chiefly history. There is a great discrepancy in the number of sites excavated in continental Croatia compared to the coastal regions caused by different patterns of settlement throughout history. The amount and quality of the data collected vary depending on the type of research, which, in the end, affects the level of professional/scientific publication. At the moment the greatest challenge for medieval rural settlement archaeology in Croatia is in presenting (and thus accessing) the analyses and publication of the finds and results; encouraging, facilitating and ensuring this publication and sharing of data would enable the creation of invaluable syntheses on the material remains of medieval rural settlements and their residents and workers.

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Infrastructure archaeology and research on inhabited rural settlements in the Czech Republic

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Research on inhabited villages in Bohemia and Moravia

Systematic research-driven study of medieval rural sites has been developing intensively in Bohemia and Moravia (the historic Czech Lands, part of former Czechoslovakia until 1991) since the 1960s. Traditional archaeological classification has focused on the one hand on early medieval settlements (late 6th–12th/13th centuries) and, on the other hand, on later medieval deserted villages (13th–15th centuries). While the archaeologically identified early medieval settlements are almost all located in the so-called classical settlement areas up to an altitude of 300–400 m, with overall settlement continuity evident since prehistory, the later deserted villages are usually set in uplands and highlands, which were only extensively settled as late as the 13th century. In contrast to excavated early medieval settlements that ordinarily have been traced archaeologically in agricultural land, most of the systematically studied later medieval villages can be found in woodland zones (forest succession usually followed the abandonment of late medieval rural settlements). An abandonment of the dispersed earlier medieval settlement pattern can be linked to the establishment of nucleated villages, that usually correlate with contemporary villages of long historic tradition. For most inhabited villages a long-term continuity since the High Middle Ages is assumed, since only a very small number of rural settlements were established in the post-medieval period, the exceptions being settlements on mountain ridges, which were usually occupied as late as in the 16th–17th centuries (Čapek and Holata 2017; Klápště 1991; 2012: 171–324; 2016: 15–40; Klápště and Smetánka 1996; Klír 2009; 2010; Mazáčková *et al.* 2016; Nekuda 1973; Smetánka 1974; Symonds and Vařeka 2016; Vařeka 2004, 229–267; 2018a, 13–15).

As elsewhere in Europe, research into the historic cores of currently occupied/inhabited villages has long been marginal to academic interest. Since the 1960s, opportunistic rescue archaeology has been carried out in several contemporary Bohemian and Moravian villages, the quantity and quality of which have depended on the possibility of recovering coherent information due to specific construction activities in rural environments and also on the interest of archaeologists in these sites. The first such research was performed in Struhy (District of Mladá Boleslav) in 1960, producing remarkable results, including the recovery of burnt debris relating to a post-medieval farm containing charred plant macrofossils (Nechvátal 1966). Numerous rescue excavations were organised on the outskirts of the city of Prague within historical villages which were then rapidly disappearing due to the modern development in the 1970s and 1980s (e.g. Huml 1982). In the same period, rescue archaeology was undertaken in villages in north-west Bohemia that were being demolished at an incredible rate due to unscrupulous open-cast brown coal mining (Klápště 1994a: 27–90). Nonetheless, in those decades, the identification of early rural architecture from the 15th/16th to early 17th centuries significantly changed our knowledge of rural sites in the territory of Bohemia, elevating awareness of potential survivals (Škabrada 1977; 1987; Škabrada and Smetánka 1974). Since then, any exploration of contemporary villages has to consider the potential for presence of preserved components of the historic built environment, from the end of the Middle Ages or the early modern period. The only systematically planned archaeological research carried out within an inhabited village has been that focused on the early medieval stronghold of Libice (District of Nymburk), that was succeeded by a later medieval rural settlement with long-term continuity to

the present day. Excavations of some sections of the historic core in the 1970s and 1980s produced interesting evidence for the medieval and post-medieval development of several structures (Justová 1985; 2002).

After the Velvet Revolution of 1989, vast social and economic transformations began to spark widespread construction activities and regeneration efforts that were primarily concentrated in urban areas, but gradually also expanded to the countryside (see the *Archaeological Map of the Czech Republic).*[1] The response to the growing need for rescue archaeology in rural areas was a proposed programme for archaeological study of present-day villages of medieval origin, which defined the theoretical and methodological framework and main research topics (Nováček and Vařeka 1996; 1997). The programme was based on research priorities identified by the results of development-led archaeology undertaken across the existing village of Libkovice (District of Most), which was completely demolished in the 1990s due to planned coal mining (see below). Since this work, numerous sites have demonstrated the high value of recovering archaeological data to help reconstruct the medieval and post-medieval rural settlement pattern from whole villages to individual farms and rural houses (Fröhlich 2017; Dohnal *et al.* 2001; Dohnal and Vařeka 1997; Kolařík, Merta and Peška 2015; Kypta *et al.* 2020; Meduna *et al.* 2001; Militký and Vařeka 1997; Musil 2017; 2020; Nováček 1997; Vařeka 2013; Vařeka *et al.* 2010). At the same time, the number of identified and documented rural houses and other buildings dated to the end of the 15th century to the 17th has increased significantly and, in some cases, both standing structures and sub-surface remains have been examined as components of complex archaeological and historic building recording projects (Anderle, Ježek and Zavřel 2000; Foud and Karel 1998; Kovář, Kypta and Šulc 2014; Krásný, Kypta and Šulc 2005; Kypta *et al.* 2008; 2020; Kypta and Šulc 2003; 2004; 2005; 2007; Kypta, Šulc and Veselý 2005; Syrová and Syrový 1992; Škabrada 2003; Šnejd and Hansová 2008).

A final area of contemporary archaeological study centres on villages that were abandoned after 1945 in the Sudetenland as the result of the displacement of Germans from Czechoslovakia (e.g. Bureš 2015; Vařeka *et al.* 2008). Recently, the European *Community Archaeology in Rural Environments* project gave scope in the Czech Republic to implement the approaches and methods of community archaeology, providing a unique international platform, and raising the possibility of comparing research results with other involved countries. An emphasis on sites threatened by (sometimes minor) planned construction activities within inhabited villages, which would otherwise not be reported to the authorised archaeological institutions, has shown the great potential for archaeologists to collaborate with local communities interested in the past of their own habitat. Examples include the community archaeology projects in Merboltice, Myslinka, Předhradí and Vanovice (see Lewis *et al.* 2020; 2021; 2022a; 2022b; Vařeka, Jansa, Netolický and Vařeková 2022; Vařeka, Mattová, Netolický and Preusz 2022).

Legislation and available datasets

Archaeological sites and portable artefacts in the Czech Republic are protected by the *State Heritage Protection Act* (20/1987 Coll.), as well as some other national legislation (e.g. *Construction Act* 283/2021, Section 266) and, of course, the Valletta Convention (ETS No. 143), which defines the principles for the protection and care of cultural heritage of archaeological character. The executive power embedded within the above frameworks for the protection of archaeological heritage is entrusted to the public authorities (municipalities, regional authorities and the Ministry of Culture of the Czech Republic), who are responsible for the performance of state monument care.

[1] https://digiarchiv.aiscr.cz/

Czech law states that archaeological excavations are authorised to be carried out by the Institute of Archaeology Czech Academy of Sciences (CAS). The two main Institute offices are in Prague and Brno, with informal territorial responsibility set for Bohemia and Moravia/Moravian Silesia respectively. Based on recommendations from the CAS, the Ministry of Culture then provides licences to public institutions such as universities or museums to conduct approved archaeological fieldwork, but also to private companies (non-profit organisations) that meet the required conditions. The Institute of Archaeology of the CAS also has a key role in regarding coordination of archaeological excavations, administration and development of information systems and responsibility for the archiving of excavation reports. Concerning infrastructure archaeology, the key policy is Section 22(2) of the *State Heritage Protection Act*, which states that developers are required to notify construction or other terrain intervention plans to the Institute of Archaeology of the CAS and to allow rescue archaeological research to be carried out in the affected area by a licensed organisation. It also stipulates that, if the necessity for rescue archaeological research arises in connection with a proposed development, its costs must be paid by the developer (for details, see Novák *et al.* 2021).

The main source of information on archaeological fieldwork events is the *Archaeological Map of the Czech Republic* (AMCR), created as part of the Archaeological Information System of the Czech Republic large research infrastructure (AIS CR).[2] The AMCR is used both for the notification of field projects and for disseminating their distribution to licensed organizations. It is also used to archive and make accessible the primary results of archaeological work (especially fieldwork reports), which are stored in a digital repository and made available through the AMCR Digital Archive application.[3] Data associated with excavations are organised within the AMCR on the basis of individual fieldwork project events, and their results presented as fieldwork event records with associated documentation. Finds recovered within fieldwork events are described as archaeological components (i.e. chronological, functional and spatially specific units identified during the course of the research). Within these components, the types of archaeological evidence used to define the component are also recorded.

For the purposes of this paper, the AMCR dataset was analysed using data exported as of 30 September 2021; this comprised a total of 136,291 fieldwork events recorded in the system. Based on the DMU 25 map (Base Map of the Czech Republic), a full 83,422 fieldwork events took place within 50 m of existing settlements. Subsequently, those fieldwork events that occur in settlements with a population of less than 5,000 were selected according to the ArcCR 500 data (a geographic database and data model for the Czech Republic). On this basis we can say that a minimum of 48,149 individual investigations have been carried out within villages to date. However, a large proportion of these (72%) can be recognised as excavations with negative results, i.e. ones without specific archaeological findings. Where archaeological events within villages do produce positive results, we can recognise a medieval component in 43% (5,865) of events, located in 2,047 individual cadastral areas (see Table 1 for a detailed overview). Of the total number of 13,091 cadastral areas in the Czech Republic, 11,202 belong to municipalities with fewer than 5,000 inhabitants; thus, we have archaeological evidence of medieval village settlement for at least 18% of the cadastral areas. However, with a few exceptions, these are located only in Bohemia (Fig. 1). The significant lack of evidence for Moravia and Silesia is probably mainly due to the lack of systematic data collection before 2010, but it may also result from different research and recording strategies on the part of the local archaeological units.

The data also show that archaeological research within village cores occurred mainly between 1980–2010, when the number of fieldwork events focused on rural environments was consistently in the

[2] https://www.aiscr.cz/
[3] https://digiarchiv.aiscr.cz/

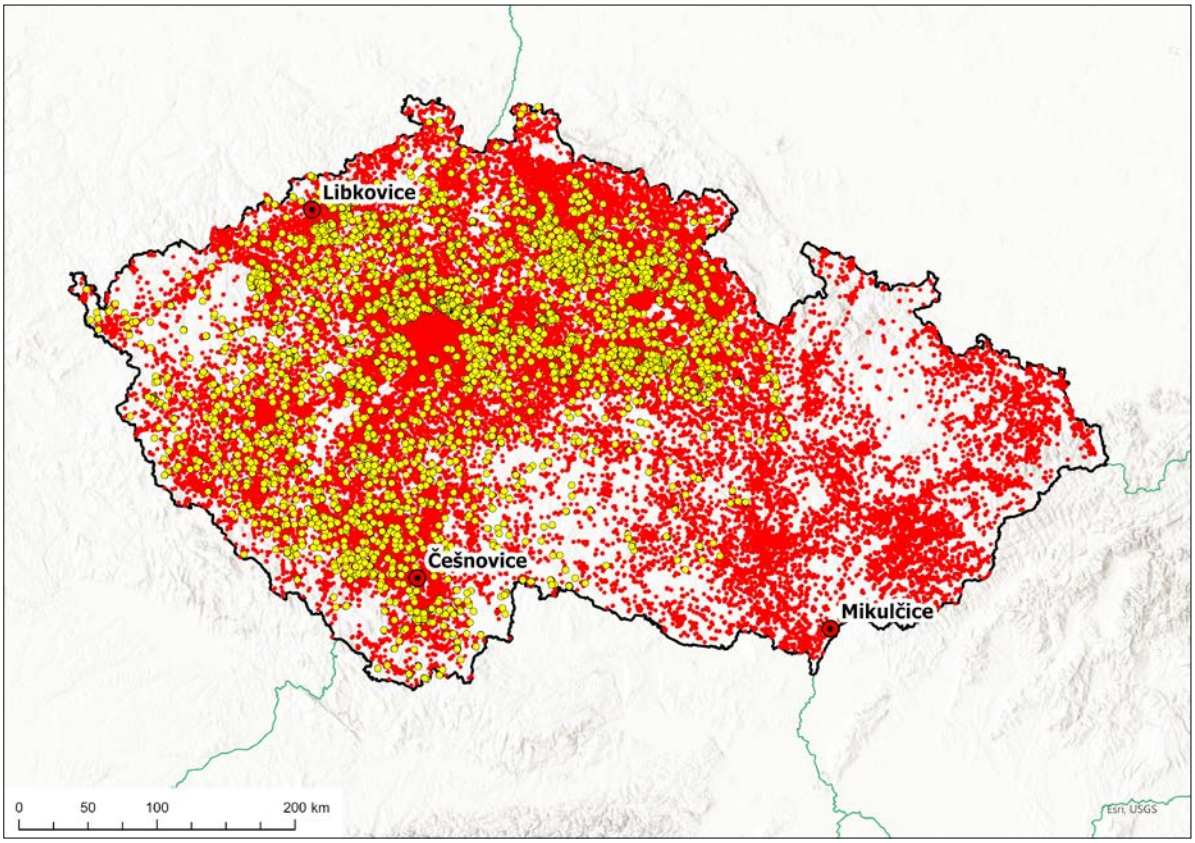

Figure 1. Spatial distribution of fieldwork events in the Czech Republic (in red), with records highlighted within 50 m of the built environment, in villages of fewer than 5,000 inhabitants, and with a documented medieval component (in yellow). Villages referred to in detail in the text: 1 – Libkovice, 2 – Česnovice, 3 - Mikulčice. *(Image by D. Novák)*

Table 1. Number of recorded fieldwork events and their outcomes. Percentages indicate the proportion of the previous logical parent category. Several components may be recorded within a fieldwork event. *(D. Novák)*

	All		Built environment		> 5,000 inhabitants	
Fieldwork events	136,291		83,422	61%	48,149	58%
Positive evidence	55,965	41%	25,316	30%	13,631	28%
Negative evidence	80,326	59%	58,106	70%	34,518	72%
Prehistory	29,486	53%	9,874	39%	5,907	43%
Early medieval	9,058	16%	4,560	18%	2,336	17%
Later medieval	13,539	24%	7,920	31%	4,143	30%
Modern	11,421	20%	8,140	32%	3,597	26%
Undated medieval to modern	5,444	10%	3,124	12%	1,588	12%
Completely undated	4,363	8%	1,532	6%	853	6%

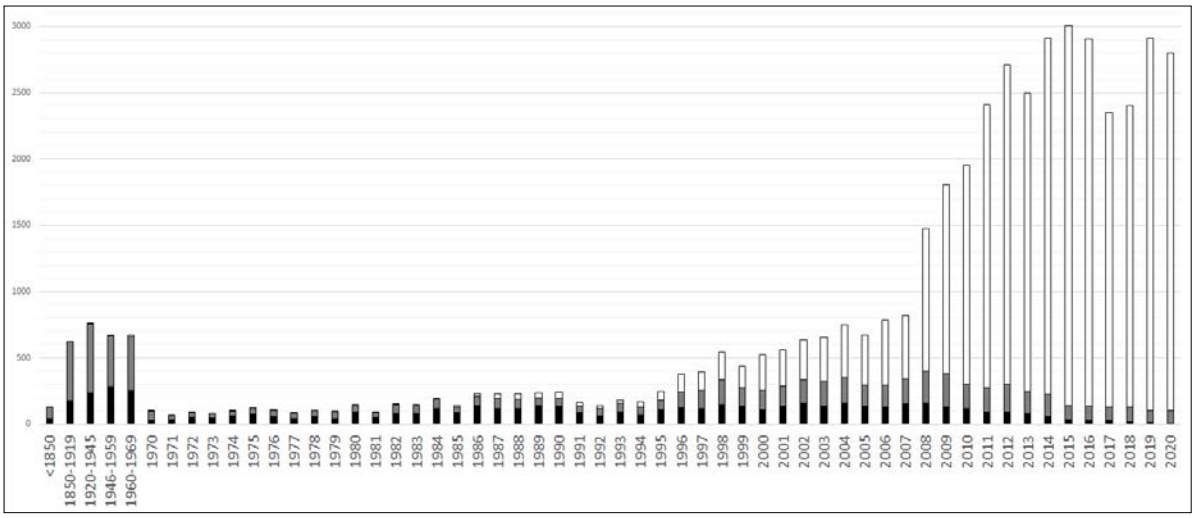

Figure 2. Number of fieldwork events within 50 m of built-up areas in municipalities with fewer than 5,000 inhabitants. White column = negative events; black column = events with a medieval component; grey column = other positive observations.
(Image by D. Novák)

range of 100–150 events per year (Fig. 2). The decrease in the last decade and more can be partly attributed to a delay in the recording of the events carried out (especially in the years 2015–2020), but is mainly due to the fact that both infrastructure and building works in the village cores have fundamentally decreased, with fieldwork presently more focused on their wider hinterland and buildings in undeveloped surroundings, where the results are most usually negative or components from other periods are instead revealed.

Selected Preliminary Results

As of early 2025, rescue excavations in more than 2,000 inhabited villages have produced evidence for medieval period occupation and activity; however, only a very small portion of these research activities have been fully processed and assessed and fewer than 30 have been published as case-studies. Nevertheless, available results so far indicate the rich potential of such research and highlight a range of questions to which the archaeological study of currently occupied villages might well provide answers.

The roots and formation process of the earliest phases of inhabited villages remain mostly unknown due to the limited size of rescue excavations undertaken. An exception is represented by the village of Libkovice in north-west Bohemia, where large-scale rescue work was triggered by open-cast coal mining (see below). At a growing number of sites, the archaeological data have helped to highlight complex developmental processes in the late medieval and post-medieval periods. Several archaeologically observed examples of transformed village plans offer a useful window, and a critical view, of the earliest cartographic evidence of the late 18th and early 19th centuries. These maps captured many village layouts which, it was assumed, fossilised much earlier settlement layouts. Archaeological evidence from such inhabited villages now suggests that retrospective analysis of these historic maps is required, with a need to compare depicted layouts against new material evidence (e.g. Dohnal and Vařeka 1997; Meduna *et al.* 2001; Musil 2020; Nováček 1997).

Significant changes in village structure may be directly associated with historical processes of the 15th and 17th centuries, although linking the archaeological record to specific historic events is not always possible. Nonetheless, material evidence relating to the turbulent events

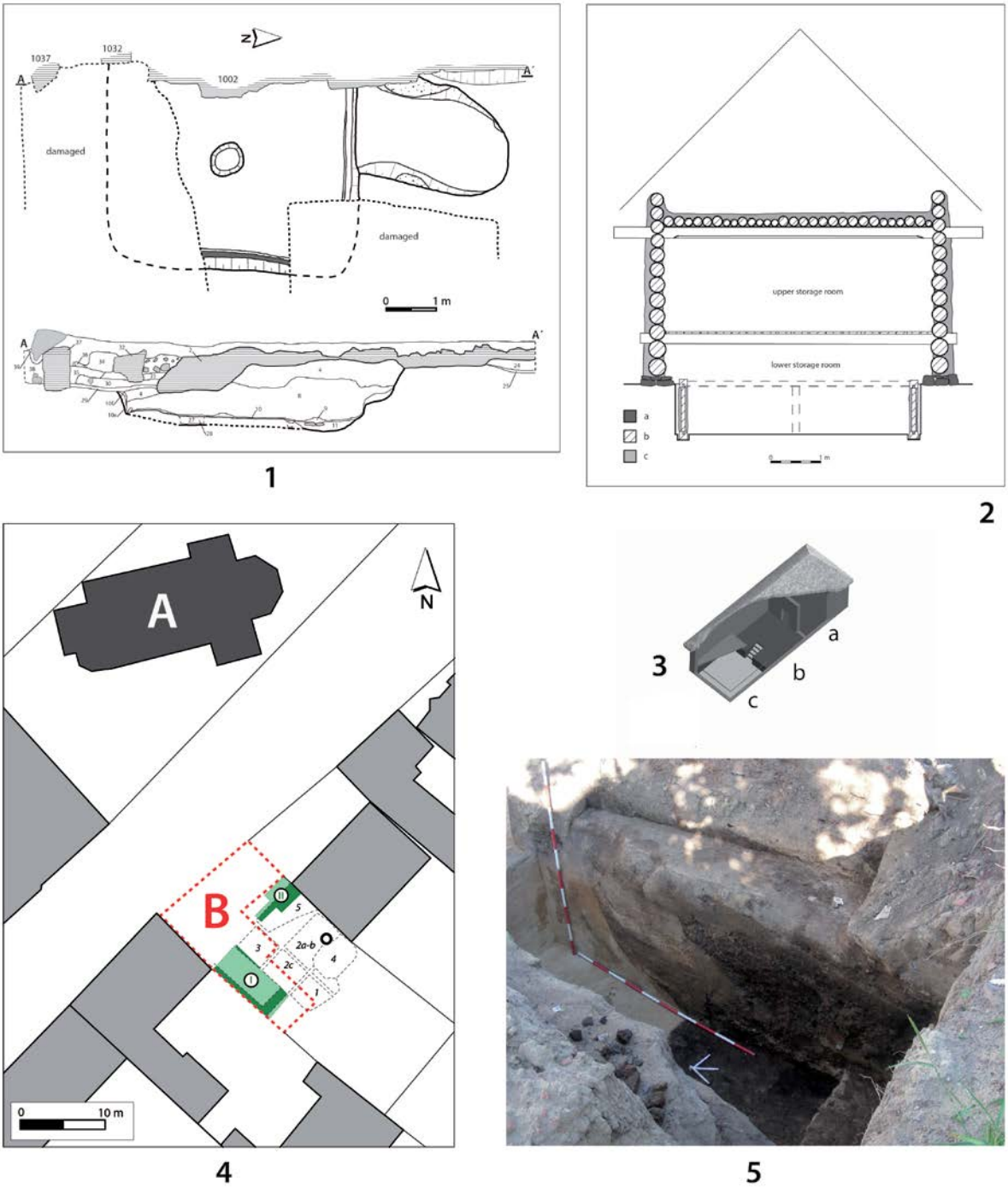

Figure 3. Rescue excavations of inhabited villages. *1–2:* Češnovice (Distr. of České Budějovice). Only a sunken storage section has preserved from the three-compartment late medieval house which was situated underneath the demolished modern dwelling (1). Burnt debris from the late 15th century contained a large amount of daub plaster fragments with negatives of block construction that enabled hypothetical reconstruction of the storage part of the house (2a = stone foundations, b = block construction, c = daub plaster). *3:* Reconstruction of the later medieval three-compartment house (a = living room, b = entrance room, c = two-storeyed storage section). *4–5:* Mikulčice (Distr. of Hodonín). Rescue excavations revealed two phases of the late medieval houses indicated by sunken storage sections on house-plot No. 121. 4A = parish church of the Assumption of the Virgin Mary, B = demolished house No. 121, 1–5 = archaeological trenches, I = earlier cellar, II = later cellar). *5:* cross-section of the earlier cellar revealed during building activities. *(Image by F. Kostrouch, J. Militký and P. Vařeka)*

of the so-called Hussite period (AD 1419–1479) associated with domestic or religious wars, and with resultant social and economic crises impacting on rural settlements, has repeatedly been postulated. Excavations have sometimes revealed extensive burnt horizons in village contexts, pointing to sudden destruction by fire and perhaps pillaging (e.g. villages deserted in the 15th century: Konůvky – Měchurová 1997, Mstěnice – Nekuda and Nekuda 1997 and Pfaffenschlag – Nekuda 1975). Similar 'catastrophic' archaeological contexts have been linked also to the period of the Thirty Years' War (1618–1648), as at the deserted villages of Bukov, Cetkov and Rovný (Symonds and Vařeka 2016; Vařeka 2018a: 40–48) or Vojkov (Vařeka 2009). Destruction horizons, it can be argued, capture a certain moment in time, and such important archaeological examples of 'stopped life' not only provide possible evidence of specific historic events (or else testify to the threat of destruction through accidental fires in houses), but also guide us on the conditions of everyday life and the living standards of peasants/rural workers. Unlike some of those deserted villages of the 15th and 17th centuries, where such destruction horizons mark the termination of settlement activities, many presently inhabited villages endured and underwent renewal. Not only were houses and farms rebuilt, but, on occasion, entire villages had to be re-founded after their destruction, often resulting in significant changes in the village structure (Dohnal and Vařeka 1997; Militký and Vařeka 1997; Musil 2020; Vařeka *et al.* 2010).

We can note how detailed fieldwork and related studies in the contemporary district of Rokycany (575 km^2) near Pilsen have shown 115 villages as documented before 1420. A total of 44 of these became deserted in the 15th century (38%). Parish villages were usually re-founded, and so there are only three deserted villages with churches in this district, i.e. with a 'lost' village, but with the church preserved (Vařeka *et al.* 2011, 330). In the Pilsen hinterland (district of Pilsen-City, 138 km^2), 44% of the medieval villages were deserted in the same period (12 out of 27) (Vařeka *et al.* 2012: 312).

In several cases, excavations within (standing) rural domestic structures have generated valuable evidence for a long-term spatial continuity of location since the later Middle Ages. However, partial shifts are similarly documented, along with changes in building techniques. Several examples show the development of the three-compartment dwelling that represents a typical rural house form in later medieval and post-medieval Bohemia and Moravia, as well as in large parts of eastern Central Europe (Fig. 3: 3). It consists on one side of the main dwelling room (*jizba-světnice/Rauch Stube-Stube*), equipped with heating equipment (a stone oven, replaced usually by a tiled stove from the end of the Middle Ages and early post-medieval period), a central entrance room (*síň/Flur*) with black kitchen space (*Černá kuchyně/Schwarzeküche*) located in its back part following the introduction of stoves with chimneys, and a storage section in the other third (*komora/Kammer*), this frequently formed by a two-storey section with its lower part sunken into the ground as a cellar. In western Central Europe, this third house part comprises a byre (*Stall*) instead of a storage room (*Wohnstallhaus*); this byre-type house can also be assumed as present in those parts of the Czech Lands settled by peasants who came from various regions of Germany during the High Middle Ages (Vařeka 2018b).

One useful example to cite is from Češnovice in southern Bohemia (District of České Budějovice), where the conversion of an old farm into a petrol station prompted the archaeological examination of its house plot (No. 13), revealing an interesting development (Fig. 3: 1–2). The earliest construction, datable to the early 14th century, was oriented with its long wall parallel to the roadway. A catastrophic fire here, marked by a burnt horizon, assignable to the 1460s–1470s, left near-unique debris enabling us insights into built form, construction and material culture. Finds included various ceramic storage and cooking vessels, plus a large amount of daub plaster fragments with well-preserved negatives of thick logs of the block construction; these filled the sunken, storage zone. A new block house equipped with stone foundations was built *c.* AD 1500. Its internal structure

was turned 180° with respect to the first house, so that the original storage section was replaced by the dwelling room and vice-versa. The last stone-built phase of the house was of almost the same size and identical internal structure; this is shown through structural analysis as having been built in 1818; it was eventually pulled down/demolished in 1995 in the face of building works in the settlement (Militký and Vařeka 1997; Vařeka 2013). Unfortunately, this is the only farm so far excavated in the village, which in the early 19th century consisted of *c.* 40 farmsteads and had a circular form and central green. In general, both late medieval and post-medieval deserted villages had between six and 20 farmsteads, exceptionally more than 30.

A second case study is from the south Moravian village of Mikulčice (District of Hodonín), one of the presumed 9th-century centres of the so-called Great Moravia, but destroyed *c.* AD 900. While large-scale excavations of this early medieval stronghold commenced already in the 1950s, archaeology has turned to the nearby, active village only recently. This village is only documented for the first time from 1141, and is seen to show later, high medieval replanning. Rescue excavations of house plot No. 121 located in the eastern part of the village green, opposite the late Gothic parish church, revealed a 14th-century house that was gable-oriented and which featured a corner-timbered log-construction with daub plaster and a sunken storage section in the back. After being burnt down in the early 15th century, a new three-compartment house with a sunken storage area was built, but with a much-altered disposition and construction mode, with its main/long wall oriented parallel with the village green and with sun-dried bricks forming the main building material. Another fire destroyed this house in *c.* 1500 (Fig. 3: 4–5). Rescue archaeology here thus provided the earliest dated evidence for the two typical attributes of the traditional architecture in southern Moravia: the long-wall orientation and earthen construction of village houses (Vařeka *et al.* 2010).

Large-scale excavations of the contemporary village of Libkovice (District of Most)

Due to one of the richest deposits of lignite in Europe, the once fertile and densely settled agricultural landscape of the Most basin, set between the Ore Mountains and Central Bohemian Highlands, has been transformed into a mining and industrial area which has become scarred by huge open pits covering tens of square kilometres and reaching more than 200 m in depth. Libkovice is one of four historical villages situated in the Lom stream valley (and one of more than 100 in north-west Bohemia) that have fallen victim to surface mining across the 1960–90s. Intensive rescue excavations were conducted in advance of extending open-pit mines that have consumed so much of the cultural landscape; however, the research focused mostly on prehistoric and early medieval sites outside of the historical village cores (for sites and studies in the Lom stream valley, see Beneš 1991a; 1991b; 1995a; 1995b; Beneš and Koutecký 1987; Brych 1989; Bubeník 1975; Bubeník and Velímský 1986; Meduna 2012).

Libkovice is sited 3 km from the foothills of the Ore Mountains (Krušné hory/Erzgebirge), the natural border between Bohemia and Saxony. It represents the last village to be destroyed due to ruthless expansion of coal mining in north-west Bohemia and, at the same time, the first one in which large-scale systematic archaeological research has been conducted in such a context. The final decision to liquidate the village and enforce a population transfer was made in 1990 as a result of the earlier mining policy (Gockeler and Reeve 1997: 34, 154). Exploratory and then rescue excavations were carried out shortly before and during demolitions of the village structures across 1991–99 (Nováček and Vařeka 1996; 1997; Vařeka 2001). But, because of the advancing mining operations by the Bílina Mine (North Bohemian Mines, a joint-stock company), which produced the substantial figure of 10 million tons of brown coal per year,[4] large-scale excavations were launched in 2015, designed to extend to investigate a substantial part of the former Libkovice cadastre which will be

[4] https://www.sdas.cz/

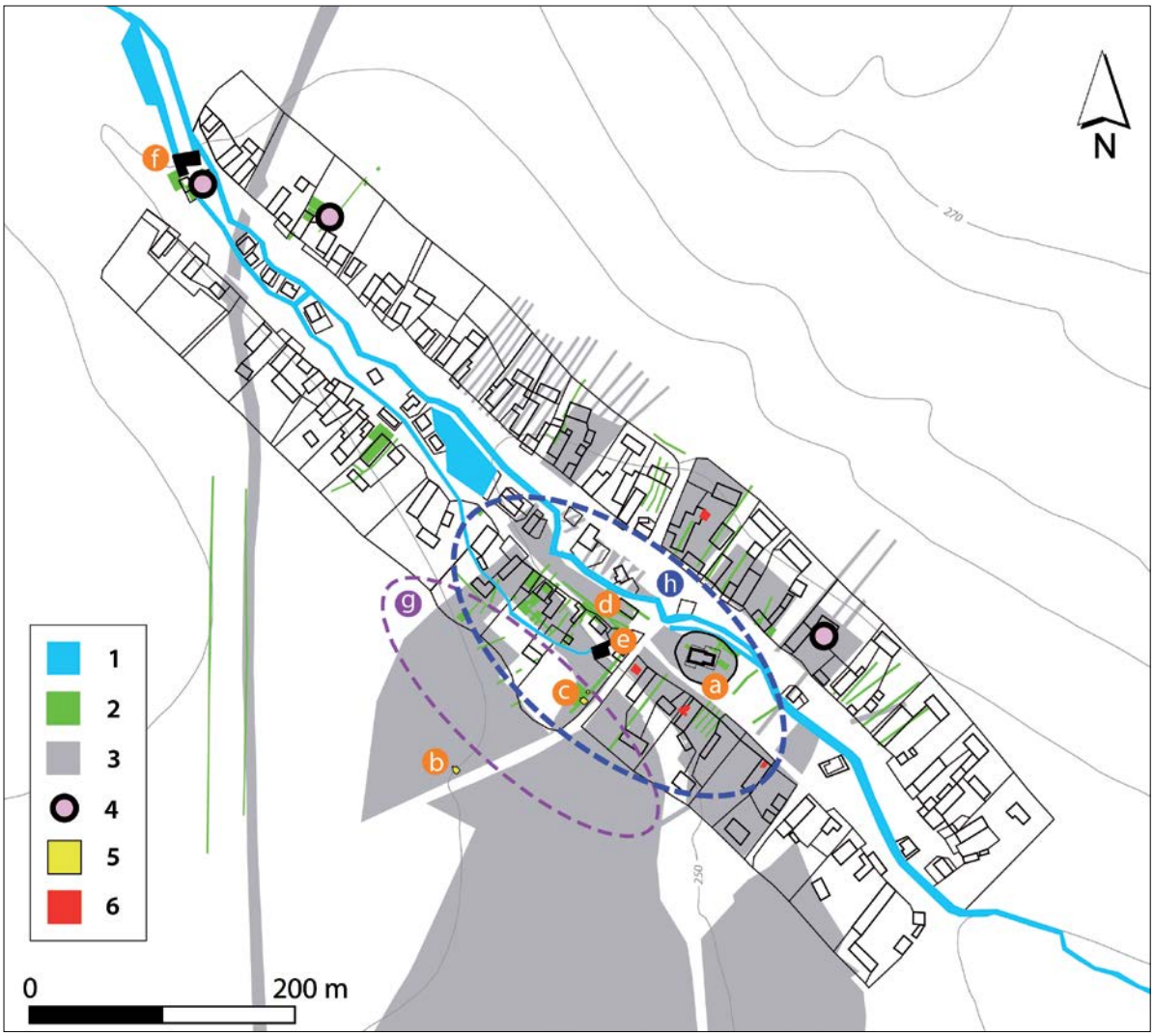

Figure 4. Libkovice: (Distr. of Most). Large-scale rescue excavations of the entire village. Extent and results of archaeological excavations (2023) projected on the village plan from 1842 (earliest cadastral map).
1 = stream, mill-race and ponds; 2 = archaeological trenches 1991–99; 3 = large-scale excavations since 2015; 4 = late 6th- to 8th-century settlement; 5 = cellars which may be linked to two phases of a residence of an elite (?late 12th–15th century manor farm); 6 = cellars of the 13th- to 15th-century village houses;
a = foundations of the early Gothic St Nicolas' parish church and churchyard revealed by excavations;
b = probable late 12th/early 13th-century manor farm; c = probable 13th- to 15th-century manor farm;
d = possible earliest mill (?11th–12th century); e–f = later mills (12th/13th century–modern era);
g = 9th- to 10th-century settlement; h = probable nucleated village core (10th/11th–early 13th centuries).
(Image by P. Lissek and P. Vařeka)

nearly completely engulfed by the mining works by 2030.[5] The methodology and the theoretical approaches of the Libkovice project built upon previous medieval settlement studies in Bohemia and the findings of earlier rescue excavations in presently inhabited villages (Klápště 1994a: 27–90; 1994b; Nováček and Vařeka 1996).

[5] The research project was organised originally by the Most branch of the Institute of Archaeology of the Czechoslovak Academy of Sciences and later by the Institutes for Archaeological Heritage Management of North West and Central Bohemia. Since 2015, it has been carried out in cooperation between the Institutes for Archaeological Heritage Management of Northwest Bohemia, the Department of Archaeology at the University of West Bohemia and the Institute of Anthropology at the Wrocław University of Environmental and Life Sciences.

Figure 5. Aerial photo of the demolished village with approaching surface mine in the backgound, viewed from the north-west; a = foundations of the modern church overlaying the early Gothic church in the central part of the former village.
(Image by P. Lissek and P. Vařeka)

The project aims centre on six main topics regarding the development of the village and its environs: 1) the early medieval settlement pattern; 2) settlement transformation and the origins of the nucleated village in the high medieval period; 3) the later medieval village and farms; 4) the parish church and its churchyard; 5) post-medieval village development; and 6) the impact of the 19th-century industrial revolution on both site and setting (Vařeka 2001: 86; 2020: 186). The Libkovice project can be considered a key point of reference for research on inhabited villages in Bohemia and Moravia. Simultaneously, large-scale excavations have been carried out in other parts of the cadastral territory outside the village, revealing extensive Neolithic settlement activity and several Eneolithic, Bronze Age, Iron Age and early medieval sites. This hugely important and ongoing research project will produce a sizeable, detailed and complex archaeological, environmental and historical databank of evidence regarding the settlement's form, history, evolution, economics and material cultures from its earliest roots to the late 20th century.

The Lom waterway shaped a shallow and wide valley in the Libkovice micro-region, characterised by a small gradient at an altitude of *c.* 250 m. The stream, which is currently routed through a concrete channel, originally meandered in the valley bottom is filled with sediments reaching 1–2 m. This stream formed a key focus of the settlement.

In an attempt to obtain the maximum data from the historical core of the village of Libkovice during the more restricted research of the 1990s, investigations combined long narrow trenches and smaller scale interventions (usually of several square metres) targeted on the village green, within

individual house-plots and inside farmhouses, some of which were still then upstanding. In total, 131 trenches were excavated in 1991–99 (Fig. 4).

Re-deposited artefacts indicate massive erosion of the slopes during both the prehistoric and medieval periods; however, some *in-situ* prehistoric settlement remains were also found at the bottom of the valley, extending from the late Neolithic to the early Iron Age. Several features situated along the stream from the late 6th to 8th centuries may indicate a dispersed settlement form situated underneath the later village but can also reflect limited preservation of the earliest settlement traces. The 9th- to 10th-century habitation area was set on the terrace above the right bank of the stream and featured typically small, one-compartment houses of a square plan (less than 20 m^2) which were slightly sunken into the ground and had stone ovens in a corner. In addition to various settlement pits, intact occupation layers were preserved. Finds of ferrous slags and redeposited furnaces from the valley floor indicate iron production which may have exploited presence of the local mud iron ore in this period (Fig. 4).

Across the 10th/11th to early 13th centuries, the settlement was seemingly concentrated in the central part of the larger later village, but without evident regularity in its layout. Archaeologically we see the early medieval tradition maintained of small one-compartment houses and an array of pits for diverse functions, notably storage. One remarkable and surprising find from 2023 was a mill-race running alongside a stream in the valley floor, which was connected to a system of pits or water reservoirs. Among the remains of well-preserved wooden structures in these were three mill-wheel blades, dendrochronologically dated to around AD 1000 (Figs 4: d and 6: A). If further excavations confirm this interpretation, they would give proof of the oldest mill yet attested in eastern Central Europe.

A nobleman's residence seemingly occupied part of the disused south-western terrace above the village. A significant isolated rectangular sunken feature (4.5 m by 4.8 m) may denote a cellar, accessed via a sunken staircase, and with the overlying residence perhaps a timber-towered structure (Fig. 4:b). This unit differed from the early medieval sunken houses by its size, depth, sunken staircase and the absence of any apparent heating equipment. A coin-find (a denar coined by Friedrich I Barbarossa (1152–90) in Nuremberg) dates this sunken feature to the late 12th century. Interestingly, the origins of the parish church with its adjacent churchyard are likely to date to the same period, with probable remains of its first, timber phase revealed underneath the later sacral building (Vařeka 2020).

The aforementioned mill-race near the stream seems to have fallen out of use, being filled with gravel sediments which could be linked to massive flood episode/s. A new mill-race was then created, operating from *c.* 1200; this ran along the contour below the edge of the right bank terrace and is in fact depicted on the earliest detailed map evidence for the site, dating from 1842. This mill-race was fed by a small pond situated in the uppermost part of the later village, where one mill was located; it also powered the second mill set near the church. The high medieval origin of both mills has been confirmed archaeologically (Fig. 4: f and 4, 6: B).

The earliest documentary evidence for the village of 'Lubcowitz' is dated to 1240, in a charter regarding purchase of a part of the village by Abbot Slavko of the nearby Osek Cistercian monastery; usefully, the text mentions two mills, a pond and a wood (CDB III/2, No. 261: 356–357). Construction of the Gothic stone-built church likely relates to the acquisition of the village by the Cistercians; however, it is only mentioned for the first time in 1282, when the priest Heinrich von Luquitz is named (Regesta IV, No. 1851: 737). The original sacral building was pulled down in 1893 due to its poor state of repair and replaced by a new church in 1893–96, which itself was demolished in 2002. The Gothic church foundations were revealed in excavations together with the entire high/late medieval and early modern churchyard, which contained more than 1,400 graves. The modern

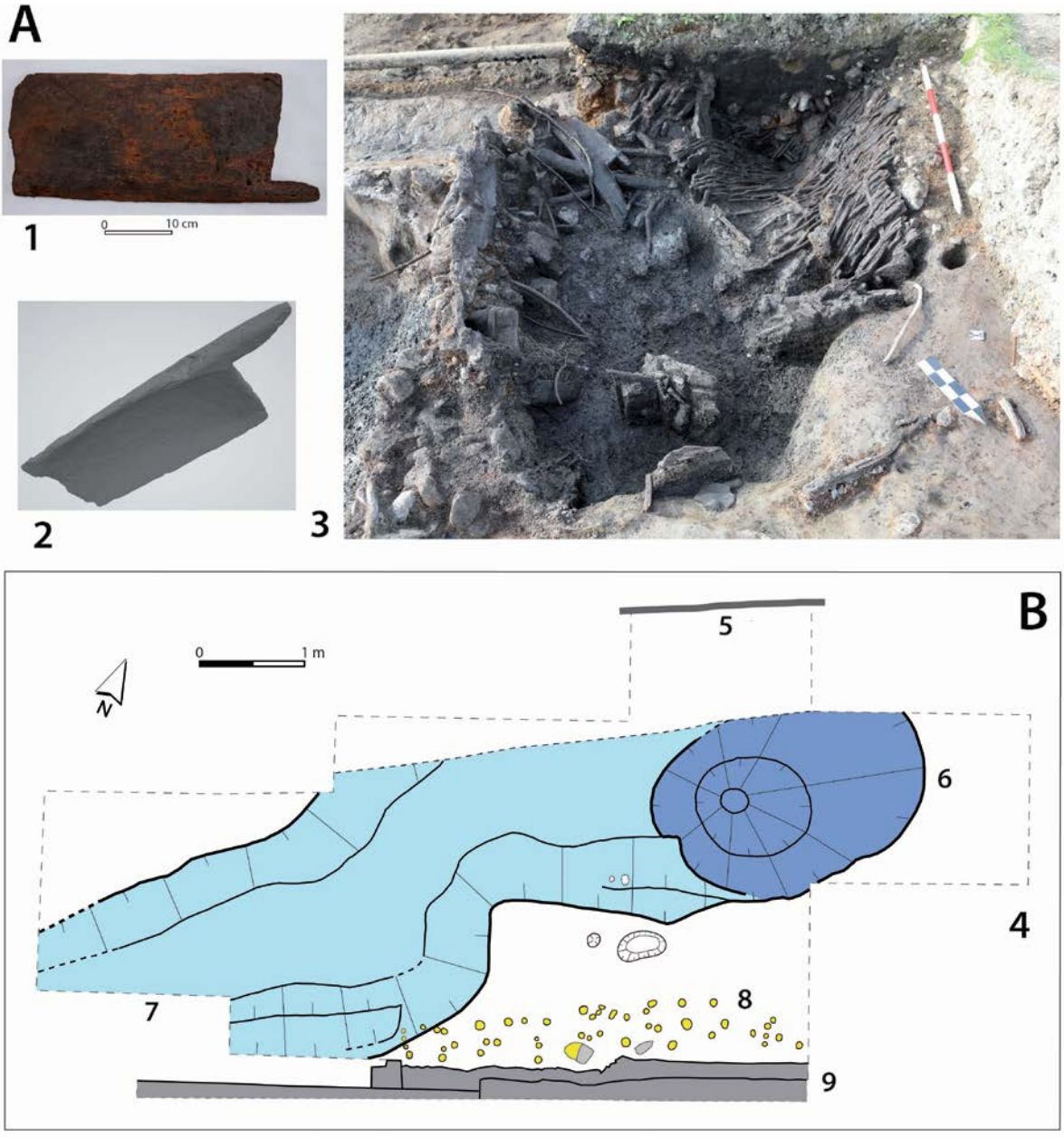

Figure 6. Libkovice: Remains of medieval mills. *A:* a pit (3) connected to the earliest mill race with well-preserved wooden construction components contained three wheel-blades dendrochronologically dated to AD 1000 (1–2). Probably a mill-wheel pit to which the later mill race dated to *c.* 1200 ended west of the church; 5 = wall of the post-medieval mill; 6 = probably a mill-wheel pit; 7 = mill race; 8 = post-holes indicating an old (medieval?) fence; 9 = several phases of the stone- and brick-built fence defining the house plot from the post-medieval period until 1991 when the mill was demolished.
(Image by P. Lissek and P. Vařeka)

cemetery of the 19th–20th centuries is situated south-west of the village (Biel *et al.* 2022; Vařeka 2020) (Figs 4: a and 5: a). The architectural form of the medieval church, with rectangular presbytery and without buttresses corresponds to small early Gothic village churches of the second and third quarter of the 13th century (e.g. Líbal 1984: 154, 166). A fragment of the portal architecture would suggest that construction was carried out by the same workshop as the Osek Cistercian monastery, which was itself founded in *c.* 1200 (Kuthan 1983: 110–112).

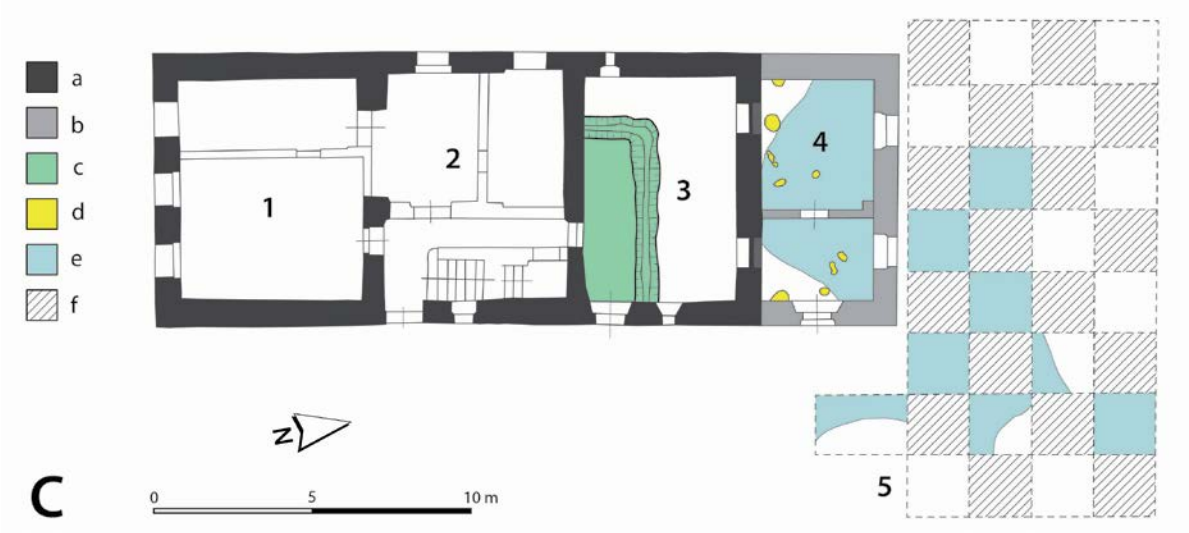

Figure 7. House No. 52 with a medieval phase preserved in the byre section which was not provided with a cellar and original deposits in the yard area. 1 = living room; 2 = entrance room (both provided with cellar); 3 = byre; 4 = later annex; 5 = yard; a = stone-built post-medieval and modern house; b = modern annex; c = remains of the later medieval house (a groove for timber walls and clay floor; probably a byre section); d = post-holes indicating some lighter post-built structures; e = preserved simple pavement of the later medieval yard; f = unexcavated sectors.
(Image by P. Lissek and P. Vařeka)

The establishment of the planned large village with two rows of farms lining a long village green with a stream flowing through its middle can be dated to the late 13th century. Excavations within individual house-plots have revealed that their boundaries were defined in this period and did not change until the 19th century, when the village was mapped in detail for the first time.[6] The characteristic gable position of the farmhouses, which were situated along one of the longer sides of the house plot, has a long continuity going back to the later Middle Ages. The three-compartment houses were built of wood until the 18th century, and their presumably block or half-timber walls rested on stone foundations or were set in shallow grooves in the ground. In some cases, the earliest houses were slightly shifted onto a crosswise axis or were narrower than their 18th- and 19th-century successors (Fig. 7). Sunken storage sectors or cellars of village houses of timber and, later, stone construction, equipped often with a sunken staircase, represent a new building element testifying indirectly to the introduction of the three-compartment rural house in the High Middle Ages.[7] The number of 41 peasants/houses at Libkovice is cited in 1579 (Urbar) and this figure does not increase significantly until the early 18th century (49 in 1713; Tereziánský katastr); nor did the layout of the village change dramatically, with the site remaining part of the Osek monastic estate until the abolition of serfdom in 1848 (Bělina *et al.* 2013: 365–367). The late medieval elite residence (perhaps belonging to lower gentry who administered the village on behalf of the monastery) continued in use on the south-western terrace above the village, where a new residence was built and of which another cellar was preserved. The residence (Fig. 4: c) suffered a catastrophic fire in the 15th century, and the ruins of its half-timbered (tower?) structure collapsed into its basement, along with its interior equipment, including a high-quality tiled stove, as well as ceramic vessels and metal finds.

[6] https://www.oldmapsonline.org
[7] On the introduction of cellars (Keller or Erdkeller) as one of the key components of the high medieval transformation of the rural built environment see Donat 1993: 225–226; 1995: 427. Similarly, cellars represent the earliest remains of the later medieval houses in the village of Breunsdorf near Leipzig in neighbouring Saxony, a site which was also completely destroyed due to coal mining (Kenzler 2002: 103–104).

More widely, the rescue archaeology has captured material evidence of the village's growth in the late 18th and early 19th centuries (e.g. building of new houses within the area of the village green) and gradual industrialisation in the later 19th and early 20th centuries. Rebuilding of farms and enlargement of the village resulted from pressing accommodation needs due to the influx of miners and workers and their families, as well as establishment of several smaller enterprises such as glassworks, pottery and a brick factory which substantially changed the former agricultural character of Libkovice. The number of inhabitants increased seven-fold across the century from 1833 to 1930, when the population reached 2,314 people and Libkovice contained a total of 258 houses (Sommer 1833: 151; *Retrospektivní lexikon*, 514). Finally, we must highlight that ethnic cleansing, a characteristic form of mass repressions in Central-Eastern Europe´s recent past, severely affected the linguistically mixed village twice in the mid-20th century: first in 1938, after the annexation of the Sudetenland by Nazi Germany, when the Czechs were expelled, and, secondly, after World War II, when the German inhabitants were deported (Benda 2014; Brandes 2002; Staněk 1991).

Conclusions

It can be stated that a comprehensive data set exists in the Czech Republic, especially in Bohemia, which has not yet been evaluated in detail, but which would allow the archaeological and architectural study of inhabited villages effectively and on a large scale. Currently, results generated reveal that archaeological investigations that have focused on existing villages of medieval origin have, in many cases, achieved significant results, which could not have been provided by research methodologies that have been traditionally oriented towards early medieval settlements or deserted medieval or post-medieval villages located in the wider landscape. These excavations have produced records that allow for a diachronous perspective regarding the development of rural sites over centuries. Such research has a great potential for studying topics such as the transformation of the early medieval settlement pattern and the establishment of nucleated villages by the later Middle Ages; the formation and development of village layouts, house-plots, farms and rural housing; as well as the examination of socio-economic changes, material cultures, living standards and the connectivities of peasants in the *longue temps durée* perspective from the beginning of the Middle Ages to the modern era. It is clearly necessary to connect up research on currently inhabited villages based on rescue archaeology, the study of vernacular as well as church/chapel architecture, and research on residences of the elite – all topics that have been long pursued separately. In addition to research based on material records, detailed study of the many and often rich archival sources (textual, cartographic) from the post-medieval period is essential for understanding the long-term (and, undoubtedly, variable) evolution of village and other rural settlements. Finally, we can identify that the participatory approach of noted community archaeology in the rural environment is proving to be very successful, since it not only allows activities and results to be shared with local people, but also deepens their interest in local history, including its neglected material component, thus ensuring the practical protection and heightened public awareness of Czech historical heritage.

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Infrastructure archaeology and medieval rural settlement in Denmark

Mette Svart Kristiansen

Introduction: Legal framework for developer-led archaeology in Denmark

This chapter explores the relationship between the practice of infrastructure archaeology and the emergence and growth of medieval settlement archaeology in Denmark. In Denmark, archaeological heritage is currently protected by the *Museum Act 2001*.[1] It was *de facto* prepared to accommodate Denmark's final ratification of the Malta Convention in 2005. The local state-recognised museum with archaeological responsibility in the municipality, currently totalling 27 museums, is responsible for conducting archaeological surveys and preliminary investigations. There are no private archaeological companies in Denmark. The museum and the local planning and preservation authorities have a duty to cooperate to safeguard cultural heritage in connection with physical planning and in the preparation of earthworks. All developers can obtain free initial evaluation by a museum, but extensive trial-trenching, geophysical surveys or other analyses must be paid for by the developer. Trial excavations are usually a part of larger developer-led projects to better integrate archaeology in the timeline for the project and reduce delays. The budget and justification for the relevance of the archaeological excavation is produced by the museum and approved by the Agency for Culture and Palaces (Slots- og Kulturstyrelsen 2025).

Only 'significant ancient monuments' can be investigated at the developer's cost. A series of national strategies has been developed in cooperation between the Agency for Culture and Palaces, museums and universities to 'help define and identify 'significant ancient monuments', to optimise and qualify the outcome of archaeological (field)work, prevent 'repetitive archaeology', and support and obtain new knowledge' (Roland 2018). The strategy for medieval rural settlement was the first to be released in 2014 (Svart Kristiansen *et al.* 2014).

Large national infrastructure projects in Denmark on land are mostly related to distribution of natural gas, extensions or construction of new motorways and railroads, and expansions of the electrical transmission grid. The establishment of the natural gas distribution network between 1979–1986 was the first national project systematically involving archaeology. Large developer-led projects in the 1980s and 1990s changed museum workflow and strategies, but significant motorway investment in the 2000s and 2010s have been particularly formative for Danish archaeology (Vejdirektoratet and Kulturarvsstyrelsen 2011; Sølgaard Andersen *et al.* 2005).

Denmark is the most intensively cultivated country in the world together with Bangladesh. In Denmark, 61% of land is agricultural, of which 93% is under the plough. This means 57% of the country is under the plough, in comparison with an EU average of 26% (Holmstrup *et al.* 2018: 6). Sites in cultivated areas, dependent on topography and soils, are therefore under constant threat of destruction by increasingly heavier agricultural machinery, with even features on several sites deep down in the subsoil having been documented as constantly reduced when revisited (Nørgaard Jørgensen and Pind 2000). Infrastructure projects may therefore sometimes terminate a likely ongoing destruction with an opportunity for the museums to document the sites. Alignment of the

[1] Museumsloven. Lov H nr. 473 af 07/06/2001 (historic); latest version: LBK nr. 1017 af 07/07/2025 (current)

projects may be adjusted based on the indications of trial excavations of the amount and character of significant archaeology in the project area, with project adjustments typically related to the situation of petrol filling stations, laybys, etc. (Ethelberg and Andersen 2012: 23–24).

The natural gas project in the 1980s: the beginning

The first large infrastructure project in Denmark was the establishment of a natural gas distribution network in 1979–1986. It resulted in identification of approximately 1,700 sites; on about 250 of these, actual excavations have been carried out. The alignment was 3,000 km long, 15–20 m broad and stretched across Denmark from east to west and north to south. A national strategy for workflow and site management and a short project period produced comparable archaeological data across Denmark, and the project added considerably to archaeological knowledge, particularly on prehistoric settlement structure and regionality (Rigsantikvarens Arkæologiske Sekretariat 1987).

Only 35 sites were related to medieval rural settlement, most of them identified through surface reconnaissance. The low numbers were explained in the project conclusion as 'a consequence of the fact that the basic settlement pattern remained the same from the end of the Viking Age to the beginning of the Middle Age' (Høgsbro 1987: 456); today, we know that medieval settlements leave very few ceramics on the surface of the site. To review the contemporary evaluation of what were acknowledged as important features and structures, all data from the 35 sites is summarised in Table 1. Though numbers are few, it may be possible to identify some tendencies: 15 sites were not included in the project's conclusion on medieval settlement; they had features like pits, post-holes and furrows from ridged fields, with either no or only one building, and in a single case perhaps two buildings. The perceived 'importance' of a site seemed to relate to the presence and number of buildings.

This focus on buildings must be seen in a research context in which Danish archaeology had conducted a series of large settlement excavations in the 1960s and 1970s, with a particular focus on settlement structure and definition of house types from the early Pre-Roman Iron Age to the Viking Age (ending in the mid-11th century). The medieval rural settlement was not a research object *per se*, neither for the predominantly prehistoric archaeologists excavating in rural areas, nor the medieval archaeologists, who, since the 1970s (in which period medieval archaeology was endowed with its own university chair) were occupied by booming *urban* excavations, as well as excavations of moats, castles, churches and monasteries. Excavations were scarce on rural medieval settlements as a research object or related to developer-led excavations until the mid-1980s, when a new *Museum Act* for the first time entrusted the management of archaeological activities to the local cultural history museums.[2]

This focus should also be seen in a context in which a powerful model for the settlement structure developed in the early years of the gas project and was widely acknowledged in the archaeological understanding of how settlements during the Iron Age and Viking Age relocated from place to place within the resource area and finally settled in the Middle Ages at the site of the currently occupied historic villages (Grøngaard Jeppesen 1981). In the 1980s, single farms and small hamlets were viewed as more flimsy unimportant structures, at least in the archaeological perception of rural life and in the field recordings. Today, we appreciate the pits, the one building, and the well excluded from the gas project's conclusion, and their significance as features from different types of medieval settlements and activities. However, buildings still remain the focus when budgets are negotiated.

Mention should also be made of preservation issues. Due to extensive agriculture, most excavations are situated in heavily ploughed fields. The introduction of buildings constructed on sills in the 12th–13th century at some sites adds to the poor preservation. The thickness of the topsoil may also

[2] Lov om museer m.v. Lov nr 291 af 6. juni 1984 (historic)

have resulted in shallower features like pits, fences and ditches barely hitting the subsoil. The site at Skovby, where trial excavations only recorded a well, could be such a site (see Table 1).

Among the excluded sites, we also have furrows from medieval or post-medieval ridged fields; however, of 1,700 sites, they are only recorded on four sites – a surprisingly low number. They clearly posed a threat to the 'important' features at the site: '[t]he structures were heavily damaged by a number of furrows from ridged fields' and 'the southern half of the house was to some extent damaged by a furrow between two ridges – a phenomenon which, moreover, complicated the interpretation of major parts of the site' (Rigsantikvarens Arkæologiske Sekretariat 1987: 209, 221, my translation).

It is also striking that very few ditches are reported, though they can be very dominant features; there is a possibility that they are recorded, but not understood. It was only in the late 1980s and early 1990s that ditches were identified as an important part of the plot-and-toft structure (Engberg 1994: 13, 18–19).

The natural gas project is usually assessed as predominantly valuable for prehistoric periods; within the project, there seemed to be some disappointment on the results for the medieval settlement, though anticipated as a consequence of the contemporary understanding of medieval settlement structure. However, the Neolithic, Early Bronze Age and Late Germanic Iron Age were also poorly represented and this strongly indicated the need for new reconnaissance and excavation methods (Näsman 1987: 465). These were developed over the following decades, especially within large motorway projects. Though the medieval rural settlement might have been underrepresented, the excavation at Bulagergård, probably a mid-12-century predecessor to the currently inhabited historic village of Veerst nearby, reintroduced medieval settlements to settlement archaeology after a few decades on the sideline (Adamsen 1982; Grundvad 2012; Jørgensen 2022). A new gas pipe made it possible to revisit the site in 2011, and the Baltic Pipe added further to the site in 2020.

The need for increased capacity in gas distribution has resulted in the expansion of the gas network in recent years. A new 94-km gas pipeline (2011) laid parallel to the old one afforded Museum Sønderjylland the opportunity to make a qualitative and quantitative comparison between methods and results. Whereas in 1980–81, trial excavations had been carried out with trenches at selected sites, in 2011, the entire alignment was trial-excavated by one interconnected trench (to identify flint from stone age sites there was an experimental addition of ploughed tracks in selected areas). This led to an increase in identified sites and excavations (from 19 to 57), which was especially important for sites from the Late Iron Age (AD 200–800), increased from two to 12, and the Middle Ages (1050–1537), increased from one to 10 (Ethelberg and Andersen 2012: 19–22).

30 years of motorways: development of strategies and methods

Denmark has approximately 1,300 km of motorway – more than Germany when population size is taken into account (Bjerring 2021). High economic growth and consequent expansion of infrastructural development in the beginning of 2000 pushed approximately €3.1 billion into upgrading of existing and construction of new motorways between 2004–18.[3] This sparked some intensive years in Danish archaeology and discussions of efficient site methodologies and workflow: e.g. how to identify sites, and how museums optimise the archaeological process and the collaboration with the developer.

[3] Aftale mellem regeringen (Venstre og De Konservative), Socialdemokraterne, Dansk Folkeparti, Socialistisk Folkeparti, Det Radikale Venstre og Liberal Alliance om: En grøn transportpolitik 2009: 6; Sølgaard Andersen *et al.* 2005: 7

Table 1. The natural gas project 1979–1986 and its 35 medieval sites. Ordered after sites included and excluded from the project conclusions. (*Data from Rigsantikvarens Arkæologiske Sekretariat 1987)*

	BACKGROUND	DATE	TRIAL EXC. MA FEATURES	EXCAVATION MA FEATURES	AREA
DATA INCLUDED IN PROJECTS CONCLUSION					
Ørumgård	?		No structures	#	Open field
Bellerup	?		No structures	#	Open field
Bellerup	?		No structures	#	Open field
Fladbogård	Surface reconnaissance	IA, MA	No structures	#	Open field
Ulv	Surface reconnaissance	MA	No structures	#	Open field
Ulv	Surface reconnaissance	MA	No structures	#	Open field
Urup	Surface reconnaissance	MA	No structures	#	Open field
Jernbjerg vej	Surface reconnaissance	MA	#	#	Open field
Dybbøl	Surface reconnaissance	MA	#	#	Open field
Kregme landsby	Historical map		No structures	#	Open field in historic village
Øverup	Historical map		Pits and culture layers	#	Open field in dispersed historic village
Ottestrup	?		?	6 buildings, 2 pithouses	Open field near church and village
Kærup	?		?	4 buildings	Open field
Bække	?		?	2 buildings	Open field
Bulagergård	?		?	8 buildings, fences, well	Open field
Lundsbjerggård	?		?	8 buildings, pits	Open field
Grønholt	#		#	Tile oven	Open field
Slevad Enge	#		#	Mill	Stream
Billund Bæk	Known site		#	Ford	Stream
Skindersbro	Known site		#	Bridge	Stream

	BACKGROUND	DATE	TRIAL EXC. MA FEATURES	EXCAVATION MA FEATURES	AREA
DATA EXCLUDED FROM PROJECTS CONCLUSION					
Haurbak	Surface reconnaissance	MA?	#	#	Open field
Skovby	Surface reconnaissance	?	Well	#	Open field
Bytoften	Place-name, Surface reconnaissance	MA	Features	1 building, well, furrows from ridged fields	Open field
Højme	Surface reconnaissance	?	Post-holes	Furrows from ridged fields, historic topsoil	Open field
Stængerholm	Surface reconnaissance	SA	Furrows from ridged fields	#	Open field
Favrvrågård	?		?	Pits, post-holes	Open field, next to farm
Egum	?		?	Pits, furrow from ridged fields	Open field
Klattrupvej	?		?	1-2 buildings, fences	Open field
Sig	?		?	1 building	Open field
Rumohrsgård	?		?	1 building, ditches	Open field
Tofteagervej	?		?	Pits, post-holes	Open field
Brændekilde	?		?	Furrows from ridged fields	Open field
Bredegård	#		#	#	Open field

With up to 200-m-wide tracks, including work areas, storm-water reservoirs and several-hectare areas for slip roads, these motorways serve as an enormous archaeological test-pit across Denmark. Based on data in the *Sites and Monuments* database (*Fund og Fortidsminder*; Slots-og Kulturstyrelsen 2022), updated by the museums and hosted by The Agency for Culture and Palaces, approximately 850 sites (retrieved 2021) are related to archaeological investigations in relation to motorways. Fewer than 30 sites are dated 'medieval', but this very low number is biased by the database structure as a site may have more periods, but only one 'main date': usually the very visible Iron Age settlements (more than 300 sites) claim the 'main date', or the first period registered by chance in the database. More medieval sites are registered in the database, but are difficult to retrieve. This might appear to be a trivial data-management problem, but it has implications for perceptions of the medieval

Figure 1. Reconstruction of farmstead within a settlement at Holdam (HAM5022) dated to 13th century. *(Jørgen Andersen and Gunvor Christensen, Museum Sønderjylland)*

rural settlement: a single medieval farm will drown in the database structure, which can influence attention given and priorities made; they become lesser sites, not only in terms of their physical appearance in the trenches, but also conceptually.

Dating and understanding settlement structures

Early and high medieval (in Denmark, the 11th–12th centuries) settlements, in particular, are represented in the excavations. Motorways usually avoid residential areas, but touch previous settlements in the surroundings of the currently occupied historical village. However, this also invites reflection on the dating methods used and other questions. For example, whether the high number of early and high medieval sites and low number of late medieval sites only reflects changes in settlement structure from a mobile and more-dispersed pattern to a settled structure; the significance of bad preservation conditions for late medieval buildings on sill in ploughed fields; whether dating to the early and high medieval period of sites based on few objects and building typology to some extent may be habit-based and influenced by conventional ideas of the development in the settlement structure. A review of dated medieval rural sites (from all types of developer-led projects) shows a significant proportion of dates within the period AD 1000–1300 for excavations undertaken in the busy decade in archaeology after the turn of the millennium, which could indicate that the *Sites and Monuments* dating category '1000–1300' – administratively practical, but culturally and historically unusually broad – has been used by default if artefacts were not to hand or the sites fitted the accepted models for settlement development (Svart Kristiansen 2019b: 14–15). A more systematic C14-dating strategy has since provided the opportunity to date settlements more precisely and better understand changes in settlement structures. The single-aisled building has a date range of 11th–18th century, but is nonetheless sometimes dated 'by topology' to 'AD 1000–1300'. C14 dating within the last decade now dates these back to the 7th century (Hansen 2015: 54: Svart Kristiansen 2019a). A review by Museum Sønderjylland of 123 medieval sites reveals that typology and ceramics remain the most common means of dating (Hartvig and Sørensen 2021): a stronger focus on C14 dating is key.

Figure 2. Reconstruction of farmstead within a settlement at Ladegård (HAM4768) dated to 16th century. *(Jørgen Andersen and Mads Leen Jensen, Museum Sønderjylland)*

Figure 3. Reconstruction of farmstead at Ravnshøjgård (HAM4729) dated AD 1000–1400. *(Jørgen Andersen and Signe Lutzau, Pedersen, Museum Sønderjylland)*

The large motorway projects can provide new knowledge on settlement structures, but widening of existing motorways can have potential. Fieldwork by Museum Sønderjylland before one new motorway in Denmark identified four medieval farmsteads: Holdam (Fig. 1) and Ladegård (Fig. 2) were single features excavated in their entirety, while Ravnshøjgård (Fig. 3) and Solvang (Fig. 4) were part

Figure 4. Reconstruction of farmstead at Solvang (HAM4725) dated to AD 1050–1250.
(Jørgen Andersen and Erling Mario Madsen, Museum Sønderjylland)

of larger sites. The widening on the motorway across Funen enabled archaeological identification of a series of settlement phases at the village of Indslev (Fig. 5). No excavations had been made prior to the route constructed in the 1950s–1980s, but features in the new road alignment made it possible to identify different settlement phases finally settling in the centre of the resource area in the 11th century. Though these narrow construction works do not allow buildings to be fully uncovered, they provide the necessary data for dating the structures and thereby informing questions pertaining to structures on a larger scale (Lauridsen 2024).

Development of methods and strategies – what about the medieval settlement?

Many museums adopted new strategies in the 1990s and 2000s for a number of reasons: the experience of inadequate site identification based on intensive reconnaissance and topographical criteria on the developer-led infrastructure projects in the 1970s and 1980s; the impact of the new *Museum Act 2001*; the general increase in speed in state planning permissions and corresponding higher demands for museum deadlines to assess the archaeological interests in a project; and the execution and methods used by the developers during the 1990s. Surveys of historical maps and antiquarian archives were still important, but, in particular, systematic trial-trenching was introduced to add the highest coverage most efficiently (Adamsen *et al.* 2003; Ethelberg and Andersen 2012: 19). The impact of mechanical excavator shovel breadth, orientation of trenches and space between them was scrutinised and calculated to gain the most efficient sample of features. This was discussed in relation to Iron Age settlements in particular (e.g. Fonnesbech-Sandberg *et al.* 1992; Henriksen 1993; Jacobsen 1984; Klitgaard 2002).

An argument for a systematic 20 m distance in trial-trenching (between the centre lines, using a 2.5 m shovel leaves 17.5 m between the trenches) was formulated by Museum Odense in 2003, prior to the new motorway between Odense and Svendborg: '[t]he purpose of the test excavations is not to uncover all ancient monuments, but only those that can add new and significant knowledge to archaeology. Therefore, it cannot be ruled out that the search trenches may cut past individual graves, small cemeteries or, for that matter, individual houses with a length of less than 20 m. Larger burial sites or connected structures, such as fences and houses, on the other hand, cannot hide between the dense network of search trenches' (Adamsen *et al.* 2003: 34, my translation).

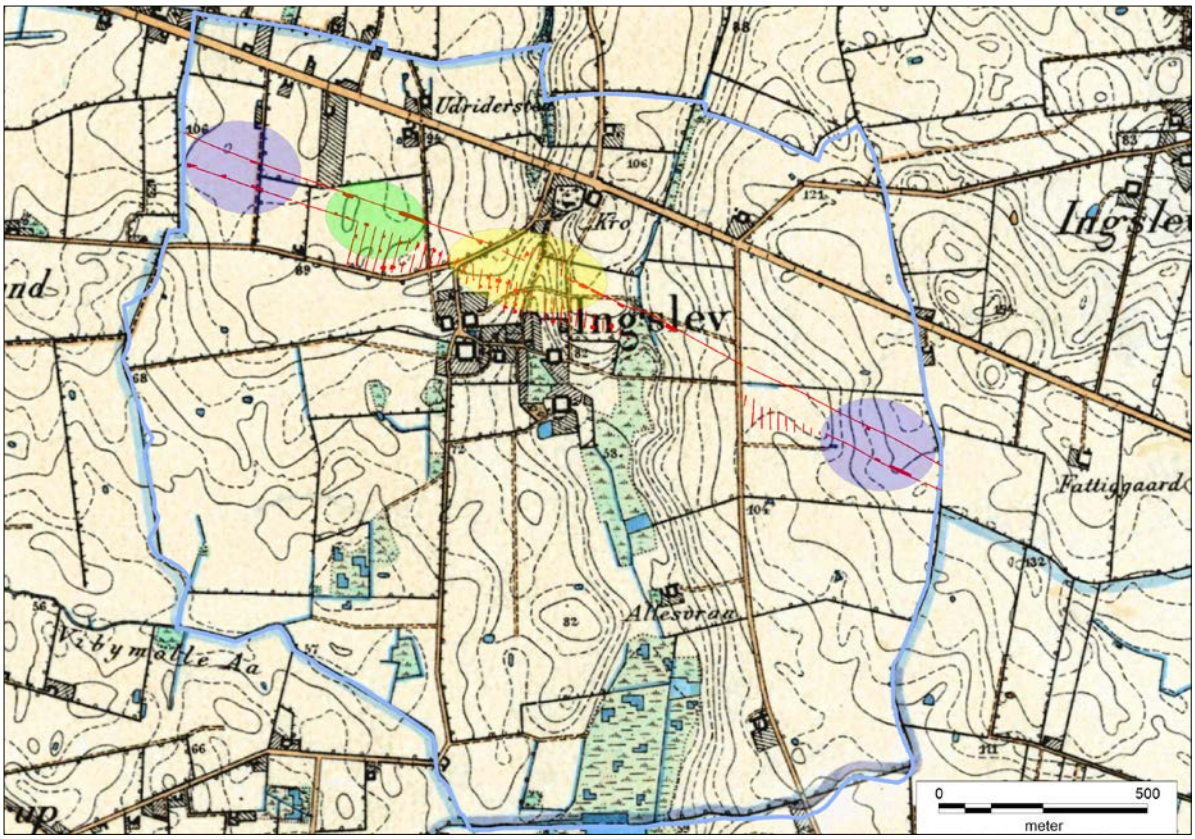

Figure 5. The currently occupied historical village of Indslev was intersected by the motorway crossing Funen (1950s–1980s) without prior archaeological surveys.
To the south are farms in the village, on a hill to the north the medieval church.
A widening of the motorway in 2020 provided important new knowledge of the settlement structure.
Purple = Early Iron Age; Green = Late Iron Age; Yellow = Viking Age and Middle Ages.
(Lauridsen 2024, 83; © Museum Odense)

Though the trial-trenching strategies in Odense were also intended to adapt to regional differences in topography, density, and character in settlement structures, the impact of the understanding of 'new and significant knowledge' on the identification, prioritisation and investigation of medieval sites would prove to have consequences that required consideration: what might be missed from medieval sites with a 20 m distance excavation strategy? A review of building sizes of approximately 70 sites from excavations carried out prior to a diversity of developer-led projects all over Denmark suggests an answer (Svart Kristiansen 2019a): potentially quite a lot. Of 437 medieval buildings from selected excavations in Denmark (e.g. haystacks, economy buildings, dwellings), only 55 were 20 m or longer, and therefore 'catchable' within this grid; the number is not even reviewed for north–south buildings, which could easily slip between the trenches as well. Small medieval farms would easily be missed, but they are pertinent to our understanding of the reorganisation of social structures and landed estates during the High Middle Ages (Håkansson 2017: 133–36). Consideration must be given to how we understand the hierarchies in the settlement if strategies for site identification are directed towards larger sites. The *a priori* assumption that small is insignificant and will not contribute new knowledge to archaeology skews the dataset. Also, the medieval farm takes on many shapes and some have buildings dispersed over large plots. The plots at the deserted site of Østergård excavated by Museum Sønderjylland as part of another developer-led project had large areas without buildings and sometimes more than 50 m between buildings. It is, therefore, the experience from Museum Sønderjylland that a pre-investigation strategy adapted to Iron Age

Figure 6. Trial-trenching in 2023, prior to the new railroad at Funen, at 12–15 m intervals with small extensions to identify features and select areas for excavation. *(© Museum Odense)*

settlements often proves inadequate in finding large, 'half-empty' early medieval crofts (Sørensen 2003: 452).

Lessons learnt from the first decades of intensive motorway projects have led to yet another evaluation of trial-excavation strategies. In 2013–14, the Agency for Culture and Palaces revised its guidelines. Alignments up to 10 m wide were recommended to achieve 20–100 % coverage, larger alignments a coverage up to 20%. The museums have adopted different strategies to achieve this, with most using 3 m-wide trenches at a distance of 12–15 m. This should be done systematically, based on the premise that sites can be everywhere. The potential of minor features in trial-trenches are followed up by smaller extensions to produce the best decision-making basis for the following archaeological excavations (Fig. 6). This has increased the number of medieval sites, also in parts of the landscape where one would not expect to find them. Further, the digitisation of historical maps in recent decades serves as an important tool for identification of areas of particular importance (Boye and Ethelberg 2019: 6–7; Slots- og Kulturstyrelsen 2025).

New tracks

As the path of a motorway offers the opportunity to sample different kinds of settlements in a region, access becomes possible to sites beyond the narrative of '*locus classicus*' sites which have been ascribed (inter)regional pre-eminence in settlement models (Hansen 2015: 49–50). Development projects are attracted to densely populated areas with high economic growth. However, infrastructure projects like motorways intersect landscapes and regions where development otherwise might not be so intense and thereby offering new knowledge on the medieval settlement structure and farm types in other regions.

The Central Jutland motorway (inaugurated 2014) and Holstebro motorway (2018) run across large areas of old heathland in central Jutland (Fig. 7). Most development and archaeological activity are currently around the rapidly growing cities of Holstebro and Herning. The motorway afforded

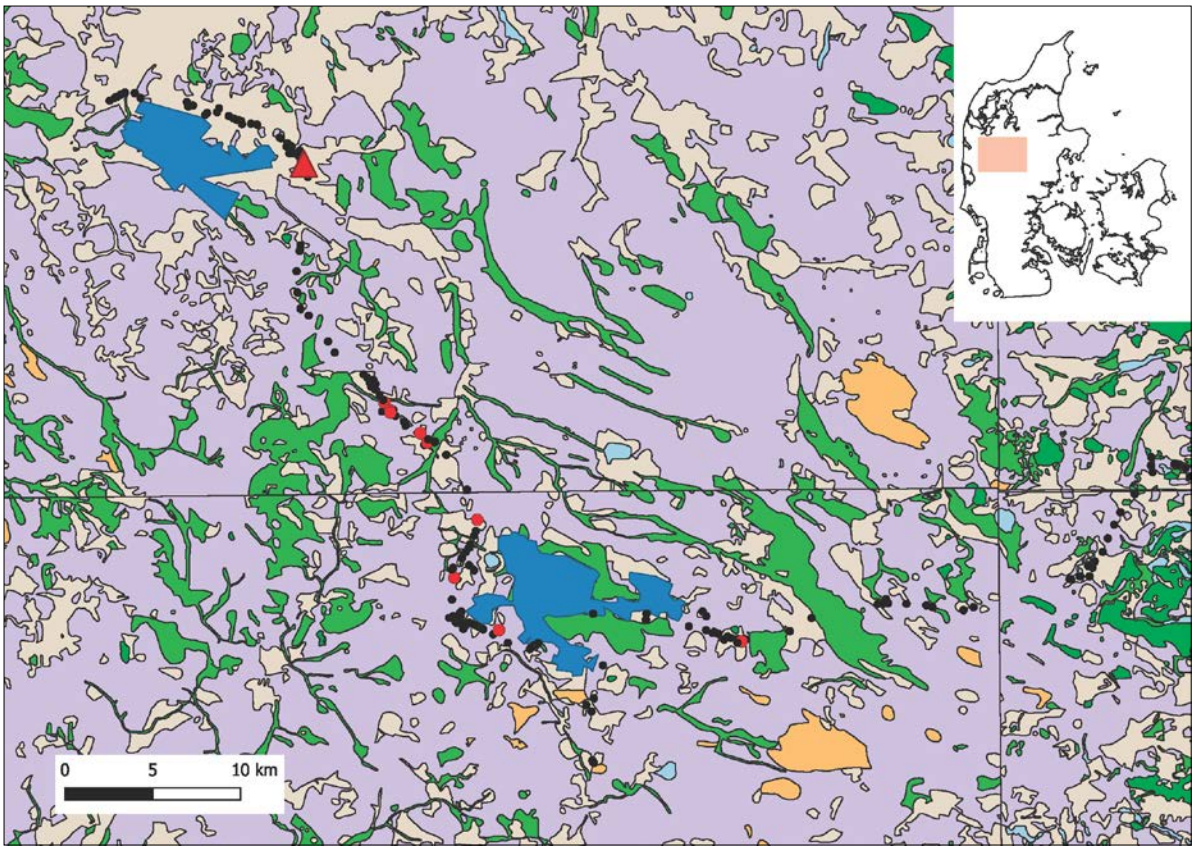

Figure 7. Sites excavated prior to the new motorways (dots) intersecting central parts of Jutland and connecting the cities (blue) of Holstebro to the north-west and Herning in central/eastern Jutland. Background map with digitised resources (customised colours) from the Royal Danish Academy of Sciences and Letters 1768–1805. Purple = heath (currently cultivated); beige = open landscape for agriculture; light green = meadows; orange = inland dunes; dark green = woodland (the more fertile eastern parts of Jutland). Red dots = medieval (main date); red triangle = the medieval site Lille Tovstrup (see Fig. 8). *(Digitisation of map by Dam et al. 2003)*

the opportunity to identify several medieval sites placed in a strategic position for exploitation of different resources on the boundaries between sandy soil, meadow and heathland (Fig. 8). The heath and its settlements differ profoundly from the landscape and settlements in the eastern and densely populated part of Jutland, where clayey soil provided background for villages and farming based on grain. The course of the motorway has thus made it possible to investigate the farms appearance, size and structure in this particular resource area and provided an important addition to the better-known farms and settlements in eastern Jutland. The importance of the landscape as a formative factor for settlement structures was also exemplified during excavations prior to the Svendborg motorway (2009), an area used in the Middle Ages and Early Modern period for pasture and archaeologically relatively unknown. The motorway cut through gently undulating landscapes where moraine hills had previously been separated by wetlands, leading to more dispersed settlement and, to a lesser extent, villages (Beck 2004, 12; Jensen 2010, 56–57).

Villages in the way

Large infrastructure projects usually avoid currently occupied villages. On rare occasions, this cannot be avoided, as was the case with the Øresund Fixed Link (1997) between Denmark and Sweden, where motorway and railway cut through the currently occupied village of Tårnby south

Figure 8. Trial-trenches and later excavation at the site Lille Tovstrup. A large area for raw-material extraction for the construction of the motorway near Holstebro led to the discovery of six medieval farms, probably not all contemporary, and an Iron Age settlement. The boundary between the farms and the arable land (green) and heathland behind (yellow) was marked by a large fence. The alignment coincides with the landscape on a cadastral map from 1817. (Risvig 2019, 86; *© De Kulturhistoriske Museer i Holstebro)*

of Copenhagen (Svart Kristiansen 2005). On the Danish side of the project, this afforded a rare opportunity to excavate a farm spanning over 800 years with up to 0.7 m depth of cultural layers, which had been protected by the more recent settlement.

Projects in villages do happen, whether in parts of the village where a previously occupied plot has become vacant, e.g. because of land reforms in the late 18th and early 19th centuries (but subsequently turned over to agriculture) or prior to new buildings on the toft, where predecessors

of the present farm can be found. However, it was not before the *Museum Act 2001* that villages became more accessible for museums. The preserved culture layers offer the opportunity to expand research questions significantly.

Other sites can also have good preservation conditions, e.g. deserted villages or single farmsteads later overtaken by forest, or coastal areas where sand drift has covered settlements and fields. Infrastructure projects in woodland areas can potentially destroy preserved features in the clearing process and need increased coordination with the local museum.

Discussion

It is important for the understanding of development-led archaeology in Denmark that few areas have preserved intact medieval settlements due to intensive agriculture. Projects will usually affect cultivated land where features above subsoil are likely to be ploughed down over time. Early field reconnaissance has rarely been able to identify those settlements, as they leave few ceramics on the surface. However, with current liberal laws on metal-detecting, some sites can now be identified prior to development by concentrations of metal finds, though waste from the farms in their fields blurs the picture. Therefore, infrastructure projects inform medieval settlement archaeology substantially.

Since the 1980s, there have been ongoing archaeological surveys related to infrastructure projects; this paper has focused on archaeology related to large, linear projects. These draw long sections through the landscape, including less densely populated areas not usually affected by other types of developer-led projects. Many infrastructure projects follow the same corridors in the landscape; together they bring not only the snapshot of a 10–200 m-wide alignment from different regions, but an added understanding of how landscapes were used over different time periods.

There has been an extraordinarily high level of activity since 2000 related to, for example, new motorway projects, widening of existing alignments, and new gas pipes. Undoubtedly, the projects have called for development of efficient methods and strategies for identifying and excavating sites prior to development. The simultaneous introduction of a new digital working environment in GIS, and digitisation of historical maps and sites in *Sites and Monuments* have proved important resources as part of this process. In many regions, infrastructure projects intersect over time and comparisons of methods and results have informed discussions on how to identify the archaeological sites. It is now evident that settlements – including medieval settlements – can be everywhere.

The development from reconnaissance to systematic trial-trenching has been important for identification of medieval sites. C14 is paramount for the correct dating of buildings and some building types have a broad dating range; within the last decade, buildings identified as medieval key types have now been dated as early as the 7th century AD. The consequent use of trenches throughout the entire alignment is also important and not only where sites could be expected according to place-names on historical maps or topography. This has identified 'unexpected' sites and added data to our understanding of medieval settlement structure.

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Assess, Dig, Avoid: Reflections on the contribution of linear infrastructure projects in advancing an understanding of medieval settlement in England, 2000–23

Richard Newman with contributions from Carenza Lewis

Introduction

A repeated lament in the recent reiterations of the Regional Research Frameworks for England is the lack of archaeological work carried out on medieval rural settlements, especially in contrast to work undertaken in towns (Petts and Gerrard 2006: 170; Newman and Newman 2020). Too much focus on development-led archaeology within the Research Frameworks may be the reason for this perception, as rural development tends to be away from the medieval centres of settlements and avoids known archaeological sites such as recorded deserted medieval settlements. Development-led archaeological work also tends by definition to be focused on development 'hotspots' (Rippon and Morton 2020: 8), leading to uneven coverage of archaeological activity across England. Much development-led archaeology, apart from a few small projects within existing rural settlement cores, tends to be structured in a way that does not favour later medieval settlement investigation. In contrast, curiosity-led public participatory archaeological research, like the CORS (Currently Occupied Rural Settlement) project in East Anglia (Lewis 2019; 2020) and community-led excavations, such as those undertaken by Altogether Archaeology in the North Pennines (Green and Frodsham 2019), make a substantive contribution to medieval settlement research. The sort of development-led archaeological projects that, superficially at least, might be expected to contribute to understanding medieval rural settlements are the large-scale infrastructure projects that have been undertaken across England in the past 25 years, especially in the south and east. A recent review of progress in medieval settlement archaeology between 2007–16 specifically notes the contribution of archaeological research within linear infrastructure developments to medieval settlement studies in the early 21st century (Rippon and Morton 2020: 1).

The study of medieval rural settlement in England

Rural medieval settlement has a strong history of substantive study in England, complemented by periodic synthesising reviews (e.g. Christie and Stamper 2012; Dyer and Everson 2012; Gerrard 2003). This work has been underpinned by long-standing public interests in local history, inspired by the pioneering work of W. G. Hoskins, Maurice Beresford and John Hurst in the 1940s and 1950s (Hoskins 1955; Beresford 1954; Beresford and Hurst 1989; 1990). The subject has benefitted immensely from the existence of energetic societies focussed on rural settlement including the Deserted Medieval Village Research Group (founded in 1952) and the Moated Sites Research Group (founded 1971), which combined in 1986 to form the Medieval Settlement Research Group.

In most parts of England, the visible remains of many deserted and extensively shrunken rural settlements have been the subject of archaeological recording and investigation (including by members of the public and community groups), using a range of techniques. Extensive enquiry-led excavations have taken place on scores of settlements, advancing knowledge and understanding of the origins, development, adaptation and contraction of rural settlement, and illuminating many aspects of life in the medieval countryside (e.g. Austin 1989; Musty and Algar 1986; Thompson 1960). The time-consuming

and destructive approach of excavation has been complemented by other methods. Topographical surveys of earthworks of abandoned settlement, aided by aerial photography, often county-based and undertaken by government agencies (e.g. RCHME 1975; 1979; 1981; 1985), have enabled the layout and extent of thousands of former settlements to be recorded across large areas (e.g. Cushion and Davison 2003; Everson *et al.* 1991; Hartley 1989), although the dates of these have not necessarily been confirmed. Another widely used technique has been fieldwalking, which has identified and dated large numbers of lost sites visible only as pottery scatters, with scores of the most useful surveys covering entire parishes or contiguous groups of parishes (e.g. Cambridge Archaeological Field Group 2015; Davison 1990; Hall 1996). Enquiry-led syntheses have mapped the form of rural settlements at a range of scales (Roberts 1987; Roberts and Wrathmell 2000) and explored their likely origins and development (e.g. Blair *et al.* 2020; Jones and Page 2006; Lewis *et al.* 1997; Rippon 2022; Roberts and Wrathmell 2002). Occasional edited monographs have reviewed the state of knowledge across the country (Christie and Stamper 2012; Christie, Stamper and Wrathmell, in prep.). Periodic Resource Assessments of known archaeology have been used to inform the development of Research Agendas, which have included medieval rural settlement (e.g. Lewis 2006).

The study of medieval rural settlement in England could thus be said with some justification to be well advanced. Much of this work, however, has been focussed on deserted, frequently nucleated, sites. Non-nucleated, specialist and seasonal settlements have been studied more frequently from the 1980s onwards, but coverage is still sporadic and sparse in comparison to nucleated sites (e.g. Antony *et al.* 2019; Woolhouse and Mlynarska 2024; Wrathmell and Young 2012: 263–5). Moreover, medieval settlements which are inhabited today (known as currently occupied rural settlements or CORS) have, until recently (Lewis 2019; 2020), been somewhat overlooked.

The development of the legal framework for infrastructure archaeology in England

In England, legislation intended to protect archaeological remains (including those of medieval rural settlement) threatened by development (including for infrastructure) has developed over decades. In the post-war era, much of the growing awareness of the damage caused to archaeological remains by reconstruction and new development for housing, commerce, transport and industry was focussed on *urban* contexts (e.g. Biddle and Quirk 1963), with a key influential review published by the Urban Research Committee of the Council for British Archaeology (Heighway 1972). In many *rural* settlements, however, medieval remains were for decades also threatened with destruction with little official enthusiasm for *in-situ* preservation and minimal resources to excavate. At Mucking in Essex, excavation between 1965 and 1978 of a multi-period site extending across 18 hectares and including several phases of a large, shifting early medieval rural settlement, carried out with minimal funding at a frantic pace needed to keep ahead of the advancing quarry. In total, 44,000 features were recorded for posterity, but lack of funds meant post-excavation and publication took decades (Hamerow 1993; Evans 2015). Likewise, at Raunds in Northamptonshire from the mid-1970s, settlement remains of later medieval date were excavated in advance of housing development, gravel extraction and road construction (Auduoy and Chapman 2009), contextualised by fieldwalking across several parishes (Parry 2006). As at Mucking, a lack of funding delayed post-excavation and publication of Raunds for decades, ultimately only achieved with funding from the national heritage agency, English Heritage (now Historic England). A better model was offered at Milton Keynes in Buckinghamshire, where an entire new town enveloped more than a dozen rural parishes. Here, the Milton Keynes Development Corporation (responsible for planning and building the new town from its designation in 1967 until the early 1990s) set up and funded the Milton Keynes Archaeology Unit, thereby integrating systematic, developer-funded archaeology into city planning and infrastructure development. Fieldwork included excavation of many medieval rural settlements (Mynard 1994) with major programmes including Great Linford (Mynard 1992), Caldecotte (Zeepvat *et al.* 1994),

Tattenhoe and Westbury (Ivens *et al.* 1995), as well as landscape surveys including extensive ridge-and-furrow field systems (Croft and Mynard 1993). All were published in an exemplary series of volumes by the Buckinghamshire Archaeological Society.

Comprehensive publications of archaeological investigations at places such as Mucking, Raunds and Milton Keynes have hugely benefitted medieval settlement studies in England, but their delivery was often beset by lengthy delays. These delays to publication were caused by a lack of provision for analysis and dissemination of project results within legislation to mitigate threats to archaeological sites subject to development. The *Ancient Monuments and Archaeological Areas Act* (1979) and *National Heritage Act* (1983) introduced formal systems of oversight and scheduling for 'nationally important' archaeological sites, but did not directly address the issue of funding for most development-led archaeological investigation or publication. In 1990, however, the publication of *Planning Policy Guidance 16* (PPG 16) officially integrated archaeology into the planning process across England and Wales, stating that while preservation *in situ* was preferred, developer-funded 'mitigation by record' should be conducted where this was not possible. Consequently, developers became responsible for funding archaeological investigations, starting with initial desk-based assessments, through excavation and recording to (in theory) analysis and archiving. The Council of Europe's 1992 *Convention on the Protection of the Archaeological Heritage* (known as the 'Valletta Convention') drew significantly upon the principles of PPG16, most notably regarding integrating archaeology into planning and establishing the 'polluter pays' approach.

Developer-funding for archaeological projects revolutionised archaeological practice, initiating a massive surge in archaeological projects of all sizes from single buildings to large infrastructure programmes. Changes to legislation in England and Wales since PPG16 include the 2012 *National Planning Policy Framework* (NPPF) and its subsequent revisions, all (to date) reaffirming developers' responsibilities, including to post-excavation analysis, archiving and publication. Professional standards for fieldwork, post-excavation and dissemination have been established by the Chartered Institute for Archaeologists (CIfA), who publish supporting guidance resources, although CIfA membership is not mandatory for archaeologists to practise in the UK.

Two systems are used to curate and make available the outcomes of archaeological investigations in England. Before fieldwork begins on any site, a record must be created on OASIS (*Online Access to the Index of Archaeological InvestigationS*).[1] As fieldwork is completed, the OASIS record is updated with a summary of results, the periods for which material has been encountered, statements on the significance on the findings, details of the archive deposition, and links to any Regional Research Framework themes. The OASIS record enables information to be passed to the Historic Environment Record (HER) within which the site lies, and to the national Archaeology Data Service (ADS),[2] which curates and archives digital files and makes fieldwork reports freely available online, including for access to the wider public. The ADS Library and catalogue can be searched using any term (such as a place-name or site type) or by author or organisation name.

Although the application of approved professional standards can be difficult to monitor and enforce on some development-led archaeological projects, this is not usually the case with infrastructure projects. Adherence to standards is part of the project-monitoring and risk-reduction strategies, which form an integral part of the environmental assessment approach providing the umbrella project structure for the archaeological investigation of infrastructure developments. As of 2025, the developer-funding model is fully embedded in English planning law, although it cannot be guaranteed that such protection might not be watered down in future iterations of planning legislation.

[1] https://oasis.ac.uk
[2] https://archaeologydataservice.ac.uk

Infrastructure development and archaeology

Infrastructure projects requiring archaeological investigation include linear projects for new transport routes, pipelines and power-cable trenches as well as area works for solar farms, quarries and so on. In England in the 21st century, most of these projects are no longer overseen through the local authority planning system, but are moved through the planning process by central government agencies under Development Consent Orders (DCOs). Generally, this means that those carrying out such schemes agree to abide by the rules set out by central government for dealing with any archaeological remains discovered through the development process. The level of archaeological investigation carried out on such schemes, and how this has increased in recent years, is illustrated by the amount of money spent undertaking archaeological works: in the 1990s, the total cost of fieldwork on a major scheme in a rural environment was in the hundreds of thousands of pounds sterling, now it is often multiple millions.

Archaeological responses to linear infrastructure developments as part of the planning system began in England in the late 1960s and 1970s with the extension of the motorway network (see Fowler 1979; Fowler and Waters 1979; Fasham and Whinney 1991). As noted above, by the later 1980s a more effective approach to such developments was evolving in response to the professionalisation of archaeology, its incorporation within local authority planning advisory systems under the aegis of PPG16 and the codification of Environmental Impact Assessment (EIA) methodologies. By the early 1990s, a systematic archaeological approach to linear infrastructure developments was in place. Proposed schemes were assessed, major sites avoided where possible, and sites that could not be avoided were excavated or otherwise recorded (Newman 1993).

In the early 1990s, with the then national government's focus on road improvements and network expansion, the focus of thinking in 'commercial' archaeology was on developing methodologies to most effectively assess and record archaeological remains on vast linear infrastructure projects, rather than on analysing the meaning of the results. In England, there is thus a good four decades of archaeological data gathered from linear infrastructure developments, yet it is only now that archaeologists are beginning to ask what all this new data means, beyond the creation of new entries within Historic Environment Records.

Methods

In essence, little has changed in the broad methodological approach to the archaeology of linear infrastructure schemes in England since the early 1990s. The avoidance of detrimental impacts on significant sites is easier to achieve through well-evidenced research rather than through confrontational public inquiries. The greatest advance, however, has been in the increasing use of digital methods for research and analysis. In the past 30 years at least, computerisation has increased both capacity and capability for assessment and analysis. Developments include the availability and use of GIS as an analytical tool, the internet as a research tool, online satellite imagery, Lidar data and multi-spectral analytical techniques.

The initial response to any scheme is to identify the known archaeological resource, to scope the likely unknown resource and to quantify the risk both pose to the scheme in terms of the likely required mitigation. Atop the list of initial tasks is the identification of sites that might pose an existential threat to the project's viability. World Heritage Sites and Scheduled Monuments come into this category. Generally, if possible, these 'designated' sites will be avoided at an early stage in scheme consideration. For other known ('non-designated') sites, a balance will be sought between the costs of archaeological investigation, both direct and indirect, through possible delays to

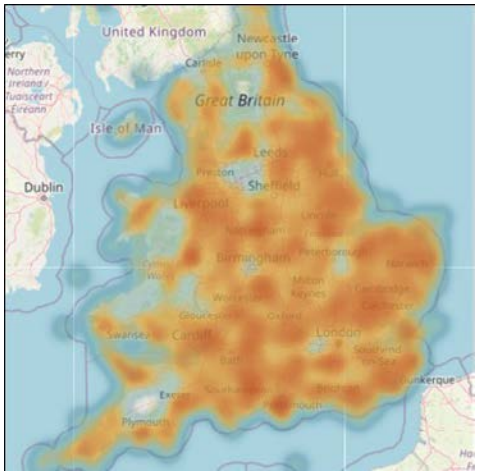

Figure 1 (left). Screenshot from the online Archaeology Data Service (ADS) showing the density of recorded archaeological resources of medieval date (AD 400–1550).
(https://archaeologydataservice.ac.uk/data-catalogue/)

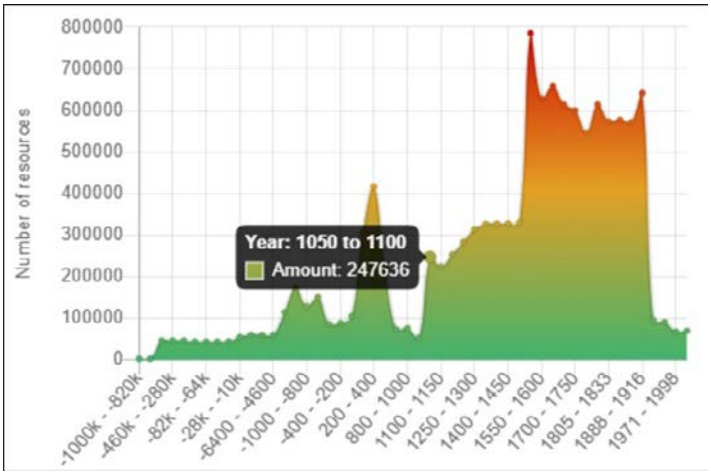

Figure 2 (right): Screen shot from the online Archaeology Data Service (ADS) showing the number of resources of different dates. *n.b.* the timeline along the x-axis varies for different periods.
(https://archaeologydataservice.ac.uk/data-catalogue/browse/when?q=)

construction requirements and the costs of avoidance. As far as possible most linear infrastructure developers want to avoid unknowns and obtain a clear idea of the duration and costs of the likely mitigation archaeological works. Often, however, within an infrastructure scheme there can be considerably more flexibility in relation to this ultimately undeliverable need for certainty, than in some other forms of development programmes.

Medieval rural settlement and infrastructure archaeology

A sense of the scale of discovery of medieval archaeology in England, mostly from the 1980s onwards and mostly developer-funded, can be gained from the ADS, which shows resources for the medieval period (AD 400–1550) to be widespread in all parts of England (Fig. 1). Dynamic graphics allow the number of recorded items of different dates to be seen, including those of medieval date (Fig. 2). This shows that, compared to the Roman period, for which 803,135 resources are recorded across the 400 years between AD 0–400 (the main period of Roman occupation in Britain), just 149,927 early medieval resources (dating to AD 600–1000, i.e. also over 400 years) are recorded; however 2,306,968 resources are recorded for the 400 years of the late medieval period between 1050–1450. This shows not only what a vast number of medieval features have been found, but also how plentiful they are compared to other periods. Within the medieval period, it is also clearly apparent that very many fewer discoveries are of early medieval (5th to early 11th centuries) than later medieval (later 11th to 16th centuries) date. Specifically, when searched in February 2026, ADS included 220,090 records dating from AD 400–600; 73,604 from AD 600–800 and 76,323 from AD 800–1000. Once into the later medieval period, the numbers surge (*n.b.* the following numbers relate to a period of just 50 years, not 200 as for the early medieval period): 52,434 from AD 1000–1050, 247,636 from AD 1050–1100 and 224,485 from AD 1100–1150 – after which the number climbs steadily to 327,203 from AD 1300–1350, from when the number flatlines until AD 1500–1550 when it leaps to 786,406.

Not all of the above records will be from infrastructure archaeology, of course, although many will be, because these works are so large and they discover many medieval sites and features. As one example, along a 19-km stretch of the new A120 road between Stansted Airport and Braintree in north-west

Essex, archaeological investigation funded by the Highways Agency identified 53 sites and excavated 47 of them, eleven of which yielded medieval material (Timby *et al.* 2007: 1). This equates to one site of possible or confirmed medieval date every 2 km or so along this linear transect, which was, in effect, a random sample of the Essex countryside. Although not all the medieval sites and features found were settlements *per se*, they all attest to activity in the medieval countryside. The A120 fieldwork was published promptly in a monograph that was concise enough to be accessible, but includes detailed thematic discussions: those of high relevance to medieval rural settlement include 'What happened to the Saxons?' (Timby *et al.* 2007: 149–156) and 'Lords or peasants? The Medieval and post-medieval evidence' (ibid. 157–175). Chapter 6 ('Continuity and discontinuity') (ibid. 177–192) includes a section discussing medieval rural settlement (ibid.: 184), noting that after a complete absence of 5th- to 10th-century material (interesting in itself): 'In medieval times the settlement pattern seems to indicate a rural landscape containing a number of dispersed farmsteads and manorial complexes with agriculturally related buildings, such as windmills and low scale industrial activity. Medieval activity along the A120 comprised two mid-12th to mid-14th-century farmsteads ... a 13th- or 14th-century windmill ... and a 12th-century pottery kiln ... where subsequently further kilns have been located ... Several medieval sites were also excavated ... mainly of 12th–13th-century date including a complete farmstead ... small medieval building and an associated windmill ...'. Remembering this investigation was a random sample of one stretch of the landscape, the medieval countryside is shown to have been remarkably busy, until 'As along the A120 and across Essex in general there seems to have been widespread abandonment of sites during the 14th century'.

This example shows the potential of infrastructure archaeology for advancing knowledge and understanding of medieval rural settlement. However, this can often face many challenges.

Medieval rural settlement archaeology: challenges and responses

Medieval rural settlement archaeology faces a distinctive set of challenges when it comes to assessing archaeological remains for linear infrastructure projects. Not least, it is bisected by a disciplinary and evidential divide. On one side is the early medieval period which, along with at least rural civilian Roman Britain and non-monumental prehistory, is for the most part not decipherable from maps and documents and is not upstanding as structures or earthworks, and is thus likely to be invisible and unknown. On the other side are the high and late medieval periods, which can seem well documented and to an extent readable from maps, with many occupation sites either surviving as still-functioning settlements or as identifiable earthwork complexes. For too many consultants and contract archaeologists working in the commercial sector, the later medieval landscape is erroneously assumed to be wholly visible, identifiable and thus readily assessable, with an assumption that if known sources (archaeological or historical) do not indicate the presence of a site of this date, there will be none there. Division between the periods before and after the Norman Conquest (1066) means that in linear infrastructure projects, approaches to data retrieval for the early medieval period differ considerably from that for the later medieval period. Consequently, in this paper the pre-Conquest and post-Conquest periods are separated.

Early medieval settlement archaeology (5th to 11th centuries)

Other than some churches, settlement remains of early medieval date (here defined as AD 410–1066) are not usually visible on the ground surface as upstanding remains or earthworks, at least in the south and east of England. Those that lie outside of existing settlements, such as villages with a church of early medieval origin, are difficult to identify from documents, although in Environmental Impact Assessments (EIA) a greater use of Domesday Book records (a survey of most landholdings in England completed in 1086) can/would be helpful. Early medieval sites recorded in local authority

Historic Environment Records (HER), where not identified from documents, will have been previously discovered either accidentally, as a by-product of development, or as a result of area-based research. For an archaeological assessor of a linear infrastructure project, it is difficult to anticipate early medieval settlement remains that are not already known. Maps and place-names may help a little but will generally lack spatial or temporal precision. Aerial photography, satellite imagery and Lidar data may show enclosures, but as early medieval domestic, industrial, and agricultural structures are usually post-built and often unenclosed, new complexes will seldom be identified. A lack of early medieval earthworks is typical of eastern England. Enclosures identifiable as crop- or soil-marks will generally not be datable and thus early medieval evidence will be difficult to distinguish from later prehistoric remains. Geophysics will provide little more chronological precision than other remote-sensing techniques. Even when evaluation trenching is undertaken, occasionally before, but often after the publication of the Environmental Impact Assessment and the granting of a Development Consent Order (DCO), a single pit, post-hole or ditch section, often lacking finds, will not confirm the presence of early medieval remains. One solution sometimes put forward is a metal-detector survey of a linear infrastructure scheme's entire route; this increases the likelihood of early medieval site identification through the recovery of metal small finds.

In 2017, metal-detection and (where possible) archaeological fieldwalking was carried out on the East Anglia One cable trench project (Stoakley 2017), which stretched for 34 km from the mouth of the Deben estuary in south-east Suffolk and westwards around the north of Ipswich (Fig. 3). The employment of this evaluation technique was an afterthought, undertaken after the trial-trenching and to an extent as a response to the lack of early medieval evidence retrieved. Clearly for a scheme which passed within a couple of kilometres of the famous Anglo-Saxon sites of Sutton Hoo and Rendlesham, a desire to identify early medieval sites was understandable. As a result of undertaking this work across the entire cable route, three early medieval metal objects were recovered from three sites. However, only one of the identified locations turned out to have early medieval remains surviving below the plough zone.

The difficulties of identifying early medieval remains, using the suite of techniques currently practically applicable within the assessment and evaluation phases of linear infrastructure projects, mean that the opportunity to assess and avoid significant remains is frequently unavailable. Consequently, early medieval settlement remains are often discovered unexpectedly during the mitigation phase of a project, usually on sites that have been identified as having archaeological potential, but where the date of potential features has not been defined. On most projects where mitigation fieldwork is targeted at cropmarks or geophysical anomalies not clearly dated by evaluation, the potential of such sites remains unknown at the commencement of the mitigation phase of fieldwork. Often the multi-period nature of the remains may not be appreciated, and an early medieval phase can easily remain hidden until excavation.

Such was the situation at some sites on the East Anglia One cable trench scheme, where ten medieval sites were identified along a transect *c.* 20 km long, four of which proved to be early medieval. One defined site near Little Bealings (Fig. 3, Site 4) had been identified tentatively at the assessment stage as having Romano-British potential, this was subsequently confirmed by trial-trench evaluation (Wardell Armstrong 2017–19). Under excavation, the site did indeed have a large aisled building of Romano-British date, believed to be an agricultural building forming part of a likely villa complex. However, this was surrounded by sunken-featured buildings which were part of a likely 5th-century Late Antique phase. In addition, one post-built, hall-type structure was identified that was seemingly occupied sometime in the 7th to 8th centuries. The abundant artefactual assemblage from the Little Bealings site was dominated by Middle Anglo-Saxon material (7th to 9th century). No evidence of continuity between the Late Antique and early medieval phases was recognised. Interestingly, a

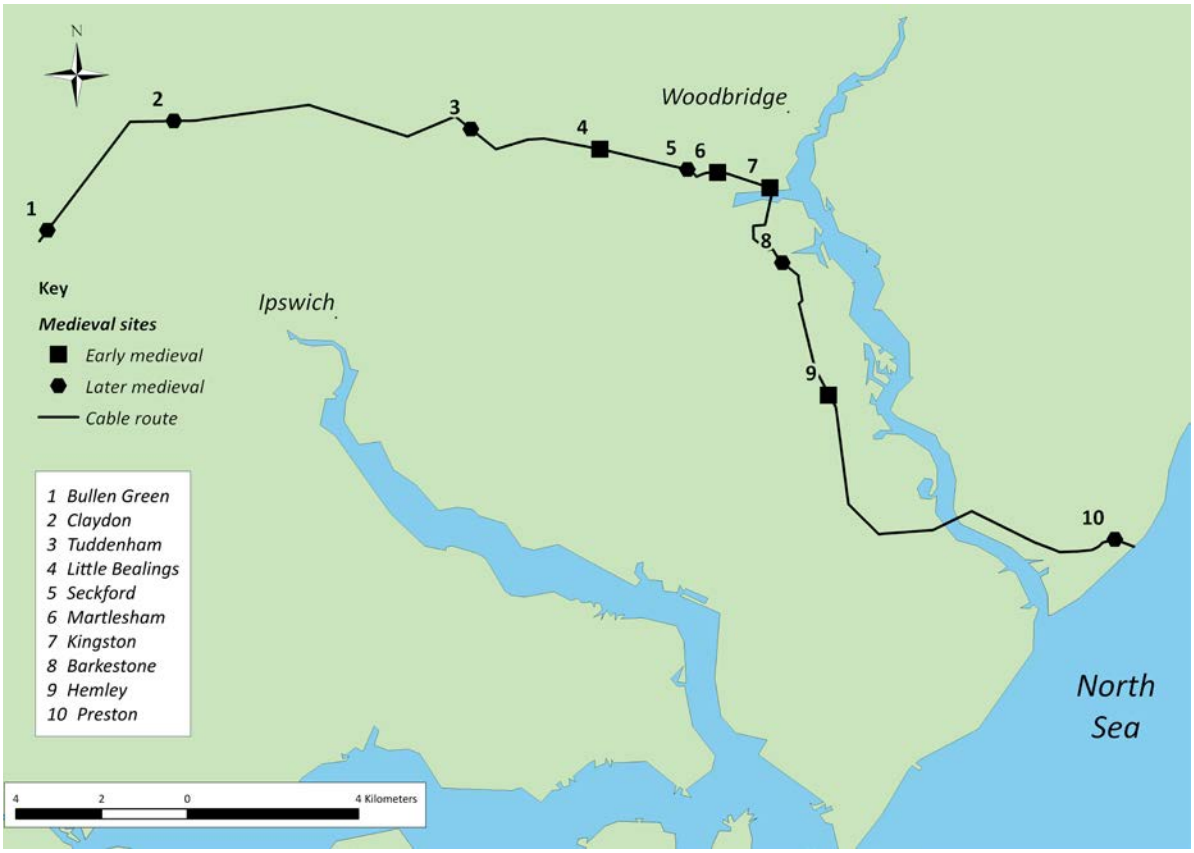

Figure 3. Medieval settlement sites along the East Anglia One cable route.

similar structure was found on a predominantly Late Iron Age and Romano-British site on the Dogger Bank cable trench in East Yorkshire in an area suggestively known on 19th-century maps as 'Burnt Tofts'. Unfortunately, only one fragment of possible post-Roman ceramic was found associated with the post-built structure, but stratigraphically it related to enclosure ditches containing 9th- to 10th and 11th- to 13th-century pottery (Jarosz-Blackburn 2022). The early medieval potential of the site was not recognised during the assessment and evaluation phases of the project.

A few kilometres to the east of Little Bealings, within Martlesham, near Woodbridge (Fig. 3, Site 6), a site was identified during assessment and evaluation on top of a small hill. It was considered following trial-trench evaluation to have moderate potential of undefined date. Under excavation the sites provided to have Neolithic, Romano-British and Middle Anglo-Saxon phases, the most significant of which was the latter. This early medieval phase comprised boundaries and a series of post-built hall-like structures. Situated on a hill above one of the foci of the polyfocal later medieval settlement of Martlesham, it has been postulated that the Middle Anglo-Saxon settlement remains may represent an early manorial caput site (Wardell Armstrong 2017–19).

Six kilometres south of Martlesham Creek, a further site was found within the medieval vill of Hemley (Fig. 3, Site 9). The site was initially identified and targeted as having Iron Age and Romano-British potential. Enclosures dating to those periods were indeed found during excavation, but at the southern end of the excavation area early medieval features were also found, including a possible enclosure/boundary ditch and waste pits containing Middle Anglo-Saxon ceramics and kiln lining (Wardell Armstrong 2017–19). This waste deposition is suggestive of a nearby habitation focus.

In conclusion, for the early medieval period, where sites have not been previously recognised, site identification during the early assessment and evaluation phases of a linear infrastructure project can be difficult. Evidence of occupation is frequently missed or at least misidentified where it forms part of multi-period sites. While the early medieval date of such sites will subsequently be identified during mitigation works, the opportunity for avoidance and thus preservation *in situ* will already have been lost. Moreover, unless there is sufficient understanding on behalf of the developer and flexibility built into the archaeological project design, the investigation of these sites may be compromised by a lack of pre-allocated resources. Fortunately, on the East Anglia One project this did not happen and once the early medieval sites are fully published they should contribute significantly to an advancement in knowledge.

Later medieval settlement archaeology

One of the key distinctions between later medieval archaeological remains and those of earlier periods in relation to linear infrastructure schemes lies in the nature and implications of route choice. For the early medieval period, the choice of route for a linear project is largely random, for remains of *later* medieval date, it is clearly selective. Routes of all types of infrastructure will where possible avoid currently occupied rural settlements (CORS), not to conserve archaeological remains but to avoid impacting presently inhabited properties. Route planners will also avoid 'showstoppers' such as scheduled medieval earthworks and will usually also avoid non-designated upstanding earthwork sites comprising settlement remains identified during the scoping or assessment phases of a project. Consequently, currently occupied rural settlements of medieval origin and known deserted medieval villages (DMVs), hamlets or farmsteads recorded in Historic Environment Records will be deliberately avoided at the route-planning stage. It is this approach that ensures many linear infrastructure projects cause a proportionately low incidence of impact on later medieval settlement remains. For example, the recent Dogger Bank onshore works cable trench in East Yorkshire encountered no later medieval remains other than a few boundary features and plentiful evidence for ridge and furrow.[3] The route assessment could clearly and accurately state, based on known sites recorded in the Humber Historic Environment Record and on 19th-century Ordnance Survey maps, that the route avoided the sites of likely medieval settlements (rural or urban) but cut its way through a series of definable medieval open common fields.

North Yorkshire

Between 2003 and 2006, the A1 roadway in North Yorkshire was upgraded to motorway status. The route included two sections of new road measuring 16.5 km and 5.3 km long respectively. The route of the road was constrained by the pre-existing route, which itself already bypassed any existing settlements. At the assessment stage most of the route was noted as crossing through the field systems of this champion landscape of nucleated settlements surrounded by open common arable fields. As would be expected in such an area, the focus of the site discovery was on the later prehistoric and Romano-British phases of landscape evolution (Brown *et al.* 2007). Unusually, one significant medieval site was not avoided but investigated. Near Wetherby, a likely medieval estate centre was identified during the assessment as the site of Ingmanthorpe Hall (Fig. 4). Excavation, however, found not just the remains of a moated manorial site but also, facing it across a road, a line of tofts, comprising a settlement occupied between the 12th to 14th centuries (Heawood and Howard-Davis 2007: 181–206). The existence of this settlement was unsuspected by the archaeological contractors before the site was excavated.

[3] https://doggerbank.com/press-releases/unearthing-ancient-history-on-east-yorkshire-cable-route/

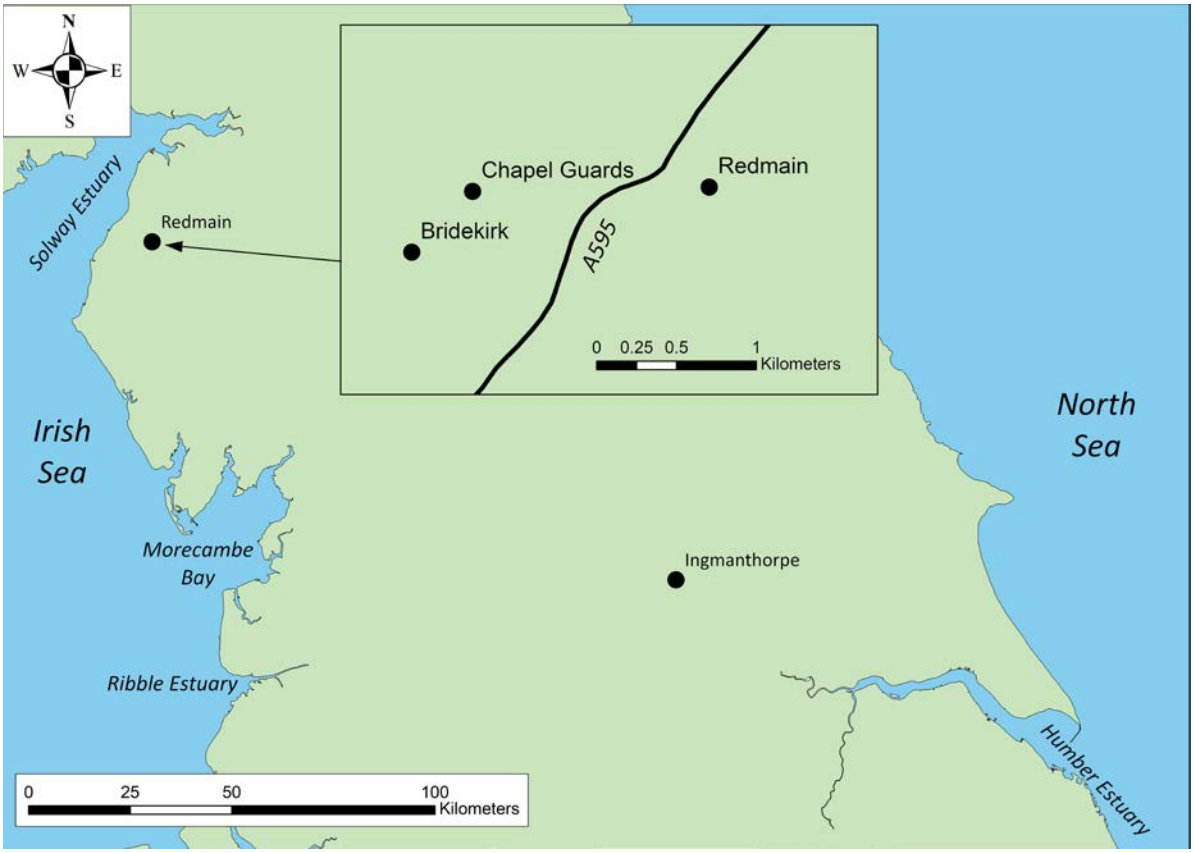

Figure 4. The locations of Ingmanthorpe and Chapel Guards in northern England.

Cumbria

Route selection operates under different constraints dependent on the nature of the infrastructure and this influences the likely impact on medieval settlement. For the construction of water pipelines, for example, the preference is for the route to be close to roads for reasons of access, and they also need to follow gradients to take advantage of gravity. Railways are, of course, similarly constrained by gradients. This restricts the placement of the infrastructure route and thus the capacity to avoid obstacles, such as known archaeological remains. A North-West Water pipeline in Cumbria in 2014–15 was routed to avoid existing settlements, including the hamlet of Redmain (Fig. 4), a settlement whose medieval origins are readily readable at ground level and from maps and aerial imagery. There was only limited flexibility in route positioning and, whilst this allowed its impact on some excellent ridge-and-furrow earthworks to be reduced, it did not allow for the avoidance of a later medieval site discovered during the route assessment. The site lay between the settlements of Redmain and Bridekirk within the township of Redmain (Fig. 4, inset). It was identified initially from Google Earth satellite imagery. Documentary research indicated that the site was part of a grange of Guisborough Priory and the area of the grange demesne was known as the Trinities (Carl, Newman and Newman in prep.). Trial-trench evaluation revealed two walls in separate locations, later medieval artefacts and some probably residual Roman material. The finalisation of the pipeline route avoided one wall, but could not be deviated to avoid the other. An excavation ensued and a later medieval stone building was found to be built above a Romano-British stone-built structure (Mann 2019). Further documentary and landscape research, un-associated with the post-excavation assessment, found the medieval building to be part of a wider landscape of grange-associated remains. The site appears to have had an upstanding building as late as the 18th century, when it was known as Chapel Guards.

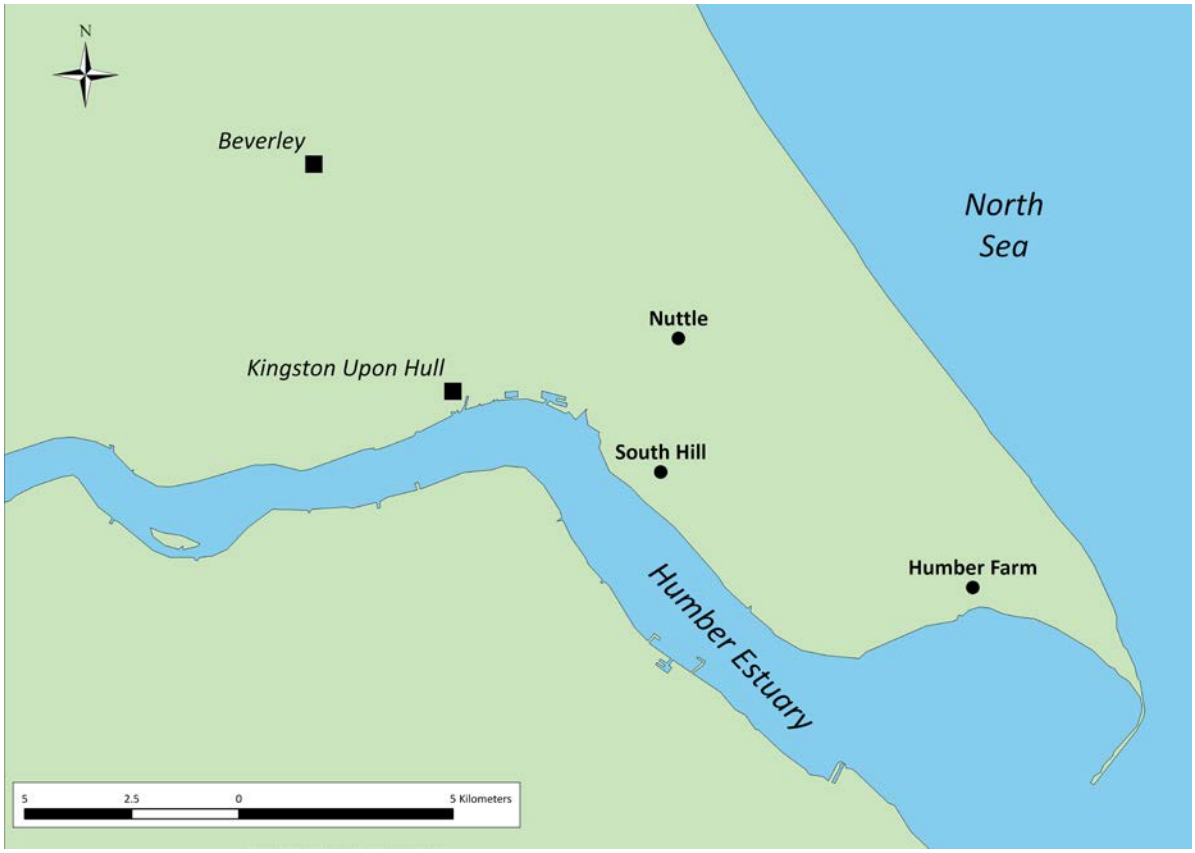

Figure 5. Medieval settlement sites identified along linear infrastructure routes in southern Holderness, East Riding of Yorkshire.

A later medieval burial found within the stone building and 18th-century antiquarian accounts indicate that the structure investigated was the chapel of the grange (Carl, Newman and Newman in prep.).

East Yorkshire

The impact of varying types of linear infrastructure projects within a champion landscape,[4] where scheme route flexibility should allow for site avoidance, can be considered by examining the East Riding of Yorkshire (Fig. 5). Even in such areas, however, competing environmental priorities may mean that avoidance of known significant historic environment remains is not always achievable. East Yorkshire has probably seen one of the highest densities of linear infrastructure projects in England thus far in the 21st century. The reasons are its location on the North Sea littoral which make it a convenient landfall for gas from the oil and natural-gas fields in the North Sea and, more recently, for offshore wind-generated electricity. In comparison to alternative landfalls, East Yorkshire is also largely rural, unlike more highly urbanised Teeside, and its terrain is unchallenging, unlike the North Yorkshire Moors and largely unprotected by landscape designation. Moreover, East Yorkshire is convenient for the power network due to its proximity to the major former coal-fired power stations and their associated grid connection and distribution network at Salt End and Drax (E. Yorks.).

[4] The differences in medieval settlement patterns and character between champion and non-champion landscapes in England have been previously highlighted in much writing on medieval landscapes and settlements, most notably by Rackham (1996), Williamson (1988; see also Williamson *et al.* 2013) and Rippon (2004). These differences are not always acknowledged by archaeological consultants in the cultural heritage assessments produced for linear infrastructure schemes.

Later medieval settlement is a particularly distinctive aspect of the historic landscape of Yorkshire's East Riding. In general, the late medieval East Riding was a classic champion landscape, featuring nucleated settlements surrounded by regular two-, three- or four-field systems, with the occasional isolated farmstead, which was often moated. Most of these sites are known and recorded on the Humber Historic Environment Record, some are protected through scheduling and potential new sites can be readily identified from Google Earth satellite imagery and Lidar data where they often show as earthworks, soilmarks or cropmarks. Consequently, linear infrastructure schemes can usually be easily routed to avoid later medieval sites and for the most part they do. There have been 24 such schemes in the East Riding in the past two decades and only three have revealed significant medieval settlement remains. The most significant has probably been the current A63 excavations within the urban area of Hull, where the site of the original 12th- to 13th-century settlement of Wyke in Holderness appears to have been encountered. In rural areas, very few medieval sites have been discovered, with newly discovered sites overwhelmingly of prehistoric or Romano-British date.

The most extensively published of these infrastructure projects is Network Archaeology's monograph on the results of the Easington to Ganstead gas pipeline (Glover *et al.* 2016). Typically, of the archaeological results of all the linear infrastructure projects in the East Riding, the most frequently investigated sites were of Iron Age and Romano-British date. In the main, later medieval remains encountered comprised agricultural features. One area of later medieval settlement was found at Nuttle within the parish of Burstwick (Fig. 5), where kilns and other features of 12th- to 13th-century date were investigated (Glover *et al.* 2016: 40–3). The presence of the site was known prior to the assessment of the pipeline scheme, but it was not avoided during route selection as the full significance of the site was not recognised in advance. The site is the settlement associated with the medieval manor of Nuttle, a sub-manor of the Lords of Holderness's manor of Burstwick, which was the caput of the lordship from *c*. AD 1200. However, although archaeological remains had been recorded, the site had not been recognised as the settlement of Nuttle, nor had it been understood in its historical context (Newman, forthcoming). A further East Riding scheme that has encountered medieval settlement remains is the Easington to Salt End gas pipeline, where previously unknown isolated farmstead sites were noted (Burgess and Daniel 2018: 24–7 and 32–8).

The conclusion is that even within champion landscapes, on linear schemes that have sufficient engineering flexibility for movement, some medieval sites will fall through the assessment 'net'. On such schemes, assessment should allow the recognition of medieval sites and thus enable their avoidance, but inadequate assessment, inadequate existing records informing the assessment, or the small scale of some settlements, mean that some sites are unrecognised or unappreciated in advance and thus they may be exposed and impacted by the development scheme. Nevertheless, for the most part, where the infrastructure scheme is not too geographically restricted by its engineering or service-provision requirements, later medieval settlements should be avoidable following the assessment phase in champion areas.

East Anglia

In areas outside the champion landscapes and their nucleated settlements, the outcomes for later medieval settlement archaeology as a result of the impacts of linear infrastructure projects can be very different. The East Anglia One cable trench is a good example of this (Fig. 3). Initially, the historic environment assessment stated that later medieval remains were unlikely, as later medieval settlements tended to be situated where modern settlements occur (Wardell Armstrong 2017–19). This could be deemed an overly simplistic statement for any area of England, but while (as discussed above) it is almost justifiable in East Yorkshire, it is certainly not so in Suffolk. Southern Suffolk

today features a mixed settlement pattern of mostly nucleated villages that are often the result of post-medieval coalescence of dispersed and poly-focal settlements, as well as isolated churches and myriad isolated farmsteads or small hamlets. For those who can read the landscape, it contains settlements that grew on the edges of commons or wastes in the later medieval period, and there is extensive evidence not just of desertion, but shrinkage and shifting. In essence, it is complicated. In south Suffolk, routing linear infrastructure to avoid today's rural settlements is absolutely no guarantee of avoiding remains of later medieval settlement.

The inaccuracy of the initial assessment for the East Anglia One cable trench development became obvious at the evaluation stage, with previously unrecorded later medieval settlement remains highlighted in six areas through excavation and subsequent documentary research (Fig. 3). At the western end of the route, three separate sites investigated parts of the settlement of Bullen or Bullen Green. Excavation, combined with documentary research, indicated that Bullen was a post-Conquest settlement of a type known locally as a tye (Horsley 2019a; 2019b). A similar settlement was identified and subsequently excavated on the line of the HS2 railway line at New Years Green in Essex (Wardell Armstrong, pers. comm.). These dispersed settlements sited, often at intervals around an area of common grazing are only just starting to be identified and investigated archaeologically. Elsewhere along the East Anglia One route, at Claydon, an isolated holding was identified close to the river Lark and at some distance from the medieval parish centre. The one building excavated contained a drying kiln and it was considered that the structure may have been linked to a watermill and dated to the 11th to 15th centuries. At Tuddenham, a series of enclosures containing kilns and a probable manorial site were identified at about 1 km east of the parish church, ceramic dating suggested 12th- to 14th-century occupation (Caygill-Lowery 2020). Further east, at Seckford, during the mitigation fieldwork another medieval rural settlement site was recognised from field observation and documentary evidence and subsequently confirmed by excavation. There, occupation appears to have commenced before the Norman Conquest and to have extended into the early 17th century. The excavated toft, based on Domesday Book evidence, probably formed part of a much larger dispersed settlement of which just the manorial hall (now a hotel conversion of a 16th-century mansion) still survives (Wardell Armstrong 2017–19). Another isolated site, probably a farmstead, was found at Kingston, a vill that seems to have undergone shrinkage in the late 14th century (Wardell Armstrong 2017–19). A further isolated building was found to the south, within Martlesham parish. The structure appeared to have been occupied in the 12th to 14th centuries. It lay on the sides of a valley where evidence of later Anglo-Saxon and later medieval occupation had been found previously at three nearby sites in the form of artefact scatters. Together, the evidence has been interpreted as the likely site of a small, dispersed settlement noted in Domesday Book as Barkestone (Wardell Armstrong 2017–19). Finally, at the mouth of the River Deben, a settlement identified from documents as Preston, a hamlet of the vill of Bawdsey, was identified through domestic remains and possible port infrastructure associated with the 13th- to 14th-century port of Bawdsey (Stansbie and Cuthbert 2019).

The conclusion is that in non-champion landscapes, such as in Suffolk and Essex (home of the A120 excavations discussed above), the recognition of later medieval settlement is much more difficult at the assessment stage than it is in champion landscapes. Linear infrastructure schemes, however, are proving useful tools for the discovery of previously unknown medieval rural settlements in non-champion landscapes and for advancing the understanding of some of the less well-researched forms of medieval rural settlement.

Conclusions

From a developer's perspective, unknown archaeological remains requiring un-planned time and money to investigate are one of their identifiable project risks. As part of any risk management strategy for archaeology, the reduction of unexpected discoveries will be paramount. However, for the archaeologist in England, it can be very difficult to identify undocumented early medieval sites within programmes of assessment and evaluation for linear infrastructure schemes. Simply acknowledging this problem within such scheme proposals would be an improvement from a risk-management point of view. For the earlier medieval period, linear infrastructure projects offer an effective opportunity to discover and investigate new rural settlements.

For the later medieval period, in some types of rural landscape the recognition of settlement remains at the assessment stage is easier than it is for early medieval settlement remains. In champion landscapes, it should be possible to identify and avoid most, if not all, later medieval settlement remains, though the capacity for this is sometimes dependent on the nature of the infrastructure scheme. Where avoidance is not possible, good assessment should at least mean that surprises do not occur and mitigation works should be properly planned and resourced. In general, for later medieval settlement remains, the level of site avoidance and conservation should be high, and the number of new discoveries low. Useful opportunities will occur from time to time, however, to investigate archaeologically less well-understood sites, such as assarts and granges.

In non-champion landscapes, previously unrecorded later medieval sites should at least be identifiable at the evaluation stage, but all too often they are not picked up at this stage. Careful analysis of the existing landscape, understanding of regional variations in settlement forms and patterns,[5] use of available online remote-imaging resources and a basic understanding of readily available (and usually published) relevant historic documents, will in most cases identify sites during the optioneering stage. The assessment and evaluation stages of linear infrastructure projects in non-champion landscapes are leading to the discovery of new later medieval settlement sites. In these circumstances, mitigatory fieldwork is providing opportunities to advance the understanding of less well-researched forms of later medieval settlement and is revealing and highlighting the variety of later medieval settlement across England.

Understanding the local and regional landscape in the medieval period is key to gaining the most from these newly discovered and investigated early and later medieval sites. Merely observing these sites as beads along a random string is not good enough. Opportunities need to be taken to understand change and complexity at the landscape scale. To this end, a research framework specifically for medieval rural settlement in England, focused on the opportunities for advancing the understanding of medieval settlement through linear infrastructure schemes, could be of benefit. It should highlight best practice in fieldwork and post-fieldwork analysis and publication, critically examine advances over the past two decades afforded by such work, identify outstanding questions and explore opportunities for further progress.

[5] The importance of the regional landscape context in defining the character of the local settlement pattern has been emphasised especially for the Midlands (see Jones and Lewis 2012 and Williamson *et al.* 2013)

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A new reading of the fabric of the village: the contribution of preventive archaeology to the knowledge of rural settlements of the Early Middle Ages in France

Edith Peytremann

Introduction

The link between archaeology and, more specifically, that of the medieval village, and land-use planning is very old. From the 19th century onwards, the industrialization of the country led to the construction of a large number of infrastructures, including the first railway lines and associated bridges, the widening of roads and the exploitation of new quarries. As a result, archaeological sites were frequently discovered, some of which were medieval settlements (Effros 2022: 26–27). This is the case, for example, with the sites of Tatiers and Osly-Courtil in the Aisne department, discovered at the end of the 19th century (Vauvillié 1894; Peytremann 2003: 67–69). The demolition and reconstruction of churches in the 19th century, particularly in the west of France, also provided an opportunity to collect some data about the religious buildings and cemeteries of the medieval village. The contribution of these discoveries remains limited, however, and the value of associating land-use planning with archaeological studies was not perceived at all. It was only very gradually that the state became aware of its archaeological heritage and the need for legislation. The first law, known as the Carcopino Law, passed in 1941. It was the modernization of infrastructures and the economic dynamism of the post-war period that, once again, led to a growing awareness of the archaeological heritage and slowly resulted in new legislation (Talon *et al.* 2009; Effros 2022), which benefited the archaeology of the medieval village. This subject from the 1970s and, above all, the 1990s, became a real focus of research (Peytremann 2003).

The legal framework for archaeology in France

In France, archaeology is subject to two types of operation: preventive archaeology and planned archaeology. *Preventive* archaeology is dependent on spatial planning works (construction of roads, allotment, railways tracks, etc.). It is predominant in France. Different operators can be involved: public bodies, such as the French National Institut for Preventive Archaeological Research (Inrap), archaeological services owned by authorities (city, departments and regions) or private bodies, since 2003, such as the Eveha, Archéodunum, Archéopole private archaeological companies. *Planned* archaeology depends generally on a research programme led by university archaeologists or those working for the Centre National de la Recherche Scientifique (CNRS) or the state service.

Preventive archaeology is governed by a 2001 law that was amended in 2003 (Anon 2016). In this law, it specified that it is the State that decides when archaeological surveys must be carried out ahead of infrastructure work and, following the results of these tests, if there must be an excavation. The preliminary evaluations cover approximately 10% of the area covered by the developments. For all works on an area greater than 30,000 m², all requests are sent to the Regional Archaeology Service, which may or may not require surveys according to the presence of a known archaeological site, and/or the sedimentary, topographic and geographical contexts. In the case of works on a smaller area, this procedure depends on the region. The regional archaeological services (state) can indeed

Figure 1. The French functioning of preventive archaeology.

decide on an archaeological zoning in a city, a village or around an important archaeological site (Anon 2016). There may be several levels, between 0 and 30,000 m², within this zoning, which govern the conducting of archaeological excavation. The cost of the surveys is financed by a charge payable by the developers (Fig. 1).

Until the 2010s, the villages that are subject to zoning were not very many in the country and often only the area around the church or castle is concerned. It can be seen from the legislation that it is difficult to require access to excavate in currently inhabited villages, particularly if the area subject to the forthcoming construction is small (Carré *et al.* 2009). The situation changed from 2012, thanks to the implementation of a new law. Indeed, since a change to national planning law instituted to protect agricultural land within a broader environmental policy framework,[1] construction work has moved back towards the centre of the villages. Moreover, the 2005 Disability law,[2] requiring the accessibility of all public buildings, has resulted in construction work associated with churches that affect underground levels. These innovations

[1] Grenelle de l'environnement 2007–2010 : LOI n° 2009-967 du 3 août 2009 de programmation relative à la mise en œuvre du Grenelle de l'environnement NOR: DEVX0811607L, II, section 1, art. 7 et LOI n° 2010-788 du 12 juillet 2010 portant engagement national pour l'environnement (1) NOR: DEVX0822225L

[2] Loi n° 2005-102 du 11 février 2005 pour l'égalité des droits et des chances, la participation et la citoyenneté des personnes handicapées NOR: SANX030021.

have led the State Regional Archaeological Services to adjust their policies, creating zoning areas in new villages and increasing the surface area concerned to enable more detailed monitoring of planning permission. Some case studies can now be described below.

Preventive archaeology outside present-day villages

It was mainly in the 1990s that preventive archaeology developed in France in connection with major infrastructure development works, such as motorways, railways, stations, airports, business parks and housing estates or in connection with raw material extraction works, mainly gravel pits. The common characteristics of all these developments are that they cover large areas of more than one hectare and are located outside any built-up area, town or village, in the countryside. Thanks to the emergence and consolidation of legislation that led in 2001 to a law on preventive archaeology, each land development project involving a large surface area leads to the carrying out of archaeological evaluation and then, if remains are discovered, to excavations. These measures have had a considerable impact on our knowledge of early medieval rural settlement in France. Indeed, before the mid-1980s, the few known settlement sites – Brebières (Pas-de-Calais), Mondeville (Calvados) and a few others in Alsace and Burgundy – were excavated over a few hundred square metres. The nature of the remains and their 'short' chronological life-span led to the view that early medieval settlements were poor and unlikely to yield much significant information.

These developments first led to an important change of scale, with the exploration of sites over large areas (more than one hectare). These excavations have led to the discovery of remains which were previously missed or overlooked, such as wooden-post buildings, silos, ovens, wells, etc. They also make it possible to understand the spatial organization of these different structures and sometimes their link with entities, such as the church and the cemetery (e.g. Tournedos, Saleux, Les Gravilliers, Sainte-Catherine-Fièrebois). This change of scale has also led to the study of landscape installations: paths, ditches, enclosures, ditches, etc., but unfortunately not of the fields, unlike in other European countries, such as Spain, Great Britain or Denmark. Secondly, these developments have led to an unprecedented increase in the number of excavated sites, leading to a doubling of the number of known early medieval settlement sites between 1990 and 2000 and a tripling between 2000 and 2020. Finally, this development of excavations has been accompanied by the development of palaeo-environmental studies (geomorphology, archaeozoology, carpology, palynology), thus opening up a wide field of knowledge, previously unknown, on the dynamics of landscapes and their exploitations.

Nevertheless, it is important to bear in mind that these territorial developments or 'major works' were unevenly distributed throughout France and that, from the mid-1980s to the mid-1990s, they mainly concerned the Ile-de-France region around Paris, the Hauts de France region and, to a lesser extent, Lorraine and the Rhône-Alpes region. It was only gradually that other regions benefited from these major developments (motorways, railways, airports), such as western and central France, Franche-Comté and Auvergne region. Recently, these infrastructure developments have particularly affected the South of France, Languedoc-Roussillon. These irregularities in the development of the territory remain a constant in preventive archaeology.

The village of Les Ruelle in Serris (Seine-et-Marne) and its terroir

For France, the village of Les Ruelles in Serris (Seine-et-Marne) is particularly emblematic of the impact that land development work can have on our knowledge of early medieval villages. The first excavations on this part of the Briard Plateau to the east of Paris was carried out in 1989, during the construction of a railway line for a high-speed train. The excavation uncovered a necropolis and the remains of a settlement. In 1990, development work, again linked to the railway line, led to the

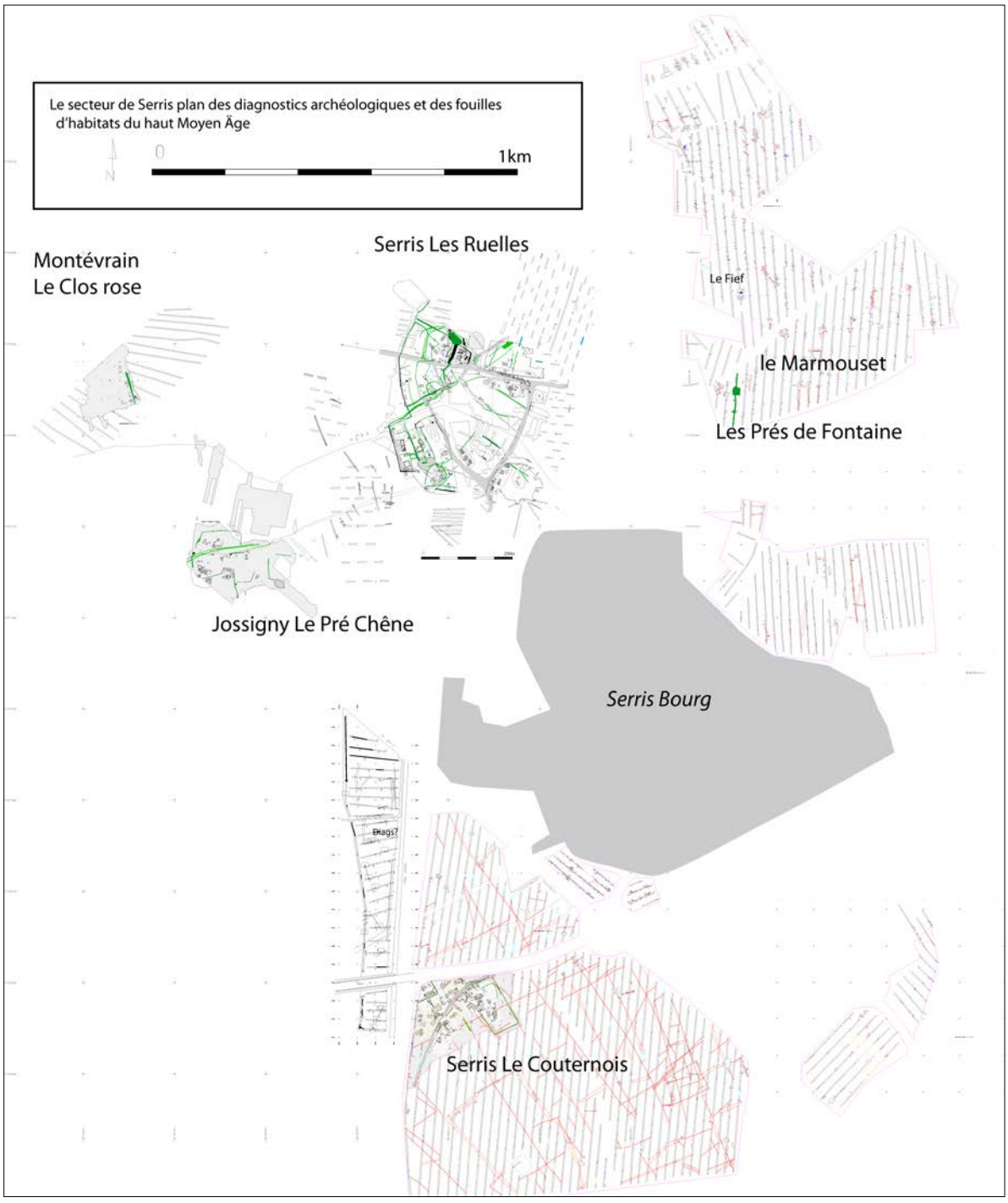

Figure 2. Location of test pits and excavations in the Serris area with location of early medieval settlements. *(Gentili et al. 2020: 153)*

discovery of an elite Merovingian settlement. Two years later, the development of the new town of Marne-la-Vallée, including the Disneyland complex, led to further excavations in 1992 and 1997. These led to the complete excavation of the village of Les Ruelles in Serris, covering a total area of 16 hectares, with 20 hectares of excavated sites, rising to 30 hectares if we include the evaluations carried out in 2006 (Gentili 2010). The continued development in this area, just a few kilometres from the village of Les Ruelles, has led to the discovery of other settlements, some of which are

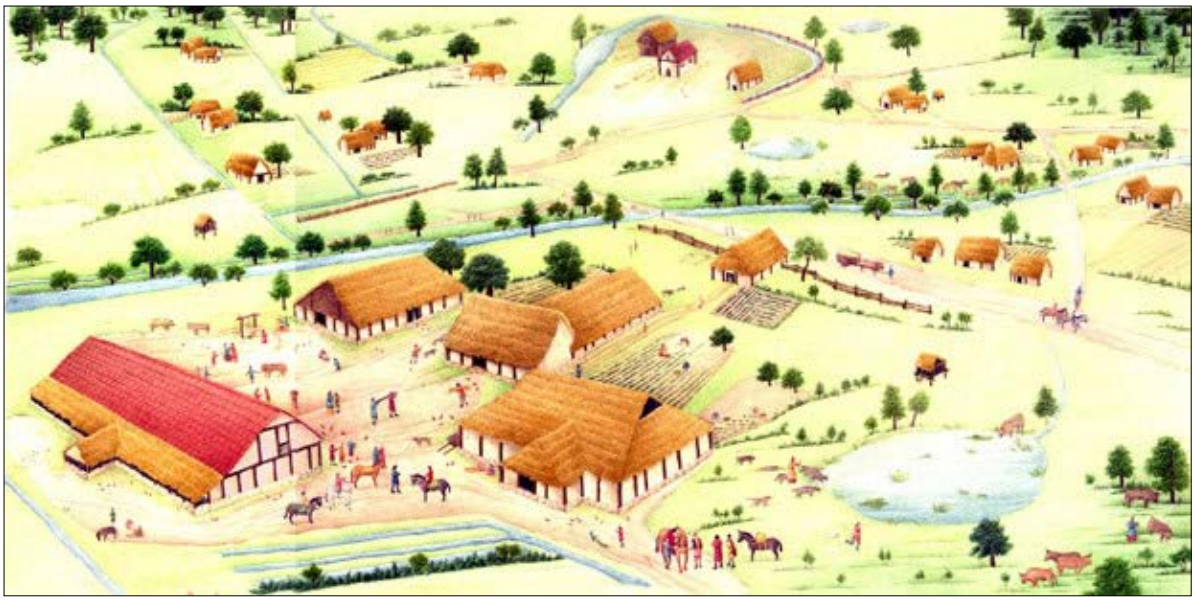

Figure 3. Depiction of the aristocratic farmstead in the foreground and the various buildings of the village of Les Ruelles de Serris at the end of the 7th century.
(Drawing by F. Gentili/Inrap: https://www.verre-histoire.org/colloques/verrefenetre/imgpage/p321_gentili_ill04.html)

contemporary with Les Ruelles, representing a completely new scale in the study of medieval rural settlements (Gentili and Sethian 2020) (Fig. 2). Sites excavated in 2006–07 included Le Pré du Chêne in Jossigny, and in 2012–13 for La ZAC du Couternois in Serris.

The study of the Ruelles site enable us to reconstruct not only the history of this village, but also that of the area in which it is located (Fig. 3). Founded in the early 7th century AD, in an area that had been abandoned for almost three centuries, the village of Les Ruelles was organised into several sectors within a network of ditches and along a small stream. One of the sectors, covering an area of around two hectares, was home to an elite settlement, characterised by its organization within an enclosure, the presence of two large stone-founded buildings and a small burial area. A cult and funerary space developed to the north and, to the east, a number of farm units characterised by their post-built architecture. There are several paths leading to and from the site. The elite complex was abandoned at the end of the 8th century, as were one of the buildings and the barn in the burial area. To the west of the latter, which was expanding, large buildings erected and probably forming a new elite sector, while to the east new farming units appeared and the road network redeveloped. In the 10th century, a circular enclosure associated with a tower and a trapezoidal enclosure was built to the south of the elite sector. The village was abandoned in the first half of the 11th century.

The village of Pré du Chêne in Jossigny, less than a kilometre to the south-west of Les Ruelles, was founded some fifty years earlier. It was delimited by an enclosure, the boundaries of which evolved as the settlement developed, particularly in the late 7th century and throughout the 8th century. It was during this period that a large pole-mounted building was built within an enclosure and on the edge of the courtyard. The settlement developed at the same time as Les Ruelles, to which it was linked by a road. The Pré au Chêne site was abandoned shortly before the Ruelles site, at the end of the 10th century. The Courtenois settlement lies 2 km to the south of Ruelles. Like the Pré au Chêne settlement, it was built in the 6th century around a large building on square posts. The dense layout grouped together several farm units spread out along a road. Here again, the settlement was deserted in the 10th century. Various studies show that these different sites probably related to the clearing of land and the development of an entire territory.

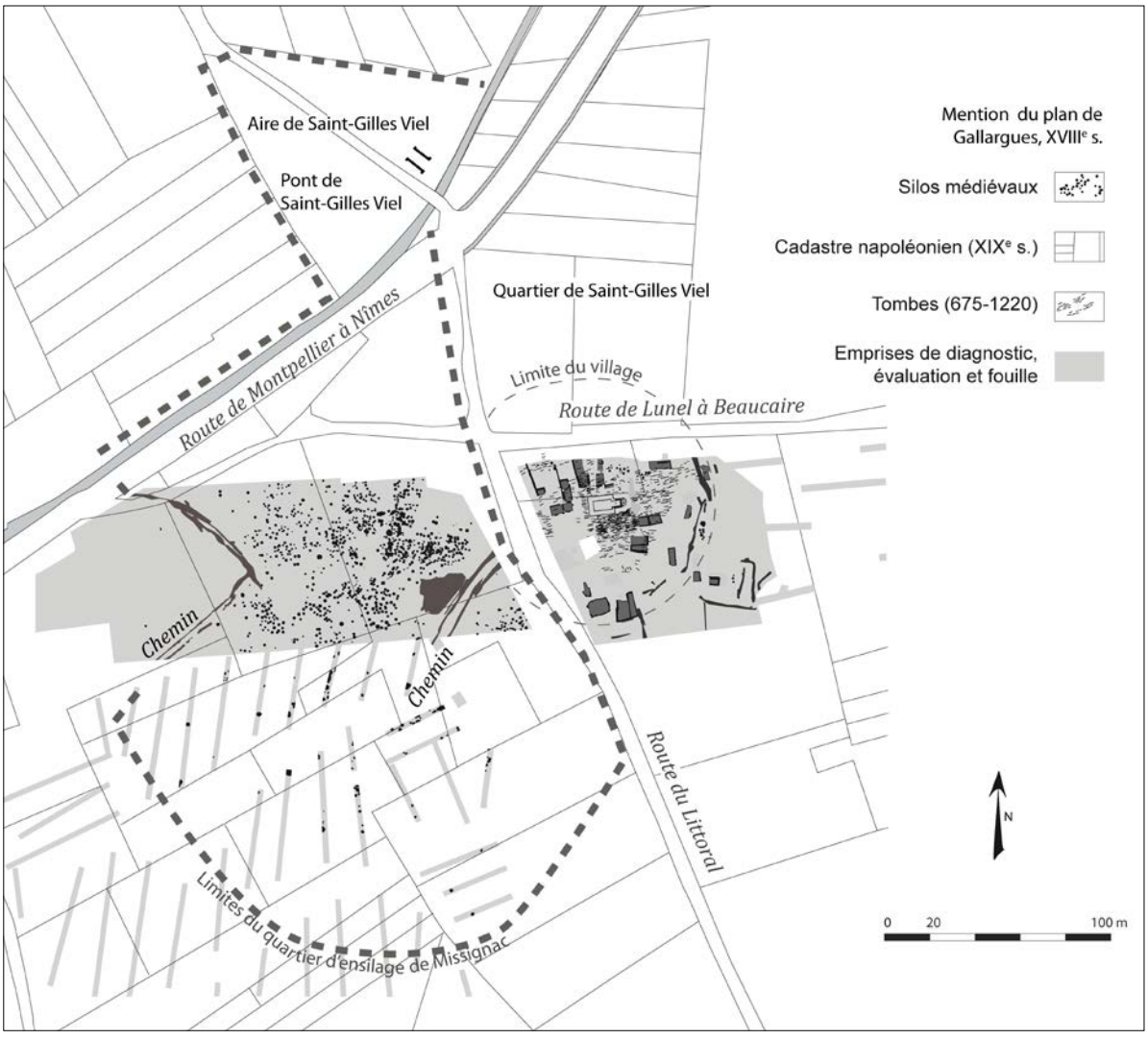

Figure 4. Missignac: extension of the village (shown in its 9th–10th-century state, but with burials from all phases) and the silage area (with all the silos, from the 7th to the 12th century).
(Drawing by O. Maufras (2020: 275))

The Village of Missignac in Aimargues (Gard)

The second example is the village of Missignac, in the south of France, in the commune of Aimargues (Gard) (Maufras *et al.* 2020). Here too, the construction of a high-speed railway line led to the discovery of the medieval village of Missigniac between 2012 and 2013, during preventive archaeological excavations covering around 1.5 hectares. Eighty houses, 450 silos, hearths, ovens, ditches, a church and no fewer than 850 graves belong to a grouped village of ancient origin that was abandoned in the early 13th century (Maufras *et al.* 2020: 258). The earliest evidence of the Early Imperial period (27 BC–end the 2nd century AD) consists mainly of fields, vineyards and small enclosures, typical of the outskirts of an agricultural establishment, probably a villa, given the type of material found in a rubbish dump. The first traces of settlement date from the 5th century and consist of wells, a few silos, slightly-buried cellars and crawl spaces, and the remains of buildings. There are probably the remains of two farm units here, to which two others were added later. This form of grouped settlement lasted until the 9th century, with the buildings maintained and sometimes renewed, and the number of dwellings and farms increasing, with a

slight shift to the north. The ditches made it possible to restore a regular, strip-shaped plot of land. From the 7th century onwards, several groups of burials took place within this settlement. The settlement and burials became denser during the 9th century, occupying the gaps between the farm units and obliterating the previous plot boundaries (Maufras *et al.* 2020: 261–2). Silage-making structures grouped together in a dedicated area. In the second half of the 10th century, a church was built in a former silage area located at a road junction (Fig. 4). The settlement then clustered around this building, creating a number of heterogeneous blocks. The various burial sectors had also undergone transformations, with some abandoned and others continued, without forming a cemetery and all more or less distant from the church. A ditch some 40 m from the church surrounded the residential area and the church, however, some of the housing developed outside this boundary. The settlement continued to densify, forming a loose agglomeration in the 11th century, and becoming a small market town by the end of the 11th century. It reached its maximum extent in the 12th century. During the final two centuries, the church was rebuilt, and the southern burial sector now accounted for the majority of burials, although the other sectors were not completely abandoned (Maufras *et al.* 2020: 277–8). During the 12th century, certain areas were abandoned, despite the construction of new houses, marking the beginning of a gradual decline in the village.

The excavation of this village represents an important step forward in our knowledge of medieval villages on the plains of southern France. This region is subject to considerable erosion because of intensive vine growing and, until now, knowledge of 5th- to 10th-century villages has come mainly from planned excavations carried out over small areas or from surveys on foot.

The Méaulte site (Somme)

The third and final example illustrates the limits of the legislative process. A project to develop a 120-hectare airport platform in the communes of Méaulte, Bray-sur-Somme and Fricourt (Somme) led to the identification of 16 archaeological sites which dated from the Final Neolithic to the 11th century AD. One of these sites is a fortified village dating from the 10th–11th centuries AD. Due to technical and financial constraints, the excavation decided upon by the regional archaeology department eventually turned into a complete removal of site topsoil over an area of 2.2 ha and a partial excavation of the village (approx. 3,500 m²). The excavated part probably corresponds to an elite residence. The plan of this excavation is interpreted solely based on the surface view of the structures. This interpretation, which has not been widely circulated (though it has been published twice: Blondiau 2007; 2011), is considered dubious in the absence of wider excavation and scientific observations. This unfortunate example is all the more regrettable given that there was an opportunity here to study a legible site that had been little disturbed by earlier or later occupations.

Preventive archaeology within currently inhabited villages

It was from the 2000s onwards that the nature of the developments began to change and even more so their location. There has been an increase in infrastructure work carried out in current villages, once again leading to a change in scale of archaeological investigation. These works affect much smaller areas (renovation of the church square, construction of municipal buildings, modification of networks, compliance with safety and accessibility standards, etc.). From 2012 onwards, the phenomenon has been accentuated by the increase in archaeological zoning. The data collected is generally more incomplete, as observations often stop at the level of test pits, even if they are positive (Peytremann 2019). On the other hand, these interventions are more evenly distributed across the country.

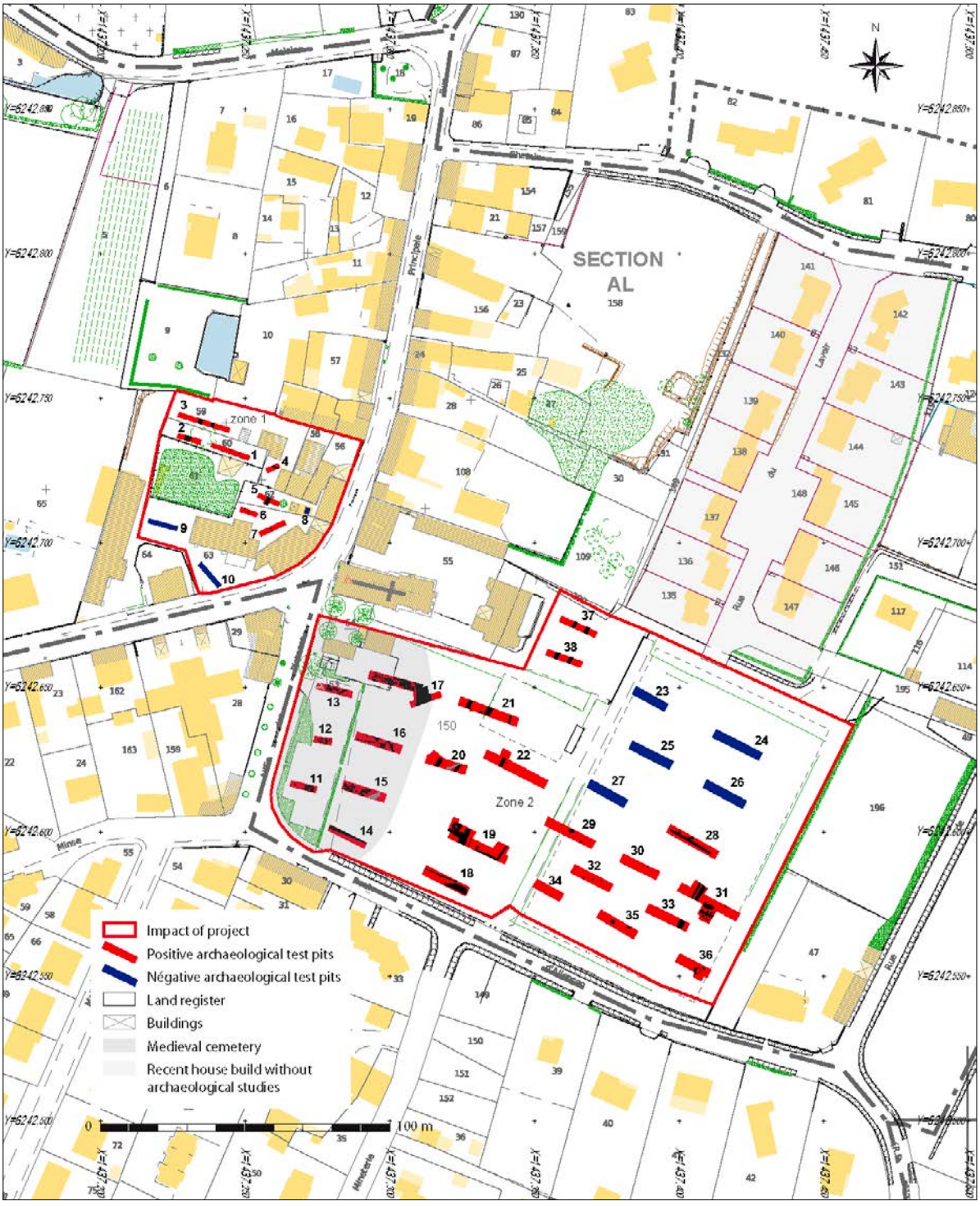

Figure 5. Vauchrétien (Maine-et-Loire): location of the evaluation trenches on the current land register plan. *(Peytremann 2013)*

The village of Vauchrétien (Maine-et-Loire)

In 2013, a project to redevelop the centre of the village of Vauchrétien in Maine-et-Loire, divided into two zones covering a total an area on almost 20,000 m^2, prompted a request from the regional archaeology department (Peytremann 2013: 25–8). This was the first time that archaeological surveys had been carried out in this village. One of the areas is next to the church, the oldest parts of which date back to the 10th century. Twenty-six trenches were dug, 21 of which contained archaeological remains attesting to occupation from the 1st to the 13th centuries AD (Fig. 5). Identified archaeological remains consisted of ditches probably belonging to a network of plots, post-holes, foundation flashings, pits and possibly a cellar. Structures from the 3rd and 4th centuries AD are rare. Medieval occupation was characterised by the establishment of a cemetery in the 7th century, which was used until the 12th century. Domestic structures, such as post-holes, pits and ditches, were also discovered in this burial area. The cemetery appears to be surrounded by an imposing ditch. A well filled in during the 13th–14th centuries marks the abandonment of this area, which apparently was no longer occupied despite its proximity to the church (Peytremann 2013: 54–56). The results of these small-scale excavations provided the first information in this geographical area on the origins of the village and demonstrated the site's potential. For this reason, the regional department issued an archaeological prescription. Unfortunately, the project was cancelled due to the cost of the archaeological dig. In the absence of wider excavation, it is impossible to identify the nature of the Gallo-Roman settlement, to know whether there were any real breaks in occupation between the 4th and 7th centuries, or whether the area really abandoned in the late 13th or 14th centuries.

The village of Gesté (Maine-et-Loire)

This development project in the heart of the village is original in that it involves the reconstruction of a smaller religious building, following the destruction of the church in 2013. Following a positive evaluation, an excavation was ordered by the regional archaeology department and took place in 2016 over an area of 480 m^2. The results show the creation *ex nihilo* on a promontory of a Merovingian cemetery, possibly associated with a wooden religious building. The permanent construction of a church with parish status dates from the 11th century (Fig. 6). Until the beginning of the 21st century, the site was dedicated to worship, but burials near the building ceased in the 14th century at the latest. While this excavation provides a wealth of information about the age of the burial and cult site, it does not provide any information about the development of the settlement. The associated documentary research shows the existence of at least four burial sites in the village before the cemetery moved outside the village in the 18th century, following a royal decree (Mayer and Gaugé 2018).

Conclusion

Undeniable progress

For more than 30 years, preventive archaeology in conjunction with current land-use planning has made a considerable contribution to our knowledge of medieval settlements (6th–16th centuries). It is worth highlighting the unprecedented increase in the corpus of sites, which for the first time makes it possible to draw comparisons, to study the village over time and to identify specific regional features. Another extremely important contribution has been the development of paleoenvironmental studies (geomorphology, archaeozoology, carpology, palynology), opening up a vast, hitherto unknown, field of knowledge on the dynamics of landscapes and their use. This increase has also made it possible to refine the concept of the village and to show development dynamics that sometimes have ancient origins dating back to the Iron Age. Based on archaeological

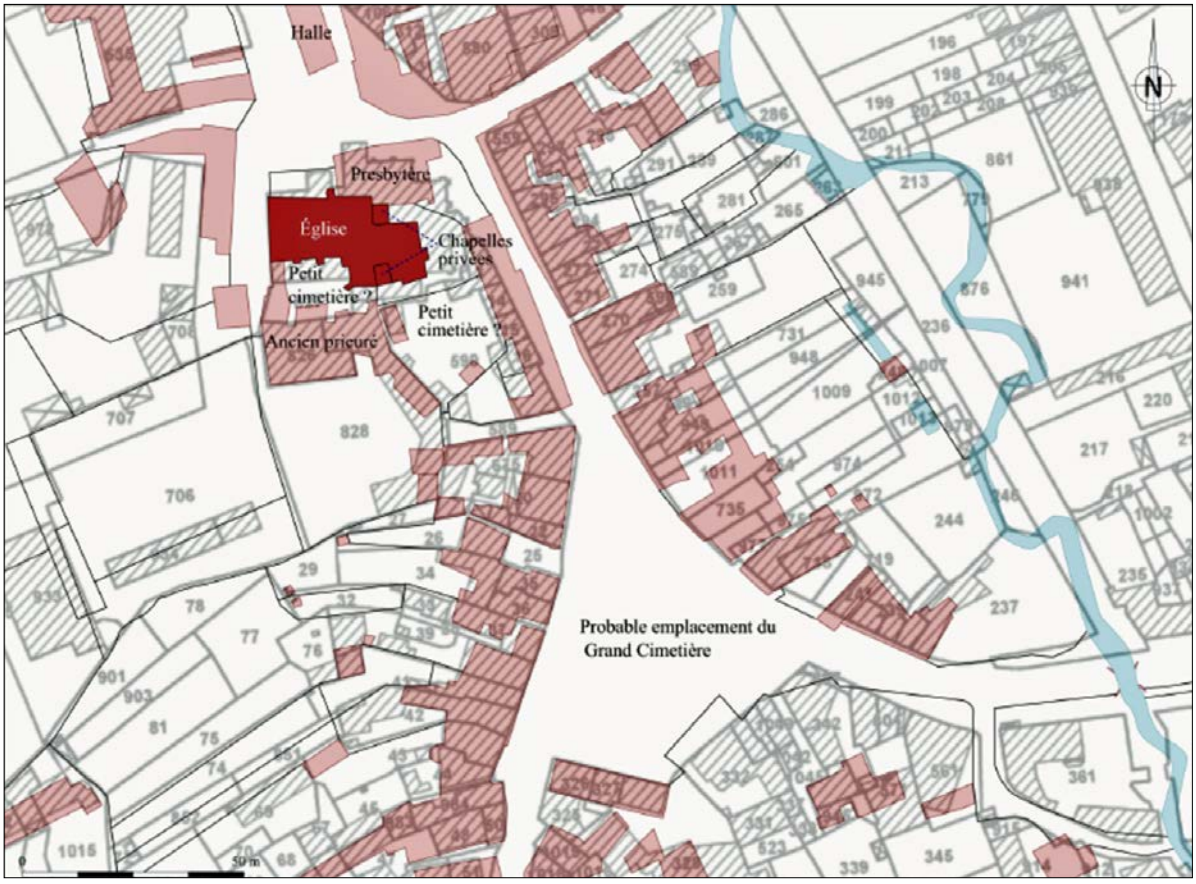

Figure 6. The church and the prioral enclosure of Gesté (according to the Napoleonic cadastre) against the background of the contemporary cadastre.
(A. Marty © Éveha 2018. Sources: recent cadastre, geoportail; Napoleonic cadastre, 1834 (AD M-L), Mayer 2018: 98)

data, the village can now be studied as a political, religious and social entity in its geographical environment. The increase in the number of publications devoted to villages or settlements reflects the importance of the development of knowledge about the medieval village, mainly in connection with regional planning work. However, there are still disparities across the country, due to the varying geography of the regions and their differing levels of economic dynamism.

The organization of preventive archaeology at state level has made a major contribution to these developments. The presence of a national council for archaeological research, which sets a national programme based on the state of archaeological research, influences the prescription policies of regional archaeological services. Research into the medieval village, by recommending that greater attention be paid to development work within existing villages, was included in the programming put in place in 2017 (CNRA 2016). It is also thanks to the increasingly demanding specifications issued by the regional archaeology departments that radiocarbon and palaeoenvironmental analyses have been able to develop.

A fragile situation that is not entirely satisfactory

The Méaulte and Vauchrétien examples, among others, illustrate a situation that is not entirely satisfactory. On closer examination, it appears that it is the post-excavation analyses (palaeoenvironmental, finds, etc.) that are currently most often adversely affected by inadequate funding.

The development of the system for preventive archaeology has occurred thanks to the introduction of a legislative system, under pressure from the scientific community and, more specifically, from those involved in preventive archaeology, as was demonstrated during a symposium in Paris in 2008 (Demoule *et al.* 2009). However, it remains fragile due to its interdependence with the economy and politics (Demoule 2009: 239–245). As we have seen, the establishment of referral thresholds remains at the discretion of the regional archaeology departments, which are placed under the control of the State. Depending on the government in power, derogations from the law may be granted in the name of 'administrative simplification' or economic constraints that transform the positive effects of regional development into the simple destruction of archaeological heritage. Let us hope that the Treaty of Malta, which was ratified by France on 18 January 1995 and came into force on 10 January 1996 (Gauthier 2009), will continue to be a bulwark against the fickleness of national archaeological policies.

Two aspects that somewhat tarnish the positive effects of our knowledge of the medieval village are also worth highlighting: the lack of publication and the problem of managing the data acquired (continuity of databases, etc.). These aspects are reliant on archaeological policies and the resources allocated to them and are particularly important for preventive archaeology (linked to the importance of infrastructure construction), which generates much more data than planned archaeology.

Lastly, uneven rates of land development remain a constant in preventive archaeology, making it impossible to obtain a homogenous knowledge of the medieval village throughout the metropolitan area.

At the end of this paper, which attempts to assess the effects of town and country planning on our knowledge of medieval rural settlements in France, it appears that the balance sheet is fairly positive in terms of improving our understanding of the materiality, functioning and organisation of medieval rural habitats, despite losses and fragilities. It should noted that the preservation of medieval rural settlement sites occurs extremely rarely and that only some buildings are legally protected.

What are the prospects for consolidating the achievements of the last 30 years in the field of preventive archaeology? The question is dizzying. First, it seems necessary to dissociate the discipline of archaeology and its preventive practice from politics in order to guarantee stability in data acquisition and processing, although, as already observed, such a dissociation is undoubtedly utopian.[3]

Jean Paul Demoule asked in 2009 what level of preventive archaeology French society wanted, pointing out that this political question had never been clearly posed, and it still hasn't been (Demoule 2009: 289). This debate has led to the establishment of an archaeological policy that is not subject to the law of the market, or at least that is subject to greater public oversight, more concerned with the conservation of excavation archives and the dissemination of results. The advantage of this archaeological policy was considered to be that it would enable us to think in the long term, to carry out projects that are more ambitious and to produce thematic summaries based on even the most insignificant data, thereby enabling a thorough renewal of knowledge about the medieval village.

It would also respond to the public's desire to know more about their own history,[4] in particular the history of the villages in which they they live and support through the construction or renewal of infrastructure. We have come full circle!

[3] The statements made on X and in the newspaper *Le Parisien* (https://www.leparisien.fr/yvelines-78/dans-les-yvelines-le-chateau-de-dampierre-erige-en-cas-decole-de-la-restauration-du-patrimoine-04-04-2024-A3HSHMTVOVEVLKZO63OXRPVJMI.php) on 4th and 5th April 2024 by the current Minister of Culture are a particularly good illustration of the fragility of preventive archaeology.

[4] The success of the European Archaeology Days is testimony to this.

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Infrastructure projects, rural development and medieval settlement archaeology in southern and western Germany

Rainer Schreg and Aline Kottmann

Introduction

In the 1920s and 1930s, the first archaeological excavations of early medieval settlements were in most cases rescue excavations due to sand quarries, lines of defence, railway lines or motorways. Medieval monuments were only thought to be of interest if they dated to the Early Middle Ages or possessed an art-historical value. Rural life was not a subject of interest, as for ideological reasons there was a paradigm that peasants had no history and that rural settlements were unchanged since early history. In many cases, excavations of medieval settlements had been done by accident, when the expectation was to research pre- or protohistoric sites, mainly Iron Age.

Things changed in the 1960s, when, driven by the renovation of churches and modernisation of towns, medieval archaeology was established in the State offices in Bavaria and Baden-Württemberg. Soon afterwards, both states got new heritage protection laws. In Bavaria, however, by legal definition archaeological heritage needed in general to date to pre- or protohistoric times. In the 1970s, this terminology included medieval sites, but, later on, when medieval archaeology was fully established, in every single case jurisprudence still insisted on additional paperwork for medieval sites, stating their exceptional status.

Heritage management in Germany

In Germany, heritage management is a task of the single federal states (Kunow and Rind 2022). There are 16 federal states and hence there are 16 different laws and 19 state offices (most often *Landesämter*). The historic monuments protection authority is in most federal states at the communal or regional level (*Untere Denkmalschutzbehörde*). In many cases, people in charge are trained in administration, but not in heritage management or archaeology. For their direct support, sometimes regional archaeology offices (*Kreis- und Stadtarchäologien*) exist, though special archaeological expertise is in general within the State Departments for Cultural Heritage. Whereas in the past they carried out the necessary rescue excavations by themselves, this is nowadays in most federal states organised on the basis of a costs-by-cause-principle (i.e. 'polluter pays') in a framework of commercial archaeology. In detail, there are many differences in the capacities to carry out such work, for example in the organisation of treasure trove regulations. This is also true regarding the interest in, and importance of, medieval and post-medieval archaeology. Today, there are still federal states lacking any expertise in these fields.

Case studies

In this paper we present examples for different infrastructure projects that bring distinct challenges and various insights into medieval settlements and landscapes.

Linear infrastructure projects, 1857–1990s

We start with linear infrastructure projects, like motorways, railways or pipelines (Fig. 1). These gained attention in recent years, but linear infrastructure like canals, *chausées* or railways date back

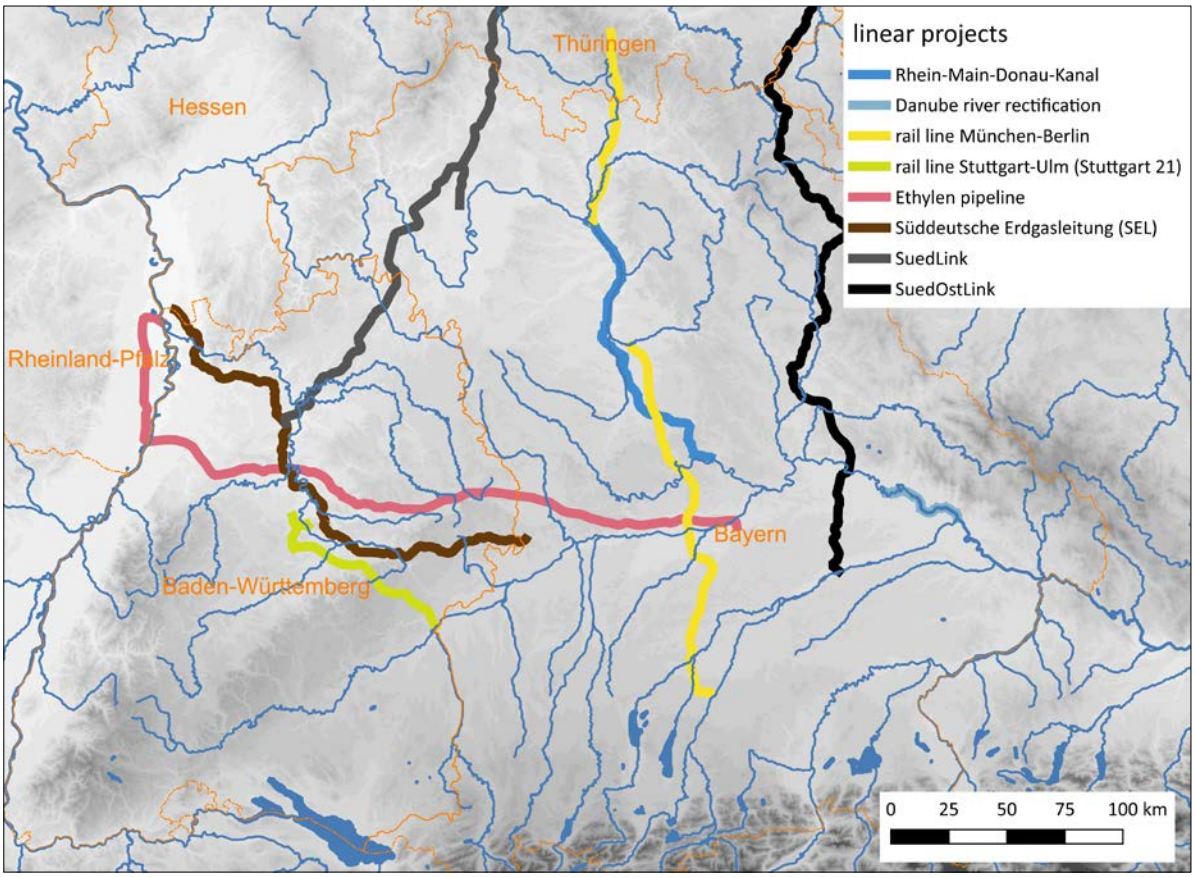

Figure 1. Linear projects in Southern Germany.
(R. Schreg)

to industrialization in the 19th century. In fact, back then the construction of railways resulted in significant discoveries and excavations, especially of Merovingian burial grounds. Excavations in 1857 at the freight yard at Ulm-Kienlesberg by Konrad Dietrich Haßler were in fact an important impetus for founding an Office for Cultural Heritage in the then Kingdom of Württemberg (Wehrberger 2008).

Motorway construction since the 1930s, including the post-war period, brought remarkably few archaeological discoveries. An exception is a medieval farmstead at Großrinderfeld partially excavated in 1939. With the Second World War, excavations came to an end and after the war the motorway was diverted around the settlement. However, the site did not gain attention as a medieval farmstead but as an Iron Age enclosure (Dauber 1941–47).

An important turning point was marked by the construction of the Canal Main-Danube in 1960–92. In the 1980s, the first systematic prospections and rescue excavations were carried out within commercial archaeology. However, only selected sites were excavated, among them a Migration period settlement (Suhr 2007) and early and high medieval settlements opposite Kelheim (Eibl and Meier 2006). Remarkably, at Nusshausen a 17th-century hammer mill was excavated in 1981 when there was still little interest in this time period (Mahler 1995).

After the German reunion in the 1990s, a programme was set up to construct new motorways and a high-speed rail line between Berlin and Munich. As the railway line, as well as the motorways, crossed several federal states, each state negotiated independently with German railways regarding the

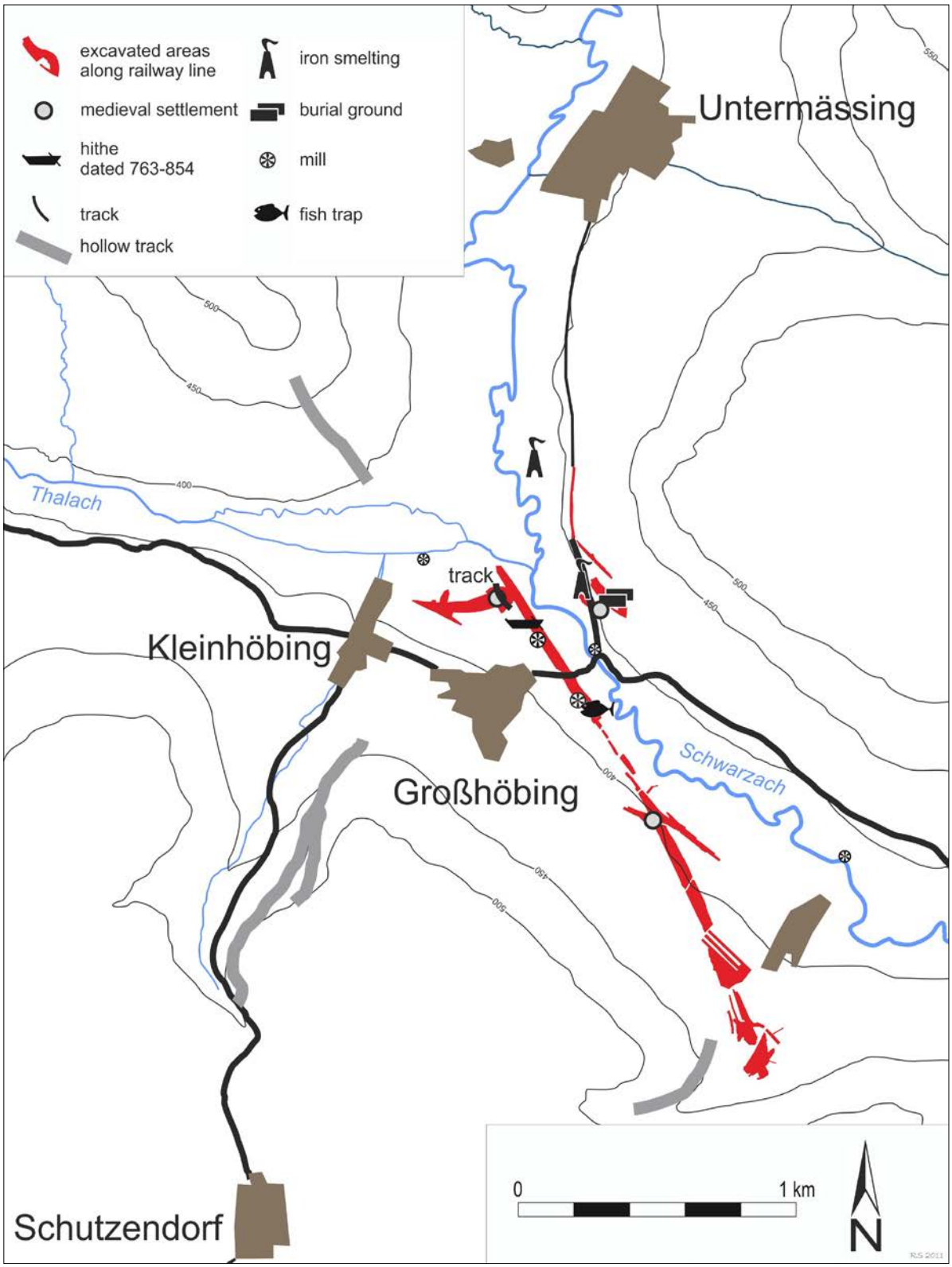

Figure 2. Railway construction in the Schwarzach valley close to Großhöbing and the medieval cultural landscape.
(R. Schreg)

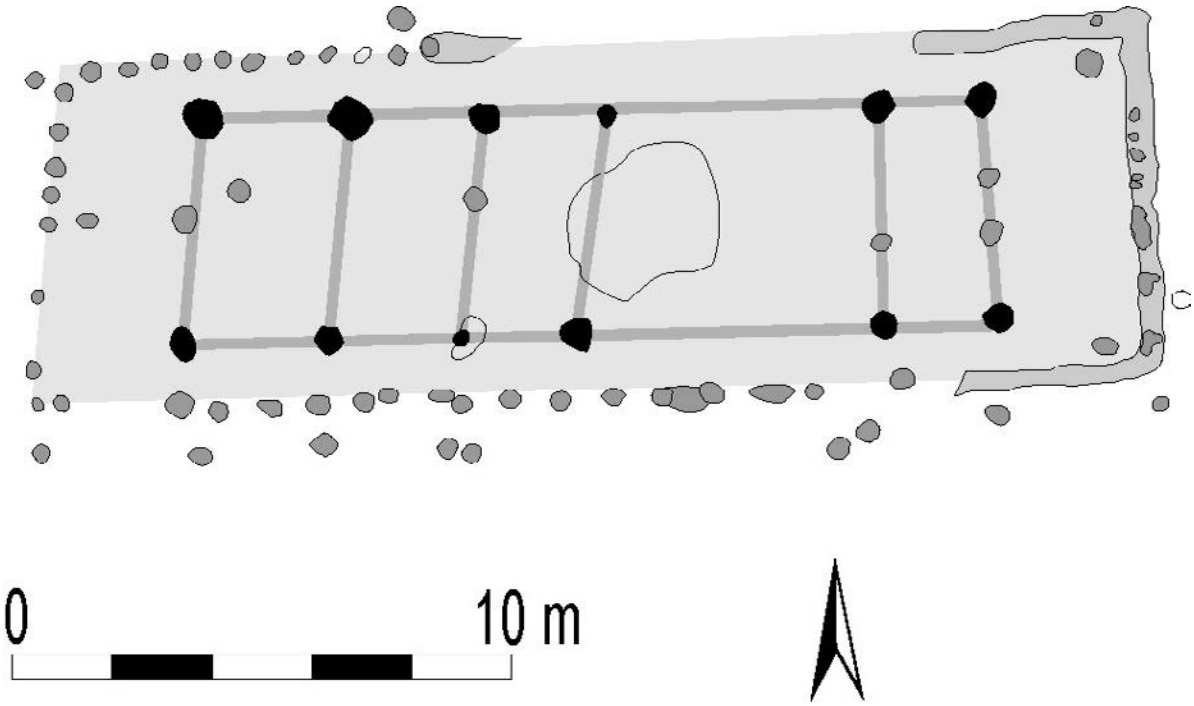

Figure 3. Migration period longhouse at the railway line Stuttgart Munich at Nellingen. *(After Thoma 2013)*

financial and time conditions for archaeological rescue excavations. Whereas the state of Sachsen-Anhalt was quite successful (Dresely and Meller 2006), there were fewer activities in Thuringia and Bavaria, where the railway crosses some mountainous regions.

For our knowledge of medieval cultural landscapes, excavations at Großhöbing in 1997 are of special interest, as in addition to a Merovingian burial ground, an early medieval fluvio-economic landscape has been recognised, including iron-smelting places, fish traps and boats (Fig. 2). The most important find, however, was the wooden remains of an early medieval mill (Liebert 2015).

Recent linear infrastructure projects, 2000–Present

In more recent times there are still construction works connected to the Berlin–Munich railway. Among the affected sites are medieval rural settlements in the Bamberg region. At Altendorf, for example, some structures of a badly preserved settlement have been discovered (Jaschek 2021). At Rattelsdorf, a high medieval timber feature, possibly the remains of a bridge, has been documented within an old course of the River Main (Berg 2019).

Another railway project is known as 'Stuttgart 21', involving a new underground railway station at Stuttgart and a high-speed line in the direction of Munich, crossing the Swabian Alps mountains. Excavations were conducted in 2010–2016, but systematic surveys using Lidar and geophysics as well as conventional field-walking started before that in 2003 (Klein 2004). The railway is 114 km long and covered an area of 462 hectares (Hye *et al.* 2017). The most relevant excavation regarding the post-Roman settlement history is a Migration period settlement near Nellingen, where three-aisled longhouses have been identified (Fig. 3). This type of house, well-known in Northern Germany, is only known at very few sites in this region (Thoma 2013).

A newly found Merovingian burial ground and an associated medieval settlement provide further insights, as do early Alamanic housing structures within a Roman *villa rustica* in Bad Cannstatt (Kretschmer 2017; Thiel and Thoma 2017).

In 2006, a military fuel pipeline connecting different NATO air bases in Baden-Württemberg and Bavaria was monitored archaeologically with only very few medieval settlement remains published (Bofinger 2012: 170). Since 2022, the gas pipeline '*Süddeutsche Erdgasleitung*' is under construction, leading from Hessen to Bavaria and covering a length of 250 km. As Roman and medieval sites have often been known for a long time, they are usually taken into account and bypassed in the route planning. Therefore, these time periods are under-represented, whereas there are plenty of new Neolithic sites, for example in fertile loess soils along the River Neckar (Schmidt and Neth 2024). However, for the Migration period and the Early Middle Ages there are several findings of previously unknown burials that indicate nearby settlements (Bosch *et al.* 2024). It is, in fact, the monitoring of vast linear projects that offers the chance of accidental discoveries of rather dispersed, and therefore rarely detected, structures. Therefore, Migration period burials constitute a proportionally high percentage of the discoveries (Bofinger 2012: 165).

A significant excavation of an early to high medieval settlement was carried out between September 2001 and June 2002 in the area of the deserted village of Muffenheim, when a new pipeline was laid parallel to the old Trans-Europe Natural Gas Pipeline (TENP) from the 1970s. The medieval settlement was well known from surface collections since the 1970s. It was occupied up to the 15th century, but the period after the disappearance of sunken-featured buildings is only represented by a few wells and a ditch, as well as by a large number of fragments of tiles, bricks and decorated floor tiles indicating the presence of well-equipped dwellings (Damminger and Gross 2008).

In 2007–2011, a 10 m-wide and 370 km-long pipeline for ethylene was constructed crossing the Federal States of Bavaria, Baden-Württemberg and Rhineland-Palatinate (Berg *et al.* 2019). This was not a public infrastructure project but was related to the chemical industry. Among the results we can refer to, Rheinzabern west of the River Rhine is well known in archaeology as an important centre of *Terra Sigillata* production in Roman times. A 12th-century pottery kiln relates to pottery production in a period of remarkable changes in economy and settlement structures. But, all in all, medieval sites are again truly underrepresented (Fig. 4).

By the 2020s, the German federal government was focussing more seriously on the transition to green/renewable energy. The Suedlink and SuedOstLink electricity lines connect wind-parks at the North Sea to the pre-alpine regions. Its powerline will not run overground but via underground cables. In addition to consulting the archives of the relevant State Heritage departments, energy companies hired archaeologists to carry out geophysical prospections and geoarchaeological survey reports. Excavations started in 2020 in the northern parts and have now reached the southern sections of the pipeline. Archaeological excavations are still ongoing and, apart from some media reports, only a few preliminary reports have yet been published (Bofinger *et al.* 2025).[1]

Non-linear infrastructure projects

Connected with the energy transition there are currently several non-linear infrastructure projects, such as wind-parks or solar-fields. These are, in respect of their effect on heritage sites, much more sustainable and efficient than open-pit brown coal mining that erases all archaeological remains.

[1] The companies' websites https://www.tennet.eu/de/projekte/suedostlink and https://www.tennet.eu/de/projekte/suedlink including information related to archaeology and heritage: https://suedlink.webmag.io/newsletter/05-2020/bodenuntersuchungen.

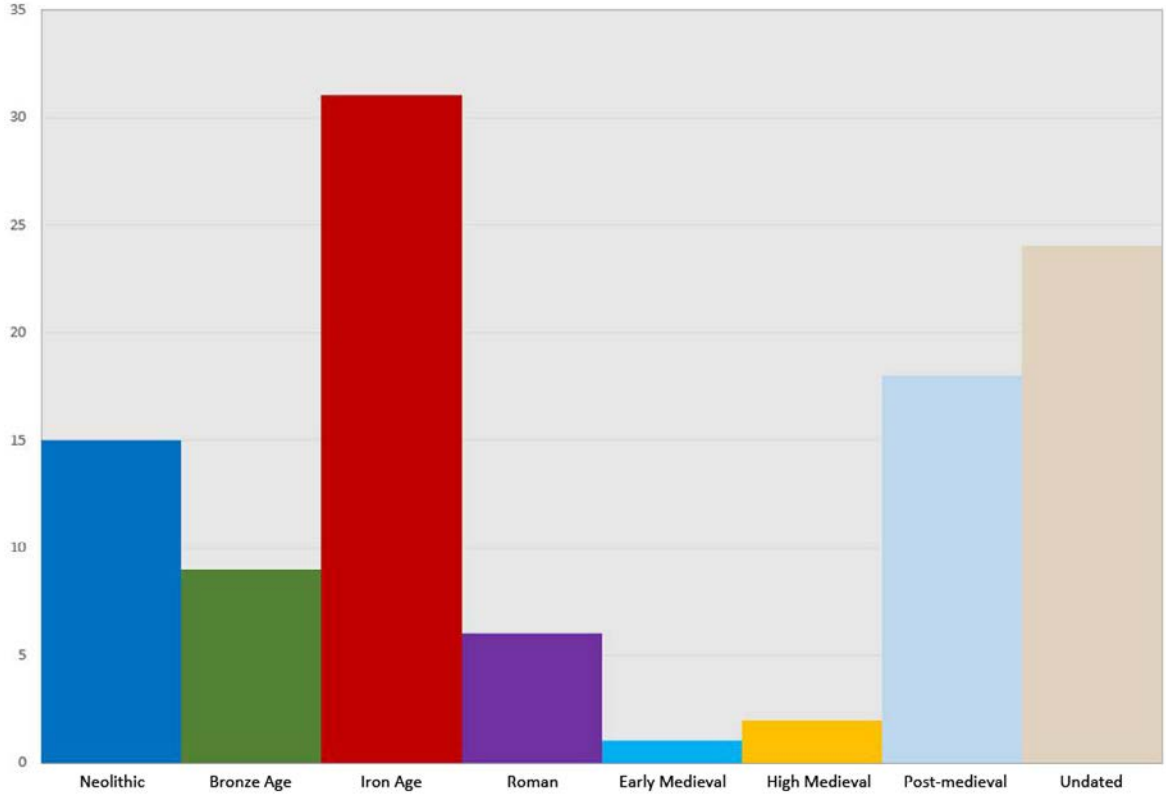

Figure 4. Researched sites at the ethylene pipeline in Baden-Württemberg 2007–11. *(Data from Bofinger and Schmid 2019, Abb. 2)*

In addition, whereas the coal-mining industry was in fact nearly exempt from the costs of heritage management (Westphal 2022), the cost-for-cause principle is applied in these modern modes of energy production. However, solar-fields are often based on a dense grid of small foundations that will cause more damage when they will be removed again later.

With wind parks, more severe interference with archaeological sites does not result from the turbines but from the construction work infrastructure. The installation of a wind turbine near Hohenstadt (Lkr. Göppingen) was originally planned at the site of a late Iron Age square enclosure (*Viereckschanze*) but was relocated to a less archaeologically sensitive spot. Rescue excavations along the access lines revealed Iron Age settlement remains, but also some isolated post-holes and stray finds of the medieval deserted settlement of Waldstetten. As the exact location of the medieval settlement was not known before, it was not factored into the planning process; however, the traces of this settlement were quite limited and primarily of only local interest (Rademacher *et al.* 2023: 144).

Currently there are several areas under consideration for the construction of wind-parks. Many of them are situated in landscapes that were previously not threatened by modern developments (Büttner and Husty 2015; Recker and Becker 2015). There is a tendency to establish wind-parks in forested environments: in the past these areas were considered to be well protected by the forest. There are several sites visible above ground as burial mounds or fortifications that are registered as archaeological sites, but we have few finds coming from settlements.

Among the areas under consideration is the deserted village of Würzbach that has been investigated by small archaeological excavations and surveys, data from which are hopefully making a convincing argument for protecting the entire area (Thode 2020). The majority of the archaeological remains

of this village – besides the ruins of some houses – consists of remains of the agrarian landscape, such as fossil fields with lynchets, clearance cairns or watering holes. These traces are often visible in high-resolution Lidar data, but archaeologists were often not interested as they were considered to be 'off-site' and too recent. In some areas these features cover huge parts of the landscape and it proved to be difficult to convince people that they are of historical interest.

Perspectives of rescue excavations for future research on medieval settlements

Summarising our observations on infrastructure projects, their value for medieval settlement research appears rather limited. Medieval settlements are rarely touched on by infrastructure projects, as in general their locations are known from written sources, old maps, toponyms or are easily detectable visible archaeological remains. This is an important difference compared to prehistoric sites. Whereas the number of newly discovered medieval sites is disappointing on the one hand, this can be assessed as quite a success for heritage protection at the other hand, as it indicates that such sites are rarely being damaged.

Although known sites were bypassed within the planning process of infrastructure projects, the situation is different when looking at more ephemeral remains of the past agrarian landscape. Linear and non-linear infrastructure projects quite often uncover, for example, pits for storage or flax roasting,[2] water channels (Böhm *et al.* 2023: 31) or fossil agrarian fields (Schmidt *et al.* 2023; Buchert and Rasink 2012). Only recently has this kind of remains come to the attention of archaeologists, who for a long time considered them not to be of archaeological interest. However, the knowledge of the past agricultural practices has very high relevance for understanding environmental history and learning about the late medieval crisis. New methods of surveying and dating landscape features are opening up important new perspectives for research, solving earlier research problems. Research into old fields – previously a topic of historical geography – is now moving into the remit of archaeology and geoarchaeology. Lidar scans show that the traces of cultural landscapes are very widespread. This makes it difficult to place such extensive archaeological monuments under general protection. Increased efforts will be required in the coming years to investigate these cultural landscape relics using the appropriate interdisciplinary methods of soil science, archaeobotany and archaeozoology (Schreg 2021). To date, there are only a few examples of research on field structures driven by heritage protection. At Albershausen (Baden-Württemberg), it was possible to recruit an interdisciplinary research team for the documentation and analysis of a medieval ridge-and-furrow complex that has given important insights in the dating of this agrarian practice (Schmidt *et al.* 2023; Kottmann *et al.* 2024).

The development of new industrial areas and living quarters in the periphery of modern villages that were also medieval settlements can be more important than infrastructure projects for improving understanding of medieval rural life and history. For quite a long time, new development areas and living areas only affected areas close to previous settlements. Due to increasing land consumption, this has now changed. In Bavaria, land consumption has increased dramatically recently and the government has allowed new business parks outside inhabited areas.[3] Also in Baden-Württemberg, new development areas are nowadays often far from the historical settlement areas. Prominent examples of early and high medieval settlements excavated in such development areas are Lauchheim, where the entire burial ground was investigated (Schmidt 2018), Sülchen close

[2] We assume that the rectangular pits in the Rhine lowlands around Eggenstein maybe interpreted as pits for the fermentation of flax fibre (Berg *et al.* 2019: 316).

[3] News report: "Gewerbegebiete bald abseits von Siedlungen möglich" *Merkur* 28.3.2017 https://www.merkur.de/bayern/neue-gewerbegebiete-bald-auch-abseits-von-siedlungen-moeglich-zr-8045259.html. News report: "Flächenverbrauch in Bayern steigt massiv an" *Süddeutsch Zeitung* 12.12.2023 https://www.sueddeutsche.de/bayern/bayern-flaechenverbrauch-landesamt-fuer-statistik-freiflaechen-1.6318279

to Rottenburg (Schoenenberg 2014) or Nieder-Ramsbach near Cleebronn (Kenzler and Neth 2021). Within these construction sites, there is an increasing risk – or a greater chance – of discovering medieval deserted settlements.

Since the 1970s, when Walter Janssen and Günther Fehring provided the first research agendas, many of their research questions, for the construction of houses for example, have been solved (Janssen 1968; Fehring 1973). Other topics, such as the many research questions related to village formation, only developed since the 1990s. An important impetus came from the observation of fluctuating early medieval settlements in an academic study comparing the situation in Southern Scandinavia with the archaeological evidence in Southern Germany (Steuer 1988). The expansion of new living quarters and industrial zones, mainly in the surrounding of Munich and Stuttgart, led to numerous rescue excavations. At Aschheim and Kirchheim near Munich, the first large-scale excavations showed the internal structure of early medieval settlements and indicated a fundamental reorganisation of the rural settlement landscape in later centuries (e.g. Kirchheim bei München and Aschheim: Winghart 1995). Important research has been done in the Renningen basin where, based on the surface finds of an amateur archaeologist, the State department for Cultural Heritage of Baden-Württemberg started rescue excavation connected with the development of an industrial zone and new local road connections. The analysis by Rainer Schreg used this example as a model for the formation of the village mainly during the time between the 11th and 13th centuries (e.g. Renningen: Schreg 2006). It became clear that in the surroundings of many villages, other early and high medieval settlements had existed that were abandoned at the latest in the 12th and 13th centuries.

Because research was centred on the Early Middle Ages, these results were only noticed very late by the scientific community and heritage curators. In the late 1990s, a renowned medieval archaeologist of the State department Baden-Württemberg declared there was no need to engage in investigations in existing villages, because it was much better to excavate early medieval houses in deserted settlements. In the brown coal mining areas of the Rhineland, 37 villages were destroyed, but (excluding some excavations of churches or fortified manors) in only one case did excavations take place within the village centre. Therefore a recent project in Kerpen-Manheim that adopted the method of test-pits, applied in the CORS project in currently occupied rural settlements in England (Lewis 2019), to a village under demolition was established (Petersen and Schreg 2021; Schreg 2024). Around 170 test-pits revealed no early medieval finds and indicate that there was minimal occupation in the later village area at the time of Manheim's first archival appearance in the 8th century. Surface finds indicate an earlier settlement area to the south-east of the later village (Petersen and Schreg 2022).

In eastern Germany, some villages, such as Breunsdorf or Klein-Görigk, were excavated before they were destroyed by coal mining (Smolnik 2011; Henker 2015). In these landscapes, village formation is strongly connected with the transformation of Slavonic societies during the period of German settlement. Related to coal mining, the cost-for-cause principle – as stated before – was politically annulled and only in the eastern German federal states were some villages researched at a large scale. These excavations were funded with research money and not by the benefitting groups.

Despite their different historical context, these eastern German projects showed the potential of excavations in existing villages. Since the practice of cost-by-cause has been introduced in Baden-Württemberg in 2016, there has been an increasing number of excavations also within villages. There is currently a re-densification that replaces old agrarian structures with new apartment blocks. This kind of research is more limited by small plots and more complex by being located in a still-used environment. Important studies come from villages around Mannheim, where at small

plots remains of earlier pit houses have been found (Wiegand and Wirth 2018). First efforts were gained at the Swabian Alb and its foreland, as, for example, in Steinheim/Albuch, Gerstetten and Dettingen unter Teck (Kottmann *et al.* 2020; Brenner 2021).

As Brenner stated, there are early medieval finds in some of the villages (Brenner 2021: 271), but this is neither surprising nor the crucial point. Excavations within the villages need to seek for the character of early medieval settlement traces and how the farmsteads of the Late Middle Ages and modern period developed from early medieval farmsteads with houses in mullion construction and sunken-floor huts. Research needs to look for the changes in the plots of land, and in the social and economic function of former farmsteads in the later village.

Therefore, it is small-scale investment in local development projects, rather than large infrastructure projects, that will foster our knowledge about medieval settlements. However, there will be infrastructure projects within modern villages, such as the installation of fibre-optic cable for Internet, new distant heating or hydrogen pipes. Even if they will only open very small insights in an already disturbed area, they can provide important information on settlement dynamics and the dating of the development of the road network in the settlement. This will allow mapping areas of settlement activities over time.

As the British CORS project showed, there is much to learn by analysing find distributions. For handling the large infrastructure projects, most state departments established specific teams to deal with these challenges. The future will show whether it will be possible to handle these new infrastructure requirements within the daily routines of heritage management. As there is the political intention to encourage this new infrastructure, there is the risk of reducing regulations and costs by mitigating the efforts in documenting the encountered archaeological features.

Conclusions

In Southern Germany, recent infrastructure projects are no driver of research on medieval rural settlement sites. Their importance is much higher within prehistoric periods. Modern infrastructure projects like pipelines, motorways and railways, as well as energy lines and wind-parks are at some distance from inhabited settlements. Further progress for the understanding of medieval settlement changes will probably come from the village centres.

Our understanding of medieval settlement and landscape change currently lacks a better knowledge of landscape ecology. Periods of settlement desertion, the effects of serious weather events or epidemics during the crisis of the 14th century can only be fully understood by looking closer at the cultural landscape. Relics of past agriculture are by our current archaeological perception 'off-site'and seldom receive the necessary attention. However, as unimpressive as these kinds of features may appear, they help to understand long-term effects of human land-use on the cultural heritage. In times of climate change, we face the challenge of further developing agricultural practices in a sustainable way and time is an important aspect of sustainability. It is only with a view back over the long history of cultural landscape development that we can evaluate risks and chances of human land-use practices. Even if pre-modern agriculture is not comparable to modern industrialised agrarian practice, only research into past cultural landscapes by archaeology, geography and text-based history will provide the insights we need into the temporal aspect of our modern decisions.

The archaeological community that benefits as a whole from the new insights must lobby in favour of sufficient basic conditions. A vital means for doing so is in communicating the relevance of research questions related to these projects.

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Large-scale infrastructure archaeology and medieval rural settlement in Hungary

Tibor Ákos Rácz and Edit Sárosi

Introduction

The year 1989 not only marked a milestone in the history of Hungary, but also a turning-point in the history of Hungarian archaeology, since, following the collapse of the communist regime and in parallel with the introduction of a market economy, Hungary's governments introduced new, nationwide infrastructural programmes. Thus, from the 1990s, several long-term projects were set up seeking to make Hungary an integral part of the pan-European traffic system – the so-called Helsinki Corridors – with the plans including the significant expansion of the underdeveloped motorway and railway systems. The process accelerated after 2004, when Hungary joined the European Union and, from 2007, when the country was eligible to apply for financial resources from the budget of the EU. Between 1990 and 2007, nearly 7,700,000 m^2 were excavated, comprising 700 sites, in connection with motorway constructions (Bozóki-Ernyei 2016: 236). Connected to transport infrastructure development, huge industrial parks and residential areas appeared around urban settlements, especially in the last decades. These projects have intensively involved reclassified agricultural lands with less disturbed archaeological sites and have effectively provided vast areas of contiguous surfaces for investigation, enabling the systematic mapping and the study of thousands of hectares of land. Another type of infrastructural development generating significant impacts on Hungary's rural archaeological heritage comprise flood-safety projects, such as the Kvassay Jenő National Water Strategy and the Vásárhelyi Plan,[1] which have included the widening of floodways by dislocating levees at bottlenecks, as well as the creation of flood-retention reservoirs.

While on the one hand large-scale projects of this kind represent a major challenge for archaeology, on the other hand, they also offer opportunities to expand scientific knowledge, improve research methods, involve and raise public awareness towards archaeology, and inform us of past cultures on a scale impossible before. Questions related to cultural heritage protection, the legislative background, and the institutional structures undergoing continuous change as well as awareness around the long-term sustainability of archaeological sites are long-debated and remain relevant in scientific literature (Bozóki-Ernyey 2007; Wollák and Raczky 2012; Bozóki-Ernyey 2016; Czifra and Fábián 2016). Importantly, the impact on archaeological heritage protection in Hungary of the many extensive excavations carried out within major infrastructural projects has been the subject of several analyses. Attila Gyucha, for example, in a short but thought-provoking article (Gyucha 2012), evaluated the legislation as being potentially detrimental to archaeology by strictly regulating large-scale excavations. By contrast, Katalin Wollák and Pál Raczky (2012) preferred to see the generation of these large-scale investigations in terms of their value in the wider context of Hungarian archaeology. Later, Miklós Takács provided an overview of how research on early and high medieval settlement had been affected by the unfavourable legislative changes made in 2012 (Takács 2017). He proposed the creation of research groups, with the involvement of external funds; he encouraged full-scale processing of materials and a holistic approach, since research had previously only worked on restricted or limited parts of settlements or on selected types of objects; and he also drew the attention to the enhancement of methodological aspects and standards. Subsequently, in

[1] https://www.ovf.hu/en

2021, researchers at Eötvös Loránd University laid the foundations of a medium-term archaeological strategy, in which they considered in detail the problems of developer- or investment-led archaeology and, in a forward-thinking way, not only assessed the situation, but also formulated proposals for the future (Raczky *et al.* 2021).

In this paper, we will outline the legislation related to cultural heritage and site protection in Hungary and consider how preventive or rescue archaeology fits in with this; we explore the numbers and types of preventive excavations connected to infrastructure projects; and then summarise some of the results generated by these with regard to medieval rural settlement. To end, we address some of the challenges related to all this important archaeological work for medieval Hungary.

Legal and institutional background of preventive archaeology in Hungary

In the 1990s, due to the new political circumstances and after approximately 50 years of unchanged protocols, the protection of historic monuments, the functioning of museums, and the frameworks of archaeological practice were reconsidered. The first law, Act CXL *On the protection of cultural property, museum institutions, public library services and cultural education*, had been issued in 1997; shortly after, new, integrated legislation came with the Act LXIV of 2001 *On the protection of cultural heritage* in terms of monument care and archaeological heritage protection for all parties concerned, including developers, public authorities and museums. This act remains in force, but has been amended a full 30 times since 2010, significantly changing not only the framework for undertaking archaeological excavations, but also the underlying institutional framework and institutional competences.

The period between 1990 and 1997 can be described as one of adaptation to new conditions, with the legal environment characterised by a lack of regulation. The 1997 legislation was intended to ensure that excavations were carried out in accordance with scientific criteria; it also granted excavation rights to county museums. The 2001 *Heritage Protection Act* came to define the term 'archaeological site' and saw the licensing of excavations as thoroughly regulated. With this came the era of contract archaeology, when new standards were set and hundreds of archaeologists began working on often large-scale excavations (Wollák and Raczky 2012). More negatively, however, from 2000 onwards, the state drastically cut museums' budgets, making them somehow use the money from the excavations to maintain themselves. This created a non-transparent financial environment for investors, all the more so as there was no uniform excavation procedure being applied in the country. This led to increasing demands for archaeological investigations to be carried out by a central state-controlled body instead of the 19 county museums and the History Museum in Budapest. The Specialised Service for Cultural Heritage Protection, set up in 2007, was given exclusive rights to carry out excavations related to major investments, but the wider archaeological community became divided over the new institution, and in fact it soon became clear that excavations were still no cheaper and that the system in its current form was not sustainable. Thus, in Spring 2012, new legislation was adopted that drastically reduced the potential for archaeology in the case of large state-financed projects, with a 30-day deadline for every single excavation project and a maximum 1% of the whole investment budget allocated to excavation work (Wollák and Raczky 2012: 133).

Key summary points for current archaeological practice are as follows:

- The present-day legislation defines that archaeological finds are state property and must in all circumstances be stored in an institution with a state licence or authorisation to preserve artefacts, most often in the local museum, or, in case of a lack of capacity, in the Hungarian National Museum.

- There are different categories of archaeological sites. All registered archaeological sites are *ex lege* protected and those with outstanding or enhanced scientific interest are designated as scheduled archaeological sites, subject to strict rules to ensure their sustainable use and long-term preservation (Bozóki-Ernyey 2013).

- It is of public interest to protect and excavate any archaeological heritage under threat, meaning that all sites have to be excavated, all archaeological features documented and materials collected, with no priorities or site selection possible.

- Existing legislation generally implements the 'polluter pays' principle formulated in the Valletta Convention in 1992, meaning that the total costs of the excavations are paid by the developers directly to the archaeological contractors.

- Since 2012, a different procedure has applied to 'Major investments' (those with a total cost above HUF 500 million/€1,25 million) and to cases of 'National capital investments' (by decision of government, introduced in 2019). Key is the requirement to prepare a so-called preliminary archaeological assessment at the planning stage of the project, including a detailed summary on the archaeological risks of the project, based on field-walking/survey, trial-trenching, geophysical survey, aerial photography, etc. (Reményi 2018; Reményi and Kiss 2019). Most of the large-scale infrastructural projects under consideration here belong to these two categories.

- Excavations may be carried out by authorised institutions on the basis of an official price list determined on the basis of intensity or complexity of the site. The price includes the total cost of the excavation, watching brief, documentation, primary finds conservation, primary finds processing, and the costs of storing the finds. This official price list has not changed in recent years, despite significant inflation, which means that all too often it is impossible to manage the tasks specified in the legislation with the amount available.

The regulations not only limit the money spent on archaeology, but even determine the length of the excavation: 30 days for trial-trenching and 30 extra days for the excavation of the entire surface. However, by way of negotiation, the investor has the option of voluntarily contracting for a higher amount than the 1% budget limit and for a longer period. In addition, the legislation allows for the planned covering of the site and an avoidance of preventive archaeological works, if it is technically feasible to protect deposits during the project by using a soil cover of appropriate quality and thickness between the archaeological layers and the construction levels. We should stress that development-led excavations, including 'Major investments', can normally only be conducted by the county museums and the Budapest History Museum, within their territorial jurisdiction. By contrast, the rapidly growing number of national and regional large-scale investments prompted the need for a form of centralised coordination of archaeological projects from the late 1990s. Following a number of organizational changes (Bozóki-Ernyey 2016; Czifra and Fábián 2016), the National Archaeological Institute of the Hungarian National Museum (HNM NAI) now forms the national body responsible for coordinating these projects from the planning stage to implementation: only the NAI can prepare the preliminary archaeological assessments and contract for excavation work, with scope to involve relevant museums in the fieldwork. Private archaeological firms may only engage as subcontractors of the museums and can contribute in limited areas, such as providing geodetic surveys and assistant field staff.

Large-scale excavations continue to this day, but tend mainly to link to construction of industrial stores, such as warehouses and logistics centres along motorways. It is valuable to view the statistics on the yearly number of excavation permits: the number increased considerably between 2000 and

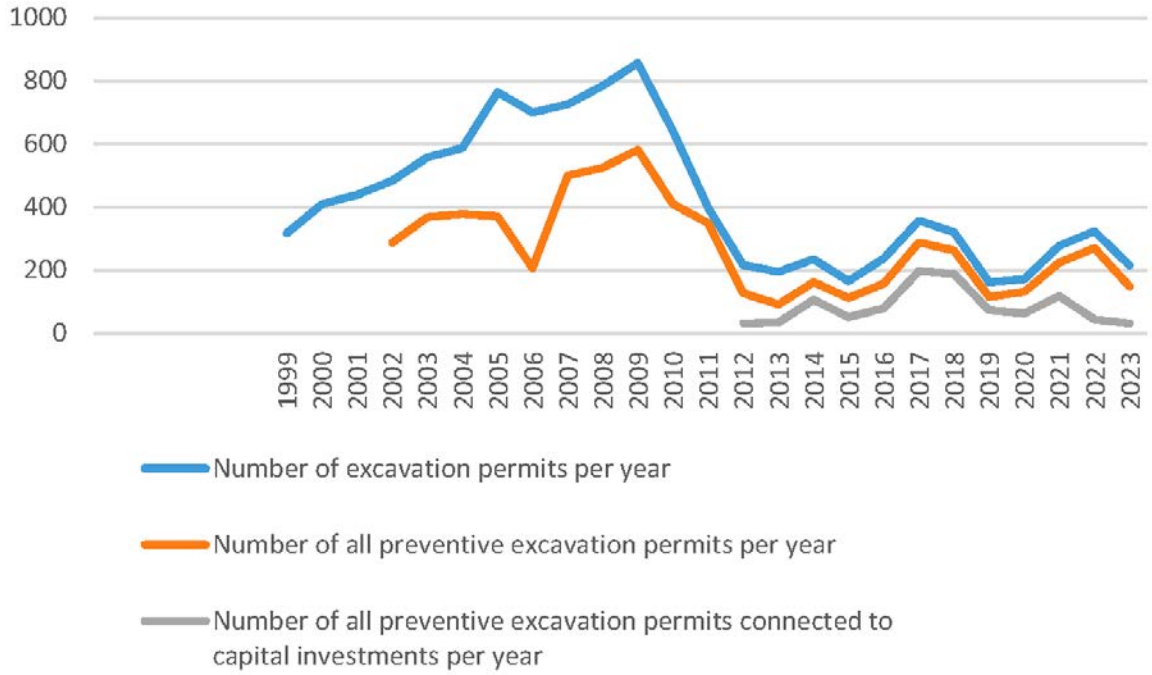

Figure 1. Yearly number of excavation permits based on data of the Excavation Committee.

2012, before falling sharply in the early 2010s; between 2017 and 2019, the data show a marked upward trend again – before that boom was sharply interrupted by the Covid-19 pandemic. After 2020, the number of permits rose again, but have shown a downturn in the last two years (Fig. 1).

Related data for permits for investigations of medieval settlements are available for the last four years. These show that medieval settlements are very well represented and investigated in excavations in general and within large investments and infrastructure projects in particular; indeed, approximately half of the excavation permits for large investments sampled or explored medieval settlement sites in some form (Table 1).

Medieval settlement research in the context of large-scale infrastructure archaeology

Publications related to medieval rural settlement research should reflect the scale of processing and evaluation of data obtained through preventive/rescue excavations. The trend that emerges reveals that while the first major excavations were professionally strong and thorough, subsequent engagement suggests reduced interest and resources as time progressed. Dividing the publications into three groups, the majority of excavations appear in the first category, namely that of excavation reports, since this is a legal obligation of the fieldwork director. However, often these comprise short textual summaries containing only basic data, lacking any kind of analysis. The main vehicle for information dissemination was for a long time the periodical *Archaeological Researches in Hungary*, but this has ceased to appear recently. Preliminary publication of excavation results can be classed as the second level, and although most motorway excavation projects have seen volumes generated shortly after the end of fieldwork, there can be significant shortcomings in these outputs. Often, however, this specific publication type can contain a range of results, plus maps, plans and finds images, and – sporadically – deeper analyses. Currently, this is the best and fastest way to obtain an overview of medieval settlement research in Hungary.

Table 1. Research into medieval settlements as reflected in the data of excavation permits of the recent past.

Year	Number of preventive excavation permits per year	Number of excavation permits connected to capital investments	Number of medieval settlements included in excavation permits connected to capital investments	Number of medieval settlements included in excavation permits connected to infrastructural capital investments
2020	131	63	32	6
2021	224	118	75	48
2022	270	176	76	32
2023	148	84	42	13

The first volume of this kind was *Paths into the Past* (1997), which included English translations of the texts (Raczky *et al.* 1997). This was followed by publication of the results from the M5 highway excavations performed by Csongrád County Museums (Szalontai 2003); this, in fact, offers various preliminary reports on medieval sites. One of the most notable archaeological projects ever conducted in Hungary came within the major M0 motorway project located around the capital in Pest County between 2001–06. Edit Tari, coordinator of the investigations, edited a valuable volume which presents summary reports on all the excavations, providing data, plans and finds images related to more than 50 different sites (Tari 2006). Later, a methodological study on the lessons learnt from the M0 motorway preventive/rescue excavations (Tari 2010), plus a preliminary report on the evaluation of medieval sites (Rácz 2010), were published. The Budapest History Museum published two large consecutive volumes on results of excavations undertaken in the capital, *Treasures under the City*, both including well-illustrated finds catalogues (Zsidi 2005; 2017). Finally, the studies within *Rolling Time...* discuss results from work linked to the M7 motorway project in County Somogy; these went well beyond the level of preliminary reports (Belényesy *et al.* 2007). Valuably, all of these publications were accompanied by temporary exhibitions and most volumes include English abstracts. However, a negative trend must also be emphasised here: since 2007, apart from the assessment of excavations in Budapest, just one other synthetic volume of this sort has appeared (Balogh 2009), even though large-scale excavations have been taking place ever since.

Finally, the third category of publications consists of articles discussing more specific topics connected to settlement archaeology or to excavation finds, offering some useful directions and angles of research. Below, to gauge the research trends, we can look more closely at some of the results from the largest infrastructural projects.

(i) Kána

The village of Kána, discovered in the 11th district of Budapest, was for a long time the only settlement of high medieval date (corresponding largely to the era of the Árpád Dynasty in Hungary) fully excavated in Hungary. Excavations were directed between 2003 and 2005 by György Terei, who produced a detailed preliminary report on the results in 2010 (Terei 2010). Both settlement and cemetery were shown to have been active across the 12th–13th centuries, with a church built sometime in the mid-12th century; only a few finds could be dated to the 14th century. The majority

of the inhabitants possibly fled during the Mongol invasion (1241–42). Two types of houses were recognised with different orientation, quite possibly denoting a chronological change. Various of the finds specialists have generated highly informative publications, such as the two separate early outputs on the iron finds (Terei and Horváth 2007a; 2007b). Daróczi-Szabó and Terei (2011) examined the 22 complete ceramic vessels which had been discovered turned upside down, no doubt due to superstitious practices, many containing animal bones, eggshells, iron knives or iron nails. We can note various other finds, some rare from rural contexts: lead weights, a pilgrim's badge and different buckles (see Terei and Vargha 2013). The unusually rich material culture of the Kána rural settlement, and especially the presence of a high number of weapons, raises interesting socio-historical questions to be explored in the much-anticipated final monograph(s) (an interim overview is published in Terei 2021).

(ii) Kecskemét

Another substantial project for Hungarian medieval settlement research was undertaken as a result of development works at the Mercedes-Benz plant in Kecskemét in 2009–17. Gábor Wilhelm and Nikoletta Lukács directed excavation work where not only groups of houses were unearthed, but an entire medieval village specializing in extensive livestock breeding. In fact, two separate settlements were identified next to each other (Fig. 2), seemingly active across the same timespan, namely from the mid-12th to the early 13th centuries. This topographical situation is exciting in itself. The two sites each featured an enclosure ditch marking the settlement boundaries. On the western and eastern sides of the larger settlement, houses and workshops were built on low elevations, while between them, in a valley-like depression, wells were established. After its abandonment, it was not built over, nor disturbed, which offered rich scope for a thorough reconstruction of the settlement structure. Nikoletta Lukács is processing the excavation material within her PhD dissertation and has two related publications so far, the first dealing with a sub-problem, namely the smoke conduction of two selected houses (Lukács 2020), while other results appeared in the 2023 *Ruralia* conference volume (Lukács 2023) reflecting on the village's internal structure and offering a functional interpretation of settlement features. Nonetheless, an explanation for the unusual phenomenon of the double settlement, an evaluation of the house types and the detailed presentation and analysis of the finds remain tasks for the future.

(iii) Overviews and analyses

The research potential contained in the materials and data gathered from the diverse large-scale, infrastructure excavation projects was evident to the research community from the outset, and from 2010 onwards the need to collate, compare and evaluate the findings became more and more pressing. In 2010, Miklós Takács summarised the research undertaken between 1990 and 2005 into high medieval settlements, producing a catalogue listing 414 sites. Their total explored area was estimated to be between 700 and 1000 hectares and the number of medieval features investigated between 23,000 and 26,000 (Takács 2010: 1–2). In total, 365 projects belonged to the category of preventive/rescue excavations, while the remainder derived from research excavations and trial-trenching.

In January 2013, a research team was formed under the leadership of Miklós Takács to tackle the scientific problems relating to this expanding medieval settlement archaeology across Hungary (Takács 2013). The project was financed by the National Scientific Research Fund and aimed to understand the changes in the rural settlement network and in landscape usage from the decline and fall of the Avar Khaganate through the Hungarian conquest of the Carpathian Basin to the foundation of the Hungarian state (Takács 2019). It involved the processing of materials retrieved in both large-scale and smaller research excavations (Fig. 3). Most of the team members (Rozália Bajkai,

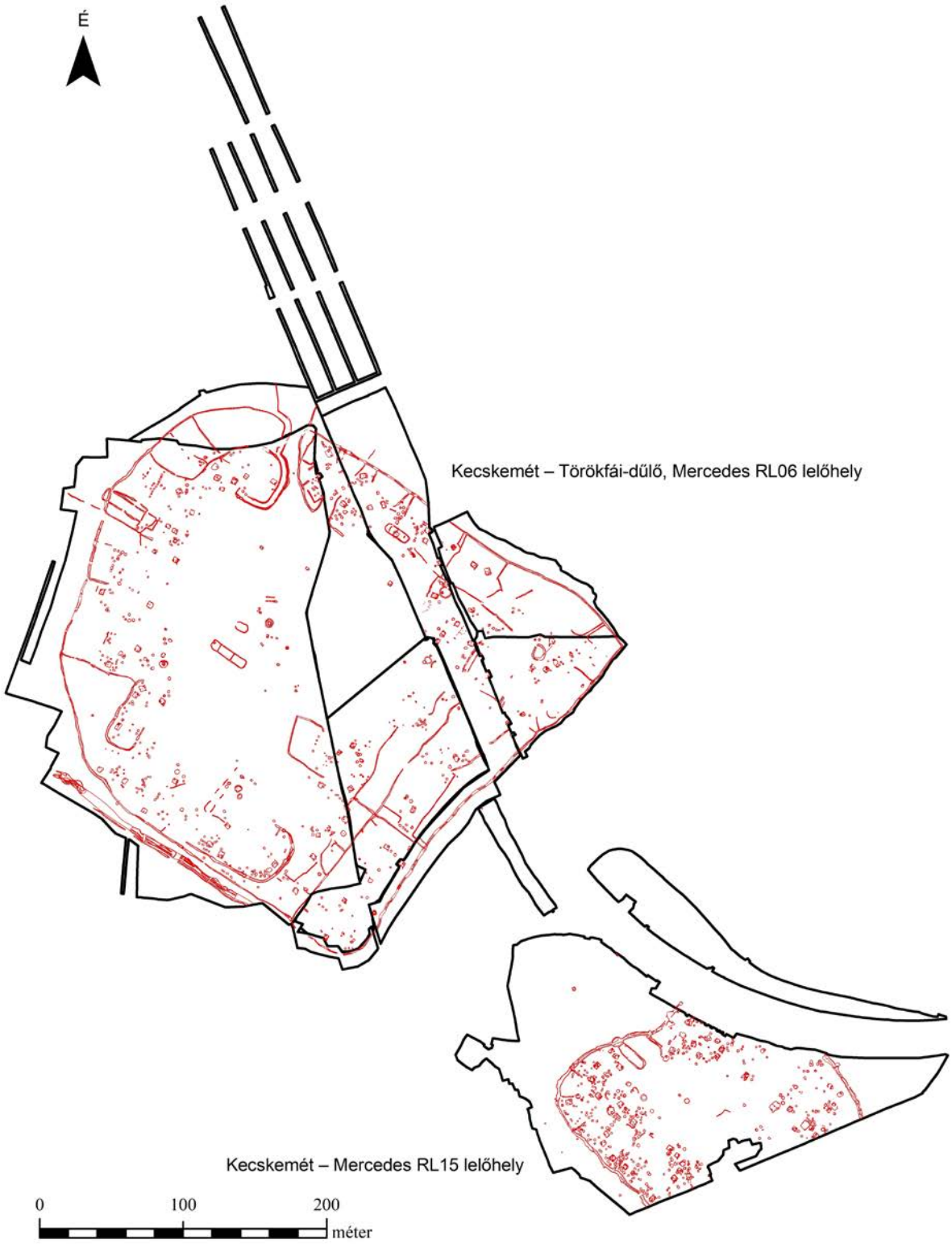

Figure 2. Ground plan of the Árpád Age sites excavated in the industrial area of the Mercedes-Benz plant near Kecskemét.
(After Lukács 2020: 389)

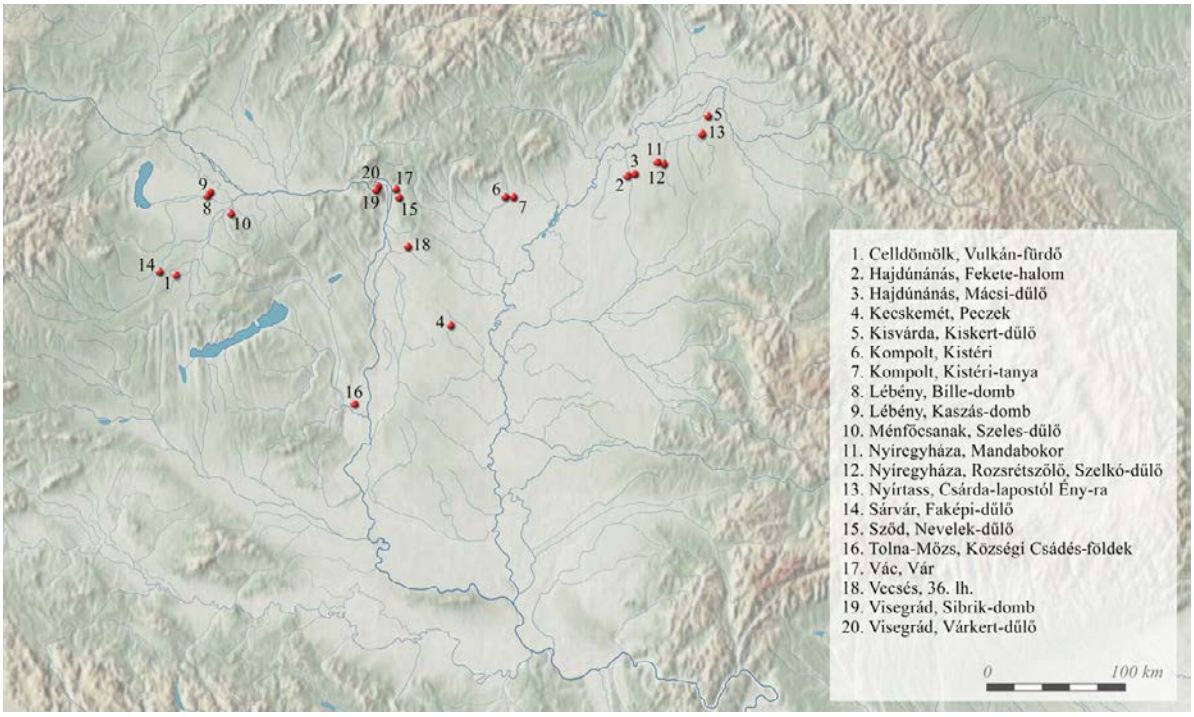

Figure 3. Map of the Carpathian Basin indicating the sites studied during the project no. 104533 financed by the National Scientific Research Fund.
(Illustration by Sándor Ősi, after Takács 2013: 2)

Andrea H. Vaday, Szabina Merva, Ildikó Katalin Pap, Zsolt Petkes, Tibor Ákos Rácz, Melinda Takács and Mária Tóth) belonged to a younger generation of archaeologists and were employed in different institutions across the country. The five-year project brought to the surface the fundamental problems of settlement research, initiated cross-institutional discussions, and helped to reflect on the questions of Avar survival, the relationships between 10th- and 11th-century settlements, the internal structure of the settlements, and pottery-based chronologies. Unfortunately, however, the co-operation of the research group was limited to the duration of the project.

Nonetheless, this cooperation and the subsequent individual outputs of the various participants have produced an important series of discussions and analyses related to settlement archaeology. Thus, Melinda Takács worked on a chronological classification of the Late Avar and Early Árpád ages in her dissertation based on materials from a site excavated along the line of M3 motorway, alongside a wider review of early medieval sites in the Upper Tisza Region (Takács 2016). Szabina Merva initially focused on the identification of the first settlements of Hungarians in the Carpathian Basin, but she soon realised that problems regarding 10th-century pottery and settlements are inseparable from those of the 8th–9th centuries. She processed finds from the settlement excavated in depth at Ménfőcsanak-Szeles-dűlő along the line of M1 motorway. Her PhD debated what role the north-eastern part of Transdanubia could have played in the 9th century in the life of the Carolingian Province of Pannonia. She exploited finds data from two micro-regions, mainly pottery: 6,600 early medieval ceramic and metal artefacts were examined, and a total of 76 buildings. One key result of the ceramic analysis was the definition of the formal spectrum of different periods (Merva 2012; 2019).

Also within the above research project, Tibor Ákos Rácz processed the archaeological materials from Vác, a settlement dating back to the 9th century, later a power-centre of the Árpád dynasty and a bishopric founded in the 11th century (Rácz 2016). His PhD concentrated on the pottery and dwelling

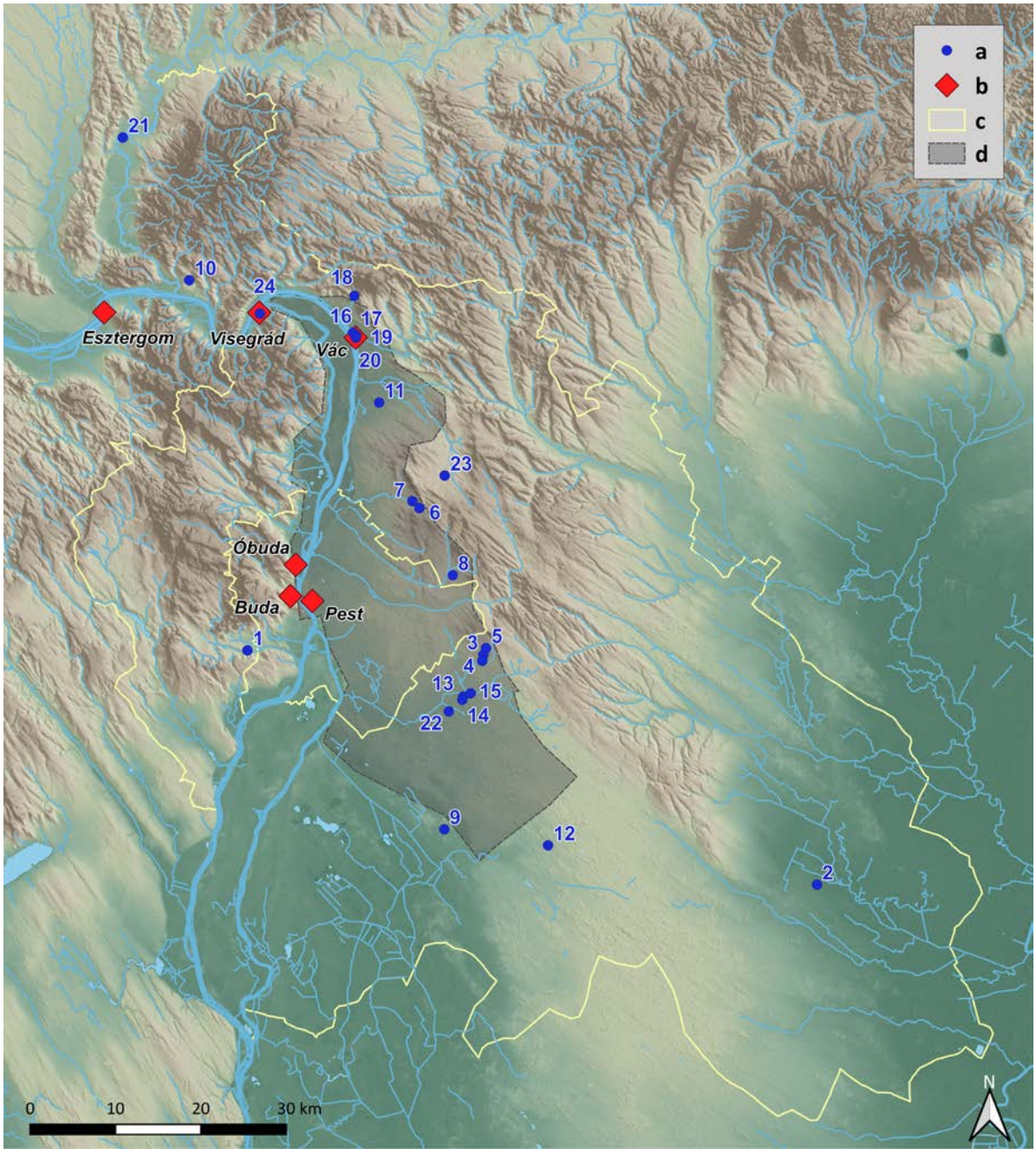

Figure 4. Position of the Pest Plain and the archaeological sites in the 2019 volume within Pest County. (a) 9th- to 14th-century settlements analysed in the volume: 1 = Budaörs, Kamaraerdei-dűlő (10082); 2 = Cegléd, Fertály-földek (35073); 3 = Ecser 6 (30837); 4 = Ecser 7 (30839); 5 = Maglód 1 (30886); 6 = Mogyoród, Juhállás-dűlő (92303); 7 = Mogyoród, Mély-gáti dűlő (26169); 8 = Nagytarcsa, Millenium utca (26201); 9 = Ócsa, Mádencia; 10 = Szob, Vendelin (11653); 11 = Sződ, Nevelek-dűlő (11712); 12 = Újhartyán, 405. út (68319); 13 = Üllő 1 (27020); 14 = Üllő 2 (27021); 15 = Üllő 7 (30900); 16 = Vác, Gépipari technikum (12172); 17 = Vác, Géza király tér (Vár) (12064); 18 = Vác, Gombás (12078); 19 = Vác, Katona Lajos utca (12196); 20 = Vác, Múzeum utca 9 (Magyar város) (12178); 21 = Vámosmikola, Kengyeles-dűlő (nyilvántartásba vétele folyamatban); 22 = Vecsés 67 (30944); 23 = Veresegyház, Szentjakab (12377); 24 = Visegrád, Várkert-dűlő (53013). (b) Power-centres of the Árpád-dynasty in the high middle ages. (c) Present-day territory of Pest county and the capital Budapest. (d) The territory of the Pest plain.
(Illustration by Ágnes Füredi and Tibor Ákos Rácz, after Rácz 2019: 205)

structures, setting these in the wider context of the evolution of the settlement network in a sample area subjected to intensive archaeological excavations, namely the Pest Plain set in the centre of the Medieval Hungarian Kingdom. In all, 23 sites dated to the Middle Ages were identified during the M0 motorway project as the engineering works passed through the plain. These settlements, alongside data from other medieval sites traced in Pest County, supplied the core material for the PhD (Fig. 4). The final results of his studies were published in his 2019 monograph (Rácz 2019), which establishes a typology for pottery and dwelling structures across the 10th to 14th centuries and offers a valuable comparative analysis of contemporary settlement forms to help to understand the dynamics of changes in the settlement network. The volume also explores how hierarchical relations affected the quality of the material culture, dwelling structures and rural settlement forms. We should recognise, however, that this is, sadly, currently the only monograph based fully on the evaluation of archaeological materials from one of these major large-scale projects.

Conclusions

Having summarised both the legislative and institutional background and reviewed the research trends, we focus now on some of the major challenges that medieval settlement research is presently facing. As outlined, archaeology in Hungary has experienced an extremely intensive period and a rich growth of data since the 1990s. Most advances in medieval rural settlement research indeed result from the noted large-scale infrastructure projects, particularly motorway construction, and the analyses of sizeable excavation datasets. The location, time and circumstances of these large-scale investigations were not, of course, defined by scholarly arguments, but by pressure of the economic sector. Thus, the data collected might be viewed as rather subordinated to eventuality and randomness, while the territorial sampling is necessarily linear and uneven, as it followed the routes of new and modified motorways. The excavation projects that sometimes extended over several tens of thousands of square metres and which could last for years and had complicated budgets, arguably caught Hungarian archaeology by surprise. A long formative period had to pass to deal with the demands of such major projects effectively. Museums operating within the system of municipalities used their own local procedure protocols instead of a nationwide unified convention. And, finally, the lack of a unified data management system hindered – and still hinders – proper data processing.

Undoubtedly, large-scale excavation projects have fundamentally changed archaeology over the past 30 years. In this period the service provider rather than the researcher-led aspect of archaeology has come to the fore. Investment-led archaeology prioritises fieldwork and unfavourably affects scientific evaluations; museum archaeologists are compelled to devote most of their time to preventive excavation work, with rare/limited opportunities for post-excavation processing or research within their own fields. Investors are bound by law to finance the excavation of affected sites, as well as the conservation, primary processing and inventorising of finds. However, the investors cannot be obliged to support full scientific analyses and evaluations or the subsequent dissemination of the results among the wider public, nor are there additional resources for this in the cultural heritage institutions. The lack of post-excavation work relates also to the fact that museums needed to use a significant part of the funds raised for excavation for their own upkeep and to try to expand their finds storage capacity. At the same time, research institutes, equally underfunded and understaffed, have only tangentially addressed the multiple materials originating from large-scale projects.

Before all these changes and infrastructural investments, Hungarian medieval rural settlement archaeology already possessed a well-developed scholarly approach to the subject and a proven excavation methodology, albeit over smaller surface areas. Preventive or rescue excavations have certainly opened up new opportunities in research on rural sites, especially in terms of the evaluation

Figure 5. Volunteers helping archaeologists on large-scale excavations, Pest County, Dabas, 2021. *(Tibor Ákos Rácz)*

of their material culture, house forms and settlement structures. However, comprehensive studies had not been produced for a long time, and the general conception of medieval villages remained static (Rácz 2019: 9-16). The elaboration of theoretical considerations has also been hampered by the fact that, besides new challenges posed by the preventive excavations, the numbers of research excavations plummeted drastically.

The legislative and institutional frameworks are fundamental determinants of research possibilities and outputs. We have observed above a negative trend in legislative regulation, increasingly narrowing the opportunities for, and funding of, quality scientific work and post-excavation work and evaluations.

Overall, Hungarian archaeology has successfully adapted to the requirements of large-scale investments and has developed its methodological procedures and technical conditions to support preventive excavations. There have been strong efforts to adapt to the ever-changing legislation and to the equally frequent changes in the institutional framework, driven by the momentary political and investor interests implemented without substantive professional consultation. Archaeologists have perceived the many new opportunities provided by the major infrastructure investments as well as the negative trends triggered by regulation. These processes have been analyzed and recommendations made for improved regulation (Gyucha 2012; Raczky *et al.* 2021), but they have not been taken into account by decision-makers. While excavations are carried out to an adequate professional standard currently, material and human resources to process and evaluate findings fully are scarce and scientific input is limited due to costs.

However, we must highlight some positive achievements, too. First, this type of large-scale rescue work prompted a new approach, the involvement and training of additional professional staff, increased storage capacities, plus the implementation of revised strategies and techniques in the field, in recording and in handling materials and post-excavation datasets. The opportunities and constraints led to the appearance of a project management approach, together with the standardization and rethinking of fieldwork practice. National-scale protocols, as well as standards, are now available not only in the areas of on-site excavation (Takács 2011), post-excavation works and documentation, but also in connection with environmental analysis, archaeometry and

conservation work.[2] Furthermore, the Hungarian National Museum now operates a countrywide unified platform of digital archaeological datasets, designed to enhance and support archaeological research.[3] Finally, it is important to recognise a growing interest from the public towards different aspects of archaeology of all periods, and it is very heartening to see a trend in national and local museums at integrating volunteers in different phases of fieldwork (Fig. 5), even within rescue projects at medieval settlements (Rácz 2021).

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Early medieval rural settlement archaeology in Ireland and the impact of large infrastructural developments

Aidan O'Sullivan and Rónán Swan

Introduction

The early medieval period in Ireland, AD 400–1100, was a time of significant social, ideological and economic transformations. Ireland's early medieval archaeological evidence, in contrast to that of the preceding Iron Age with its sparse settlement evidence, suggests a likely notable growth in population from the 6th century AD onwards, with people building and inhabiting many tens of thousands of settlement enclosures – raths, cashels (known to archaeologists as ringforts), crannogs, churches and other dwellings – across the landscape (Fig. 1). Surviving in the modern Irish landscape, there are at least 55,000 early medieval settlement sites, with estimates of at least 47,000 ringforts (including earthen-banked raths and stone-walled cashels), 2,000 crannógs (inhabited, built artificial islets in lakes) and *c.* 5,500 church sites. Beyond these enclosed settlements, there are probably thousands of burial or cemetery sites. This mass or wealth of early medieval archaeology appears unparalleled in Europe – we do not know of similar surviving numbers of highly visible early medieval settlements elsewhere. This review will accordingly focus mainly on the early medieval period, with a brief review of late medieval discoveries at the end.

This time period sees the introduction of Christianity into Ireland from about the 5th century AD onwards, and the widespread conversion of the Irish by the 7th and 8th centuries. This brought changes in beliefs and burial practices, but also had an impact on the settlement landscape and economy, with the development of monastic settlement enclosures, remote eremetical settlements, and a likely investment by the Church its own extensive agricultural estates. Importantly, Christianity brought literacy, too, and from the 7th century onwards, the Church generated contemporary written documents in Old Irish and Hiberno-Latin, enabling us to now translate and read extensive early Irish laws from the 7th to 9th centuries; saints' hagiographies or *Lives* from the 7th to 12th centuries; annals recording political dynasties and events across the period; and a wide range of inventive and creative narrative literature, including adventure and voyage tales. Such sources thus provide a powerful means for reconstructing an understanding of early Irish society, mentalities, social structures and everyday life. They also provide a range of insights into early medieval Ireland's distinctive dynastic politics and its territories, as well as the character and organisation of early Irish kinship, social classes, gender roles and religious beliefs and practices.

Thus, even prior to the so-called Celtic Tiger economic boom in Ireland (*c.* 1995–2008) (O'Sullivan *et al.* 2014a; O'Sullivan *et al.* 2021) we knew that the archaeology of early medieval settlement was already one of the richest in Europe (O'Sullivan 2016). And yet, as will be outlined below, this archaeology was enhanced in different ways from that boom period, with major EU- and Irish government-funded infrastructural development since the early 2000s, which included massive investments in motorways and road improvements (especially in the Republic of Ireland). Mitigation of these infrastructural developments led to large, long-term excavations, which created a cohort of well-qualified, highly-experienced professional archaeologists expert at investigating the subtleties of settlement archaeology, and a mass of evidence related to a wide variety of settlement types and land-use, some of which has seen – invaluably – strong related publication (e.g. O'Sullivan and McCormick 2017; O'Sullivan *et al.* 2021).

Figure 1. Map indicating the widespread distribution of over 47,000 early medieval ringforts and enclosures throughout Ireland.
(Map drawn by and reproduced with permission of Matthew Stout)

In this paper, we focus on the impact of archaeological investigations in advance of infrastructural development, notably within motorway projects. These motorways traversed the country in all directions, and their network can be seen by distributions of at least 325 excavations of early medieval (and other) sites along the routes (Fig. 2).

Figure 2. Distribution map of 325 archaeological excavations of early medieval sites on Irish motorway and roads developments; the numbers (e.g. M3) refer to the different schemes. An interesting aspect of the linear distributions is how it shows that in regions with lower previously known numbers of early medieval sites – for example the M3 through Co. Meath – motorway schemes have revealed sites with little or no surface expression. It is likely that centuries of tillage have reduced the visibility of early medieval sites.
(Map by Michael Stanley, Transport Infrastructure Ireland)

The legal framework for development-led archaeology in Ireland

There is a long history of archaeological excavations of early medieval settlements in Ireland (see full account in O'Sullivan 2014a: 13–45), but only from the 1930s did more systematic, problem-oriented excavations start being carried out, largely influenced by a research programme of investigations undertaken by the American Harvard Archaeological Expedition to Ireland, including on major crannog (artificial islands) sites at Ballinderry and Lagore (e.g. O'Sullivan 1998: 111–125). We can note also several important Irish university-based digs of early medieval settlements by Prof. Seán P Ó Ríordáin and Prof. Michael O'Kelly, mainly in the 1950s and 1960s, but virtually all these were focused on single sites, and often small-scale in extent (O'Sullivan 2014a: 16–19).

O'Sullivan *et al.* (2017b) summarise the transformations in Irish archaeology specifically brought by roads archaeology, but the changes originate earlier. In 1973, both the United Kingdom (which is relevant here to archaeological practice in Northern Ireland) and the Republic of Ireland gained membership of the European Economic Community (EEC) – latterly the European Union (EU). This had significant, though initially unanticipated, impact on archaeological research on the island of Ireland (O'Sullivan *et al.* 2014a: 20–22). Farm-improvement grants from the EEC were the first indicators of a change in the way in which archaeology would be investigated, with full excavation of a number of sites prior to their removal on farmland. Thus, in Northern Ireland in the 1970s and 1980s, archaeologists from the Historic Monuments and Buildings Branch, then Department of Environment (NI), excavated a number of important early medieval sites, including Deer Park Farms, Co. Antrim, a raised rath in the Glenarm Valley, with evidence for occupation from the 7th to 10th centuries, with remarkable organic survival in the waterlogged soils of its lower occupation levels, and a substantial raised rath during its later occupation (Lynn and McDowell 2011).

EU membership led to the implementation of the Environmental Impact Assessment Directive (85/337/EEC) of 1985 and its subsequent amendments (O'Sullivan *et al.* 2014: 20–21). These required that public and private projects likely to have significant environmental effects be made subject to an assessment prior to development consent being given. This brought about a fundamental shift in Irish policy and practice in relation to archaeological assessment, including, where appropriate, the use of test excavation, geophysical survey and other methods in advance of such developments.

The EU's Structural Funds (SF) are its basic instruments for supporting social and economic development in member states, accounting for up to a third of its expenditure. The reform of these in 1988 increased the availability of capital expenditure for regional development and infrastructure (O'Sullivan *et al.* 2014a: 21). The Republic of Ireland, in particular, benefited hugely from these funds from 1989 to 1999, through the provision of financial support for a number of important large-scale infrastructural projects, such as cross-country gas pipelines and road-building schemes. The scale of these infrastructural projects was unprecedented, with commercial archaeological companies running multiple simultaneous excavations, and large teams in the hundreds working for up to a year or more on schemes over many kilometres across the landscape. This newly emergent commercial archaeological consultancy sector became responsible for conducting excavations in advance of new infrastructural developments, with funding provided by developers on the principle of 'the polluter pays' (O'Sullivan *et al.* 2014a: 24–26).

EU membership placed the archaeological resource under the protection of tighter planning legislation, as codified in the European Convention on the Protection of the Archaeological Heritage (1992) (the 'Valletta Convention'). This sought to protect the archaeological heritage throughout the European Union by legislation, and it was adopted by the Republic of Ireland in 1997 and by the United Kingdom in 2000. Although licensing of archaeological excavations had occurred prior

to the existence of the EU legislation, one of the major impacts of the adoption of the Convention was the standardisation of the licensing process in the Republic of Ireland and in Northern Ireland (O'Sullivan *et al.* 2014a: 29–33).

The greatest impact of Valletta on archaeology in Ireland, however, has undoubtedly been the legislative incorporation of archaeology into the planning and pre-planning process. In Northern Ireland, this was covered by Planning Policy Statement 6 (PPS6) and in the Republic of Ireland by the various *Planning Acts* and *National Monuments Acts* (1930–2004, the latter now succeeded by the *Historic and Archaeological Heritage and Miscellaneous Provisions Act* 2023). This means new forms of 'testing' and 'monitoring' excavations, under the supervision of licensed archaeologists, must be undertaken within *and near* the delineated boundaries of identified protected and scheduled monuments in advance of any form of development.

Furthermore, in Ireland, archaeological sites to be destroyed by development must be subject to 100% excavation, as opposed to sampling, on a principle of 'preserve *in situ*' or 'preserve by record'. As a result, excavations have the potential to reveal the full character of a site and its immediate environs (e.g. fields, cereal-drying kilns, etc., which usually lay outside the boundaries of settlement enclosures).

Finally, in terms of legal frameworks, the primary legislation in the Republic of Ireland is now the *Historic and Archaeological Heritage and Miscellaneous Provisions Act* 2023, which replaces the *National Monuments Acts* 1930–2014 and modernises and strengthens the protection of Ireland's heritage. Key provisions include immediate legal protection for newly discovered sites, a new Register of Monuments, a statutory reporting scheme for finds, and updated enforcement measures like civil penalties, as well as new powers to protect underwater cultural heritage. It also provides for an Integrated Licensing System that replaces older, multiple systems with a single, unified process for obtaining permits for all archaeological activities (e.g. excavation, radiocarbon dating, geophysical survey, etc.).

Transport Infrastructure Ireland and how infrastructural development was managed

By the 2000s, the stage was set for the true archaeological boom in knowledge that came about during the years of Ireland's so-called Celtic Tiger economy, *c.* 1995–2008 (O'Sullivan *et al.* 2017). In particular, motorway construction continued apace throughout the late 1990s and 2000s, with the creation and expansion of an island-wide network of major roads, albeit mostly within the Republic, but there were also schemes in Northern Ireland (a notable example being the Enniskillen Bypass, which led to the excavation of the highly significant early medieval Drumclay crannog, Co. Fermanagh – see Bermingham *et al.* 2013).

The original strategy in the Republic for dealing with archaeological sites was that those known sites or ones identified during Environmental Impact Assessments were excavated prior to roadway schemes, while monitoring during the main construction works would discover any previously undocumented sites. This was unsatisfactory in a number of ways: sites would be discovered too late, perhaps damaged during preparatory road works, and excavations could lead to compensation claims by developers due to delays. The key, even critical, development which led to the transformation of archaeological practice was the agreement in 2000 of a Code of Practice in the Republic of Ireland between the then NRA (National Roads Authority, subsequently enfolded within Transport Infrastructure Ireland, or TII) and the National Monuments Service, within the then Department of Arts, Heritage, Gaeltacht and the Islands (Irish government departments tend to be re-adjusted after national elections). This Code signaled a shift both in terms of policy and of practice of mitigation of infrastructural developments (TII and DAHRRGA 2017).

First, experienced professional archaeologists, including several experienced and licensed site directors (*all* excavations in Ireland must be licensed by the state; no other excavations may occur), were appointed as project archaeologists to the various local authority National Roads Design Offices (NRDOs). The Code facilitated the use of new techniques, such as more extensive geophysical surveys, as well as more comprehensive centre-line testing along the proposed road corridors. As motorways were being planned, both known and previously unknown sites that could not be avoided in the roads' pathway were to be preserved by record in advance of construction. The development of codes of practice to manage archaeology was adopted in other sectors, including the Railway Procurement Agency in 2007 (O'Sullivan *et al.* 2017: 3).

This brought major changes to the practice of archaeological excavation in Irish archaeology, particularly in terms of the scale and quality of investigations. Excavations could now be much more ambitious in terms of their complexity, time taken and the extent of the area investigated. Moreover, these digs were carried out by highly accomplished and experienced directors, supervisors and large teams that were vastly more skilled and expert in understanding soils and their investigations than any previous generation of Irish archaeologists. And, in contrast to previous practice which tended to dig narrow, exploratory trenches through banks and ditches or small areas within enclosures, TII-funded excavations were/are not restricted to the boundaries of early medieval settlements or cemeteries themselves, but include the large spaces up to and around them – i.e. all the areas impacted by the road-take (Fig. 3).

With the establishment of TII in 2015, following the merger of the NRA and the Railway Procurement Agency, a new Code of Practice was published in 2017 which focused on the whole life of projects and, very importantly, made explicit commitments for the publication and dissemination of archaeological results.[1] Another development has been the development by TII and its partners in both academia and commercial archaeology of new guidelines which clarify expectations and help drive consistency – these cover a range of topics including *Cultural Heritage Impact Assessments* (2024), *Zooarchaeological Sampling* (2021) and *Palaeo-Environmental Sampling* (2015, currently under review).

Regarding publication, rather than solely drafting 'grey' literature reports for state archives (a legal responsibility, and important for the preservation-by-record strategy certainly), TII archaeologists established a range of publications, including the proceedings of annual conferences, a popular magazine-type publication called *Seanda* and, most excitingly, a series of 'scheme monographs', devoted to one or more major excavations along particular road schemes. To date, NRA/TII has published 33 monographs on regional roadway schemes, 12 conference proceedings and a number of related books, including one on archaeological reconstruction images. Several of these can be accessed and downloaded free at the TII website.[2]

These well-produced and lavishly illustrated publications have appeared regularly for roadway schemes across the country. Virtually all contain information on significant early medieval sites. These many NRA/TII publications in themselves, as well as the vast array of data behind them in archives and collections, should drive a generation of research on early medieval Ireland. These publications also illustrate the high potential of commercial sector/university collaborations. For example, an early medieval settlement and burial ground at Ranelagh, Co. Roscommon was the subject of highly innovative bioarchaeological study, including aDNA, led by Queens University Belfast in collaboration with Irish Archaeological Consultancy and TII (Delaney and Murphy 2022). This is a type of in-depth analysis impossible in any other context.

[1] https://www.archaeology.ie/app/uploads/2025/02/code-of-practice-transport-infrastructure-ireland-EN.pdf
[2] https://www.tii.ie/en/technical-services/archaeology/publications/

Figure 3. Early medieval settlement enclosure and fields excavated at Roestown 2, Co. Meath, in 2005–06 in advance of work on the M3 motorway scheme, in eastern Ireland. The site had no surface expression. The figure demonstrates that once a site is identified within the land-take for the motorway (seen here as a fenced area from bottom left to top right) it is completely excavated.
(Photograph by Archaeological Consultancy Services Ltd (ACS) and Studio Lab; reproduced by permission of ACS and Transport Infrastructure Ireland (TII))

Furthermore, through collaboration with the Digital Repository of Ireland (DRI), TII archaeologists and commercial archaeological companies have created extensive online, freely available, digital resources for study, including numerous older excavation reports from before the Code of Practice, previously languishing as unpublished grey literature. The DRI Digital Heritage Collections website can be searched using various headings. As of October 2025, a total of 3,156 reports are available to download, including 890 associated with the early medieval period, of which 794 are 'archaeological excavation reports' including of 122 enclosures.[3] The TII Digital Heritage Collections also feature a range of other resources including audiobooks, videos and, most recently, downloadable 3-D models, while a range of other resources are available on the TII website including 20 Storymaps.

[3] https://repository.dri.ie/catalog/v6936m966

The approach of the TII archaeologists has been driven by three inter-related objectives: to manage archaeological risk; to ensure legislative compliance; and to build public trust (TII 2018). This has been underpinned by an explicit focus on quality in terms of procurement, contract management and delivery of outputs, whether technical reports, audiobooks, story maps or archaeological monographs.

The *Early Medieval Archaeology Project* (EMAP)

Since the 2000s, universities were also engaging in generating new data. A prime example to flag is the Early Medieval Archaeology Project (EMAP), based in UCD School of Archaeology, University College Dublin, and Queens University Belfast, set up in 2007 and led by Aidan O'Sullivan and Finbar McCormick. This was one of several long-term Irish research projects attempting to create knowledge from the wealth of emerging excavation data, gathered primarily from the noted infrastructure and roadway projects. The team produced multiple, co-authored annual reports focusing successively on dwellings and settlement, agriculture, crafts and production, and the economy. A key principle that EMAP adopted was 'the best is the enemy of the good', meaning that we preferred to publish what we could, as gateways for further research projects (e.g. PhDs, MSc theses). This included releasing our reports annually as open access. The original EMAP reports can now be downloaded from the UCD Library Research Repository.[4] EMAP reports were then moved to publication in the International Series of the British Archaeological Reports. These EMAP 'red books' include *Early Medieval Dwellings and Settlements in Ireland, AD 400–1100* (O'Sullivan *et al.* 2014b); *Early Medieval Agriculture, Livestock and Cereal Production in Ireland, AD 400–1100* (McCormick *et al.* 2014); and *Early Medieval Crafts and Production in Ireland, AD 400–1100: The Evidence from Rural Settlements* (Kerr *et al.* 2015). These monographs go into each subject in significant detail and include interpretative chapters and extensive gazetteers of hundreds of early medieval sites. A final EMAP digital report, *The Economy of Early Medieval Ireland* (Kerr, McCormick and O'Sullivan 2013), offered concluding thoughts on how the early medieval economy worked. This was not published as a BAR, but is available to download in the UCD Library Research Repository. By the end of the project, a major synthesis – the EMAP 'white book' – was published as *Early Medieval Ireland, AD 400–1100: The Evidence from Archaeological Excavations* (O'Sullivan *et al.* 2014a); this was subsequently re-printed in 2021 with an extensive bibliographical essay summarising work and publications since 2014 (O'Sullivan *et al.* 2021). The creation of so many substantial monographs devoted to collating infrastructural archaeological information for early medieval settlement archaeology at such as scale is a remarkable achievement which appears unparallelled in Europe.

More recently, UCD School of Archaeology has been grant-aided to support a project by the Irish funding agency, Taighde Éireann – Research Ireland, an agency of the Department of Further and Higher Education, Research Innovation and Science working in collaboration with higher education institutions and other state agencies, such as the Higher Education Authority (HEA), IDA Ireland and Enterprise Ireland. This new project, *Early Medieval People and Things* (*EMPAT*), seeks to create better understandings of material culture in Ireland, i.e. the objects or artefacts of daily life, across the period *c.* AD 400–1100. This project will draw heavily on the finds from infrastructural archaeological excavations, including things of the body (brooches, pins, beads, combs, etc.), things of the household (rotary querns, ceramics, knives, rushlight holders, etc.) and objects associated with crafts and agriculture (such as tools and plough parts).

Population and demographics in early medieval Ireland

The data from early medieval Ireland has created opportunities for tackling many questions, such as the scale of population and how it changed. If one accepts that there were *c.* 55,000 settlement

[4] https://researchrepository.ucd.ie/home - search for 'early medieval archaeology project'.

enclosures in early medieval Ireland at *c.* AD 700 – a figure based on extensive surveys, aerial photography, remote sensing and fieldwork – and if we assume that perhaps half of them were built and occupied around the same time, and also assume that the social group inhabiting each one of them was in the region of 8–10 people (a *muintir* in Old Irish, or an extended family), then at *c.* AD 700 the Irish population could have been 240,000 people. However, this calculation does not include church settlements, so that figure is probably too low. Analysing the many thousands of early medieval radiocarbon dates accumulated in the last three decades especially, as a proxy for activity, Hannah and McLaughlin (2019: 26) have estimated a much larger population, proposing in fact over three million people in Ireland in the 8th century, building on growth evidenced from *c.* AD 500, when there was a sudden increase in ringfort construction; but they also argue for a slow drop in population to approximately two million by AD 1000. This model of population decline towards the end of the early medieval period certainly provides some explanation for the apparent lack of rural secular settlement activity in the 10th and 11th centuries.

Demographic studies now also benefit from a range of published scientific analyses, including bioarchaeology, genomic, isotopic and geochemical and demographic analyses, which are providing some fascinating insights into diet, health and lifestyle in the rural landscape. Fibiger and Seaver's (2016) analyses of population, death and burial from an early medieval farming settlement at Raystown, Co. Meath, is one of many studies of health that are now possible given the large-scale excavations. At Raystown, skeletons exhibiting evidence for degenerative joint disease, osteoporosis, dental problems, gout, pulmonary tuberculosis or occasional weapon trauma reveal that rural people were used to hard work and sometimes personal disaster, but were otherwise well-nourished. McKenzie *et al.* (2015) and McKenzie *et al.* (2020) have also used multi-proxy studies of the human remains from the early and late medieval Ballyhanna cemetery, Co. Donegal, dated to between the 7th and 17th centuries, to reconstruct lifestyle, health, diet and disease across time in Gaelic Ireland. Novak *et al.* (2017) sought to reconstruct children's health on early medieval rural sites, finding general issues from physiological stresses and with poor health across all social classes and over time. Ryan *et al.* (2017) used multiple stable- and radiogenic-isotope ratios to investigate diet and migration amongst people and animals from early medieval burial grounds at Raystown, Collierstown and Johnstown, Co. Meath, identifying two individuals buried at Raystown who had moved into the area from elsewhere. Meanwhile, Alonzi *et al.*'s (2019) biogeochemical analyses of burials at early medieval monastic or hermitage sites argued that their communities were composed mostly of local people provisioned by their immediate communities.

Early medieval rural settlement – what more do we know now?

Comber (2016), O'Sullivan *et al.* (2014a) and O'Sullivan (2016) provide general descriptions of early medieval settlement enclosures in Ireland, their form, chronology and social and economic roles. They have shown how people lived and worked the rural landscapes of Ireland from the 6th to the 9th century AD, and that their dwellings were predominantly characterised by dispersed, enclosed settlements, both secular and ecclesiastical. Most people lived within a settlement enclosure of some form, defined either by earthen banks and ditches (known as a rath) or stone walls (known as a cashel), or, in some contexts (e.g. lake crannogs), by timber palisades. Although some forts may have been associated with territorial defence, most were simply the enclosed homes of a free, land-owning class. The sheer numbers of settlement enclosures (as noted, running to tens of thousands) and their chronology established by radiocarbon dating signify a notable growth in population from the 6th century AD and a concomitant exploitation of lands and resources (including animals).

The most common early medieval settlement enclosure type in Ireland is the rath or ringfort, with the majority constructed and occupied between the late 6th and 10th century. A rath can be defined

Figure 4. Three early medieval univallate raths at Ballinderry townland, Co. Roscommon.
(© National Monuments Service, Department of Arts, Heritage and the Gaeltacht; reproduced by permission)

Figure 5. Aerial photograph of an early medieval stone-built enclosure or cashel at Dún Eochla on Inis Mór, one of the Aran Islands, Co. Galway, set amongst a palimpsest of late medieval and post-medieval field enclosures. *(Photograph by, and reproduced by permission of, the National Monuments Service, Department of Housing, Local Government and Heritage)*

as a circular, oval or irregular space surrounded by an earthen bank and fosse (or ditch), typically 28–35 m in diameter (Fig. 4). Depending on the number of enclosing banks and ditches, raths can be univallate, bivallate or multi-vallate. The social status of the owner could be displayed in the scale of their ringfort: a simple, single-banked enclosure denoted a farmer of ordinary status, while more powerful lords and petty kings resided in larger, more complex forts with multiple banks and ditches. However, the vast majority – over 80% in some regions – are reckoned to be simple univallate sites, defined by the digging of a circular ditch and the throwing up of a low internal bank and counter-scarp external bank (O'Sullivan *et al.* 2014a: 50).

Cashels can essentially be regarded as the stone-built equivalent of earthen raths, and are typically found in regions where stone is more easily located as a building material, generally in the western parts of Ireland (Comber 2016; O'Sullivan *et al.* 2014a: 53–55). The enclosing walls of stone cashels can be quite impressive in terms of size, scale, defensibility and architecture (Fig. 5). Some particularly largely cashels or duns may have been associated with high-status settlement. It is possible that some cashels were built slightly later in the early medieval period, after *c.* AD 800. There is increasingly strong evidence from some regions, such as the Burren in Co. Clare in western Ireland, where early medieval stone cashels were being set up in the 10th and 11th centuries and even afterwards (Comber 2016).

Excavations of their interiors have revealed the layout of the farmstead. Evidence for domestic housing is common, typically showing post-holes and foundation trenches for one or two main dwellings. These houses were initially circular in shape, but gradually transitioned to rectangular structures through the period. Experimental archaeology has been used to investigate early medieval houses in terms of their construction, use and living conditions, and how they would have been experienced in terms of heat, light, smoke and use of space (O'Sullivan and McCormick 2017; O'Sullivan and O'Neill 2019; O'Sullivan, O'Neill and Reilly 2017; O'Neill and O'Sullivan 2019). Alongside houses, the enclosed area often contained evidence of craftworking, such as metalworking hearths, as well as significant deposits of animal bone in middens, indicating a reliance on cattle, sheep/goat and pigs, yet with relatively little exploitation of wild animals. The wealth and connections of the occupants are also occasionally evident through the discovery of high-status artefacts, such as imported E-ware pottery (Doyle 2009) from continental Europe and fine personal ornaments, such as pins and brooches, which are found more frequently at the larger, high-status sites (Doyle 2015). Other features can include pathways, a midden, perhaps some outdoor hearths, and possible small pens for pigs or poultry. Such enclosures were the dwelling places of an extended family, with their livelihood and subsistence based on cattle herding for dairying and crop cultivation, the processing of foods, and a range of complex socio-economic relationships with neighbours and their local lord (O'Sullivan and Nicholl 2011).

Another key discovery has been the identification of several early medieval enclosed settlements with associated cemeteries or burial grounds (Ó Carragáin 2010), variously termed secular-cemeteries, cemetery-settlements or settlement-cemeteries. Examples include Balriggan 1, Co. Louth (Delaney 2010), Johnstown 1, Co. Meath (Clarke 2002; Clarke and Carlin 2008), Twomileborris, Co. Tipperary, where settlement enclosures were found with burials (Ó Droma 2008). At Carrigatogher (Harding) Site 6, Co. Tipperary, excavation identified a settlement with extensive metalworking industry as well as a distinct burial zone (Taylor 2010), and at Parknahown 5, Co. Laois, excavation uncovered 50 burials, dating between the 7th and 12th centuries and set within a bounded area within a larger settlement enclosure with a probable round house (O'Neill 2010) (Figs 6a and 6b). It is still unclear how these sites functioned in the socio-economic landscape, but they clearly had complex and changing histories and probably more than one function. They were certainly centres of production, either within estates or territories. The strategic placement of some of them has led to the argument that they served not only as burial places but also as important communal places of assembly, known as *oenaig*. Thus Gleeson (2015; 2017b; 2018) sees some of these as local community centres, used for inaugurations, legal proceedings and other social gatherings – a suggestion supported by the location of many of these settlements near or at documented assembly landscapes. Gleeson's perspective duly allows their development to be used to track changes in politics, regimes of overlordship and economic strategies.

In some cases, they seem to be centres of substantial agricultural production. Thus, at Raystown, Co. Meath, we see extensive evidence for cereal-drying kilns and horizontal watermills at the exterior,

Figure 6a. Aerial view of the early medieval settlement-cemetery site at Parknahown 5, Co. Laois, during excavation, where an enclosed burial ground for a community was located within the north-east quadrant of a double-ditched enclosure that also saw settlement activity.
(*Archaeological Consultancy Services (ACS); reproduced by permission of ACS and Transport Infrastructure Ireland)*

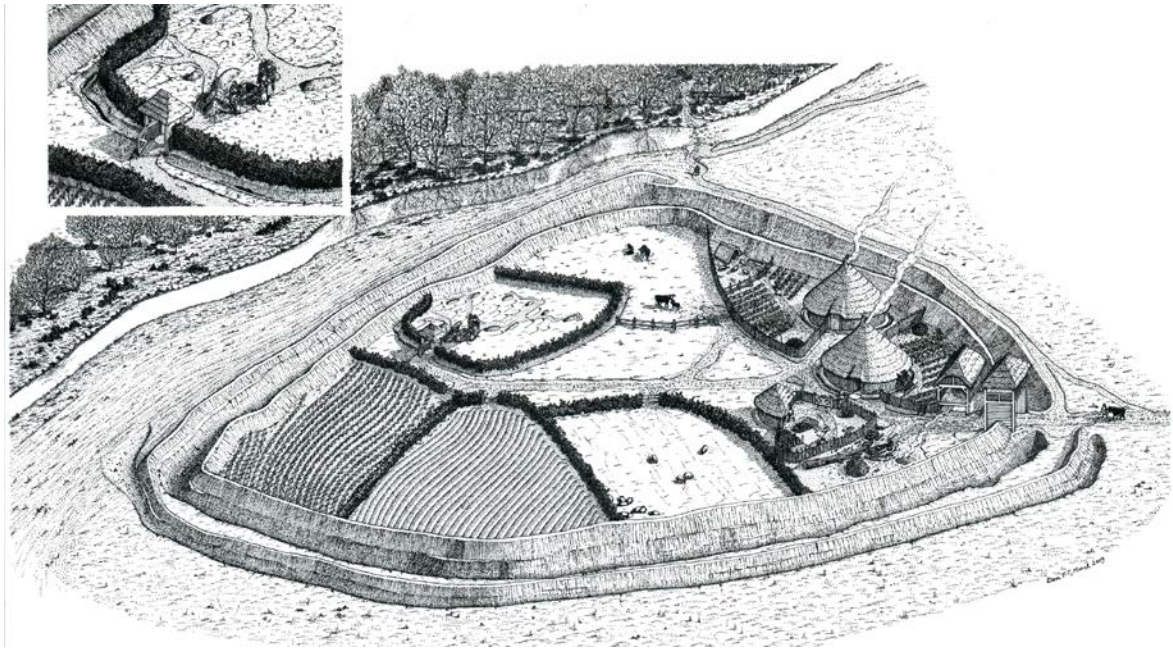

Figure 6b. A reconstruction drawing of how the site might have appeared *c.* AD 800.
(Drawing by Daniel Tietzsch-Tyler, reproduced by permission of the artist, Archaeological Consultancy Services Ltd and Transport Infrastructure Ireland)

whereas at the heart of the complex there is an extensive burial ground (Seaver 2016). Potentially, this was an agricultural community serving as a centre of production for a local secular or eccelasiastical authority, with the dead buried close to the working community rather than in a church graveyard. Moreover, EMAP's zooarchaeological analyses from some of these sites show a predominance of older cattle, with faunal assemblages more like those found at 'consumer sites', such as Viking towns and larger monasteries. This might suggest that that feasting events and a large-scale consumption of meat were part of what happened at public assemblies (McCormick and Murray 2017).

Early medieval monastic enclosures typically encompass a sacred space for churches, high crosses and burials, but have outer enclosures used for settlement and economic activities (O'Sullivan *et al.* 2021, 139–78). Early medieval churches have tended to be avoided by road schemes, with a few exceptions (Stevens 2006; 2010). However, this raises the question of what precisely we expect to find on an early medieval settlement owned by or associated with the Church? At Owenbristy, Co. Galway, an early medieval cashel was the location for a possible rectangular timber building and a cemetery, with evidence for crafts and agricultural activity (Delaney and Silke 2011) (Figs 7a and b). It produced a typical early medieval finds assemblage with evidence for metalworking and the butchery and cooking of cattle, sheep and pigs. A discrete area on the eastern side of the enclosure was given over to burials, most of which dated between AD 640 and 800. Was this a church and cemetery site within a settlement enclosure – how, we might ask, would we know?

Regional studies in early medieval settlement are now able to use the increased corpus of excavated data. For example, Kerr (2017–18) discusses the potential for thinking about regional variation in early medieval settlement patterns; McNeill (2017–18) also argues that we should expect both chronological and stylistic variation in the forms of early medieval settlement across the island; Monk (2019) has been able to offer reflections on newly discovered early medieval settlement archaeology in north Cork, as part of the publication of Transport Infrastructure Ireland (TII) excavations on the M8 Fermoy–Mitchelstown motorway. Similarly, Hession (2020) has reviewed the early medieval settlement archaeology of the Lee valley, near Tralee, Co. Kerry, discovered in advance of major road development there.

New understandings of early medieval farming, livestock and crops

Thanks to the larger areas excavated during roadway schemes, a wide diversity of early medieval sites and features have been explored, including unenclosed habitations, burial grounds and cemeteries, field systems, horizontal watermills, cereal-drying kilns and various types of industrial or craft-production sites, including pits associated with charcoal production, and ironworking shaft furnaces (Kerr *et al.* 2015).

Importantly, the motorway schemes have enabled examination of areas outside the boundaries of a number of settlement enclosures, revealing much evidence for small fields of varying sizes (Fig. 8a). Most probably, such fields and garden plots were used to manage animals (e.g. keeping calves away from cows as part of the dairying practice) or for growing vegetables, beans and pulses. Early medieval settlements often have cereal-drying kilns nearby, comprising earth-cut or stone-lined structures used to dry oats and barley after harvesting, as would be necessary in a typical damp climate, and for making beer. For processing grain beyond the domestic quern, evidence exists for horizontal watermills with associated channels, sluices and buildings, dating from the 6th century onwards, and used for transforming cereals to flour. All these discoveries have strongly challenged the older view of early medieval Ireland as a pastoral society purely devoted to cattle and dairying, and proving instead that cereal cultivation was intensive and central to the economy. Furthermore, many sites are associated with souterrains (underground stone-lined passages and chambers),

Figure 7a. Excavations at Owenbristy cashel, Co. Galway, in advance of the N18 road scheme, showing enclosing stone wall.
(Photograph by John Sunderland; reproduced by permission of Eachtra Archaeological Projects and Transport Infrastructure Ireland).

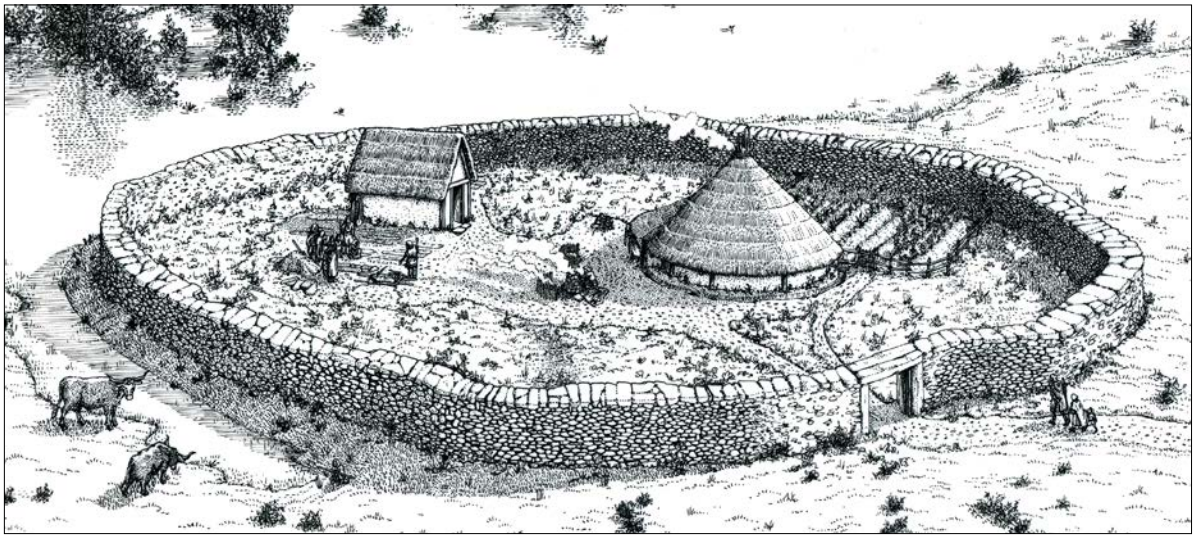

Figure 7b. An artist's reconstruction drawing shows an early medieval cashel and cemetery—and possible wooden church or oratory—at Owenbristy, as it might have appeared in about AD 700.
(Reconstruction drawing by Daniel Tietzsch-Tyler; reproduced with permission of the artist, Eachtra Archaeological Projects and Transport Infrastructure Ireland; from Delaney and Silke 2011, Figure 5.19)

serving chiefly for the storage of dairy foods like milk, butter and cheeses, but perhaps occasionally used as refuges during times of danger.

These practices of early medieval agriculture were carefully investigated by EMAP, leading to the publication of *Early Medieval Agriculture, Livestock and Cereal Production in Ireland, AD 400–1100* (McCormick *et al.* 2014a). This includes a reconstruction of the farming landscape, with a focus on fields, tools and technologies (McCormick *et al.* 2014b). In that monograph, Kerr (2014a) reviews the animal remains from early medieval sites, posing some key questions about livestock management; this is supported by an extensive gazetteer of animal remains from *c.* 120 sites (Kerr 2014b). McClatchie (2014a), in a highly significant study of plant remains from early medieval sites, interrogates the role of cereals in early Irish farming and also provides a highly valuable gazetteer of plant remains with tabulated data from *c.* 60 sites (McClatchie 2014b).

Figure 8a. An early medieval settlement at Dowdstown 2, Co. Meath, excavated during the M3 Motorway scheme. This was initially a simple, circular rath with associated field, dating to the 6th or early 7th centuries AD, that was then replaced eastwards by a large, D-shaped enclosure with additional external enclosures, dated to the late 7th/early 9th centuries AD, and substantial fields to the north (upper part of image), downslope and near the River Boyne.
(Reproduced by permission of Archaeological Consultancy Services and Transport Infrastructure Ireland)

These various analyses of excavated raths combine to indicate regional practices in agriculture, and reveal that early medieval settlements had small garden fields and animal enclosures contiguous to them, but not necessarily with extensive field-systems. However, Harte and Ó Carragáin (2020) argue for early medieval stone-built field walls in the west of Ireland, especially in south Kerry and the Burren, indicating that there was clearly variation.

Kerr's (2014a; 2014b) analyses confirm the high importance of cattle-herding across the early medieval period, though other livestock were managed, of course, including pig and sheep/goat. The zooarchaeological record indicates that the contemporary livestock economy was dominated by cattle, with this species typically accounting for between 40% and 50% MNI of the main domesticates (McCormick and Murray 2007: 106). The age and biometrical data also show that herds were predominantly made up of adult females while a second peak of younger cattle, killed off at around two years, are assumed to have been bullocks exploited for their meat. This pattern has been interpreted as evidence for dairying, the basis of the cattle economy of early medieval Ireland, and is supported by the legal sources which extol various types of daily foods and drinks, milk, butter and cheeses (McCormick and Murray 2017).

Meriel McClatchie's (2014a, 2014b; McClatchie *et al.* 2015; McClatchie *et al.* 2019) valuable archaeobotanical analyses of plant remains show the significance of cereals grown, and reveal that hulled barley and oat were the dominant crops (both being suitable to Irish soils and climate),

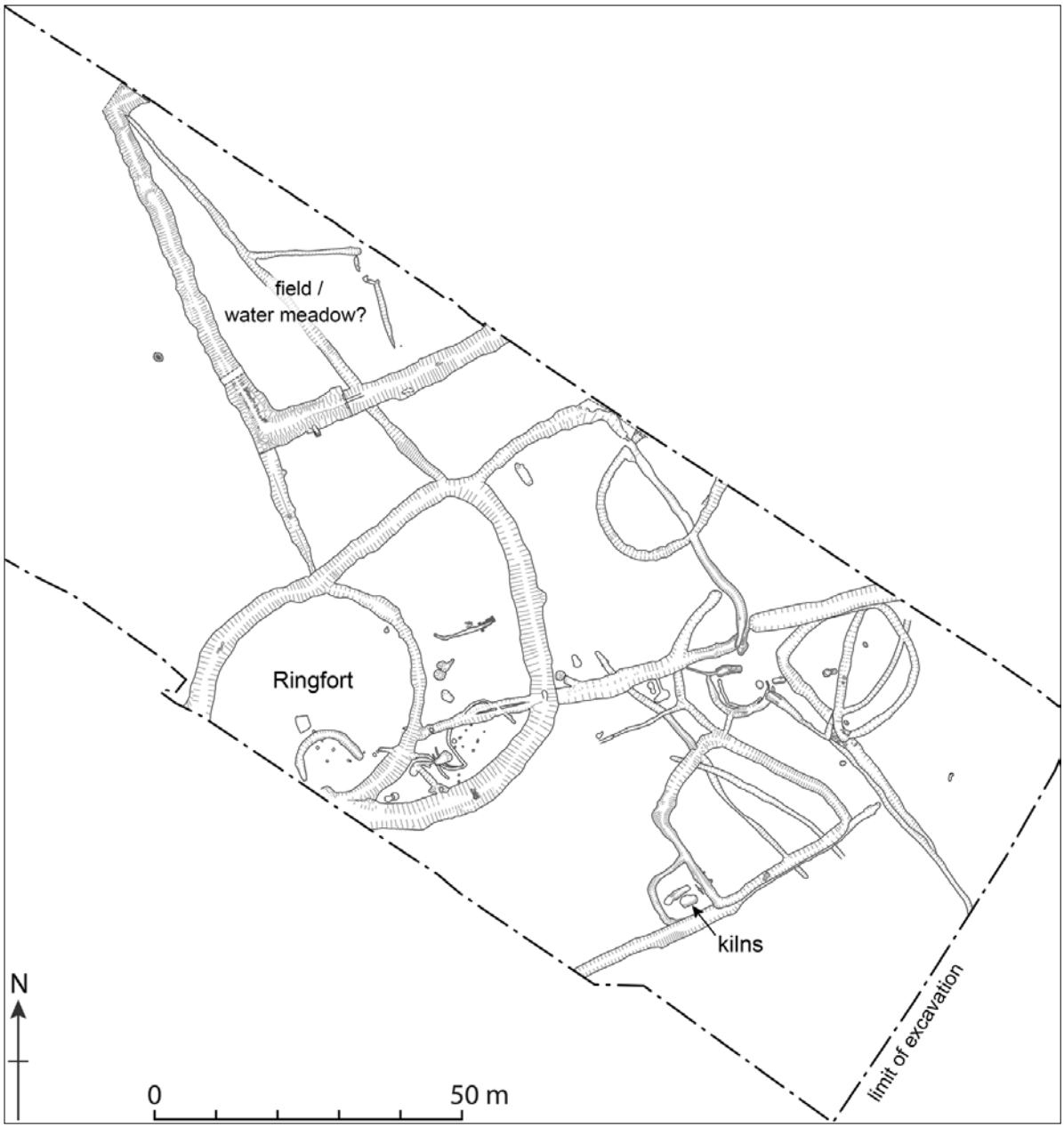

Figure 8b. An early medieval settlement at Dowdstown 2, Co. Meath, excavated during the M3 Motorway scheme. Detailed plan of the ringfort, including location of corn-drying kilns.
(Reproduced by permission of Archaeological Consultancy Services and Transport Infrastructure Ireland)

naked wheat was grown, but not as a primary crop, and rye was a minor crop in all locations; flax, pea and fat hen were occasionally present. In terms of economic change, it seems that there was an increase in crop cultivation across the early medieval period, with more variety emerging. McClatchie *et al.* (2019) also explore how the new archaeological and environmental data are changing our perspectives on early Irish farming. Examples include Rynne's (2018) analysis of early Irish plough technology, which offers key insights into innovations in farming tools and equipment, and specifically the introduction of the coulter plough. Mick Monk, the pioneer of environmental archaeology in Ireland, and particularly of the study of archaeobotanical remains, has published papers on early medieval arable agriculture and settlement (Monk 2017–18), on early Irish tillage (Monk 2015) and on early medieval cereal-drying kilns (Monk and Power 2014). All of these valuable

studies are possible simply because of the wealth of fresh archaeological and environmental data produced by excavations linked to infrastructural schemes, from which we are gaining a much fuller and more nuanced understanding of Ireland's early medieval countryside (Figs 8b, 9 and 10).

Changes in medieval rural settlement in the 10th and 11th centuries

There has been general consensus over the last decades between Irish medieval historians, historical geographers and archaeologists that there were significant political, social and kinship changes from *c.* AD 800 onwards, and particularly in the 10th and 11th centuries (for example Ó Cróinín 1995; O'Keeffe 2000). It has been suggested gradually a transformed settlement landscape emerged, in the form of nucleated, village-like settlements. This model proposes that raths and cashels were abandoned owing to population relocation within new territorial frameworks under lordship control (O'Keeffe 2000: 26), and that such societal re-organisation may have necessitated the emergence of the central, lordly 'fortress' around which people lived. O'Keefe (2000: 26–9) argued for the emergence of new types of village-like settlements (*baile*) around these 'fortress' sites. In the Gaelic Irish historical sources as early as the 10th century these are referred to as *longphort*, *daingen*, *dúnad* or *dún*, while in the early 12th century they are referred to as *caistél* or *caislén*.

However, if the infrastructure-driven archaeological excavations have revealed anything, it is that there is little clear evidence for any such nucleated settlements within the 9th- to 10th-century landscape. We may well have had nucleated settlements at larger monastic or church establishments, the so-called 'monastic towns', though that is debatable, and we certainly have densely occupied, proto-urban settlements in the late 9th-/early 10th-century Viking towns of Dublin, Wexford, Waterford and Cork. Nonetheless, the archaeological excavations of the last two decades, both in advance of NRA/TII motorways and gas pipelines traversing the Irish countryside and in our smaller rural towns and villages, have failed to provide convincing evidence for any early medieval secular, nucleated, rural settlements in the 9th and 10th centuries (O'Sullivan and McCormick 2017).

Monastic settlements may have been the most populated spaces in the rural landscape, and the church had certainly established itself as a significant power and influence in Ireland. It is also clearly apparent that some of the most significant monastic settlements, such as Clonmacnoise, Glendalough and Armagh, were places where there was a growing clerical and lay population in the early 12th century. Some monastic or ecclesiastical settlements were centres of political power and patronage, education and agricultural wealth, supporting a range of clerics, scholars, craftspeople and agricultural labourers and tenants on their extensive estates, while others were not. The Viking or Hiberno-Norse towns of Dublin, Waterford, Limerick and Cork were also now fully formed urban settlements, with enclosing walls, and they functioned as centres of manufacturing production that traded with ports across Atlantic Europe and beyond, as the space and time that we term, early medieval Ireland came to an end.

Anglo-Norman colonization, Gaelic Ireland, and developments in late medieval rural settlement after AD 1169

Gardiner and O'Conor (2017) have reviewed the character of Late Medieval rural settlement based on findings from infrastructural development. In 1169, the Anglo-Norman invasion and subsequent colonisation of Ireland led to the establishment of settler colonies across Ireland, with political control wrested from the Gaelic Irish, gradually reducing their hegemony into their kingdoms in the north-west and west of the island. In the regions that we denote as Gaelic Ireland in the 13th and 14th centuries, and after, people held on to, and renewed, their traditions and dwelling practices. Early medieval raths, cashels and crannogs in the Gaelic west and north-west continued in use as

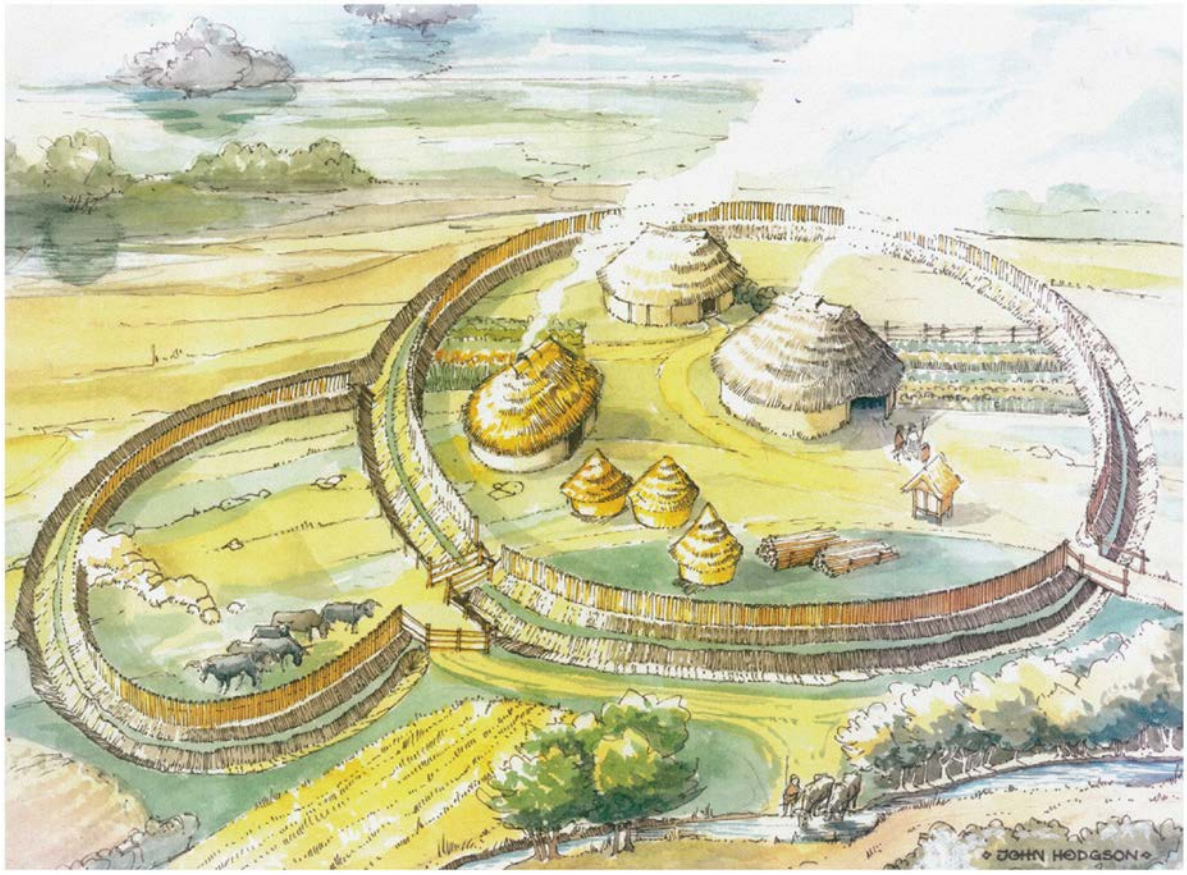

Figure 9. An early medieval ringfort at Curraheen, Co. Cork, with an annex to the enclosure interpreted here as a livestock pen for cattle, that were so important to early Irish status and economy.
(Artist: John Hodgson)

settlements, others were actually built anew (Fitzpatrick 2009). Archaeological research excavations show Caherconnell cashel, in the Burren region of Co. Clare, for example, was constructed in the late 10th century and occupied continuously until *c.* 1600 (see Comber 2016). It is also likely that most of the population on Anglo-Norman manors in the east of Ireland were Irish tenants (known as *betaghs*), people of Gaelic descent living and working the land of Anglo-Norman owners, though it might be difficult to see an archaeological signal of their ethnicity and lifeways.

But, simultaneously, traditional Irish early medieval rural settlements in the colonised regions were being abandoned in the regions under increasing Anglo-Norman control. There are nonetheless a few early medieval settlements in the east of the country that have evidence for continued occupation into the 12th century. These include Castlefarm 1, Co. Meath, where there was substantial late medieval activity (O'Connell 2009) and Johnstown 1, Co. Meath, where settlement and industry continued into the 14th and 15th centuries (Clarke and Carlin 2008). Some raised raths that originated in the early medieval period in the north-east and east of the island were used by incoming Anglo-Norman colonists as the location for defended mottes in the late 12th and early 13th centuries, perhaps for symbolic as well as practical reasons (O'Keeffe 2000).

Anglo-Norman colonists did establish many new forms of medieval rural settlement. Gardiner and O'Conor (2017) state that there have been more than 200 Late Medieval (i.e. dating to between the 12th and the 16th centuries) sites excavated as part of TII and other infrastructural developments. Most of these excavations have taken place in the parts of Ireland that were under the control of

Figure 10. Artist's photoshop reconstruction image of an early medieval cashel settlement with small fields at Cahercommaun, Co. Clare, a probable high-status settlement. The evidence revealed by 21st-century motorway schemes, combined with older excavated sites like Cahercommaun, excavated in the 1930s, suggests that many early medieval settlement enclosures had small gardens plots and fields immediately outside them, and beyond there may have been open countryside managed for cattle herds. *(Photoshop reconstruction by Conor McDermott, UCD School of Archaeology, based on an aerial photograph by National Monuments Service, Department of Housing, Local Government and Heritage)*

the Anglo-Normans in the period from the late 12th century until the 14th century, and by their descendants after that date. There has been far less excavation in the Gaelic Irish-held areas of the north-west, west and south-west.

Late Medieval rural settlements associated with Anglo-Norman colonisation include moated sites (a defended farmstead), manorial centres, rural medieval farmsteads, and at least some nucleated settlements, as well as late medieval cemeteries, fields, cereal-drying kilns, refuse pits, iron-working sites, charcoal-production sites and lime kilns. In Ireland, previous late medieval archaeological and historical research has tended to concentrate on the sites of the elite in society, such as castles, abbeys, priories and manorial centres, or on the medieval towns. The benefits of the roadways and gas pipeline excavations are that the wider landscape has been investigated. In Gardiner and O'Conor's (2017) memorable phrase, 'The picture that emerges from these excavations of sites that were located in what might be termed the 'deep' countryside of later medieval Ireland is one of an organised, agricultural landscape of fields, farms and productive woodlands.'

Conclusions

In conclusion, the last two decades of archaeological practice and mitigation in advance of infrastructural development has led to a profound transformation of Irish archaeology itself, but also in how we understand the past, from prehistory to the Middle Ages.

Our understanding of early medieval rural settlement has been enhanced in the large-scale archaeological work preceding infrastructural development, especially the construction of Ireland's motorway network. These extensive excavations crucially moved beyond the highly visible ringforts and examined the wider landscape between them, revealing not just the infrastructure of a busy agricultural landscape, but also the integrated settlement patterns of a stratified society, from the powerful lord in his multi-vallate fort to the humble farming family in their more modest settlement enclosure. In early medieval Ireland, most people lived inside a settlement enclosure, and although we do see some unenclosed settlements (Hannah 2023), we have no evidence for the emergence of nucleated secular settlements, or villages, as seen elsewhere across Europe. Early medieval monasteries may have been centres for larger populations, production or redistribution, but they were not towns, and hardly even villages. It is not until the establishment of Viking towns in the 10th century along the Irish coast, such as Dublin, Wexford, Waterford and Cork, that we see the emergence of urban settlements in Ireland.

The challenge facing Irish archaeology now is how to deal with all these new data, but the explosion in professional and academic publication indicates that the challenge is being met. At the heart of it all were the key developments in archaeological practice in the 2000s, especially by archaeologists in TII and their archaeological colleagues in the Irish commercial or consultancy sector, supported by the state services and universities, that have enabled Irish archaeology to develop an exemplary framework for the archaeological mitigation of infrastructural development.

One can wonder why this happened like this. One explanation is the fact that archaeological excavations are centrally licensed by the state, both the National Monument Service and the National Museum of Ireland, with requirements for reporting; no other excavations are permitted. Secondly, the expansion of infrastructure, particularly motorways, across the country was being managed by a single, semi-state agency, namely Transport Infrastructure Ireland, working closely with local, regional authorities. This meant that archaeologists working within TII could establish a single code and standard of practice, which has been enhanced across time. The Celtic Tiger boom enabled the expansion of an archaeological consultancy sector, with multiple companies at various scales, and even though this was rocked by austerity after the financial collapses of 2007–08, this sector has recovered and is thriving again. This sector has been responsible for virtually all excavations and it has worked closely with the state sector and TII to maintain and improve standards. Finally, universities have been able to tap into state research funding to work collaboratively with all these sectors, to promote research projects, especially involving archaeological sciences, but also more traditional enquiries. The Irish situation may well be unique, but at its heart are collaboration, a community of practice, a constant state of growth and the pursuance of excellence.

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Major modern infrastructure projects and the archaeology of the Middle Ages in rural Italy

Paul Arthur

Introduction

Much is often made about the large percentage of the world's cultural heritage contained within Italy's borders – the fruit of somewhat wishful thinking. Even if there is no doubt that Italy's cultural heritage is not wanting, as indeed is reflected in the number of sites in the UNESCO World Heritage List, the country's public spending on archaeology, paradoxically, is preferentially addressed to sensational or high-profile discoveries and their news-worthiness, rather than to the pursuit of wider scientific knowledge and public dissemination. In essence, Heritage and Culture, which are managed by the government, are seen ever more as a way of furthering the public economy, rather than a route to promoting better public understanding of the past; in fact, it is justified to say that some people even see archaeology as a hindrance to development and thus something to be accomplished speedily. This is at odds with the Italian constitution that places cultural heritage among the nation's highest values, pre-eminent even over economic ones. The economic angle is particularly evident in present and various past governments' overriding investments in sites like Pompeii, where arguably needless excavations continue apace and discoveries are made daily, it would be far more beneficial to concentrate on the abundant remains that, also daily, are being damaged and even destroyed across the country through development or neglect. Also telling are the 900 million euros that have recently been set aside for the government's 'Strategic plan for the major cultural attractions'. It all boils down to priorities, whether economic benefit through 'spectacularisation' or balanced knowledge, and depends strongly upon the value that politics and the State attribute to the Heritage sector (on the issues mentioned above, see de Caro 2021).

Current resources are quite clearly insufficient to make public the potential information about our past that is coming to light. This is despite the legal framework, the so-called '*Codice Urbani*' (Italian legal decree of 22/01/2004, no. 42), that was put in place in 2004, and the great amount of money that is nonetheless available for cultural heritage, although within the framework of specific projects launched by the government as part of the new post-Covid Recovery and Resilience Plan (PNRR). The 2004 legislation, incidentally, officially recognised the professional role of the archaeologist for the first time (Manca di Mores 2020) and some professionals were quick to rise to the call of development-led archaeology (e.g. D'Andrea and Guermandi 2008). However, legislation has also ensured that virtually all practical archaeology and all pre-modern artefacts are under the stringent and restrictive control of the Ministry of Culture. This not only limits the initiatives of local government and the private sector, but enforces the lack of freedom of 'panorama', a condition that Italy, for example, shares with various African and Middle Eastern countries, and which was affirmed and extended by the '*Codice Urbani*' to all cultural and artistic objects and places. Even non-invasive studies of the landscape, such as analysing aerial photographs without permission, is prohibited by the Ministry of Culture's regulations. This is far from many people's idea of democracy. This is all also tantamount to there being little freedom of press, whether academic or journalistic, with regard to archaeology and pre-modern culture in general. Although affecting the general public – somewhat subservient to a strict State control of culture since the 19th century – this has created a backlash amongst academics, who call for more freedom and democracy in the use of cultural heritage for enculturation and research (Manacorda 2014; 2023; Pavolini 2017; Volpe 2019).

Personally, I do not believe that cultural remains or heritage in general, like culture itself, belong to any one nation or group of people. Nations and people can only be custodians, even though, in some cases, they may be the preferred or ideal custodians because of their cultural identity; however, this cannot allow forms of privatisation of culture, since culture is a global heritage. Of course, large-scale state enforcement of restrictions is impossible, paradoxically promoting clandestinity in Italy, and application boils down to individual sentiments and the means of government officials. Ideals may be wonderful, but practicality is fundamental.

Italian archaeology is, furthermore, largely in the grip of its classical past (Güll 2013). When medieval archaeology finally became an established field of research in Italy in the 1970s, it was still new enough to be able to profit from major developments in both survey archaeology and the rise of New Archaeology in Britain and the United States. This contributed to a revolution in archaeology in Italy that was spearheaded by the classical archaeologist Andrea Carandini and which found its principal exponents for the Middle Ages in scholars like Riccardo Francovich and Tiziano Mannoni, the founding fathers of medieval archaeology in Italy (Brogiolo 2009). Notwithstanding, archaeology in Italy is still largely the realm of classical archaeologists, a number of whom continue to be somewhat cavalier in understanding or recording the often insubstantial or unspectacular evidence of post-classical occupation or activity, thus severely limiting appreciation of the scale and nature of the transformation from Antiquity to the Middle Ages or of medieval times in general.

Development-led archaeology – origins, processes and controls

Development-led excavations are mostly directed, though often nominally, by a government official (the inspector), but conducted by one of the many professional associations of archaeologists that now exist in Italy and which are represented by the independent *Associazione Nazionale Archeologi* (ANA). Construction companies, rather than the State, usually fund the work of these associations. With other priorities in mind, such companies pay for the archaeology required by law, such as excavation and conservation, but rarely fund the study of finds and the subsequent publication of results, even if the necessity to do so was already emphasised in the 1992 Valletta Convention – which was finally ratified by Italy in 2015. Nonetheless, publication has never been enforced, perhaps primarily with the aim of containing costs. The study and publication of such excavations remain the prerogative of the State – the inspectors – rather than of those diggers who effectively carried out the excavation (Brogiolo 2002). The State does not usually have the incentive, people, time, nor money to guarantee results. Thus, most development-led archaeology, though costing what it does, does not lead to an appreciable gain in public knowledge.

Sadly, there has not been much public discussion about development-led archaeology, comparable to the movement in Britain, already so well-addressed in the influential work *Rescue Archaeology,* edited by Phillip Rahtz as long ago as 1974. Who will ever forget *The Future of London's Past* (Biddle and Hudson 1972), which, thanks to Italian universities, led to an appreciable development of urban archaeology in Italy in the 1980s? To be sure, the 1960s witnessed an economic upturn after the post-war recession that marked a rapid expansion of the city of Rome into its hinterland. In terms of archaeological impact, this led to the famous South Etruria project, brainchild of the then director of The British School at Rome, John Ward-Perkins, which was aimed at tracing and cataloguing archaeological sites threatened by the city's development (Potter 1979; Patterson *et al.* 2020). However, it took some years for this pioneering field survey (and related excavation) project to have a knock-on effect in the country. A few early works in Italy on the questions raised by development-led archaeology outside of the urban context, such as the book by two big names in Italian archaeological and landscape studies, Sabatino Moscati and Folco Pratesi, published in 1993 (planned as the first in a series that never was), were mainly illustrative of discoveries and had

little resonance. However, the problem of ever-increasing archaeological discoveries, made all the more acute by developing awareness of the benefits of stratigraphic archaeology and its relevance to historical interpretation and synthesis, was to have its effects. Although finally codified in the 2004 legislation cited above, some archaeological Superintendencies were already prescribing field surveys and explorative excavations in advance of development by the 1980s, if not earlier.

Since 2004, the web platform *Fasti Online* has attempted to guarantee the dissemination of news of ongoing archaeological investigations across Italy through digital publication of results.[1] *Fasti Online* was a project created by the International Association of Classical Archaeology (AIAC) and the Center for the Study of Ancient Italy of the University of Texas at Austin (CSAI) and was welcomed by the Ministry of Culture and swiftly adopted as a national platform for reporting all archaeological discoveries. Indeed, until a short time ago, it was obligatory to report archaeological fieldwork through the *Fasti*. This was done by most non-governmental concessionaries, although sometimes such amounted to little more than succinct reports, often prepared before any post-excavation work had taken place. Typing in the keywords 'medieval' and 'Italy' in early July 2022 produced 616 results from the year 2000 onwards, which, at first glance, looked promising, but which, in reality, is probably just a fraction of what was really unearthed.

In 2016, the Central Institute for Archaeology or ICA (*Istituto Centrale per l'Archeologia*) was created by the Ministry of Culture with a broad mission, including the coordination of information deriving from the plethora of development-based archaeological activities conducted daily in Italy. Data should eventually be made available through a specific QGIS-based Geoportal. To standardise the process of documentation and data entry, the ICA released a new and mandatory version (1.2) of the GIS application on 1 August 2022, accompanied by an operating manual.[2] The aim is to 'simplify and standardise the way in which such data are collected and archived', so as to facilitate usage and minimise errors. The new director of the ICA, Elena Calandra, tells me that the ICA is still awaiting many data from various Superintendencies. This is not an easy task, not just because of lack of resources, but also because much original documentation was stored on floppy disks well into the 21st century and has not been transferred onto new digital supports. Indeed, there is a very real fear that data have been lost. In the meantime, however, some institutions have already implemented their own WebGIS platforms, such as the Superintendency of Emilia-Romagna – which is not new to development-led archaeology (e.g. Valloni and Bernabò Brea 2003) – and the Special Superintendency for Rome (see below).

Notwithstanding their good intentions, after over 40 years of practising archaeology in Italy, I can confidently state that various of my friends, students and collaborators who have reached significant positions in the Italian public administration of archaeology and culture uniformly lament being swamped by bureaucracy, leaving them little or no time to do what they were originally trained to do, which is that of revealing, understanding and disseminating knowledge about the past. More's the pity, as Italy undoubtedly trains excellent archaeologists and conservators, of international standing, and the data passing through their hands would have much to tell us.

Infrastructure and development-led projects and medieval sites

Italy is one of the European countries with the highest number of major infrastructures, many of which concentrate in the northern half of the peninsula. We may count, for instance: motorways

[1] *Fasti Online* was very much the brainchild of the archaeologist Elizabeth Fentress, whose track record included collaboration with such colleagues as Barry Cunliffe and Andrea Carandini. See http://www.fastionline.org/.

[2] See now: http://www.ic_archeo.beniculturali.it/it/170/news/480/archeologia-preventiva-online-la-nuova-release-1_2-dell-applicativo-per-la-raccolta-dati

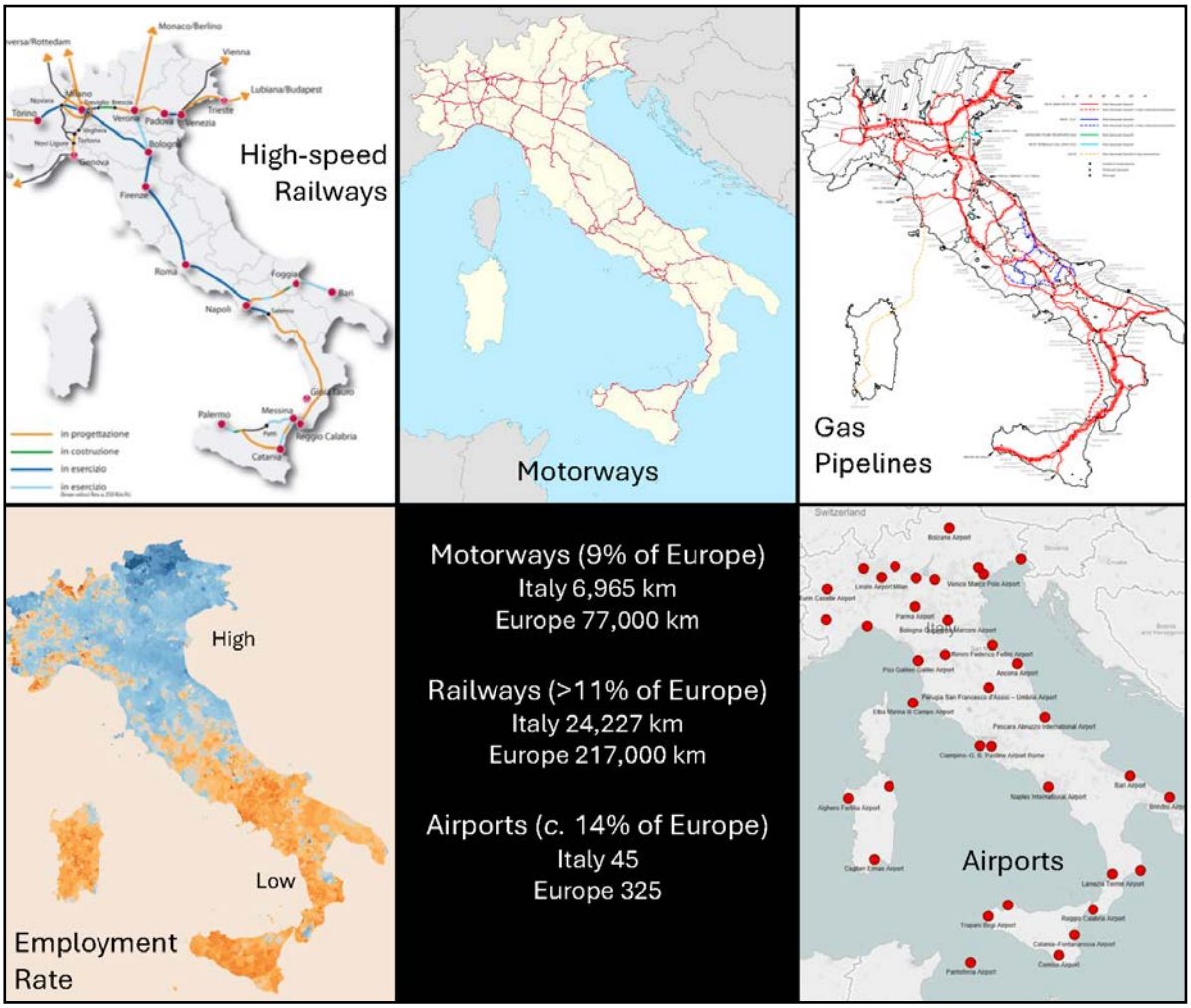

Figure 1. Maps of the main infrastructures in Italy, excluding wind and solar farms which are concentrated in southern Italy and Sicily.

(9% of Europe), railways (>11% of Europe) and airports (almost 14% of Europe), all of which are, naturally, being maintained or enlarged (Fig. 1). To this list we should add the laying of methane pipelines and, more recently, heavy investment in sustainable energy (wind and solar), tourist ports and other infrastructures. The immense impact of these on archaeology and the environment led to specific legislative provisions concerning preventive archaeology in 2005, following a debate between the Ministry of Cultural Heritage and the Ministry of Infrastructure and Transport.

Leaving aside the archaeology of cities and towns, where large building projects have resulted in a substantial increase in knowledge, particularly since the development of urban archaeology in the 1980s – we can cite well-published projects such as the underground railway in Milan (Caporusso 1991), the Crypta Balbi excavations in Rome (Manacorda 2001) or the post-earthquake excavations in Naples (Arthur 1995) – the impact on medieval rural archaeology in Italy is currently extremely difficult to both access and assess. Any overview will be largely based on very unevenly published data. Indeed, it appears that the majority of examples of archaeological practice in, and publication of, major development projects are concentrated in the more economically developed northern part of the country; the south still suffers from lesser investment, reflecting upon both the quantity of major building projects and the resources dedicated to archaeology (Catania 2017).

Figure 2. The large Lombard cemetery discovered along the route of the motorway at Sant'Albano Stura, Cuneo.
(Source: Micheletto, E., Garanzini, F., Uggi, S., Giostra, C. 2014)

The most significant and spectacular data regarding medieval rural archaeology concerns Lombard cemeteries of the 6th to 7th centuries, as well as a few earlier Ostrogothic-period cemeteries, that have been uncovered through motorway, high-speed railway and pipeline construction in northern Italy. The cemetery at Treviglio, with probably up to 120 burials, seems to feature continuity of use from late imperial times, with some 36 burials of early Lombard date, but possibly of indigenous people (Galante 2022). By contrast, a substantially immigrant population appears in the contemporary cemetery of Fara Olivana, containing 113 burials (Fortunati and Giostra 2019). Even more impressive was the substantial cemetery unearthed between 2009 and 2018 along the route of the motorway at Sant'Albano Stura, Cuneo (Fig. 2), yielding some 842 burials (Micheletto *et al.* 2014); here, however, given the fragile nature of many of the contexts, a large micro-excavation project was conducted under laboratory conditions, whilst the discovery is now on display in the Museum of Cuneo.

Finds from the construction of the Autostrada A35 Brebemi, and the Treviglio–Brescia high-speed railway line have led to the creation of the *Museo Archeologico delle Grandi Opere* (MAGO) of Pagazzano in 2015, which was awarded the Riccardo Francovich prize for its merits in 2024. The museum highlights the rich funerary evidence from the Lombard period, testifying to the presence of high-ranking figures

in the low Bergamo plain. Similarly, in nearby Piedmont, Lombard cemeteries have been encountered and excavated, such as at S. Albano Sura, mentioned above, and Momo (Novara), found during the laying out of the Snam Gas pipeline. The skeletal remains from some of these have been subjected to stable isotope and genetic analyses, with intriguing results (Giostra 2019).

Moving down the Italian peninsula, from Rome to the south and the islands (Sicily and Sardinia), apart from some archaeological centres of excellence and the labours of a number of internationally renowned scholars of the Middle Ages, the quantity of publications drops and public interest in and knowledge of these centuries seemingly wane in contrast to the remains of pre-Roman local cultures and Magna Graecia, despite medieval re-enactment having become a popular public activity.

Rome itself is, of course, rather well-served. For instance, the excellent SITAR (*Sistema Informativo Territoriale Archeologico di Roma*) project, which won the European Association of Archaeologists prize for open data in 2021, is mapping finds from the entire area of Rome and its hinterland, including evidence revealed through development-led archaeology. However, with over 15 years of digitization and despite recording over 20,000 archaeological sites and about 250,000 objects, or just over half of what appears to be available, it has very few data on the Middle Ages (Serlorenzi *et al.* 2021). Indeed, using the digital library in 2023, the search term 'medieval' yielded only 154 results, in contrast to 1,737 using the term 'Roman'. Mirella Serlorenzi, the director of the project, told me that post-classical or, rather, post-6th-century finds were just not being considered by many archaeologists. However, things are certainly now improving.

Whilst Rome's SITAR is moving in the right direction, the high-speed railway line (TAV) between Naples and Rome, whose construction began in 1994, becoming functional by 2003, and covering a distance of 205 km of a total of 630 km to Milan and Turin, is not. Indeed, its archaeological engagement is little short of scandalous, despite good intentions (e.g. Bellini 1995). If we take the proposed estimate of an average of one archaeological site every 500 m (Mauro 2004: 262), such would amount to an estimated potential total of 400 or so sites being intercepted along the line, without even considering evidence encountered relating to the historical environment and land-use. By 2005, 149 sites had been found (Anonymous report, 2007: 40). While we know that an enormous amount of archaeology has been conducted by hundreds of enthusiastic young archaeologists, little, however, has been published (see, for instance, Recchi 2005) and virtually nothing bar occasional references regarding the Middle Ages. We might cite, for instance, the important Roman *vicus* at Mignano Montelungo, Caserta, probably abandoned during the 6th century, and with an early medieval church on a hill nearby (Gasperetti 2006: 249); or the Roman villa at Caivano (TAV, IV sottotratta, lotto 1) where 'close to the villa there were nine burials datable to the 4th century AD and three wells of the 6th–8th centuries AD. The wells reached a depth of 4 m and produced intact millstones, faunal remains and whole jugs and jars datable to the 7th century AD' (Sampaolo 2005, translation by Paul Arthur).

The railway line apparently cost €47.3 million per kilometre (*Eunews*, 18 July 2014). The total cost would therefore be something like €9,696,500,000, although I have found an alternative cost of €5.2 billion mentioned in the press. Whatever, they are astounding sums and I do not know how much was spent on archaeology. How is it possible that, in the face of such financing, so little is known about the archaeology revealed by the Rome–Naples high-speed railway? It is difficult to regard the scant published information as value for money.

As Stefano De Caro, Superintendent of Archaeology at the time, wrote in 2013, regarding the important site at Mignano Montelungo (De Caro 2013; see also De Caro 2012: 217–218):

> 'It was the year 1995 (...) Unfortunately, many years have (now) passed since the railway line came into operation, but, contrary to what was prescribed by the Superintendency and accepted by the railway company, the subsequent stages planned at the time to complete the archaeological exploration and enhancement – albeit with the appropriate limitations – of the site have never been implemented, so that the name and identity of the site, the historical reasons for its foundation at such a short distance from another similar centre such as *vicus Rufranus*, still elude us.
>
> 'At a time when research is being carried out on the new high-speed railway lines, the implementation of another old regulation issued by the former Superintendency – the museum display of the extremely important archaeological finds made during the construction of the TAV station at Afragola and the completion of the exploration of this vicus of Mignano Montelungo, in order to add an important piece to the history of such a historically important area of the Caserta area – which would not only be a legal duty (the failure to implement the regulations issued by the Superintendency would in fact give credibility to the entire public project), but also a positive step towards the future of the area, is finally under discussion. It would not only be an act of statutory obligation (the failure to comply with the regulations of the Protection Authority renders such an important public work illegitimate), but would also give credibility to the whole process of preventive (development-led) archaeology, confirming that Italy is finally on the right track towards implementing the dictates of the European Convention for the Protection of the Archaeological Heritage (Valletta 1992).' (Translation by Paul Arthur)

There are, nonetheless, some good examples of development-led archaeology in the south of Italy. In Basilicata, following the discovery of hydrocarbons in Val d'Agri, the Tempa Rossa project, run by the French multi-national firm TOTAL (Dapoto 2013), has led to some significant work. Over the course of the project, mainly between 2008 and 2015, 51 sites were discovered, some dating back to the Iron Age, and with eight featuring medieval remains. The most promising medieval sites, both subjects of preliminary reports, are:

- UT 3/Site 8 Corleto Perticara (PZ), containing a 6th- to 7th-century date cemetery and part of a church (Lapadula 2015); and

- Site 26 Tempa San Nicola (PZ), where a possible 6th- to 10th-century Lombard cemetery was revealed (Lapadula 2018).

It is unlikely, however, that the preliminary reports will be replaced soon by more thorough publications, because the archaeologist in charge of the project has been appointed to a position within the government hierarchy and transferred.

Similarly, the 150+ archaeological sites discovered between 1999 and 2010 during the installation of the Viggiano–Taranto oil pipeline and well collection network by ENI S.p.a., the Italian multi-national energy company, have been presented to the public in a preliminary study, but are unlikely to ever be thoroughly published. The volume, interestingly, shows the increase in number of known archaeological sites through the project (Preite 2016), while highlighting the scant number of early medieval sites found and the absence of any later medieval remains (Fig. 3).

Most of the discoveries discussed above relate to cemeteries, concentrated between the later 6th and (early?) 8th centuries, and dated materially by grave-goods, which tend to disappear from burials after the 7th century. Far less is known of any associated settlements. In southern Italy, early medieval cemeteries are frequently identified inserted into and around the remains of earlier buildings. Examples may be cited in the territory of Ragusa in Sicily, where a pipeline intercepted a Roman bath-building that was transformed into a church with a cemetery in the 8th century (Fiorilla *et al.* 2021:

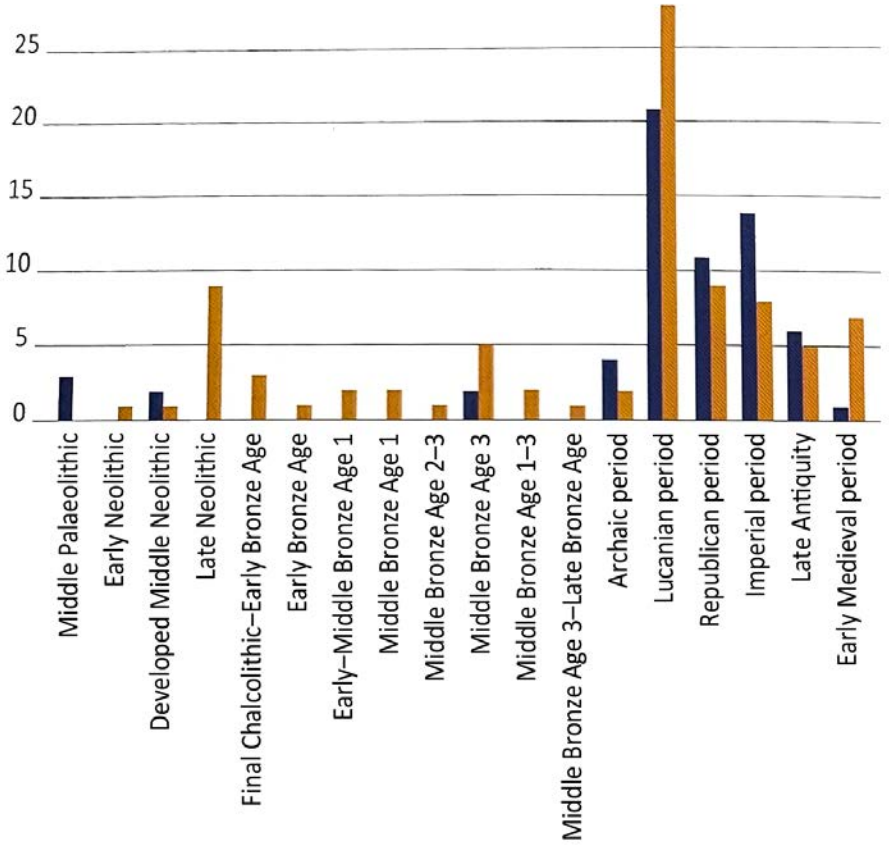

Figure 3. Slightly modified histogram of site numbers by period known before (black) and after (brown) the 1999–2010 ENI development project between Viggiano (Basilicata) and Taranto (Apulia).
(Source: Preite 2016)

212); and near Sepino in Molise where – as detailed in one of the few books specifically dedicated to reporting the archaeology of a pipeline in Italy – the Biccari–Campochiaro pipeline revealed 6th- to 7th-century burials inserted within a ruinous Roman villa (Mucilli and Colombo 2021: 169).

Only occasionally are data on actual rural settlement sites in Italy recovered from development-led archaeology, most often when they are located on earlier buildings, such as at the Roman villa at Marsicovetere (PZ) (Ruzzo and Guerrini 2009; Gargano 2010). I am informed that in Campania virtually all rural Roman sites found along the Rome–Naples high-speed railway line (TAV), which is now being extended to Bari, show evidence for early medieval occupation or reuse. Comparable evidence emerges in Apulia, in the Marche and elsewhere, where early medieval post-built huts have been found, some of which date at least into the 8th century.[3] Details of these would be fundamental to understanding the forms and degrees of continuity and change from Late Antiquity to the Early Middle Ages and the transformation of the rural habitat that appears to have occurred between the 8th and 9th centuries.

Abandoned villages are rarely traced, but include the late antique and early medieval site unearthed during construction of a gas pipeline at Zimella, near Verona (Bruno and Vitale 2021), and the suburban settlement and tombs at Collegno, near Turin, revealed during extensions to the underground railway for the 2006 Olympics (Pejrani Baricco 2004). During the same project work, creation of a bobsleigh track on high ground revealed a portion of an antique/early medieval

[3] See, for instance, the sites at Biccari (FG) (Calastri and D'Elia 2020) and Torcharolo (BR) (D'Auria and D'Onghia 2023) in Puglia, and those in the Marche, including Giove di Murcia (FG) (D'Elia, 2020; Frapicinni *et al.* 2019).

habitation in the Alps at Cesana (TO). Work for a new motorway between Alessandria and Acqui Terme also brought to light a small Gothic settlement and its cemetery at Frascaro (Micheletto 2019). To such sites we may add individual rural buildings and even medieval infrastructures, such as the later medieval drainage system found at Cavernago, Bergamo (Fortunati 2016); meanwhile, the total absence of archaeological sites encountered in the Brescia–Verona railway works near Lake Garda suggests the presence of a large forest, the *Silva Lucana*, right through the Middle Ages.

Reporting, publishing and public perceptions of the archaeological past

Alessandro Garrisi, past President of the National Association of Archaeologists (ANA), has recently stated (2019):

> 'Since preventive archaeology often proceeds on the basis of the discovery of structures or parts of structures whose value is immediately comprehensible, both to the excavator (the archaeologist) and to those who carry out the work and must finish it quickly, it is undeniable that due to certain phenomena typical of post-classical archaeology, the post-classical often simply escapes the meshes of protection due to its intrinsic evanescence (...). This is a reality that must be reckoned with by those who study the post-classical on the basis of the material data, and even more so by those who in the post-classical insist on investigating contexts such as rural ones, which are highly evanescent. Today, the situation is improving, but the loss of information from past excavations is something to be taken into account for anyone involved in the reconstruction of post-classical contexts and landscapes. The lack of data from a context must therefore be critically considered from time to time, starting with an honest analysis of the quality of past investigations.' (Translation by Paul Arthur)

All in all, the picture for Italy as a whole can be deemed as somewhat bleak, since, although a great deal of archaeology is being done, relatively little is being published or made freely available, contrary to the practice of some other countries (Augenti 2020). The very idea of seeing the publication of data from developer-led archaeology is a chimera according to Daniele Manacorda (2020: 18), who writes that 'The stature of publishing does not have the same dignity as that of knowing, and mountains of unpublished material accumulate in our warehouses, first and foremost in those of the territorial superintendencies, awaiting the dissemination of data, which we cannot resign ourselves to considering an optional extra'. This lack of publication not only hinders scientific research and the growth of knowledge, but also impedes public access to data and ideas so as to promote a better sense of community and belonging and to develop fuller interest (including via tourism) in the wealth and diversity of Italy's heritage (Valenti 2022; and see Hodges 2018, on placemaking at Butrint in Albania).

It might be argued that, overall, the fullest effort for medieval archaeology in terms of excavation, post-excavation work, analytical publication and widescale diffusion of results is to be found in the north of Italy. Perhaps unsurprisingly, much that has been published up and down the country relates to 6th- and 7th-century cemeteries; far fewer later cemeteries have been identified. It is not only the excavation of these early medieval cemeteries, but, above all, the analysis of associated finds and genetic and isotopic analysis of the human remains, that are beginning to develop our knowledge concerning immigration and integration in the peninsula, particularly as regards the earliest phases of the Lombard conquest (but what, we might ask, of the Byzantines, Arabs, Normans, etc.?).

Conversely, there is very little information on contemporary settlements, infrastructure and the environment, just as there seems to be rather little on the later Middle Ages. In fact, apart from advances made in studies of the history and archaeology of the Lombards, the archaeology carried

out for major infrastructure projects has yet to contribute in any substantial way to our knowledge of the Middle Ages in Italy, despite the potential of the data collected. Even in terms of money spent, this cannot be considered a great achievement.

We can attribute this phenomenon to various factors, such as:

- A preponderant focus, ever since the Renaissance, on classical archaeology and Graeco-Roman evidence, catalysing attention and obscuring the visibility of the Middle Ages. Just a few years ago, it was written that: 'Perhaps it is no coincidence that some innovative approaches have been implemented by lecturers in medieval archaeology, a discipline that deals with a heritage not recognised by MiBACT [as the Ministry of Culture was then called] in the category of archaeological heritage, as this officially stops at the late Roman period (5th–6th century)' (Marson 2020: 21).

- The overriding attention to classical archaeology means a general ignorance of medieval material culture – often not recognised by many archaeologists – which is a matter of tradition, individual interests and university teaching.

- A vision of archaeology by some university lecturers, and thus of their students, as subservient to art history, rather than being a powerful and wide-ranging historical discipline.

- Lack of time and other resources necessary to prepare publications, compounded by often inaccessible archives concerning past work.

- Perhaps also the lower level of surviving medieval remains in much of the open countryside, compared to Roman times, with settlements concentrated beneath modern towns and on hilltops. However, already in the 1940s and 50s, John Bradford (1957), a pioneer of aerial archaeology, illustrated the palimpsest of archaeological remains that can be traced in the Italian countryside, including a wealth of medieval sites, field systems and roads that showed the great potential of medieval archaeology.

Recommendations (and universities)

Clearly, much more needs to be done. Here, I offer a series of recommendations, which partly reiterate what has been expressed many times by various colleagues in Italy and which bring into question current laws and regulations of various government ministries.

First of all, Italy requires bold, new legislation on cultural heritage. The current legislation is extremely restrictive, based on the concept of protectionism (Güll 2013: 103), rather than on what is beneficial to the public. Furthermore, since 2014, state superintendencies of archaeology no longer exist, having been merged with the superintendencies responsible for the arts, architecture and the landscape (Franceschini reform of 2014). Without significant new resources, this has created an excess of time-consuming work, particularly with the enormous expansion of windfarms and solar panels that require authorisation, and responsibilities that are not easily managed by the available human and financial resources.

Either centralised or governed at regional level, all of Italy should now be covered by GIS managed through an open-source database of archaeological finds and notifications, that would not only aid research, but would also provide a valuable tool in planning infrastructural projects. I am personally familiar with the online CartApulia, the map of Apulia's cultural heritage, that was launched in 2013,

and which is a very basic GIS, connected to a minimal series of site and context entries that are often skimpy and sometimes inaccurate.[4]

The past is the birth-right of society, it remains our common shared heritage, and thus society has the need to know. Therefore, accurate and sometime time-consuming excavation, post-excavation analysis and publications should be obligatory and planned and budgeted from the initial project -design phase. It follows that government should encourage publication, making it easier, giving excavators the right and freedom to report their finds and allowing for the liberal and cost-free circulation of images.

The Ministry of Culture must be more open-minded to the idea of external collaboration, of both the general public and universities, fully aware that knowledge of the past is not just property of the ministerial chosen few. At present, the public is little more than a passive recipient of what information the government decides to disseminate. This is tantamount to control of knowledge, which sets a dangerous precedent for democracy. Thus, I argue for more public participation in field archaeology, especially field survey, that can be achieved in advance of large infrastructure projects in the countryside. Despite current legislative restrictions, I would also welcome the sort of question-oriented test-pitting that Carenza Lewis (2014; 2019) and others have so successfully carried out in various parts of England, with the aim of involving local public groups, including schoolchildren. All these activities are revealing, highly instructive, fun, help create a love of the past and build a sense of community, and they can be achieved through properly informed and managed volunteers. Despite the enormous historical and social benefits that such have produced in various European countries, they would be almost impossible in present-day Italy, because of the opposition to volunteer labour (see Pavolini 2017: 195–200) and the bureaucracy that permission for every test-pit would require.

Personally, I am less enthusiastic about uncontrolled metal-detecting, which is generally illegal in Italy, but I do realise that the practice cannot be stopped. Hence why the UK has turned the custom into an advantage for recovering and preserving a surprising quantity of objects and knowledge about the past, to history and society's benefit, through the Portable Antiquities Scheme (PAS) (e.g. Oksanen and Lewis 2020). In Denmark, a similar scheme led to over 30,000 items being reported to the National Museum in 2021.[5] A similar strategy in Italy would limit the relentless loss of artefacts and data and provide a further key to understanding areas of particular archaeological interest.[6]

What should the role of universities be in all this? I will never forget how, as a student at the London Institute of Archaeology in the late 1970s, I was, thankfully, obliged to work with Peter Drewett in Sussex. He effectively tackled archaeology in the county through the Sussex Archaeological Field Unit that relied on the human and material resources of the Institute of Archaeology. It seemed the perfect way of involving a university and training students in the daily questions of landscape archaeology. Yet there is no current agreement between Italian ministries that effectively facilitates direct participation in the management of the country's cultural heritage by universities; indeed, quite the opposite situation prevails, despite the resources that could be constructively deployed (Brogiolo 2013; Volpe 2022). Nevertheless, virtually all archaeologists who work directly or indirectly for the Ministry of Culture have university degrees, at the very least.

[4] http://cartapulia.it/

[5] Data from a panel seen on display in the National Museum of Denmark in August 2023.

[6] Every year in Italy police forces recover large quantities (but perhaps in reality a mere fraction) of finds that have been clandestinely recovered. Although much news is made of such recoveries, the general public is largely unaware of the irreparable damage caused by the finds' lack of provenance or context.

Universities have a lot to answer for, and a review of university teaching of archaeology in Italy has been frequently called for (see Volpe 2020). We certainly cannot expect that all students study medieval archaeology, but we can make it obligatory for archaeology students to take a general course in the subject, which is now offered by almost all universities in Italy. However, only relatively recently have universities established courses specifically addressing developer-led archaeology, albeit ones oriented towards assessing the legal framework. Whilst archaeological methodology is now widely taught, courses in archaeological theory and interpretation, in the methods and potentials of preventive archaeology or in the archaeology of infrastructural projects, on how to prepare fieldwork reports and the basics of publishing, should also be obligatory.

Furthermore, recognising that archaeological excavation is inherently destructive of data, all field archaeologists must be made aware that publication of their data is an absolute priority that cannot be put aside with the idea that it can be postponed (postponing is one of the best ways of never getting anything done while salving one's conscience). Barry Cunliffe is said to have had the words 'If not now, when?' taped onto his office wall. Therefore, before any project gets underway, time, money and resources for publication need to be planned.

Finally, use should be made of the large and linear infrastructure projects not only for the study of individual sites, but also for assessing the longer history of landscapes, since rarely is it possible to obtain such extraordinarily long sections across such large swathes of territory. Clearly, one cannot realistically expect contractors to want to invest too much in such work, but it would not be unreasonable to invite university research teams to work on such projects to mutual benefit. Universities might potentially contribute with their own funds and resources or, ideally, via specific government funding, such as that recently been made available through the substantial PNRR (Recovery and Resilience Plan) programme, funded with €6.675 billion (De Caro 2021). This would be a way of substantially furthering landscape archaeology and presupposes the creation of serious research agendas for infrastructure projects, instead of solely doing the minimum prescribed by law. Sadly, the recent Prime Minister's Decree of 14 February 2022 places preventive archaeology in a marginal position, by attempting to reduce time for excavation and key related activities.

Even today, archaeology is still largely often perceived as an obstacle to development, instead of added value to Italy, and this view certainly needs to change as quickly as possible.

On a more positive concluding note, whilst conditions may not be ideal, major infrastructure projects have led to the consolidation of a substantial number of independent archaeologists who can earn a living without having to aspire to work directly for the Ministry of Culture or the universities. Even outside of the Ministry and the universities in Italy, professional archaeology has come to stay.

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Willems, and many who I have not mentioned and, thus, beg their forgiveness. I should also like to thank colleagues who took part in the question-and-answer session of the MSRG Infrastructure Archaeology seminar, including Nick Corcos, Haighleagh Winslade and Aidan O'Sullivan. Paolo Güll kindly read this paper prior to its completion. Please note that, unless expressly cited, no one is responsible for the opinions vented in this paper other than myself.

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The impact of large infrastructure projects on the state of knowledge about the development of medieval rural settlements in Poland

Paweł Duma

Introduction

The political changes that took place in Poland after 1989 contributed to a complete economic transformation of the country. The consequence of these changes was also an extraordinary investment activity, which translated into the remodelling and expansion of the existing road network. Due to the widespread underdevelopment of the country previously, the establishment and completion of infrastructure projects took place on an unprecedented scale. Many major investments began in the 1990s, and although the road network has now largely been completed, new investments are still being launched. Some of these fall within the boundaries of existing roads, but there are examples of roads being designed from scratch. There are also industrial investments (factories, halls, warehouses) which cover large areas. Often, they are established in areas of designated economic centres aimed at concentrating similar types of infrastructure in one place.

The consequences of these dynamic changes have been numerous problems and challenges faced by Polish archaeology, which does not have much experience in conducting wide-ranging research in difficult conditions and under strong time and financial pressures. In spite of all these difficulties, it seems an appropriate moment now to summarise our state of knowledge and answer the question to what extent these projects have really contributed to the expansion of the archaeological state of knowledge and study of medieval and early modern rural settlement in Poland. The Middle Ages in Poland lasted from the 10th century to the end of the 15th century. The early modern period lasted from the beginning of the 15th century to the beginning of the 17th century.

Planning for rescue archaeological excavations within the boundaries of the planned road network took place from 1996 onwards (Fig. 1). This programme was unanimously assessed as unprecedented in terms of time and scale, not only in Poland, but also in Europe. The research changed the image of Polish archaeology to a large extent. Hundreds of hectares were investigated during the rescue excavations. The state of our knowledge has been significantly expanded, but any shortcomings and problems that archaeology has faced since the beginning of the research have been highlighted. It is acknowledged that the commercial research sector has been greatly expanded, but at the same time scientific objectives have been marginalised (for further details on above, see Czopek and Pelisiak 2014: 433).

Undoubtedly, however, the knowledge gained during the rescue works has contributed to verifying many traditional views on the development of rural settlement in Poland from the Early Middle Ages (6th–7th centuries AD). This was undoubtedly influenced by the state of research. Archaeological research covering medieval settlements in Poland was generally not conducted before the 1990s, and the political changes are a visible boundary, and the results of any such research has been described as modest (Moździoch 1997: 46; Biermann 2010: 61–64). Investigations had usually not yielded spectacular results, either in terms of remains of dwellings, or with regard to artefacts.

Figure 1. System of roads and highways in Poland.
(Map: Follow by white rabbit, CC BY 3.0 Licence)

With the start of the major infrastructure projects, it was hoped to fill the many gaps in our knowledge relating strictly to rural medieval settlement. These projects, and in particular the motorway construction projects, investigated everything within the limits of their developments. In doing so, the preferences of archaeologists, who until then had subjectively decided on the selection of research topics and sites, waned in significance. On the other hand, these projects were forced to stay with the boundaries of the infrastructural development, even if the boundary cut the features in half. A further major problem has proved to be the very process of making the results of the surveys available. Most of their results were not published, and presumably never will be (Marciniak-Kajzer 2016: 794).

In addition, in the context of research on rural settlements, as Krzysztof Fokt (2012: 39) has observed, it is relatively rare that abandoned villages, manors and late medieval hamlets have been found during major infrastructure projects. This is due to the fact that motorways and bypasses generally

avoid modern rural settlements, most of which have retained their original medieval location. However, infrastructure projects have increasingly led to the discovery of early medieval rural settlements. For many countries where villages and manorial sites from this period have rarely been investigated – and usually only by chance – these findings represent a major advance. Poland is one such example: the construction of roads, reservoirs and gas pipelines has brought to light numerous remains of early medieval settlements. Similarly, large-scale roadworks across Central Europe have uncovered sites dating from the 12th to 13th centuries, providing valuable insights into the development of settlement patterns and the transition to German-law colonization between the 12th and 14th centuries AD.

Despite the caveats given, the remains of early settlements are abundant and began to be recorded from the start of the rescue research programme in 1997 (Marciniak-Kajzer 2016; 2021; Żemigała 2011: 10). Some of them were recognised only partially, others in large areas, allowing the reconstruction of their spatial layout. The results of the rescue excavations have significantly expanded the archaeological base of known dugouts (sunken-featured buildings) dating from the early medieval period. The results of the investigations have been published to varying degrees. During works carried out within the borders of the planned A4 motorway, the remains of settlements were found in Strzelno (Lower Silesia) and Wilkowice (Lower Silesia), amongst others. Based on the pottery found, the period of use of the settlement in Wilkowice was dated to the end of the 11th to the middle of the 13th century. Six buildings, pits, a hearth and a well were identified (Kopeć *et al.* 2000; Nowaczyk and Nowaczyk 2007). Also, at the Sadków site (Kolenda and Chrzan 2012), the remains of early medieval buildings were numerous. During the works, well-preserved relics of wells with wooden constructions were also found, three of which were dendrochronologically dated to *c.* AD 670, after AD 678 and after AD 731. Among the most important artefacts dating to the early medieval period that were uncovered during the survey of this settlement were agricultural implements, a deposit of which was discovered in one of the features (Feature 426). The settlement is assumed to have been inhabited between *c.* AD 670 and the first half of the 13th century, with a break probably lasting from the last quarter of the 9th century to the end of the 10th century AD.

Many infrastructural works were also carried out in south-eastern Poland, which resulted, among other things, in the discovery of the largest known settlements of the Prague culture in Poland to date (Early Middle Ages, 5/6th–7th centuries). The results of this research came as a surprise. The environs of Rzeszów (south-eastern Poland) and the presence of loess meant that the Slavs were keen to settle there from the first centuries of their presence within the borders of modern Poland. Six unknown settlements were discovered, resulting in the exposure of at least 45 half-timbered sites built on a square plan. It was possible to capture the layout of entire or almost entire settlements. These houses had a near-square plan with sides ranging from 2.5 m to 4.5 m. The depth of the subterranean lot varied from 48 cm to 85 cm. The wooden walls of most of the buildings were erected in a log structure, but relics of post-built buildings could also be seen. In the corner of each hut were the remains of a stone oven. The rescue excavation provided an unprecedented amount of evidence for early medieval settlement, but in the author's opinion it is cautious to conclude that it will not lead to a radical re-evaluation of previous findings (Parczewski 2011: 99).

Other excavations were also connected with the A4 motorway (Podkarpackie Voivodeship Poland) and were carried out in 2007–2008. Among other things, a multi-cultural settlement of an area almost 10 times larger (23 hectares) than that indicated by the earlier field survey was found. In total, 2,508 features were investigated, including very interesting remains of an early medieval village (Żyraków site, 7th–11th century). Among the discovered features there were 112 relics of early medieval buildings (dugouts) (Okoński 2012). A characteristic feature of the early medieval village is the layout of buildings with a manorial character. The buildings usually occurred in legible

clusters consisting of a dwelling house and farm buildings. Quadrangular half-timbered houses, a continuation of the traditional form of early Slavic residential buildings, are exceptionally common. The settlement, found and surveyed over a large area, is of great cognitive importance. We have at our disposal a plan of a part of the village from the tribal period and the first decades of the Polish state: similar finds were rare and unknown in such a vast area until the research was undertaken.

Remains of early and late medieval settlement were also discovered during rescue works carried out, among others, in Suchy Las (Greater Poland; Krzyszowski 2011). Animal bones from this site were analysed in detail. It was shown that the management strategy for breeding and rearing animals was similar to that indicated by assemblages discovered on higher-status strongholds, but the Suchy Las 'low horses' were smaller in size (Makowiecki and Makowiecka 2011: 246–247).

The highway surveys also contributed to the exposure of fragments of settlements dating from the later Middle Ages. Research at the Sługocinek site provided interesting results (Krzyszowski 2005). The works were conducted on the occasion of rescue excavation connected with the construction of the A2 motorway. The result of the work was the discovery of remains of medieval houses and traces of economic activity. The site is dated to the late medieval and early modern period (late 14th to early 16th centuries). This dating is based on artefacts found during the excavations. In addition to numerous pottery fragments, metal artefacts were found: knives, nails, a pair of spurs, a belt buckle, a crossbow bolt, an iron brooch and a silver ring. In addition to the houses, two wells were found. One of the buildings, interpreted as a dwelling, measured 3.7 m by 4.9 m and was built using the log technique. According to the researchers, the building bore traces of destruction by fire. The skeleton of a young man (22–24 years old) was found within its boundaries. The individual showed extensive cranial trauma and traces of a severed upper limb. A treasure consisting of 1,950 coins concealed in two vessels (deposited around AD 1480) was excavated a short distance (about 40 m) from the relics of the house. A short distance from the destroyed homestead, a burial of a woman was encountered in a shallow grave cavity, but with no visible traces of trauma on the bones (Krzyszowski 2005).

Rescue excavations at Pomorzany (now Pomarzany, Łódzkie voivodeship; Świętosławski 2011), carried out in 2003–2005, uncovered 539 features dating to the late medieval period and modern times (16th–19th century). The dating of the settlement was based on the analysis of pottery fragments, as well as precise dendrochronological dates obtained from three wells (a barrel dug into the ground around AD 1350 and a second well, constructed around AD 1420). The results show that one of the wells functioned for many centuries, bearing traces of numerous repairs (from medieval times until the 18th century). The concentration of buildings from the modern period around the square shows that the spatial development concept created in the later Middle Ages survived until modern times. The large-scale destruction of the remains of the late medieval settlement did not allow more detailed conclusions to be drawn about its layout. However, some artefacts, such as a fragment of a brass plaque with Gothic letters (probably part of a book binding) and fragments of pottery or decorated stove tiles, indicate that traces of a magnate's residence located within the site boundaries, but destroyed at a later date, have been discovered. Remnants of this activity include the remains of numerous structures without foundations or erected on stone foundations. Many of the discovered modern relics bore traces of destruction by fire (mid-17th century). The younger farm buildings were probably demolished in the early 19th century. The authors of the research maintain that the found traces of buildings typical of a manor layout push back the beginnings of the manor on Polish soil from around the mid-15th century to the last quarter of the 14th century. The castle, in the form of a motte, probably ceased to exist at the beginning of the 16th century and the remains of the oldest medieval village buildings were found. During the research in Pomorzany, traces of the surroundings of the manor and farmstead from the late medieval and modern periods

were discovered, investigated and documented, which have so far been very rarely studied by archaeologists (Poklewski-Kozieł 2013).

In turn, during works carried out in connection with the construction of the A2 motorway in Żerniki (Greater Poland), late medieval relics of buildings were found, which consisted of houses, farm buildings and other features (wells, a tar pit, hearths, traces of metallurgical activity and a barn). The authors surmised that the uncovered relics represented linear settlement type. On the basis of the artefacts found, it is believed that the settlement functioned at least from the mid-14th century to the mid-15th century. However, artefacts from the modern period were also found, which indicate that the area was used in later centuries. The authors of the study suspect that the site was associated with a modern grange operating nearby (Pawlak 2007).

Interesting results were provided by works conducted at the Mniszek site (Kuyavian-Pomeranian Voivodeship), connected with the construction of the A1 motorway. In 2006, wooden elements, metal artefacts and fragments of pottery dated to the later Middle Ages and modern times were uncovered. Preserved relics of wooden structures and a waterwheel identified the structure as a watermill. It is one of only a few mills known so far from the territory of Poland. Samples were taken from the preserved wooden elements for dendrochronological studies. The waterwheel was made of wood cut down around AD 1421/22, the accompanying piles were cut down after 1380. The uncovered relics allowed a partial reconstruction of the mill and the accompanying infrastructure (Górzyńska *et al.* 2011).

Infrastructural research was also an opportunity to identify old field boundaries, space management practices or farming techniques. On the route of the A1 motorway, in Piaski-Nowa Wieś (Łódź Voivodeship), Piotr Strzyż discovered five parallel ditches. During the work, elongated, darker patches were observed: parallel to each other and crossing the entire length of the excavated trench (with lengths ranging from 185 m to 274 m, their width varied and ranged from 40 cm to 2.2 m, while their depth varied from 25 cm to 50 cm). They thus resembled shallow ditches, in cross-section similar to a rectangle with a fairly flat bottom. Tadeusz Poklewski-Kozieł pointed out their similarity to the discoveries of Władysław Filipowiak in Dobropol (Pomerania) and helped to interpret them as traces of ploughing with a one-sided ridged plough (Filipowiak 1972; Maik 2016). Among other things, Władyslaw Filipowiak found in Dobropol the remains of so-called long ridges, which can be seen in the field today and are known in late medieval sources as 'die langen Stücke'. On the surface they could be seen as two parallel rows of shallow ditches and small mounds. The ridges get this appearance after ploughing with an asymmetric plough.

The expanded and upgraded road infrastructure creates an environment and incentive for industrial expansion (factories, warehouses, etc.). These investments, often covering large areas, necessitate archaeological excavations on an unprecedented scale. They result in the discovery of settlements and relics of buildings from the medieval period. One such example is a settlement found during rescue excavations carried out by the Archaeologia Silesiae foundation on behalf of Eko-Okna company in Kornice (Upper Silesia).[1] The works uncovered a deserted settlement dating back to the colonisation under German law (13th century) (Fig. 2). There are no preserved written references about it. During the archaeological excavations numerous features of various purposes were found, as well as remains of buildings, including those of a very well-preserved dugout in loess (Figs 3–5). Steps leading to the interior, a bench near the wall modelled from loess and a repeatedly repaired dome-shaped hearth in one of the corners were all identified. The results of this research have not yet been published.

[1] The work was carried out by a team comprising: M. Furmanek, P. Duma, J. Nastaszyc, T. Murzyński, J. Piekalski and M. Masojć.

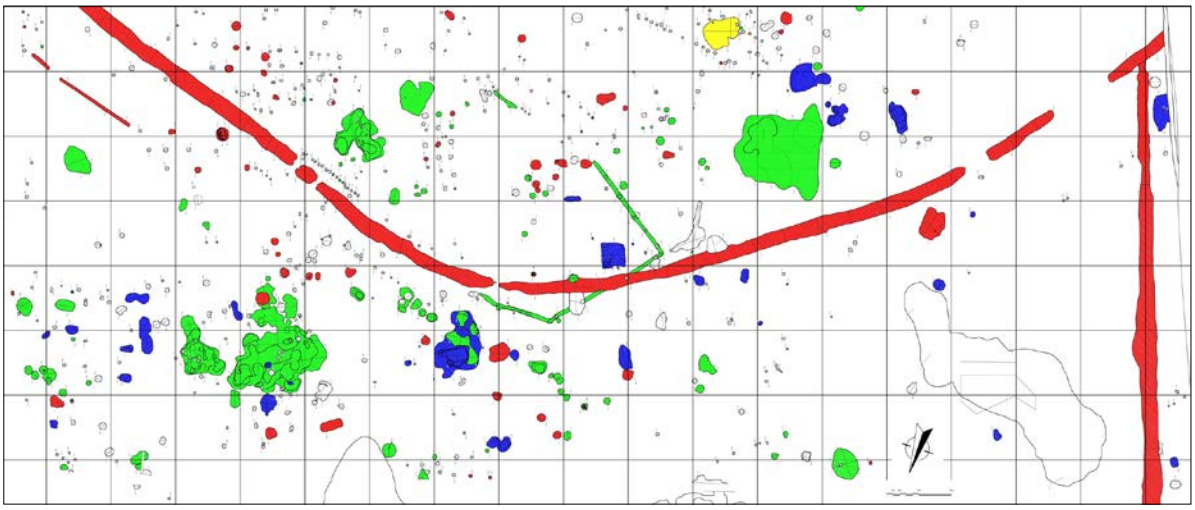

Figure 2. Kornice (Upper Silesia): Plan of the archaeological features found in 2013. Medieval features in dark blue.
(Mirosław Furmanek, Joanna Nastaszyc, Tomasz Murzyński)

Figure 3. Kornice (Upper Silesia): Photograph of Feature 170, the remains of a 13th-century dugout.
(Paweł Duma)

It is worth noting at this point that it is increasingly common for new infrastructure projects to call for pre-emptive, comprehensive, non-invasive investigations. This is intended to allow, among other things, better planning of future archaeological investigations. As practice has shown, the boundaries of known archaeological sites often do not coincide with the actual excavation site boundaries, and there are cases where these differences are considerable. Non-invasive survey is

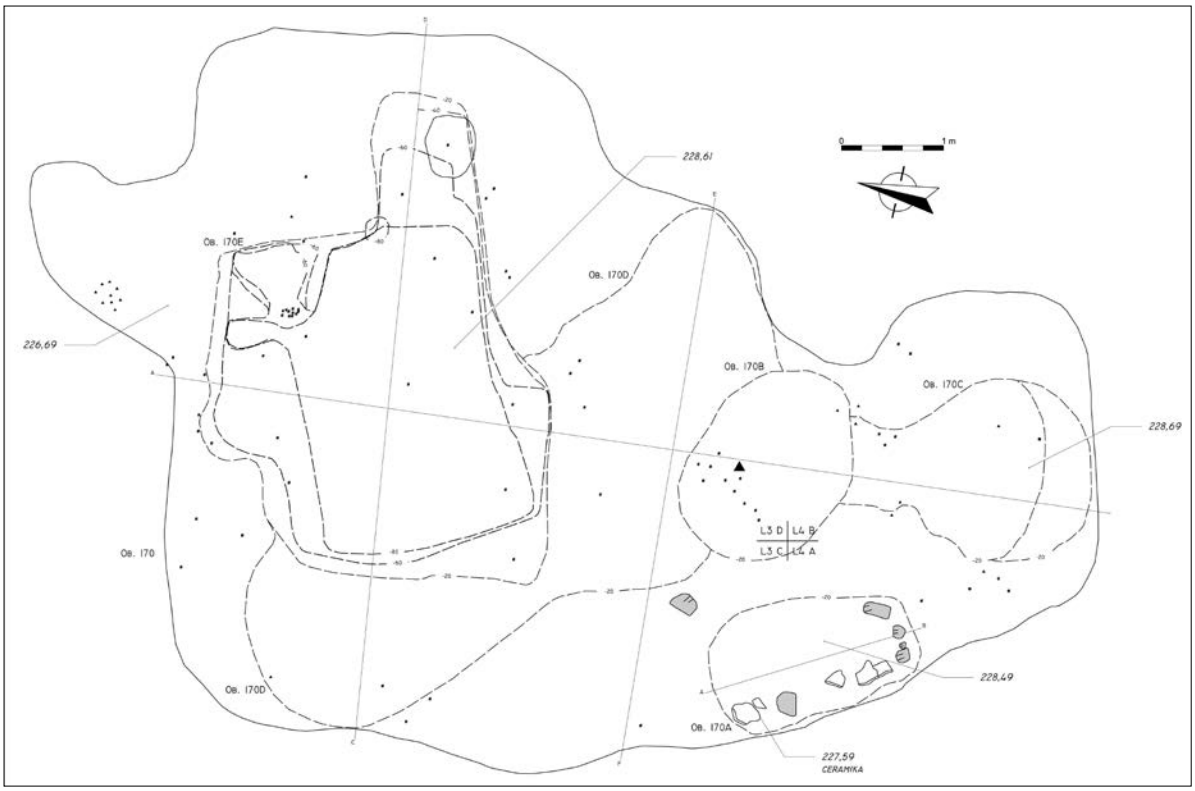

Figure 4. Kornice (Upper Silesia): Plan of Feature 170 and associated features.
(Natalia Nastaszyc and Tomasz Murzyński)

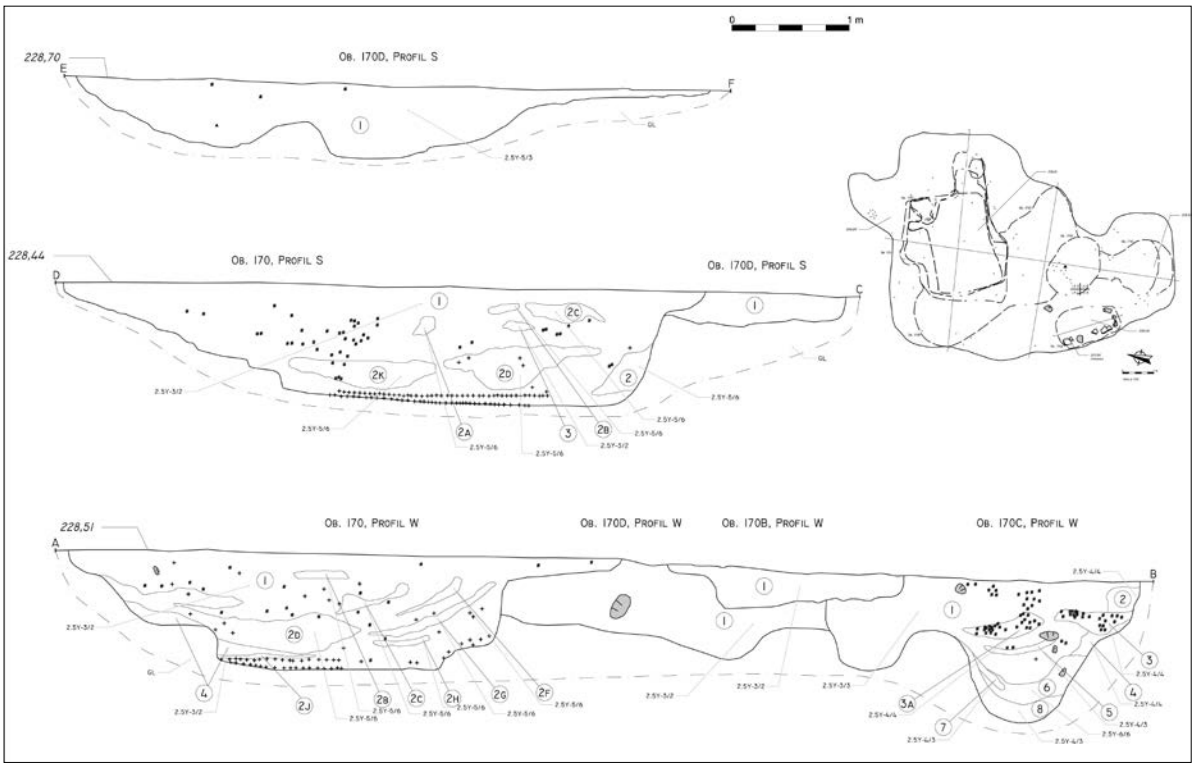

Figure 5. Kornice (Upper Silesia): Cross-sections of Feature 170.
(Natalia Nastaszyc and Tomasz Murzyński)

being used more and more frequently and, regardless of large infrastructure projects, it is worth noting the spectacular discoveries made thanks to the new technical possibilities. Such discoveries include the finding of the deserted medieval village of Goschwitz near Strzelin (Lower Silesia). Its location was identified thanks to the analysis of Lidar data (Fokt and Legut-Pintal 2016: 127). The process of this research activity unfolding in parallel with infrastructural research shows, however, that the interest of archaeologists in studying the development of medieval settlements in Poland has increaded greatly in the last few decades.

Conclusions

Major infrastructural works have changed the face of Polish archaeology and led to a surge in archaeological data for medieval settlements. Polish science was only partially able to cope with this. Prior economic underdevelopment and the subsequent sudden increase in investment corresponding to the high demand for new road infrastructure led to the fact that, despite the high demand, work was carried out over large areas without adequate institutional support and often without proper preparation. This has resulted in only partial publication of the collected data and in some cases its low quality. The long-term infrastructure projects carried out in Poland took place with little state participation and, as a result, the scientific dimension was lost and the financial dimension became the main factor. Despite these problems and shortcomings, some of the work was carried out to a high standard, greatly extending our knowledge in relation to earlier decades. Comprehensive plans of many early medieval settlements have been acquired, knowledge gaps relating to the location, size of houses and farm buildings have been filled, and data has been obtained for environmental studies. The paradox of large infrastructure projects, however, is the relative paucity of data relating to late medieval and modern settlements. As noted above, the main reason for this is the great stability of many villages and towns established as late as the Middle Ages. Much of the data acquired during the infrastructure survey is still in the process of being compiled. However, there is a perceptible lack of synthesis focusing precisely on the compilation of information covering the issue of the development of rural settlement in the medieval and modern periods within the borders of modern Poland.

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Medieval rural settlement, infrastructure projects and commercial development: the Scottish experience

John A. Atkinson

Introduction

This paper seeks to draw together the evidence of medieval rural settlement discoveries from infrastructure projects in Scotland over the last 20 years and present this within the context of Scottish Medieval rural studies as a whole. It will also seek to present the legal framework for development-led archaeology in Scotland and highlight case studies where potential or actual impacts occurred and show how those impacts led to a clearer understanding of aspects of medieval settlement archaeology in Scotland.

To achieve the above, it is essential to provide a degree of clarity of what we actually mean by 'medieval rural settlement' in a Scottish context. We will also need to clarify and define the term 'infrastructure project' in its widest sense, as opposed to its commonly used sense amongst commercial archaeologists in 21st-century Scotland.

To provide the context of the period of study we will need to consider earlier research projects that framed later discoveries and established a body of work that sought to address questions on where medieval rural settlements might survive, be found or how they may have been constituted in a time where little documentary evidence is available to cast light on the subject. This paper will also address an issue central to medieval settlement studies in Scotland – the lack of significant relict settlement patterns recognisably of medieval date within both the arable and pastoral lowlands and across the Highlands.

Having considered wider contexts, we will discuss some recent discoveries, presenting case studies drawn from recently published sites associated with linear infrastructure development. We will also review other commercial developments of the last 20 years that have added immeasurably to our understanding of rural medieval settlement in Scotland.

Development-led archaeology in Scotland

The history of development-led archaeology in Scotland follows a similar course to that witnessed in England and originates from the same 'polluter pays' planning policy changes espoused in 1990 within *Planning Policy Guidance Note 16: Archaeology and Planning* (PPG16). The principles of the English guidance were recast in *National Planning Policy Guideline 5* (NPPG5). *Planning Advice Note 42* (PAN42 (1994)) formed the core of the legal framework for Scotland (Barclay *et al.* 1997: 17), together with the *Ancient Monuments and Archaeology Areas Act* of 1979. NPPG5 and PAN42 were 'fundamental to the creation of contract archaeology in Scotland in its present form' (Carter 2022: 870).

In practice the 'polluter pays principle' was well recognised by archaeologists and developers in Scotland well in advance of 1994, and a range of fledgling commercial companies began to form in response to the need to provide services to central government and developers from 1990 onwards. These included AOC (formerly the Central Excavation Unit of the Scottish Development Department's Historic Buildings and Monuments Division) in Edinburgh, the Scottish Urban Archaeological Trust

in Perth, Glasgow University Archaeological Research Division (GUARD) (originally known as Archaeology Projects Glasgow (APG)) and The Centre for Field Archaeology (CFA) at the University of Edinburgh (see Carter 2022 for further discussion).

The years following 1994 saw a gradual evolution in Scottish policy and legislation which has continued to the present day, with the *Historic Environment (Amendment) (Scotland) Act* (2011), the *Historic Environment Policy for Scotland* (HEPS) (2019) and its supporting *Planning Advice Note 2/2011* (2011) defining the key structures. NPF4 and HEPS deal specifically with planning policy in relation to heritage.

Definitions and meanings

The background to medieval rural settlement studies in Scotland has been shaped by the history of the discipline and the lack of evidence for medieval settlement patterns in the lowlands in particular. Consequently, the study has taken a wider definition and the term 'Medieval or Later Rural Settlement' (MoLRS) has been used to draw together the study north of the border (Govan 2010; Historic Scotland 1998). However, for the purposes of this paper the term medieval rural settlement is used and defined chronologically as rural settlement broadly of the medieval period, broadly from the 12th to the 16th centuries.

In addition to defining the chronological range, it is also essential that we define what constitutes medieval *rural* settlement in Scotland. For the purposes of this paper, we should exclude significant urban centres, religious houses and centres of estate power (castles, etc.) and limit our view to places where the general population lived and worked within a rural environment. This study will therefore take the specific view that rural settlement will include joint-tenancy farms, cottars' houses, deserted villages and defended farmstead sites. The original remit of the April 2021 MSRG seminar was to take a view on the impact on medieval rural settlement of large infrastructure projects specifically, which are perhaps more readily interpreted as linear infrastructure projects, such as roads, water and waste-water, gas and electricity schemes, where medieval rural settlements have been encountered. Consequently, the case studies chosen below are based on this definition. It is, however, worth noting that the definition of infrastructure also includes public or service-related buildings. If we include major house-building schemes and significant commercial developments of the last 25 years, it is notable that excavations at the sites of these have actually led to the more significant discoveries of medieval rural settlement remains.

As will become apparent below, the general lack of evidence of excavated medieval-dated rural settlement sites in Scotland tends to lead to an assumption in commercial or developer-funded archaeology that there is little perceived threat to medieval deposits from either linear or area infrastructure schemes. However, as we shall see, these offer a clear opportunity to add to our knowledge and understanding of the period in question.

Context: research in the highlands

The late 20th century saw the emergence of a new commercial archaeology sector in Scotland, as elsewhere throughout the UK. It was also a period of significant increase in survey projects, principally led by the Royal Commission for the Ancient and Historic Monuments of Scotland (RCAHMS), which focussed attention on relict medieval landscapes, in upland Perthshire in particular (RCAHMS 1990; 1994). These discoveries would ultimately lead to further research excavations focused on these new discoveries and a better understanding of the medieval rural settlement pattern.

Excavations at Pitcarmick (Carver *et al.* 2013) and latterly at Lair in Glen Shee (Strachan *et al.* 2019), combined with university research projects in the Western Isles (Sharples 2005) began to add significant detail to the study of the extent and form of early and late medieval settlement within landscapes on the edge of modern field systems in upland or marginal Scottish contexts.

Further research work in the Central Highlands was greatly assisted by another RCAHMS study, and once again fragments of an upland rural settlement pattern were encountered and excavated, adding to the corpus of understanding for the period (Atkinson 2000; 2010; 2016). The Ben Lawers Historic Landscape Project (1996–2005), which ran as a series of initial pilot seasons in the late 1990s with main seasons from 2002–2005, also sought to investigate the location of medieval settlements in the lower-lying arable lands along the lochside. Investigation focused on two main methodological techniques: geophysics/trial-excavation, and targeted excavation of later buildings. Both methods utilised the available cartographic evidence and documentary sources to target known sites which had a degree of longevity and could, therefore, potentially be sites of medieval joint-tenancy farms.

The results of the Ben Lawers targeted excavations certainly added to our knowledge of the post-medieval period and, in one case, revealed prehistoric evidence. However, the project failed to reveal significant medieval material. Likewise, the targeting of areas where settlements had existed on mid-18th-century estate plans, but are today unoccupied, by geophysics and trial-trenching, also proved unsuccessful in locating medieval evidence. The reasons for this failure may well be related to the elusive form of buildings and construction materials used (principally turf) in the Highlands and limited contemporary use of ceramics that can be dated to the medieval period, rather than a failure of the investigative technique itself.

Although upland research, particularly in the Highlands, has aimed to identify the elusive settlement patterns of the medieval period, little in the way of significant discoveries has occurred during infrastructure projects. Major projects, such as the dualling of the A9 road between Perth and Caithness, for example, a major 25-year-long development project covering some 300 miles of road, has, to date, revealed nothing of significance to add to our understanding of the arable or upland zones throughout the Highlands during our period of interest.

Context: the lowland arable zone

The picture in the arable zone south of the Highland line has also proved to be, at best, unclear.

Archaeological investigation has occurred in advance of a series of significant road schemes on many of Scotland's major arterial roads (A1, M8, M80, M9, M77, etc.) in recent years, as well as a whole host of work on bypass projects (A75, A737, A77, A82, etc.). Few traces of medieval rural settlement sites were encountered before 2010. In fact, the only site discovered during extensive fieldwork associated with major linear infrastructure works was during preparatory investigations in advance of the construction of the A78(T) Ardrossan, Saltcoats and Stevenston Bypass in 2003. Here, trial-trenching by Headland Archaeology revealed the remains of a settlement known as Corsankell, which subsequent excavation revealed to be 15th to 16th century (Atkinson and Brown 2015).

The remains revealed at Corsankell, although relatively late in date, compliment Morag Cross's assessment of the documentary evidence, which suggests that the focus of the settlement may have been elsewhere during 12th century (when it is first documented), moving to the location of the excavated discovery at some point in the 15th century (and moving away again in the 19th century) (Atkinson and Brown 2015). This observed sequence of settlement movement was regarded by the archaeologists as a good example of the use that can be made of combining observations from both historical sources and archaeological remains.

Away from road projects, one of the very few examples of medieval settlement remains to be discovered in the arable zone is a Pictish and later medieval settlement in Fife at a site called Scotstarvit, to the south of Cupar, during the construction of a new water pipeline. Here, physical remains were represented by negative cut features, possibly defining buildings and dated by pottery and radiocarbon assays (MacGregor 1998).

Further examples of medieval rural settlements have been encountered during linear infrastructure projects in Scotland during the last ten years. Medieval settlement sites investigated by GUARD Archaeology which have now been brought forward to publication include two deserted village sites: at Philiphaugh to the south-east of Selkirk (Will and Hunter Blair 2014) and Netherton to the north-west of Hamilton (Arabaolaza *et al.* 2021). In addition, the discovery and excavation of a medieval building to the west of Kintore in Aberdeenshire has added further to the slim corpus of medieval rural settlement remains encountered during linear infrastructure development projects. These case studies are considered in more detail below.

Case study: Philiphaugh

The medieval settlement remains discovered at Philiphaugh, near Selkirk, in late 2012 and early 2013 provided a tantalising glimpse into late medieval lifestyles in the Scottish borders (Fig. 1). The remains were identified during the construction of a new water pipeline running close to the A703 and through the edge of a Scheduled Monument (SM) thought to be the remains of an Anglian settlement. The archaeological constraints here meant that a metal-detector survey and subsequent watching brief became necessary. To complicate the picture further, the location also formed part of the known site for the Battle of Philiphaugh in AD 1645 and, as such, had high archaeological potential. To reduce the risk to known archaeology, the impact corridor was minimised for this section of the pipeline to no more than 2 m in width.

Although the metal-detector survey revealed little of significance (the battlefield site is inferred to have been stripped of finds by detectorists in the past), the watching brief revealed extensive remains of cobbled surfaces, walls, hearths and pivot stones throughout the scheduled area and extending westwards beyond it. Radiocarbon dating suggested a date range of AD 1472–1645, although associated material makes a date in the mid- to late 16th century more likely. The town of Philiphaugh is recorded in historic documents in 1582 as constituting a tower, fortalice (fortified house), manor, gardens, orchards, mills, tenants and dwellings. It seems likely that the remains encountered during archaeological investigation in 2012–13 revealed a slice through some of those structures. Interestingly, the town itself does not seem to have survived beyond the first half of the 17th century, as contemporary accounts of the battle in 1645 do not record its presence. It is worth reflecting on the implication the radiocarbon dating of this site has for remains elsewhere that have been dated using evidence from aerial photographs to the Anglian period (*c.* AD 600–1000). Although this may be correct, other interpretations might also be considered given the newly excavated evidence.

Case study: Kintore

As part of an ongoing programme of work on the East Coast 400kv Reinforcement Project, a new electricity substation at Kintore, Aberdeenshire, was required, leading to a programme of archaeological works culminating in excavation (Kilpatrick 2017). Extant remains were located within a 19th-century tree plantation known as Harthill Plantation, which included an upstanding structure. Initially thought to be associated with the adjacent 19th-century stockyard, further investigation revealed that the building was overlain by a yard wall and was hip-ended rather than

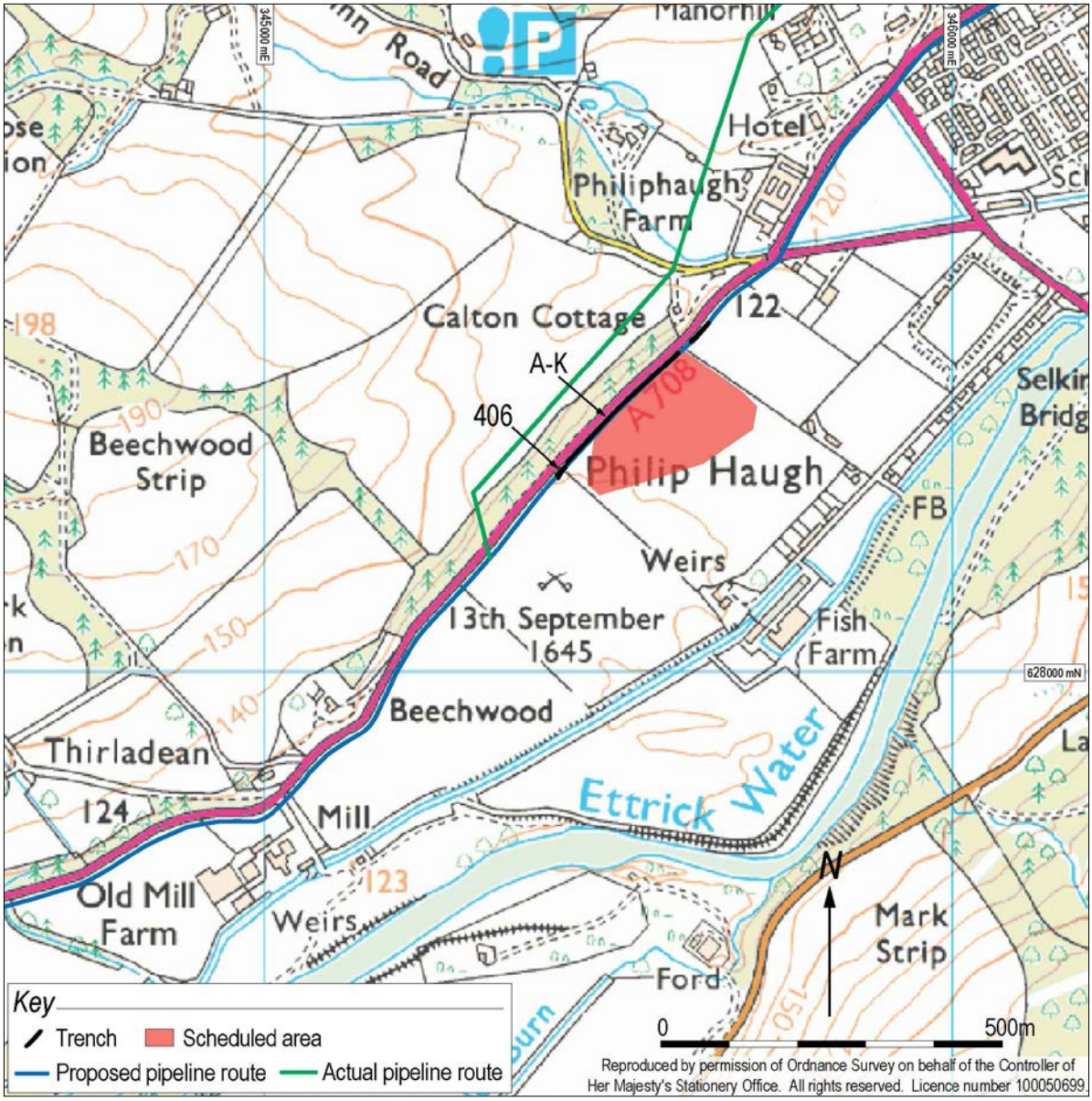

Figure 1. Location map of Philiphaugh archaeological works, Scottish Borders.
(Published in ARO 11; © GUARD Archaeology)

square. Excavation of the building ascertained that its stone walls sat directly on top of a subsoil and it had internal features, including shallow post-holes, surviving along the wall base at the western end of the building, suggesting cruck-framed supports for the roof. No hearth was present (Fig. 2).

In terms of dating evidence, a few securely stratified sherds of a Medieval Redware were recovered, suggesting abandonment of the site sometime after the 15th century, although it is tempting to view its association with the stockyard as evidence of re-use use during the 19th century as a shelter for young animals. This intermixing of human and animal use of the same area may well give some explanation to the rather skewed sequence of radiocarbon dates, which indicated use in prehistory, the early historic period and the later medieval period (Kilpatrick 2017). Based on the evidence the excavator proposed a date for the site in the 14th to 15th centuries, with an original form of a stone- and turf-built structure similar to those encountered at Pitcarmick (Carver *et al.* 2013), Ben Lawers

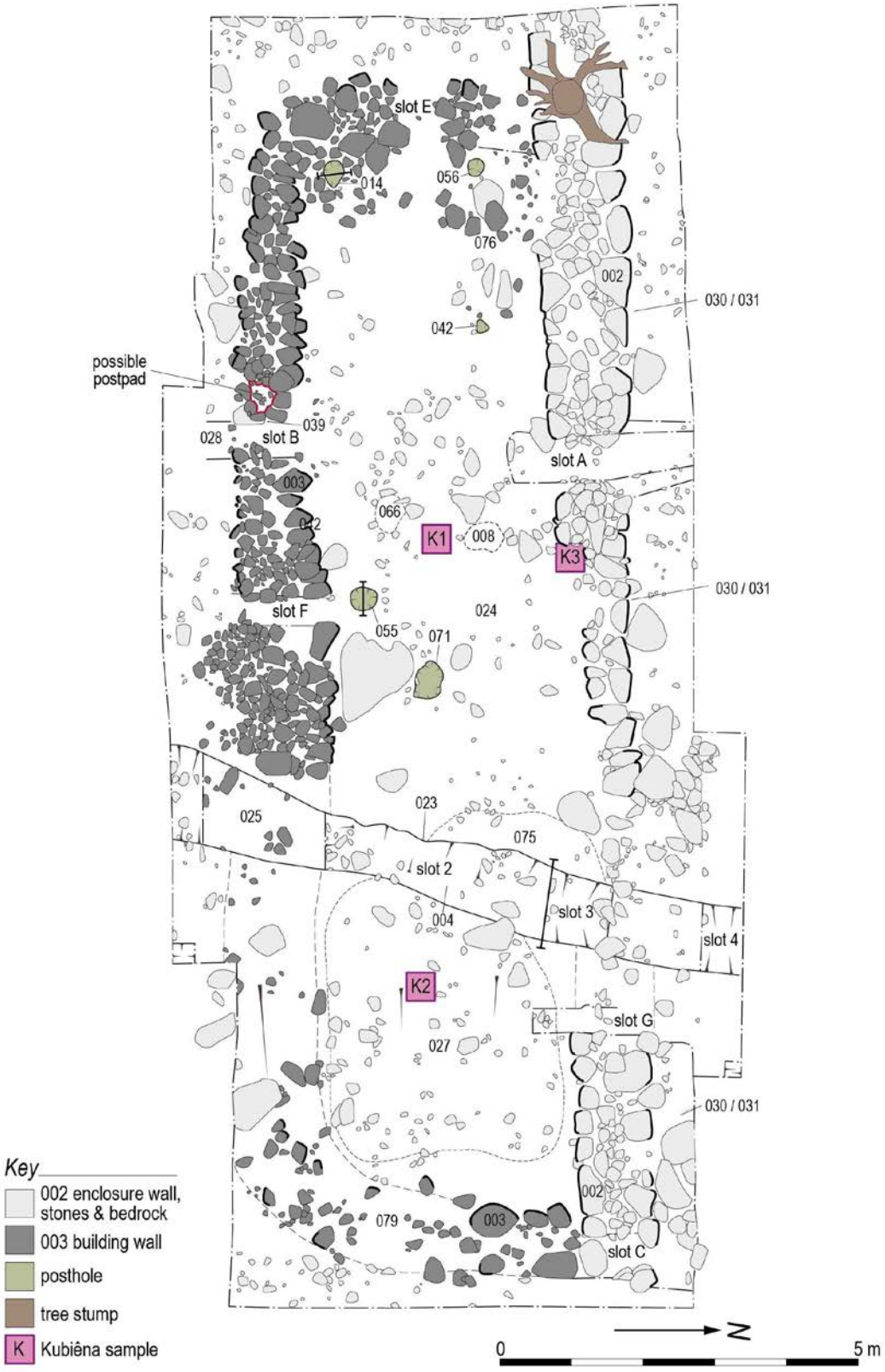

Figure 2. Post-excavation plan of Kintore medieval building, Aberdeenshire.
(Published in ARO 26; © GUARD Archaeology)

(Atkinson 2016) and South Uist (Sharples 2005). Interestingly, the recurrent theme of turf-and-stone buildings and unusual, episodic dating sequences was also apparent at Ben Lawers, where structures T16 and T17 returned prehistoric and early historic, as well as later medieval dates.

Case study: Netherton

Returning to linear infrastructure developments, the third and final example of significant discoveries associated with the expansion and upgrade of the road network in Scotland comes from the programme of excavations conducted in support of the M8/M73/M74 Motorway Improvements Scheme in 2013–2014. Recently published (Arabaolaza *et al.* 2021), this project involved the widening of the southbound carriageway of the M74 motorway as it passed Hamilton in South Lanarkshire.

The widening works ran from the edge of the motorway to the former site of the Netherton Cross – a 10th-century carved cross (in the style of the Govan stones), which had been relocated in the early 20th century to a safer location in Hamilton. Monitoring of the site strip at Netherton revealed evidence of other structures present in close proximity to the motorway, which came as a surprise given the general assumption that the verges would have suffered considerable sub-surface impact during the construction of the original road (Fig. 3). If it were not for the former location of the Netherton Cross and the adjacent Low Park Motte Scheduled Monument across the motorway, it is very unlikely that archaeological monitoring of the verge would have been considered in this location.

Discovery of the remains of four structures near to the cross location represents the last vestiges of the late medieval settlement of Netherton, which may also have gone by the name Cadzow. The buildings themselves appear to date from the early 14th century to the first quarter of the 17th century, and may have stood as late as the 1790s before being swept away by land improvements undertaken by the Duke of Hamilton in the late 18th century. The presence of the 10th-century cross on the edge of this village is of note and suggests a degree of longevity to the occupation in the immediate locale (Fig. 4). This notion is supported to a degree by the presence of a pit below Structure 1, which was filled with material dating to the late 10th to early 12th centuries AD.

The discovery and excavation of the sites at Philiphaugh, Kintore and Netherton, although adding significantly to the corpus of excavated medieval settlement results in the Lowlands, have all been constrained by the limited nature of the investigations, tailored to project requirements, at the sites. As such, our view of the sites has been limited to a glimpse or snapshot of the past. This is particularly the case for Philiphaugh, where further investigation in the future may add significantly to what was achieved as part of the developer-funded investigation. The discoveries from Kintore were more complete, whilst Netherton was as complete as the constraints of the project would allow.

Moving beyond linear infrastructure

When we move beyond the confines of linear infrastructure projects, we enter the realms of greater possibility when it comes to archaeological excavation sites. Open-area excavations, for example in advance of industrial, extractive, residential, recreational or commercial development, offer greater potential for more representative results that are able to see a larger part of a settlement layout in plan, including complete building excavations, to observe relationships between buildings and, importantly, to assess the gaps between buildings.

Figure 3. Working at the side of a live motorway at Netherton, South Lanarkshire.
(Published in ARO 41; © GUARD Archaeology)

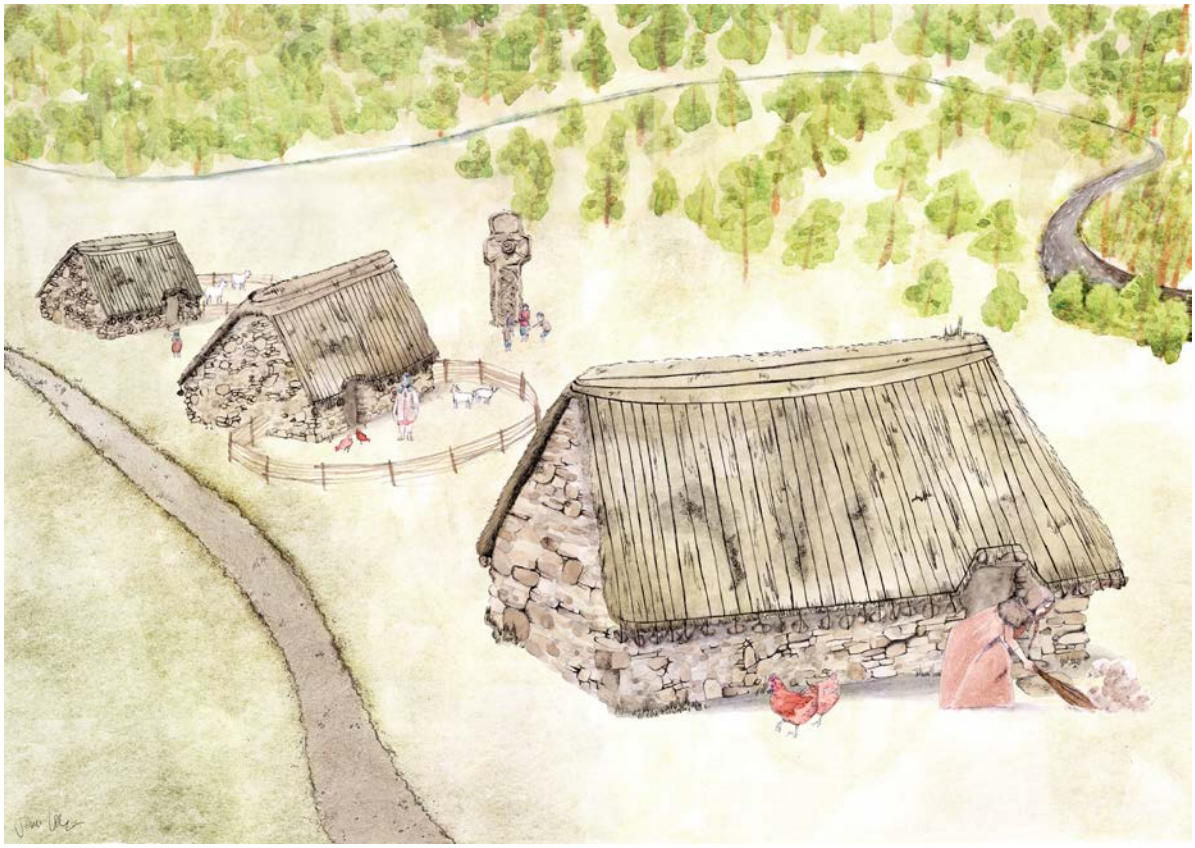

Figure 4. Reconstruction of medieval village at Netherton, South Lanarkshire.
(Published in ARO 41; © GUARD Archaeology)

The interpretative framework over the last 20 years has been set by keynote open-area excavations on a relatively small number of sites, the most notable being Rattray in Aberdeenshire (Murray and Murray 1993) and Springwood Park, near Kelso in the Scottish Borders (Dixon 1998). Since 2000, a small number of sites have been added through the results of investigations in advance of infrastructure work, such as mining and quarrying and golf-course construction, as well as house building in particular. This has included a wide variety of work, from single building excavations, such as at Gasswater near Cronberry in East Ayrshire by Headland Archaeology (Baker 2000) to large-scale excavations of 14th- to 15th-century settlements at Laigh Newton (Fig. 5) by Glasgow University Archaeological Research Division in 2003 (James *et al.* 2017)

The site that has probably provided the greatest amount of evidence is Eldbotle on the Archerfield Estate in East Lothian. The site was initially discovered during trial-trench evaluation by Headland Archaeology in 1999 in advance of a new golf course (Maloney and Baker 2001) and then more fully excavated in 2003 (Morrison *et al.* 2008). This work was followed by further investigation in advance of a new golf course to the west of the original discoveries by AOC Archaeology in 2006 (Hindmarch and Oram 2012). Both phases of investigation provided broadly similar date ranges from AD 400 to 1400, significant artefact assemblages including imported ceramic wares, and numerous examples of building forms.

Around the same time, CFA Archaeology were also investigating another medieval settlement site in East Lothian in advance of house construction (Mitchell and Anderson 2011). The site, known as Hallhill, lay to the south of Dunbar and revealed badly plough-truncated building forms, similar

Figure 5. Laigh Newton Medieval Rural Settlement, East Ayrshire.
(Published in ARO 11; © University of Glasgow)

in some respects to the Laigh Newton site. At Dunbar, although a large artefact assemblage was recovered, the artefacts were less varied in comparison to Eldbotle or Kelso.

Returning to the Western Lowlands and changing focus slightly to higher-status types of site, it is worth highlighting the excavations at Perceton, near Irvine in South Ayrshire. Excavated in advance of a housing development in 2001, the site contained the remains of a stockaded farmstead and a later 14th-century moated enclosure. Excavated by Headland Archaeology, the Perceton excavations identified a site of the type that functioned as farms and estate centres for the seigneurial (feudal superior) sections of society (Stronach 2004). As such, it is one of only maybe 120 such sites known in Scotland.

GUARD Archaeology have recently excavated a moated enclosure in its entirety in Ayrshire, at Chapeldonan just to the north-east of Girvan. The site was originally identified via aerial photographs and, upon excavation, was revealed to be 64 m by 56 m in extent with moat ditches up to 8.5 m wide and 2.5 m deep. The lower strata within the moat fill had been waterlogged, so preservation of organic remains was significantly higher than on most rural Scottish sites. Consequently, discoveries included leather shoes and straps, animal bone and a large wood assemblage, including utensils, bowls and plates, tools and structural timbers that all add to our understanding of wood-working techniques and woodland resources in the late medieval period. The large number of structural timbers have also expanded the dendrochronological record for south-west Scotland (Coralie Mills pers. comm.) with timbers dating to the 11th to 13th centuries (Mills, forthcoming), while the discovery of a large ceramic assemblage points to local and imported wares forming part of the exchange network of this site. In addition, the discovery of a small coin hoard within the moat dating to the 13th-century reigns of Alexander III/Henry III (Savage, in press) and a range of other non-organic artefacts adds further significance to this site (Green, forthcoming).

Conclusions

Although there have been relatively few medieval settlement sites excavated during linear infrastructure projects in Scotland in the last ten years, a growing number have been located

and part-excavated and the future potential looks bright. However, it is worth noting that development has also provided Scottish archaeology with numerous other opportunities to expand our collective knowledge of medieval settlement since 2000. This paper has hopefully illustrated where archaeological companies have expanded our collective knowledge and goes some way to summarising the impact of development on studies of this period. It is no exaggeration to say that we have witnessed a bit of a sea change in comparison to our state of knowledge in 1999.

Acknowledgement

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Infrastructure archaeology and medieval settlements in Spain: a partial review

Jesús Fernández Fernández and Gabriel Moshenska

Introduction

This chapter explores the relationship between the practice of infrastructure archaeology and the methodological development and growth of medieval settlement archaeology in Spain. For a number of reasons this is a necessarily partial perspective. First, the authors' perspective is primarily academic, with minimal first-hand experience in commercial archaeology, none of it recent. As such, our viewpoint is necessarily that of external observers, with experience primarily of research that focuses on small-scale archaeological projects in rural areas, conducted in close collaboration with local communities. Secondly, the impact of infrastructure archaeology has been uneven across different regions of Spain. Indeed, in areas such as Aragón, La Rioja, Cantabria and Asturias, where archaeological practice remains closely tied to university-led research, the engagement in and impact of infrastructure archaeology have so far been limited. This has also been the case in the south of the peninsula, in the medieval al-Andalus. In contrast, we can observe that commercial archaeology has been more intensively developed around major urban centres, in particular in and around Barcelona and Madrid, from where most of the examples in this paper will be drawn (Fig. 1).

Despite these constraints, we aim to provide a balanced overview of the contributions and limitations of infrastructure archaeology within the broader context of Spanish archaeological practice in rural medieval sites and their working landscapes, drawing on examples of significant, if not nationally-representative, sites.

The legal framework for developer-led archaeology in Spain

To trace the roots of developer-led archaeology and of medieval archaeology in Spain, we must look back to the 1980s and the surge of economic and intellectual development that saw the country emerge from four decades of Francoist dictatorship. The Spanish Association of Medieval Archaeology was founded in 1982; in 1983, they held their first national congress in Huesca, after smaller events in Toledo in previous years (Quirós Castillo 2009a). In 1985, the legal foundation for developer-led archaeology came into force, as part of wider heritage legislation (see below). Alongside these changes, we can recognise how medieval archaeology was starting to distinguish itself as a separate discipline, not just within archaeology, but, as importantly, by gradually coming out from under the shadow of medieval history.

Following the death of Franco in 1975, Spain transitioned to democracy, marked by the passing of the 1978 Constitution. Section 46 of the Spanish Constitution stated that:

> The public authorities shall guarantee the preservation and promote the enrichment of the historical, cultural and artistic heritage of the peoples of Spain and of the property of which it consists, regardless of their legal status and their ownership. The criminal law shall punish any offences against this heritage. (*Constitución Española* 2024)

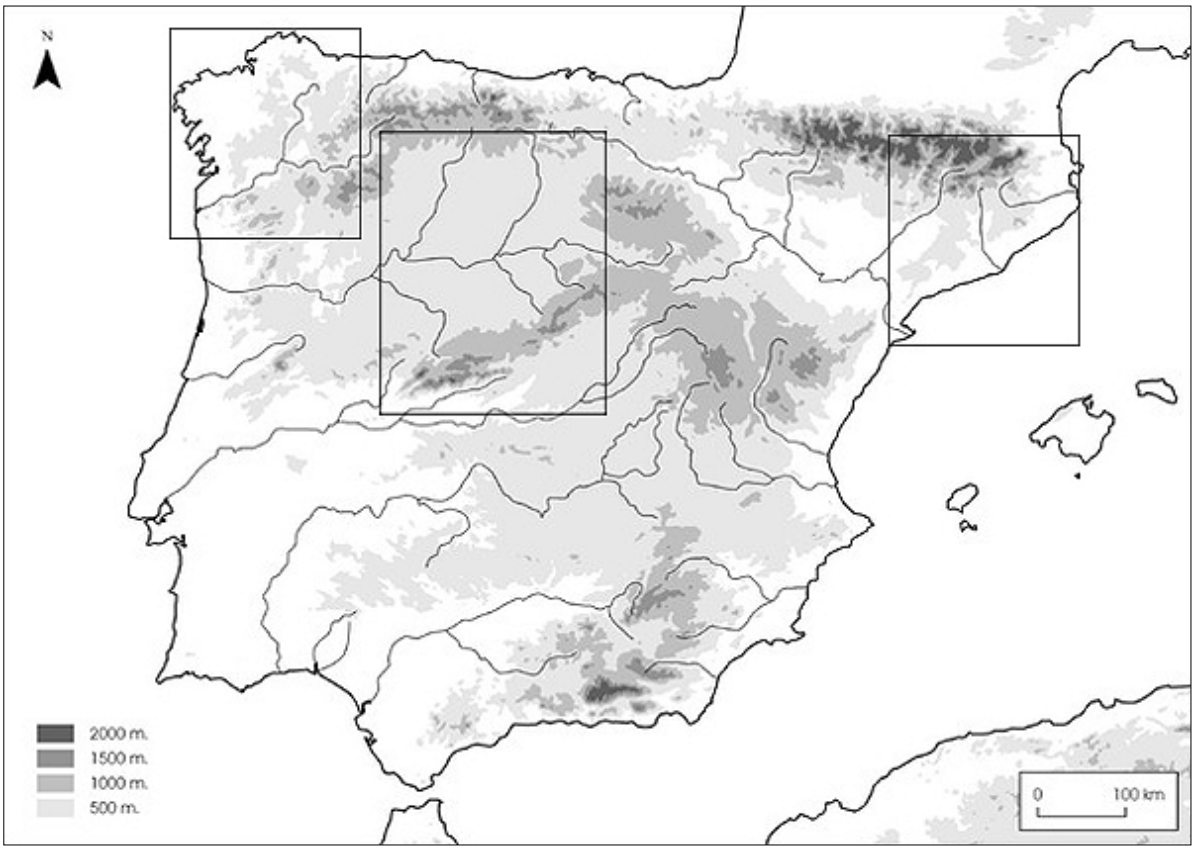

Figure 1. Geographic areas highlighted in the text where infrastructure archaeology has been focused including notable sites, from east to west, in Catalonia, Madrid and Northen Plateau, and Galicia.

The legal expression of this Constitutional clause followed in 1985, with the passage of Law 16/1985 on the Protection and Conservation of Spanish Historical Heritage. This was followed by Royal Decree 111/1986, which further clarified the responsibilities under this new law. Law 16/1985 identified the constituents of national heritage and designated the Historical Heritage Council to oversee and report on its implementation at national level as well as in the autonomies; the 1985 law also called for the identification and listing of *Bienes de Interés Cultural* (BIC) or distinctively important heritage assets (Pérez 2023).

In the years following the 1978 Constitution, Spain had become divided into 17 autonomous regions; thus the 1985 law recognised these and devolved appropriate legal power over historical heritage to the regional level. By 2007, 15 of the seventeen regions had implemented their own heritage laws. This fragmentation has also made it challenging to present coherent overviews of Spanish commercial archaeology. (For a list of these regional heritage legislations, see Appendix 1 of Martínez Díaz and Castillo Mena 2007.)

For the emergence of rescue archaeology, the most important part of the 1985 law was Article 43, which stated that the government could order excavations to take place 'wherever it is presumed there may be sites or archaeological, palaeontological or geological remains associated with them' (Martínez and Castillo 2007: 188). Writing on the eve of a global financial crisis, Quirós Castillo pointed out that the 1985 law not only transferred the responsibility for heritage management to the autonomies, but also laid the foundations for a new era of archaeology (2009a). In the years following these legislations, there was a dramatic increase in the number and scale of

archaeological interventions in the peninsula, the majority of them as part of infrastructure and urban development projects.

It is crucial to highlight that these changes were not driven by governmental bodies, but rather depended on the generation of archaeologists who emerged from universities starting in the late 1980s. Many of them were significantly influenced by Italian post-classical archaeology during one of its most productive periods (Francovich and Hodges 2003), which better prepared these professionals theoretically and methodologically to identify and document archaeological records effectively, especially for the Early Middle Ages. Differences in archaeological management and engagement across autonomous communities (CCAA) were largely determined by the availability of this professional factor, often leading them to conduct this type of archaeology against bureaucratic obstacles and administrative inertia. This situation also explains, at least in part, the significant disparities in excavation outcomes, despite similar regulatory frameworks. In regions where professionals were more traditionally trained within the classical archaeology paradigm, non-walled or non-stone-structured sites often went unnoticed or were far more challenging to detect due to a lack of appropriate methodological skillsets.

Alongside the emergence of a managerial class of local authority archaeologists, the main area of expansion was in the field of commercial archaeology (Quirós Castillo 2009a: 176). Quirós Castillo noted the coincidence of the emergence of archaeological heritage management and the rapid development of medieval archaeology in Spain from the 1980s. However, he also observed that, while the study of rural settlements was the foundation of medieval archaeology in much of northern Europe, in Spain and southern Europe it was only with the advent of rescue archaeology that such settlements started to be studied in quantity or depth (Quirós Castillo 2009b: 14).

Writing in the aftermath of the more recent economic crisis (after 2008) that has decimated Spanish commercial archaeology, Parga Dans agrees that developer-led archaeology emerged as part of this post-Franco period of modernisation and economic growth. She notes that, alongside the 1985 law and its implementation across the 17 regional administrations, there was massive state investment in infrastructure, transport and urban and suburban development (Parga Dans 2019: 113). Against this background of rapid growth, the first Spanish commercial archaeology firms were established in 1990. Two years later, the Valletta European Convention on the Protection of the Archaeological Heritage was adopted, coming into force in 1995, and establishing the framework for the conduct and funding of commercial archaeology across Europe.

Alongside this emergence of rescue archaeology as a sector, Spain experienced strong economic growth between 1997 and 2008, driven to a considerable extent by construction. Parga Dans (2019) notes that between 1990 and 2009, the number of commercial archaeology companies in Spain grew from zero to 273, employing more than 2,500 people. She highlights the impacts of this growth on archaeology in Spanish higher education, which came to focus on training field archaeologists. Quirós Castillo stressed the impacts of this growth on the field of medieval archaeology specifically, pointing out that data from archaeological interventions had led to many new developments in settlement studies, as well as advances in urban archaeology, conservation and related fields (Quirós Castillo 2009a: 179). He observed that, alongside this emphasis on urban foci:

> ‘A new phenomena [sic] in recent years is the development of the serious archaeological study of the medieval peasantry through open area excavation of rural sites. This development has allowed archaeologists to overcome the division between archaeology of dwellings and that of agricultural landscapes’ (Quirós Castillo 2009a: 184)

However, the 2008 global financial crisis ended Spain's construction boom and brought down the commercial archaeology industry that had become reliant upon it. Parga Dans states that, in 2009, an astonishing 95% of archaeology firms were solely dedicated to carrying out archaeological impact assessments for construction projects (Parga Dans 2019: 115). For a few years, state investment buoyed the construction industry, including archaeology, but by 2011 this had run its course. A survey in 2014 showed that nearly half of those archaeology firms operating in 2009 had by then closed down, with substantial job losses and a strong move towards part-time working on low pay (ibid.: 116).

Spanish infrastructure archaeology in context: results, constraints and research potential

Spain's entry into the European Economic Community in 1986 and, with it, access to the European Regional Development Funds (ERDF), led to a significant investment in public works and infrastructure. Between 1989 and 2006, no country benefited from the ERDF more than Spain, driving substantial growth in the construction sector (Serrano *et al.* 2010). This period coincided with the development of a new regulatory framework adapted to the needs and challenges faced by Spanish society at the time, including cultural heritage, as discussed above. Both factors were key elements in the development of commercial archaeology in Spain, although their impact varied significantly across regions. In some areas such as Asturias, Aragón, La Rioja and Cantabria, their influence was minimal, with these regions remaining more dependent on university-led research projects (Tejerizo and Quirós Castillo 2018). Although further research is needed to ascertain the extent to which professional factors and administrative guidelines have influenced these outcomes – particularly the role of the administration and the directives from technical experts and regional heritage management leaders – many of these regions did implement large infrastructure projects.

Interestingly, in the southern Iberian Peninsula, corresponding to the area of Al-Andalus, rescue archaeology has not been primarily associated with large infrastructure projects; instead, it has been more connected to local initiatives focused on restoring architectural heritage or on urban interventions (Kirchner 2020). Our analysis will thus focus primarily on the areas near major cities, such as Madrid and Barcelona as well as other areas in the north, such as Galicia and Castilla y León – all areas where infrastructure archaeology has had the most impact.

Madrid and the Northern Plateau

Since the mid-1990s, significant archaeological activity has taken place around large infrastructure projects, as well as the construction of suburban residential buildings and major leisure spaces/complexes in the area surrounding Madrid and other nearby regions of the northern plateau. Amongst the most noteworthy of these projects, and most significant for this study, are those carried out at La Indiana and Gózquez between 1997 and 1999, and at El Pelícano between 2001 to 2009. These are just a few examples from a longer list of sites identified and examined (see, for example, Penedo and Sanguino 2009; Quirós Castillo 2013; Vigil-Escalera 2007; 2018), but they can be viewed as illustrative of the kinds of projects within the region during this period.

These sites were excavated as large open areas: at Gózquez, near Madrid, for example, the investigated area covered nearly 30,000 m² and revealed a complete early medieval rural settlement including its necropolis and agrarian and working areas (Fig. 2). This scale of operation contrasts sharply with the small-scale excavations conducted on medieval settlements in Spain prior to this boom period. This new large-scale commercial archaeology, increasingly detached from historiographic approaches and more aligned with the even younger academic archaeology, focused on issues such as Visigothic archaeology (5th–8th centuries) and landscape evolution, and employed a fundamentally different and novel methodology used also on prehistoric settlements with equally spectacular results. This

Figure 2. An early medieval village uncovered through large infrastructure archaeology: Gózquez, near Madrid, a site active across the 6th–8th centuries AD.
(Adapted from: Vigil-Escalera 2018: 275, Fig. 11.2)

included extensive excavation, bioarchaeological analyses, and landscape archaeology approaches, enabling new light to be shed on the spatial relationships of rural settlements, as well as their internal structures, all of which were previously unknown or poorly examined topics (Quirós Castillo 2018).

The large, open-area excavations allowed for the analysis of house plots and agricultural areas in and around the settlements. In Gózquez, these investigations revealed that every household included mixed-use activity spaces and demonstrated cycles of construction and reconstruction of domestic structures. Comparative studies have shown how these plots became reduced in size over the centuries, but it is now clear that from the Early Middle Ages rural housing, however modest, always had its own space with these characteristics (Vigil-Escalera 2022). This type of detailed study would not have been possible without the site identification and scope for extensive open-area exploration made through these infrastructure projects. We argue that this is one of the most important contributions of such investigations, namely recognition and understanding of these productive activity spaces, which were intrinsically tied to domestic spaces and did not belong to separate spheres, and were thus vital elements in the logic and functioning of medieval rural settlements (Fig. 3).

The boom period of Spanish rescue archaeology has left behind a wealth of excavation data and records. In the post-crisis period of low employment, a number of doctoral researchers – some of them, in fact, former commercial archaeologists – have begun the process of systematising and mining this resource, producing important interpretative research in their theses (e.g. Vigil-Escalera 2009; Tejerizo García 2017). Furthermore, there is also a current trend amongst some of the remaining professional archaeologists to orientate their work towards community archaeology projects, many of them smaller-scale heritage dissemination projects that are more sustainable over longer periods of time. One example is 'UNDERGROUND | Archaeology, Heritage & People', a post-2008 initiative that adopts a mobile, community-based model focused on rural, collaborative heritage practices.

Figure 3. Early medieval (5th–11th century) rural agrarian structures, work areas and livestock pens associated with various domestic contexts excavated through infrastructure archaeology. *(Adapted from Vigil-Escalera 2022: 27, Fig. 3)*

In the case of the Duero basin in the Northern Plateau, the impact of rescue excavations developed differently to other territories, such as the Madrid region, Catalonia or Galicia. Despite the significant number of infrastructure-related projects, most were linked to the construction of railways, highways and small industrial estates. While this produced a very large dataset on the archaeologies of diverse types, including early medieval rural settlements, the greatest part of this work took the form of long-distance linear excavations (following road and rail courses), with very few of the large open-area excavations that were common elsewhere, as for example in the south of Madrid (Tejerizo García 2017). Tejerizo's thesis is one strong example of an attempt to systematise this record in order to generate new scientific knowledge. Unfortunately, however, this work is more the exception rather than the rule, since most archaeological excavation reports of this type remain scattered and unpublished.

Nonetheless, taken together, these studies represent a significant methodological development that would have been impossible without this type and scale of excavation and recording. Analyses of faunal remains, charcoal, seeds and pollen, as well as anthropological studies, have evolved from minor, and often neglected, appendices in excavation reports to playing a critical role in archaeological interpretation. Furthermore, they have enabled the better sequencing of ceramics, allowing more nuanced discussions of the archaeology and lifeways of early medieval peasantry in Spain (Vigil-Escalera 2006; 2019).

The most noteworthy advances in our knowledge of early medieval settlements in the Madrid region derive from a) the identification of the characteristics of domestic architecture and more precise definitions of the household unit and the internal organization of the settlements, and b) clarifying the structure of rural habitation, primarily through the relationship between residential areas and burial grounds, as well as the connections between these and agrarian and working spaces. The findings overall suggest a potential hierarchy among villages and farms in the countryside north

of Toledo, although this model may not be uniformly applicable to the other territories considered below (Vigil-Escalera 2018).

In sum, we can state that infrastructure archaeology has had a significant impact on the interpretive paradigm of early medieval archaeology in the northern Iberian Peninsula. These landscape interventions represent a genuine paradigm shift, not only methodologically, but also in terms of our core understanding of early medieval rural societies in the peninsula as a whole (Escalona 2009).

Cataluña/Catalonia

In 1981, the *Generalitat* (the autonomous government of Catalonia) was given oversight of excavation work and related functions previously provided by the regional Ministry of Culture. A dedicated archaeological service was established, along with the first regional regulatory framework. However, it was not until the late 1980s and 1990s that commercial archaeology began to flourish. Subsequently, it reached an unprecedented scale, peaking in 2006–07, with Barcelona at its epicentre. This growth has led, as noted, to significant territorial inequality, which is applicable across the entire Spanish territory, with some areas of Catalonia featuring a rich archaeological record while others exhibit notable gaps. Across this period (2000–2010), over 3,000 interventions at medieval and modern sites were recorded (López 2011); among these sites, approximately 30 correspond to the 5th–8th centuries and around 20 to the 9th–11th centuries (Roig 2009). Sadly, we lack more precise chronological data for the remainder.

In some cases, these excavations have been rushed and, in others, are methodologically questionable, driven by the needs and timescales of large urban and suburban development and infrastructure projects (Roig 2009). As observed in the case of Madrid and its territory, a portion of these identified sites have been excavated extensively and documented almost in their entirety, particularly those with earlier chronologies (5th–8th centuries). Regardless of the negative implications inherent in such activities, they have generated a great deal of data that has allowed for the characterization and description of these rural settlements, distinguishing between areas for habitation, production, storage and burial. Unfortunately, most of the findings from these excavations remain unpublished.

At this stage, numerous lines of inquiry and opportunities exist for medieval archaeology in Catalonia, but also many challenges, such as the standardisation of ceramic records, dating, systematization of this body of data and comprehensive synthesis and analysis. The application of these themes to early medieval settlements and burial grounds is still a work in progress (Roig 2009; 2013; 2019), although we can note how a growing record of burial practices from the 6th to 10th centuries as revealed by preventive/rescue archaeology has emerged. Based on this, Roig (2019) has identified two primary types of burial sites: cemeteries associated with churches or monasteries, and the more widespread rural village- or farm-cemeteries (generally smaller in size and number of interments). He has also discussed anomalous burials of seemingly socially excluded individuals, likely identifiable as slaves or servants, found in non-funerary contexts.

The strong potential of the data gathered from rescue excavations can be highlighted through consideration of two medieval sites, namely Can Gambús and Can Roqueta, both located in the province of Barcelona. The Can Gambús archaeological site is located in Sabadell, Vallès Occidental. Revealed within the Urban Development Project, three rescue excavations were conducted between 2003 and 2007, identifying a significant site divided into three sectors across an excavated area of approximately 75 hectares. Remains dated from the Neolithic, Bronze Age, Iron Age, Iberian, Roman and medieval periods, but, in Can Gambús-1, a settlement with diverse phases from the 6th to 8th centuries AD was discovered and a total of 293 structures and an occupation area of approximately

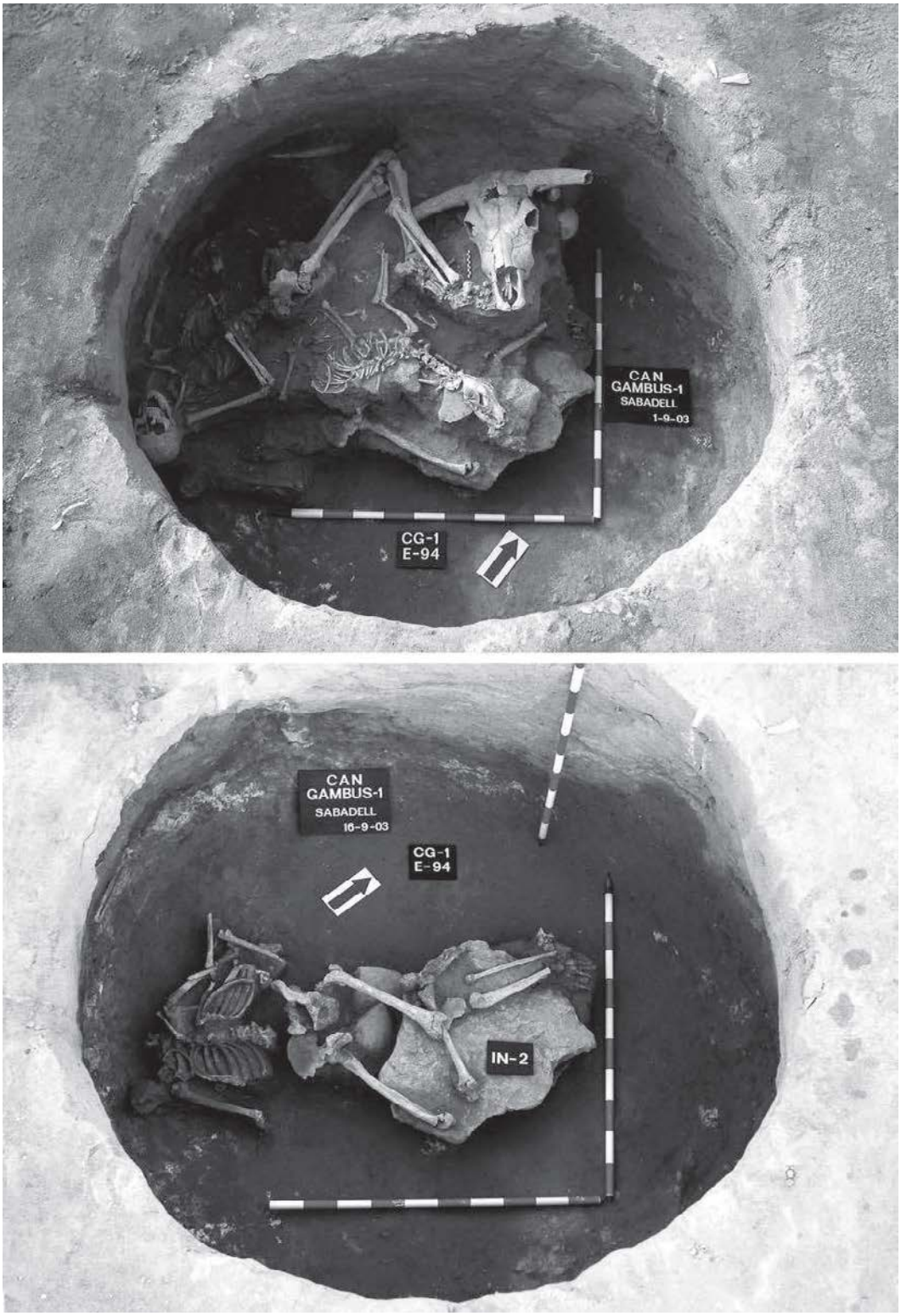

Figure 4. View of two successive early medieval silos at Can Gambús-1 site, dated between the mid-7th and the early 8th centuries, repurposed as a rubbish dump. The deposit includes soil, domestic waste and animal skeletons (two dogs, a sheep and a bovine skull), together with two human individuals whose bodies displayed no obvious funerary treatment.
(Source: Roig 2013: 157, Fig. 8.4)

1.7 hectares located (Roig 2009). What is particularly interesting about this site is that it represents an *ex novo* foundation, showing no continuity with any preceding settlement in the surroundings. Evidence of sunken-featured buildings, domestic kilns, production areas, silos, pits, wells and more were found (Fig. 4). The settlement had an associated burial ground, slightly separated from the habitation and production areas.

At least nine confirmed examples of this settlement type have been identified in Catalonia, representing a key contribution of infrastructure archaeology in the region. These rural settlements, typically small, comprised around four or five family households. They reflect an economic transition and a new approach to land-use during Late Antiquity and the Early Middle Ages, characterised by the emergence of a settlement model in areas without direct Roman antecedents (Roig 2009).

The second example is the site of Can Roqueta II (Sabadell, Barcelona), which belongs to a later period of settlement in this region. This small complex, covering an area of about 525 m², consists of 29 silos and storage pits dated through its ceramics to between the 9th and 10th centuries, with radiocarbon dates corroborating these chronologies around the 10th century (Roig 2009: 242). Can Gambús 1 featured similar structures from this period, which, along with those from a broader set of sites, highlight differences from the earlier period (6th–8th centuries). Sunken-featured buildings, typical of the previous phase, are no longer present, and productive areas are less clearly defined. Furthermore, a shift in ceramic traditions is recognised, while in some of these sites, we observe the construction of funerary chapels; these were absent in earlier settlements, but became more widespread during this later period (Roig 2009: 210).

Galicia

Recent research in the region of Galicia in the north-west of the Iberian Peninsula (Fig. 1) has focused on medieval agricultural structures and specifically terraces (Ballesteros-Arias 2003; 2010; 2020). This research was conducted within the framework of the Institute of Heritage Sciences, Spanish National Research Council (Incipit, CSIC) and builds upon the long-standing work of LaPa (landscape laboratory), a working group on landscape archaeology and heritage management established by archaeologist Felipe Criado in the early 1990s. LaPa is one of the few Spanish research groups with a strong theoretical approach (Criado 2012). Its primary research focus has been on landscape archaeology, especially prehistoric. However, by understanding the landscape as a structured, integrated system through which long-term historical processes can be comprehended, they have necessarily paid good attention to other periods, including the Middle Ages (Ballesteros-Arias 2010; Ballesteros-Arias *et al.* 2006a; 2006b; 2011).

This group has also developed expertise in heritage management, engaging productively with commercial and infrastructure archaeology (Criado *et al.* 1998; Ballesteros-Arias 2003). This serves as an excellent example of the benefits that a theoretically oriented commercial archaeology, driven by research questions, can provide (Fig. 5).

The interventions carried out on cultivation terraces yielded remarkably early chronologies for some, dating as far back as the 5th century AD. Many terrace systems appear to have been consolidated during the medieval period and persisted, even with notable wider agricultural transformations, into the 20th century, revealing an agrarian structure much older than previously suggested by medieval historiography. However, at this point we remain cautious about these results, since the dates are based on C14 analysis of a soil sample which may introduce chronological variations, and so these structures could potentially be more recent. In any case, this remains an open question, made possible by the methodological innovations involved in excavation of terraces with large

Figure 5. Construction of the Galicia Gasification Network saw the archaeological monitoring of public works which enabled the recognition, excavation and documentation of diverse components of agrarian landscapes of different date in the region.
(Source: Ballesteros-Arias 2020: 47)

cross-sections, providing a clearer understanding of their construction processes, stratigraphy and dating. This approach represented a valuable advance in research methodologies for the study of agricultural archaeology in Spain (Fig. 6).

While other groups have previously conducted excavations on agrarian terraces in different chronological contexts (see Ruiz del Árbol 2006), LaPa has been a pioneer in medieval archaeology, and their methodologies have been adopted in university projects in the Basque Country and Asturias (Fernández 2014; 2017; Quirós Castillo 2014), yielding highly valuable results. Collectively, these efforts have provided the first systematic archaeological record of such structures, enabling better recognition of the sometimes-complex transformations of agrarian spaces across northern Spain during the Middle Ages. Thus, methodological renewal and rethinking, stemming from well-directed commercial archaeological work, has had a significant impact on subsequent university-led research projects.

Conclusions: an archaeology at the rhythm of capitalism; a few highlights and many shadows

The above analysis has, throughout, offered a necessarily partial view of the impact of infrastructure-driven archaeology on the study of medieval rural settlements in Spain. While we have highlighted clear positive outcomes and some important advances, we have also identified numerous gaps across different territories and shown that a large body of information remains unsorted, awaiting full analysis, unpublished, and insufficiently framed by specific research questions. This 'unseen' archaeology – i.e. unpublished, disorganised – represents a notable missed opportunity.

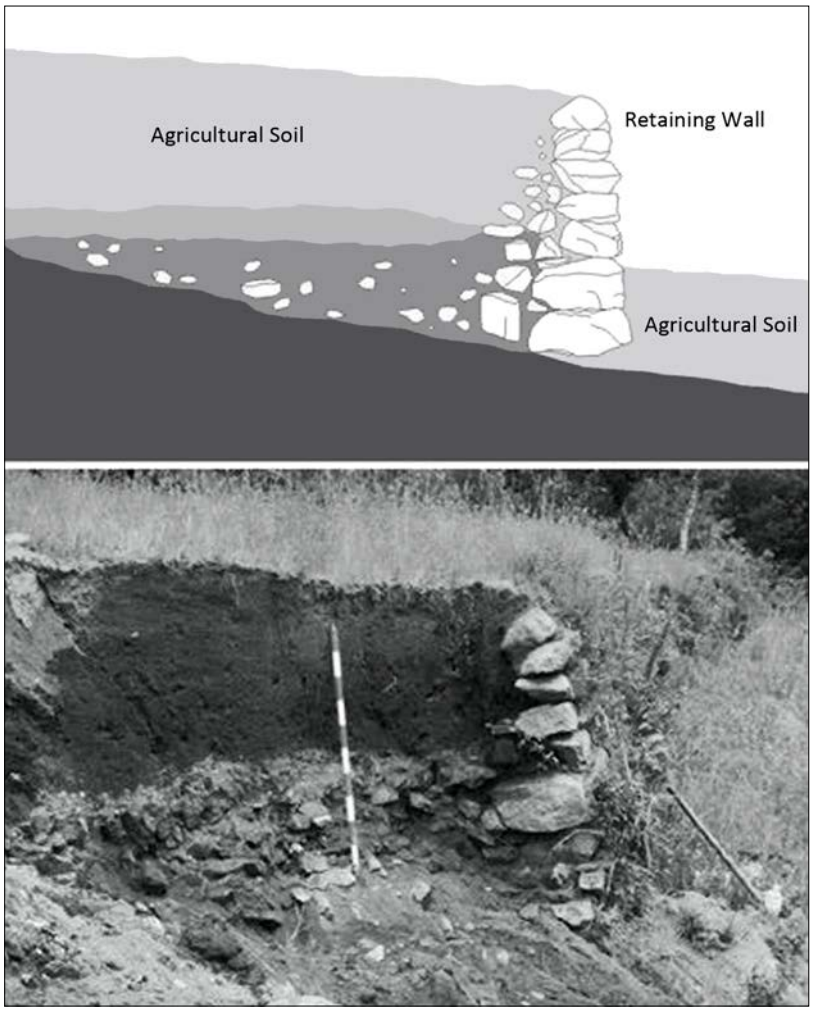

Figure 6. Profile of one of the agrarian terraces excavated in Galicia (Lume de Quintas) during an infrastructure project, along with the interpretation of its stratigraphy.
Some of these structures date back to the 5th century AD.
(Source: Incipit-CSIC, in Ballesteros-Arias 2020: 157)

Nonetheless, as emphasised throughout this article, methodological innovations stemming from well-directed commercial archaeology have had a notable influence on subsequent research-driven projects. This methodological shift has proven especially impactful in the archaeology of the Early Middle Ages, providing new insights and challenging pre-existing frameworks. However, the same cannot be said for the High and Late Middle Ages: in regions such as Catalonia, despite a generally richer medieval archaeological record, uncertainties persist regarding this later period, particularly concerning rural settlements beyond the study of churches or castles, which have indeed experienced recent advances. The dominance of paradigms derived from written historical sources has left less room for archaeology to contribute, but there is good potential for it to do so, even in these better-documented, later periods.

In terms of current circumstances, the landscape of large-scale infrastructure archaeology so evident in the first decade of this century has nearly disappeared in Spain. Many professionals in the field have either left the sector or transitioned into academia and other industries. As a result, medieval archaeology has largely returned to the university setting. This marks a striking shift, since, for the past two decades, commercial archaeology has been a driving-force, offering almost

an experimental environment in which new methods and approaches could be tested. This model of archaeology has proven to be fragile, totally dependent on the fluctuations of capitalist economic cycles of boom and bust, and unable to adapt to fundamental changes in funding.

Academic archaeology, for its part, has historically regarded commercial archaeology with a mixture of envy and skepticism. While it benefits from greater institutional stability, it has not always demonstrated the capacity or inclination to systematically organise the vast records generated by commercial excavations, nor to develop a coherent framework for critical reflection. However, in certain instances, as discussed here, collaboration between commercial archaeology units/companies and university-led research projects has produced many valuable and informative results.

Looking to the future, the question remains whether we will witness another boom phase of expansion in Spanish medieval archaeology. At present, this seems unlikely. Large-scale investments in infrastructure have decreased substantially, and the ongoing socio-economic legacies of the Covid-19 crisis further complicate the prospect of revival. However, we would argue that academic archaeology has matured considerably, learning valuable methodological lessons from the commercial sector's experiences. Moving forward, it is imperative that archaeology be driven by knowledge, social commitment and economic sustainability. A diversified funding strategy – one that is not overly reliant on the private market – will be essential for the field's long-term survival and impact.

Currently, we await another expansion or crisis of capitalism, for which it seems we will be ne better prepared than for previous ones. Therefore, when it arrives, the impact on medieval archaeology will undoubtedly, as in the past, feature a few highlights, but also many shadows.

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Roads to ruin – or restitution? The impact of infrastructure-led archaeology on rural medieval settlement across Europe

Carenza Lewis, Neil Christie, Gareth Davies and Aidan O'Sullivan

The papers in this volume seek to explore how effectively archaeological practice across Europe has responded so far to the paradox that infrastructure developments simultaneously present major threats and unique opportunities to medieval rural settlement archaeology. This concluding chapter offers a synthesised overview of the vast array of insights from the 15 different countries, demonstrating very clearly how the processes, the practices, the outcomes and the legacies of infrastructure archaeology have impacted the condition, knowledge and understanding of medieval rural settlement across Europe. In doing this, we will identify themes, commonalities and standalones in what has been done, what has been found and what it has told us, identify what is working well and what is not, and identify ten key actions associated with the most effective outcome for medieval rural settlement studies. Insights are drawn directly from the chapters in this volume, and cited by name in the discussion below.

We first review the diversity of underpinning disciplinary and legislative frameworks, comparing the levels of scholarly interest in the study of medieval rural settlement and the ways in which infrastructure-led archaeology is managed in different countries. Next, we look at the impact on medieval rural settlement remains, considering the extent to which these have been encountered and affected by infrastructure developments, and how the use of different approaches has affected their discovery, identification, excavation and interpretation. We then review the impact that new discoveries have had on our knowledge of the medieval rural past, first considering what has been learned about individual rural settlements across Europe, then how our 'bigger picture' understanding of the development of both settlements and landscapes more generally has been advanced. We reflect on the effect of this new knowledge on people today, including on archaeologists' practice and how effectively public awareness and interest have been engaged. Finally, we identify the problems that remain and identify ten actions that aggregated experience across the continent suggests might most improve the capacity of infrastructure-led archaeology to support the preservation, knowledge, understanding and appreciation of medieval rural settlement remains across Europe.

1. The study of medieval rural settlement in the past

Importantly, the many contributions in this volume reveal how the study of medieval rural settlement (MRS) across Europe (and the *evolution* of that study) has been uneven, shaped by different cultural paradigms and research priorities.

1.1. Studies before the mid-20th century

In many countries, the medieval history of rural life was largely ignored before the late 20th century: 'In the 1920s and 1930s … rural life was not a subject of interest, as for ideological reasons there was a paradigm that peasants had no history and that rural settlements were unchanged since early history' (Germany). In France, 'before the mid-1980s, the few known settlement sites … were excavated over a few hundred square metres', with such limited excavations considered 'unlikely to yield much significant information'. In Croatia, 'before 2004, the scope of research … was exceedingly small … primarily focused on cemeteries'.

In other countries, there has been an extended history of substantive study including 'longstanding public interests in local history' and 'pioneering work in the 1940s and 1950s' (England). In the Czech Republic, 'Systematic research-driven study of medieval rural sites has been developing intensively in Bohemia since the 1960s', while in Hungary, well before the 1990s 'medieval rural settlement archaeology already possessed a well-developed scholarly approach to the subject and a proven excavation methodology.' In Ireland, after independence from Britain from 1922, the study of early medieval rural settlement became integral to nationalist state-building as early medieval rural Ireland represented a time before all foreign invaders, whether Vikings, Normans or the British colonial power.

1.2. In the later 20th century

From the 1970s and 1980s, especially, interest in medieval rural settlement increased in many regions. Thus, in England, 'the visible remains of many deserted and extensively shrunken rural settlements have been the subject of archaeological recording and investigation (including by members of the public), using a range of techniques', while in Austria, 'even back in the 1970s, a systematic landscape archaeological approach was attempted, which today provides valuable information on rural medieval structures.'

Despite this, in other countries, interest took longer to develop or priorities elsewhere – hence we hear that 'archaeological research covering medieval settlements in Poland was generally not conducted before the 1990s' and in Denmark, medieval archaeologists from the 1970s were focussed on 'urban excavations, as well as excavations of moats, castles, churches and monasteries', whereas 'medieval rural settlement was not a research object *per se*'. Our Spanish contributors, meanwhile, report that 'while the study of rural settlements was the foundation of medieval archaeology in much of northern Europe, in Spain and southern Europe it was only with the advent of rescue archaeology that such settlements started to be studied in quantity or depth.'

1.3. In the 21st century

The present century has brought significant changes to the level of archaeological interest in medieval rural settlements, largely driven by the surge in excavation from development-led archaeology, noted by nearly all contributors to this volume. Thus, in Croatia, we hear of 'a dramatic increase in the number of discovered and excavated sites [increasing] nearly a hundredfold since 2004', while in France, there has been 'an unprecedented increase in the corpus of sites'. In the Flanders region of Belgium, of '2659 [new] archaeological sites ... 15% date to the medieval period.'

Nonetheless, it is striking that for many European countries, our contributors stress how the medieval period – and especially its landscapes – remains very much less prominent in university departments and museums than prehistoric, classical or modern periods. Fairly typically, in Italy, 'archaeology ... continues to be somewhat cavalier in understanding ... post-classical occupation'. Digital library searches in Italy show stark contrasts: '[searching for] 'medieval' yielded only 154 results, versus 1,737 for 'Roman''. It is not surprising to hear of a commensurate lack of public interest and knowledge in medieval centuries which 'seemingly wane in contrast to ... *Magna Graecia*'.

1.4. Disciplinary divides

One longstanding and enduring factor across the continent is a disciplinary divide between those who study the *early* and *later* medieval periods: 'On one side is the early medieval period ... largely hidden and invisible. On the other side are the high and late medieval periods' (England). This divide might seem strange, but it developed from different traditions of scholarship and the different

forms of evidence available for study. With the exception of Ireland (which has rich documentary sources of early medieval vernacular laws, hagiographies and narrative literature), as a broad generalisation, the early medieval period (approximately spanning the 5th to 11th centuries) offers a limited amount of documentary evidence, upstanding structures or works of art, meaning that understanding is more heavily reliant on archaeology. On the other hand, the later medieval period (broadly from the 11th to 16th centuries) has a relative wealth of documentary, visual and literary evidence to which archaeological evidence has sometimes been considered to be of secondary value.

Early medieval rural settlement is increasingly well-known and understood in some regions, but much less so in others. In Ireland, the large number of early medieval settlements from ringforts to raths to monastic enclosures, and their high visibility, has attracted considerable scholarly attention. In countries including Italy and Croatia, interest in early medieval rural populations was mostly due not to settlement remains, but the presence of furnished early medieval burial grounds. The emphasis that artefactual studies often placed on cultural identity led interest in the early medieval period to be ideologically driven in countries: 'As the new Yugoslav State with a socialist system was established in 1945, so the archaeology of the Early Middle Ages took off, especially with regard to that of the Slavic migration, which was considered as pivotal in shaping the ... brotherhood and unity of Yugoslav nations and nationalities'.

The study of settlements of later medieval date also features familiar places (e.g. inhabited towns and villages), types of site (e.g. castles, monasteries, etc.), cultural practices (e.g. marriage, feudalism) and belief systems (e.g. Christianity, Islam, Judaism). Accordingly, academic study of these centuries has been less heavily or exclusively reliant on archaeology. Furthermore, the close links with the present (with many later medieval settlement sites still inhabited today and using the same names) fostered the assumption that late medieval settlement remains were of little interest. Thought to be either already known or destroyed by more recent habitation, they were considered to offer minimal scope to tell us anything new. Interest has thus tended to focus mostly on deserted sites whose (usually undocumented) causes of abandonment demanded explanation, and where lack of later disturbance predicted good preservation of archaeological features. In England, large numbers of deserted and extensively shrunken villages, hamlets and farmsteads survive as earthworks (sometimes clear, sometimes partial) whose excavation and survey have been instrumental in 'advancing knowledge and understanding of the origins, development, adaptation and contraction of rural settlements, and illuminating many aspects of life in the medieval countryside'. The second half of the last century has generally seen less archaeological attention given to deserted later medieval settlements due to rising costs of investigation, and with new building/agricultural developments avoiding visible remains. In many countries, the search for later medieval settlement has remained largely ignored due to an assumption that all sites of this date underlie existing villages and towns. This presumption has rarely been rigorously tested by archaeological investigation, although in the Czech Republic it is noted that out of 48,149 individual investigations within villages, 72% have produced negative results.

1.5. Site-type divides

Another divide is between larger/nucleated and smaller/dispersed sites, with the former typically better studied than the latter. Large-scale excavations of nucleated settlements have significantly advanced knowledge and interest, especially when supported by prompt publication and syntheses of data. Examples include Milton Keynes in England (1970s–1990s) and Hard in Austria (1970s). In Denmark, 'Danish archaeology had conducted a series of large settlement excavations in the 1960s and 1970s with a particular focus on settlement structure and definition of house types from the early Pre-Roman Iron Age to the Viking Age (ending in the mid-11th century)'.

Smaller and dispersed sites have often missed out on detection or been overlooked for serious consideration. Accordingly, for England we are told that in dispersed, non-champion landscapes, 'recognition of later medieval settlement is much more difficult at the assessment stage'. Work in Ireland, however, stands out, where extensive detailed, published and synthesised fieldwork in a predominantly dispersed landscape has revealed 'how people lived and worked the rural landscapes ... dwellings were predominantly characterised by dispersed, enclosed settlements' and challenged older assumptions, such as the view of early medieval Ireland as purely pastoral: 'cereal cultivation was intensive and central to the economy'.

2. The management of infrastructure-led archaeology across Europe

2.1. What do legislation and codes of practice require?

As noted in our introductory chapter, most European countries now base their frameworks for infrastructure archaeology on the Valletta Convention (1992), which enshrines the 'polluter pays' principle that developers must fund investigation when their proposals threaten archaeological remains. In some countries, these principles were introduced before 1992 and indeed helped shape the development of the Valletta Convention. In England, the 'polluter pays' principle was introduced in a 1990 government document entitled *Planning Policy Guidance 16: Archaeology and Planning* (*PPG16)* which 'officially integrated archaeology into the planning process ... [requiring] developer-funded 'mitigation by record'... desk-based assessments, field-surveys ... trial-trenching ... excavation, recording and reporting'. Similar principles introduced in 1994 in Scotland in *National Planning Policy Guideline 5* (*NPPG5)* were 'fundamental to the creation of contract archaeology in Scotland in its present form'.

All the countries represented in this volume have now ratified the Valletta Convention and have systems in place intended to ensure that their national heritage protection legislation observes its principles. Inevitably, however, these have been interpreted and implemented differently in different countries, and most have seen repeated amendments over time. Thus, in Bulgaria, 'investigation of any archaeological remains likely to be impacted by development (including infrastructure) has been required since 1989, based as in most European states on the principles of the Valletta treaty', while in Denmark, the *Museum Act (2001)* secured the principle that 'significant ancient monuments' must be excavated at developer cost. Most countries have revised their legislation, some on many occasions – Hungary, for example, ratified the Valletta Convention in 1993, then has amended its *Act LXIV* 30 times since 2001. In some countries, legislation is controlled at national level, as in Bulgaria, Ireland and Austria, where development-led interventions are 'organised, managed, and carried out by the Federal Monuments Authority as a state authority' (Austria). In others, such as Germany, heritage protection is legislated at state level, resulting in differences in practice between states which can lead to challenges where infrastructure developments span several *Bundesländer*.

Overall, despite national variations, most countries require early-stage assessment, evaluation (including geophysics/trenching) and mitigation – prioritising preservation *in situ* where feasible or, if not feasible or justifiable on grounds of cost or importance, excavation and preservation 'by record'. The latter is by far the most common outcome.

2.2. Who pays and for what?

The default requirement is that the 'polluter pays', but the scope of this obligation varies. In Ireland, the policy goes furthest: 'archaeological sites to be destroyed by development have been subject to 100% excavation, as opposed to sampling'. In Denmark, 'alignments up to 10 m wide were recommended [for] 20–100 % coverage'. Also in Denmark, only 'significant ancient monuments'

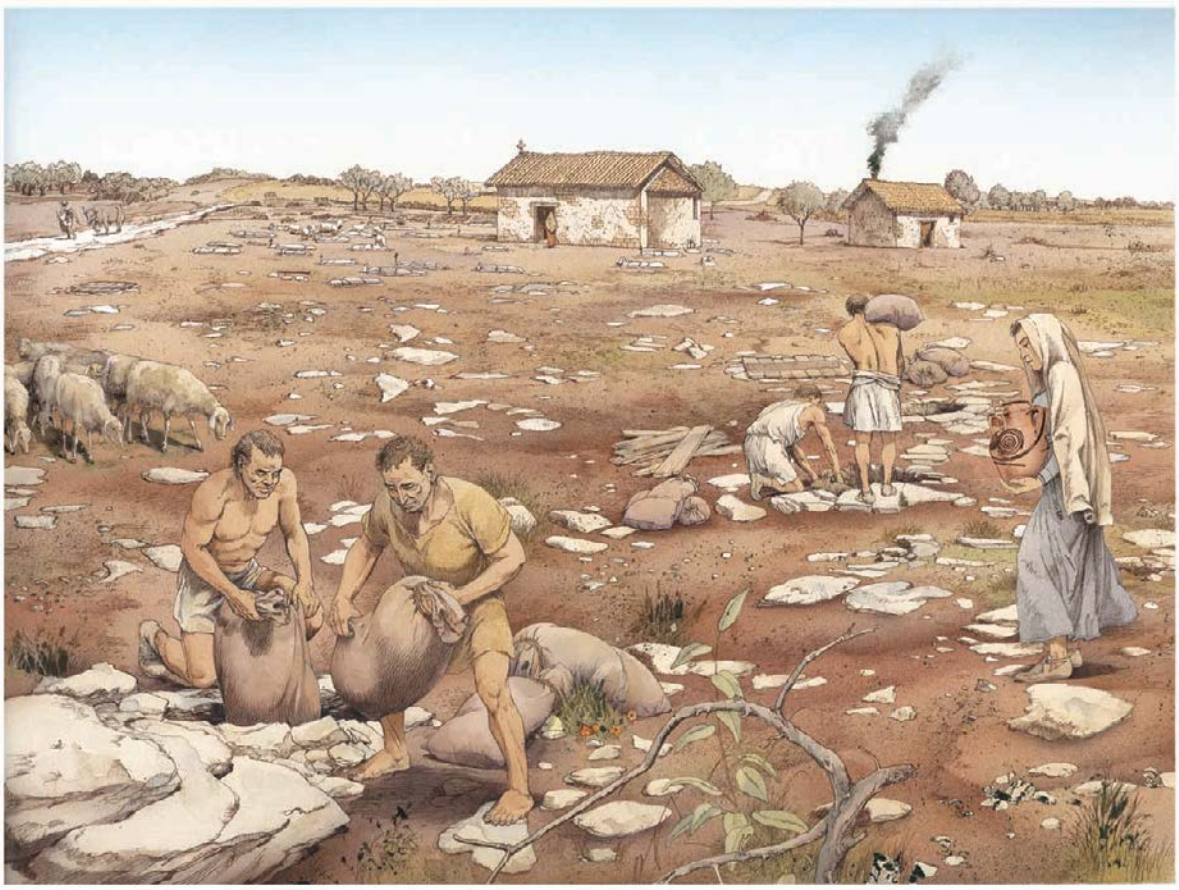

Figure 1. Reconstruction drawing of rural settlement at Apigliano (Martano) in Italy where excavations have shown that the deserted medieval village, already in embryo during the 7th century, developed over a restricted area of pottery fragments that has been interpreted as the possible remains of a late antique farm. *(Discussed in Arthur, P. 2012. 'Villages, communities, landscapes in the Byzantine and Medieval Salento' in P. Galetti (ed.) Paesaggi, comunità, villaggi medievali. Spoleto.)*

must be investigated at the developer's cost, while Hungary caps archaeology to 'a maximum 1% of the whole investment budget' and with strict time limits, constraining investigations and post-excavation potential. The extent of funding for post-excavation work is widely problematic. In Austria, developers pay for excavation 'and a first conservation treatment ... plus a report ... [but] further archaeological analyses are not financially covered' and, in Italy, companies 'rarely fund ... full scientific analyses ... or the subsequent publication'. The issue of publication is addressed further later in this chapter.

Given that most infrastructure developments benefit from some degree of state funding (either directly or indirectly), state support is *de facto* the case in many countries. In Croatia, 'investigations necessitated by large-scale infrastructure projects are typically funded through public resources, most often via public companies tasked with the execution of such projects. These resources are generally sourced from the national budget or secured through European Union funding mechanisms'. In England, 'most of these projects are no longer overseen through the local authority planning system, but are moved through the planning process by central government agencies'.

2.3. Are medieval rural settlements explicitly included?

A few countries now explicitly recognise medieval rural settlement in strategies and codes, although in none is it specifically acknowledged in legislation. In Denmark, the strategy for medieval rural settlement was the first to be released for a series of national strategies drafted to 'help define and identify the 'significant ancient monuments' that should be excavated at the developer's cost, to optimise and qualify the outcome of archaeological (field)work, prevent 'repetitive archaeology', and support and obtain new knowledge'. France's programming has 'included ... medieval village[s]' in development work since 2017, where 'the presence of a national council for archaeological research, which sets a national programme for archaeological research based on the state of archaeological research, influences the prescription policies of regional archaeological services. Research into the medieval village, by recommending that greater attention be paid to development work within existing villages, was included in the programming put in place in 2017'. For Hungary, we are told that medieval settlements are 'very well represented' and that 'approximately half of the excavation permits for large investments' sampled medieval rural settlements. Importantly, in England, regional and county research frameworks highlight the need to challenge the assumption that later medieval settlements are already wholly known and visible.

2.4. External factors affecting delivery

On-the-ground delivery is, inevitably, shaped by politics, economics, funding cycles and changing priorities for infrastructure development. In countries formerly within the USSR, the post-communist era was characterised by high expenditure on infrastructure, but often without systems in place to ensure that threats to archaeology were mitigated. Hungary experienced massive motorway and rail expansion aligned with EU accession: 'following the collapse of the communist regime, and in parallel with the introduction of a market economy, Hungary's governments introduced new, nationwide infrastructural programmes ... including the significant expansion of the underdeveloped motorway and railway systems'. EU Structural Funds were also a major source for infrastructure expansion in western Europe, such as Spain, where 'between 1989 and 2006 no country benefited from the ERDF more than Spain, driving substantial growth in the construction sector' and Ireland, where 'major EU- and Irish government-funded infrastructural development since the early 2000s included massive investments in motorways and road improvements', enabling comprehensive excavation and publication programmes.

The counterpoint to this heady growth, namely economic recession, clearly had a severe impact on various levels in many countries. In Spain, for example, after the 2008 crash, 'nearly half [of the] archaeology firms operating in 2009 had by then closed down [with a] move towards part-time working on low pay' meaning that 'medieval archaeology has largely returned to the university setting'. In Croatia, this exacerbated an enduring processing backlog: 'material and human resources to process and evaluate findings fully are scarce', although Ireland provides a counter-example where the *Code of Practice* (2017) and Transport Infrastructure Ireland's (TII) pro-active publication programme mitigated downturn effects by institutionalising dissemination.

A decade later, several contributors observe that the Covid-19 pandemic had a milder, temporary impact on the amount of infrastructure archaeology being carried out, with a short-term downturn in permits recorded in Hungary, but with field archaeology in England being one category of work mostly exempt from requirements to work from home during lockdowns.

Today, the long-term impact of the mid-2020s economic stagnation in many European countries mostly remains to be seen, as does the growing issue of climate change. The latter is, however,

already instigating a diverse range of new infrastructure works which are impacting rural heritage, such as flood-safety projects in Hungary, new underground powerlines requiring extensive linear trenches in Germany, and reservoirs for water required by artificial snow machines in ski resorts in Austria.

3. Who carries out infrastructure-led archaeology in Europe?

As many contributors to this volume have shown, infrastructure-led archaeology in Europe can be delivered by a range of bodies, including state agencies, museums, the private sector (i.e. commercial field units) and (least often) universities. However, as summarised below, the balance between these varies significantly by country.

3.1. State agencies

Some countries, including Bulgaria and Ireland, operate highly centralised systems in which the state authorities dominate. In Austria, 'all archaeological interventions ... are organised, managed, and carried out by the Federal Monuments Authority as a state authority'. Similarly, France relies on the national body Inrap (*Institut for Preventive Archaeological Research*), who undertake all early assessment and evaluation, with regional services, and (since 2003) private firms undertaking mitigation work. In Italy, 'virtually all practical archaeology and all premodern artefacts are under the stringent and restrictive control of the Ministry of Culture' – here seen to limit flexibility and private involvement.

3.2. Museums

Museums play a major role in a number of European countries including Denmark, where 'the budget is produced by the museum and approved by the Agency for Culture and Palaces', with museum staff not only curating the infrastructure process but also often leading evaluations and carrying out trial-trenching. Museums are also, of course, where many of the finds end up. This dual role can cause problems, as in Hungary, where historically it was museums which managed excavations, but due to financial pressures, more recently funds for post-excavation have been redirected when 'museums needed to use a significant part of the funds raised for excavation for their own upkeep'.

3.3. Private Companies

The private sector dominates infrastructure archaeology in a number of countries, including Ireland, England and Scotland, whereby developer-funded archaeology is delivered by commercial firms or 'units' working under state planning requirements. As noted above, private companies proliferated in Spain prior to the economic crisis from 2008; this is likewise the case in some former communist countries, such as Hungary and Croatia, which also license private companies alongside museums. In contrast, Bulgaria prohibits private excavation entirely, making it 'one of the few European states that does not currently allow private/commercial companies to conduct archaeological investigations'; Denmark similarly has 'no private archaeological companies'.

3.4. Universities

Academic institutions, where involved, can be seen to contribute to infrastructure archaeology mainly through post-excavation research and synthesis, rather than in the primary fieldwork. In Ireland, collaboration between Transport Infrastructure Ireland (TII) and universities such as Dublin and Belfast produced the *Early Medieval Archaeology Project* (EMAP), which transformed unpublished grey literature into open-access research outputs. In Hungary, various PhD projects have processed

some motorway excavation datasets, generating new typologies and a number of comparative analyses. However, Italy reports 'no current agreement … facilitating direct participation … by universities' in heritage management, reflecting a disconnect between commercial and academic sectors.

3.5. Co-ordination between state, museum, academic and commercial sectors

Ireland stands out for having achieved effective co-ordination between these diverse bodies: 'archaeologists working within TII could establish a single code and standard of practice', which was backed by a 2017 *Code of Practice* committing to publication and collaboration with the Digital Repository of Ireland to release legacy reports. The Irish EMAP-partnership with universities made good use of the principle that 'the best is the enemy of the good' to push through prompt open access annual publications that could seed further research. One of these, the *Early Medieval People and Things* (EMPAT) project, is investigating material culture, with preliminary estimates indicating that there are *at least* 11,000 early medieval objects that remain to be analysed after decades of excavations.

In France, a mixed ecology for archaeological practice has evolved, since 2003 including the national agency Inrap, regional services and private companies. Austria centralises authority, but outsources fieldwork to commercial firms; however, publication often 'remains the prerogative of the State'. The Belgian authors identify gaps: 'no quality control of archaeological operations and reports' and a lack of structural knowledge-transfer, while Hungarian authors flag fragmented standards and data-management shortfalls. For Italy, Arthur suggests that a restrictive, highly centralised system limits private/commercial participation and hinders university engagement.

Overall, it can be observed that co-ordination in archaeology is strongest where licensing and practice are centralised, publication is mandatory, and digital repositories make results accessible, making the public benefit of undertaking such work much clearer. Where responsibilities are devolved across regions, frameworks can be uneven: as noted for Germany, '16 different laws and 19 state offices' exist, each with varying requirements, these inevitably producing inconsistencies for cross-border schemes.

4. The impact of infrastructure developments on medieval rural settlement remains

A wide range of factors can be seen to affect the impact infrastructure archaeology has on medieval rural settlement remains. With regard to Austria, we are told that 'as is the case everywhere, the routes pass wholly or partially over archaeological sites from prehistoric times to medieval deserted sites or post-medieval sites'. By contrast, 'villages that exist today are taken into consideration in the planning of the routes so that they are not affected or impacted. This means, however, that the only sub-surface features excavated and recorded are deserted sites, i.e. villages that did not persist beyond the late medieval or early modern period'.

4.1. Different types of settlement have been differently impacted

From this, we can recognise that different types of rural settlement can be differently impacted. Nucleated villages in champion landscapes (characterised by nucleated villages with regular open fields), have, in general, not been seriously impacted because, being large, visible settlements, their locations (whether deserted or still inhabited) are well known and so are usually avoided by linear infrastructure routes (as noted in several countries, including Germany and England). The impacts of infrastructure archaeology on nucleated settlements thus tend to be on their associated landscapes, including field systems, boundaries and other peripheral elements (see below). Most

of the cases where entire nucleated villages have been destroyed by infrastructure work, such as for coal mining in the Czech Republic and Germany, occurred before legislation required their excavation. Examples where excavation *has* taken place across nucleated settlements extensively affected by development, such as at Ruelles in France in advance of the Disney theme park, have provided remarkable new evidence, allowing the development of the settlement to be characterised and traced over nearly a thousand years.

Dispersed, small and open settlements are proving much more vulnerable to interception by linear transects, since their more subtle traces may not be known before development begins. Croatia's motorway and pipeline work repeatedly identified semi-sunken-featured houses, pits, wells, hearths and short-duration units characteristic of *Einzelhof* patterns. In parts of England with dispersed patterns of settlement, archaeologists find 'one site of possible or confirmed medieval date every 2 km or so' along linear transects. Conversely, 'early medieval settlements are quite rare', as discoveries in infrastructure developments in Austria. In northern European countries, such as Denmark, Scotland and England, smaller dispersed settlements have been seen to be vulnerable to being missed during both pre-excavation assessment and excavation stages of archaeological fieldwork.

4.2. Different types of infrastructure have had different impacts

Different types of infrastructure developments – roads/railways, pipelines/cables, flood control, energy networks – interact differently with medieval rural settlement archaeology depending on landscape character, planning practice and route flexibility. Typically, linear excavation projects will encounter the largest number of medieval settlements, many of which may be small, previously unknown and only be partially affected. In contrast, area projects, such as reservoirs may encounter fewer settlements, but invariably this impact is greater. Most authors highlight how the width of easement required for different types of linear infrastructure, which varies considerably, profoundly affects the impact on medieval rural settlement remains. Wide road works and revised rail corridors require broader excavation windows than pipelines and cables which require narrow easements that sample mere slivers of sites.

Green transition infrastructure, such as powerlines and flood-safety schemes can affect long transects across rural landscapes, sometimes with compressed programmes and strict budget/time-caps that will constrain the depth of investigation (e.g. Germany and Hungary). In Germany, it is noted that, although the construction of solar farms is relatively low impact, their end-of-life removal will create secondary impacts which will be much greater than initial construction.

Although the length of most linear projects extends chiefly across open countryside, these do affect the margins of settlements when connecting inhabited places. In addition, small within-village infrastructure works including upgrades (of utilities, for accessibility, etc.) in countries such as France have increased knowledge of medieval settlement origins and development, albeit piecemeal. Peripheral expansions and industrial parks near to inhabited settlements can be more important than linear projects for discovering elements of deserted or shifted medieval rural settlement, as seen in examples discussed for Germany.

4.3. Different types of settlement pattern have been differently impacted

The impact of infrastructure developments on medieval rural settlement is less for periods or areas of nucleated settlement than for those characterised by dispersed settlement. In England's so-called champion areas, linear infrastructural schemes often avoid known medieval cores and scheduled earthworks; for example, cable trenches in East Yorkshire encountered almost no late

Figure 2. Reconstruction drawing of 6th- to 7th-century rural settlement at Scorpo, Supersano (Italy), where excavation indicated an open-plan layout characterised by a number of sunken-featured buildings and at least one well.
(Discussed in Arthur, P. 2012. 'Villages, communities, landscapes in the Byzantine and Medieval Salento' in P. Galetti (ed.) Paesaggi, comunità, villaggi medievali. Spoleto.)

medieval settlement beyond boundaries and ridge and furrow. In non-champion zones (e.g. Suffolk and Essex), later medieval settlement was polyfocal, dispersed and complex, and so routing of works around modern villages is no guarantee of avoiding medieval sites.

4.4. Wider Medieval landscapes have also been impacted

In Europe, comprising diverse lands known to have seen much extensive exploitation across the Middle Ages, infrastructure works which cut through open country, even if not encountering medieval rural *settlements*, are very likely to encounter medieval rural *landscape* features such as field remains, boundary features, extraction sites and other areas of resource exploitation. Settlements and their landscapes were closely interconnected in the medieval period, and so this evidence is important. Some reports can be dismissive of features that are 'just' field remains. Rainer Schreg and Aline Kottman note for Germany that 'relics of past agriculture are by our current archaeological understanding 'offsite' and seldom receive the necessary attention'. However, where these are recorded and analysed, they can provide important new information on the wider context within which rural settlements existed.

5. The impact of archaeological activity on the discovery, identification and excavation of medieval rural settlement remains

A number of factors seen in various European countries affect the capacity of infrastructure archaeology to usefully advance knowledge of medieval rural settlement.

5.1. Scale and intensity of investigation

The size of areas slated for development obviously affects the extent of the impact on archaeological remains, while the intensity with which these areas are sampled affects the likelihood of detecting features. As already noted, large areas, while more destructive, can offer a major advantage for reconstructing settlement plans, landscape use and long temporal sections. Gózquez near Madrid (Spain) provides a clear example: 'the investigated area covered nearly 30,000 m² and revealed a complete early medieval rural settlement, including its necropolis and agrarian and working areas'. Similarly, the long sequence of works around Marne-la-Vallée allowed 'the complete excavation of the village of Les Ruelles in Serris' over 16 hectares, one of a number of French examples that highlight the contribution to knowledge of large-scale, open-area excavation.

By contrast, narrow linear easements – typical of pipelines and cables – restrict excavation to a tight corridor, which limits damage, but also hinders full plan recovery. Excavation may expose small sections of features ranging in size from lengthy boundary ditches to small pits or kilns without generating complete plans. This can be helpful for establishing both the presence and the date of medieval rural activity, but may otherwise be of limited use for understanding related settlement layout or development. Nearly all contributors to this volume noted this, including in Croatia, where 'data and results from these are often far more modest owing to the scope of research', and Bulgaria, where authors recognised that key associated features may have lain just beyond the easement of pipeline sampling.

A second variable is the density of coverage during evaluation, with several contributors expressing concern that significant evidence may become lost in gaps between sampled areas. For Denmark, Mette Svart Kristiansen notes that data are sometimes missed through sampling geometry, such as standard trench grids which might miss small farms or north–south buildings between trench runs. Denmark's revised guidelines for systematically trial-trenching alignments (e.g. 3 m trenches at 12–15 m spacing) have improved detection rates and raised the number of medieval sites found, even 'in parts of the landscape where one would not expect to find them'. Ireland's shift after 2000 to full centre-line testing along road corridors is noted to have significantly reduced 'surprises' from unanticipated discoveries and damage during construction.

5.2. Variable levels of interest or expertise in medieval rural settlement

In some countries, disciplinary biases continue to de-prioritise medieval rural settlement (or, sometimes, the medieval period entirely). Historically, this has been a particular problem in countries where archaeological remains from other periods are more familiar or more visually imposing, including Mediterranean countries whose archaeology is dominated by the classical period. Writing about Spain, authors note that biases in staff training or experience dominated by well-defined structures (e.g. stone-built, mortared or large structures) have led to some medieval sites being missed or misinterpreted. In Germany, the problem is aggravated by federal fragmentation which leaves many some states 'lacking any expertise' in medieval/post-medieval archaeology. In Hungary, museums have tended to use divergent local protocols in a growing commercial sector where scientific objectives can come to be marginalised. Conversely, Ireland's coordinated model (involving central licensing, state agency standards, explicit publication commitments and university partnerships) illustrates how expertise ecosystems can share knowledge to improve detection, analysis and dissemination.

In Denmark, the impact of this problem was highlighted after only 35 out of 1,700 sites along a 3,000 km long gas pipeline in the 1980s were recorded as relating to medieval rural settlement;

this contrasts with a road project in England that encountered medieval features every couple of kilometres. At that time, the low numbers in Denmark were explained in the project report as 'a consequence of the fact that the basic settlement pattern remained the same from the end of the Viking Age to the beginning of the Middle Ages'.

However, change is underway: Denmark's agency-led coverage rules now institutionalise practice that focusses attention on slight traces of potential medieval date and acknowledges that 'today we know that medieval settlements leave very little ceramics on the surface of the site'. Spain points to bottom-up improvements led by a new generation influenced by post-classical archaeology. Training and guidance help: Ireland's recent zooarchaeological and palaeoenvironmental guidelines standardise expectations and sampling strategies. Broadly, infrastructure projects, when paired with robust evaluation and publication, have forced engagement with rural medieval archaeology, because, once recognised, it is so widely found, and this is beginning to raise interest.

5.3. Disregard for small, slight or poorly defined features

The slight traces left by rural settlements of medieval date make them particularly vulnerable to oversight by archaeologists with limited expertise or experience in more ephemeral archaeology – or indeed with little time to tease out such features in infrastructure projects with tight deadlines. Infrastructure excavations that encounter medieval rural settlement frequently expose small, shallow or poorly defined features with few artefacts, such as foundations, pits, post-holes, ditches, kilns, hearths and ridge-and-furrow. Some sites may have many of these, some just a few. Occasionally, they may be overlain or overshadowed by more robust features, such as mortared walls or paved floors, in others they may be entirely isolated. Historically, slight features have often been undervalued, overlooked or unrecognised. In Spain, classical training (focussed on solidly built features such as stone walls) had made 'non-walled or non-stone-structured sites ... far more challenging to detect'.

A lack of interest in slight traces lacking distinctive features might seem reasonable to the lay person, but given that one of archaeology's prime directives is to recognise and interpret partial evidence whose presence or significance is not necessarily self-evident, such failed engagement in ephemeral remains of medieval rural settlements is not acceptable. Indeed, minor features, such as pits, single buildings, wells and field furrows, can be crucial indicators of presence, date and function for small thorps and farms: 'The *a priori* assumption that small is insignificant and will not contribute new knowledge to archaeology skews the dataset' (Denmark). One wonders what the impact of similar rethinking would be in countries where this problem has not (yet) been identified.

5.4. Difficulties in dating medieval rural settlement features

Dating features of possible medieval date is commonly cited by authors in this volume as a problem, especially in northern Europe, although it may be that undated features of possible medieval date are being entirely overlooked in other countries. Early medieval sites often lack substantial diagnostic features, such as enclosures that can be dated morphologically using non-invasive methods, while rural settlements whose medieval communities were aceramic or used sill-based construction methods may offer few datable artefacts and little stratigraphy, leaving date and significance ambiguous, as noted in Denmark. In Scotland, 'the targeting of areas where settlements had existed on mid-18th-century estate plans, but are today unoccupied, by geophysics and trial-trenching, also proved unsuccessful in locating medieval evidence. The reasons for this failure may well be related to the elusive form of buildings and construction materials used (principally turf) in the Highlands and limited contemporary use of ceramics that can be dated to the medieval period,

Figure 3. Reconstruction drawing of a 3,000 m² enclosed settlement of 13th- to 15th-century date excavated at Kergoutois à Carhaix in France, divided into three distinct areas with different functions.
(Dir F. Le Boulanger, dessin: C. Jégou; discussed in Catteddu, I. and le Gall, J. 2020. Archéologie du premier Moyen Âge rural en Bretagne. Etat des lieux et perspectives. Archéologie du Midi Médiéval 2020 Suppl. 9: 199–207)

rather than a failure of the investigative technique itself'. Striking is this comment for Flanders area of Belgium: 'the nature of almost one-third of medieval sites found during [linear projects] could not be determined'.

5.5. Presumption that late medieval rural settlement remains only exist within CORS or known DMVs

A common pre- and mis-conception is that *late* medieval rural settlement remains will be absent from infrastructure investigations because these only exist under currently occupied rural settlements (CORS) or on the sites of recorded deserted medieval villages (DMVs). In some regions, infrastructure investigations show this view to be justified, as in Poland where few 'abandoned villages, manors and late medieval hamlets have been found during major infrastructure projects [because] motorways and bypasses generally avoid modern rural settlements, most of which have retained their original medieval location'. In England, of 24 linear infrastructure schemes in East Yorkshire, 'only three have revealed significant medieval settlement remains'. However, caution needs to be applied if there is no evidence to support the presumed absence of medieval settlement remains beyond today's settlements: for instance, elsewhere in England, Richard Newman notes that the East Anglia One cable trench in Suffolk, despite being routed away from modern villages, still encountered dispersed late medieval settlement remains in six areas, including dispersed 'tye' settlements, isolated holdings, manorial sites and port infrastructure. Newman cautions that 'for too many consultant and contract archaeologists working in the commercial sector, the later medieval landscape is erroneously assumed to be wholly visible, identifiable, and thus readily assessable, with an assumption that if known sources (archaeological or historical) do not indicate the presence of a site of this date, there will be none there'.

The impact of these difficulties will be aggravated if evidence for medieval settlement remains is not being monitored due to incorrect presumptions of absence. It is clear that different types of medieval landscapes (such as those with dispersed and unplanned settlement with fluid histories of shrinkage

and shift) demand bespoke strategies, which require a knowledge of landscape development and cannot rely solely on maps and existing records of known sites and monuments.

5.6. Neglect of unstratified deposits during spoil removal

Modern activity, such as ploughing on soft loess soils, which are widespread across Europe, can easily erode medieval features. The relatively shallow depth of many medieval features, especially in rural contexts that are generally less likely to exhibit deep stratigraphy, means medieval rural settlement features are particularly likely to have been truncated by recent activity such as agriculture. We hear that in Denmark, *c.* 57% of the country is under plough, with heavier machinery frequently damaging features deep down in the subsoil; infrastructure work sometimes terminates ongoing destruction, but the record captured may be partial. However, while features may have been destroyed, diagnostic, datable material culture such as pottery and small finds may survive to float unstratified in plough-soils or other subsoils. This is shown by the large number of medieval finds that are reported by hobby metal-detectorists in countries where this is allowed and recorded, such as in England and Denmark.

Removing topsoil from sites by machine risks missing unstratified finds that may be the only surviving evidence of truncated medieval rural settlement remains. Experience in Ireland has shown that trowelling down from ground level, or at least sampling machine-removed topsoil by sieving, can mitigate this risk. In England, use of a metal-detector 'after the trial-trenching and to an extent as a response to the lack of early medieval evidence retrieved' in the vicinity of the famous Anglo-Saxon sites of Sutton Hoo and Rendlesham meant that 'three early medieval metal objects were recovered from three sites', one of which subsequently proved to have early medieval remains surviving below the plough zone.

5.7. Inadvertence of the value of negative evidence

While, as noted above, oversight of minor or undated features can lead medieval settlement sites to be missed, the significance of genuine absences of settlement evidence from infrastructure investigations can also be overlooked. 'Negative evidence' (i.e. a confirmed absence of medieval features despite robust evaluation) is often undervalued (or unrecorded on state databases), yet it can be highly informative. For example, in Italy, 'the total absence of archaeological sites encountered in the Brescia–Verona railway works near Lake Garda suggests the presence of a large forest, the *Silva Lucana*, right through the Middle Ages'. Equally, the absence of datable material may signify breaks in site-use or periods of abandonment.

5.8. Disregard for medieval landscape features

Landscape features have frequently been disregarded or even seen not as valuable evidence in their own right, but as a threat to the 'important' features at the site such as when 'structures were heavily damaged by a number of furrows from ridged fields' (Denmark). In some countries, 'it was only in the late 1980s and early 1990s that ditches were identified as an important part of the plot and toft structure' (Denmark). In Belgium, 'low density-sites or so-called off-site phenomena (e.g. charcoal-burning pits or field systems) are generally not deemed 'excavation-worthy' since the costs of archaeological excavation and related processing of materials, to be paid by the developer, is not deemed to justify the knowledge gained from these 'low-density' sites.'

However, cases where landscape features *have* been studied show their value. Germany's interdisciplinary study at Albershausen refined the dating of ridge-and-furrow dating; in Denmark, variations in the frequency of ridge-and-furrow traces across 1,700 investigations helped map

differences in the intensity of medieval agricultural land use, while integration of evidence of cereal-drying kilns, mills and small fields has transformed views of early medieval economies in Ireland.

6. How infrastructure archaeology has advanced knowledge and understanding of medieval rural settlements

Notwithstanding the limitations discussed above, the reviews in this volume allow us to assert that knowledge and understanding of medieval rural settlement have very much been transformed by infrastructure archaeology.

6.1. Thousands of medieval rural settlement sites have been investigated

Across Europe, the scale of infrastructure-led archaeological investigation has transformed the number of medieval rural settlement sites that have been excavated, as is evident in countries such as Belgium, where the increase since the turn of the millennium is vividly apparent in graph format. The chapters in this volume show that of the tens of thousands of sites that have been found during infrastructure works, between 10% and 50% of new discoveries are related to medieval rural settlement or associated activity. Croatia has seen almost a hundredfold increase in medieval remains discovered and sampled since ratifying Valletta in 2004: 'in the period leading up to 2004 intermittent research, mainly consisting of trial excavations, included a total of 42 sites with medieval settlement elements, comprising a combined area of 30,685 m² ... The number of sites with settlement elements dating from the Middle Ages that have been investigated since 2005 stands at 136, their total area measuring 2,782,050 m².'

This is transforming our knowledge of how, what, where and when rural settlements existed and evolved. In Croatia, 'research on medieval settlements ... can be divided into two major periods: work prior to 2004/05 and studies since then'. In Ireland, infrastructure archaeology has moved knowledge of rural medieval settlement from keyhole insights based on scattered case studies to a panoramic vision based on a nationwide dataset. In those countries, such as Bulgaria, where medieval rural settlement has *not* previously been extensively studied, even if the number of known sites remains relatively small, almost every newly discovered site has an even greater capacity to transform understanding of the nature and extent of medieval rural activity in the region. Although many countries do not yet have integrated datasets facilitating comprehensive data retrieval and synthesis, the potential for developing these is infinitely greater than was the case a generation ago; GIS and AI will surely provide the means to take this next step.

6.2. Many new settlements have been discovered

The nature of infrastructure projects, often bisecting areas that have seen little or no previous archaeological investigation, means that they frequently find sites that were previously unknown. Edith Peytremann notes that in France infrastructure archaeology has delivered an 'unprecedented increase' in the number of known sites through preventive archaeology, enabling – for the first time – robust regional comparisons. One of these was found near Les Ruelles, where 'the first excavations ... uncovered a necropolis and the remains of a settlement. In 1990, development work, again linked to the railway line, led to the discovery of an elite Merovingian settlement.'

In Austria, at Mitterretzbach, 'excavations became necessary when human graves were discovered during the construction of an expansion of a residential area. It was only then that the archaeological monument authorities were called in and several plots of land covering an area of approximately 7,000 m² were archaeologically investigated'. In these excavations, 'various pit-houses and ground-level houses from the Early and High Middle Ages have been uncovered' and 'a detailed chronology

Figure 4. Reconstruction drawing showing 'A day in the life' at the Carolingian farmstead of Wortegem – Diepestraat, Flanders, showing food being prepared and a new well being made from a hollowed-out tree-trunk.
(*© Yannick De Smet and SOLVA*)

has shown that pit-houses still predominated in the Early Middle Ages, while ground-level dwellings and various agricultural outbuildings were erected from the High Middle Ages onwards'.

In Bulgaria, a previously unknown rural settlement of late medieval date was found 300 m from the village of Turyane, where 'late medieval structures included sunken-featured and above-ground dwellings, ovens, hearths and pits'. More than 1,500 finds included: 'coins, arrow-heads, tools (including chisels, awls, scrapers and knives), weights, fragments of copper vessels, pottery, jewellery, belt fittings, pectoral crosses, medallions and fibulae'.

These are just a few of the many discoveries reviewed in this volume, which are themselves a small subset of the total number across the continent.

6.3. The histories of many known settlements have been rewritten

Many contributors report how major infrastructure excavations have enabled archaeologists to reconstruct the development of entire settlement sequences. Such investigations not only provide compelling individual stories, but also help interpret and understand other sites where work has had to be more limited.

For example, in Austria, 'the early medieval settlement of Pellendorf ... excavated in 2003–05 as part of the construction of the Nordautobahn motorway connecting Vienna with the Czech Republic. A particularly high density of artefacts was found dating from the 7th to 10th/11th centuries. With

Figure 5a. Reconstruction drawing of the late 8th- to early 9th-century farm of Sint-Denijs-Westrem – The Loop in Flanders, showing a child playing as adults are storing this year's harvest in pits to secure a seed stock for next year.
(© Yannick De Smet, DL&H and Ghent University)

around 130 features, including 33 complete or almost completely preserved structures, numerous deep storage pits (some with secondary animal skeletons), several exposed oven features and two separate burials located within the settlement area, the site is one of the largest known rural settlements of the Early Middle Ages in Lower Austria. ... In addition, the archaeobotanical and archaeozoological finds obtained during the excavations make it possible to draw conclusions about the economic and environmental conditions in this border region' over a 300-year period.

An insight into a shorter-lived settlement was gained from excavations at Sługocinek in Poland, where 'the building bore traces of destruction by fire. The skeleton of a young man (22–24 years old) was found within its boundaries. The individual showed extensive cranial trauma and traces of a severed upper limb. A treasure consisting of 1,950 coins concealed in two vessels (deposited around AD 1480) was excavated a short distance (about 40 m) from the relics of the house. A short distance from the destroyed homestead, a burial of a woman was encountered in a shallow grave cavity, but with no visible traces of trauma on the bones'. This is a powerful new story, hitherto lost, from the past.

Discoveries such as these deliver vivid insights into life (and death) in the medieval countryside and help generate detailed reconstructions that bring this past alive to members of the public, most notably for local people who might even be descendants of the inhabitants of those excavated settlements (Figs 1–5).

6.4. New types of medieval rural settlement have been identified

Infrastructure archaeology has led to the identification of new types of settlement. In the Catalonia region of Spain, for example, observations from several excavations have elicited a distinct type of small rural settlement containing four to five family households established as an *ex-novo* foundation in areas without direct Roman antecedents. In Ireland, archaeologists have noted distinctive 'early medieval enclosed settlements with associated cemeteries or burial grounds, variously termed secular-cemeteries, cemetery-settlements or settlement-cemeteries'. These have been identified as

Figure 5b. Reconstruction drawing of the late 8th- to early 9th-century farm of Sint-Denijs-Westrem – The Loop in Flanders, showing winter on the settlement.
(© Yannick De Smet, DL&H and Ghent University)

Figure 5c. Reconstruction drawing of the late 8th- to early 9th-century farm of Sint-Denijs-Westrem – The Loop in Flanders, showing a rainy day when work has paused and the windmill has stopped turning.
(© Yannick De Smet, DL&H and Ghent University)

'centres of production, either within estates or territories. The strategic placement of some of them has led to the argument that they served not only as burial places, but also as ... local community centres, used for inaugurations, legal proceedings and other social gatherings'. We have also seen known types of settlement found in new areas, as at Atzersdorf in Austria, where 'a north–south running ditch, which delimited the village and at the same time offered defensive protection' is a type of feature that has 'rarely been excavated in Austria ... however, a large number of them are now known from Germany'.

6.5. We know more about rural houses

Settlements by definition contain houses, and in diverse rural contexts we now know much about how house forms appeared, developed and were used, including transitions from circular to rectangular forms and from sunken/semi-sunken to above-ground construction. At Turnyane in Bulgaria, for example, 'the sunken-featured dwellings were cut a sizable 2.5–3.0 m deep below the contemporary ground level with irregular oval, rectangular and square shapes ... where hearths were present, these were open and usually located in the central part of the dwelling. Construction pits for wooden supports were found both in the central areas and along the walls of the structures'. In Croatia, the new data revealed 'a change in the housing format, with sunken and semi-sunken dwellings being replaced by above-ground units constructed using various techniques, such as the log-house (*Blockbau*) and the wooden-frame technique (*Fachwerkbau*).'

Near Rzeszów in Poland, 'houses had a near-square plan ... wooden walls of most of the buildings were erected in a log structure, but relics of post-built buildings could also be seen. In the corner of each hut were the remains of a stone oven.' Surprising intrusions have appeared in known distribution maps, such as the discovery of three-aisled long-houses near Nellingen, a house type well-known further north, but rare in this region of Germany.

We also know more about the interplay between interior and exterior spaces, and of domestic and craftworking spaces. For example, in Spain, 'investigations revealed that every household included mixed-use activity spaces and demonstrated cycles of construction and reconstruction of domestic structures. Comparative studies have shown how these plots became reduced in size over the centuries, but it is now clear that from the Early Middle Ages rural housing, however modest, always had its own space'. Ireland's early medieval settlements regularly show post-built houses, workshops and middens with species profiles (cattle, sheep/goat, pig), indicating mixed pastoral-arable economies with dairying strongly represented. In Hungary, extensive excavations at rural settlements such as Kecskemét have allowed detailed reconstructions of the relationship between house clusters, enclosure ditches and resources.

As a result, in many regions, settlement typologies can now include function and sequence, not just form; while knowing more about the detail of features, such as houses, will make settlements easier to recognise and interpret in the future.

6.6. Waterlogged deposits have helped characterise and date daily life

Waterlogged contexts accessed through excavations on linear projects have been particularly rich sources of information about medieval rural life, preserving organic evidence that is lost on dry-land sites. At the Sadków site in Poland, for example, the remains of numerous early medieval buildings were associated with well-preserved relics of wells with wooden constructions and artefacts including a deposit of agricultural implements in one of the features. In Scotland, the Chapeldonan moat yielded preserved wooden utensils, plates, structural timbers and leather shoes, which not only illuminated daily life in the countryside, but also provided valuable dendrochronological evidence that helped

anchor site dating. In the Czech Republic, three mill-wheel blades, dendrochronologically dated to around AD 1000 attest to the oldest mill yet found in eastern Central Europe. And in Belgium, analysis of pollen in samples from well fills has enabled a detailed reconstruction of vegetational change over nearly a millennium.

As the impact of climate change continues, we may expect waterlogged sites to be more frequently affected by infrastructure archaeology related to water management.

6.7. We know more about higher-status sites associated with rural settlements

Infrastructure archaeology has also revealed sites of elite status associated with rural settlements. At Pomorzany in Poland, 'artefacts, such as a fragment of a brass plaque with Gothic letters (probably part of a book binding) and fragments of pottery or decorated stove tiles, indicate that traces of a magnate's residence were located within the site boundaries, but destroyed at a later date'. In Croatia, a 'wealthier household, detached from the centre of a rural community, excavated on the route of the DC10 expressway, belongs to a rare type of settlement ... a large residential structure ... with a cellar, a separate farm building and a cattle pen'. In Scotland, leather, ceramics and a coin hoard from a moated enclosure showed how elite sites were provisioned and connected with exchange networks. And at in Suchy Las in Poland, faunal analysis showed the same strategy to have been used for breeding and rearing horses on village and higher-status sites, but with the elite's horses larger in size.

6.8. We know more the relationship between rural settlements and landscapes

Some of the biggest gains from infrastructure archaeology lie in wider landscape archaeology. This might seem unsurprising given its tendency to cover large tracts of the landscape, but it is good to see the value of this information being recognised. Long linear exposures cut across fields, commons, woods, wetlands and so on, and such can enable reconstructions of field systems, lynchets, clearance cairns, watering holes and ridge-and-furrow, often with new dating evidence. In Ireland, it has long been known that there were enormous numbers of early medieval settlement enclosures, but infrastructure schemes have frequently revealed associated features, including small fields, kilns and watermills, demonstrating intensive cereal production alongside dairying, completely overturning prior ideas that the rural economy was 'purely pastoral'. Denmark's motorway projects that cut through heath and moraine landscapes showed dispersed settlement reacting to micro-ecologies of soils and wetlands. Projects in Spain mapped terraced agriculture and farmed slopes with early medieval stratigraphy in Galicia. In a number of places, including France, palaeoenvironmental and archaeozoological data have helped to open 'a vast, hitherto unknown field' for the study of medieval land-use dynamics. The fact that multiple infrastructure projects may follow the same corridors in the landscape, offering more than one chance to investigate the same zone, is noted by some contributors as potentially enhancing understanding of 'how landscapes were used over different time periods' (Denmark).

7. How has 'bigger picture' understanding of medieval rural settlement development been advanced?

The impact of new discoveries on 'bigger picture' understanding is noted by several authors in this volume, including in France, where 'based on archaeological data, the village can now be studied as a political, religious and social entity in its geographical environment. The increase in the number of publications devoted to villages or settlements reflects the importance of the development of knowledge about the medieval village, mainly in connection with regional planning work'. Academic understanding of medieval rural life more widely has also been significantly advanced, especially in

countries where post-excavation processing and publication have been prompt, data are accessible and syntheses generated. Key themes can be summarised here:

7.1. The origins of nucleated villages

Open-area excavations and long transects across rural spaces have been crucial in advancing our understanding of when and how nucleated villages were formed. Some insights are remarkably precise. In the Czech Republic, for example, 'across the 10th/11th to early 13th centuries, the settlement was seemingly concentrated in the central part of the larger later village, but without evident regularity in its layout … The establishment of the planned large village with two rows of farms lining a long village green with a stream flowing through its middle can be dated to the late 13th century … their boundaries were defined in this period and did not change until the 19th century'. The complete excavation at Les Ruelles (Serris) in France showed a settlement active from the 5th to 9th centuries to nucleate around a newly built church in the 10th century, then evolve into a loose agglomeration and then a small market town, thereby offering a phased narrative from scattered farms to nucleation anchored by ecclesiastical and market functions. In Croatia, 'Excavations of large areas have also traced a good number of settlements which are attributed to the Late Middle Ages (14th to early 16th centuries), and which appear structurally different to those from the previous period in being more compact and showing a greater degree of arrangement of structures (both houses and stores) into clusters. At in Can Gambús-1 in Spain, a nucleated settlement with diverse phases from the 6th to 8th centuries AD included 293 structures spread over 1.7 hectares that appeared as an *ex-novo* foundation, with no continuity with any preceding settlement in the surroundings.

Variations in the date of the transition from dispersed to nucleated settlement outlined in diverse chapters of this volume combine to show that multiple routes to nucleation were followed at different points in time and space, rather than a single model being followed across the continent. As noted by Andrej Janeš, in Croatia 'a lower degree of spatial organisation has been observed in settlements of similar date identified in eastern Slavonia compared to those within Hungary and Czechia, whereas greater spatial organisation can be observed in (some) villages established during the 15th century and lasting into the post-medieval period'.

7.2. Dispersed medieval settlements

Contributions to this volume also show how, in some parts of medieval Europe, nucleated settlement never actually appeared. With more rural ground sampled, scholarship is now better equipped to distinguish champion-settlement landscapes (with nucleated villages associated with regular open arable fields) from non-champion ones (with small, dispersed and shifting settlements dominated by pastoral economies) with far greater nuance. 'In the 1980s, single farms and small hamlets were viewed as more flimsy unimportant structures, at least in the archaeological perception of rural life and in the field recordings. Today we appreciate the pits, the one building, and the well … and their significance as features from different types of medieval settlements and activities' (Denmark). In England, linear corridors in the county of Yorkshire encountered no settlements, yet in the counties of Suffolk and Essex, the same type of evaluation repeatedly revealed unexpected late medieval dispersed elements (tyes, isolated holdings, manorial sites, port infrastructure), even where routes deliberately skirted modern village centres. Denmark's motorway work across heath and moraine landscapes showed dispersed settlements were sited to make use of different soils and wetlands, while, in Croatia, 'sites with structures and pits organised in a similar fashion, scattered in smaller groups set around 40 m apart … can be ascribed to the *Einzelhofsiedlung* type of settlement, wherein dispersed groups of structures were used for dwelling and for farming, presumably belonging to one

(extended) family'. In some parts of Croatia, both *Einzelhof*-like dispersed sites and nucleated late medieval villages were evident.

7.3. Settlement desertion

Many sites of medieval date (early or late) ended up permanently deserted, and larger numbers of excavated sites help calibrate the dates or the driving processes for this. In Kecskemét in Hungary, 'two separate settlements were identified next to each other seemingly active across the same timespan, namely from the mid-12th to the early 13th centuries ... After its abandonment, it was not built over, nor disturbed, which offered rich scope for a thorough reconstruction of the settlement structure'. In the Czech Republic, we are told that 'many presently inhabited villages endured and underwent renewal. Not only were houses and farms rebuilt, but, on occasion, entire villages had to be re-founded after their destruction, often resulting in significant changes in the village structure'.

In some periods and places, settlement desertion is not seen as a negative outcome, as argued in the Renningen basin in Germany, where the move away from clusters of small, dispersed settlements in the 12th or 13th centuries is seen as an evolutionary planned developmental process. Likewise in England, settlement desertion is seen to be associated with a fluid process of settlement shift. Conflict is rarely cited as a factor in such places, but elsewhere it is much more commonly assumed to be a major factor: for instance, in the Czech Republic, 'material evidence relating to the turbulent events of the so-called Hussite period (AD 1419–1479) associated with domestic or religious wars ... has repeatedly been postulated. Excavations have sometimes revealed extensive burnt horizons in village contexts, pointing to sudden destruction by fire and perhaps pillaging'. Indeed, for the Pilsen hinterland, 44% of the medieval villages were deserted in the same 15th-century period and this dramatic loss is often directly ascribed to the Hussite wars.

7.4. Settlement plans and their development

Infrastructure archaeology has shifted our understanding of many sites from dots on maps to excavated plans with known internal structures. Near Rzeszów in Poland, 'six unknown settlements were discovered, resulting in the exposure of at least 45 half-timbered sites built on a square plan. It was possible to capture the layout of entire or almost entire settlements', while in Spain, a 30,000 m² excavation at Gózquez captured an entire early medieval settlement with necropolis, residential and working areas, and agrarian spaces, allowing household-plot analysis and layout change through time to be reconstructed. In England, excavations enabled fuller site plans to be generated, such as in the case of Ingmanthorpe, where excavation 'found not just the remains of a moated manorial site, but also, facing it across a road, a line of tofts, comprising a settlement occupied between the 12th to 14th centuries', transforming understanding of the development and significance of the site.

Boundary feature have frequently been informative. Some sites have revealed boundary features in places where these are uncommon, as at the deserted settlement of Aczesdorf in Austria, where 'three house parcels could be recorded. Also of significance is a north–south running ditch, which delimited the village and at the same time offered defensive protection. Such village enclosures have rarely been excavated in Austria'. The authors note that 'this evidence will help understand similar unexcavated sites 'known' from aerial photographs'. In Czech villages, boundaries defined in the late 13th century have been shown to have remained fixed into the 19th century, providing an archaeological and topographic signature for unsuspected extended long-term continuity.

Importantly, some cases have allowed detailed models of settlement development to be reconstructed, which might be used to help understand settlement development elsewhere. Our Spanish contributors note this type of insight study would have been impossible without

the extensive open-area exploration funded by infrastructure projects: 'The most noteworthy advances in our knowledge of early medieval settlements in the Madrid region derive from a) the identification of the characteristics of domestic architecture and more precise definitions of the household unit and the internal organization of the settlements, and b) clarifying the structure of rural habitation, primarily through the relationship between residential areas and burial grounds, as well as the connections between these and agrarian and working spaces. The findings overall suggest a potential hierarchy among villages and farms in the countryside north of Toledo.'

7.5. The extent and density of medieval rural settlement

Large, systematic datasets generated by infrastructure archaeology across Europe reveal the density of medieval rural settlement. A prominent case-in-point is Ireland, where the exceptional visibility of early medieval enclosures (raths/cashels), crannogs and church sites – estimated to number more than 55,000 – has provided an unparalleled measure of rural settlement intensity, reshaping continental comparisons and demonstrating how extensive everyday occupation could be across pastoral and arable landscapes. In the Flanders region of Belgium, regional syntheses summarising 2,659 sites indicate the frequency of medieval evidence to be comparable to Roman and Bronze/Iron Age material, demonstrating clearly how medieval activity was neither rare nor marginal, but distributed across varied landscape zones. In Croatia, 'given the rather restricted previous research, the evidence and finds gathered are exceptionally important since most of the explored sites have provided new information on the settlement distribution for the area between the Sava and Drava Rivers, on the layout and organization of these settlements, and on their material cultures and lifeways'. Earlier ideas of settlement size have been overturned in countries including Poland, where one settlement along the A4 motorway was found to be 'almost 10 times larger (23 hectares) than that indicated by the earlier field survey'.

Mette Svart Kristiansen's comment, 'it is now evident that settlements – including medieval settlements – can be everywhere', should be applicable across Europe, well beyond Denmark. The results of infrastructure archaeology is moving scholarship of medieval rural settlement beyond lists of 'known' places to quantified, region-specific measures of density, with clear urban–rural gradients and pockets of dispersed habitation now better mapped.

7.6. Medieval population levels

A corollary of our awareness that the number and size of medieval rural settlements were greater than previously supposed is the growing recognition that medieval population levels must also have been higher; this is supported by radiocarbon dating and dendrochronology, as well as the sheer volume of rural excavations. Such evidence makes our demographic modelling much more robust. In Ireland, for example, analyses of thousands of radiocarbon dates indicate early medieval population growth from *c.* AD 500 to have risen as high as 3 million in the 8th century, before easing to *c.* 2 million by AD 1000. These inferences can be triangulated with settlement counts (ringforts, crannogs, churches), agricultural installations (kilns, mills), zooarchaeological data (herd composition) and palaeoenvironmental proxies, offering multi-line evidence rather than reliance on textual extrapolation. Elsewhere, country-level inventories of data from excavations now enable relative density comparisons at scale (as in Belgium and France), allowing population estimates to be tuned to regional settlement signatures more accurately than would be possible from evidence dominated by elite or urban contexts, indicating, for example, more densely occupied lowlands compared with more sparsely settled uplands/heathlands.

7.7. Historical meta-narratives

Infrastructure-led evidence is contributing to our understanding of major historical events and their impacts on the countryside. In Spain, the transition from Late Antiquity to the Early Middle Ages is related to the appearance of a small settlement type that reflects 'a new approach to land use, characterised by the emergence of a settlement model in areas without direct Roman antecedents'. In Ireland, demographic models propose population growth through the 7th to 8th centuries, while palaeoenvironmental work throws light on the effects of climate effects on rural lives. Assemblages and settlement sequences allow disease/famine hypotheses to be weighed against agrarian continuity and structural change. Processes, such as the Slavic colonisation of Central and Eastern Europe, have been illuminated by Croatian and Czech datasets that relate the development of dispersed and nucleated settlements to that of the medieval Hungarian Kingdom, demonstrating how colonisation and political incorporation can be manifested materially in house types, plots and field boundaries. Similarly, in Croatia, the impact of the Ottoman invasion has been identified via motorway excavations, which have shown late 13th- to 14th-century settlements being abandoned in the early 16th century, aligning archaeological discontinuities with historical incursions; nonetheless, some communities and land-use persisted into the 17th, signifying regional variation in impact and resilience.

The scale and diversity of the rural datasets from infrastructure archaeology now support synthetic histories that integrate settlement, economy and environment. Ireland's motorway archaeology work both confirmed the importance of living within settlement enclosures as the overwhelming experience of all people and also overturned the 'pastoral only' paradigm: kilns, mills and small fields for cereal production, alongside zooarchaeological data for butchery patterns all indicate mixed agro-pastoral regimes. In France, the multi-disciplinary use of geomorphology, palynology and archaeozoology is re-writing long-term landscape narratives that tie soils, vegetation, and fauna to settlement change. Croatia's diachronic sequences, from Late Avar dispersed settlements to compact late medieval villages, abandonment in the Ottoman period, and persistence into the early modern, create region-specific trajectories of settlement organisation and resilience. 'The excavation report's authors identify this as a typical open-type Slavic settlement dating to the 8th and 9th centuries based on the ceramic evidence … such sites are rare in Croatia and this adds important new information for the Late Avar Period in the former territory of southern Pannonia'. In Belgium, cross-period statistics have been used to contextualise medieval frequencies against earlier and later eras, composing comparative frames that keep medieval rural activity in proportion.

Such broader narratives reposition medieval rural life as dynamic, innovative, central to economic transformation and integrally affected by wider social and political changes.

7.8. Longue durée development of medieval rural settlement

This volume's many contributions allow us to identify waves of change that can be seen in rural settlements across Europe. Late Roman period settlements tend widely to be large in size, often regularly planned and involve construction in durable materials, such as stone or using techniques that leave clear below-ground traces, such as post-built timber buildings or heated grain driers, with large volumes of finds, such as pottery. In most of the early medieval period, settlements are typically smaller, often mobile or only inhabited for a few generations, with fewer finds and buildings constructed with materials such as timber and mud, leaving little trace beyond sub-surface post-holes and pits. The most archaeologically visible traces left by many early medieval rural communities (visible because they leave sub-surface features) are cemeteries (whose function is easy to ascertain), plus pits or silos, post-holes, stone settings, sunken-featured buildings and

ditches whose function can be less clear. Widely, rural settlements are more common, widespread and larger than previously suspected.

There was, of course, no overnight change in rural settlements in the year AD 1000, but the century or so either side of this did see larger, nucleated settlements developing in many parts of Europe, particularly in areas of widespread or increasing arable cultivation, accompanying changes in land-holding, including widespread adoption (or imposition, depending on one's perspective) of the feudal system. Settlements in areas of pastoral economies were more likely to remain smaller and dispersed. Whether high medieval communities were living in nucleated or dispersed settlements, most acquired a parish church in this period, many of which are still in existence and are often the only surviving upstanding building of medieval date in settlements whose only other superficially obvious medieval feature may be their names. Paradoxically, in a period of rising population, larger settlements and more substantial construction, traces of high medieval habitation can become more difficult to detect archaeologically, as new carpentry techniques allowed robust timber buildings that would last for generations to be constructed without below-ground foundations. Whether stratified in features or floating in truncated subsoils, a surge in the number of metal small finds attests to the reach of urban production into the countryside. Across Europe, traces of smaller and dispersed rural medieval settlements are found when searched for, but the evidence explored in this volume would suggest that these are frequently overlooked.

Widely, we see a stalling in the growth of settlement and population in the period from the 14th to 16th centuries, with few new settlements of this date found, despite the greater volume and visibility of material culture, which was mass-produced across the continent from the 13th century and reached even the most remote rural settlements. Across Europe, late medieval communities suffered the headwinds of climate cooling, pandemic disease, economic difficulties, the decline of the feudal system and political and religious conflicts, some of which reignited to cause many medieval rural settlements to be permanently depopulated in the 17th century.

The emerging result is an increasingly evidence-led scalable history of the Middle Ages which shows rural medieval settlements as more extensive than previously thought, more complex and variable in the form they took, and less sub-altern – no longer appearing as passive recipients of events beyond their control, but functioning as adaptive and often resilient entities, whose forms, economies and land-use reflect intelligent responses to environmental, social and economic conditions.

8. Impacts on archaeologists' knowledge and practice

8.1. Increased expertise in medieval rural settlement archaeology

In many of the countries surveyed in this volume, infrastructure archaeology has been reported as having helped to create a generation of professional archaeologists with specialist expertise in rural settlement archaeology of all periods, aided by engagement with large, long-term excavations. These projects have demanded nuanced interpretation of both ephemeral features (pits, post-holes, field boundaries) and complex settlement morphologies, leading archaeologists to sharpen skills in identifying, recording, interpreting and contextualising slight features and understanding dispersed and poly-focal settlement patterns that were previously overlooked. As importantly, the sheer volume of medieval sites encountered in infrastructure archaeology has normalised medieval rural settlement as a core research domain rather than a marginal interest.

8.2. Innovations in fieldwork

A number of methodological innovations – from aerial survey through to on-site scientific analysis of individual deposits – have transformed practice, enabling medieval rural settlements to be better identified, excavated and understood. As one practical example, Denmark revised its guidelines in 2013–14 to require 20–100% coverage for alignments and use of 3 m trenches at 12–15 m intervals; this measure dramatically increased medieval site detection, even in landscapes where none were expected: 'whereas in 1980–81 trial excavations had been carried out with trenches at selected sites, in 2011 the entire alignment was trial excavated by one interconnected trench', leading to a ten-fold increase in identified sites of medieval date. In Spain, 'a fundamentally different and novel methodology included extensive excavation, bioarchaeological analyses and landscape archaeology approaches, enabling new light to be shed on the spatial relationships of rural settlements, as well as their internal structures, all of which were previously unknown or poorly examined topics.' This multi-disciplinary approach strongly recalls that used so successfully in Ireland, whose *Code of Practice* (2000, updated 2017) also introduced extensive geophysical surveys and trial-trenching along road corridors, reducing unexpected discoveries and adverse impact. Many countries have integrated geomorphology, palynology and archaeozoology, enabling reconstructions of land-use and environmental dynamics. In more cases, archaeologists now routinely include later medieval rural settlement in Environmental Impact Assessments, challenging old assumptions that later medieval landscapes were fully visible and documented. Belgium and Denmark have emphasised radiocarbon and dendrochronology as 'essential' for securely dating early medieval features, moving beyond typology.

8.3. Research agendas

In some regions, academic and governmental research agendas have guided investigation and analysis, as at Libkovice in the Czech Republic, where methodology and the theoretical approaches were informed by previous medieval settlement studies in Bohemia and the findings of earlier rescue excavations in presently inhabited villages. These identified six main topics to explore regarding the development of the village and its environs, four of which related to the medieval period: the early medieval settlement pattern; settlement transformation and the origins of the nucleated village in the high medieval period; the later medieval village and farms; and the parish church and its churchyard.

These innovations reflect a shift from reactive rescue work to strategic, question-led and research-driven mitigation, embedding medieval rural settlement into planning and heritage frameworks.

8.4. Data archiving and dissemination

Many countries are moving towards making digitised archaeological data from rural settlements accessible to the public online or in record offices. In England, the publicly funded Archaeology Data Service (ADS) curates and makes publicly available nearly all completed archive reports that would have formerly languished unread as so-called 'grey' literature, i.e. reports that have been completed, but not formally published. In Austria, the Federal Monuments Authority maintains the HERIS database, which 'contains all archaeological sites and monuments' and is being transferred to regional planning systems that publish data in public map services, making them 'visible to the general public'. Similar is the development of the *Archaeological Map of the Czech Republic* (AMCR) and its digital archive, which stores excavation reports and primary data and provides open access via an online portal; a comparable resource exists in Bulgaria.

8.5. Public engagement strategies

Public engagement is particularly important for medieval rural settlement discoveries, as these sites are the antecedents (and sometimes the direct ancestors) of the places in which everybody lives today, therefore people can and do feel a connection. People are also likely to be affected by the infrastructure developments which prompt the excavations, so it is important for local people to know and understand the significance of what is found. Many authors in this volume recognise 'a growing interest from the public towards different aspects of archaeology of all periods, and it is very heartening to see a trend in national and local museums at integrating volunteers in different phases of fieldwork, even within rescue projects at medieval settlements' (Hungary).

In some countries, this has led to a growth in the number of opportunities to engage: 'one of the most important effects of this quantitative growth and maturation of archaeology as a self-reliant economic sector is that opportunities for public outreach have grown significantly. Consequently, the societal impact of archaeology has grown exponentially. For example, the region-wide, multi-day archaeological event *De Archeologiedagen* (Archaeology Days), organised yearly since 2018, now draws over 31,000 visitors' (Belgium). Attractions, such as the recreated early medieval settlement at West Stow in Suffolk, England (Fig. 6), and the late medieval buildings at *Bärnau-Tachov Geschichtspark* (History Park) in Germany (Fig. 7), are enduringly popular with thousands of visitors every year.

Elsewhere, a public curiosity about local history and archaeology is viewed as latent, but not yet fully developed. In France, for example, heritage professionals note that greater engagement 'would respond to the public's desire to know more about their own history, and in particular, the history of the villages they live in and support through the construction or renewal of infrastructure'. In Italy, although public interest in medieval archaeology is considered to be rather limited, such potential is indicated by the popularity of medieval re-enactment, often at castle sites. This suggests that medieval rural archaeology can resonate strongly, especially at the community level, where people value insights into the origins and evolution of the settlements and landscapes that they know and inhabit.

9. Roads to ruin? Remaining problems

Notwithstanding the immense achievements of infrastructure archaeology for medieval rural settlements and their study, briefly summarised above, a number of issues remain which prevent it from more completely fulfilling its potential to maximise benefit to the study of medieval sites and landscapes while minimising harm. We list the key issues below; some are specific to medieval rural settlement, whereas others are more widely applicable.

9.1. Insufficient funding

No-one familiar with archaeology will be surprised to learn that funding is a constant problem affecting the effective delivery of infrastructure archaeology in many countries (with the apparent notable exception of Ireland). Although the situation is nowhere as bad as was the case in, for example, mid-20th century England, the problems remain many and various, and to some extent underpin most of the other problems listed in this section.

Structural under-funding arises widely from the design of the systems intended to protect archaeology. In some places, 'fiscal drag' has arisen as fixed prices have not been index-linked: in Poland, official excavation price lists have not changed despite significant inflation, making it 'impossible to manage the tasks' specified by law within allocated budgets. In countries where competitive tendering favours companies offering to complete work at the lowest costs, pared-down funds allocated in tendered budgets may be inadequate. Periods of economic downturns and rising

Figure 6. The educational visitor attraction run by the local authority at West Stow, Suffolk, in England, an early medieval settlement occupied from *c.* AD 420–650, where eight buildings have been reconstructed on the precise sites of excavated features to show different uses, including craft building, farmer's house, hall building, living house, sunken house, weaving house and workshop.
(© Alan Clarke)

costs are widely noted as constraining state and municipal budgets, which are often the source of funding for infrastructure developments – hence, in Hungary, permit cycles dipped in the early 2010s and post-Covid volatility, while Spain's 2008 crash led to closure of nearly half of archaeology firms and a shift back to universities, shrinking capacity for processing and dissemination. In some countries we hear that developers can object even to existing requirements to fund archaeology. Hence, resistance to the 'polluter pays' principle is noted in Bulgaria, where large investors periodically attempt to reduce obligations, citing cost burdens. All these factors foster a fragile environment for heritage protection, especially during periods of economic recession and/or where legal frameworks are contested or under revision.

Funding issues are particularly prone to impact post-excavation stages of an archaeological investigation in several countries where developer funding stops at excavation and basic reporting. Adversely affected activity typically includes post-excavation analysis, where the variety and volume of data from large-scale excavations raise the costs of thorough specialist analysis, report writing, archiving and public engagement. In Austria, companies pay for excavation, initial conservation and a report to the Federal Monuments Authority, but 'further archaeological analyses are not financially covered', leaving palaeo-environmental and specialist studies underfunded. Croatia reports that only around one-third of sites have been comprehensively analysed. Because medieval rural settlement remains should be of special interest to local people and wider publics, the loss of activities that identify, demonstrate and disseminate the significance of new discoveries is particularly acute.

9.2. Sites missed or discovered late

Factors ranging from lack of historical documentation to poor condition of remains can make medieval rural settlement sites easy to miss. Settlements that were aceramic and/or have few cut or upstanding features (such as earthworks or buildings) remain difficult to detect during the desk-based assessment stage and thus are prone to being found only after project budgets have been approved, contracts signed and schedules confirmed. When they are found unexpectedly during fieldwork, resources are not necessarily in place to extend fieldwork adequately, as highlighted in the England chapter. This results in pressure for investigation to be hurried or cursory, constraining what can be learned.

In addition, *during* fieldwork, slight or scattered features (and/or unstratified material from destroyed or truncated deposits) of medieval date may not be noticed or else might be incorrectly identified, leading the former presence of medieval activity to go unreported. This problem is noted by several of our contributors, but is likely to be under-recognised in regions where slight medieval features are even easier to overlook on multi-period sites dominated by much more visible features of classical or post-medieval date.

Received perceptions that medieval remains have previously been absent can shape estimates of the likelihood of finding medieval rural settlement features in future projects and limit the attention given to monitoring – a problem to which medieval rural settlement is particularly vulnerable due to its often-low visibility. Scotland reports a verge section that would not have been considered if not adjacent to known monuments, implying that assumed poor survival can blinker investigation. In England, consultants have too often pre-supposed that later medieval settlement is wholly visible via maps and records, and yet linear schemes routed around modern settlements can still encounter medieval remains.

Given the commonalities in medieval settlement patterns across Europe, it must be suspected that countries that do not acknowledge the risk of medieval rural settlement remains being missed or misidentified have simply not yet recognised this problem.

9.3. Fieldwork bias

There are a number of ways in which medieval rural settlement information is biased. First, all infrastructure-led archaeological discoveries, including those of medieval rural settlements, tend to be concentrated in some areas more than others, because routes and investment cluster in economically developed regions. Hence, in Italy we see a greater concentration in the north compared to the south, while in Bulgaria most infrastructure-led investigations have come in the south, with fewer in the north and fewest of all along the Black Sea. Uneven sampling, of course, produces regional blind-spots in medieval settlement evidence.

Another source of bias comes from excavating small trenches in restricted areas. Although this reduces damage to medieval deposits, it can also miss features, with some feature types more vulnerable than others. Denmark demonstrates how small buildings within large settlements can fall between sampling trenches, with pre-investigation strategies adapted to Iron Age models not necessarily suitable for sparsely inhabited early medieval crofts. Elements of dispersed, open or interrupted settlements are particularly vulnerable to this, such as *Einzelhof* patterns in Croatia represented by small, separated feature groups. Landscape features are also particularly prone to being missed: in Germany, agrarian features, such as lynchets, clearance cairns, watering holes, flax pits, and ridge and furrow were long treated as ‘offsite’ and overlooked, while in Denmark, ditches and ridged field furrows have been recorded surprisingly rarely, despite their importance

Figure 7. Aerial view of the *Bärnau-Tachov Geschichtspark* in Bavaria, 'Germany's largest medieval park', which contains more than 30 recreated medieval buildings and offers visits as well as living history weekends and reenactments. *(https://www.geschichtspark.de)*

to plot/toft structure. Overlooking these land-use signatures will always bias our understanding of settlement economies.

It is difficult to remove these biases given that the areas to be excavated are determined by development requirements not archaeological agendas, but it is important to be aware of them, both when planning mitigation strategies and interpreting evidence found in archaeological survey and excavation.

9.4. Dating

Dating remains a widespread problem. In some regions, early medieval settlements are aceramic, while later medieval structures may leave little below-ground trace. In addition, being relatively recent sites located in open country, medieval levels may be quite shallow, making them particularly vulnerable to truncation by activities, such as ploughing, which may remove dating evidence from features (or destroy features entirely). Experience in Denmark shows that if topsoils and subsoils are not monitored during removal, then vital dating evidence can be missed.

The authors from Belgium emphasise that absolute dating (e.g. radiocarbon and dendrochronology) is 'essential in assigning features and structures secure medieval dates, as is especially true for early medieval features and structures'. The value of this is shown in work in both Scotland and Poland where waterlogged deposits preserved features, such as wells and mills, whose dendrochronological

dating has served as chronological anchors, as well as in England, where metal-detecting along infrastructure easements has led to the identification of early medieval features.

9.5. Data curation and access

After medieval rural settlement remains have been identified, investigated, recorded and interpreted, it is vital that this information can be accessed by people, now and into the future, including developers and archaeologists planning or interpreting investigations, curators and policy-makers making decisions, or wider publics wanting to learn about their history. Most countries reviewed in this volume have digital repositories for completed reports and digital records of sites and monuments. In some countries these are freely accessible online, such as the ADS in England which includes a zoomable map linked to individual records. No system will ever be complete, and in some places mandatory online reporting falls short of meaningful engagement. In Italy, the *Fasti Online* platform was introduced to guarantee dissemination of archaeological investigations, and although reporting was obligatory, Paul Arthur notes that entries were frequently little more than short reports, often prepared before any post-excavation work had taken place. A keyword search for 'medieval' yielded 616 results, which 'looked promising, but in reality is probably just a fraction of what was really unearthed'.

Data *structures* can also present a problem. Denmark notes that entries for multi-period sites to databases allowing only one 'main date' tend to opt for Iron Age, leaving medieval phases invisible to search engines. New digital technology is mostly being adopted only slowly. It is striking that GIS is not used consistently widely to store data or make it searchable or accessible by all.

Problems of data incompatibility can arise over relatively short periods of time. For example, in Belgium, 'over the course of more than a decade of research, registration methods and standards had changed considerably … plans, descriptions and databases could not be easily matched due to differences in file types and degree of registration detail.'

At an even more basic level, data-storage hardware may become obsolete rendering data inaccessible. In Italy, 'much original documentation was stored on floppy disks well into the 21st century and has not been transferred onto new digital supports'. There is a very real risk that without routine digital migration, decades of excavation records could become permanently unusable.

9.6. Publication and synthesis

Publication – delayed, inadequate or non-existent – is noted as a problem in almost all of the chapters in this volume. In the Czech Republic, for example, rescue excavations in more than 2,000 villages produced vast datasets, but fewer than 30 case studies have been published, leaving an enormous body of information unsorted and insufficiently framed. In Hungary, although excavation reports are a legal obligation of the fieldwork director, 'often these comprise short textual summaries containing only basic data, lacking any kind of analysis'. Italy notes that motorway and highspeed rail excavations have generated 'mountains of unpublished material', undermining public access to knowledge. For Croatia, it is reported that only around one-third of sites have been comprehensively analysed, with publication uneven, while most findings from many large infrastructure excavations in Spain remain unpublished, with outputs limited to preliminary reports. When findings remain unpublished, or unexplored through comparative wider syntheses, archaeologists will lack the knowledge base to recognise comparable medieval traces in future projects.

Similarly, there are rarely resources for research-driven synthesis across many sites/projects: for Belgium, for example, we hear that, while infrastructure-led archaeology yields rich data, there

is 'no automatic or rapid conversion' into scientific insights. Several contributors emphasise the value of funded projects to tackle wider thematic questions, including in Austria where 'some new insights into the medieval settlements and work sites both in the lowlands and in the Alpine regions have been gained through the archaeological investigation, but comprehensive analyses framed by specific research questions are rare'. Suggested questions needing such analyses include 'internal village structures, such as markets; the entire network of medieval settlements; crafts in rural areas; and the areas used for agriculture'.

Devolved heritage responsibilities can result in variable standards and fragmentation of records, complicating attempts at nationwide synthesis. In Germany, for instance, responsibility for heritage management across 16 federal states with distinct laws and offices produces inconsistencies; similarly, in Spain, regional laws complicate coherent overviews of commercial archaeology. Synthesis across international borders is, perhaps inevitably, even more difficult due to the use of different data standards in different countries and further aggravated by different languages and terminology. AI may offer solutions in due course, but its use for syntheses drawing out 'bigger picture' insights has barely (yet) been explored.

Solutions include collaborations with universities, which have been very effective in Ireland where EMAP (noted above) was shared between schools in University College Dublin and Queens University Belfast. In Belgium, in 2018, 'the Flemish Government created a yearly project grant to allow for in-depth archaeological research', which has 'the potential to be a valuable tool for this conversion of data into knowledge'; our Belgian authors note, however, that this budget only covers six to eight projects per year. Meanwhile, Hungary's call for research groups and strategic proposals shows how difficult it is to secure funding for enquiry-led research that extends beyond basic requirements for legal compliance.

Ironically, while the funding of syntheses can be regarded by some developers as beyond their responsibility, it is precisely this sort of work that enables the significance of new discoveries to be recognised, not just by archaeologists, but also, vitally, by policy-makers and wider publics.

9.7. Quality control and maintaining standards

The competitive nature of some infrastructure-led archaeology can encourage contractors to be as time- and cost-efficient as possible, which potentially risks compromising standards. For the Flanders area of Belgium, it is noted that 'while there is a *Code of Goede Praktijk* (Guide of Good Practice) that sets minimum requirements ... in practice, quality control falls short'. In some countries expertise in medieval rural settlement is limited, unrecognised and/or undervalued. Regional offices in devolved countries may have decision-making development control officers trained in administration, but not always in heritage or archaeology, let alone medieval archaeology. Where regional archaeology offices exist, expertise may be concentrated in state departments, leaving gaps in decision-making capacity (as noted for Germany). Insufficient development-control expertise can weaken requirements and undermine monitoring. Licensing criteria may not credit expertise (regional, chronological, material culture), discouraging specialist appointment and reducing knowledge transfer (as highlighted for Belgium). When expertise is undervalued, it may become lost, leading to medieval phases being missed or misinterpreted. Professional standards may be set for archaeologists, for excavation, post-excavation and dissemination, but these might not necessarily be enforced, producing uneven quality and limited accountability. Standards once set can decline over time.

Issues can also arise in maintaining standards over time: 'the trend that emerges reveals that while the first major excavations were professionally strong and thorough, subsequent engagement suggests reduced interest and resources as time progressed' (Hungary), and 'discontent among large private and public investors regarding the requirement to pay for archaeological works, generating periodic attempts to change the system and reduce developers' obligations' (Bulgaria).

9.8. Research frameworks/agendas

As Richard Newman notes in advocating for English research agendas, 'Merely observing these sites as beads along a random string is not good enough. Opportunities need to be taken to understand change and complexity at the landscape scale'. Research frameworks are valuable because by identifying outstanding questions and opportunities for further progress, they enable the significance of new discoveries to be demonstrated, and their value to be explained to non-experts. To this end, the *Onderzoeksbalans Archeologie* (Archaeological State of the Art for Flanders) is focussing on identifying the research questions that development-led archaeology can help tackle. In countries that lack frameworks summarising the state of knowledge and remaining questions are absent, it is difficult to assess the value of any new discovery: 'at this stage of archaeological research in Bulgaria, a settlement of a similar character [i.e. rural settlement] and from this period [i.e. medieval] has not yet been investigated, so it is difficult to make a proper comparison'.

9.9. Public engagement

Infrastructure archaeology has offered, and continues to offer, unparalleled chances to connect people with 'their' medieval past – the past of everyday people and places. Public awareness of medieval settlements and land-use patterns has improved in some places, such as in Hungary, where we are told of 'a growing interest from the public towards different aspects of archaeology of all periods'. However, progress is clearly uneven across Europe. Thus, for Bulgaria, it is noted that 'these infrastructure-led medieval rural settlement-related discoveries would have more impact if their results were more widely disseminated. Increasing public awareness of the links between abandoned rural settlement sites and the places that people inhabit today has potential to increase public support for archaeological investigation'. Italy's Ministry of Culture is urged to be 'more open-minded to the idea of external collaboration, of both the general public and universities, fully aware that knowledge of the past is not just property of the ministerial chosen few. At present, the public is little more than a passive recipient of what information the government decides to disseminate.'

Where dissemination is tokenistic or delayed, and where medieval rural settlement remains compete with more visually striking heritage (such as precious-metal finds or well-preserved ornate buildings), awareness and interest remain low: 'public interest in and knowledge of these centuries seemingly wane in contrast to the remains of pre-Roman local cultures and *Magna Graecia*, despite medieval re-enactment having become a popular public activity' (Italy). Public engagement should be a priority for funders as it helps demonstrate the societal value of their business, while low levels of public awareness or interest not only discourage future public engagement, but risk undermining public support for archaeological investigations for which they may be paying, directly or indirectly.

10. Actions for best outcomes from infrastructure-led medieval rural settlement archaeology

All told, the 15 chapters in this volume show the extent to which infrastructure-led archaeology has impacted on the medieval settlements that precede and underlie the places we all live in today, from the smallest farms to the largest cities. The contributors have also shown the wealth and significance of the new discoveries that have been made as the threats to these sites have been mitigated through excavation, analysis and publication.

The overarching conclusion we can recognise is that, across Europe, infrastructure archaeology has shown that medieval rural settlement remains occur more widely than previously suspected, and that archaeological investigation can provide important new insights into the medieval history and development of the places we all live in or near. Infrastructure works are particularly likely to impact land that has not hitherto been investigated, with linear works tending to encounter larger numbers of settlement remains, and open-area works allowing more comprehensive investigation of these. The outcomes from these different types of investigation complement each other when insights from different projects are combined.

However, the reviews in this volume have also shown how medieval rural settlement remains can be widely vulnerable to being missed or overlooked at every stage of the mitigatory process for infrastructure developments. There is a particular tension intrinsic to the investigation of medieval rural settlement deposits due to their frequently slight, undated, damaged or destroyed nature. Valletta-derived requirements tend to focus on treatment of *surviving* archaeological remains, with less consideration given to the value of characterising destroyed elements and unstratified deposits that would improve understanding of surviving features.

As we can see that positive outcomes from infrastructure-led archaeology can 'significantly influence subsequent decisions to implement archaeological monitoring on similar infrastructure projects, leading to the assessment of comparable projects as standard practice' (Belgium), we offer here ten actions identified across the many countries reviewed in this volume which we feel are needed to ensure that the discovery of medieval settlement remains fulfils its potential to inform, enlighten and enthral, thereby mitigating the impact of their destruction by infrastructure development. Some of these recommendations are specific to the study of medieval rural settlement, but most would increase knowledge, understanding and appreciation of a much wider range of archaeological evidence encountered during infrastructure works.

10.1. Mandate developers to fund the full archaeological lifecycle from assessment → evaluation → excavation → post-excavation → publication → accessible archive

We should mandate ring-fenced funding for all stages, index-linked to inflation, and include deliverables for interpretive reports, publication, open digital archiving and public engagement. Ireland's *Code of Practice* shows this works when embedded in contracts. Prioritise prompt studies of medieval objects and material culture (e.g. ceramics, metals, bone/antler, organics), rather than consigning collections to museum archives for some future, unknown date of revisiting.

Benefit: This action ensures medieval rural settlement evidence is not just 'preserved by record' and then forgotten, but contributes to wider knowledge that can grow over time. It responds to identified remaining problems of insufficient/fragmented funding, lack of publication and data curation issues.

10.2. Ensure degrees, apprenticeships and professional development include content on medieval rural settlement and landscapes

Many practitioners undervalue apparently modest features such as pits, ditches, charcoal-production pits, and plough ridges that are diagnostic of medieval rural life. Include content in all degrees, apprenticeships and professional development on medieval settlement archaeology, settlement forms, dispersed patterns and landscape features.

Benefit: This action ensures that more knowledgeable archaeologists will be better able to identify and interpret subtle medieval evidence more effectively, reducing information loss and enriching

wider understanding of rural communities. It responds to identified remaining problems of variable expertise and disciplinary bias and undervaluing of small/slight features.

10.3. Refine on-site sampling and monitoring standards to reduce risk of site/feature loss

Medieval settlements, especially those which are small or in landscapes of dispersed settlement are often missed by insufficiently detailed assessment. We should require systematic trial-trenching in areas of identified high potential, monitoring and recording of all affected areas and contingency budgets for unexpected finds; and require unstratified deposits to be monitored for finds during removal, agrarian features recorded as core evidence, and negative results to be reported to inform future risk models.

Benefit: This action can improve detection and dating of medieval rural sites beyond nucleated village cores, reducing loss and enabling more representative study of settlement diversity. It responds to identified remaining problems of sites being missed or discovered late, dating difficulties and disregard for medieval landscape features and negative evidence.

10.4. Strengthen governance to require, recognise and reward high levels of professional knowledge and expertise

We must better recognise medieval expertise in procurement scoring and licensing. We should publish best-practice guides and case studies to show how small finds inform big questions about economy and social structure, and close compliance gaps with automatic reporting of major works, penalties for non-notification, and enforce minimum coverage standards. Tariffs should be index-linked to inflation and standards should be co-ordinated via cross-regional frameworks to avoid inconsistencies.

Benefit: Strong governance ensures medieval rural settlements are not destroyed without record and that investigations meet consistent, high standards across all landscapes. It responds to identified remaining problems of quality control and fieldwork bias.

10.5. Mandate scientific dating wherever possible for undated features/contexts

Medieval settlement sites that are aceramic or have few surviving cut features need scientific dating and environmental sampling. We should mandate radiocarbon dating/dendrochronology where possible, involving specialists from project design stage, with protocols for soil, pollen, macrofossils, and zooarchaeology. Metal-detecting and monitoring of machine-removed deposits should be used to screen for unstratified/decontextualised finds that may be datable. We should require prompt reporting so that density maps can be developed to help future assessment of significance thresholds.

Benefit: This action secures greater chronological precision and reduces the risk of features of medieval date not being identified as such. This helps reconstruct land-use, economy, and lifeways, allowing medieval rural settlements to be interpreted in context rather than left as largely undated anomalies. It responds to identified remaining problems of dating difficulties and failure to monitor unstratified deposits.

10.6. Develop archive data systems that make medieval sites, phases or features more visible and accessible

We should require multi-period indexing, digital migration of legacy data, and open access deposition of reports and datasets. GIS should be used across Europe to make data available at scales ranging from hyper-local to continent-wide. We should fund meta-analysis projects (e.g. exploring the use

of AI) to provide new insights into patterns in the data and incentivise university partnerships for thematic syntheses. Negative results should be reported and integrated into online digital archives. Devolution should require coordination to enable comprehensive syntheses.

Benefit: This prevents medieval phases from being lost within archives and enables comparative research across hundreds of sites, transforming isolated finds into coherent narratives of rural medieval life and improving the accuracy of 'risk models' for medieval remains that will ensure pre-excavation assessments are realistic and cost-effective. It responds to identified remaining problems of data curation and access and publication backlogs.

10.7. Maximise public engagement and interest by collaborating with community organisations and public groups

Medieval rural settlements are the antecedents of modern communities of all sizes, yet they lack the visual drama of castles or cathedrals. We should provide training in public engagement for archaeologists and involve organisations and groups familiar with communities most connected to infrastructure developments to co-create resources (e.g. school packs, accessible archives, exhibitions, reconstructions) and activities (e.g. site visits, volunteer participation, archives) that will most beneficially connect people with new discoveries, support learning and local economies and increase public interest in 'their' medieval rural settlements. We should aim to connect rural settlement discoveries from infrastructure archaeology to local identity, familiar places, aspired destinations, local landmarks and school learning. Museums and living history attractions should integrate volunteers into fieldwork and curate exhibitions illustrating how ordinary medieval life shaped today's landscapes.

Benefit: Members of the public working with skilled professionals able to inform and engage communities increase the chances of new discoveries being able to be valued as part of communities' shared heritage and to deliver meaningful benefits, such as to well-being, education, place attachment, visitor economy, etc. Greater public engagement builds social value for medieval rural heritage, encouraging protection and generating support for research funding. It responds to identified remaining problems of insufficient public engagement and lack of funding.

10.8. Fund collaborations with universities/academic institutions for syntheses and meta-analyses of new discoveries

Formal partnerships with universities and other research institutions, including museums, can be very effective in enabling thematic syntheses which extend beyond the scope of single projects. Embedding infrastructure-led archaeology into university courses in archaeology (e.g. field methods, medieval rural settlement studies) will mean that students learn from real datasets and develop skills in interpreting dispersed, low-visibility sites. Universities and others could offer benefits to field archaeologists, through updating research literature, access to libraries and educational programmes. Furthermore, joint supervision of MA/MSc and especially PhD projects can convert grey literature into monographs and comparative studies.

Benefit: This transforms compliance data into academically robust outputs and trains future archaeologists to value and interpret medieval rural settlement evidence. Insights from syntheses will enable the significance of new discoveries to be demonstrated, and the value of future discoveries to be immediately evident. It responds to identified remaining problems of deficits in capacity for synthesis and uneven knowledge of medieval rural settlements.

10.9. Carry out a Europe-wide resource assessment for medieval rural settlement that will enable the significance of future discoveries to be demonstrated

Structured resource assessments linked to digital GIS data systems that draw together what is known about medieval rural settlement and its character and condition in different places, and that identify gaps in evidence enable future work (whether led by developers, researchers or wider publics) to be targeted, designed and prioritised effectively so they can be of the greatest possible benefit. Using evidence from infrastructure archaeology in this way, to show how it can contribute to wider knowledge and guide other strategies, offers another way for its benefit to be demonstrated.

Benefit: This action ensures that anyone can know where medieval rural settlement remains of different types have been found, helping planners and contractors define realistic requirements, evaluation strategies and budgets, design appropriate sampling strategies and resources allocations and enhance place-based public engagement (interactive maps; community projects) that connect today's settlements to their medieval antecedents. It responds to identified remaining problems of fieldwork bias, inconsistent data and geographical blind spots, and negative evidence and sites being missed because risk models are inaccurate or incomplete.

10.10. Develop research frameworks for medieval rural settlement in Europe which will help practitioners target resources and demonstrate value.

Without clear research frameworks with clear agendas, infrastructure archaeology risks producing isolated site reports of limited wider significance. Research frameworks at regional, national or international scale define priority questions (such as the origins of nucleated villages, dispersed settlement dynamics, agrarian systems, materialisation of social hierarchies, processes of culture change, patterns of health and sickness, impact of climate change, etc.) and link the investigation of these questions to infrastructure work. Such frameworks can also help justify funding for synthesis, encourage collaboration between commercial archaeology and academia and provide a springboard for public engagement. Given that the boundaries of modern European countries and regions may not always have relevance to medieval borders, agendas should include cross-border collaborations on medieval rural settlement, possibly with support of EU-border funding and agencies.

Benefit: Research frameworks elevate the significance of medieval rural settlement discoveries, ensuring that they inform big-picture narratives rather than remaining as disconnected compliance outputs. It responds to identified remaining problems of individual sites not contributing to wider understanding and generates an agenda to tackle gaps and biases in existing knowledge.

Summary

Taken together, the ten actions summarised above show how the immense potential of infrastructure-led archaeology for medieval rural settlement can most effectively be fully realised. The preceding chapters have demonstrated that such settlements are far more widespread, diverse and informative than previously assumed, yet also very vulnerable to being missed, misinterpreted or left unpublished. The actions build on established good practice across Europe, distilling the mechanisms needed to convert this expanding body of discoveries into secure knowledge, coherent narratives and lasting public value.

Implementing these actions will ensure that archaeologists can anticipate and recognise medieval rural settlement more effectively, through better training, improved sampling strategies, consistent scientific dating and stronger professional frameworks. This will lead to more accurate identification, recording and interpretation of the often subtle and dispersed traces that characterise medieval

rural settlements. Strengthened governance, complete funding cycles and robust data systems will ensure that evidence is not only excavated, but also properly analysed, archived and made accessible.

For medieval archaeology as a discipline, these actions will support the creation of reliable, comparable datasets, enabling regional, national and cross-European syntheses that will illuminate the development of settlement forms, landscapes, economies and populations. They will help ensure that new discoveries contribute meaningfully to wider historical questions, rather than remaining isolated compliance outputs and help develop new lines of enquiry for the future.

For wider society, these actions will unlock the stories of the people and places that underpin today's rural landscapes. Better dissemination and community-centred engagement will allow these discoveries to foster local identity, well-being and public understanding of heritage.

Finally, developers and funders will benefit from clearer risk models, fewer unexpected discoveries, more predictable project planning and an enhanced ability to demonstrate the social value and public benefit of the work that they support.

11. Final thoughts

The 15 country-based reviews in this volume combine to suggest that medieval rural settlement features typically make up 10–15% of all sites found during infrastructure projects (and sometimes this figure can be as high as 50%). Our contributors have also clearly demonstrated the capacity of infrastructure archaeology to mitigate the damage caused to medieval rural settlements by advancing knowledge about them: infrastructure-led investigations can *discover* previously unknown medieval rural sites and add significantly to the number of such sites that have been *excavated*. This is developing archaeologists' knowledge of *what* these sites look like, *where* they may be found and how *insubstantial or truncated* their features may be, helping ensure that future remains will be more easily identified and better understood. This is beginning to overturn pre-conceived ideas which believed that medieval rural settlement was mostly already known, and that excavation outside existing villages was unlikely to reveal anything new about the medieval countryside.

Importantly, this volume highlights how these sites are not only interesting discoveries in their own right, but are also transforming our wider understanding of the extent and character of human habitation in the medieval millennium, revealing a complex, shifting kaleidoscope of regional variation and change over time in greater detail and precision than ever before. Discoveries from infrastructure-led investigation are helping tackle wider questions, such as the density, pattern and complexity of settlement and related demographics across the medieval period, and of the ways in which different sites related to one another and to their landscapes, and how and why this changed over time. As the authors of the Belgium paper note:

> 'The significant increase of data generated and gathered from such investigations has enabled the conduct of vital archaeological baseline studies on rural settlement and landscapes of the medieval period … This has fundamentally reshaped our understanding of the distribution, character, and evolution of medieval rural settlement. While the significance of archaeological research conducted during the 1970s to early 1990s should of course not be underestimated, it is only through this modern period of development-led archaeology that medieval rural archaeology has truly matured into a distinct subdiscipline equipped with extensive datasets.'

Replicated across many counties, this is a remarkable achievement and should be celebrated.

Compared to before the 1990s, well-managed infrastructure archaeology has, over the last three or four decades, helped medieval rural settlements and their landscapes to be better known, better understood, better contextualised, better appreciated and better protected, as new understanding has been embedded into planning, evaluation, research agendas and the public record. Infrastructure developments have required and enabled archaeologists to recognise medieval rural settlement in all its subtlety, including settlement patterns that are dispersed, nucleated and mixed, features that range from easily identifiable to near-invisible, and material culture that may be rich or absent; all integrated within complex, shifting mosaics of land-use, communication and culture. These insights are increasingly embedded into planning frameworks, evaluation methodologies, research agendas and the public record.

Considerable potential remains for the future to study wider topics as diverse as 'the transformation of the early medieval settlement pattern and the establishment of nucleated villages by the later Middle Ages; the formation and development of village layouts, house-plots, farms and rural housing; as well as the examination of socio-economic changes, material cultures, living standards and the connectivities of peasants in the *longue temps durée* perspective from the beginning of the Middle Ages to the modern era' (Czech Republic).

The remaining challenges are clear: convert existing field data (including negative results) into accessible, comparative syntheses, high-quality public publication and effective training so that archaeologists will be increasingly better able to recognise, interpret, disseminate and celebrate the significance of medieval rural settlements that are seen anew through the vast windows into the past that infrastructure developments can prise open.

Achieving this is fundamental to securing a fuller, richer and more accurate understanding of Europe's rural medieval past that reflects its richness, diversity, resilience and dynamism, and its enduring relevance to the landscapes we inhabit today.

This volume provides a unique new Europe-wide perspective on the impact of infrastructure led archaeology on our knowledge of medieval rural settlement.

Good infrastructure is essential for modern society to function well, but its construction can be immensely destructive of archaeological sites including medieval settlements whose remains are rarely sufficiently monumental to warrant costly redesign to preserve them intact. However, since the adoption across Europe of the 'polluter pays' principle obliging developers to fund the identification, investigation and recording for posterity of at-risk archaeological remains, our understanding of the extent and range of medieval settlement remains in the landscape has expanded substantially.

The book's chapters explore the paradox that 'While largescale infrastructure projects represent a major challenge for archaeology, they also offer opportunities to expand scientific knowledge' (Rácz & Sárosi, this volume). Fifteen new reviews by experts in medieval archaeology and heritage management in Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, England, France, Germany, Hungary, Ireland, Italy, Poland, Scotland and Spain consider the impact of discoveries from infrastructure-led archaeology on knowledge of rural settlement in the past, and on archaeological practice today. The volume culminates in a synthesising overview distilling transnational themes and identifying ten key actions shown by experience across these fifteen different states to maximise the knowledge dividend of infrastructure archaeology.

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