MANAGING ARCHAEOLOGY
IN DYNAMIC URBAN CENTRES

edited by
**Paul Belford
& Jeroen Bouwmeester**

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Introduction: issues, principles and practice

Jeroen Bouwmeester and Paul Belford

This volume has its origins in a session organised by the editors at the 23rd annual meeting of the European Association of Archaeologists (EAA) in Maastricht in 2017. A series of interesting case studies were presented, which provoked wide-ranging discussion. Some of the chapters in this book come from presentations made at the session, others have been contributed by members of the audience there or at a subsequent EAA session the following year in Barcelona. This was, of course, not the first appearance of urban archaeology at an EAA meeting. Every year there are numerous conference sessions and individual papers which deal with many of the themes around archaeological understanding of the creation, use and decline of urban spaces by populations from prehistory to modern times. Indeed, the session which generated this book was one of four dealing with urban archaeology at the 2017 conference alone. The editors of this volume had organised sessions at earlier conferences – notably in The Hague (2010) and in Oslo (2011). What, then, makes this volume different and special?

The 2017 EAA meeting was typical of many. Quite understandably, most discussions of urban archaeology tended to focus on the scientific results themselves rather than the conditions under which those results were obtained. Thus an excellent session on the role of archaeological science in understanding patterns of urban life focussed on techniques such as bioarchaeology, artefact analysis, micromorphology, and stable isotope analysis (Degraeve *et al.* 2017). A more theoretically-directed session explored the creation of urban spaces and identities using artefactual and ecofactual studies from a range of European cities (Dahlström *et al.* 2017). A related session looked at disseminating those networks based on archaeological material (Parby *et al.* 2017). Other sessions contained papers which used urban locales to explore particular theories or approaches. Examples chosen more or less at random included the use of network theory to discuss elite urban architecture in Pompeii and Herculaneum (Barker *et al.* 2017); the use of historical bioarchaeology to examine medieval urban populations (Altena *et al.* 2017; Suppersberger 2017); and early medieval mobility in urban contexts in Denmark, the Netherlands, the Czech Republic and Hungary (Croix *et al.* 2017). These and others tended to foreground

academic results rather than the problems associated with designing, directing and delivering archaeological outcomes in complex urban projects.

In some cases, papers did address issues of resourcing and project management as well as conservation and interpretation in urban situations (Kadrow 2017; Kjærgård 2017; Peppas 2017; Cousserier *et al.* 2017; Siddell 2017). However these issues were either secondary to the academic findings, or they were considered as technical problems in isolation rather than in the context of dynamic urban development. We were concerned that the issues of resourcing, project management, conservation and interpretation needed to be explored in their own right – and specifically in relationship to the complexities of urban regeneration schemes. It was clear that archaeologists across Europe (and beyond) face a number of similar challenges, despite the very different structures and frameworks for dealing with urban archaeology in different places. The session – and this book – represents the first attempt to look at these challenges, and possible solutions, in the round and on a pan-European basis.

The rest of this introduction is in two parts. The first explores what some of these issues might be, and how they might be resolved in practice. The second introduces the individual papers and some of the strands which they have in common.

1 Issues, principles and practice

1.1 Archaeological resource management

Archaeological heritage management changed dramatically in the last century. Beginning as an archaic form of management to protect special sites against demolition, such as the 1734 Act in the Netherlands to protect megalithic tombs, or the first UK Ancient Monuments Act of 1882; the discipline has evolved to consider all archaeological remains, not just the visible ones (Brongers 1976; Willems 1997; Belford 2012). Today archaeologists are sitting next to developers discussing how to deal with all archaeological remains. The late Willem Willems gave an overview of the development of archaeological heritage management in Europe in one of the first issues of the *European Journal of Archaeology* in 1998. He defined three phases. The moment each phase starts and ends differs between the different countries (Willems 1997; 1998, 294-296):

1. The early phase. From the eighteenth century onwards archaeology develops as a discipline, and in this period the first ordinances to protect monuments are published;

2. The formative period. In this phase the first legislation is enacted, and behind this a system is developed which regulates the listing and protection of sites and the excavations. This period is about the care and protection of monuments: already in the nineteenth century there was a state-controlled national heritage in Italy and Greece for example. A large part of the excavations are rescue excavations, reacting to developments;

3. The third stage is the new concept of the management of archaeological resources, which began to develop from the mid-1980s. Instead of a reactive approach, archaeologists developed models and carried out surveys with long term preventive goals. Archaeological heritage management was carried out within the regional context,
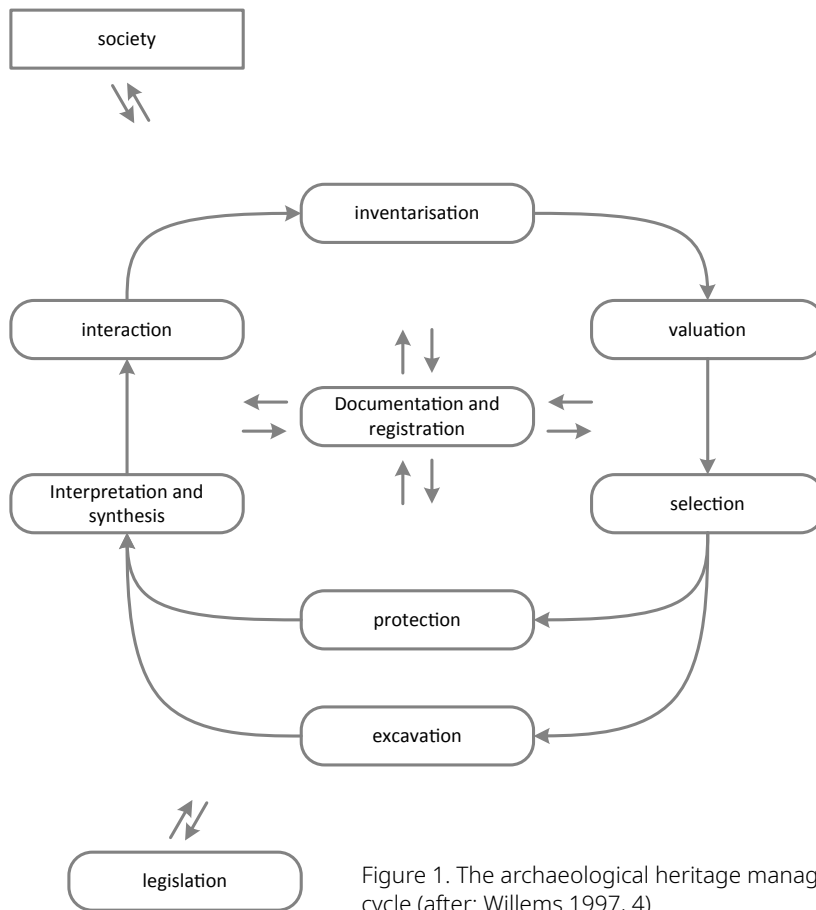
Figure 1. The archaeological heritage management cycle (after: Willems 1997, 4).

political context and the land-use planning process. The Valletta Treaty (1992) was an important milestone in this third stage. The process of the management of archaeological resources had a cyclical nature (Fig. 1).

1.2 Archaeological heritage management in an urban context

The development of archaeological heritage management in an urban context followed the phases outlined by Willems. In the first phase the first urban 'excavations' took place. Many of these excavations were focused on remains from the Roman era, which lie underneath many European towns; medieval sites were not completely neglected although not always given the prominence they later had. The remains were often documented in a rudimentary way and excavations were focused on digging up objects rather than establishing context. Later, during the first half of the twentieth century, new urban excavations took place which not only looked at specific Roman remains but also turned their attention to the medieval period and later, connecting the modern town with its own past (Sarfatij 1992, 10-11; Fehring 1996, 7; Schofield and Vince 2003, 4-12).

Perhaps the biggest stimulus to urban archaeology was the destruction of many towns and cities during World War II. Older remains were revealed beneath demolished buildings and needed recording. The process was accelerated during the urban renewal during the

1960s and 1970s. Local governments wanted to modernize the urban environment by building new roads, shopping centres and other infrastructure within the old urban core, thereby destroying medieval and later buildings and the archaeology beneath. Although the archaeological work was on a relatively small scale, archaeologists were able to raise public awareness about the destruction of heritage. In several countries the effects of all this destruction was investigated; an early example being in the UK (Heighway 1972; see also Belford this volume). It was evident that post-war rebuilding was causing severe erosion of the archaeological record, and measures were needed to prevent it. This changing attitude towards archaeological remains represents Willems' third phase: not saving archaeological remains by rescue excavations but trying to prevent further demolition of archaeological sites. The situation was the same across Europe: in Germany, the Netherlands and the UK the response involved a combination of measures – setting up archaeological units or companies, employing city or county archaeologists, and encouraging preservation of archaeological remains during development (Fehring 1996; Janssen and Verhaeghe 1992; Künow 1992; Schofield and Leech 1987; Schofield and Vince 2003; Van Es *et al.* 1982; Verhaeghe 1990). One major factor didn't disappear: the highly dynamic urban environment which makes preserving archaeology and excavating sites a challenge.

A significant moment in the development of the archaeological resource management in Europe – and therefore also of urban archaeology – was the Valletta Treaty (1992). The two 'prime movers' of change identified by Willems were: first the necessity of taking the archaeological remains into account in new developments; and second that those responsible of the development projects had to pay the costs for the archaeological work (Willems 1998, 296). As a result the position of archaeologist changed: in many countries they became more equal with other parts of government and with the developers. This fundamental change was visible everywhere; however the degree to which it was implemented varied depending on the individual arrangements that were already existing in each country.

Urban archaeology in the 21st century

Although the economic crisis of the early twentyfirst century had an impact on the scale of urban developments, the situation within towns didn't change dramatically. The environment remained highly dynamic, and consequently the following conditions prevailed:

- A high pressure on space;
- Many stakeholders and interests (from environmental to social house building);
- A high concentration of archaeological remains, often deep underground;
- Complex building projects with many partners and subcontractors;
- Complex sites and circumstances for archaeological excavation;
- Difficult to keep sites intact (preservation *in situ*).

The challenge to unite archaeological heritage management with building and infrastructure projects remained the same. Indeed this challenge is becoming more difficult, as the notion of 'sustainable development' – widely adopted across Europe and beyond – means that there is a greater pressure to increase density within urban areas rather than extending them. This means destroying old buildings, building new and larger buildings; and also potentially using more of what is left of open (and green) space.

As a consequence archaeologists have had to become more flexible and adaptable in looking for solutions. On the one hand this means a change in emphasis from 'recording' to delivering understanding – acquiring more information from the same material by using new techniques, especially in archaeological science (the third science revolution). On the other hand new methods are also being developed to improve 'preservation *in situ*' – to keep archaeological remains intact and yet still make new buildings possible, for example by using piles for foundations (see Groenendijk, this volume). Another development is researching the layout of the urban environment and developing predictive models (Bouwmeester 2017; Bouwmeester *et al.* 2017). These approaches help government, urban planners and developers to find the best locations for new projects, and either causing less damage to the archaeological record or making a 'least worst' decision and accepting the costs for archaeological excavation. Connected to the development of models is a better understanding of urban archaeology and urban development as a whole.

Unfortunately urban archaeology as a discipline is very fragmented. Many archaeologists focus on their own town, and see their own town as a unique site (see for example Schütte 1992, 60). This is of course logical but on the other hand by exchanging knowledge of urban archaeology and comparing the development of towns, a better understanding of individual towns can be achieved. For delegates at the EAA, of course, this goes without saying. In many countries efforts have been made to share understanding and recognise common issues and areas for future research. In the UK projects in Scotland and England during the 1990s and early 2000s synthesised data to arrive at coherent narratives and research questions; there were also attempts in the same period to develop 'research frameworks' for use in development control (see Belford, this volume). Sadly these have now run out of steam, as apparently have the biennial Lübecker Colloquia exploring the urban archaeology of the Hanse region and its hinterland. In the Netherlands there have been several initiatives: two projects were carried out within the Valletta Harvest project – 'huizenbouw en percelering' (house building and parcelling) and 'ambachtelijke productie' (artisan production); another project is The Urban Graveyard (Van Oosten *et al.* 2017; Van Oosten *et al.* 2018).

There is one fundamental transition within society that already dawned in the 1990s which is a new role for the public. Article 6 of the Valletta Treaty places archaeologists under an obligation to promote public access to the results of their research. In his third phase Willems made a scheme of the archaeological process and explicitly mentions the interaction with the public (Fig. 1). In 2005 European countries concluded the Faro Convention. Not all countries have ratified this treaty, but still the heart of the agreement is visible within the archaeological system. The Faro Convention is about the meanings and uses people attach to cultural heritage and the values this heritage represents: the convention talks about a changing society and a new role for its inhabitants as communities of interest and knowledge. This means a growing public involvement in the heritage process, which includes archaeology.

Entering the fourth stage of the archaeological heritage management system

Archaeology – including urban archaeology – is entering a new, fourth, stage in the development of the archaeological heritage management system. The basics of the process remain the same, but changes are taking place to the way these stages are carried out

and who is involved in them. In the third stage the processes were largely carried out in a 'closed' professional system which connects with the outer world at particular times – such as through legislation or public consultation – but remains somewhat aloof from the public on a day-to-day basis. In this fourth stage the process is carried out by professional archaeologists embedded and (partly) integrated in a public environment. This doesn't mean that all activities are carried out by professionals and the public together, but the growing involvement of the public is clear. Although some archaeologists would find this involvement worrying, in fact closer engagement by the public in archaeological research and decision-making is a benefit for archaeology and cultural heritage more widely.

Greater public engagement gives archaeologists many opportunities. In discussion, planning and management of urban space developers and government don't always give archaeology and heritage the prominence it deserves: the position of archaeologists is often weak compared to other interests, such as social housing, economic growth, public safety and the natural environment. Public involvement and engagement can change this: the position of the archaeological heritage can be improved. Individuals and groups such as heritage societies can influence politicians and the public debate. Investing in a group of local followers pays back: by involving the public in their research and encouraging public engagement with archaeological research questions and results, it becomes easier to develop a shared responsibility. The successes of this sort of approach have been borne out across Europe. Those municipal archaeologists who survived the cutbacks during the economic crisis of 2007-2009 – in the Netherlands, Germany and UK for example – were those who were most successful in connecting with the public and local politicians.

Of course, there are still risks. Public support can fall down when people themselves have to pay for archaeological research or feel the constraints of the archaeological agenda. It is therefore essential to keep informing the public why archaeology is important, and to help individuals through the process. This is especially the case in small-scale developments, where the costs of archaeological work can be disproportionately high. For towns without a town archaeologist reaching out to the public is often complicated and also expensive to manage, and in these places the risk of losing public support for archaeology is very high. Resources are important, but it is not just about resources; it is also about the right attitude and approach to the public (Van den Dries 2016, 134-135; Olivier 2016, 21).

1.3 A new archaeological heritage management cycle

These changed conditions can be put together in an altered archaeological heritage management cycle (Fig. 3). An important change is that the archaeological heritage management process is placed within society instead of outside society and just interacting with it. Also a fundamental change compared to the third stage, is that after the evaluation and selection of a site there is no 'black and white' choice between preservation and destruction. There is an important moment of interaction between the builder or developer, the government, archaeologists and other stakeholders. At that moment all these stakeholders plan together what choice is best for that specific situation: it need not be a complete excavation or a complete preservation *in situ* of a site, but can (and must) be a combination of the two (see Groenendijk, Bouwmeester and Bis-Worch, this volume). An important and often underestimated part of a project is to engage the public in the archaeological results to bring about a greater understanding of urban development and

Society

inventarisation

interaction

valuation

Documentation and registration

selection

Interpretation and synthesis

Design

protection

excavation

legislation

Knowledge:	knowing and awareness what is important and/or valuable and why
Instruments:	maps/models with disturbances, archaeological sites, monuments etc.
Support:	what is important for the public and/or government
Policy:	legislation

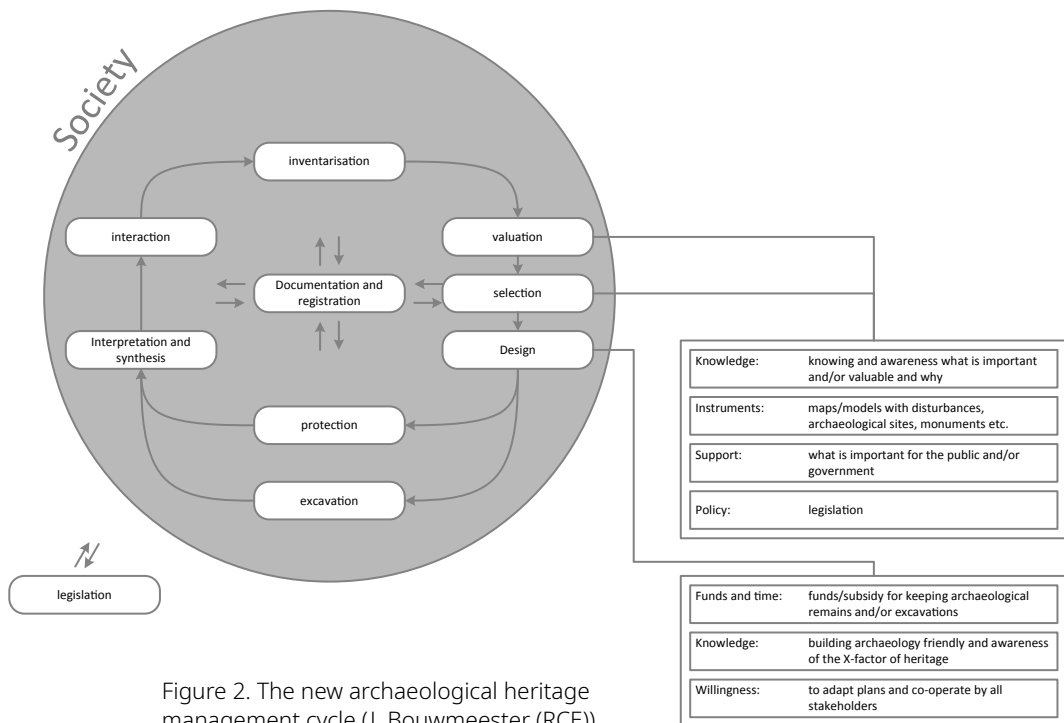| Funds and time: | funds/subsidy for keeping archaeological remains and/or excavations |
| Knowledge: | building archaeology friendly and awareness of the X-factor of heritage |
| Willingness: | to adapt plans and co-operate by all stakeholders |

Figure 2. The new archaeological heritage management cycle (J. Bouwmeester (RCE)).

place-making through time. This in turn creates support for the act of archaeology itself – this moment of interaction is the moment to think about all these aspects and defining the right strategy.

In Figure 2, the right-hand column within the process represents the decision making. There are several necessary conditions for making the right choices and also for organising the process. For evaluation and selection it is necessary to decide on which archaeological remains are important or valuable to society – and not just from the scientific or professional perspective of archaeologists, but also to the wider public (Olivier 2016, 21). This requires ways of assessing the significance and uniqueness of the site, including models (real and virtual), maps and images. Archaeologists need to be sure that their value-judgments and decisions are supported by the public, politicians and government. Finally, in order to make decisions and implement the changes, it is necessary to have the correct legislation in place.

The design of a project needs to reflect the importance of the archaeological remains that may be encountered. Important choices need to be made during this design process: will these remains be completely excavated or is it possible to preserve (parts of) the archaeological site? How then can archaeological remains be integrated in the new building (if it is preserved *in situ*), or how can remains and our knowledge of them be shared with the public during and after the excavations. Knowledge of the technical possibilities, such as piled foundations, helps to improve the design of the project. None of this is possible of course without the funding to be able to carry out the plans. To be successful in designing the project and really integrating archaeology and involving the public, it is important the stakeholders are able to agree on the priorities and process (in Dutch this concept is known as the *poldermodel*) and create a successful project for all

parties. This is of course an ideal situation but working on these conditions will improve archaeological resource management in urban context.

1.4 Sharing and developing knowledge

Sharing and developing knowledge is vital for improving the position of archaeological record, archaeologists and their research within the process. This can be divided into several categories:

- Sharing the results of archaeological research of towns;
- Sharing knowledge of and developing new techniques of archaeological research;
- Sharing knowledge of and developing new construction methods and thereby saving the archaeological record beneath new buildings;
- Sharing knowledge of diverse types of disturbances (human, environmental) and of protecting the archaeological record against these;
- Sharing knowledge of creating predictive models;
- Sharing knowledge of better interaction with the public and interest groups, also with for example environmental groups, but also developers and politicians to improve the position of archaeologists and their interests.

For urban archaeologists it is vital to share this knowledge. The aim of the community for urban archaeology and this book are vital in building an improved urban archaeological heritage management in Europe.

2 About this book

The chapters in this book are arranged broadly north-to-south. Edita Povilaitytė-Leliugienė begins in Lithuania, discussing some of the contestations around the heritage of Gediminas Hill and the Upper Castle in Vilnius. She touches on a range of themes that echo throughout the volume. These include the role of heritage in reshaping national identities, whether before 1990 (in which aspects of national identity were supressed in favour of a supra-national narrative), or afterwards, when other tensions come to the fore. Povilaitytė-Leliugienė also highlights the tensions between conservation and restoration, and between the natural and historic environments. The next chapter visits another periphery of Europe where Paul Belford discusses some of the issues confronting urban archaeology in the United Kingdom. Here, despite well-known and often exemplary work in London and other urban centres, there are some systemic issues. Planning systems across the UK are increasingly divergent, and after decades of financial pressure resources are stretched. Belford also highlights the fragmented nature of the archaeological profession, which has not always acted in its own best interests; he argues that greater public engagement is the only solution for long-term viability of urban archaeology.

The next few chapters focus on Belgium and the Netherlands. Femke Martens, Daan Celis, Veerle Hendriks and Karen Minsaer discuss the complexities surrounding the redevelopment of the Kipdorp site in Antwerp as part of the 'Noorderlijn' project, one of the largest infrastructure projects ever seen in Belgium. As well as the challenges in delivering archaeological outcomes in difficult conditions, the project developed a range of approaches to public engagement and outreach. Maarten Groenendijk revisits work in Gouda over a decade ago which transformed approaches to archaeology in the city.

However the 'archaeology-friendly method' is not without its challenges: to what extent are the remains actually preserved *in situ*? Groenendijk explores these issues and what happens when things go wrong. More recent work to redevelop the central station in Utrecht is the focus of Jan Willem Oudhof's chapter. From an urban regeneration point of view the project is making a positive change to reunite two parts of the city centre that were divided during the 1970s. However dealing with the archaeology – including the substantial remains of a sixteenth-century fortress – has been problematic. Oudhof calls this 'pressure cooker archaeology', and discusses the range of approaches including excavation, *in situ* preservation and a combination of both of these. Finally Jeroen Bouwmeester looks at Deventer and the role of heritage management in improving the urban environment as well as archaeological research. The practice of archaeological heritage management within urban context benefits dramatically when you have a better understanding of where to expect archaeological remains and the level of disturbance of these remains.

One of the most exciting locations in the development of urban archaeology in the last two decades has been in Germany. Substantial investment in urban infrastructure and regeneration has resulted in a huge dividend to archaeological understanding of the development of towns and cities. A vibrant West German tradition was invigorated with the programme of redevelopment that took place after reunification; this in turn created a new generation of urban archaeologists who were able to develop new approaches. For this volume Thomas Höltken and Marcus Trier explore the long history of archaeological and historic understanding of the city of Cologne before discussing the massively increased scale and tempo of operations that took place as part of the construction of the Cologne North-South Urban Light Railway. This is one of the more ambitious public transport projects in Germany, with tunnels at a depth of more than 25 metres, and substantial areas required for stations and interchanges. As a result new frameworks and structures for archaeological research needed to be developed. In contrast the situation in Luxembourg – although generally attempting to preserve archaeological remains *in situ* – is made more challenging by political and legal issues. Christiane Bis-Worch explores the tensions between the different stakeholders, and highlights some successes and failures for conservation, understanding and public engagement.

Moving south, the next three chapters cover Switzerland and Italy. Marion Liboutet describes some of the difficulties in recognising the potential for buried archaeological remains in advance of development in Canton Vaud, Switzerland. Whilst urban construction projects have revealed significant remains, planning for the archaeology is not always considered as part of the project design. Predicting archaeological remains is the subject of Claudia De Davide's paper, which looks at the situation in north-west Italy. Here understanding of stratigraphy is being used both to understand the pre-urban landscape, and to predict the impact of future developments on archaeological remains. Another approach to the same problem is through the use of Geographical Information Systems (GIS), described in action in Rome by Valeria Boi. Here it has been possible to create sophisticated deposit models using a wide range of information from historic excavations and observations as well as more recent work. Finally, in geographical and political contrast – but in fact echoing many of the same themes and issues as other chapters – Jon Seligman looks at the role of urban archaeology in Israel. The focus in his article lies on excavating these remains and archaeological heritage management. The book concludes

with a short chapter by the editors which draws out themes common to all the chapters, as well as highlighting some of the differences between different approaches. This looks at ways in which the challenges and opportunities around managing archaeology in dynamic urban centres can be realised in the future.

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Gediminas Hill and the Upper Castle in Vilnius: interactions between nature, heritage and a dynamic urban centre

Edita Povilaitytė-Leliugienė

Abstract

There has been intensive archaeological research in the surroundings of the Gediminas Hill. Apart from this research there have been large-scale reconstruction and rebuilding of the Lower Castle as well as imprudent restoration and conservation projects of the Upper Castle. There were also engineering works in the later twentieth century to stabilize the mound. All these works have badly affected the condition of the remaining hill today. Even when Vilnius' historic centre was inscribed on the UNESCO World Heritage List in 1994, there was a lack of sensitivity for heritage. So this did not create a basis for the integration of nature and heritage protection models in Vilnius. This chapter discusses the effects of Upper Castle's conservation, restoration works and management of the hill's slopes from a historical perspective, and questions whether these rebuilding processes were adequate to protect this archaeological site.

Keywords: Gediminas Hill, landslide, erosion, heritage management, cultural landscape, castle.

'If people do not work with the landscape – the landscape will disappear.'[1]

1 Introduction

Due to the devastation at Gediminas Hill (in Vilnius, Lithuania) a national emergency was declared on 30 December 2017. The reasons were the large-scale landslides which had occurred in 2016-17, and the threat of new deformations on the site and the consequent

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1   From the architect and urbanist Pietro Laureano's lectures in the summer school 'Cultural Landscape' organized by Vilnius Academy of Arts in collaboration with Kursiu Nerija National Park and Vilnius University and held in Nida Art Colony (5-12 of August 2017).

threat to the Upper Castle's masonry remains, which had been noticed by the Lithuanian Geological Survey's geologists. The interactions between the protection of a naturally eroding hill structure, the heritage management of fragile stone and brick remains on the peak, and the intensive reconstruction works of the Lower Castle's buildings on the foot of the Gediminas Hill were not properly estimated and calculated during 1930-2013. Vilnius old town was inscribed to the UNESCO world heritage list on December 1994 based on Criterion II (as 'an outstanding example of a medieval foundation') and Criterion IV (as a 'rich diversity of buildings'). However the recognition of UNESCO did not result into an appropriate model of research and heritage management of the unique values of Vilnius Castles' cultural landscape.

On the one hand, geologists, archaeologists, architects, engineers, etc. researched the territory and heritage of Upper Castle, and suggested the different works of conservation, restoration, and rebuilding in the twentieth century. From the first glance, these works were based on the idea of rehabilitating this historically active monument. However it was also the case that during the period 1930-2013 there were a number of localised investigations by researchers or heritage specialists provoked by particular episodes of deformation of the slopes or the structures. An example of this is an incident which happened on 6 April 1930, when stones broke away from the castle's palace and rolled down the slopes (Povilaitytė-Leliugienė 2016, 144).

This accident encouraged one of the biggest and the longest investigations on the hill's peak. This took place in the 1930s and 1940s, when unknown or lost architectural structures of the medieval castle were discovered and recorded (Holubovičienė and Holubovičius 1941; Budreika 1958; Dambrauskaitė 1986; Kitkauskas 2012). The different scale of archaeological research or restoration works raised the central theoretical question of this paper: how did the different institutions preserve the Gediminas Hill and the Upper castle during the latter part of the twentieth and early-twenty-first centuries, and what could this case study reveal about the efficiency of their heritage management?

While there has been considerable research on the general Gediminas hill' geological, geomorphological and slope stability (Kirščiūnas *et al.* 1959; Satkūnas *et al.* 2009; Vaičiūnas 2011; Guobytė 2007; Mikšys *et al.* 2002; Vaitkevičius 2010), on specific deformation processes (Pečkaitis 2004; Žaržojus and Baniulis 2010), and on the remains of the historic castle, which have been valued as the most important architectural and archaeological heritage connected to the establishment of Lithuanian state (Kitkauskas 2012; Rackevičius 2000; Vitkauskienė 2008), the analyses of the comprehensive cultural landscape formation of Vilnius castles' territory, of the negative impact of urbanistic changes and of the inappropriate heritage management have been neglected. Using two methods of inquiry – namely the discourse analysis of different cases which directly or indirectly negatively affected archaeological and architectural heritage (Vitkauskienė 2010) and comparative, synthesis methods – this chapter argues that the intensive human interventions into nature and the natural processes have made an enduring unfavourable impact on the cultural landscape. Furthermore the deficiency of deeper understanding, complex perceptions' research and imprudent management works of heritage objects lead to mistakes.

This chapter pursues three main issues in order to construct the overarching argument. First, the extent to which past human activities (earth moving works, planting, the building of engineering structures, technologies) determined the massive landslides and other

slope deformations of Gediminas Hill in 2016-2017. Second, which heritage management solutions that contributed to the preservation of architectural remains became the direct or indirect reasons for the hill's structural changes (Budreika 1958)? Third, what were the effects of the constructions and reconstructions of the historical environment of the Vilnius Castles' valley on the changes in the cultural landscape? The interactions between nature and human activities began with the first new settlements on the territory and the first construction works on the erosive hill and at its foot. However, along with the concepts of heritage preservation, which began in the nineteenth century and intensified in the twentieth century, appeared the aspiration to conserve the existing architectural remains or cultural landscape and, most of all, to recreate, reconstruct or rebuild the historical 'scenery' (Kitkauskas 2012; Bartezky 2010, 298). Looking at the examples of human activities within the territory of Vilnius Castles, mostly from 1930 to 2013 with some key earlier cases from the nineteenth century, this chapter will then explore how separate small-scale ground moving works on an erosive hill can causemore significant deformation processes. It will also consider how to evaluate the possible consequences of any heritage management, engineering interventions or even destructive investigations (as for example archaeological excavations).

By focusing on the heritage management works of Gediminas Hill and the Upper Castle as its primary sources, this chapter seeks to clarify the dominant approach of the interactions between nature, heritage and urbanistic development in the Lithuanian heritage policy and research field. Therefore the discussion of the engineering aspects – both historically and in 2016-17 – will be more limited. This chapter considers the evolution of heritage management as well as the failing communications between the various disciplines.

2 Creation of cultural landscape

Human activities interrupting the natural environment were not only changing but also creating the landscapes (Laureano 2001; Mallarach 2008). For instance, Vilnius Hills and the valley of three main rivers (Neris, Vilnia, Kačerga) expose human creation processes of the cultural landscape. The formation of it lasted almost two thousand years, and here started the urban development of Vilnius city. Archaeological evidence collected over many years (1938, 1940, 1950-2017) show that on the peak and at the northern foot of Gediminas Hill was laying a fortified settlement well before the fifth century AD (Holubovičienė and Holubovičius 1941; Kitkauskas 2012; Vaitkevičius 2010). The height of the Gediminas Hill is around 48 metres from its base, and the slope is between 35 and 40 degrees.

From the few historical sources, and also from archaeological and architectural research, the first structures of the wooden defensive castle were built before or during the thirteenth century with the Upper Castle on the hill and the Lower Castle at the bottom. This changed the naturally formed landscape. Furthermore, the builders and later owners of the masonry castle on Gediminas Hill had to confront the destructive processes of the erosive hill itself. The earliest historical account of such erosion was in 1396, when a huge landslide on the west slope hit Montvylas house and killed 15 people there (Balinskis 2007, Kitkauskas 2012). Other historical sources reveal that people worked hard to control the natural processes of the slopes' erosions which quite frequently damaged the buildings on the hill as well as on its foot (Balinskis 2007, 162). Winters and thaws in the spring, floods,
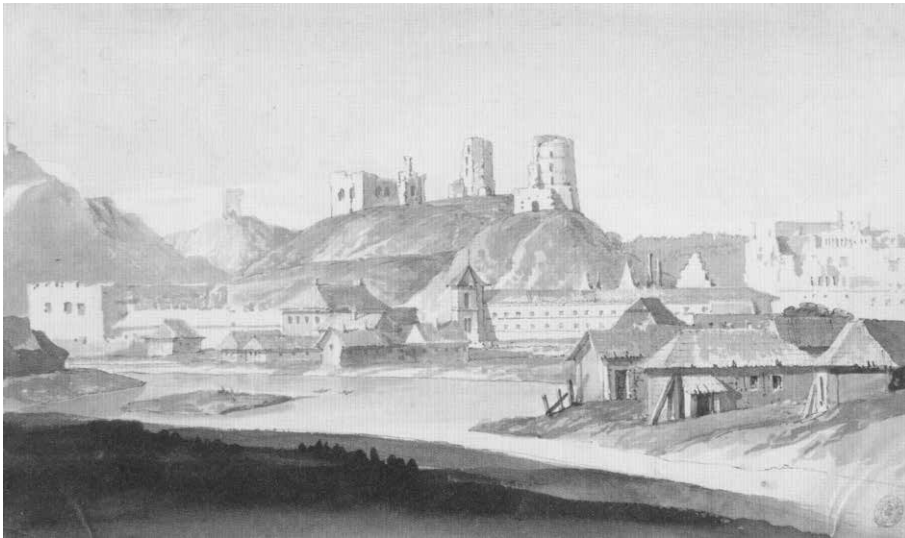
Figure 1. Pranciškus Smuglevičius. The North side of The Upper Castle and Gediminas Hill, 1785 (Drėma 2013).

and rains all exacerbated the usual human struggles with the destructive powers of nature to protect the safe and comfortable living area (Vitkauskienė 2010).

However, the immense loss of the medieval landscape, as well as the scenery of the mighty defensive complex, occurred during wars in the seventeenth and eighteenth centuries when the Upper Castle was damaged and was left unattended by regular maintenance. During the course of more than one hundred years the landslides caused the collapse of the defensive walls, two known towers and other unknown architectural structures. According to late-eighteenth century iconographic sources, the surface of the hill's slopes was ridged by deep vertical ravines and some landslides. The condition of the castle's remains in the graphic paintings of Pranciškus Smuglevičius, looked rather miserable.

3 Protection vs. Destruction of the Natural and Cultural Heritage

Nevertheless, from the beginning of the nineteenth century several preservation projects were started on the Gediminas Hill's slopes and castle masonry structures. This was due to changing conceptions of the old buildings, which gradually accrued value as heritage objects (Frycz 1975; Schenkowa 2002; Glemža 2002). Though this paper does not seek to give a detailed image of the processes during the occupation by the Russian Empire however, in responding to the research aim, it is essential to mention a few critical cases of human activities on the Gediminas Hill and its surroundings. First, the course of the river Vilnia was straightened by engineers following the 1817 project by Scottish urbanist and architect William Hastie, which identified an imminent landslide of the east slope and the consequent collapse of the castle's palace (Tamošiūnienė 2012, 44-45). Hastie also suggested strengthening the slopes of the hill by fascines. However, the most significant reshape of the Gediminas Hill and its foot was made in 1831 when the Tsar ordered the construction of the Vilnius fortress. The builders constructed the ramparts on the hill's

peak, arranged some gunpowder vaults and the path in the north slope and adapted the castles' masonry structures to the needs of the defence (Sliesoriūna 1980; Tamošiūnienė *et al.* 2016). Thus intensive activities on the hill on the one hand saved this object but also revealed the destructive human impact on the landscape and this heritage.

However, the main cause of the current condition of Gediminas Hill probably emerged with the hill rehabilitation project which was ordered and prepared by the Executive Commission of Gardens. The implementation started in the last decade of nineteenth century (Povilaitytė and Vitkauskienė 2014, 59-66). In fact, the ideas about the preservation and the representation aspects of the heritage for the citizens and tourists were vital in that period as well, as it reflected a new approach to the historical perception. The concept of the rehabilitation project was to try to adapt the south foot of the hill and the hill itself as a public park. To do this, as well as some progressive conservation works of the castle's masonries, a new pedestrian path was arranged from the south foot of the hill and obliquely raised by east-north slopes. This was done by digging off the slopes, and consolidated by lawns and stone walls. Consequently, these works reduced the stability of the east slope. In particular, the periodicals of that time recorded the occurring of landslides which were caused by unaccountable earthmoving works (Vitkauskienė 2010). Moreover, some current practices of slope protection positively highlighted the planting of trees and brushes at that time as a preventive way to strengthen the slopes. Therefore the hill after few decades became much greener however there was no maintenance by institutions or specialists of the growing plants.

Furthermore, the Upper Castle's archaeological and architectural investigations and excavations (1930-1940) resulted in the most significant earth removing works (Fig. 4). Documents suggest that all the whole area of the hill's peak was excavated to a depth of between one and five metres. The first mistakes of the environmental management emerged during the adjustment of the mound for the promenade and for an open view to the Vilnius old town (1940): the trees were started to be cut down, and their roots were covered by soil from the peak (Lukoševičius 1940). The biggest landfilling with soil was done on the southern and northern slopes. The main reason was to fill the ravines or hollows in these slopes. Due to the intensive conservation and restoration of the castle, as well as the rehabilitation projects of the hill's environment in the1930s-1940s, the first analyses and thoughts appeared about the impact of the trees on the stability of the erosive slopes. However, there was still no professional maintenance.

Figure 2. Workers removing earth from the ancient masonry structures in 1940 (E. Povilaitytė-Leliugienė).

4 Interactions between human activities and natural processes

This brief historical discourse suggests three main reasons for the deformations and landslides of the Gediminas Hill's slopes in the second half of the twentiethth century.

1. during the different types of management works the vegetation on the mound was not maintained;
2. the moving of earth for the archaeological research and the uncountable digging of tranches for the communications as well as the engineering works for stabilization of the slopes;
3. additional load by soil and architectural structures.

Undoubtedly the natural processes of the erosion or landslides also depend a lot on the hard rains, changes of the weather and the geological structures of the hill. It is even quite complicated to analyse the the deformation processes as well as smaller or bigger scale landslides on Gediminas Hill after the Second World War. The reason for this is that there was no institution responsible for the detailed documentation and observation of the geological processes of this object. There have been many different researches and management works (1948-2013) but they have never been related to each other or even analysed by using comparative and synthesis methods.

The growing trees and bushes were changing the grounds of the hill's slopes as well as the cultural landscape itself. The complex management of nature and heritage was missing throughout the second half of the twentieth century, leading to the mismanagement of the trees and other vegetation although there was a vivid discussion about this. For example, a spontaneous and thoughtless incident happened in 1950. For planting trees, students dug 500 holes (diameter 40-100 cm and depth – around 75 cm) based on the decision of two architects. Even though the planting was stopped, the solidity of the soil surface was disturbed. After the geological research (1958-1960) they started gradually to thin out the trees, but this process has never been well managed by any institution.

The first projects of the hill's slope management were prepared by SSRS Architectural heritage protection inspection in 1960. According to specialists, it was decided to stabilize the north, north-west slopes only by removing the ruinous vegetation as well as to cut off all brushes, also to seed the grass, to drainage the spring in the east side of the hill, and to plant the green hedge.[2] In contrast to these less invasive works the numerous removals of the trees from the upper terrace was done before the engineering projects by G. Laucius and J. Mendelevičius (1983). For these projects it was decided to reinforce the upper part of the hill with piles and anchors in 1985-1990 and 1995. Indeed the deformation and landslides in the 1990s, and in 2004, 2008 and 2010, were mostly associated with the negative impact of the growing trees and weak structure of sward under them. Also, the putrefied roots of removed trees and the waterlogged soils reduced the stability of the ground (Pečkaitis 1999; Satkūnas *et al.* 2009, 63-67). As a result of the intensified

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2   The information is generalized from different reports collected to the one archival folder (Dokumentų byla apie Aukštutinės ir Žemutinės pilių pastatus, jų liekanų kompleksą bei Gedimino kalno sutvarkymą (Gedimono aikštė) Atr-13ab, 1950-1973. 2. Vilnius: Kultūros paveldo centro bibliotekos archyvas, f. 3, ap. 1, b. 353).

Figure 3. Gediminas Hill from north during the 1950s (Centre of Cultural Heritage archive F.45, negative number 2875).

deformation processes during the last decades, the tree removal was stopped by specialists in the hope of protecting the hill from more significant erosive processes and the collapses of masonry heritage. These processes were attentively observed by Lithuanian Geological Survey arborists, who ascertained the poor conditions of the trees.

The most discussed topic in the last decade was about the decision of the Lithuanian National Museum, who prepared with a specialist the vision and the project, that because the mound has never been overgrown with trees or bushes, they ordered to cut down all trees on the Gediminas hill's slopes in 2011-2013. However, this decision about the plants created a problematic cycle. On the one hand the roots systems of the trees help to stabilize the erosive processes on the slopes; the trees can also absorb vast amounts of water during heavy rainfall. On the other hand the foliage of the tree weakens the growing processes of the grass, which is not strong enough to prevent soil being washed down the slope. This could cause landslides, and there is also the potential for the trees to be moved or even toppled by strong winds, which would also affect the slopes.

Above all, it needs to be emphasized that V. Krikščiūnas, J. Juodis, V. Krikštaponis and V. Jackevičius did the most significant engineering geological research of the Gediminas Hill in 1959 (1959). From the summarized data, they distinguished that the trees and the absence of the stable structure of sward formed conditions for the erosion and gullies; moreover they found that all slopes are covered by additional soils which consist of sand, rubbles, as well as the deformations of the hill, coming from solifluctional processes. Accordingly to this study the heritage management as well as the maintenance of the environment of Gediminas Hill had to change into a more complex and conceptual approach.

However, these conclusions were only partly analysed and accepted during later landscape management works. As mentioned before, the trees have been started to be removed from the slopes, but afterwards covering the remaining roots with soils proved

Figure 4. Gediminas Hill from east, in around 1951 (Centre of Cultural Heritage archive F.45, negative number 1003).
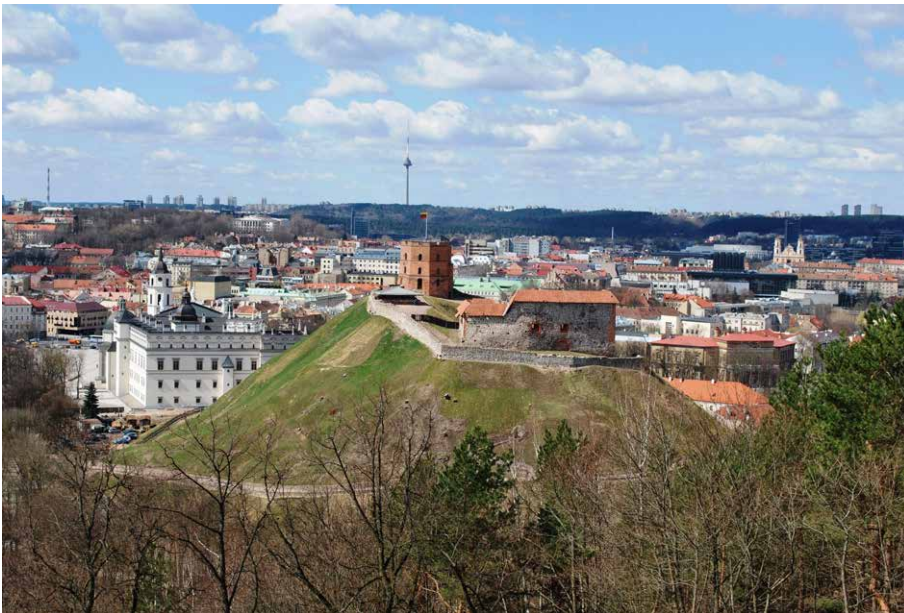

Figure 5. Gediminas Hill from the east. 2013 (E. Povilaitytė-Leliugienė).

MANAGING ARCHAEOLOGY IN DYNAMIC URBAN CENTRES

to be the biggest error as it permanently increased the pressure on the slopes. This was not accurately assessed by a landscaping specialist or geologist. For example, after the 2011-13 hill management works when all trees (around 300 trees, mostly maples) were removed, it was decided to deposit soil on the slopes with , to cover the swards and place geotextile. The results of these works were rather poor. During more recent years (2016-17) huge landslides appeared in the northern (the size of the deformation was around 1,218 square metres), eastern, southern and south-western slopes despite a geologist observes the deformation in the perimeter of the hill. The latest geological research finds out that these additional grounds cause the current deformation of the slopes (Grigas 2017, 12).

The third cause of the slopes' reduced stability were the mechanical ground moving works and technological invasion to the slope structures. Some earlier examples showed that digging in the slopes could cause the deformation. In particular, during the Upper Castle's tower adaptation in 1960, many underground communication systems were installed. As architect Vytautas Landsbergis-Žemkalnis (1976, 6) remembered during the excavation of a trench for a cable, a small landslide happened in 1976.

However, the biggest and the most destructive engineering works to prevent the upper part of the slopes from the deformation were done in the 1980s. The first ideas about anchors as a method to stabilize the east slope against the distortion were mentioned in the 1950s. The technical project 'The reinforcement of the Gediminas Hill's slopes and the management of the environment' was prepared by G. Laucius and engineer J. Mendelevičius (in press 1983). One of the provided works was to rebuild the Upper Castle's defensive wall along the hypothetical perimeter on a constructed *rostverk* (grate). It was arranged on piles all around the hill's upper terrace and the masonry wall was built up to one metre high. All slopes were maintained by armature anchors every 4-6 metres distance and they were connected with a ferroconcrete structure. The ferroconcrete structure rested on a gravel surface and the spaces between and above them were covered with soil. The upper surface was originally seeded with grass, however due to week growing processes it was covered lateron with sward. During these works, more than 6000 cubic metres of earth was added to the slopes. However, the works on the slopes' reinforcement were interrupted because of suspended financing in 1990 and they were renewed only after five years. That's why the east slope is left unfinished and the rebuilding of the defensive wall was only finished at the end of twentieth century. But after this break, the specialist established that the rain waters still destructively affected the slopes. That's why due to the 'Geostatyba' project was decided to fix the water picking system from the upper terrace and to arrange the additional drainage systems as well as to strengthen the *rostverk* by placing additional piles. Moreover, further works were prepared in 1998 by 'Geostatyba' to arrange two additional *rostverks* on the drilled piles on the altitudes of132.0 and 128.0 metres (Grigas 2017, 11). However, this was made only in the north-western slope where the first of the hugest landslides happened in 2016.

The expertise of the landslides in 2016 revealed that the technical works were made without quality: the cement of the piles was weak and the piles were much shorter than planned in the project as well as the diameter of the piles was too small (Grigas 2017). Another essential conclusion about the reasons why the landslide happened in west-north slope, the group of specialists and researchers concluded that there was no extensive analysis of Gediminas Hill and its surrounding geological and hydrological condition during any of the works within the project (Grigas 2017, 12).

Figure 6. The landslide on the north slope of Gediminas Hill in 2017
(E. Povilaitytė-Leliugienė).

Figure 7. The landslides on the south-west and south slopes of Gediminas Hill in 2017
(E. Povilaitytė-Leliugienė).

5 Heritage management without the complex investigations and visions

The heritage management of the Upper Castle's remains of the architectural structures mostly was on quite a small scale. It was limited on the repairs (nineteenth century), conservations (the end of the nineteenth to the early twentieth century), restorations (from the 1930s to the end of the twentieth century) and some of the rebuilding works (1938-1939; 1980s-1990s). However, analysis of the heritage protection aspect of these works revealed that the heritage management policies on the Upper Castle were lacking complexity and missing the long-term concepts. The main reason for this was a permanent deficiency of the finances. Moreover, the unstable Gediminas Hill's grounds and slopes required different heritage management concepts and non-destructive methods (Lasavickas 1959; Lasavickas 1977; Povilaitytė and Vitkauskienė 2014, 97-143). Lithuanian heritage management of other defensive objects after the Second World War was based mostly on large scale restoration and rebuilding concepts (the Trakai Island Castle's rebuilding started in 1951) (Baliulis *et al.* 1991). Also the complex history of Lithuania (with occupations by Russian Empire (1795-1918), Vilnius and its region by Poland (1919-1939), Nazi Germany (1941-1944); Soviet Russian (1944-1990)) prevented the creating of coherent heritage protection and research policies (Čepaitienė 2005; Butkevičienė 2014). Therefore the analysis of the heritage management will be focussing only to the presentation of the essential heritage preservation works which emphasize the most significant interactions between nature and heritage or urban changes.

During the nineteenth century, the heritage management of the site was limited mostly on the maintenance of old masonry structures especially if this aspect of preservation and investigation of the Upper Castle helped to strengthen the Tsar's government. The interest of the Tsar's Administration in this castle's masonry remains started in 1815 when the Vilnius general gubernatorial received the order to maintain the existing architectural structures as it is (Sliesoriūnas 1980, 15). Later during the constructing of the Vilnius Fortress, the remains of the castle were incorporated into the new defences. Even the western tower of the castle had to be adapted. However, in 1838 the upper parts of the walls were destroyed and a wooden superstructure of two stories was built for a telegraph (Sliesoriūnas 1980). The new defensive fortress as well as the adapted tower changed the cultural landscape for one hundred years (the wooden structure was demolished in 1930). Most of the repairs were done by strengthening the basements of the tower and the palace's masonries.

Perhaps the 1930s research of the Upper Castle had an impact on the hill's stability while at that time many of masonries were excavated: the palace first floor, the defensive walls, tower and other architectural structures at the northern side of the Gediminas Hill's peak; the basement of the southern tower and also small parts of the defensive walls in the south. During these excavations and some archaeological research, the masonry parts were conserved, some abutments of the northern defensive walls were built on the sides of the slope to prevent the collapse of uncovered medieval masonry (Bortnowski 1938). The more significant reconstruction works were done in the western tower when after the demolishment of the wooden structure, the engineer and architect Jan Borowski restored the third floor and installed the viewpoint above it. However, these works were not destructive for the hill's stability. The concepts of the heritage management were

Figure 8. The Upper Castle's western tower before reconstruction; photograph taken before 1930 (Album Pamiątkowy z Okazji X-lecia Wyzwolenia Wilna. Związek Oficerów Rezerwy Rzeczypospolitej Polskiej. Koło Wileńskie).

Figure 9. The Upper Castle's western tower before the reconstruction. 1974, photograph by J. Šaparauskas (Center of Cultural Heritage archive F.45, negative number 177).

based more on the ideas of conservation as well as the aim of the architects and heritage specialist to leave the 'shape of ruins' based on romantic visions.

The first ideas about the rebuilding of the Vilnius Upper Castle appeared in 1950s-1960s. But during the research and heritage management projects conducted by the young architect Sigitas Lasavickas (1955-1962) the complex conditions of the site prevented larger-scale restoration or reconstruction works (Povilaitytė and Vitkauskienė 2014, 97-143). Still the ideas of rebuilding were very much alive in the concepts of the architect and the conservators. Their suggestions were also reflected in the heritage and environmental management project (for example the already mentioned rebuilding of the defences).

Consequently, in line with the aim of this paper, a significant conclusion was made by the architect S. Lasavickas after the research of the Upper Castle's palace foundations (1958-1959) conducted by the archaeologist E. Skardžius and the geologist E. Vodziskas (1959). They analysed the condition of the palace's fundaments, the geological hill's structure beneath them and the archaeological layers. Lasavickas combined the different research data. He stated that: '... the Gediminas Hill's structure cannot maintain any additional loads, so to think about the bigger restoration of the palace and other buildings of the Upper castle would be a wrong decision which could cause huge loss of this heritage object' (Lasavickas 1959). With this conclusion in mind, the architect tried to suggest the fewest possible conservation works for the masonry heritage as well as for the management of the hill's environmental conditions. Lasavickas' plan was to brick the upper parts of the walls and to construct a lightweight hidden roof above all the walls to protect the ruins of the palace (Lasavickas 1977). Moreover, for the Upper Castle's heritage management and rehabilitation project in 1960, the architect proposed to plant a green hedge. This would simultaneously strengthen the top part of the hill and provide a symbolic marker of the defensive wall (Povilaitytė and Vitkauskienė 2014, 110-113).

Afterwards, the sensitivity and responsibility for the non-destructive heritage protection of the Upper Castle returned in the later projects of Lasavickas (1977). However, the lack of conceptual thinking by the institutes and the secluded positions of the architects, heritage protection specialists and many others necessary for the complex vision of the Upper Castle, prevented the way to a new approach. This happened even among the three maintenance projects of the palace's ruins created by Lasavickas (1977) at that time with the innovative strategy to cover the ruined walls under the roof as well as the use of lighter material for the constructions (made of metal and wood) to recreate the representative space of the palace interior. His vision was very close to those of the architects Inger and Johannes Exner who, almost at the same time, started their project of the conservation and restoration of the Koldinghus palace (Denmark) (Exner and Exner 1994).

However, in the 1990s started the by Lasavickas himself called, 'barbarian works' without any understanding of the values and fragility of the mound (Pažūsienė 1998, 12-13). First, the load on the hill was enlarged by widening the court to recreate the authentic size of it and by rebuilding a hypothetical defensive wall around the whole perimeter of the hill's peak. Second, the upper parts of the palace walls were reconstructed which caused the later cracks in the eastern and southern walls (Satkūnas 2009, 65). Also, some other smaller heritage management works were done on the foundations of the southern and northern towers (2015).

Figure 10. The Upper Castle's palace in 1974, photograph by J. Šaparauskas (Centre of Cultural Heritage archive F.45, negative number 202).

Figure 11. The Upper Castle's palace in 2013 (E. Povilaitytė-Leliugienė).

6 Changing cultural landscape – new urban developments

As the third subtheme of this paper, the changes of Vilnius Castles' environment during the second half of the twentieth and into the twenty-first century will be discussed. Also we will look deeper into how the shifting cultural landscape preserved the historical values and into the impact of the increasing number of constructions for the natural environment and cultural heritage. The quickly growing needs of the urbanizing city after the Second World War touched the old town and the castle's territory in direct and indirect ways. Even though the urban development of Vilnius was relatively low compared with the bigger European capitals, the impact on the cultural heritage was considerable.

The first negative aspects of the increasing traffic movements were noticed in the 1970s during the analyses of cracks in heritage objects like the Vilnius Cathedral and St Anna Church. It was observed that due to the specific geological condition of the river valleys (Neris and Vilnia) the ground poorly absorbs any vibration. Confirming the most recent conclusions that there was a deficiency of geological, hydrogeological and hydrological analyses during projects and reconstructions (Grigas 2017, 12); this fact was largely ignored while preparing new developments especially close to or within the territory of Vilnius castle (Kitkauskas 1970, 15-43). For instance, even with the knowledge of the results of earlier investigations into the negative impact of traffic on the outstanding heritage objects, the construction of Mindaugas Bridge was approved in order to reduce the impact of traffic on the old town. The consequence was that the traffic in the streets around the Vilnius Castles became quite intensive. Also, the new underground communication systems, the repair and improvement of the road system and many other engineering works indirectly changed the cultural landscape. For example, the funicular was built on the north slope of Gediminas Hill. According to 2006 project plan it was founded by drilled piles. At the same time a profound analysis of the impact on the geological structure and heritage objects was missing or even ignored by the project planners.

Nevertheless, arguably the most destructive action for the Vilnius castles' cultural landscape as well as for the condition of the Gediminas Hill was made by the thoughtless reconstructions of the Lower Castle's buildings. In the first place, there was lack of profound analyses and valuations of nature, geology, hydrology, architectural heritage, archaeology, history of technology, urban development and human activities in this territory. The archaeological data about the medieval and post medieval technology of masonry constructions were not used. Also the hydrogeological condition of the river valleys and the foot of Gediminas Hill was ignored during the rebuilding projects of the destroyed or semi-reconstructed Lower Castle's buildings and the overall construction processes. Further damage was caused by the wrong decisions during the engineering works of the new construction in the foot of Gediminas Hill, as well as the inadequate supervision of the heritage preservation institutions of these works. In addition, there was little financial support for the archaeological and architectural research during the works and the rebuilding (constructing) processes. This caused rushed investigations only on a local level, but not to profound and interdisciplinary investigations between groups of different specialists.

From the second half of the twentieth century, investigations on the Lower Castle's buildings has started. As local research, there were many archaeological excavations and geological analyses. However, any profound analysis was only the result of individual efforts by some dedicated researchers. For instance, during the investigations of the territory of the east corps' Old Arsenal (1970s-1980s), architect Lasavickas tried to identify the evolution of the shoreline of the River Neris by referring to the archaeological and geological data. Also, he tried to understand the impact of its changing course on the earlier settlements at the northern part of the Gediminas Hill's foot (Lasavickas 1980). The understanding of the formation of the historical castle was based on hypothetical reconstructions by geologists. The main characteristic of the soil on which the first wooden and later masonry buildings were build, consisted of small-scale island peats with a high groundwater level.

After the Second World War repairs, restoration or conservation works on the Lower Castles' buildings were necessary due to their poor condition. When the first organization responsible for the heritage research and management was established (in 1950), the architects and other specialists started to develop ideas for the Vilnius Castles rehabilitation to meet the museums' needs (Lasavickas 1960; Kitkauskas 2009, 23). However, some of the former buildings were collapsed or destroyed. For example, the Grand Duke's palace was demolished at the beginning of the nineteenth century, the eastern building of the Old Arsenal was reconstructed in the first half of the nineteenth century, the northern building of the Old Arsenal was replaced by a two-storey house at the beginning of twentieth century, and the western Old Arsenal building collapsed during the Second World War. Therefore the general concepts and reasons for the reconstruction of these buildings formulated by heritage specialists were to create more cultural space in Vilnius as well as to recreate the urban and historic landscape of the castle.

It was decided that he eastern building of the Old Arsenal was to be adapted for the museum. However, after some incomplete architectural and archaeological research, the first activities for the rebuilding were done for which the piles disrupt the rich archaeological layers (1977) without profound and more intensive investigations. The architect, Vytautas Žemkalnis-Landsbergis, who made the first designs for the rebuilding, noted this careless approach of the engineers, and others challenged the uncertainty of the chosen methodology. A combined analyses and theoretical prediction of the impact of the piles on the environment had not been made. . That's why he thought the Gediminas Hill would be affected by pilling and earth moving process at the base of the hill. (Žemkalnis 1976). Paradoxically, the contemporary condition all three rebuilt buildings of the Old Arsenal was and is poor. Cracks in the walls have been observed in almost every building. Moreover, because of rebuilding of the Grand Duke Palace (2002-2018) and the archaeological exposition of the authentic masonry basements, the level of groundwater was reduced by around five metres. Fears from the different specialists and researchers spread to the public about the impact for the other architectural heritage objects. Archaeological, architectural and structural engineering research revealed that due to the characteristics of the soil the ancient masonry basements were built on a wooden construction (for example the cathedral, and other masonry structures on the western, north-western and northern territory at the foot of Gediminas Hill). Hence the underground waters are necessary for the preservation of the heritage values, because the waterlogged conditions have a positive effect on the conservation of the underlying timbers. The changes of the hydrogeological situation have some impact on all surroundings and the Gediminas Hill is no exception. However, this impact has not been analysed properly.

7 Conclusion

Perhaps the most significant insights into Gediminas Hill came in the late 1950s and early 1960s. This was the result of different heritage preventive methods, as well as experience. Specialists who arrived at these conclusions looked deeper and in more sophisticated ways into the geological, hydrological, technological, and heritage-specific preventive methods as well as the surroundings of the Gediminas Hill itself. However, the destructive engineering and heritage management activities were more severe than the excellent practice of heritage protection launched after the vast Gediminas Hill's deformation processes in 2016-17. These processes were caused by the inappropriate urban

development, the imprudence of nature and heritage management and the deficiency of knowledge and recourses.

That is why heritage management has to be as comprehensive as possible and the interactions between the natural landscape and dynamic urban centre have to be researched very thoroughly if we want to protect the fragile historical monuments. Separate objects or incidents within the cultural site should be analysed by a group of different specialists and regarded as a part of a cultural landscape which connects these multiple disciplines. The analysis of a fragment can reveal an indivisible cultural landscape entirety. Therefore, the conservation of nature and heritage has to be based more on traditional or non-destructive technologies.

The concept is to pass through the 'doted' heritage management of the hill to be part of the complex view of the dynamic urban centre. Unfortunately, the heritage management was fragmented in Lithuania as well as in the Vilnius castles' territory. The continuity of protection management did not continue in any of the objects here. Bridges between the different needs of the growing capital city, the institutions of heritage management as well as the communication between different specialists have not been built yet, and that's why it is a good example of mismanagement of an archaeological site in the dynamic urban centre.

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Some more equal than others? Some issues for urban archaeology in the United Kingdom

Paul Belford

Abstract

Urban archaeology in the UK began in earnest in the 1960s; it went on to contribute important methodological advances, and was also closely linked to the rise of professional archaeology. Since the 1990s archaeology has been part of the planning process, which has led to an increase in the quantity of urban archaeological research. However the system is not without issues. There is an imbalance in resourcing between larger projects and urban centres and smaller ones. The discipline of archaeology itself is fragmented, and public benefit is poorly served by the adversarial nature of the UK system. There are legacy issues around archiving and synthesis. This chapter outlines the broad history of developments in urban archaeology and highlights some issues and possible solutions, mindful that the pressures on archaeology and cultural heritage are likely to increase in the coming years.

1 Introduction

Urban archaeology in the United Kingdom (UK) has a long history, during which it has made some significant contributions to the discipline. However it has not always maintained consistent standards in methodology, research outcomes or public benefits. Rather, these have been unevenly distributed at different times and across different places. In part this is a failure of archaeology – or of archaeologists – for not developing coherent collective positions for advocacy. In part too it is an inevitable consequence of the ebbs and flows of the economic cycle. However it is also a reflection of some inherent structural inequalities in the way that the UK is governed, resulting in a complex mixture of micro- and macro-level social, political and economic frameworks within which urban archaeology takes place. This chapter explores some of these inequalities, and the issues they present for urban archaeology in the UK. Many of these issues are systemic; therefore they are prickly and hard to eradicate.

The UK is a political union of four territories – England, Wales, Scotland and Northern Ireland – which occupies part of an archipelago (usually referred to as the British Isles) situated to the northwest of mainland Europe. The different parts of the union have different histories, different perceptions of their own cultural heritage, and sometimes very different legislative systems. The UK is dominated by England, which has the largest population and the most influence; London is the capital of the whole union. Administration is heavily centralised, although devolution has produced a degree of autonomy in some administrative 'competencies' in the different countries, notably Wales and Scotland. The archipelago's geological variety and mineral wealth has been an important factor in its development. Exploitation of these resources began with the Romans, and expanded dramatically from the later medieval period. Extraction of coal, iron and clay in particular enabled a number of technological developments which produced an 'industrial revolution' from c.1600 onwards. Industrial growth went hand-in-hand with the creation of an empire, which was necessary to provide both raw materials and markets. Consequently the UK became one of the most heavily urbanised countries in the world. The urban area in the UK today comprises 1,883,015 hectares, representing around 8% of the total land area (Eftec 2017). This contains 45 million people, or 83% of the total population (DEFRA 2019). The urban UK therefore has a population density of around 2,390 people per square kilometre, making it one of the densest populations in the world.

2 From antiquarianism to professionalism: a positive experience?

The story of the development of urban archaeology in the UK is a conspicuous part of the heroic narrative of post-war 'rescue' archaeology; it has also been co-opted to serve narratives around the development of 'professional' archaeology. More recently urban archaeology is often portrayed as the slick, well-resourced and socially-responsible side to major infrastructure developments. The reality of course is a mixture of all of these and none.

2.1 Rescue, innovation and the rise of professionalism

Archaeology began with antiquarianism, part of the post-Renaissance recognition of scientific enquiry as a mechanism for exploring, cataloguing and generally making sense of the universe. The aristocratic Grand Tour was an important influence. Eventually British antiquarians raised their gaze from the sun-drenched delights of classical civilisations, and turned to the muddy landscape of their own soggy archipelago. Some notable early interventions explored the medieval archaeology of provincial towns such as Oxford and Shrewsbury in the 1870s and 1880s (Ottaway 1992; Baker 2010). The British imperial vision of the nineteenth century was well aware of Roman antecedents, and it is not surprising that Roman towns provided an arena in which to display both the science of archaeology and the deep roots of modern imperial hubris. Significant work was done at Verulamium (St Albans) and Colchester in the 1920s and 1930s (Ottaway 1992). Urban archaeology expanded in London in the late-1940s and 1950s, as the city was rebuilt after bombing in the war of 1939-45. Indeed the Council for British Archaeology (CBA) had been established in 1944 with this in mind: its remit was to coordinate 'rescue' efforts and raise awareness. Important Roman and medieval discoveries were made in London during an interval 'free

from the cramping limitation of time and builders' needs', despite a somewhat *ad hoc* framework of management, labour and finance (Grimes 1968).

The UK did not develop consistent sophisticated approaches to urban archaeology until the 1960s. The Winchester Excavations Committee was a pioneer in this regard: between 1962 and 1971 it enabled a programme of excavations which explored the evolution of urban space over two millennia. At the time this was the largest urban archaeology project ever undertaken in the UK. Its influence was widespread: the first permanent local government archaeology posts (at Gloucester and Lancaster) were established in its wake during the 1960s. A permanent unit was set up at Winchester in 1968; this was imitated in other provincial cities and ultimately in London with the formation of the Department of Urban Archaeology at the Museum of London (Palliser 1975; Collis 2011; Belford 2012). The second wave of post-war redevelopment also provoked a second wave of archaeological organisation. In 1971 'RESCUE: the Trust for British Archaeology' was established in similar spirit to the CBA of an earlier generation: to organise and staff 'rescue' excavations on threatened sites. The existence of RESCUE and the successes at Winchester led the CBA to raise awareness of the development pressures on archaeology in historic urban centres. In 1972 it was noted that barely 3% of British towns had 'adequate' archaeological work in progress; it concluded that within 20 years almost all archaeological evidence would be destroyed in half of them (Heighway 1972; Simpson 1972).

Work in the 1970s and 1980s made significant progress in understanding urban archaeology and developing its methodologies. Most of this was funded through the public purse, at first through the state heritage agencies (of which more below), but increasingly through local authorities and third-sector bodies. In York, for example, excavations at Coppergate revealed remains of the early medieval town, with well-preserved waterlogged timber structures on the street frontage standing up to 2m high. Pits and other features in the back yards contained artefacts and palaeoenvironmental material which enabled a detailed picture of medieval life to be obtained (Hall and Hunter-Mann 2005; Hall *et al.* 2014). Similarly spectacular discoveries were made elsewhere in England – notably in Norwich, Exeter, Southampton and London – and continuing work in Winchester (Carver 1987; Schofield and Leech 1987; Qualmann and Ottaway 2018). In Scotland important developments in urban archaeology took place in Perth, Aberdeen, Elgin and elsewhere during the 1970s. An archaeology unit was established in Aberdeen in 1976, and two years later the Society of Antiquaries of Scotland helped set up a specialist Urban Archaeology Unit. From 1982 this became the Scottish Urban Archaeological Trust (SUAT) and increasingly began to focus on development-driven rescue archaeology (albeit initially with significant public funding); over time SUAT developed a rich and nuanced understanding of urban archaeology in Scotland (Murray 1982; Rains and Hall 1997; Bowler 2003).

Two important strands emerged from these somewhat *ad hoc* origins. The first was the development of analogue methodologies for recording and understanding urban archaeology. One was the Harris matrix, a tool for understanding stratigraphic relationships developed at Winchester in the 1960s, and subsequently widely adopted (Harris 1989). Another was the archaeological recording manual initially developed by the Museum of London Department of Urban Archaeology (later MoLAS and now MOLA) which came to be widely adopted and imitated elsewhere in the UK. The second was the transition to a self-regulated profession, a slow process marked by periodic resistance. In 1973 the CBA

set up a working party to consider setting up a 'British Archaeological Institution' along the lines of other professional bodies. This came to nothing, but six years later an 'Association for the Promotion of an Institute of Field Archaeologists' was established, and within two years had gained 500 supporters (Addyman 1989). The Institute of Field Archaeologists was formally constituted in 1982, renamed itself the Institute for Archaeologists in 2008 to reflect a wider remit, and gained a Royal Charter in 2014. It is now the Chartered Institute for Archaeologists (CIfA), with over 3,800 members in 40 countries (Schauer and Hinton 2019). Its role is discussed further below.

2.2 Archaeology, planning and infrastructure

During the 1980s the UK government reorganised and to some extent devolved national state heritage services. In England, this resulted in the creation of English Heritage as a non-departmental public body in 1983 (subsequently restructured with regulatory functions being undertaken by Historic England). Scotland and Wales saw the creation of Historic Scotland (now Historic Environment Scotland) and Cadw respectively. Since then the relationships between these bodies and their respective administrations has shifted; in England and Scotland (but not Wales) separate Royal Commissions that had been set up in the early twentieth century were later merged with these bodies (Belford 2018). Details are well-catalogued elsewhere; the point here is that these arrangements are indeed complex, differ across the UK, and the histories of these changes and mergers have influenced corporate and individual behaviour which in turn has affected the ways in which things are done.

From the early 1990s archaeology and 'the historic environment' became embedded in the policy and practice of spatial planning. This was a politically-driven change, which to some extent reflected broader international trends in applying so-called 'polluter pays' principles to archaeology and cultural heritage. Again there were variations within the UK in the adoption of this kind of developer-funded planning-based archaeology; these also owed something to pre-existing arrangements for dealing with cultural heritage in Wales, Scotland and England. Although going under different names and acronyms the basic principles of developer-driven archaeology were broadly the same in Wales, Scotland and England, although in Northern Ireland there remained a greater role for the state, and the provisions for developer funding were less rigorous about archiving, publication and public engagement (Williams 2010; Belford 2012; MacDonald 2012; Belford 2018). The day-to-day operation of the UK spatial planning system is the responsibility of local government, either directly (in Scotland and England outside London) or by proxy (in Wales and London). The system is reliant on the Historic Environment Records (HERs) which are a GIS database of all archaeological sites and events.

Over time the language of planning policy and guidance has changed from 'polluter pays' towards 'sustainable development', reflecting a real change of emphasis as a result of political changes. In England a National Planning Policy Framework (NPPF) was introduced in 2012, and revised in 2018 and 2019. The revisions were intended to counter criticisms about the ambiguity of phrases such as 'sustainability', to improve guidance for local communities, and to deliver increasingly ambitious targets for new housing. There was concern that the NPPF would dilute the rigour of the planning system, with archaeology an easy target for politicians keen to be seen to remove 'red tape' from development and economic growth. The NPPF requires that local planning authorities

should maintain or have access to an HER, and that any information obtained through planning-led development should be made publicly accessible. However the NPPF is more circumspect than earlier guidance about the value of archaeological remains. In Wales, the devolved administration has delivered a series of policies around wellbeing – including historic environment legislation in 2016 which made maintaining HERs a statutory duty for Welsh ministers. Planning policy in Wales is also a devolved matter, and here measures to protect the historic environment have remained stronger (Belford 2018).

Development outside the planning system also has impacts on urban archaeology. These projects broadly fall into two categories: very small or very large. Very small projects are so-called 'permitted developments', which include the work of utilities companies which for historic reasons are allowed to renew infrastructure – pipelines, cables and so-on – without planning consent. Generally the impact of these works are quite small because they tend to involve re-excavating ground that has already been disturbed. At the other end of the scale are large infrastructure projects: examples in the last two decades include the high-speed rail link from London through Kent to the Channel Tunnel (HS1), the construction of the M74 motorway in Scotland and the M6 Toll motorway in England, and the Crossrail project to create new capacity on London's complex systems of urban railways (Carver 2011; Carver 2013; Nevell 2016; Pfizenmaier 2017). Although they are not subject to planning rules in the same way as other developments, these projects do have to comply with environmental regulations and so archaeology and cultural heritage is always addressed – indeed it represents potentially high-profile good news stories which can help counterbalance the inevitable negative media around cost over-runs and delays. For these sorts of infrastructure projects there is good forward planning, close co-ordination of archaeology and construction, and a great deal of public access both to ongoing fieldwork and the results of analysis. The importance of having archaeologists embedded in the construction design and management teams is key to the success of the archaeology.

3 Inequalities, market failure and public benefit

Notwithstanding recent measures to loosen planning policy, urban archaeology remains well served by legislation. However a closer look suggests that there are issues at a practical level, three of which are highlighted here. First is the fragmented nature of the archaeological profession and the structures within which it operates. This leads to the second issue, which is the consistency of approach in places where development pressures may be equally dynamic but the frameworks for design, procurement and delivery of archaeological services less robust. Finally, there is the curation and conservation of the archive legacy: not only the records of archaeological work, but the many millions of artefacts and ecofacts in storage. A related consideration is the long-term succession of individuals and their expertise.

3.1 A fragmented archaeological 'biosphere'

Like many aspects of life in the UK, the systems within which archaeologists work have evolved under diverse and often very different influences at different rates. Consequently the archaeology and historic environment sector in the UK has found it difficult to speak with a unified voice (Boyle 2019). Archaeologists include public servants working for national and local government as much as it includes those working for

large multinational multidisciplinary consultancies. Within archaeology there are many divisions between chronological periods, and between different types of archaeology: 'below-ground' archaeology and standing buildings, for example, or lab-based specialisms versus field-based specialisms. This 'biosphere' of archaeological practice in the UK can be characterised as a series of 'ecosystems', which for simplicity here has been reduced to five (Fig. 1).

- Non-professionals. Arguably the oldest 'ecosystem', with its origins in post-Enlightenment antiquarianism; volunteer workers were essential to the programme of post-war urban archaeology in London (Grimes 1968). The sector remains strong, but with some exceptions is not generally involved with complex urban archaeology;
- Academics. Primarily motivated by research and teaching, many UK academics do not study the archaeology of the UK. They often have closer relations with other academics than with the local communities within which their institution is situated; as individuals they are generally politically unconstrained;
- State heritage agencies. Arrangements for 'state heritage agencies' differ markedly between the different parts of the UK. Wales effectively has three actors in the system, England now has two and Scotland just one. They may be more or less 'arm's length' but need to observe political sensitivities;
- Planning authorities. These are one side of the coin of the 'polluter pays' system. As noted above this generally operates at local authority level or by proxy (in London and Wales). As with colleagues in state heritage agencies there may be explicit or implicit political constraints;
- Consultants and contractors come in a bewildering variety of sizes and institutional structures (see below). Standards of work are enforced through the planning system, and regulated through accreditation (of individuals and organisations) by the Chartered Institute for Archaeologists (CIfA).

There are differences of detail between the different parts of the UK, as noted in the preceding section; nevertheless some generalities are constant. Links are strongest between the two sides of the 'polluter pays' coin: they both closely engage with the Historic Environment Records (HERs) to inform their work, and their work adds data to the HERs. Planning archaeologists tend to have good links with their colleagues in the state heritage agencies too. Those in the state heritage agencies are usually well-connected politically, but not always directly with archaeologists 'on the ground' or with local communities. Academics tend to engage less frequently with commercial archaeologists, and with planning archaeologists and HERs. Non-professionals tend to engage most closely with local authority archaeologists or their proxies; many academics also involve local volunteers on their project and engage with the more formally-constituted societies through lectures and publications.

There are of course further divisions within the different 'ecosystems' which both amplify and cut across this 'biosphere' of archaeological practice. Academics tend to find common ground more easily with colleagues who are studying the same area of interest. They will construct networks of shared interests that may have broad international scope but limited range in terms of period or archaeological material. Knowledge will tend to be shared through the medium of peer-reviewed academic journals and international
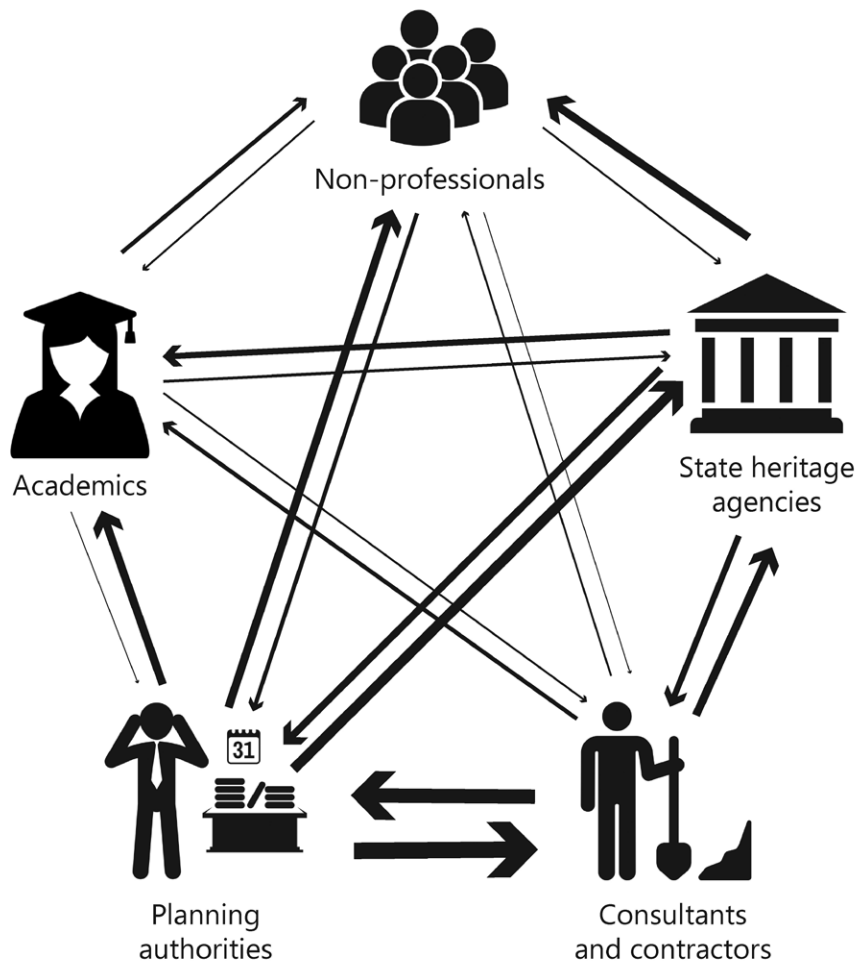
Figure 1. Structures in UK archaeology: the archaeological 'biosphere' and its five 'ecosystems'. Thicker arrows show closer engagement and greater information flow between 'ecosystems' (Paul Belford).

conferences. Stepping outside those narrow confines is fraught with danger: 'people who are fully aware of debates in their own area' may summarise the situation elsewhere 'on the basis of reading a single article' (Woolf 2009). Professional archaeologists are if anything an even more fragmented 'ecosystem'. Some will specialise in particular methods or processes, such as geophysical survey or field evaluation. CIfA's ability to enforce its standards and guidance is hampered by a lack of resources. In many ways the sharing of information is also constrained by structural borders which create separate silos for grey literature and 'academic' output (Bradley 2006; Fulford 2011).

Two 'ecosystems' – planning authorities and commercial archaeology firms – are the most closely involved with urban archaeology. There are inconsistencies between local authorities in the application of planning to archaeology. There is also considerable variation between the commercial organisations which carry out the work. The introduction of

development-driven archaeology produced a substantial increase in the amount of work being undertaken, and in the diversity of organisations undertaking it. For example the proportion of archaeological work in Scotland undertaken by commercial companies rose from 34% to 84%; between 1993 and 2012; over the same period the numbers of firms increased from six to 25 (Barclay 1997; Smith 2014). A similar change took place in Wales, although the stability of the system operated by the Welsh Archaeological Trusts has produced a greater consistency in standards and processes. In Northern Ireland the private sector is smaller, and there has been much collaboration and competition across the border (Williams 2010). In most of south-eastern and central England there has been vibrant and at times aggressive competition; in other parts of that country the picture is more mixed – especially in areas lacking dynamic urban redevelopments, such as parts of the north-east and the south-west. There are around 70 commercial archaeological organisations in the UK, and many more 'sole traders' or consultants working as part of multi-disciplinary firms. A few of these work across the UK and have multiple offices.

In general it is probably fair to say that both quality and variability of urban archaeology has increased as a result of archaeology being part of the planning process. There is a greater range of approaches to sites and features, and some innovations have made fieldwork more efficient and effective. As well as access to data through the HERs, many of the major infrastructure projects have a commitment to – and resourcing for – publication built in from an early stage. As a result comprehensive and accessible publication of archaeological projects usually take place, although not always in a timely fashion. Large swathes of urban archaeology have entered the literature in this way: from the M74 in Glasgow to the Crossrail project in London, and a whole host of smaller regeneration projects in urban centres as diverse as Birmingham, Bristol, Cambridge, Carlisle and Worcester (Brown *et al.* 2016; Nevell 2016; Brickley *et al.* 2006; Ridgeway and Watts 2013; Alexander 2016; Cessford and Dickens 2019; Howard-Davis 2009; Zant 2009; Devenport 2015). There are however some caveats to this generally positive image.

3.2 Consistent approaches and coherent narratives

The high-profile large infrastructure or regeneration projects do not represent the vast majority of archaeological work which is being undertaken in UK towns and cities. Most development work is on a much smaller scale (Fig. 2). The increased complexity of the 'ecosystem' of commercial archaeology, together with pressures on planning authority archaeologists as a result of reduced resources, means that not all urban archaeology is equal. As noted above, the pre-planning 'rescue' archaeology phase had seen the creation of a range of archaeology 'units' in urban places across the UK. These were predominantly public sector organisations in some way – even if they were independent charities (such as the York and Canterbury trusts, SUAT in Scotland or the Welsh Archaeological Trusts) they still relied heavily on public funding from local or national government. As the post-1990 world of developer-driven archaeology took shape, these organisations were beset by real or imagined conflicts of interest, as well as a political narrative which favoured 'market forces' across various aspects of society.

Some organisations were able to adapt to these changes. For a while some enterprising University departments of archaeology established field units to compete in the new marketplace, but on the whole they failed to deliver the potential synergy between academic and commercial creativity. Some local authority units were closed altogether,

Figure 2. Excavations by the Clwyd-Powys Archaeological Trust in Shrewsbury, England in 2017. This project represented one of the largest urban excavations in this provincial town (population c.70,000); although ostensibly a private development it was ultimately funded and underwritten by the local authority and other public bodies (Paul Belford).

others were cut loose to sink or swim in the market. Some long-established archaeological Trusts became substantial concerns, and took over other organisations as they expanded: a classic case is Oxford Archaeology, which originated as a charitable trust in the 1970s but expanded through the early 2000s to become for a time the largest archaeological contractor in Europe, in the process absorbing former local authority units at Lancaster and Cambridgeshire. At one time it was feared that the 'mega-units from the south of England' would overcome all other models; however this has turned out not to be the case, particularly in Wales and Scotland (Smith 2014). In some areas of England too local authority units have been able to survive and prosper, for example in Worcestershire where there has been a long continuity of employment which means that staff are familiar both with local urban archaeology and in delivering public benefit (Dalwood 2000). On the whole the rise in commercial archaeology has tended to favour urban archaeology: more development takes place in dynamic urban centres, and UK government emphasis on re-using 'brownfield' land in particular has resulted in a significant increase in work on industrial and later historical period sites (Symonds 2004; Belford 2006; Nevell 2011; Symonds 2011; Belford 2012).

In such a fragmented 'ecosystem' there is a potential problem with maintaining standards. There are two aspects to this. First is professional conduct, the need to maintain high standards of ethical and responsible behaviour. Here CIfA plays an essential role: archaeologists who join the professional institute chose to be bound by an independent system of regulation and accreditation – essentially peer-review of their conduct and competence (Belford and Wait 2018; CIfA 2019). The issue in the UK is that membership of CIfA is optional; probably about half of all archaeologists are individual members – although many more effectively work to CIfA professional standards because they work for CIfA-registered organisations. The second aspect is more problematic, and that is ensuring adequate standards of archaeological recording and conservation. Although a number of conventions are well-established (from 'rescue' days), there is no single template for on-site recording forms, for example; monitoring is the responsibility of planning authority archaeologists who don't have the resources to inspect every detail on every site. Ironically, a market-driven approach has resulted in more conservatism. There aren't the resources or capacity to consider new approaches to archaeological recording and conservation unless in exceptional circumstances (Thomas 2019).

Although the results from smaller projects undertaken through the planning process are accessible through the HERs and the 'grey literature', synthesising these to create a coherent narrative has been inconsistent. The risks to coherence posed by systemic fragmentation were recognised early on in the 'rescue' days, and attempts were made to deal with them. The Scottish Burgh Survey was a pioneering attempt to characterise the archaeology of towns in Scotland, and to identify potential threats. Starting in the 1970s and 1980s as a series of rough-and-ready unpublished reports from University of Glasgow, they were eventually taken on by SUAT and from the mid-1990s began to be formally published as a series of monographs (Murray 1983; Talbot 1984; Owen 2002). In England, *ad hoc* attempts to identify threats to small-town urban archaeology emerged at the same time, but a systematic approach was only developed in the 1990s. In 1992 English Heritage (then the state heritage agency) published *Managing the Urban Archaeological Resource*, which set out a programme to create of a series of urban archaeological assessment

projects – initially in order to produce better information, understanding and policies for local authorities (Thomas 2006).

The English project undertook two levels of assessment: 'intensive' studies of 35 historic towns in detail, and 'extensive' urban surveys of smaller towns on a county basis. Each survey created a database of published and unpublished archaeological work; this was synthesised to create a narrative about the development of these places, and a resource to inform future archaeological research (Lowther *et al.* 1993; Darvill and Gerard 1994; Baker 1994). After 15 years 25 towns had benefitted from 'intensive' surveys and nearly 700 towns were covered by 'extensive' surveys. Funding models varied but ultimately all the work was publicly funded – at a total cost by 2005 of around £5m, representing 'good value for money' (Thomas 2005). As the project went on it developed more sophisticated approaches to place, identity and belonging, in line with government heritage policy at the time. Thus the surveys looked at characterisation and the needs of regeneration; the focus shifted away from traditional small towns towards the larger cities and later post-medieval conurbations (Thomas 2006; Baker *et al.* 2018). Regrettably the programme was not universal across England. Nothing comparable to the Scottish Burgh Survey or the English urban surveys has ever taken place across Wales or Northern Ireland, although periodic attempts have been made to do so.

Some period-based syntheses have also been attempted by academics using the grey literature. To date these have focussed on prehistoric and Roman archaeology, with limited exploration of urban archaeology and especially the later periods (Bradley 2006; Fulford 2011; Fulford and Holbrook 2011; Fulford and Holbrook 2015). Another form of synthesis – again not specifically focussed on urban archaeology but potentially helpful in urban areas – are the regional and national archaeological research frameworks. These were developed from the late 1990s in response to the pressures generated by commercial archaeology; at their best they form a useful tool for identifying research lacunae for different periods, areas and topics. However they are often unwieldy and outdated, and since the initial wave of funding there is no resource for updating or developing them, except in Scotland (Southport Group 2011). Additional funding for synthetic approaches is unlikely to materialise in the current political and economic climate.

3.3 More elephants in the room

As well as the question of synthesis and publication, there are some other legacy issues. One of these is a pressing problem of archives. This is particularly acute for urban archaeology, which typically produces significant quantities of artefacts, including sometimes substantial structural waterlogged remains. These all require recording, cataloguing, conservation and storage. Then there is the additional problem of the numerous physical site records and the increasing quantity of digital data. The connectedness or otherwise of these parts of the archive is also critical. These are not new problems: indeed there has been a long-running crisis of archaeological archives across the UK; despite a variety of studies, recommendations and guidance the lack of resources means that there have been few improvements. (Barclay and Owen 1995; Boyle 2019; Brown *et al.* 2014). Archiving does not always take place as promptly as it ought to. Indeed it has been noted that 'some archaeological practices, whose stores may only be intended to function as temporary holding areas, can house specific collections for many years', leading to 'inevitable physical deterioration and longer-term conservation problems' (AAF 2009). A recent

project in Exeter may provide a useful model: a collaboration between Historic England, the Universities of Exeter and Reading, and Cotswold Archaeology has attracted funding not just to synthesise previous work but to undertake new scientific analysis of archived material including osteoarchaeology, dendrochronology and archaeometallurgy (Rippon *et al.* 2018).

Finally, but arguably most importantly, is the situation of the archaeological workforce. Despite a number of excellent recent initiatives – most notably the development of archaeological apprenticeships and accreditation of university courses by CIfA – there remain significant issues in training and developing archaeological staff. The fragmented nature of the system makes it difficult for employees and employers alike to develop long-term training and professional development. In recent years there has been a tendency to deal with labour shortages by employing archaeologists from other parts of the EU; however the UK's departure from the bloc means that this is no longer an option. A generation of senior staff who worked through the 'rescue' days are at or near retirement. Some of their skills are being passed on, but the fragmentation of the system means that local collective memories are at risk. There are also significant structural inequalities in the UK archaeological labour market: a stubbornly persistent gender pay gap, for example, and an equally stubborn lack of ethnic diversity.

4 Conclusion

In a lengthy discursive Epilogue to his pioneering account of *The Excavation of Roman and Medieval London*, W.F. Grimes wrote:

'The problems of facilities to work and of money to finance work are closely related when they reflect the attitudes of those in whose hands lies the power to be helpful' (Grimes 1968, 219).

The archaeological system in the UK is still very much dependent on the goodwill of those with the 'power to be helpful'. However it is not clear that urban archaeology in the UK is actually delivering the public benefit which was the impetus behind the development of the developer-driven model. Even the most passionate advocate of commercial archaeology has to admit that 'the investigation of below ground remains, with its strong element of risk and unknowns, is not ideally conducive to a purely commercial form of procurement' (Carver 2011, 529). In an atmosphere where private-sector firms describe how they can help developers 'minimise … archaeological risk' and achieve 'cost-effective discharge of planning obligations', sight of the public benefit that archaeology should deliver can be obscured or even lost altogether (Headland 2018; Cotswold 2018). In recent years positive steps have also been made towards public engagement during archaeological work, but these remain rare additions rather than regular core objectives (Ford 2017). CIfA requires that procurement of archaeological services from or by its members and registered organisations must include adequate post-excavation provision (CIfA 2014). However in reality the levers in the planning system which ensure that this happens are very weak. Indeed in some cases they have become weaker: in recent years legal action by developers has overturned local authorities' archaeological conditions on developments (Phillips 2019).

Certainly the relative weakness of archaeology as a sector is partly a consequence of the ways in which the UK adopted the 'polluter pays' principle. As the examples in this volume

show, other European countries have chosen to develop systems that are less adversarial and confrontational, and less reliant on a type of private-sector 'entrepreneurship' that in reality is the consequence of a failed or forced market. Yet there has been a shift in emphasis in the planning system (at least in England) which emphasises the importance of understanding over and above the mindless 'preservation by record' – but archaeologists appear to have been reluctant to accept or embrace this change, which has the potential to liberate the profession from some of these issues (Thomas 2019). The UK's departure from the EU potentially threatens the continuation of the 'polluter pays' principle. At first glance the political mood does not bode well for archaeology. The prevailing theme of 'austerity' in public funding finds easy targets in arts, culture and heritage. The process of achieving Brexit has been accompanied by dangerous rhetoric about opportunities for deregulation that will liberate Britain's entrepreneurial spirit. The structural weaknesses of the archaeological profession mean that finding a united voice to defend archaeology will be difficult. It is made more difficult by the fragmented and adversarial system which archaeologists have partly devised and partly perpetuate. If archaeologists can find a way of articulating the clear public benefits of their work – which may mean stepping away from the development-driven model – then there is hope.

Acknowledgements

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Integration of the sixteenth-century Kipdorp site and the 'Noorderlijn' project, Antwerp, Belgium

Femke Martens, Daan Celis, Veerle Hendriks and Karen Minsaer

Abstract

In consequence of the Noorderlijn project (2016-2019) large parts of the well-preserved sixteenth century fortification wall below the main ring road around the city had to be excavated. Previous archaeological research (2002-2006), a desk-based study and additional test pits offered insight into what was to be expected archaeologically and allowed to budget the necessary field research in time for the building contractor. Simultaneously, a weighed decision was negotiated to give up a part of one of the nine bastions of the fortification after thorough archaeological registration, to invest all means in an integrated project design whereby another part of the defence system – the Kipdorp site – could be preserved, restored and presented as an open air site. The general public was involved in all steps of the excavation and restoration project. Since December 2019 the restored Kipdorp site forms a new attraction within the city.

Keywords: Antwerp, Spanish fortification,sixteenth century, excavations, restoration, outreach.

1 Introduction

In 2016, the city of Antwerp, the Flemish transport company 'De Lijn' and the Flemish Region began with one of the largest infrastructure works in Antwerp for over 50 years. The city boulevards ('Leien' in Dutch), were laid out on the remains of the sixteenth-century ramparts, also called 'the Spanish fortification'. The boulevards had to be renewed to meet contemporary mobility needs. The redevelopment comprises constructing a tram connection ('Noorderlijn'), between the city centre and the northern parts of Antwerp, and a pedestrian public square with parking space and tunnels for the traffic underneath. These construction works were undertaken by the consortium TramContractors. The

archaeological department of the city of Antwerp was responsible for the excavations and integration of the remains of the sixteenth-century fortification. The unique Kipdorp site, with city walls and a bridge over a moat, was to be integrated in the new layout of the city fabric. This offered a possibility to present these monumental walls in a new urban setting.

First this article will describe the history and the excavations at Kipdorp site while the corresponding public outreach activities will be briefly discussed. However, the focus of the article lies on the reminiscence and integration of the monumental structures of the 'Spanish fortification' into the urban planning of the boulevards, with the Kipdorp site as a focal point. Finally, some posed challenges and choices of the envisioned design will be elaborated.

2 The 'Spanish fortification' and Kipdorp site

Throughout history Kipdorp itself was strategically important. It was a small hamlet situated at a topographically elevated location at the east of medieval Antwerp. The history of Kipdorp dates back to the thirteenth century. With the late-medieval expansion of Antwerp, this settlement was incorporated into the territory of the city (Veeckman 2010, 120).

The monumental fortification around Antwerp, which replaced the late-medieval one, was commissioned by Holy Roman Emperor Charles V. In the sixteenth century, the southern Netherlands experienced several politico-religious tensions. From the north, warlord Maarten van Rossum had already executed a failed coup on strategically important Antwerp in 1542 and a new fortification was deemed important. The fortification, a true innovation in the field of military architecture, was designed by the Italian engineer Donato di Boni and built between 1542 and 1553 (Lombaerde 2009). In 1860 these ramparts formed the blueprint for the boulevards and have been well-preserved below the modern surface. The boulevards were thus built on the dismantled remains of the fortification. In some places the old city wall corresponds with the western alignment of the boulevards. Every curve on the trace of the city boulevards corresponds with one of the nine protruding bastions or bulwarks (Fig. 1).

The city was accessible through five main gates with a bridge over the moat, which was 60 metres wide. The Kipdorp gate was one of these gates and was the scene of the French Fury in 1583, when the French duke Charles of Anjou tried to invade the city. The civilians of Antwerp battled bravely and prevailed over the French troops, who lost over 1,500 soldiers. This historical location has been excavated and has been integrated in the new design of the Opera Plaza.

The gate remained an important access to the city throughout its history and even now -in the twenty-first century- it lies at a main traffic node, both for public transport (buses, tramway) as well as for private and professional traffic along the boulevards (cars, trucks) and pedestrians entering and departing from the historical heart of Antwerp.

The fortification was designed according to the old Italian bastioned system. When compared to the medieval fortifications this system was innovative because of the alternation between long straight walls, the curtains, and protruding bastions or bulwarks. This type of bastions had long faces and two short retracted flanks. Where the built-up walls of different angles meet between flank and face, a rounded corner was created, called ear or orillion. The connection between the two faces is called salient. Both orillion and salient have a protruding (half) pyramid or bec, a typical architectural Renaissance element, forming the transition of the underground square foundation of the substructure
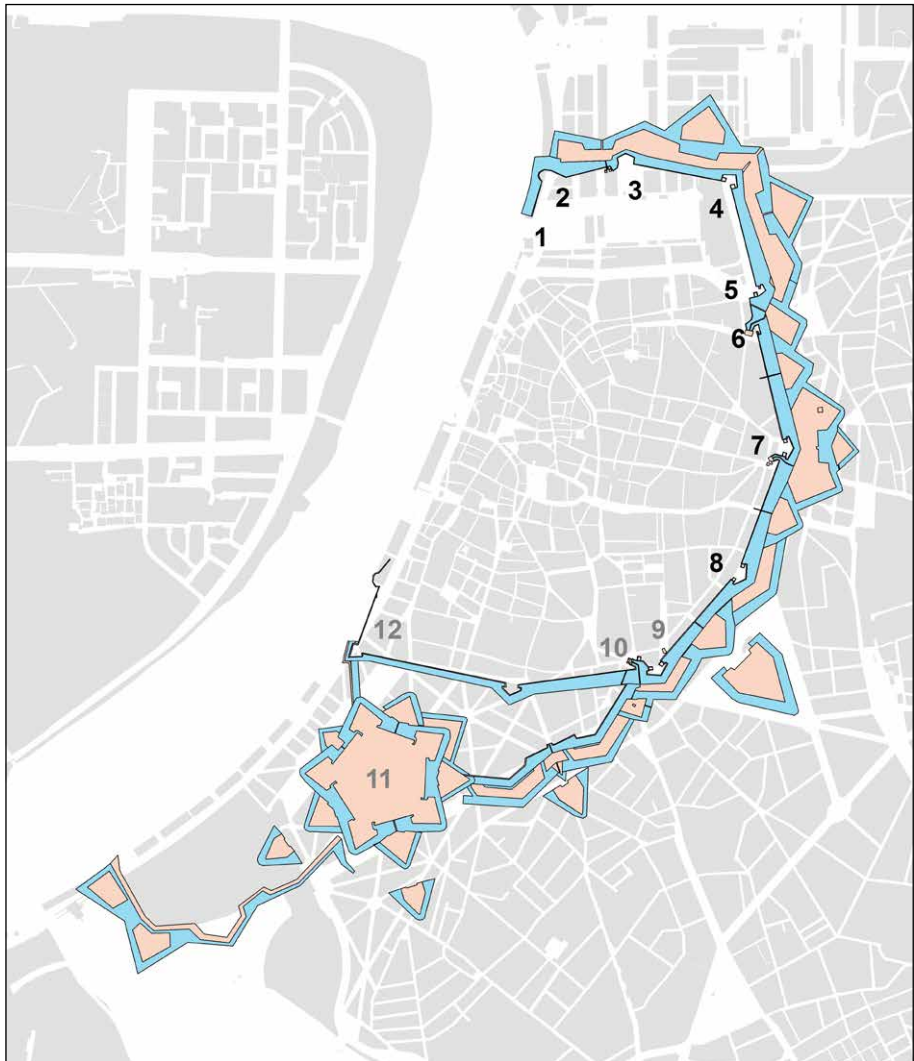
Figure 1. A projection of the sixteenth-century fortification on the current street lay-out of Antwerp, with Red Gate Bastion (5 and 6), Kipdorp site (7), Tanner's Bastion (8) and Emperor's Bastion (9) (City of Antwerp, department of archaeology).

to the curving wall of the superstructure. On top of the pyramids, a stone demi-sphere was constructed as an additional decorative Renaissance element, which is seen in historical paintings featuring the fortifications. However, none of the five excavated pyramids still possessed this element. Only a small or negative imprint was visible at three of them. Each bastion had one or two square open artillery emplacements or casemates accessible by posterns. The posterns were flanked by several little squared powder magazines (Kamps, van Kerkum and de Zee 2004, 53-67). The casemates had two open gun ports to defend the city walls and the bridge (Fig. 2).
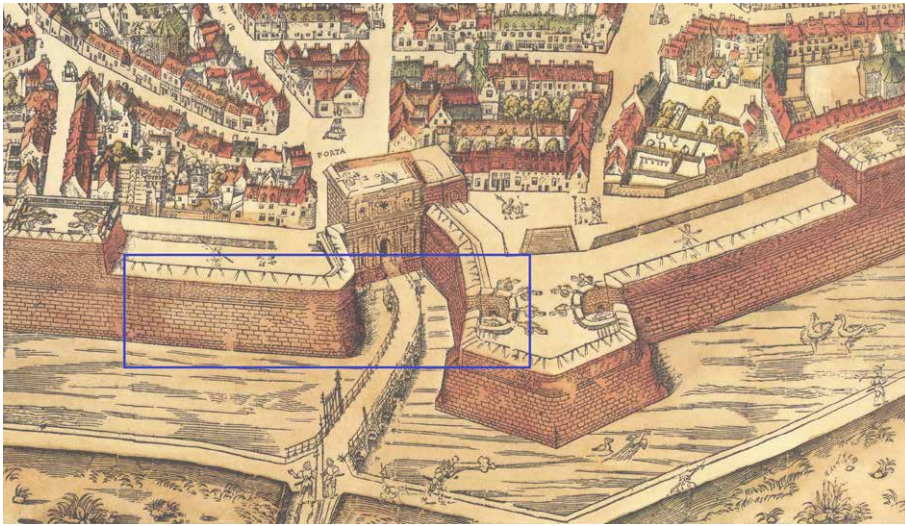
Figure 2. Detail of sixteenth-century print of the woodcut of Virgilius Bononiensis with indication of Kipdorp site (1565; Museum Plantin-Moretus).

3 The excavation of the Kipdorp site

During the excavations of 2017-18 the Kipdorp site, the city wall and the southern bastion wall were unearthed. The main rampart was excavated over a distance of about 70 metres. The northern part of the wall curves to the west, where it continues parallel with the bridge, forming a cul-de-sac towards the gate. The city walls were built with a core of brick masonry and a pale white limestone facing. The main wall was reinforced with buttresses, each 1.40 metres wide, spaced at a distance of 5.60 metres. The bricks have a red, orange-pink to yellow colour, characteristic of the local brick production in the sixteenth century. The base of the curve of the city wall was furnished with a pyramid. The walls were supported by a protruding stepped brick foundation, constructed upon a level of chalk stone, containing only one or two rows of blocks. With the average height of the foundation of 1.60 metres and the nearly 5.50 metres high standing wall, the building remains were thus preserved over a height of 7 metres. The main wall was renovated on various occasions throughout its 320 years of existence (Fig. 3).

The Kipdorp Bridge was excavated over about 30 metres (of a total of 90 metres), with three monumental arches visible to foundation depth. The arches spanned a distance of seven metres, and the bridge itself was seven metres wide. The core of the bridge was still original, but the entire facade was rebuilt in the early nineteenth century. With the dismantling of the wall in 1860, the facing stones of the upper part of the southern side of the bridge had been partly removed and the cobblestones of the bridge deck were also dismantled. The flank of the bulwark was aligned parallel with the bridge. Two levels of the open platform of the casemate were excavated. The two original sixteenth century gun ports were preserved underneath the early nineteenth-century brick artillery floor level. These gun ports were composed with a shallow S-shaped stone wall and a curved division wall between them. The nineteenth-century bomb-proof renovation of the artillery floors contained a division of three gun ports and a roof of barrel vaults covered with earth (Fig. 4).

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Figure 3. View from the west of the excavation of Kipdorp site with the monumental city walls of the bastion, the orillion and bridge (Koen Ver Eecke).

Figure 4. View from the west of the excavation of the nineteenth-century casemate, with artillery floor and postern in place (Lucid).

Different techniques were deployed for the investigation of the military architecture of the site. The excavated wall structures were fully covered by 3D scanning with a dense and accurate point cloud as a result. Furthermore photogrammetry, orthophotos, drone shots and several webcams provide additional raw documentary resources. Combined, this evidence will be used for 3D reconstruction, for educational and communication purposes and, most of all, for the detailed planning and realisation of the restoration project.

As part of the excavation strategy the sediments of the large city moat encircling the city and the rampart were also examined for finds. The moat contained a range of finds: from building debris to used wares such as pottery, clay pipes, wooden balls, toys, all types of instruments and tools, leather shoe soles, craft waste, coins and militaria ranging from little musket bullets to cannonballs (Minsaer and Martens 2013). Within the range of the Kipdorp site the moat was systematically scanned in levels of 20 centimetres each and in boxes of 2 metres by 2 metres, with the support of archaeology students and amateur metal detectorists. Additionally, 60 large samples were collected from the moat for wet sieving to collect smaller evidence such as fish bone, seeds, bone dice, coin weights and marbles, among other things.

4 Outreach and public engagement

The archaeological department of Antwerp places great value on informing the general public about the archaeological sites and development. Especially for the 'Noorderlijn' project, the archaeological department deemed it important to involve the general public in every step of the excavation of these monumental structures to create awareness of and public engagement for archaeology. Alongside existing brochures and information sheets on the sixteenth-century ramparts, a new brochure was created about the Kipdorp site and open days were organised with tours on the archaeological site.

Public open days were organised at the Tanner's Bastion in 2016 (2,800 visitors) and the site of the Red Gate in 2017 (2,400 visitors). At the former site the bastion flank was visible; at the latter the bridge, bastion and city wall.

The Kipdorp site excavation was open to the public on two occasions. The first time (2017) a large part of the archaeological site was visible, with the flank of the bastion, the southern casemate with corresponding postern, a medieval road and the Kipdorp bridge that was then exposed to four metres below the modern boulevard level. Visitors could access the site and follow a safe route across the sixteenth-century bridge and along the different remains. At several points, information panels provided a more detailed explanation and interpretation of the site. The archaeologists were also on site to explain the features and answer any questions the 1,350 visitors might have had.

In February 2018, the Kipdorp site was open for a whole weekend, with a nocturne on Saturday evening. The flank of the bastion, the Kipdorp bridge and part of the main rampart were visible to a depth of seven metres below ground level. A trail with two large staircases was created for visitors to access this level of the site. Besides walking over the bridge people could now walk also underneath its vaults, at the same level of the sixteenth century moat. The casemate, postern and medieval road had then already been dismantled to allow the construction activities for the tunnels to begin. The open weekend was a great success, with 11,000 people queueing up to see the site and walk between the sixteenth century walls. All visitors were surprised to see this monumental site, of both public and military importance, that had been hidden underneath the busy boulevard for more than 150 years (Fig. 5 and 6).

Figure 5. View of the public event, where people were queueing to enter the site (City of Antwerp, archaeological department).

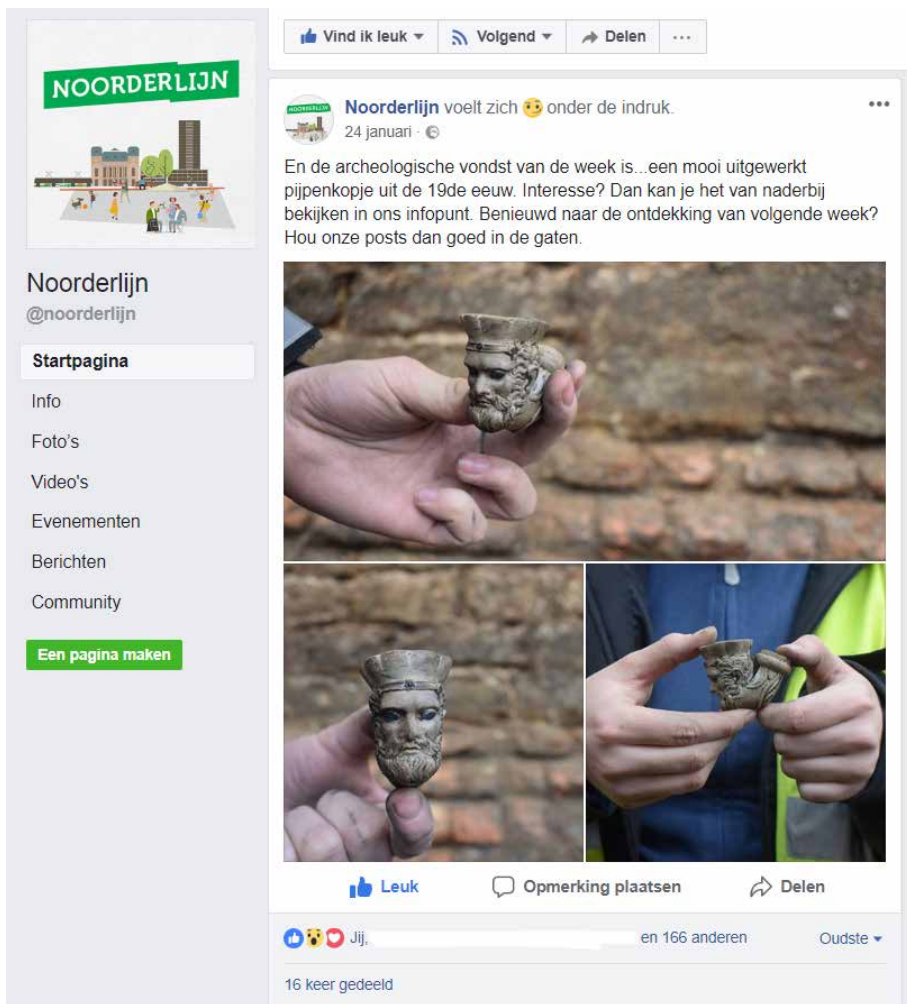Figure 6. View of the nocturne at Kipdorp site (Frederik Beyens).

Figure 7. Detail from the Facebook page of 'Noorderlijn' (City of Antwerp, archaeological department and Noorderlijn information spot).

During the excavations, information panels and fence banners were attached to the safety fences to give pedestrians of the busy intersection information about the site, the excavations and the planned integration. Banners, information panels, brochures and more background content about the different elements of the fortification are also available online on the city's website (https://www.antwerpenmorgen.be/projecten/kipdorpsite). A find of the week was chosen every week during the excavation of the moat. The 'Noorderlijn' information spot posted this on their Facebook page and on the website (Fig. 7). A small selection of finds was also on display at the information point.

Further outreach activities took place after the completion of archaeological excavations. For example in August 2018 the archaeological department participated in the annual Antwerp Museum Night. The Felixatelier (the public name of the workplace of the department) presented a small exhibition about the 'Noorderlijn' excavations and the finds of the Kipdorp site.

The Kipdorp site will also be a point of interest in the 'Archaeology Tour' in the Antwerp Museum App. This is a free app which offers tours around the city and several museums. The archaeological department of Antwerp in cooperation with 'Geheugencollectief' is preparing a tour for the app with several points of interest where visitors can see archaeology, integrated in the modern urban environment and setting.

5 Integration of the archaeology

Already when the southern part of the boulevards was rearranged the archaeological department realised and proclaimed the importance of displaying the monumental sixteenth century military structure in different facets. These so-called 'pearls' offer a chance to bring the great fortification of the Antwerp Golden Age to the attention of the general public. To do this, the objective is to consider the main parts of the fortification such as bastions, bridges and city walls as pearls in a necklace, beautiful on their own but stronger together. Each element of the fortification has its specific individual state of preservation and possibilities of display in the urban setting. A spatial marker of the different links in the necklace will be integrated in the urban public space with a strong reference to the sixteenth century ramparts. By doing so, the historical-archaeological identity of the city walls becomes clear and apprehensible for pedestrians, visitors and drivers.

An important restoration project was realised when part of the 'Spanish fortification' was excavated in 2003, on the occasion of the renewal of the southern part of the boulevards in 2002-2006. In the course of this project the monumentality, scale and excellent preservation of the remains of the 'Spanish fortification' became apparent. This led to the salvage and restoration of part of the Emperor's Bastion and gate (Minsaer 2011a, 112-131; Minsaer, Bogaerts and Bellens 2007, 47-49). A stretch of 30 metres of this monumentally constructed protruding stronghold securing one of the main entrances to the city was then excavated. Part of the bastion was cut into 250 cubes each of three tonnes and reassembled in the newly built underground parking, on the same location – albeit at a lower level – than the original one (Minsaer and Slock 2007). The insertion of an internal skeleton of fibre bars made the dismantling and reassembling possible. As a testimony to this process the sawn joints were left visible after the restoration as part of and reference to the recent history of this monument. The space housing the restored monument is now open to the public. It functions as an exhibition room and is also used for educational programs. When plans were made for rearranging the northern part of the boulevards new opportunities arose.

6 Origin, process and design of the Kipdorp site

The rearrangement of the northern boulevards both posed a threat as well as a range of opportunities for the military heritage of Antwerp. The salvage of part of the Emperor's Bastion had offered the incentive for the preparations of the integration of other parts of the sixteenth century fortification into the urban fabric (Minsaer 2011b, 167-187).

The integration of the Kipdorp site was initially not incorporated into the new design, but could only be accomplished after an intensive trajectory of negotiations. The task of designing the new plaza with subterranean tunnels and a parking lot was assigned to the Spanish architect Manuel de Solà-Morales. The initial design impacted upon the remains of the Tanner's and Kipdorp Bastion. Already in 2004 the archaeological department of Antwerp produced several recommendations stressing the value, excellent preservation

and potential of the remains of the fortification to be integrated in new urban projects. In 2006 at the occasion of the removal of the temporary 'Iron' bridge at the location of the Kipdorp site the excellent preservation of the historical Kipdorp Bridge and surrounding remains of gate and bastion could be further established. These observations provided a solid base for the negotiations on the project design.

A well-considered decision was negotiated to give up part of the Tanner's Bastion – albeit after thorough archaeological research and a 3D scanning – to concentrate all means on an integrated project design whereby the Kipdorp site could be partly preserved, restored and presented as an open air site.

The archaeological department of Antwerp was persistent in arguing that these unique and well-preserved historical remains should be incorporated into the new layout of the area; however this posed a true challenge to the urban planners. The construction plans, including a tramway, an underground parking lot and two tunnels leading ongoing traffic below a new plaza, made the integration a complex matter. In the course of the preparatory study it was negotiated how prerequisites of architectural design, technical feasibility, mobility demands, safety issues and financial cost could be reconciled with a maximal preservation of the historical evidence.

To support this process it was imperative to gather as much information as possible on the dimensions, state of preservation and exact position of the building remains. Therefore, evidence from a desk-study and various phases of field work were combined with sixteenth- and seventeenth-century maps and nineteenth-century plans produced prior to the dismantling of the wall. As such the position of the Kipdorp Bastion, bridge and city wall could be predicted and combined with the modern street plan. This tentative position of the remains was fine-tuned in 2012 (Minsaer and Martens 2013) by means of strategically planned braced trenches excavated to a depth of 8 metres, whereas the composition and preservation of the masonry was tested with vertical and horizontal core drillings.

Based on this evidence a number of technical decisions were made. Firstly, it was decided that of various options the scenario of merging both tunnels at the point where they traversed the central pillar of the bridge would entail the least damage to the historical bridge. As such at least one vault would remain intact and visible, whereas two others could be supported by the tunnel roof. Secondly, a sensible choice for an open archaeological site was made. By opening up the wall of the tunnel for traffic from the north, automobilists would see the impressive pyramid crowning the curve of the city wall. Driving to the south they would pass along the city wall over a distance of 75 metres. From south to north cars coming from the parking area would continue below the Kipdorp bridge and have the pyramid of the southern bastion flank in their eye sight. To the north both tunnels would traverse underneath the remains of the casemate of the bastion. In addition, to be able to evacuate people from the tunnels, emergency stairs had to be provided. An open air site would allow evacuation.

The casemate had to be dismantled for the construction of the tunnels. The outlines of the southern casemate were to be superficially reconstructed to maximise the extent of the archaeological site. To guarantee paramount legibility of the ground plan of the site, the outlines of the design were kept as symmetric as possible, whereby straight and orthogonal axes represented modern outlines and oblique lines referred to the historical structures (Fig. 8 and 9). Due to the layout of the tramway across the bridge and casemate, the limited open space of the site and all other armatures required for the public use of the area a
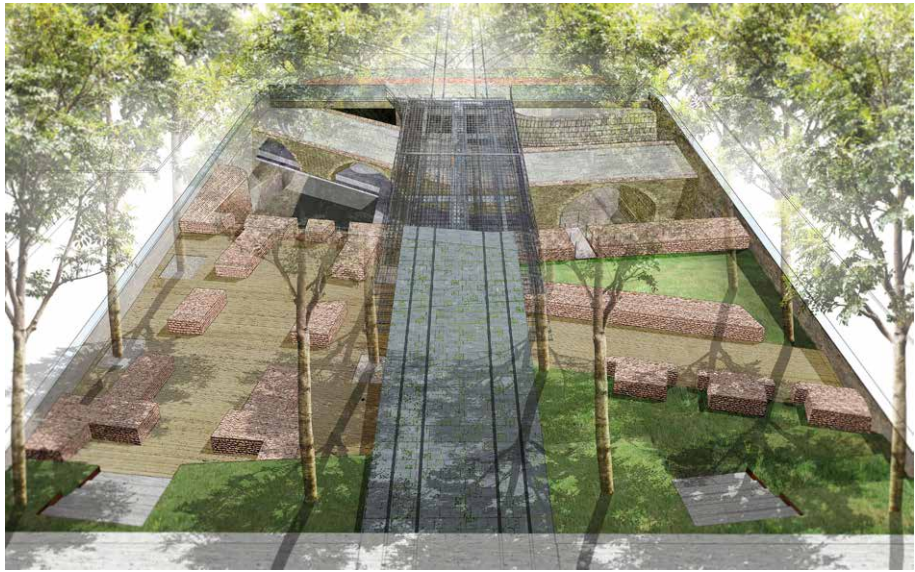
Figure 8. Design of the open air site (Manuel de Solà-Morales and Bureau A33).

Figure 9. Design of the open air site (Manuel de Solà-Morales and Bureau A33).

fragmentation of the design was a real danger. The design aimed to meet this challenge. Equally the choice of building materials used for the restoration had to support the general comprehension of the site from various angles. The design was developed by the architect Manuel de Solà-Morales and Bureau A33. Combined with new excavation data and 3D scanning the design was adapted to obtain a more accurate lay out of the casemate.

Simultaneously the archaeological department consulted a scholarly board of experts in the field of military architecture on issues such as the reuse of original building materials for the reconstruction of the casemate, the public accessibility of the site, how to minimise the visual impact of the tramway that had to pass across the site, and how to reinforce the amenity value of the archaeological site. Additionally the organisation 'Monumentenwacht vzw' was contacted to advise on restoration issues such as the impact of the applied reinforcement of the masonry of the city wall on the facing stones, or on whether or not applying an anti-graffiti coating was desirable (nota Monumentenwacht 2017).

As the design took its ultimate shape all imperatives and specifications for the excavations and restoration project were defined to be included into the building specifications of the DBFM-contract (Design, Build, Finance and Maintain), awarded to the consortium TramContractors. By means of these specifications, the excavation and integration of the archaeological remains were anchored in the 'Noorderlijn' project planning. As such the excavation terms and deadlines outlined caused no delays in the realisation of 'Noorderlijn'. One of the demands was the involvement of a restoration architect (Origin Architecture and Engineering) to guide the realisation of the Kipdorp site.

7 Challenges and choices in the course of the restoration project

7.1 technical challenges

To allow both archaeological recording and to solidify foundations required for the new design, the walls were excavated and subsequently consolidated in various steps and levels. The preserved top surfaces of the city wall and bastion flank were unearthed and registered. To improve the stability of the masonry, the walls were vertically consolidated with grout pillars piercing from the top until the level below the foundations. Behind these, large crossbars upon a new foundation were built through the city walls to support the entire substructure of the underground parking place. Simultaneously the side walls of the Kipdorp site were realised by retaining walls. Subsequently, the limestone facing of the wall was unearthed in three steps. After careful documentation the limestone blocks of the upper part of the wall's facing were systematically dismantled and stored, to be reinstalled during the finishing works of the project. In a final stage the brick foundation of the wall was exposed. The brick base was removed after documentation to allow the anchorage of the wall and to provide a solid foundation to a greater depth for the parking place.

For the Kipdorp bridge a specific process was developed. Firstly, the vaults of the bridge were strengthened by piercing a horizontal netting of glass fibre sticks through the deck. Subsequently, the deck of the bridge was unearthed and documented. Then, the pillars of the bridge were reinforced with a grid of steel I-shaped profiles consolidated with concrete. As such the reinforced bridge no longer had to be supported by its own foundations. After registration of the whole bridge by various techniques the pillars of the bridge could be dismantled to allow the tunnels to pass below the vaults (Fig. 10).

7.2 Challenges and choice of material

The realisation of the archaeological site requires the rebuilding of the upper level of the city wall's facing stones, the dismantled facing of the Kipdorp bridge and the upper level of the flank of the bastion. This will be executed using the original material wherever

Figure 10. Aerial picture of the construction of the tunnels below the vaults of the bridge (City of Antwerp, archaeological department).

possible and additional new stones where required. As mentioned above, the whole facade of the bridge was renewed in the early nineteenth century. The restoration of the bridge thus will reflect this later phase.

As for the bricks, the vulnerable state of the sixteenth-century material requires that newly produced bricks are used. These bricks have a similar appearance (colour and format) as the original bricks. The outlines of the southern casemate of the Kipdorp bastion will be rebuilt using two types of newly produced bricks, referencing to the floors and the walls of the casemate. The red bricks will also be employed to rebuild the dismantled level of the bastion flank where the renovation of the nineteenth century comprised alternating of levels of brick and limestone.

The edges of the rebuilt upright walls of the casemate will be finished with a modern wall termination. This implies a clean finish of bricks on top of the walls to give the illusion of an on-going wall. This was preferred over other options such as an archaeological section and soft capping with vegetation, which was believed to be too romantic and rural for this urban setting. The finishing with a coping stone, which would give the wrong impression of a proper upstanding short wall (note Origin Architecture and Engineering 2018).

8 Conclusion

The 'Noorderlijn' large-scale infrastructural project posed a threat as well as a range of opportunities for the research and valorisation of the military heritage of Antwerp. The importance of the monumental remains for the cultural history of Antwerp as well as their excellent preservation offered great potential for an integration of the sixteenth-century walls into the modern urban fabric. It was important that the design of the restored site was

as comprehensible and legible as possible for the various users of the public space and from multiple angles. Fragmentation of the historical narrative was a particular danger due to the crossing tramway, the mobility needs of the pedestrian pavement – as well as the tunnel for motorised traffic, and the limited space available for the open air site The legibility was enhanced by a pure and symmetrical design and a careful selection of original and new building materials for the restoration project. In the course of the excavation process several outreach activities were organised to inform the general public on the results and to explain the forthcoming realisation of the open air site As such the moment was grasped to generate a broad basis and support for this new centre of attraction.

After excavation and as complete as possible documentation of the open air site at Kipdorp bridge and its casemate, the dismantling of the walls was monitored and documented. Current work involves the processing of the excavation data to learn more about the use and building history of this part of the 'Spanish fortification'. Furthermore, the restoration project was monitored and efforts are being made to continue informing the public on the project's progress on the Kipdorp site as well as on the other parts of the city wall and bastions exposed as part of the 'Noorderlijn' project. As such, the shackles of the great fortification of the Antwerp Golden Age should become a lively aspect of this important chapter of Antwerp's history, and once more tangible in the urban fabric of the modern city.

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Archaeology-friendly building in a city centre: mission achieved or mission impossible?

Maarten Groenendijk

Abstract

At the Koningshof location in Gouda, the Netherlands, a so-called archaeology-friendly building plan was designed and executed between 2006 and 2008. Using all sorts of mitigating measures, builders and archaeologists worked together to preserve the archaeological remains *in situ*, beneath the new buildings. This proved to be so effective that the archaeology-friendly method is now incorporated in the archaeological policy of the city and is used regularly. The method offers an alternative for archaeological excavations which is particularly useful when operating in complex urban environments. However, the archaeology-friendly building method does come with a number of dilemmas that have to be addressed. Are the remains underneath the buildings really preserved *in situ*? What is the nature of the remains that are preserved? Is monitoring required? What to do if things go wrong? And how can future preservation be ensured? This article describes these dilemmas and the way Gouda dealt with them.

Keywords: Archaeology-friendly building, dilemmas, piling, reversed monitoring.

1 Introduction

Gouda is a city in the western part of the Netherlands. The city originated in the early twelfth century and was granted city rights in AD 1272. It then grew rapidly, within approximately 75 years, to the size of the current historic city centre, demarcated by the canals around it. The city walls were completed around AD 1450, after which the city shape remained unchanged right up to the nineteenth century.

1.1 Location

The topic of this article, the Koningshof location, is an area of about 15,000 square metres located in the western part of the old city centre. Archaeologically, it is considered to be a highly valued location, containing a large amount of potentially important archaeological

Figure 1. Historical city map of Gouda in the sixteenth century, drawn by Blaeu. The Koningshof location is highlighted (Municipality of Gouda).

remains. The first building activities on the site originate from about AD 1400. Based on old geographical maps of the city, most of those buildings were situated on the edges of the site. The back areas appear to be mostly empty as far as houses are concerned, but they were used intensively for other activities. Based on several historical sources and maps, the area was used as a shooting range, while there was also room for a rope factory and several wind mills. In the seventeenth century, it housed an increasing number of small workshops, particularly for making the clay pipes Gouda has become famous for. During that same period, all available spaces in the city, including this one, were filled in rapidly with houses to accommodate the rising urban population, resulting in a tightly build urban square.

In the nineteenth century, a large factory was built over almost the entire location: the 'Goudse Plateelfabriek'. This factory produced another famous Gouds product: plateel, a specific type of pottery. In other cities, the construction of a factory the size of the Goudse Plateelfabriek would probably have caused a lot of disturbance to the archaeology beneath it. Fortunately this is not automatically the case in Gouda, which is mostly built on peat. Peat is not the best foundation for a city and as a result, there has been (and still is) a lot of subsidence. To counter the effects of this subsidence, Gouda's inhabitants have added layer upon layer of soil for centuries, just to keep their feet dry. As a result, a layered archaeological deposit with a thickness of four to five metres has formed. While modern building projects as well as the nineteenth century factory may have disturbed the top part of that deposit, the lower layers are still almost completely intact.
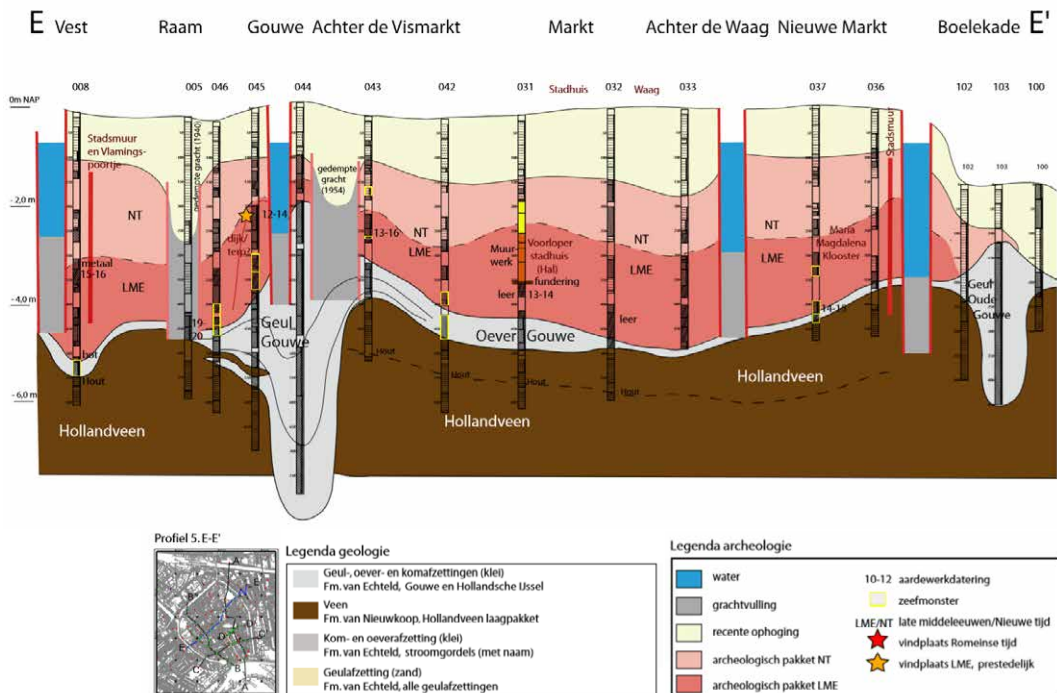
Figure 2. Soil section through the city centre of Gouda (not to scale), showing the thickness of the layers of soil beneath the city. Based on a series of mechanical cores (Archeomedia BV).

2 Archaeology-friendly building method

On the Koningshof location, a redevelopment was planned in 2006. Considering all complexities (not to mention the costs) involved in excavating a large site like this inside a historical city centre, an alternative way of building was proposed: archaeology-friendly building (Groenendijk 2009, also discussed at the EAA 2012 in Oslo). This building method consists of a list of mitigating steps that are taken to prevent any disturbance (other than piling) deeper than 50 cm below the surface. This list includes (but is not limited to): the exclusion of subterranean facilities, the use of shallow foundation beams, the obligatory use of existing utility trenches instead of newly dug ones, the use of fewer piles and a highly optimized piling plan.

In their own right, none of these proposed mitigating steps is new or unique. The strength of the method lies in the combination of all these measures and in a very strict enforcement of them. The resulting project remains very complex and requires a lot of archaeological management and supervision. However, it enables the preservation of the archaeological remains *in situ*, thus removing the need for an equally complex and expensive archaeological excavation.

2.1 Dilemmas

The archaeologically-friendly method turned out to be very successful, so much so that it is used regularly these days, both in Gouda and in other cities in the Netherlands. In Gouda,

Figure 3. Disturbance caused by piling through a stone wall at the Koningshof location in Gouda (Municipality of Gouda).

it has even been included in the official city policy on archaeology. However, the method also raised several dilemmas that had to be faced in 2006 and which are still relevant today. Questions such as 'are the archaeological remains really preserved while using this method?' and 'what to do when monitoring (assuming we are indeed monitoring) reveals that things are going wrong?' had to be addressed (Groenendijk 2011). These dilemmas and the way Gouda dealt with them are discussed below.

2.2 Preservation in situ?

The first question in regard to the archaeology-friendly building method is: are the archaeological remains really preserved *in situ*? After all, in many cases of archaeology-friendly building piles are used, and those piles obviously cause a disturbance of the soil and any archaeological features that are present. But to what extent do they disturb these remains? At the start of the project in 2006, this information was not yet available. To remedy this, all photographs of piles through archaeological sites in Gouda were collected and studied (Groenendijk 2009). Based on that study, the conclusion was that no unacceptable information loss occurs, as long as the spacing between rows of piles is sufficiently large (4.5 to 5 metres apart) to enable future archaeological investigations to use mechanical excavators.

While the above-described situation applies to Gouda, it does not necessarily apply to other cities in the Netherlands. For example, cities in the eastern, Pleistocene parts of the

country have a radically different soil structure, so the effects of archaeology-friendly building in general and piling in particular can be quite different there. More research is required to ascertain the risks of piling in other cities in the Netherlands. This issue is currently being addressed by Groenendijk in his PhD research, which shows (preliminary) that although physical disturbance around piles can be extensive, the archaeological remains between them are generally quite well preserved. (Groenendijk 2016; Goenendijk in prep.).

2.3 What archaeological remains are preserved?
The studies show that archaeological remains in Gouda are indeed preserved *in situ*, at least theoretically. However, the exact nature of the remains that are preserved *in situ* remains unclear. The archaeological remains can consist of burials, houses, traces of production, religious buildings and so on, dating from a range of historical periods. Likewise, remains might be very well preserved, or they could be in a rather poor condition. The question then arises whether it is necessary to know what archaeological remains are preserved prior to building over them? If so: in what detail? And how far are archaeologists prepared to go to determine the nature and condition of these archaeological remains?

Naturally, the more is known about what is being preserved, the better it allows archaeologists to monitor and safeguard the archaeological remains on that location. However, too much research would cause a problem. On the one hand, archaeological research to establish the nature of the remains could actually damage those remains, for example by exposing them to oxygen. And on the other hand, extensive archaeological research prior to preservation *in situ* would take away any financial incentive to try the latter. After all, a large advantage of an archaeology-friendly building method is that it removes the costs of archaeological excavations. If developers need to invest heavily in mitigating measures and still have to pay for research as well, they are much less inclined to do so and will simply opt for excavations.

Based on those arguments, it would be advisable to limit the pre-building research to a minimum and thus just preserve whatever remains are present, regardless of their nature and condition. It is important to bear in mind that in this case in Gouda, the preservation of the archaeological remains is by definition quite good due to waterlogged conditions. Additionally, in Gouda we are not dealing with the archaeological top-monuments of the Netherlands. Unlike for example the Rose Theatre in London, which was preserved only after an excavation had revealed its unique character, the Koningshof location in Gouda is a fairly ordinary archaeological site. That site will without a doubt yield a lot of valuable archaeological information when excavated, but it is not unique *per se*. In other words: losing a part of the site would be unwanted, but it is not a disaster. Therefore, in 2006 it was decided that in the case of the Koningshof location, a desktop study combined with an archaeological watching brief during construction would be sufficient.

Since 2006, this policy has changed somewhat, although excavations prior to archaeology-friendly building are still not obligatory in Gouda. To be able to ascertain whether piling is a problem, it has to be established that no cemetery or any other site type more vulnerable to damage from piling, is present. To this end, both a desktop study and archaeological coring prior to developments are required. The archaeological cores also serve as a way of establishing the current situation of the site. This baseline measurement can be used to asses afterwards (in the future) what the effects of building over the site where.

Monitoring and reverse monitoring: what to do when things go wrong?

The baseline measurement brings up the next issue with the archaeology-friendly building method: monitoring. Should an archaeological site that is built over in an archaeologically friendly way, be monitored to ensure that the remains are indeed preserved as was expected? This question is closely related to another dilemma: what to do when things go wrong after all?

In the case of the Koningshof, after the buildings are constructed, there is no way of excavating underneath them, except by demolishing the buildings again. That is something which, common sense dictates, is not going to happen. This basically means that there is no way of intervening when it becomes clear that things go wrong. If intervention is not an option, there really is no use in spending money on monitoring. This dilemma was addressed earlier by Hans Huisman and Bertil van Os (2016), who ultimately came to the conclusion: 'relax, don't do it'.

This may sound quite crude, but again: the Koningshof site is not a unique archaeological site, nor are the other sites in Gouda where the archaeologically-friendly building method is used. Thus, any damage resulting from building activities is not catastrophic. Additionally, there are still a lot of undisturbed archaeological sites left in Gouda. When viewed on a map, the Koningshof location measures about 1/30th of the entire inner city of Gouda. So even if the archaeology was entirely destroyed at this site, about 96% of the archaeological heritage beneath the rest of the city remains in which to conduct comparative research.

This safeguard, combined with the fact that there is every indication that things will not go wrong, is sufficient insurance that active monitoring prior to and during the development is not required. However, what is required in Gouda is a so-called 'reverse monitoring'. When sites are excavated, specific attention is paid to recent disturbances caused by previous building activities on the site. By consciously documenting those recent disturbances (something that is not common practice in the Netherlands), the effect of building on archaeological remains can be reverse-engineered. That information can then be used when designing new preservation schemes.

2.4 Future preservation

Finally, one last dilemma remains: how can future preservation be ensured? The current state of preservation of the archaeological remains in Gouda is considered to be quite good. Between the rows of piles, large areas of archaeological remains are completely undisturbed and intact. However in another 50 years or so, the engineers of the next development might decide to place new rows of piles exactly between the current rows. This accumulative piling could result in locations like Kraanbolwerk in Zwolle, where four foundation- and pile types are visible, with little room in between them to excavate. Can the archaeological remains on a site like that still be considered to be preserved? If not, how can such scenarios be prevented?

This is one dilemma that is not entirely and satisfactorily solved in Gouda. At the moment, special care is taken to prevent any new or extra disturbances on sites where archaeological friendly building method is used. Any new buildings or utilities on these sites are to be constructed in the same archaeology friendly way as was used earlier. Of course there is no real way of ensuring that this policy will still stand in 50 years' time. On the other hand, preservation *in situ* does not necessarily have to be for eternity. In

Figure 4. Accumulative piling at the Kraanbolwerk location in Zwolle, making archaeological research between the piles very difficult (Municipality of Zwolle).

50 years' time, a lot might have changed, regarding both the available techniques for preservation *in situ* and the techniques of archaeological excavation and recording; as well as the feelings of the archaeological profession on the matter. It is up to the next generation to assess and judge the situation and make their own choices based on what they believe to be important.

3 Conclusion

This chapter shows that archaeology-friendly building is not straightforward. A lot of issues and dilemmas need to be addressed. This can cause intense discussions among archaeologists, who are not all convinced that archaeology-friendly building is indeed a good way to preserve archaeological remains and feel that more information is needed prior to using this method.

While this may be true for other cities in the Netherlands, Gouda is convinced that enough information is available to ascertain that archaeology friendly building is a viable alternative for difficult and expensive excavations in a dynamic city centre. And based on that, we would suggest one thing: 'Relax. Just do it'.

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The construction of the new Station area in Utrecht: a decade of pressure cooker archaeology

Jan-Willem Oudhof

Abstract

Utrecht is building a new Central Station Area. This is one of the major transformation projects in the Netherlands at this time. The historic city centre and the Station Area were two separated parts of Utrecht; these parts will be connected again to form one coherent centre. Whilst the redevelopment project is taking place, the businesses in the area must continue as usual. For archaeology this means that sites are accessible and available for research during the building phase. This means dynamic as dynamic can be. This paper will discuss the role archaeology played in a part of the eastern renewal and will focus on the remains of the sixteenth-century stronghold Vredenburg in the context of the modern building process. Some parts of this stronghold are preserved *in situ*, other parts are replaced within public space. These were the results of a complex and long term process.

Keywords: Urban archaeology, archaeological heritage management, integrated approach.

1 Introduction

Utrecht is building a new central station area. This is one of the major transformation projects in the Netherlands at this time. The historic city centre and the station area were two separated parts of the city. These parts will be connected again to form one coherent centre. Redevelopment was much needed. Ever since the Hoog Catherijne (HC) mall was built in the 1970's there has been a maintenance backlog, a growing city, a growing number of passengers and a desire to get water back in the old canal again. With the construction of a new and renewed area all these things are tackled at once. This paper will discuss the role archaeology played in a part of the eastern renewal and will focus on the remains of the sixteenth-century stronghold Vredenburg in the context of the modern building process. The biggest challenge is the fact that the redevelopment must take place with the least possible interference and inconvenience for residents, businesses and users of the area. During the building process it's business as usual. Contractors are seen as

visitors of the area and should conduct themselves accordingly and organize their work to best contribute to this goal. All parties have a strong commitment to take measures to reduce the time window within which the redevelopment of the building plots must take place. Archaeology is one of the conditions which must be dealt with during this process. Most archaeological remains in the area are lying beneath existing buildings, main roads, subsurface infrastructure and at least 2.5 metres of topsoil. In order to reach these remains in the first place, sheet piles, soil injections with water glass and other construction measures must be in place. At this time however the contractor has obtained legal ownership of the building plot and the archaeological research became part of the construction contract. The contractor and the archaeologists have to team up to get the job done. This is a challenge for both parties, because neither can perform optimally but both have to cope with it. It is a working situation that is dynamic as dynamic can be. Communication is the key.

Vredenburg Castle is one of the most important historical archaeological sites in this area: a sixteenthth century stronghold built by Habsburg emperor Charles V. In 1528, the Holy Roman Empire annexed the Bishopric of Utrecht. Emperor Charles V immediately ordered the construction of a stronghold in Utrecht. The main reason to order the construction was not only to protect the domain from invasion by the duke of Guelders, but also to keep the inhabitants of Utrecht under control. In March 1529 the building location was selected. Construction began in April 1529 with 1500 workers. The castle was defendable in 1532 and completed in 1535. An amazing job, but the castle would only last for forty years. On 8 November 1576, the States General of the Seventeen Provinces ratified the Pacification of Ghent, an agreement to drive mutinying Spanish mercenary troops
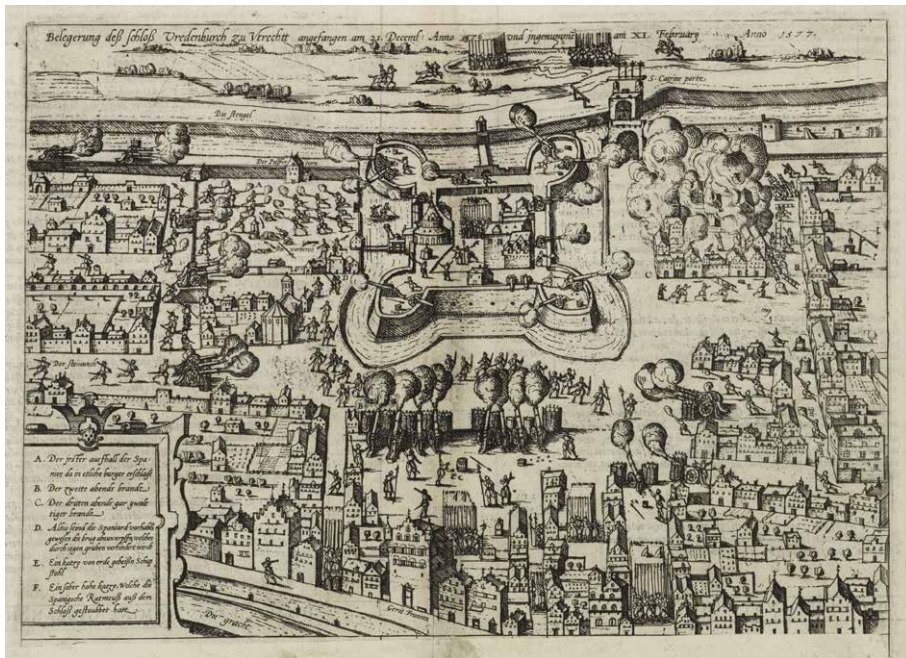

Figure 1. Anonymous seventeenth century picture of the siege of Vredenburg (Utrechts Archief).

from the country. In December Dutch rebels besieged the castle's Spanish garrison. The Spanish abandoned the castle in February 1577 (Fig. 1). The citizens of Utrecht demanded the demolition of the castle to prevent the Spanish or other suppressors from dominating the city again in the future. For strategic reasons the city government opposed demolition. However, the population took the matter into their own hands and started to destroy the castle in May 1577.

2 Vredenburg and the new building process

Of course the castle wasn't completely demolished. Until the early twentieth century parts of it were still in use (Fig. 2). Later in the twentieth century these remaining parts were removed for new developments on a piecemeal basis. The first development of the area took place in the period 1920-1970. Large scale archaeological research did take place in the 1970s, but the results were never completely published. Since then, the remains of Vredenburg Castle have stayed buried beneath existing buildings, main roads and at least 2.5m of top soil. In the preparation phase of the recent redevelopment this led to a new research goal. It had to become clear which parts of the castle were completely vanished and in which areas there was a risk of finding remains (Fig. 3). It was decided that the main goal of the developers and archaeologists would be to preserve the remains of the castle *in situ* as much as possible. The second best option would be to temporarily remove the remains and then replace them during the building process. The third option would be to record and then remove the remains, but this was only for the smallest remains. Based on these three options, reserves of money, but more importantly also of time, had to be made for the different building plots.

The three most important redevelopment projects in the Vredenburg area had a substantial underground construction element. Under the new commercial/residential building in Vredenburg an underground bike parking had to be created. Under the new Tivoli-Vredenburg music hall an underground expedition cellar was to be built. And last but not least a five level deep parking garage was planned on a spot where a much smaller parking garage had been built in the 1970s and would be partially incorporated

Figure 2. Late nineteenth century stereo-photograph of Vredenburg Castle. In the middle is the gasworks that was built in the former castle. To the left and the right of the buildings the north-west and south-west towers are still visible (Utrechts Archief).
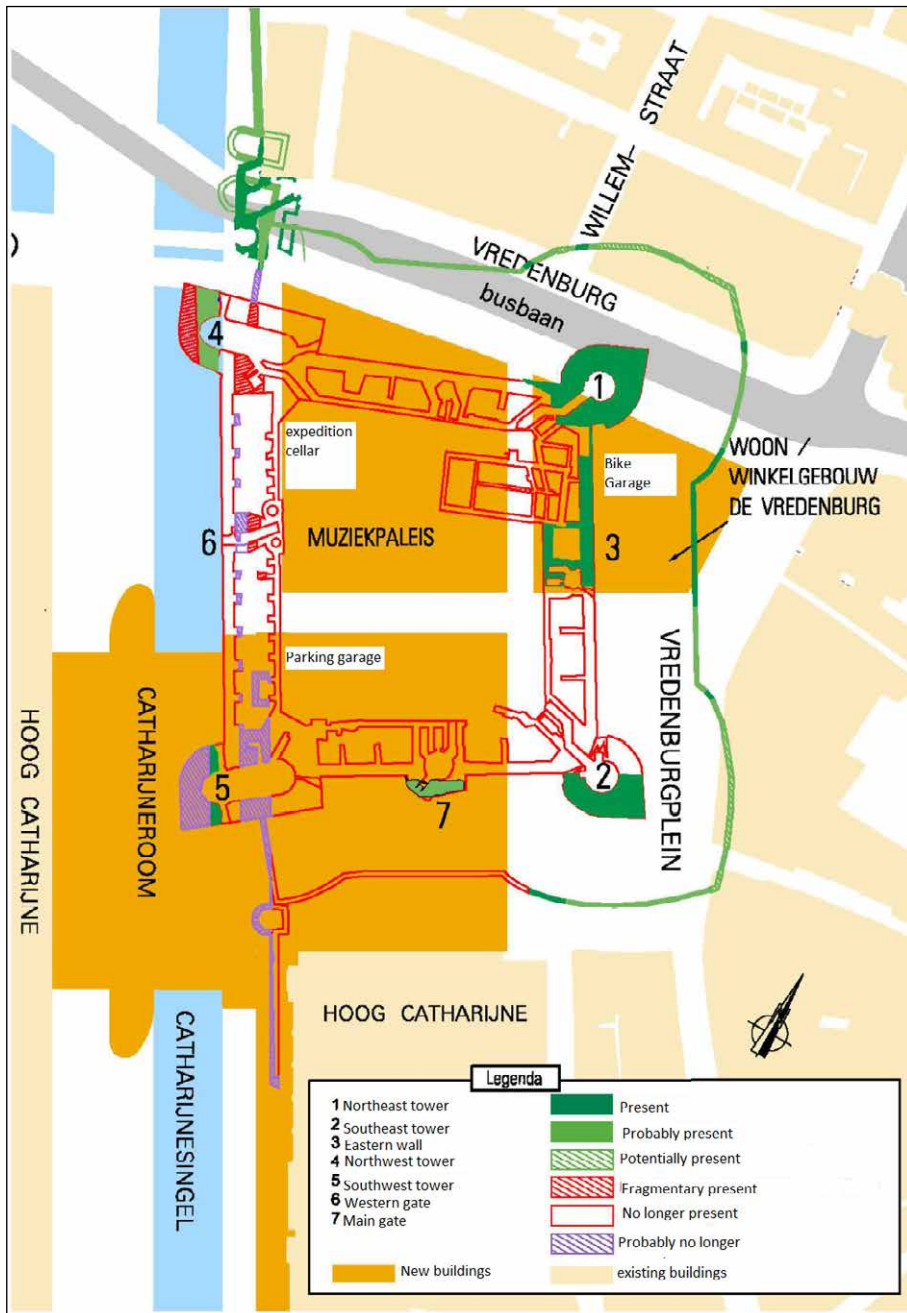
Figure 3. Plan showing the expected remains of the castle, based on preliminary research (J.-W. Oudhof).

into the new scheme. As much information as possible was gathered in advance through desk-based assessment, geophysical research, trenching anddrilling, and heritage impact assessments, assessing the effect of the project on the archaeology. All of this was done in order to find the best possible balance between planning and archaeological research.

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Figure 4. Fire tube in the north-eastern tower (www.cu2030.nl).

The first project was the bike parking. This basement was planned on the location of the north-eastern tower and the eastern wall of the former castle. Because of its monumental status, the new basement was built around the castle remains and the northeast tower and eastern wall were incorporated in the new construction, without being removed. Some tangible reminders of the past and information panels were placed to give the users and visitors of the bike parking a sense of place (Fig. 4). The second project was the service basement of the Tivoli-Vredenburg music centre. The purpose of this basement was to enable trucks to unload equipment and other necessities needed for acts to perform on stage underneath the theatre without causing traffic congestion. All the preliminary investigations indicated that in this area only smaller remains of the western wall were to be expected, and for these minor remains a demolition permit was in place. However, after demolishing some concrete buildings from the 1970s, it turned out that underneath the modern buildings a large part of the western castle gate was in fact well preserved. This element wasn't 'minor remains' and so wasn't covered by the demolition permit. The procedure time to apply for a new permit in this case would take 26 weeks. The length of the procedure was too long to cope with during construction period, and so a solution was reached that would not require demolition of the remains. Part of a technical room was altered to make it possible to preserve the remains *in situ*.

The third project was the building of a five level deep parking garage at a location where a much smaller parking garage, built in the 1970s, had to be partially incorporated. The preliminary investigations indicated that parts of the main gate, the north-west and the south-west tower were to be expected in this area. Part of the main gate had already been excavated and removed during the building phase of the earlier parking garage in the 1970s. It was clear that *in situ* preservation was impossible in this type of underground car park. In this case it was decided to temporarily remove the remains

Figure 5. Figure 5. The Main gate before dismantling (Source: www.cu2030.nl/G. Serné).

Figure 6. The main gate blocks during replacement (www.cu2030.nl/G. Serné).

and replace them during the building process. Because of its weight and size the remains could not be taken out as a whole, so they had to be downsized in manageable and transportable pieces of approximately 10 tons each. First the Main gate was excavated during the building phase (Fig. 5).

The archaeologists had to share their working space with a piling company and other civil engineers. Tight planning was key, and it turned out that the archaeological process was planned better than the civil works. The excavation took place in 2014. The remains of the main gate were not the only discoveries. In the castle moat, the remains of the wooden bridge were found. The moat itself was filled with debris of the castle. Amongst the debris the archaeologists found tons of building material, as well as fragments of an

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Figure 7. The main gate after replacement (www.cu2030.nl/ G. Serné).

Figure 8. The south-west tower before dismantling (www.cu2030.nl).

almost man-sized polychrome statue, weaponry and more than 100 cannonballs. After the excavation ended, the whole structure was 3D scanned and dismantled. The twelve pieces of over 10 tons each were stored for over a year. At that time the building process had advanced so far that the blocks could be replaced as exactly as possible at the same spot as they were found. They had to be craned in like Lego bricks, while the roof of the -1 floor was still open (Fig. 6). During the completion phase of the building process, the remains of the Main gate were put behind glass and combined with information panels, a showcase with excavated finds and a display with a 3D reconstruction of the castle. The remains can be visited by anyone, not only by car park users (Fig. 7). The south-west tower was also excavated during the building phase in 2014 (Fig. 8). Again the excavations brought to light
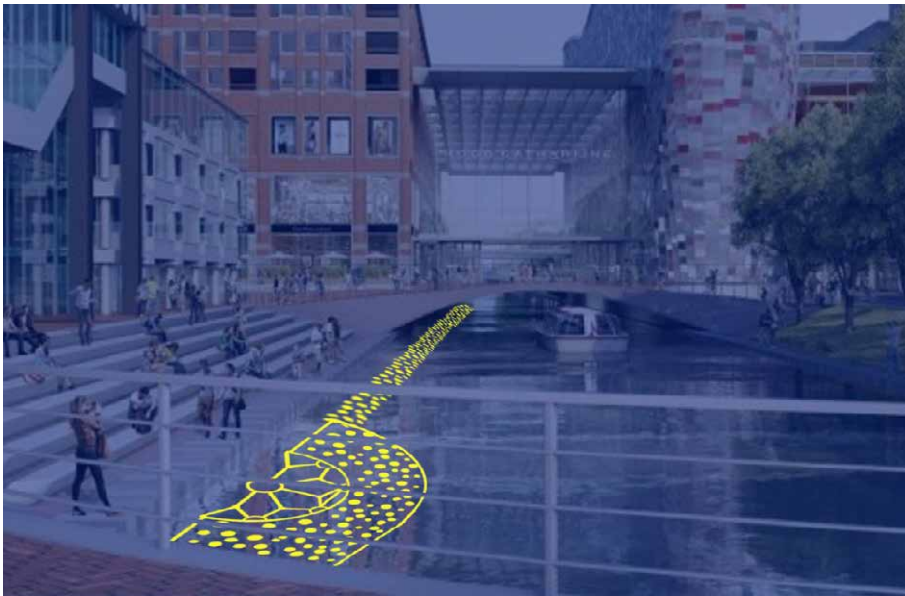
Figure 9. Impression of the light art, designed by Jacqueline Verhoeven.

that the remains had much greater potential than anticipated. A much larger part of the tower survived the 1970s building phase than was thought. After the excavation the whole construction was 3D scanned and the most outstanding part of the tower was dismantled. After more than two years also these blocks were replaced as exactly as possible on the same spot as they were found.

The remains of the north-western tower were polluted with creosote in the nineteenth century by a gasworks, planted in the tower. Because the pollution had penetrated the walls to the core, remediation was the only solution. The remains were treated as chemical waste and disposed of accordingly. Both towers where situated in the old canal, which will be restored completely as part of the redevelopment. This brings the possibility for the location of the missing north-western tower to reimagine the towers with an art project using underwater light and air bubbles. The artist Jacqueline Verhoeven made a design which was implemented in 2018 (Fig. 9). Other references to the castle have been created elsewhere in the Vredenburg area. On Vredenburg Square the contour of the Southeast tower and the Western wall will be made visible in the pavement. An overreaching framework will be created in which the different visible elements of the castle will be interlinked. In this way visitor of the area will be able to experience the enormous size of the castle in public space. Moreover, it provides opportunities to tell the story of the importance of Vredenburg castle as a high tech defence system in the sixteenth century at that time. It also provides the possibility to explain the role the castle had in the history of Utrecht. Despite the vast amount of archive sources and archaeological data, Vredenburg seems a bit of a blind spot in literature. The new book on Vredenburg that will be written will hopefully contribute to the improvement of this.

3 Conclusion

Of course a project of this size has its hiccups. It was necessary to do some re-engineering. Unexpected elements of the listed monument were found. It is impossible to avoid accidental discoveries and setbacks in complicated and large redevelopment projects like this and all of these aspects required discussions on budget and planning. So, it is necessary to incorporate archaeological works as a calculated risk and to keep budgetary slack. It is important for archaeologists to be honest and frank about the risks and keep an open mind towards the other interests in the project. It is a game of give and take and you can't have them all.

Catching archaeology in Deventer. A case study of combining two instruments to improve archaeological heritage management in urban context

Jeroen Bouwmeester

Abstract

As part of the Archaeological Knowledge Kit programme, two research projects have been carried out on the surroundings of historic towns. The first project focussed on modelling the location of different types of sites. In the other project was researched the level of disturbances beneath buildings and residential areas. A case study in Deventer gave a good insight in the working of these models and its benefits. As a result of the project it can be concluded that the surroundings of historic towns contain valuable information about the functioning of the towns. It is possible to model the location of the different sites. Also a level of disturbance of less than 30% by nineteenth and twentieth century residential areas is overall far less than expected. This knowledge helps to develop a better policy to preserve these remains for the future.

Keywords: Urban archaeology, modelling, disturbance, Deventer, Jacob van Deventer, foundations.

1 Introduction: A short history of Urban Archaeological heritage management in the Netherlands

It was in the 1920s when the famous Dutch archaeologist A.E. van Giffen started the first Dutch urban excavations in Groningen (Van Regteren Altena 1982, 26). This was the first of very few urban excavations in the Netherlands before the Second World War. This changed after the war when urban archaeology was put on the agenda as a result of the many destroyed town centres which brought archaeological remains to light. On the other hand, time and money was then especially meant for rebuilding towns, not for scientific archaeological research. It was no coincidence that one of the most destroyed cities, Rotterdam, was the first with their own urban archaeologist. Until the 1980s urban

archaeology wasn't very widely practiced. Most of the few excavations were carried out by the Rijksdienst voor het Oudheidkundig Bodemonderzoek (ROB: the predecessor of the Cultural Heritage Agency of the Netherlands), (amateur) archaeologists and for a brief period the University of Amsterdam. From the late 1970s the number of town archaeologists grew steadily from six to at least sixteen around mid-1990s (Janssen & Verhaeghe 1992, 1-2). They were responsible for most of the excavations but also for an improved status of urban archaeology on the local political agenda.

Preserving urban sites by giving them a monument status was and is very problematic. Already in the 1970s the ROB stated that it was no use protecting urban sites – there were many sites lying beneath different plots with different owners and so it was too much work to put a monument on the list. Every owner would have to agree with this new monumental status or at least have been consulted during the procedure. This, combined with the highly dynamic urban environment with building activities and other spatial developments, the national government considered it no use protecting sites by law. In their vision, the local government should take responsibility by incorporating important archaeological sites within their plans or at least have these sites excavated. In reality this made important sites extremely vulnerable. By weighing all interests by the local government, archaeology must compete with social, economic and political interests. In the early days this often meant that in the best-case scenario sites could partly be preserved by rescue excavations carried out by mostly local amateur archaeologists or sometimes by a local urban archaeologist or the ROB. Many sites had been lost. This was confirmed by the results of the project '*Bodemarchief Bedreigd*'. This study, a Dutch version of the British project *The Erosion of History* led by Catherine Heighway (Heighway 1972), investigated the urban sites which had already disappeared or were under severe threat by urban developments. The results were shocking: the archaeological remains within 45.9% of all Dutch towns were under severe threat or had already disappeared. Even in the largest Dutch cities 80% of the archaeological resource was under severe threat (Van Es *et al.* 1982, 86-87). This study led to a slow growth of the number of municipal archaeologists (Janssen & Verhaeghe 1992, 1-2). On the other hand, later research showed that for other towns the erosion of the archaeological record was still growing instead of slowing down (Magendans & Poldermans 1985, 63).

From the 1990s onwards urban excavations were also carried out by private companies, due to the implementation of the Valletta Treaty. Also, because of new legislation, municipalities had to develop their own policy towards their archaeological record, not only for the countryside but also for the urban centres. The largest improvement of this all was that less sites were disturbed without archaeological research. On the other hand, with circa 190 historic towns in the Netherlands, most towns don't have their own archaeologist. The Dutch quality standard for archaeological research (KNA) doesn't explicitly demand a certain degree of historical research. This combined with the fact that this historical research and later the excavations are often carried out by organizations operating on a national scale, the risk increases of losing the specific local historical and archaeological context of urban excavations. Also the archaeological predictive models for urban centres and their direct surroundings are mostly very basic. On most of the maps, these zones are just coloured red (containing remains of high archaeological value) without specification. Comparable maps made for building archaeology are far more

specific (for example Glaudemans 2008).[1] Also how disturbed the archaeological record is by the urban extensions from the nineteenth and twentieth century is unclear. One other large downside of the current system is the lack of comparative research within towns and between towns. Recent projects of the Cultural Heritage Agency of the Netherlands (RCE) faces these problems (Lauwerier *et al.* 2017).

In this paper two of these projects, modelling archaeology and mapping disturbances, will be presented using the case study of the town of Deventer.

2 Combining two instruments

Two tools to refine knowledge of the archaeological record and its preservation will be presented and tested. Both tools are part of larger projects within the Archaeological Knowledge Kit programme (Lauwerier *et al.* 2017).

2.1 Modelling archaeology

The first tool is a model of archaeological remains around historic towns. Around 1560 the cartographer Jacob van Deventer made very detailed maps of almost all the Dutch and Belgian towns and some towns in Northern France, Luxembourg and at the western border of Germany. The maps were developed in order of the Spanish king (Vannieuwenhuyze 2012, 5). About the goal of the maps is a lot of debate. One opinion is that the detailed maps were made for a military purpose (Vannieuwenhuyze 2012, 10). At that time most towns could also be seen as large military fortresses to control the country. Jacob van Deventer made the maps in such detail they could nowadays easily be used as town map (Fig. 3). The maps showed not only the towns, but also their immediate surroundings. Consequently we now have quite a good impression of how the late medieval towns and surroundings looked like.

In this project an inventory was made of all the buildings and objects around nine Dutch towns. Also the distance was measured between the separate objects and the town wall. The first stage of the research consisted of only three (of fifteen) of the larger towns around 1560 AD in the Netherlands with more than 7,500 inhabitants (Alkmaar, Nijmegen, Deventer) (Bouwmeester 2017a. The number of inhabitants derives from Lourens & Lucassen 1997). This was extended in 2017 by three (of 27) middle large towns with between 2,500 and 7,500 inhabitants (Zutphen, Arnhem, Sneek) and three (of 46) small towns with less than 2,500 inhabitants (Doesburg, Vlaardingen, Wijk bij Duurstede).[2]

Two important factors can be discerned: the number of buildings in relation to the distance from the town wall and the diversity of buildings in relation to the distance from the town wall. When both these factors are combined, a so called CXF factor is created:

$$CXF = \frac{number\ of\ complexes * frequency\ of\ buildings\ and\ objects}{number\ of\ towns}$$

Based on these data, the surroundings of the towns can be divided into three zones.[3] These zones reflect the influence of the town on its direct surroundings. The first zone lies

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1   For example Amsterdam: https://www.amsterdam.nl/publish/pages/863108/architectuur-_en_ bouwhistorische_waardenkaart.pdf.

2   The first part of the project which is presented in Bouwmeester 2017a only focussed on the mentioned three larger towns including Deventer. The number of inhabitants derives from Lourens & Lucassen 1997.

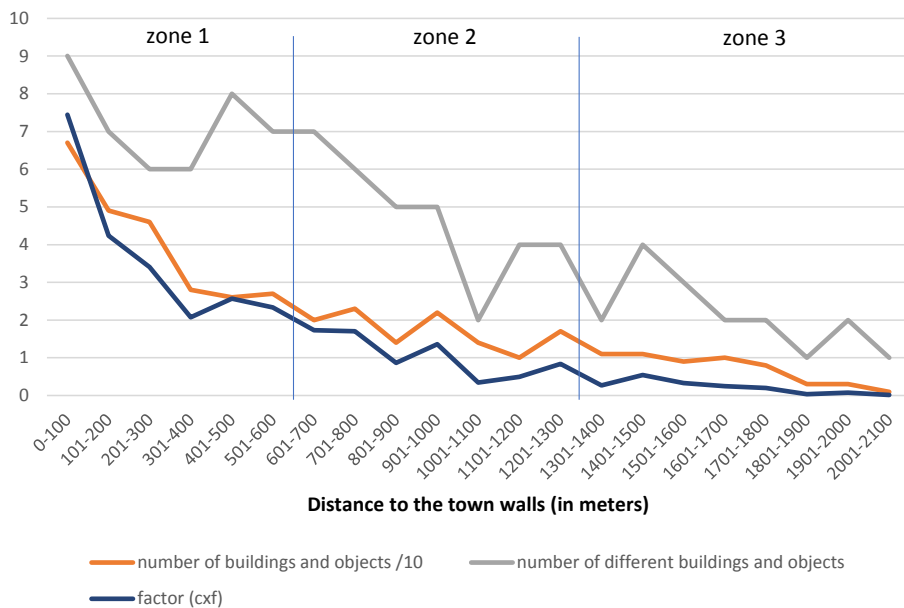3   For more detailed information on the method: Bouwmeester 2017a.

Figure 1. Graph with the CXF-factor in relation to the three zones (J. Bouwmeester (RCE).

between 0 and c.600 metres from the town wall, the second zone lies between c.600 and c.1,300 metres and the third zone is the area from 1,300 metres onwards.

From the first to the third zone the number of buildings and objects decline and also the diversity of the objects. But there is more. There are specific complexes which can be allocated to different zones (see Table 2). For example, most of the windmills and pillories or stocks (for punishment) can be found in the first zone directly near the town. On the other hand, gallows lie further into the second zone. It is not uncommon that gallows lie near the borders of the town borders (Baas, Mobach & Renes 2005, 50). Also most of the convents lie in the second zone, a bit further from the town walls but not too far away.

The most striking difference between the larger towns and the smaller towns is that the relative number of buildings and objects compared to the number of inhabitants is lower with the larger towns. The same is the case with the diversity of buildings and complexes.

2.2 Mapping disturbances

Most of the Dutch towns only started growing beyond their medieval borders after the Fortifications Act in 1874, which made it possible for towns to extend their territory beyond their fortifications. This was needed because living conditions in towns had deteriorated as a result of both the large population and industrialisation, which also took place mostly within the town borders. So shortly after the Fortifications Act new industrial zones appeared outside the former defences. New residential areas were built and the former fortifications were often transformed into large parks. Towns started to change into the large urban agglomerations of the 21st century.

The new residential areas differed completely from the urban morphology within the previous fortifications. Within the town walls buildings were largely built on top of the foundations of their predecessors. Complete new blocks erasing the previous urban 'grain' –
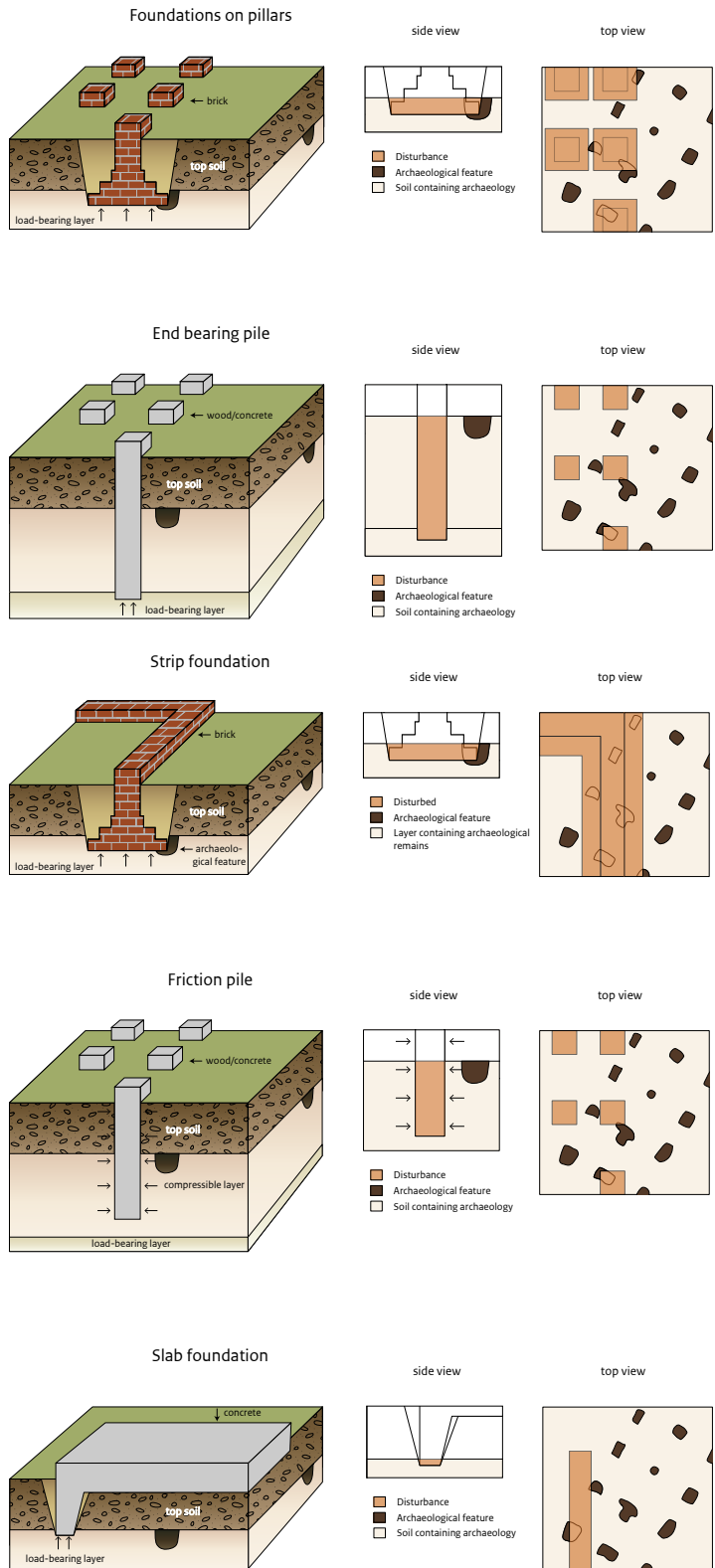
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Figure 2. The most common foundations found beneath buildings in relation to archaeology (Bouwmeester *et al*. 2017, 150).

the structure of building blocks and streets – were relatively scarce. It is no coincidence that the 16th century maps of Jacob van Deventer, described earlier, could still be used today and also for the earlier medieval town. After 1874 a new structure appeared outside the fortifications: along and between existing main roads these new areas were planned on a mostly empty sheet (Rutte & Van Mil 2016, 223-227). Many residential areas were planned. Also houses were mostly not built as individual objects but as part of larger building blocks.

From an archaeological point of view these new residential and industrial areas that were being built during the nineteenth and twentieth centuries could have disturbed or destroyed older archaeological remains dating from the medieval period and further back into history. The question is how severe this disturbance was. The Cultural Heritage Agency has developed some tools to help to determine this. The disturbances by building new residential areas can be viewed on two levels. The first level is the disturbance of a residential area as a whole. A residential area consists of building blocks but also of roads, gardens and other infrastructure and features of the environment. This suggests that large parts of the archaeological record could still be intact (see Fig. 5).

The second level is the disturbance caused by constructing the buildings. Nowadays many new building projects are preceded by large scale levelling operations during which the whole landscape is turned upside down and with it the archaeological record. Whilst this could have happened in the past, on the whole the foundations didn't disturb more than just the footprint of the building. Often the disturbance was even less than the footprint of the building as a whole – for example when piles were used or with strip foundations along the lines of the walls – only parts of the ground were disturbed.

Even so there is still the potential for fragmentation. Foundations, but also small disturbances within plots like the digging of large ponds, can fragment the archaeological record. Small dispersed pieces of an archaeological site are then wiped out. It could be compared with a sheet of paper with a drawing, but full of holes. The more holes, the harder it gets to discern the drawing on the paper. Eventually the drawing becomes so badly damaged that a reconstruction is impossible, and the paper should be thrown away. Indeed even when some of these holes are recorded, it is still very hard to discern the original drawing. In reality, because the land is divided into small blocks by ownership, large building blocks will not be excavated when there are new developments, but just individual houses and/or their backyards. Understanding such small parts of an archaeological site or landscape can be difficult. It is safe to say that the profit in knowledge of an excavation of a complete building block will be exponentially higher than of separate excavations of the houses within.

In conclusion, the first impression of the large urban extensions is they damaged large parts of the underlying archaeological record. However when studied in more detail, damage caused by the residential areas would be far less than expected. With the exception of large scale levelling operations, the worst case within our research showed that 56% of the record would be disturbed. Even then the extent of the damage would depend on the type of foundation used for the buildings. Almost all of the residential areas that were studied had a building density of less than 30% (Bouwmeester, Abrahamse & Blom 2017). Of course the ideal scenario would be an intact archaeological record free from damage by building, land use and/or erosion. Yet in fact these urban extensions have in many ways functioned as a conservation blanket for years, because new developments in many of these very popular residential areas are still out of the question – especially the

areas built before the mid-20th century. The current threats are especially the rebuilding of the areas built from the late 1950, 1960s, 1970s onwards, and the fragmentation of sites mentioned previously.

3 The case study: Deventer

For this case study we use data from the historic town Deventer. Deventer lies in the eastern part of the Netherlands along the river IJssel. The municipality nowadays has c.100.000 inhabitants.[4] The origins of the town lie in the second half of the eighth century with the founding of a chapel by the missionary Lebuinus (Bartels 2007, 37). Deventer subsequently developed so that it became one of the largest urban centres between the tenth and twelfth centuries. In 1123 Deventer received its charter (Bartels 2007, 49). In late medieval times Deventer became part of the Hanseatic League. Gradually Deventer, together with other Hanseatic towns – particularly those in the eastern part of the Netherlands – lost its economic and political power to the seaports in the western part of the Netherlands, especially Amsterdam. Around 1560 Deventer was with 7,700 inhabitants the fourteenth largest town in the Netherlands (Lourens & Lucassen 1997, 71-72).

4 Modelling archaeology in Deventer

4.1 The map of Deventer

Around 1560 the cartographer Jacob van Deventer, who despite his name actually came from the town of Kampen, made a detailed map of Deventer (Figure 3). As was usual with Van Deventer's mapping, both the town and its surroundings were depicted. All the building blocks are visible on the map. Special buildings which stand out from the rest are drawn in more detail. All the roads are clearly visible and marked with small dots. On a smaller map only the streets and the special buildings are drawn with some of their names (in Latin). Clearly visible on the map are the main routes to and from the town. The routes to the north converge at the main road to Zwolle. The river IJssel, which connects the river Rhine with the North Sea, plays a significant role in the spatial development of the town and its surroundings. The elongated plan of Deventer originates in the town's location directly next to the river where during the high Middle Ages ships could moor. The town is located between the confluence of the Schipbeek with the river IJssel to the south (where there was another harbour), and the bridge carrying the main land route from the western part of the Netherlands to Germany to the north-west, the so-called Hessenweg. This emphasises the importance of Deventer at the crossroads of these key river and land routes of trade and commerce.

4.2 Sites around Deventer

There are a total of 74 sites (buildings and objects) visible on the map. The largest category is houses (n=46). Unfortunately this is a very broad category because the mapmaker didn't categorize the smaller buildings like farms, houses of craftsmen and fishermen, inns, toll buildings and so on. Therefore it is not possible to discern on the map what the buildings were used for. The second largest category is windmills: there were thirteen standing around Deventer. Eleven of these windmills stood together within a moated area directly

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4   CBS. https://opendata.cbs.nl/statline/#/CBS/nl/dataset/37230ned/table?ts=1516101700873.(2018).
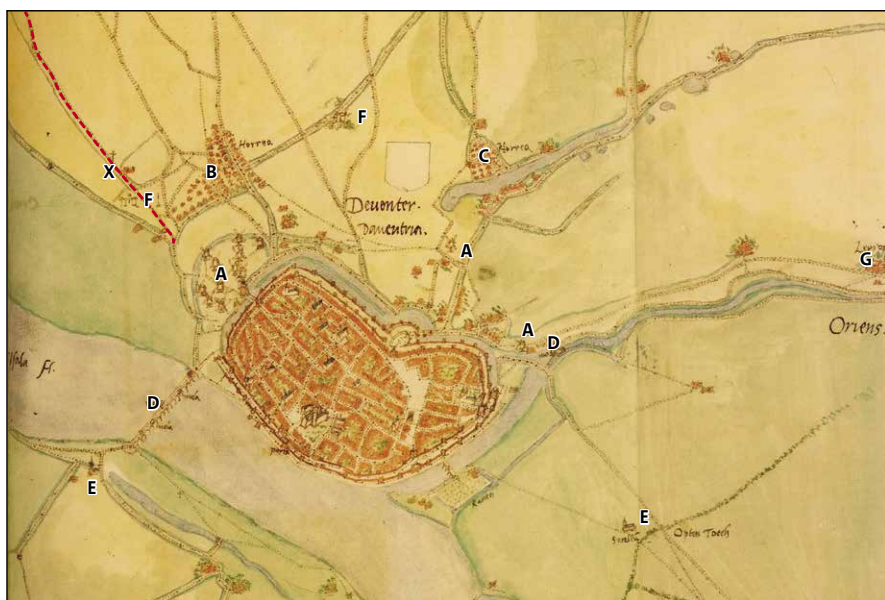
Figure 3. Map of Deventer around 1560 by Jacob van Deventer. A: windmills; B/C: warehouses (horrea); D: watermills; E: chapels; F: gallows; G: leper house; X: location of the nineteenth-early twentieth century factory for vitrified clay pipes and pottery; red dotted line: predecessor of the Zwolseweg (J. Bouwmeester (RCE)/M. Haars (BCL Archaeological Support).

outside the town walls (see Fig.3 (A)). Further to the north another cluster of objects is visible. These are warehouses (Horrea) that were used for the storage of grain (see Fig. 3 (B)). In the database this cluster is counted as one, because in contrast to the windmills, it is difficult to ascertain whether all these buildings were accurately put on the map. Because all the mills were drawn with a connecting road, it makes it relatively safe to count every individual mill. Northeast of Deventer lies a second zone with warehouses. These are also counted as one. Deventer had five watermills. Three of these mills were integrated in the bridge over the river IJssel, and the other two stood just outside the eastern town wall next to the Schipbeek.

The other categories include only one or two sites. The low number of sites doesn't necessarily reflect that they were unimportant. In contrary, the gallows and pillory both were objects which most towns had somewhere in their surroundings – they had deeply symbolic meanings as well as a physical purpose. As noted above, the gallows stood often a bit further away from the town wall than the pillories. Both objects always stood along a connecting road or river and could be seen as markers indicating the jurisdiction of the town (Baas, Mobach & Renes 2005, 50). Tenter grounds for the cloth industry outside the town walls don't often appear on the maps of Jacob van Deventer; one missing category around Deventer is monasteries.

4.3 Location of sites within the zones

Compared to the other eight towns the number of sites and also the variety in categories in zone 2 and 3 in Deventer is quite low (see Table 1 and 3). Almost all the sites lie within the first zone. Even the cross lies just over the border between the first and second zone.

There are a few striking patterns in the location of sites around Deventer. First of all is the location of windmills and warehouses. Both categories, in contrast to many other towns, are mostly found in large clusters. The windmills lie at the north side of the town, near the town wall, and are surrounded by a large moat (see fig. 7.3 (A)). For windmills the right location is essential. To work best, windmills need to have enough space around them to 'catch' the wind; this location near Deventer is perfect for the wind from the west and south-west. The river valley is extremely flat so the wind is not blocked by buildings and trees. The only obstacle for the windmills must have been at times the other mills around them. One other mill lies in the middle of the field near a road and another windmill stood near two watermills at the east side of Deventer. Parts of the mill biotope are, next to the wind, the roads to reach them. All the mills, including those within the clusters, were accessible by road.

Near most of the towns, storage buildings for grain (warehouses) lie dispersed through the fields. Often they stand near farmsteads, but in Deventer they are gathered within two clusters. The first cluster lies above Deventer at the southern end of several large farmlands (see Fig. 7.3 (B)). The warehouses are reached by some roads, but on the map not every building has a direct connection. The location of this first cluster is ideal because it lies almost directly adjacent to the group of windmills noted above and to the main roads through the farmland. The second cluster lies at the east side of Deventer near one of the main roads to the town and also close to several large farmlands and a windmill (see Fig. 7.3 (C)).

As already noted, five watermills were located in the environs of Deventer (see Fig. 7.3 (D)). The three on the bridge over the river IJssel were connected by road to the town, but

Type of site	Zone 1	Zone 2	Zone 3
Habitation zone	-	-	-
Gallow	2	-	-
Warehouse	2	-	-
Hospital	-	-	-
House	31	14	1
Castle	-	-	-
Church	2	-	-
Monastery	-	-	-
Cross	-	1	-
Leper House	-	-	1
Pillory	1	-	-
Tenterground	1	-	-
Watermill	5	-	-
Windmills	13	-	-
TOTAL	57 (77%)	15 (20%)	2 (3%)

Table 1. The number of sites around Deventer specified per zone.

the road also branches off to the large windmill complex and warehouses in the north. The other two watermills lie on both banks of the Schipbeek, the tributary of the IJssel; these mills are also connected by roads. Near these watermills stood also a windmill.

Outside the town were two churches or chapels (see Fig. 7.3 (E)). One was the Chapel of St Anna to the south. The other was the church or chapel built directly at the other side of the bridge over the IJssel. Both buildings are isolated. There are no other buildings such as houses around them. At the border of the first zone were the two gallows and a pillory (see Fig. 3 (F)). The leper house was further away from the town centre in the third zone (see Fig. 3 (G)).

There are many buildings which can be categorized as houses at other locations around Deventer. As previously stated, this is a collective name for several types of buildings, varying from farmsteads to inns. Many of these houses lie directly on the other side of the moat. The rest are clustered in the direct surroundings of Deventer. During the Middle Ages new farmsteads were built and new land was reclaimed; at the same time some farms disappeared (Van Beek 2009, 201). All in all the Jacob van Deventer map is a representation of the landscape around Deventer around 1560 which reflects also the ages before.

4.4 From the 16th to the nineteenth century

When we compare the sixteenth century map with the nineteenth century map of Deventer and its direct surroundings the most striking differences are the changes in the urban fortifications (see Fig. 4). These had a direct impact on the landscape. The northern areas with windmills and warehouses have disappeared. On the seventeenth century map of Blaeu with the new fortifications, the windmills have moved mostly to the north western ramparts of the town.[5] At the same time the roads in this area are on new alignments; the main road – the Boxbergerweg – changed direction towards the location of the new town gate. Old roads had mostly been removed and a new division in plots had been made.

The fortifications had also a heavy impact on the location of the houses (including farms, inns and other domestic-type buildings). The houses directly around the town walls had been removed. The reason for this was to create a clear view and have a clear shot from the fortifications. Now the buildings are mostly lying further away from the fortifications and more dispersed through the landscape, although they are still within the first zone around the town centre. The same goes with the more industrial activities. The cluster of windmills has disappeared and instead mills can be found on higher locations near the fields in combination with a road, as well as on the ramparts of the town. Other more industrial complexes have also newly appeared outside the town, like a large tannery near the river and a ropewalk. The gallows near the river seems to have disappeared on the map but the location of executions is recalled by the name of one of the roads in this area, the Radstakerweg. It is not known when the last executions took place at that location. On the eighteenth century map there are already allotments (Hottinger map 1787. https://wmsonly-services.geodataoverijssel.nl/viewer/layer/raster_alleen_wms/ Hottinger_kaart_1787).

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5   https://commons.wikimedia.org/wiki/File:Blaeu_1652_-_Deventer.jpg.

Figure 4. Map of Deventer around 1905 with fortifications and first extensions (Bonnebladen 1905). X: location of the nineteenth-early twentieth century factory for vitrified clay pipes and pottery; red dotted line: the Zwolseweg (J. Bouwmeester (RCE)/M. Haars (BCL Archaeological Support).

These small fields, or allotments, just outside the earthworks and on the other side of the river are new. The allotments on the east side of Deventer are often combined with small houses. On several of the other allotments small buildings like garden sheds are visible.

Further away from Deventer, mostly in the second zone, were large plots of farmland. They form part of a cluster of large fertile agricultural lands, the so-called *enkgronden* (in English: *plaggen soil* or *plaggic anthrosol*). The Zwolseweg (see red dotted line on Fig. 3 and 4), which was the main road to the north and already visible on the sixteenth century map, was in fact the western border of these complexes. The road was also lying on just the higher rim of land. This and other roads through these large clusters of fields were still there in the nineteenth century and exist even today. These roads formed the axis of the plot division. The age of these roads suggest that this division might have been already there for centuries. Only a few years after the 1874 Fortification Act a factory for vitrified clay pipes and pottery was built along the Zwolseweg in area of farmland (see Fig. 4 (X)). Within 20 years the rest of the Zwolseweg was filled with houses and in the early 1920s the factory had been removed and new houses were also built on this plot.

5 Mapping potential disturbances around Deventer

5.1 introduction
As stated in the introduction two levels of disturbances can be identified, the level of the residential areas and the level of the buildings. The oldest residential area of Deventer is the medieval town. This is a palimpsest of archaeological traces. In fact the disturbances

building density
50 to 100%
35 to 50%
25 to 35%
10 to 25%
less than 10%

chronological development map
1200 AD
1350 AD
1500 AD
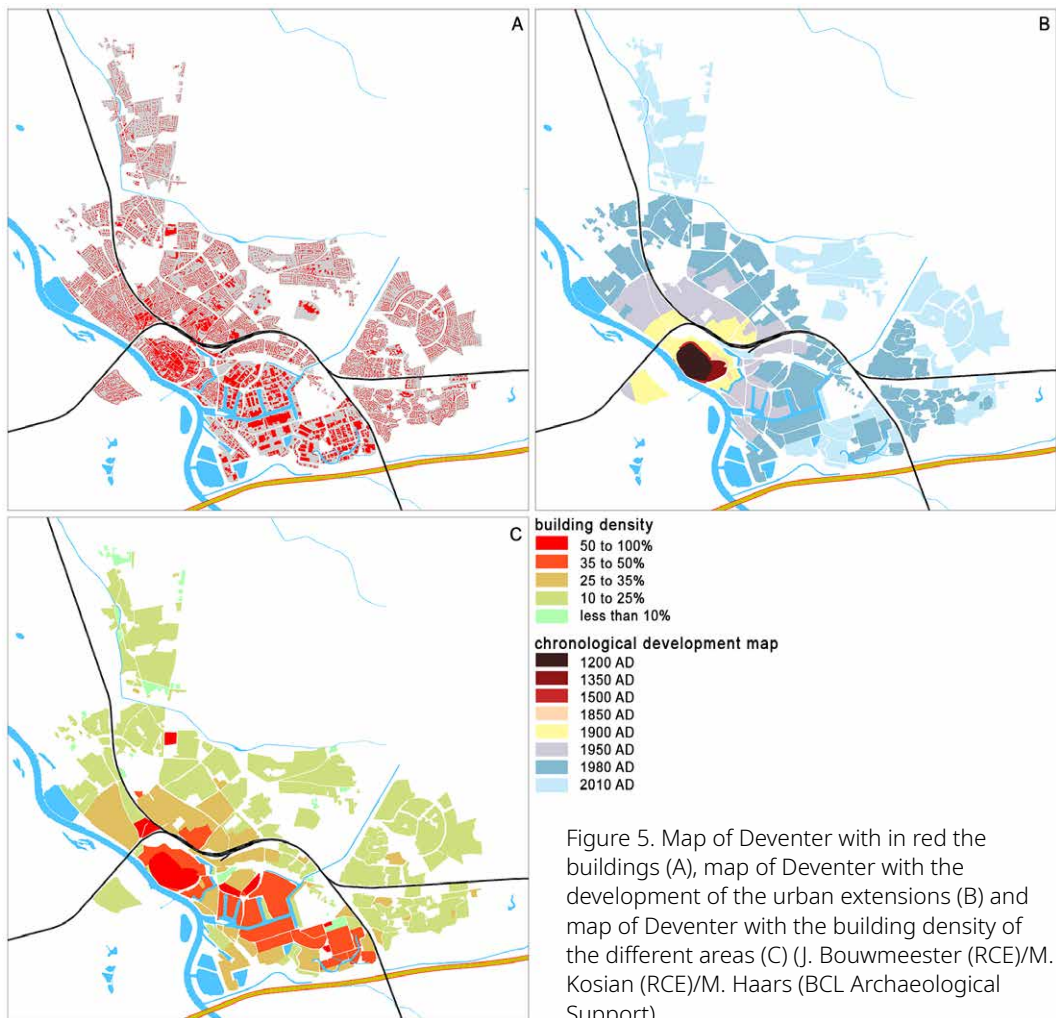1850 AD
1900 AD
1950 AD
1980 AD
2010 AD

Figure 5. Map of Deventer with in red the buildings (A), map of Deventer with the development of the urban extensions (B) and map of Deventer with the building density of the different areas (C) (J. Bouwmeester (RCE)/M. Kosian (RCE)/M. Haars (BCL Archaeological Support).

through the ages of older remains have become archaeological traces themselves. In this research the focus lies on the urban extensions from the eighteenth to the twentieth century. This doesn't necessarily mean there won't be any older disturbances. For example, during the siege of Deventer by Rennenberg in 1578 many ramparts and military camps were constructed directly around Deventer. Undoubtedly these ramparts have removed some older remains, such as the warehouses on the north side of the town. All these disturbances took place in the first zone with also the highest expectancy rate of archaeological remains from the Middle Ages.

5.2 Disturbances of residential areas

The three main factors determining the lay-out and type of buildings in residential areas – and therefore also the potential archaeological disturbance – are (1) the building period, (2) the design of the buildings and (3) the social-economic background of the inhabitants (Bouwmeester *et al* 2017, 146). Because of these three factors the building densities of the residential areas in Deventer (see Fig. 5C) differ from one another. The medieval town

Figure 6. Early photograph of the building complex at the Zwolseweg in Deventer designed by Knuttel and build in 1923 (N.N. 1931, 69).

centre and some industrial areas have a high building density. The first urban extensions have a lower building density of between 25% and 35%. Some parts have a higher density of 35-50%. These areas contain mostly working-class houses. The extensions from the 1950 onwards have a much lower building density between 10% and 25%. This all means that during the construction of these residential areas, the builders only disturbed the archaeological record on the location of the buildings and much of the remaining archaeological record should be intact.

5.3 The disturbance on a building level

The construction of buildings has disturbed the archaeological record in diverse ways. Mostly this has to do with the way of funding. In this example, a building complex at the Zwolseweg in Deventer will be examined. The houses were designed by the Deventer architect Knuttel and built in 1923. The houses were built on the location of the former vitrified clay pipes and pottery factory. The new building contained 11 houses in a row (or terrace), but was designed to appear as a single palatial design with the houses at both ends and the house in the middle standing a bit forward to the street. The houses were so called *Herenhuizen* or upper middle-class houses (see Fig. 6).

Each house was three stories high and had a cellar. Looking more closely to the foundations, only a part of the foundations were cellars and went through the archaeological layers. Most of the walls were funded by strip foundations. Each load-bearing wall was founded underground by a slowly widening foundation until the load-bearing layer was reached. This meant that potentially under large parts of these buildings, between the foundations, the archaeological remains could still be intact (see Fig. 7). A visual inspection under one of these houses confirms this. The walls of the house were built on strip foundation. Two walls went deeper in the ground and formed also the
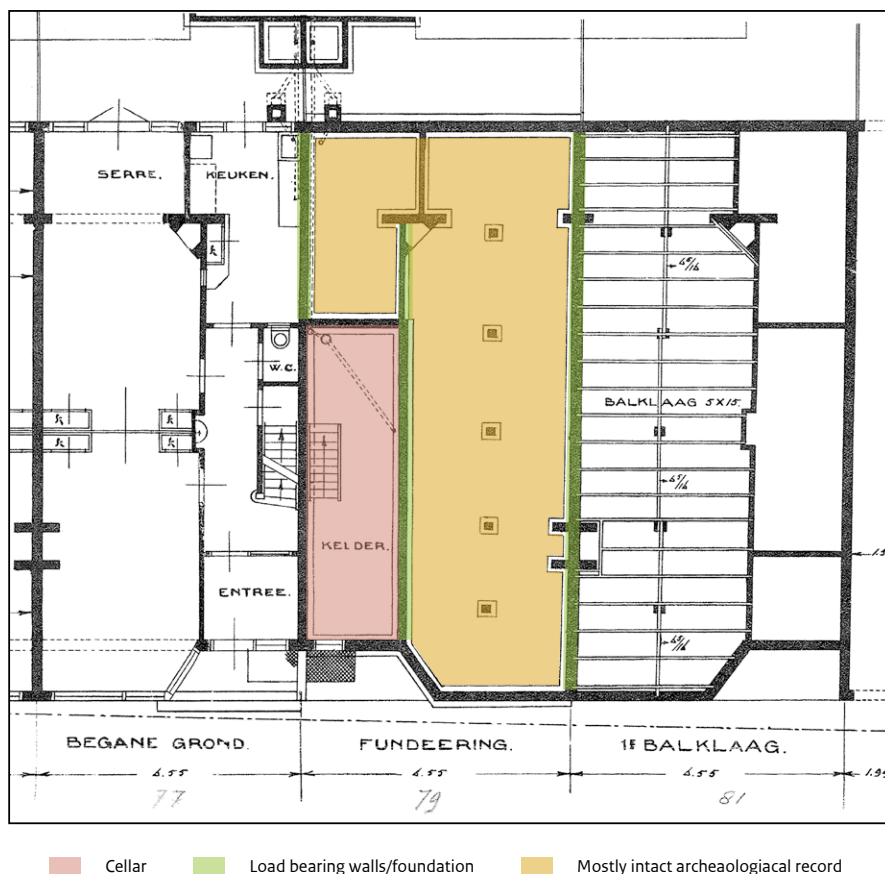
Figure 7. Plan of the building at the Zwolseweg in Deventer with the expected degree of disturbances (J. Bouwmeester (RCE)/M. Haars (BCL Archaeological Support).

walls of the cellar. The archaeological remains will be disturbed there. Outside the cellar between the cellar wall and the southern foundation of the house only a small layer of sand was removed for ventilation, sewer pipes, water pipes and later also electricity. The builders didn't even remove some of the walls of the previous industrial building that stood there. They used one of these walls to bear one of the sewer pipes. This indicates that most of the archaeological remains from the nineteenth century and earlier will still be intact beneath this house.

6 Discussion

6.1 Modelling archaeology: Regularities within site location

The historic maps show that the exact location of sites may change over the years. But within the defined zones there are still regularities in the location of specific sites. Combining the type of sites with the different zones and specific location characteristics gives quite a specific indication of where certain sites can be expected (see Table 2). The location characteristics are not specific for the 16th century, but can also be used for

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Type of site	Zone 1	Zone 2	Zone 3	Location characteristics
Habitation zone	10	6	1	Close to town; higher ground (or raised land); along main road next to town gate
Gallow	3	3	-	Visible; along main roads or waterways; border of urban territory
Horreum	5	-	-	Along main road; higher ground near the fields
Hospital	1	-	-	Along main road
House	142	92	46	Higher ground (or raised land (mounds)); near roads
House – Inn	-	-	-	Along main roads
House – Farm	-	-	-	Higher ground (or raised land (mounds)); near roads; near fields / arable land
Castle	1	1	1	Near roads / waterways; political – strategic locations
Church	7	3	3	Higher ground; often near crossroads; habitation zones/villages
Monastery	1	3	3	Along main roads; locations with space; not too close to the town (might depend on the monastic order)
Cross	5	1	-	Along main roads;
Leper House	2	1	1	Along main roads; mostly not too close near towns
Pillory	9	3	-	Along main roads and/or waterways; easy to reach from the town; not too far from the town (more nearby then gallows)
Tenterground	1	-	-	Close to town
Watermill	14	2	1	Along waterways with a current; along a main road
Windmills	42	5	-	Good mill biotope: location with enough wind ('windvang') and easy to reach by roads; Often on higher grounds with little and low buildings

Table 2. The combined number of sites around Alkmaar, Nijmegen, Deventer, Zutphen, Arnhem, Sneek, Doesburg, Vlaardingen and Wijk bij Duurstede specified per zone with location characteristics.

earlier and later periods. By using the zones and location characteristics it is possible to be more precise with where certain sites can be found.

6.2 The Deventer model versus other towns

The main question is how representative the results of Deventer are compared to other Dutch towns. When we compare the model of Deventer based on the sixteenth century maps with other larger and with smaller towns in the Netherlands, only minor differences can be seen (see Table 3). One main pattern is that the smaller the towns, the smaller the total number of sites. The other main pattern is that also the variety in type of sites decline from the larger towns to the smaller towns. This is of course a model based on the average. Local exceptions exist, like Arnhem with a surprisingly large number of houses around the town walls.

6.3 Nineteenth and twentieth century urban extensions within the zones

Logically the urban extensions after the Fortification Act concentrated on the direct surroundings of the town wall. In fact this is the first zone within our model. In this zone, shortly after 1874 first a mix of factories and houses appear. But soon afterwards, at the Zwolseweg only within 50 years, the factories are pushed further away. In fact this first zone is urbanising and a new transition zone is created further away from the old heart of the town (see Fig. 8). This first zone largely coincides with the first phase of the

	Total number	Total %	Large towns			Semi large towns			Small towns		
			Alkmaar (n:)	Nijmegen (n:)	Deventer (n:)	Zutphen	Arnhem	Sneek	Doesburg	Vlaardingen	Wijk bij Duurstede
Inhabitants 1560:			13650	9000	7700	6000	5200	3000	2100	2000	1500
Type of site:											
Habitation zone	17	4%	8	-	-	2	5	-	1	-	1
Gallow	6	1%	1	1	2	-	-	-	-	1	1
Horreum	5	1%	-	3	2	-	-	-	-	-	-
Hospital	1	0%	-	-	-	-	-	1	-	-	-
House (including farms)	280	67%	29	32	46	18	84	8	18	25	20
Castle	3	1%	1	-	-	-	1	-	-	-	1
Church	13	3%	-	2	2	2	3	-	1	-	3
Monastery	7	2%	3	-	-	1	2	1	-	-	-
Cross	6	1%	-	5	1	-	-	-	-	-	-
Leper house	4	1%	1	1	1	1	-	-	-	-	-
Pillory	12	3%	-	5	1	4	2	-	-	-	-
Tenterground	1	0%	-	-	1	-	-	-	-	-	-
Watermill	17	4%	-	-	5	-	10	-	2	-	-
Windmill	47	11%	10	13	13	2	-	4	1	2	2
TOTAL	419	99%	53	62	74	30	107	14	23	28	28
Sites per inhabitant			0,004	0,006	0,009	0,005	0,021	0,004	0,011	0,014	0,019

Table 3. Overview of the sites around Alkmaar, Nijmegen, Deventer, Zutphen, Arnhem, Sneek, Doesburg, Vlaardingen and Wijk bij Duurstede.

urban extensions until 1900. Another development confirms this change. As the old town was a palimpsest of buildings, the same is happening with these first urban extensions. Buildings, like the pottery factory were demolished and new houses were built over the old foundations. The first post-1874 extensions are therefore being rapidly urbanized as residential zones.

The effect of this transition is a far more fragmentation of sites in plots with different owners – not only older sites, but also nineteenth century sites like the factory. Excavating these sites as a whole will become problematic and as consequence archaeological research will focus more on smaller parts. This also means a growing risk of erosion of the archaeology by small scale activity like digging ponds or other landscaping works in backyards. The damage can't be underestimated. Of course many historical records exist of the buildings which stood there and what they were used for especially in the post medieval period. On the other hand, the material culture, with information about for
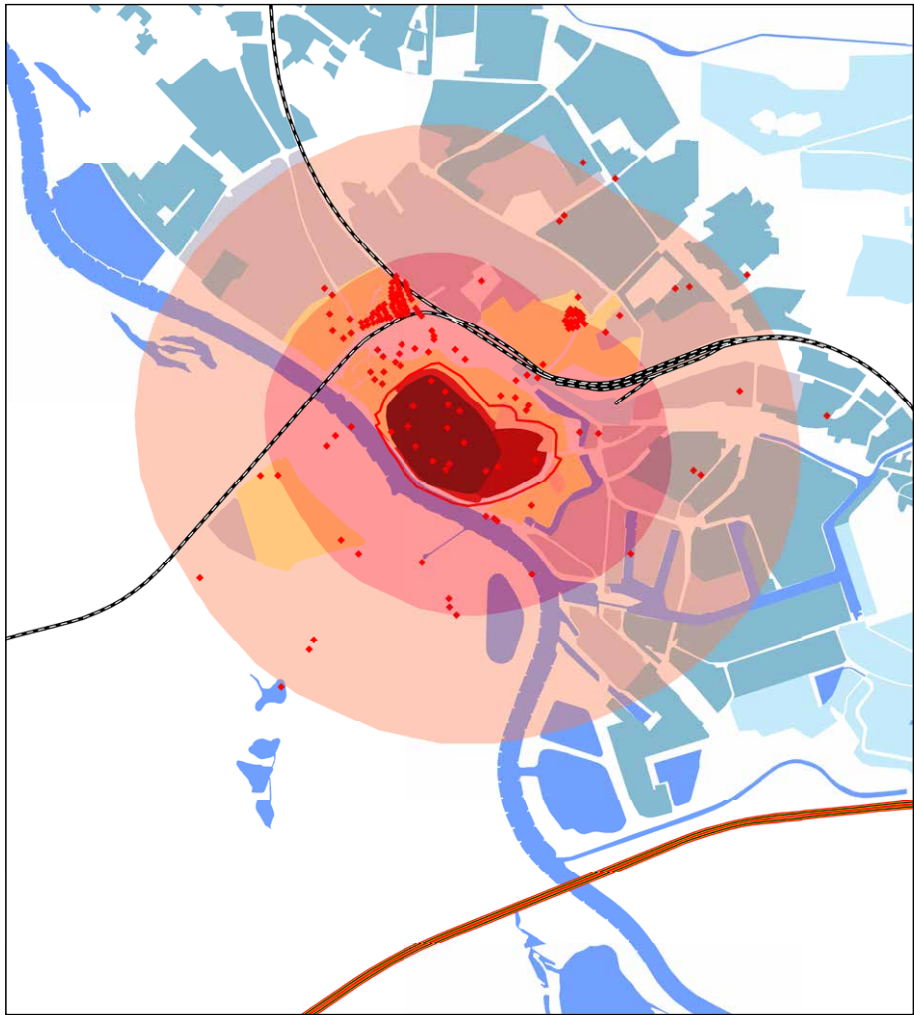
Figure 8. Map of Deventer with the urban extensions, the different zones and in red the location of sites derived from the Jacob van Deventer map (J. Bouwmeester/M. Kosian(RCE)).

example how the buildings were used and how people lived and worked there, suffers from large-scale erosion. This might result in an archaeological gap.

6.4 Remarks on the degree of disturbances

As already mentioned in the introduction of mapping disturbances, within every residential area there are other disturbances to find. Often these disturbances are quite small, like a pond, but sometimes they can be larger like a complete sewer system. This means of course that the degree of disturbance within residential areas in reality will be higher than noted earlier – although if an extra 5% is added for these small disturbances the effect on the total percentage is almost neglectable. Still, most areas will have less than 30% disturbance and therefore the archaeological record will remain potentially largely intact.

7 Conclusion

The first zone around historic towns contains many archaeological remains which can directly be linked to the historic development of the town. The evidence includes not only the buildings but also the agricultural landscape. The crops which grew there provide information about the economy of the town itself. The Fortification Act had a big impact on the urban development in the Netherlands. In the Deventer example shortly after 1874 the first buildings were erected outside the fortifications. But also new residential areas arose, within only 50 years already replacing the earlier factories. The urban border was moving rapidly past the first zone of the model. Parts of this zone seem to change into the palimpsest of the older urban core, with fragmentation of sites and also building phases on top of each other. For the model this means that in the post medieval period new types of sites, especially houses and factories can be found here in higher concentration. Most houses from the nineteenth and twentieth centuries still exist but one must be aware of almost forgotten buildings and structures which stood within these zones. Researchers must also keep in mind that on many of the plots important information can be found about living conditions, home industry and the material culture of the nineteenth and twentieth centuries. This is information which often won't be found in the historical record.

The degree of disturbance to the urban extensions in this case study is low. The average 'footprint' of the neighbourhood itself is between 25 and 35%. But also in other towns the footprint is in most cases below 30% (Bouwmeester *et al.* 2017). Looking more closely to the buildings itself and its foundations, the degree of impact will be even lower. There is a high potential for information still hidden beneath all the post-18th century urban extensions, which means that awareness and special care and policy is needed to ensure their preservation and protection. The model enables greater precision in identifying where certain complexes can be found. The combination of this information with the degree of disturbance, results into a very useful instrument to help improving the local government policy for the archaeological preservation of these sites.

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Archaeology in Cologne: Tradition versus urban development

Thomas Höltken and Marcus Trier

abstract

Cologne is the only city with over one million inhabitants in Germany with 2000 years of town history. Even in the Middle Ages, the population was aware of its ancient roots. From the beginnings of the urban archaeology at the end of the nineteenth century, a regular archaeological monument conservation was developed at the beginning of the 1920s, which occupied a special position due to the special role of Cologne in the preservation of historic monuments legislation. Much could be preserved for posterity by the early urban archaeology in Cologne, but there were also significant losses in times of reconstruction after World War II. The archaeological monument conservation was simply not prepared for the construction boom of the economic miracle. Today, modern urban archaeology in the Roman-Germanic Museum of the City of Cologne is confronted with the manifold challenges of monument preservation between the priorities of modern urban development. Huge new building projects in a central location – such as the construction of the North-South Urban Light Railway, which has led to more than ten years of rescue excavations – are taking effect on a large part of the underground memory of the city. Often the archaeologists' work is reduced to the documentation of excavated features and the recovery of the finds, but time and again it is possible to preserve monuments in the cityscape and thus the Roman, medieval and modern period history for the following generations.

keywords: Cologne, Excavation Law, Römisch-Germanisches Museum, North-South Railway, rescue excavation, monument preservation.

1 Antique heritage of the medieval city

The interest of the people of Cologne in their history goes back to the Middle Ages. When Albertus Magnus dedicated the altar of the sacristy of the gothic cathedral in 1277, he reported: 'In Cologne we saw how very deep excavations were made. Below construction pieces of wonderful shape and beauty were found, apparently made in ancient times.'
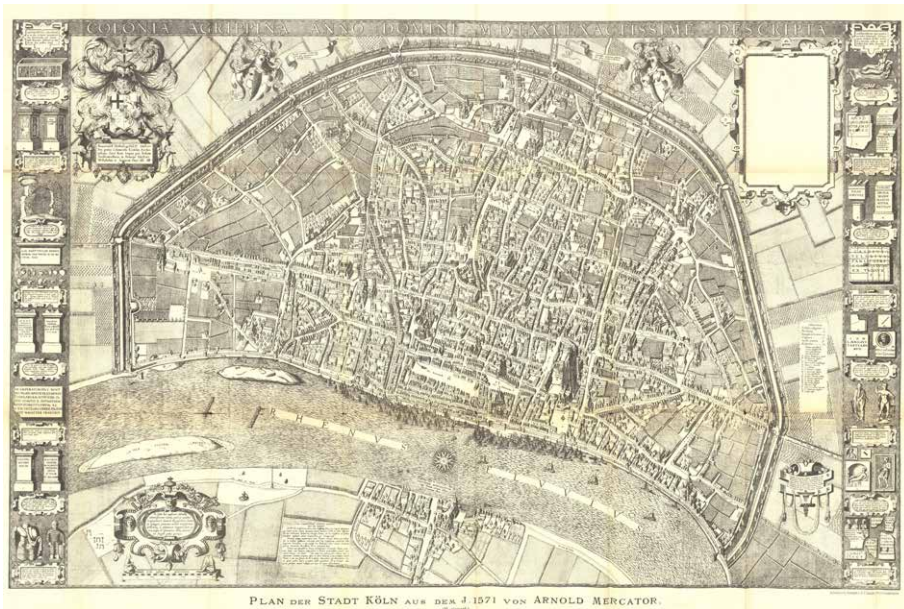
Figure 1. Mercator's Map of Cologne, 1571 (Rheinisches Bildarchiv).

(Corsten 1958, 89). Already in the early twelfth century proper excavations took place in Cologne, when the surroundings of early churches was dug up in search of venerable, but also economically marketable relics (Verstegen 2005). The poet Francesco Petrarch (1304-1379), who visited Cologne in 1333, noted that the Roman past was omnipresent. The ancient heritage was not only revealed to the visitor in preserved buildings and ruins, but also in the social self-image, the Roman era was still alive. Thus, the late medieval patricians of Cologne, the urban leadership, regarded themselves as direct descendants of Roman senators who were once sent by Trajan to the Rhine. At the beginning of the sixteenth century, scholars and members of the Cologne upper class began collecting antiques. In city representations such as Mercator's plan of 1571, Cologne antiquities appear as important 'mosaic stones' of the town history (Fig. 1).

2 First steps of an urban archaeology

The first regular archaeological documentation measures were taken in the 1880s. At that time, the number of inhabitants of the city had risen sharply and the sewer system was hopelessly outdated or non-existent. Under the direction of the town surveyor Carl Steuernagel (1848-1919), in 1881 the planning and construction of a modern sewage network began (Fig. 2).

The work in the area of 'Köln Alt- und Neustadt' was completed around 1900. Steuernagel was not only an engineer, but had also received a humanistic education in Prussian tradition, which was the basis of his interest in the Roman origins of the city of Cologne. It was due to the great personal commitment of Steuernagel and his colleague Rudolf Schultze (1854-1935) that the archaeological features, which had been unearthed during earthworks in the centre of Cologne since 1887, were documented (Schultze and Steuernagel 1895). Their research is regarded as the beginning of modern rescue

Figure 2. Construction of sewers on Eigelstein, Cologne, c. 1890 (Rheinisches Bildarchiv).

archaeology in Cologne (Trier 2005). Among the early, more or less systematic excavations are also the investigations of the early Christian baptistery next to the cathedral (1866), the late Roman fort Divitia-Deutz (1879/82) and the Roman cemetery on the Luxemburger Straße (1897).

3 The beginnings of archaeological monument conservation in Cologne

The Prussian Archaeological Excavation Law, which was passed in March 1914, entrusted "state representatives for cultural-historical archaeological antiquities" with the archaeological department. By the outbreak of the First World War, however, the new law did not apply until 1920. Due to its rich history, the city of Cologne was given a special status (lex Colonia) and received its own representative.

The beginning of the systematic archaeological monument conservation is inseparably connected with the name Fritz Fremersdorf, who took over the direction of the Roman department of the Wallraf-Richartz-Museum in 1923. Immediately Fremersdorf prompted a scheduled monitoring of construction sites and organized pre-construction archaeological investigations. There were numerous investigations, around 1925 in St. Severin and St. Ursula, 1926 in the Roman estate Cologne-Müngersdorf and in the naval base Alteburg, 1927 in the fort Divitia-Deutz, 1928 in St. George. Excavations in the Neolithic settlement of Cologne-Lindenthal (1930-1934) set international standards (Trier 2015). Even during the Second World War – Cologne was severely hit by area bombing since 1941 – Fritz Fremersdorf and Otto Doppelfeld, who had been employed in Cologne since 1939, were able to undertake at least individual investigations. With limited human and financial

resources, they carried out excavations in the churches St. Severin, St. Ursula and St. Gereon, the Roman naval base Alteburg and the Frankish cemetery Cologne-Junkerdorf, among others. Many measures from 1940 to 1942 were related to the construction of air-raid shelters or fire ponds. When the famous Dionysos Mosaic came to light in the summer of 1941 during the construction of the 'cathedral bunker', more than 30,000 people rushed to the excavation to admire the find. The mosaic is today at the place of discovery and forms the nucleus of the Romano-Germanic Museum (Trier and Naumann-Steckner 2014).

4 Excavations in times of reconstruction

After the end of the war, Fremersdorf strove not only for the retransition of the museum inventories relocated in southern Germany, but also for the reorganization of the municipal archaeological monument conservation – in the midst of a ruined city and mountains of rubble. Gradually, the war-ravaged cityscape was restored by the reconstruction starting in the 1950s. Many things were done in great haste. People urgently need infrastructure, housing, office and commercial space. There was little time for archaeological investigations during the 'economic miracle' of the post-war period. Archaeological monument conservation activity was often hopelessly overworked, short-staffed and with limited material resources. So they concentrated on selected places and epochs: the Roman centre, ancient cemeteries, the cathedral and early churches. Other things, such as the rich testimonies of medieval and modern period urban history, played a minor role for a long time. Until 1980 there was not even a modern Monument Protection Law in North Rhine-Westphalia. Furthermore, the framework of the Prussian Archaeological Excavation Law of 1914/20 was valid, and so many things had to be grudgingly accepted by the Cologne urban archaeology, such as the construction of new wider through roads and suburban railway lines. Especially with these new traffic routes, which crisscrossed the historic city centre, at best small sections could be documented after a fashion. Nevertheless, Fremersdorf and Doppelfeld succeeded in documenting countless important features in difficult times, or even preserving them permanently. To this day, the excavations under the Spanischer Bau of the historic town hall (since 1953), in the Jewish quarter on the Town hall Square (Rathausplatz) and under the cathedral are open to visitors (Fig. 3).

5 Modern archaeological monument conservation in Cologne

The Prussian Archaeological Excavation Law was superseded in 1980 by the Protection of Historical Monuments Law of North Rhine-Westphalia. However, it took a few years for it to undergo comprehensive practical implementation in the archaeological monument conservation of the city of Cologne. At that time, Cologne's special status remained untouched and nothing has changed to this day. However, much has changed in the day-to-day business of archaeologists.

The present-day Romano-Germanic Museum, opened in 1974 next to the cathedral, has grown out of two urban collections: the Roman collection that, since 1935 had formed the Roman and Germanic Departments of the Wallraf-Richartz Museum and the Prehistoric Museum, known since 1926 as the Museum of Prehistory and Early History. At the same time, the Romano-Germanic Museum is the agency responsible for the protection of archaeological monuments in the urban area of Cologne, which is roughly 400 square

Figure 3. Rathausplatz (beneath the present-day Spanischer Bau): excavation of the Roman governor's palace, 1953 (Rheinisches Bildarchiv).

kilometres in area. All applications for construction permits in the Cologne city area are examined to determine whether archaeological sites or listed historical monuments are endangered by the project. If this is the case, builders and architects are invited to discuss the reasons and the duration of a possible rescue excavation before the actual construction work begins. The duration of archaeological investigations depends on the size of the study area, the depth of the archaeological layers and the nature and complexity of the expected

archaeological features. As in the course of the approximately 100-year archaeological monument conservation more than 3,000 finds reports are available for the urban area of Cologne alone, find expectations can often be very accurately predicted. On this basis, the timeframe between builder and Romano-Germanic Museum are contractually fixed exactly.

6 Rescue excavations: gains and losses

Every year, the Romano-Germanic Museum undertakes around 50 rescue excavations in the urban area, from smaller construction-related measures, to preliminary investigations in the course of major urban development projects. Wherever possible, urban archaeology tries to minimize on-site impacted areas in the planning phase in favour of a permanent preservation of historical monuments.

The construction of the 'Rhine Boulevard' in Deutz on the right bank of the Rhine is a prime example of modern archaeological monument conservation and inter-office cooperation within the city administration. Since 2008, flood protection measures and the construction of a 500 m long exterior staircase system have been implemented opposite Cologne's old town. As part of the planning approval procedure, the flood protection wall was relocated in close coordination between the archaeological monument conservation, the municipal drainage operation (Stadtentwässerungsbetriebe) responsible for flood protection, and the offices responsible for the construction of the staircase, so that the historical monument, the late Roman fort of Divitia-Deutz, was affected as little as possible (Fig. 4). When a fortification tower of the High Middle Ages came to light within the fort, which was endangered by the route, the project participants succeeded in preserving the historical monument by means of a so-called minor amendment to the planning approval

Figure 4. Excavation in the Roman fort of Divitia-Deutz, 2015 (Römisch-Germanisches Museum der Stadt Köln/Hi-FlyFoto).

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(Trier 2011; Höltken and Karas 2016b). As a result the parts of the historical monument are almost completely preserved as well in the course of the construction work and left in the ground – partly visible, partly invisible. Integrated into the staircase system is the northwest tower of the fort, which later became part of the Prussian barracks and the station of the Bergisch-Märkischen railway. Further parts of the western Rhine fort walls are preserved, whose underground course is made visible on the surface. And also the foundations of the church Alt St. Urban, whose origins go back to the early Middle Ages (Höltken and Karas 2016a), are integrated into the 'Historical Park Deutz', as are parts of the former railway station from the late nineteenth century and a monument reminiscent of the Prussian cuirassiers. These relics are complemented by the eastern gate of the late Roman fort, which was already uncovered in the 1930s, and the fortress walls preserved in the cellars of the baroque monastery complex of Alt St. Heribert.

In the last decade the former office complex of a large insurance company was converted into a high-quality residential district in the northern Cologne city centre. The area is close to the Romanesque church of St. Gereon and in the midst of the large Roman-early medieval northwest necropolis of the Colonia. After careful consideration, twelve-month excavations were undertaken here on 3,400 square metres, in which all features – Roman burials and relics of the former *immunitas* – were documented. As far as possible, the civil engineering works took place in areas with little or no find expectation. The archaeological excavation area of 3,400 square metres stood in contrast to the 11,100 square metres where the historical monuments were permanently preserved (Wieland 2013).

A similar situation occurred in the area of the Opera Quarter (Opernquartier) in the centre of downtown Cologne. The renovation of the listed Riphahn-Opera with the theatre (Schauspielhaus) made underground expansions imperative. Since the site is located in the midst of the Roman and the medieval city centre, six-month rescue excavations were required over an area of approximately 3,500 square metres. Initial considerations of the planners to extend the civil engineering work in a northerly direction were soon abandoned, in favour of the conservation of the archaeological monuments. The area not only contained Roman and medieval features, but also the synagogue in the Glockengasse. Again the area of excavation (3,500 square metres) was dwarfed by the area in which the historical monuments were preserved, which was over 17,000 square metres in extent (Schäfer 2014).

7 Archaeology XXL

In the past ten years, the archaeological research and excavations for the construction of the Cologne North-South Urban Light Railway have significantly shaped the work of the urban archaeological monument conservation in the Romano-Germanic Museum. The new Urban Light Railway, which will in future connect the main station with the south of Cologne, is one of the more ambitious projects for public transport in Germany. As the tunnel lies at depths of more than 25 metres, the route usually runs far below the archaeologically relevant strata. The excavations were limited to the future stations, technical structures and pipeline routes. The total of these infrastructure elements resulted in an impacted area of more than 30,000 square metres, or four football fields. As the archaeological deposits reached a depth of up to 14 metres below the current street level, the total archaeological volume was 150,000 cubic metres. This was the most

extensive impact in the underground history of the city of Cologne to date. The Romano-Germanic Museum recognized early on the archaeological challenges in connection with the construction of the North-South Urban Light Railway.

In order to firmly anchor the rescue excavations in the project, detailed reports (specifications) were made by the Romano-Germanic Museum over a two-year period, which combined the available archaeological, historical and topographical knowledge for each study area and predicted the expected results of the excavations. This was only possible due to the rich information already in the local archives of the Romano-Germanic Museum, which preserve above 3,000 find reports from work done over more than 100 years for the historic city centre alone. On the basis of these specifications, the time required and the level of the archaeological staff were calculated for each individual study area. The time required varied from 4-18 months depending on the size and requirements of the specification. At times more than 100 archaeologists were working on these sites. The excavators found support in numerous natural sciences: dendrochronology and wood identification, archaeobotany, paleozoology, anthropology, soil science and mollusc research; numismatics and epigraphy also provided the archaeologists with important insights.

Since the Romano-Germanic Museum had insufficient staff and resources to carry out such a comprehensive rescue excavation, employees of archaeological specialist firms were brought under the supervision of the Romano-Germanic Museum. Weekly site consultation meetings with representatives from all stakeholders discussed current results and outlook on how to proceed. At the beginning of the following month, there had to be written reports in which the insights of the previous month were presented. The excavations were carried out – as far as technically possible – before the start of the construction work. They began in 2003 and were essentially completed in 2011. Overlaps with the building operations occurred in many respects. As a rule, work was only done outdoors for a short time under the open sky and in daylight. After the advance excavation had reached a depth of about 3 metres, auxiliary bridges (steel girders and concrete slabs) were laid over the building pit and traffic was passed over them. The excavations then took

Figure 5. Excavation underground on Kurt-Hackenberg-Platz. (Römisch-Germanisches Museum der Stadt Köln / Axel Thünker DGPh).

place underground under artificial light (Fig. 5). Despite the concrete and steel ceilings, the archaeological works were not protected against water ingress. Problems were caused by heavy precipitation, which invaded the building pit uncontrolled, as well as unexpected (burst) channels. During the construction and replacement of pipelines archaeological work took place alongside engineering work, which created its own problems, but generally the two disciplines were kept separate where possible.

The work under auxiliary bridges kept the archaeology from the view of the public. Therefore, special attention was paid to media work. Hundreds of reports in local, regional and international newspapers and magazines as well as contributions to radio and television kept the public informed about the work of the Cologne archaeologists. The Kölner Verkehrsbetriebe have also paid a lot of attention to archaeology. The website for the North-South Urban Light Railway has reserved its own chapter for the history of Cologne, and several brochures from the company also address archaeological topics. In the Bechergasse, an exhibition space with up-to-date finds from the light railway archaeology was also set up at the beginning of the project. The Romano-Germanic Museum dedicated itself in the photo exhibition *Unterweltsbilder* (2007-08), in the large state exhibition *Fundgeschichten* (2010-11) and in the exhibition *ZeitTunnel* (2012-13) to topics around the archaeology of the North-South Urban Light Railway (Otten *et al.* 2010; Trier and Naumann-Steckner 2013).

Parallel to the field work, the innumerable finds were cleaned, scientifically determined, entered into databases and packed in an archive-ready manner according to the specifications of the Romano-Germanic Museum. In the course of the light railway excavations, a total of around 2.5 million objects were salvaged and packed in thousands of find boxes. Their scientific evaluation will occupy much time. First reports on particularly important find complexes, such as the inscribed amphora fragments, were made available quickly (Ehmig 2007; Ehmig 2009). In the future, detailed excavation reports will be published to publicize the research results to the public and the professional community. Even without detailed assessment and analysis of all the results, it is clear that the excavations during the light railway construction represent a unique cross-section through the more than 2000 years of Cologne's history. The increase in knowledge of many chapters in the city's history is immense. The archaeologist, however, sees this with mixed feelings for these new insights are opposed by a great loss of archaeological sources, since the excavation of a historical monument in the end measures up to a documented destruction. Only in a few cases was it possible to preserve outstanding archaeological features permanently *in situ* for posterity.

8 Monument preservation and visualisation

The construction of the new Urban Light Railway line in Cologne inevitably resulted in conflicts with the underground archaeological resource, including substantial structures. The course of the huge route was rectilinear and not very flexible and was subject to the strict building regulations of a planning approval procedure, which practically did not permit changes; archaeological obstacles could therefore not be bypassed. It was therefore all the more encouraging that, despite technical adversities, it was possible to preserve a whole series of archaeological monuments.

A special success is the permanent preservation of a large section of the Roman city wall at Kurt-Hackenberg-Platz (Berthold 2011). Here the flank of the city fortress from the

late 1st century AD, which bordered on the ancient Rhine harbour, runs underground. The excavation pit for the light railway crossed the course of the wall over a length of 25m in a north-south direction. This rises above a 3-metre wide foundation base with 2.4m thick, rising masonry walls with carefully carved greywacke squares and a cast core of *opus caementitium*. In addition, a 6.5 x 7.4m large gatehouse of the city wall was uncovered. The gate was made up of large blocks of sandstone opened to the harbour via the outlet of a man-sized Roman sewer. Immediately in front of the city wall heavy, rectangular hewn oak timbers of a pile wall were preserved in the soil, which served to secure the building pit of the city fortification. Also preserved was the cladding of the city wall foundation, which was made of fir planks. Dendrochronological analysis at the University of Cologne dated this section to the year 90 AD and shortly thereafter. The port gate was bricked up with re-used stone in the fourth century AD to protect against Frankish raids; the blocking included architectural elements such as column fragments as well as older grave and dedication stones (Schäfer and Trier 2012). The ancient city wall was clearly visible and was also maintained until the high Middle Ages.

The excellent preservation of this monument ensemble led to early considerations and negotiations for the lasting preservation of the important features. It was not possible to relocate the light railway line as the new tunnel tube met the old rail network that had

Figure 6. Kurt-Hackenberg-Platz, Cologne. Permanent preservation of a large section of the Roman city wall (Römisch-Germanisches Museum der Stadt Köln / Arge KölnArchäologie).

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been in existence exactly at this point since the 1960s. By a masterpiece of engineering, it has nevertheless been possible to permanently preserve large parts of the monument in the form of a 12m long, 5m high and 400 tonne heavy section with gate and canal outlet (Fig. 6). This was possible with only the foundation base being lost to the construction of the light railway tube. The secured segment of the city wall was suspended during the tunnel construction with steel cables and is now fitted on top of the underground tube. The historical monument is to be made permanently accessible in the future via an underground visitor space.

About 500 m farther south, the construction of the station Pipinstraße-Heumarkt revealed further remains of the city wall as well as an upstream slope retaining wall. The Roman city wall was severed, but remained visible as a stump in the access area of the station. The upstream Roman retaining wall could be preserved in parts as well and is presented in public space.

Of course, the conservation and presentation of ancient architecture from archaeological excavations in Cologne is particularly possible due to its high quality of construction, good state of preservation, and its aesthetic qualities. Consequently the Roman city wall is a highly memorable monument for the citizens of Cologne; its massive construction is also significantly eye-catching. In addition, purely technical or pragmatic reasons play a role, why Roman remains are favoured in preservation on site: on the one hand, the ancient wall remains are naturally deep and are based – especially in representative buildings from public hands – on solid Rhine gravel. By contrast, medieval architecture – mostly located in the upper layer packages – usually has little
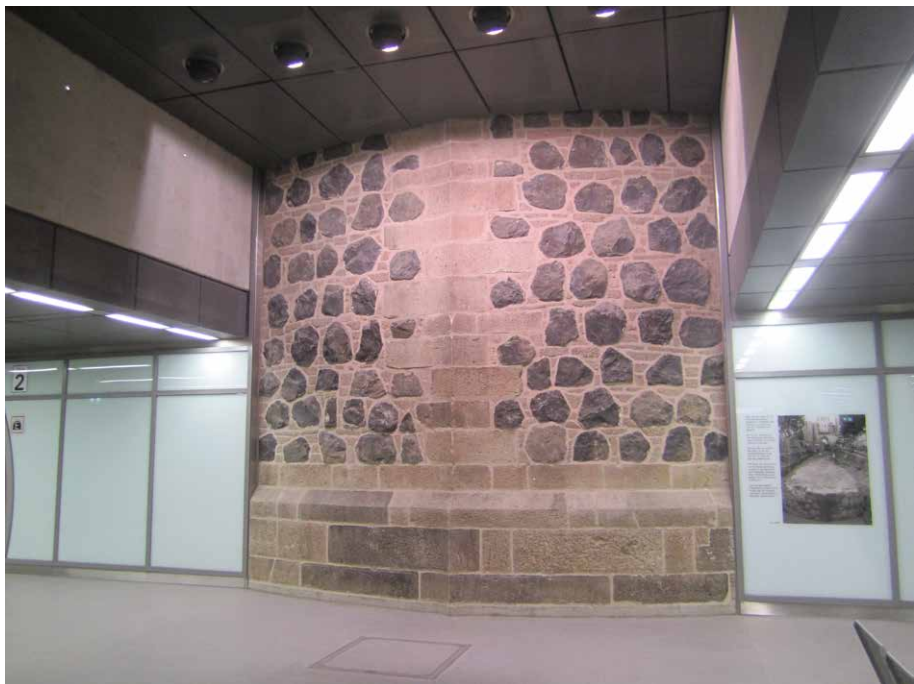

Figure 7. Chlodwigplatz, Cologne. Rebuilt bastionary fortress construction of the Renaissance (Römisch-Germanisches Museum der Stadt Köln / M. Euskirchen).

substance to resist modern construction. Especially for fragile features, such as simple soil discolorations of posts, pits or latrines, conservation was not possible.

Therefore the chances of permanent monument protection increased with the solidness of the feature. In the south of Cologne's old town, for example, the light railway line met the medieval city wall of 1180, which surrounded the city until the nineteenth century and was constantly brought up to the latest state of defence technology over the centuries. In the 15th century, probably from 1469, the southern city gate – the Severinstorburg – was modernized by the construction of an apron fortification in view of a tense political situation. From the former boat-shaped building in the old city moat system, well-preserved remains of the wall were found around 1.5 metres below the modern road during light railway construction (Kupka, A. 2006). Its field-facing side was articulated by a pedestal and a curving projection of trachyte, over which rose a 20-metre high cannon tower. Being an extraordinarily interesting testimony to the technique of fortification at the transition from the medieval to the bastionary fortress construction of the Renaissance, the possibilities of conservation were discussed extensively. The wall section was measured in 2006, then dismantled and temporarily stored on wooden pallets until rebuilding. In 2013 a section – the distinctive tower top – was rebuilt as a historical tribute and integrated into the new station Chlodwigplatz (Fig. 7).

9 Permanent preservation? Not always

Apart from the archaeological monuments preserved and staged in the public space, a series of features had to yield to the urban light railway. This affected among others remains of monasteries, collegiate and parish churches, which influenced the cityscape of Cologne in the Middle Ages, indeed even dominated it. It was not only churches that were at the heart of monasteries, but buildings of the *immunitas* such as the refectory, the dormitory, the scriptorium or the chapter house.

Medieval Cologne, besides Rome, is said to have surpassed all other European cities many times over in terms of the number of its churches. The French traveller Jean Charles Francois Baron de Ladoucette, who visited Cologne around 1800, noted that the city had as many church towers as the year has days (Diederich 1984, 60). This popular saying comes very close to the medieval reality: around 240 complexes are known historically. At the top of the hierarchy stood the cathedral chapter, followed by 80 monasteries and collegiate churches (Keussen 1910, 150-154; Höltken 2014, 261). The base was formed by over 150 simple retreats and Beguines convents, semi-monastic communities, which often housed only a handful of members. Of course, not all of these complexes existed at the same time, but were distributed throughout the medieval and early modern periods. The influence of the clergy was extraordinarily high in Cologne during the late Middle Ages: around 50% of the properties in the city were owned by the church and about 7% of the population – that is around 2,500-3,000 people – were clergy.

Only a small number of the 240 former monastic complexes are preserved today. Others now lost are reflected in the names of streets and squares, such as Augustinerstrasse, Kreuzgasse or Machabäerstrasse. A large number of these complexes were disbanded and demolished after the arrival of French troops in 1794. The cityscape changed rapidly and comprehensively over a short period of time. Particularly significant are the modern period changes in the area of the former cathedral *immunitas*. Apart from the Gothic Episcopal Church, all the complexes that belonged to the *immunitas* have disappeared today. As part

of the light railway project, the remains of the archbishop's palace built shortly before 1164 by Archbishop Reinald von Dassel, which was dismantled in theseventeenth century, were excavated. This work revealed the roughly 80-metre long main hall building – an outstanding example of Hohenstaufen architecture – which was in places built directly on the Roman city wall (Höltken 2012).

About 500 metres south of the palace, the project uncovered remnants of the Augustinian Hermits monastery on the Pipinstraße (Frasheri 2009). Its roots went back to 1280, when Archbishop Siegfried allowed the Augustinian Hermits to build an oratory. From this nucleus a complex measuring about 90 x 110 m developed (Beuckers 1998, 214). In the course of the excavations, an area of around 5,000 square metres was examined. Settlement layers of a Roman residential quarter were followed by a high medieval settlement horizon consisting of rectangular building remains, made up mainly of tuff, basalt and greywacke and interspersed with Roman *spolia*. It is not known who inhabited this area in the time before the foundation of the monastery. In the course of the building of the monastery, the area was extensively restructured in the late Middle Ages. The Augustinian monastery was abolished in 1802 and its buildings dismantled in 1807. The newly created open space was transformed into a course complex, the Place Napoléon (later Augustinerplatz), on which a casino was built in 1829-31.

Particularly important for the reconstruction of the complex and the reliable classification of the excavation features is a site plan produced around 1800 from the Cologne city archives. This reproduces the church, the surrounding streets and the convent buildings to scale. On the edge of the excavation area some remains of the church could be examined, which however had to be torn down after their documentation. A sad circumstance that, nevertheless, offered a surprise as a consolation: in the masonry

Figure 8. Waidmarkt, Cologne. Remains of the Carmelite monastery preserved under a schoolyard (Römisch-Germanisches Museum der Stadt Köln).

of a renaissance-era extension, a horizontally built-in stone figure was salvaged. It is a well-preserved torso of a tuff statue, on which remains of the colour pigment were well preserved. A small bulge on the chest points to the evangelist John, who held in his right hand his no longer existing attribute – a small oil cask. The colour residues on the figure suggest an ochre-coloured robe and a golden and light blue padded coat (Euskirchen 2010).

Around 400 metres to the south, remnants of another monastery of the mendicant order, the Carmelites, were unearthed in the excavation pit at the Waidmarkt station (Höltken 2014). The Cologne Carmelites from the 'Order of the Brothers of the Most Blessed Virgin Mary of Mount Carmel', as it is officially called, were briefly called *Frauenbrüder* (women's brothers) in medieval Cologne. They acquired a plot on Waidmarkt for their monastery in 1256. The construction of the complex progressed quickly. Five years later – in 1261 – an oratory (a small chapel) and several outbuildings were under construction. This complex was also demolished in the early nineteenth century, and fortunately, historical plans dating back to the time shortly before the demolition of the monastery were preserved, which help to classify the archaeological finds. There were also numerous building remains that were not recorded in historical sources. These included for example a small building with a cellar, in which remains of late medieval storage vessels stood embedded in the loam screed. Large parts of the former monastery are today located directly under the schoolyard and the buildings of a school, where they are probably excellently preserved (Fig. 8).

During the construction of the Severinstraße station, some 200m to the south of the Carmelite monastery, it was possible to examine remnants of the thirteenth-century former church of St. Katharina, erected by the German Order and demolished in 1807-08. Above ground its existence is only marked by the An St. Katharinen. In addition to the architectural remains there were a series of burials, which were found in the cemetery of the German Order commandery directly in front of the church (Ihde 2010; Ihde 2013). These were burials according to the well-known scheme in an extended supine position with the head in the west. The dead lay in wooden coffins, of which only the nails were preserved. One of the graves was lined with stones and is believed to belong to the twelfth or thirteenth century. The anthropological examination of the skeletal remains from a double grave identified an adult couple with hands clasped together and a grave with an 18-20 year old woman, who probably died in childbirth. These graves belong in a different social environment than the members of the knightly order and prove that also persons from the civil society could be buried here: a right probably earned by donations to the order. Medieval grave finds are not uncommon in Cologne; but almost exclusively the early medieval burials with rich grave goods fall into the sphere of public perception. For the rather simple high and late medieval graves or modern period burials, the chances are – not least for reasons of piety – not good that they will be preserved and presented as a monument to the public.

10 Conclusion

Based on the modern Monument Protection Law in North Rhine-Westphalia urban archaeology in the city of Cologne remains a challenge. Preservation and visualization are subjects of a permanent discussion and evaluation of many relevant factors. Archaeology sees itself not as a barrier of urban development, but a constructive component.

In this context the dual function of the Romano-Germanic Museum as Office for Archaeological Preservation of Cultural Heritage of the City of Cologne and museum of prehistoric, roman and early medieval culture is a stroke of luck and ensures a high acceptance of archaeology amongst the local population.

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Urban archaeology and the conservation of archaeological sites in Luxembourg – potential conflict or valuable addition to modern construction?

Christiane Bis-Worch

Abstract

Today's urban dynamics cause enormous pressure to urban archaeology and to the conservation of archaeological sites in cities all over Europe. During the annual meeting of the EAA in Maastricht it was revealed that the competent authorities of countries facing this pressure found many different ways how to respond and how to mobilize the resources necessary to excavate and/or to protect their archaeological patrimony *in situ*.

In Luxembourg, we try to preserve archaeological sites as much as possible integrating them into new buildings. Some of these solutions will be presented in this paper, focusing on the continuous conflict between developers, city council, ground-owners, architects and archaeological heritage at the beginning of each project, the excavation and the solution finally found. Most of the current problems are due to legal aspects of the current legislation in Luxembourg. Furthermore, the pros and cons after some years of experience will be discussed (public acceptance, conservation problems, *et cetera*).

Keywords: Urban archaeology, managing urban archaeological heritage, in situ conservation, archaeological sites, current legislation in Luxembourg.

1 Introduction

Luxembourg is one of the smallest countries of the European Union and can hardly be compared with its big neighbours, but Luxembourg is nowadays known for its vibrant and growing economy. Therefore, as Luxembourg City is the centre of it – a rising metropolis and a melting pot – urban dynamics cause enormous pressure to urban archaeology and to the conservation of archaeological sites.

Luxembourg's archaeological heritage is particularly rich due to its strategic position in the heart of Europe. Statistic shows us that we can expect to find five archaeological

sites per square kilometre in this little country measuring only 45 to 80 km, and the concentration of archaeological sites is even higher within the City! So, how are we facing this situation today?

2 Legal and administrative frameworks

The first topic to point out is the legal situation we actually have to deal with in Luxembourg:

The actual law is based on an act of 1927, containing the first and, for a long time, the only Article explicitly referring to archaeology. This was the simple but powerful Article 15 (now Article 30 of the current 1983 act on the conservation and protection of the national heritage)[1]:

> 'Every archaeological find must be preserved and declared immediately to the mayor of the village where the find was made, the Museum or the Ministry of Culture. Any intentional destruction shall be punished either by a fine or by 8 days to 6 months imprisonment. Sites and objects may be confiscated if the landowner fails to comply'.

Besides, there are today some other laws referring indirectly to archaeology, for example[2]:

- the legal obligation for a building promoter or an administration (municipal or state) to submit a mitigation plan for those projects which have 'a notable impact on the environment'[3];
- the law concerning motorway and railway construction projects, including archaeology in the impact notice, thus permitting the expenses of a possible excavation being supported by the motorway or railway company.

Indeed, the Luxembourg Government generally bears the costs for an excavation without making any distinction between rescue, preventive or research excavation. Finally, the act of October 2004, concerning town and country planning[4], provides an evaluation of possible restrictions such as the protection of national sites and monuments (art. 17). Furthermore, in the general building plan areas containing archaeological sites that need conservation (art. 55) as well as listed monuments (art. 56) have to be indicated. However, if the government wishes a binding restriction for building activities, even unexcavated archaeological sites have to be inscribed to the list of national monuments or to the additional list of protected sites.

As Luxembourg is rich in archaeological remains, it is impossible to declare every important known site as a national monument. Also for obvious reasons, investment companies, estate agents and landowners, don't like the procedure of classification as

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1   *Loi du 18 juillet 1983* concernant la conservation et la protection des sites et monuments nationaux. Meanwhile, a new law is on its way, but it will certainly takes time to become reality.

2   *Loi du 3 mars 2017 dite 'Omnibus'. Loi du 30 juillet 2013* concernant l'aménagement du territoire. *Loi du 22 mai 2008* relative à l'évaluation des incidences de certains plans et programmes sur l'environnement.

3   *Règlement grand-Ducal du 7 mars 2003* concernant l'évaluation des incidences de certains projets publics et privés sur l'environnement (Mémorial A N° 48 du 17 avril 2003).

4   *Loi du 19 juillet 2004* concernant l'aménagement communal et développement urbain (Mémorial A – N° 141). *Loi du 18 novembre 2004,* Aménagement communal et développement urbain (Mémorial A – N° 182). *Loi du 19 juillet 2005,* Aménagement communal et développement urbain (modification des lois précitées). Règlement grand-ducal du 8 mars 2017 concernant le contenu du plan d'aménagement général.

national monument that risks becoming difficult due to landowners' opposition, who would no longer be able to sell their property as a simple building area. Nevertheless, Luxembourg signed the 'European Convention of London' (1969) on the protection of archaeological sites, and the 'Convention of Paris' (1972), on the protection of the world heritage of culture and nature. The 'European Convention on the Protection of the Archaeological Heritage (revised)' (Malta 1992, also known as the Valetta Treaty), which is the most important of these conventions, was only signed in 2017. Indeed to date, Luxembourg was the last state to ratify the convention. That seems maybe a bit late, but in fact, the overall approach in respecting and conserving the past was even not so bad without the convention.

3 Actors managing archaeological heritage and archaeological practice

The Minister of Culture gives permission for any kind of research and excavations, and specifies under which conditions they have to be accomplished.[5] There are only two national institutions responsible for the archaeological heritage: the National Museum, of which the *Centre National de Recherche Archéologique* (CNRA) is an autonomous part; and the heritage agency *Service des Sites et Monuments Nationaux* (SSMN). In essence, the CNRA is the only responsible actor concerning Archaeology in Luxembourg, but until 2011 the valorisation of archaeological sites used to be in the hands of the SSMN, when this responsibility has been partly switched over to the CNRA too. As mentioned above, there are only a few specific sites with a high environmental impact, where the town and country planners have to pay for preventive geophysical surveys and even for test trenching. So normally in Luxembourg, from the legal point of view, the situation is that it is only possible to react after an archaeological site has been discovered.

However, the acknowledgment of the law that allows us to stop any building project for a non-specified period if an archaeological find is made, is very often a very convincing argument to let the CNRA organize excavations beforehand. Nothing is worse for the economy of a project than unexpected interruptions and as they cannot know the dimension of the increasing costs coming along with, and how much time the disruption in planning will take. This makes it better to integrate the time for an excavation into the planning. And of course, as the Luxembourg Government generally bears the costs for an excavation, there is even a great financial aspect, because after the archaeological excavation is done, there is a space all ready for the foundations of the new building which has been paid for by the Government! Money is a very convincing argument at any time and any place in the world, so it is in Luxembourg too, and this helps especially in the urban context with its high potential for conflict.

4 Thirty years of urban archaeology, thirty years of experience

Thirty years ago, when urban archaeology started in Luxembourg, neither the government nor the public – nor indeed the different actors of the building industry – were aware of

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5   *Loi du 25 juin 2004* portant réorganisation des instituts culturels de l'Etat. *Loi du 21 mars 1966* concernant a) les fouilles d'intérêts historique, préhistorique, paléontologique ou autrement scientifique; b) la sauvegarde du patrimoine culturel mobilier.

the historical potential covered by modern constructions. This was because it was assumed that all archaeological remains of the old medieval town had been destroyed during the construction of the later Fortress. However, as new construction works continued to reveal previously unknown archaeological evidence – and continue to do so with new experiences and new important knowledge about our history – the mentality changed and the public became more and more aware of our rich archaeological past.

This evolution came along with several negative experiences for the building sector due to unexpected interruptions of construction sites, with the effect that the different actors (architects, urban planners, stakeholders and so on) started more and more to contact the CNRA beforehand searching to avoid these unexpected interruptions. At the same time the CNRA themselves did not enjoy finding themselves in a situation of never-ending conflict; therefore we were – and still are – trying to find the best solution in each particular case. Indeed, the lack of specified legislation defining how to proceed in which case (how to excavate; when and how to protect an archaeological site) leads us to a case-by-case development of policy and practice, which has some advantages.

Some examples (Fig. 1) will allow to discuss the pros and cons of each project and the politics which were behind these.
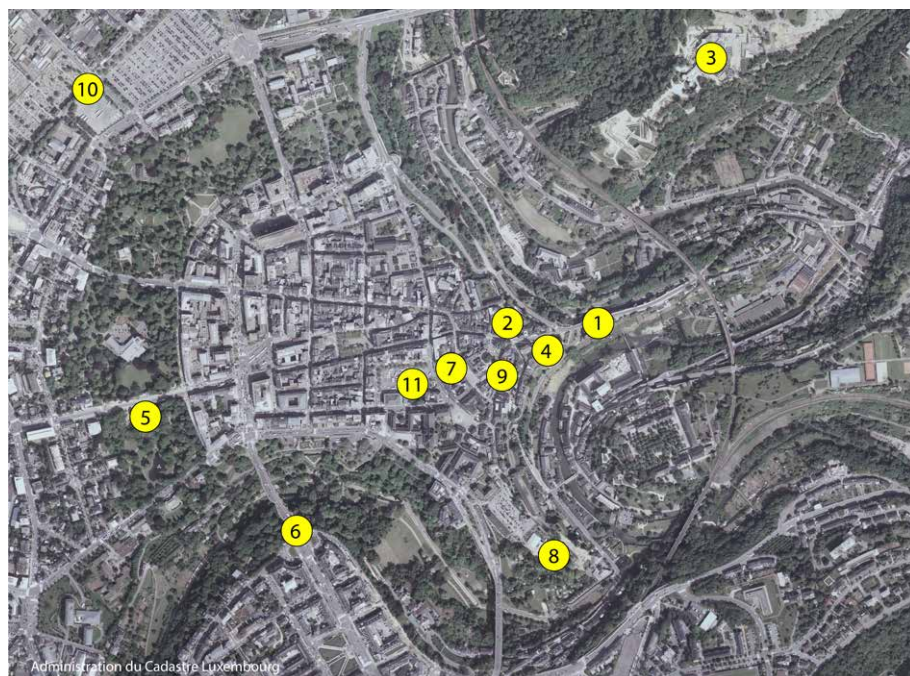
Figure 1. Map of Luxemburg City showing the examples mentioned in the text. 1) Bock Castle, 2) National Museum/former Provincial Council, 3) Fortress Museum/Musée Drai Eechelen, 4) first burgus and (first) bailey of the Bock Castle, 5) Fort Louvigny/Parking Monterey, 6) Adolph Bridge, 7) first town wall, 8) Cloister of the Holy Spirit, 9) second (outer) bailey of the Bock Castle, 10) Glacis Chapel, 11) Knuedler-Parking/former Franciscan cloister and church.

4.1 The remains of the Bock-castle and the construction of an archaeological crypt under the street

The Bock-castle was first mentioned in the Charter of 963 when Count Siegfried acquired the promontory, and is considered to be the nucleus of the modern country of Luxembourg. Excavations took place in 1963 and in 1992 (Zimmer 1996). The first excavation was in connection with the celebrations of the millennial birthday of the town and therefore of highest political interest; the second one – more profane – was due to the renewal of the town infrastructure. As the second excavation unveiled important remains of the castle, the government decided to integrate the results in an underground crypt lying under the street and connected to the Casemates, an impressive defensive system of the Fortress cut into the rock. In this way, the archaeological remains of the castle are best presented to the public, and as part of the famous 'Wenzel tour' – starting here and leading through the old town – this is one of the most visited sites of the city with about 130,000 visitors per year (Fig. 2).

4.2 Excavations integrated into museums

As in many European Cities, some excavated sites had been integrated into museums, as for example one cellar of the former house of the Provincial Council built between 1515 and 1535 by reunification of some elder medieval houses (Bis-Worch 1999). This building used to be the most important administrative building after the destruction of the Bock-

Figure 2. The remains of the Bock Castle under the Street: the Figure shows that the way through the excavation is partly using the original pavement and partly hanged up at the ceiling of the road above. Furthermore, several explanation panels and a film are illustrating the history of that site and of the medieval town and later Fortress (C. Bis-Worch CNRA).

castle in 1545. The excavation took place in 1993/94 in connection with the renovation of the National Museum of History and Art. To enlarge the exhibition surface of the Museum, the architect proposed to use the open space beneath the Museum by cutting out the rock three levels deep (Fig. 3). But as the so called 'big cellar' of the Provincial Council, a

Figure 3. Remains of the ancient Provincial Council. A: the rock with the cellar on top during the ongoing construction work. B: down the actual exhibition of the roman times exposed in the gothic cellar. Furthermore, the rock under the cellar was also cut out, creating a new cave for the reconstruction of a very important Neolithic side, the Karelsée, a sort of rock shelter called 'Abri' in French (Fonds de Rénovation de la Vieille Ville de Luxembourg and C. Bis-Worch, CNRA).

vaulted cellar of gothic style should remain as last witness of this important building, the stakeholder decided to preserve and to integrate it into the new exhibition.

This example stands for some other sites where archaeological remains had been integrated into museums, as for example a part of the ancient Fort Thüngen, in the Museums of Modern Art (*MUDAM*) and of the Fortress, the so-called *Musée Drai Eechelen* (Fig. 4). Even if the process of integration was in each case sometimes difficult, the result is at least very positive, because their protection presents no problems concerning the well-organized environment – there is no uncontrolled humidity or daylight, and no vandalism – and the structures are well presented and explained.

4.3 The former hospital of Franciscan nuns – a private initiative

In 2013, not far from the Bock-castle and near the Saint Michel's church (which was, *inter alia*, part of the first bailey of the castle since the tenth century), a private company started the renovation project of the former hospital of Franciscan nuns. This was originally constructed at the beginning of the seventeenth century by the Dominicans in one of the famous and oldest quarters of the medieval town. The building is both protected by the state, as national monument, and by the City council as protected area. As this project was of high archaeological potential and very complex, the responsible investor decided to ask for excavation long before the renovation work started in order to integrate as much as possible the historical elements of the site and to avoid unexpected problems due to unknown older manipulations and changes to the historic masonry.

The CNRA started the excavation in autumn 2014 in the ancient cloister garden, expecting to find the tombs of the Dominican monks in the cemetery belonging to the St Michel's church situated only a short distance from the site, and which is also one of the oldest churches of the country (Bis-Worch 2015; Zimmer 2002). Part of some of these expected remains were revealed, including cellars and walls belonging to the older,

Figure 4. View of the Fort Thüngen during the excavation (R. Wagner, MNHA-CNRA).

Figure 5. View of the remains of the first medieval burgus and the later cellars during the excavation (C. Bis-Worch, CNRA).

medieval built-up area. These were dated by a range of interesting diagnostic objects from the late twelfth century to the sixteenth century. The most important structure unveiled was a wall partly cut out of the underlying bedrock and reused as part of a cellar of late gothic style (Fig. 5). The discovery of this wall prompted reconsideration of the results of older excavations made in the immediate area; consequently the formerly well-established theory that the Bock-castle formed the nucleus of historic Luxembourg. Indeed, although the wall had been part of the first medieval *burgus*, the famous *Lucilinburhuc* mentioned in the Charta of 963, its original construction considerably predated this. It is likely to have existed long before, at least since the eighth or ninth century, at an important crossing point of two old traffic routes and integrating a small building under the Saint Michel's church.

This discovery was of such great value for Luxembourg's history and also for the success of the renovation project that the investor himself decided to protect and to integrate the remains in adopting the initial project. This work was of course monitored and approved by CNRA and SSMN. This shows that good planning, a good relationship and goodwill of all parties, the government as well as the private investor, can change projects in a positive way for all participants.

4.4 Fort Lambert and the fortress under the Adolphe bridge – open archaeological sites

The famous engineer Vauban, responsible for many other fortresses in Europe and at the origins of Luxemburg, later known as the 'Gibraltar of the North', built Fort Lambert around 1685. Excavation took place in 1991 with the aim of preserving the structures and integrating them into the Monterey Car Park as a 'view into the past' (Fig. 6). The historical remains were restored and are now to be seen when entering the car park, while passing the bridge, or while wandering around the park which surrounds the town.

Figure 6. The integration of Fort Lambert into the Monterey-Parking (R. Wagner, MNHA-CNRA).

Another open site brings us to the Adolphe-bridge, one of the famous national monuments and very important for the Luxembourgian identity, and with some remains of the Fortress of the eighteenth century. The fortress was excavated during renovation work on the bridge, which lasted two years. This site reopened to the public in spring 2018, and it is quite interesting to see that the people (not only tourists) are very delighted about how the architects made the integration of the old and new elements.

Both examples[6] are situated partly under a roof and are partly exposed to the weather. In both cases the architects were aware to integrate the structures and to recognize them as a positive element valorising their projects. The park service of the City is responsible for maintaining the monuments and so far the experience is very positive: there is a good acceptance by the people and no vandalism at all!

4.5 The old town-wall of the twelfth century – one bad experience leading to another policy

It is now necessary to discuss examples of sites where there were bad experiences with the preservation of remains. One was the excavation of the street called *Rue de la Reine*, which took place in 1998 as part of improvements to the infrastructure of the city (Reinert 1998). The most important discovery was a well-preserved part of the medieval town-wall with its moat cut into the rock. The structures were so impressive that the city council decided to protect them and to make them accessible to the public (Fig. 7).

The idea was sound in principle, and the project was executed very well. However, the practicalities of day-to-day management and operation were not considered. In particular, nobody thought about how to manage the opening times! As no one feels responsible, the site is never open to the public and finally it became a place were homeless people feel

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6   Robert Wagner, CNRA, has excavated both projects (see also http://www.ffgl.lu/forteresse/lambert.html).

Figure 7. Part of the 12th century town-wall to be seen in an archaeological crypt under the street *Rue de la Reine* (C. Bis-Worch, CNRA).

free to use the corner as a toilet. This is therefore a useful example which shows that it is of greatest importance to decide beforehand who will be responsible for the site, responsible for maintenance, opening times and so-on.

In another case, a monastic complex – the cloister of the Holy Spirit (*Saint Esprit*) had been excavated and preserved in a nice archaeological crypt under a layer of around one meter of sand (Bis-Worch *et al.* 2009). Everything is prepared, the plans are completed, but until now no-one has been willing to pay the costs for the extraction of the sand and the final installation of the crypt since the *Cité Judiciaire* on top of it was finished in 2006. These experiences are the reason why there is increasing reluctance to authorise construction works on archaeological sites if the legal and financial responsibilities are not clear beforehand.[7]

4.6 Conservation within buildings not open to the public, or re-buried with sand

Another approach to conservation is the integration of the excavated structure in buildings and structures which are not open to the public but only accessible for scientific reasons. Indeed, in 2017, a small part of the second wall of the outer bailey of the Bock-castle, dating from the eleventh century, was excavated in the *Rue de l'Eau* in connections with infrastructure improvements (Bis-Worch, CNRA, unpublished). As this part of the structure is the last witness of its existence, the responsible stakeholder of the city was asked to preserve the remains for later generations. The structure was located in a part of the street where a supplying tank was to be built; therefore, the engineers adapted their project in form and plan so that later access for further scientific research will be possible (Fig. 8).

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7   Recently the project creating the archaeological crypt of St Esprit became current again.

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Figure 8. View of the last remains of the second outer baily of the Bock-castle integrated into a technical pit (C. Bis-Worch, CNRA).

Figure 9. The little Glacis-chapel, recovered by earth and sand for conservation purposes, is today only to be seen by different material used for the new pavement (C. Bis-Worch, CNRA).

In this way, the historical structure is well preserved and will be even recognized by later generations of non-archaeologists (such as utilities operators and engineers) if they open the tank for maintenance. Indeed, there is less danger for an accidental

destruction by ignorance compared to the archaeological remains which are covered by earth, as illustrated by the example of the little Glacis-chapel (Fig. 9) (Colling 2016). This seventeenth-century chapel, where the veneration of Saint Mary as patron of the town and later as patron of the country started, was discovered during the construction of the new Tramway. The chapel was destroyed for military reasons, but never forgotten by the people.

The rescue-excavation of the Glacis-chapel had a very high popular interest and there was discussion about the potential for showing the remains under a protective glass. As this would provoke all sorts of mould and vegetation, and would require a great deal of maintenance work afterwards, the decision was made against the people's wishes, and the remains were recovered by geotextile and sand – knowing that in the future we have to be very attentive to avoid unexpected destruction by ignorance!

4.7 Avoiding long-lasting excavations in high political cases: the Knuedler-Parking in the heart of the town

The last example brings us to another Franciscan monastery, called *Knuedler*, founded around 1230 before the gates of the medieval town and destroyed at the beginning of the nineteenth century against the people's will. One half of the remains had been definitively destroyed by the construction of the first underground Parking at the end of the 1970s. The other part of the monastery, the church, was and is still lying under the paving of the actual place called *Place Guillaume II.*

In 2008, excavations in the garden of the new population office unveiled the remains of the oldest church of this monastery (Bis-Worch 2011). This was very interesting from a scientific point of view, but for the City Council another fact was more important: that also the remains were discovered of parts of the second church, which was constructed around 1661 and was found to be well-preserved with remains up to 4m deep. This was important because in the same year, the council decided to enlarge the existing underground parking at this location, creating enormous potential for political conflict. On one hand, this church used to be the most important church of the old Duchy and was therefore declared as national monument with the underlying objective for it to be protected. On the other hand, the actual place is very important for daily life in Luxembourg City today. The town hall is on one side of the square, the Grand Duke's palace on the other side, so each political event starts here. It is also the marketplace and a place where tourists and Luxembourgian meet each other.

The full excavation of that church and its cemetery would have prevented the use of this important location for around four or five years. And after all, if the structures were still standing up until 4m high and would have been exposed to the public, a discussion about whether to preserve the remains or not, would certainly have taken place. Therefore, in order to protect, as much of the remains as possible and to avoid long lasting excavations and discussions, a compromise between excavation, preservation and the planned parking had to be found.

The solution was the construction of a gigantic 'coffin' about 45m long, 38m large and 4m deep, in which the archaeological remains were to be preserved *in situ* (Fig. 10). Only the area necessary for the construction of that coffin had to be excavated. The plan provided for the excavation of the forecourt of the church (Fig. 11, zone 1) until the natural bedrock was reached; this assumed that there would be fewer structures encountered.
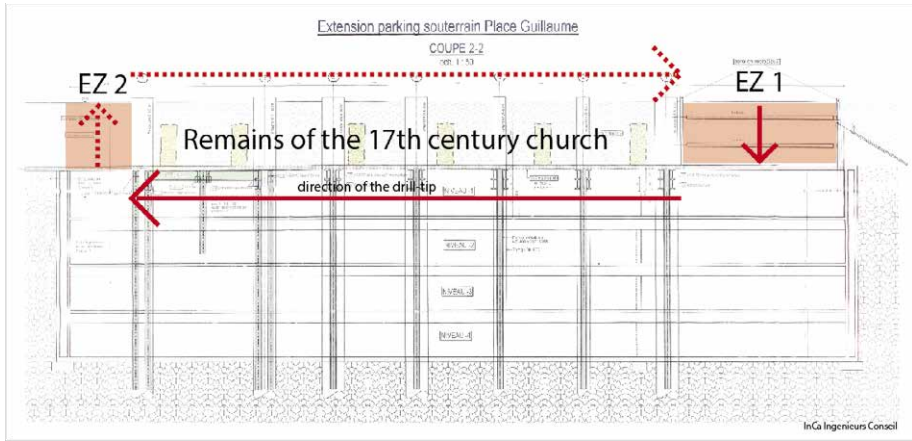
Figure 10. Schematic drawing of the 'coffin' at Knuedler (C. Bis-Worch, CNRA, based on a drawing of INCA Ingénieurs Conseils Associés).
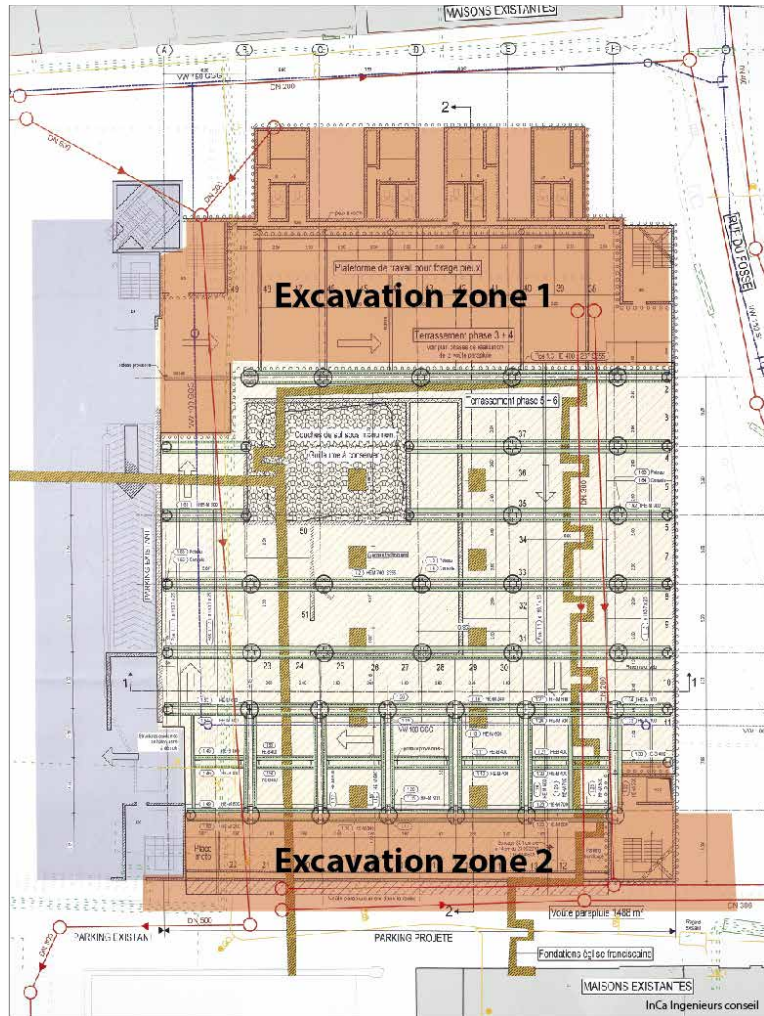

Figure 11. The church superimposed on the plan of the future parking, indicating the position of the pillars and the excavation zones (C. Bis-Worch, CNRA, based on a drawing of InCA Ingénieurs Conseils Associés).

Figure 12. A: view of zone 1. B: the drilling-machine (C. Bis-Worch, CNRA).

This assumption was confirmed by the excavation, which took place in 2015, where buildings related to the cloisters of the period between the thirteenth and seventeenth centuries were found. These were of interest but ultimately of less symbolic value than the church itself (Fig. 12).

A smaller excavation zone (Fig. 11, zone 2) was necessary for the extraction of the drill-tip of the drilling machine in order to complete the construction of the horizontal ceiling beneath the remains of the church. This second section had been excavated in 2016 and took place in a zone of high archaeological risk. Indeed, not only were the remains of the seventeenth century church and several tombs revealed, but also a part of the choir

Figure 13. Some views during the excavation of the pillar-zones (C. Bis-Worch, CNRA).

of the first (thirteenth century) church. Fortunately, there was an old abandoned canal, which could be used for the extraction of the drill-tip in order to protect the existing remains. Another step was to determine the exact position of the vertical drill holes for the pillars necessary to suspend the different parking levels and the remains of the church. Because of the dimension of the pillars, each vertical drill hole was excavated beforehand to avoid undocumented destruction (Fig. 13).

The work is still ongoing, and sometimes archaeological monitoring is required for small interventions when the drill-tip is lost or if there is a doubt about a structure, like an unknown cave or pit which could be touched by the drill-tip. On the whole the experience is positive, but not without problems. In the future, the remains will not be shown to the public, nor will their location be indicated in the design of the new paving for the square. It is therefore to be hoped that the archive records of the excavation will serve to remind future generations that the remains of the church are still lying beneath the ground here.

5 Conclusion

The legal situation is nearly unchanged since 1983, but since the 1990s, most of the stakeholders involved in infrastructure and construction projects are aware to avoid conflicts as much as possible. This is done by:

- contacting the CNRA as early as possible in advance to give enough time for excavation work;
- organizing the planning of the project together with the CNRA;
- trying to reuse existing trenches for cables and pipes;
- and being flexible in case of unsuspected finds.

It is very satisfactory that there is a generally widespread acceptance of the need to integrate excavated structures into the new buildings. Stakeholders are aware of the potential that archaeological and historical remains have for enhancing the value and prestige of their projects. Covering the structures with sand is a fast and simple way of protection, with a high responsibility for later generations to avoid destruction by ignorance; this potentially increases the risk of unwitting destruction through ignorance in the future.

The different examples shown here hopefully illustrate how we tried to react from case to case. Nevertheless, the red line is that we try to integrate as much as possible of our archaeological heritage into new building projects and to underline the high touristic potential. Following Valetta, we are treating the remains as contemporary witnesses of their respective period, as something to be preserved as much as possible for our next generations, to allow them to make further research and to follow or to correct our ideas and theories. It is true that urban archaeology and the conservation of archaeological sites in Luxembourg have the potential to create conflict with new development. However they can also be a valuable addition to modern construction too!

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Managing Archaeology in Dynamic Urban Centres in Canton Vaud

Marion Liboutet

Abstract

Canton Vaud depends on legislation made in 1969 and essentially founded in the protection perimeters of Régions archéologiques (Archaeological zones). In the case of building projects in urban areas, which threaten archaeological remains, it is generally impossible to conserve them *in situ* and in most instances they are excavated and thus destroyed. Nevertheless, their detection and especially their documentation remains a major issue. Indeed urban construction sites, particularly the replacement of urban subterranean networks, have revealed unprecedented data such as sections of fortified walls or ancient occupation sites. Surveillance of such sites is difficult to implement since this is often not considered during the planning stage of renovation projects. These sites pose real challenges for archaeologists entrusted with heritage protection. This chapter examines the procedures and processes as well as the results that were obtained.

Keywords: Urban archaeology, management, underground service network, legislation, perimeters of protection, Medieval and Modern period.

1 Introduction

Switzerland is a federal state comprising 26 cantons. It is a small territory in the centre of Europe where 75% of the population live in an urban context. French-speaking Switzerland or La Suisse Romande (23% of the land mass) contains two of the four largest cities in Switzerland: Geneva and Lausanne making this a heavily urbanised area. With population growth and sustained economic activity, the resulting pressure from construction projects in Canton Vaud is intense. Urban centres endure unprecedented change, not simply in their fabric, but also their historic buildings. Cities are also expanding, with peripheral areas being integrated into the urban network. New housing and infrastructure also has a significant impact on medium-sized towns. In city and town centres as well as neighbouring areas, archaeological remains (those identified and others as yet undetected) are seriously under threat. Issues of detection, conservation and study
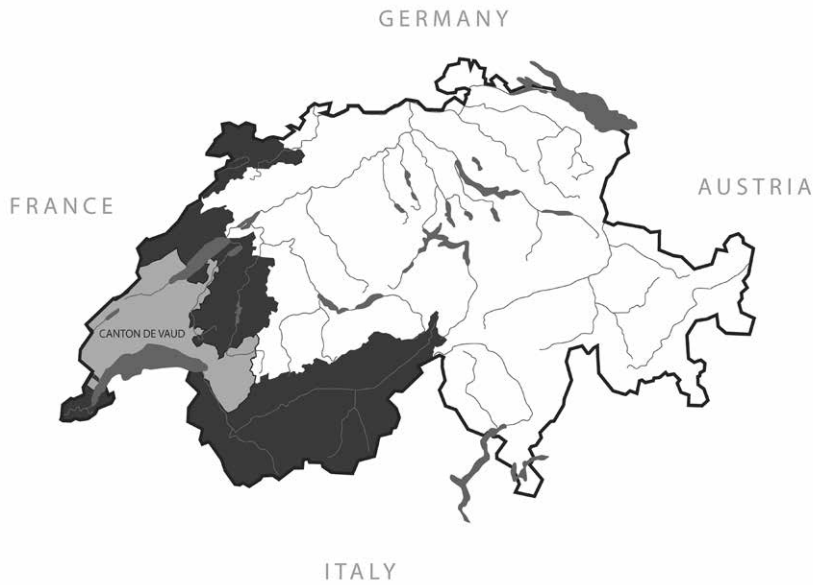
Figure 1. Map of Switzerland with Canton Vaud in light grey and the Romandie (French-speaking area) in dark colour (David Glauser).

of remains are particularly on the agenda and heavily solicit the archaeological services responsible for heritage protection. The purpose of this article is to present the tools the Canton Vaud possesses to protect archaeological remains (such as perimeters of protection and thematic studies of fortified town walls), to demonstrate the type of archaeological operations recurrent in recent years (such as the alteration of public networks and the transformation of old buildings) and the scientific results these operations were able to provide. Finally the limits of the system will be discussed, for instances where preserving remains *in situ* is impossible and destruction thus permitted.

2 Archaeological regulations and practice in Canton Vaud

2.1 Legal framework and finance in archaeology

On a national level, the *Constitution fédérale* (Federal Constitution) of the 18 July 1999, the *Loi fédérale* (Federal Law) of the 1st of July 1966 on the *Protection de la Nature et du Patrimoine* (LPN), the *Ordonnance sur la Protection de la nature et du paysage* (OPN) and the *Code civil suisse* (CCS) define the general framework and orientation regarding heritage. The 26 cantons of the Swiss Federal State have their own individual policies. Each canton therefore issues its own laws in the heritage domain. Canton Vaud relies heavily on a stock of regulations, the main principles of which were laid out in 1898 by Albert Naef, the first Archéologue cantonal (Cantonal Archaeologist). In 1969 this law was replaced by the *Loi sur la protection de la nature, des monuments et des sites* (LPNMS) and its regulations of application (RLPNMS) dated the 22nd of March 1989. The new cantonal constitution of the 14th of April 2003 fulfils and reinforces the principals stated in the LPNMS. On an international level, in 1995 the Swiss Confederation approved and endorsed the Valetta Convention of 1992, which then came into practice in 1996. Despite this, it was

never applied since no federal order ever was given which would have required cantons to translate the convention objectives into law. The convention is however respected in diverse ways specific to each canton. Most cantonal regulatory systems pre-date the Valetta Convention. Articles of law deal with the same themes as those discussed in the Valetta Treaty. They therefore, to a certain extent and according to each canton, respect the Valetta directives (Archéologie Suisse 2017, 21). The LPNMS in the Canton Vaud corresponds, in certain aspects to the directives of the Valetta Treaty. However two things are particularly lacking in the package of regulations concerning archaeology. First is the obligation to integrate archaeology into development planning; second is the legal vacuum concerning the financial aspects of archaeological work. Financing archaeology is one of the important points articulated in the Valetta Convention, which is not in the least translated into Swiss law. Article 56 of the LPNMS specifies that:

'L'Etat peut participer financièrement aux fouilles...des antiquités classés'. [1]

Even if in reality rescue archaeology rarely touches listed remains, the canton financially supports land or property owners who are responsible for salvage costs.

In Canton Vaud, the Archéologie cantonale (Cantonal Department of Archaeology) provides a recommendation in the case of planning permission. The Department of Archaeology in Canton Vaud is too small to undertake large-scale operations. Only surveillance operations covering a few days or small scale surveys can be done internally. When numerous archaeological remains are unearthed the department is obliged to hand the project over to a private excavation company. Canton Vaud has chosen a very different way of working in comparison to the Cantons of Bern and Fribourg who are equipped with archaeological services with consistent human resources, assuring the entire chain of the archaeology process.[2] In these cantons, the archaeological process is totally financed by the public sector (from writing the primary report, to excavation and publication). In Canton Vaud, by virtue of the principal of causality, the cost of excavation is the responsibility of the owner or construction company who, upon request, may receive a grant from the canton. In the case of work instigated by the town, archaeological work is the financial responsibility of the town or city and cantonal subsides are never provided. Work such as street repair necessitating the replacement of underground networks, excavation funding is the responsibility of the town. Concerning the transformation of civil buildings, the owners are often private owners who are eligible for a grant. Additionally under a convention programme between the Office Fédéral de la Culture (Federal Office of Culture) and the canton, federal grants may be allocated.

2.2 Perimeters of protection

Article 67 of the law on the *Protection de la nature, des monuments et des sites* (Protection of Nature, Sites and Monuments) defines the protective perimeters of archaeological remains under the heading Régions archéologiques. These Régions were created based on a variety sources namely subterranean investigation, prospection and documentation. The level of knowledge of the importance and nature of the remains varies according to

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1   'The state may participate in excavation financing...of listed relics'.
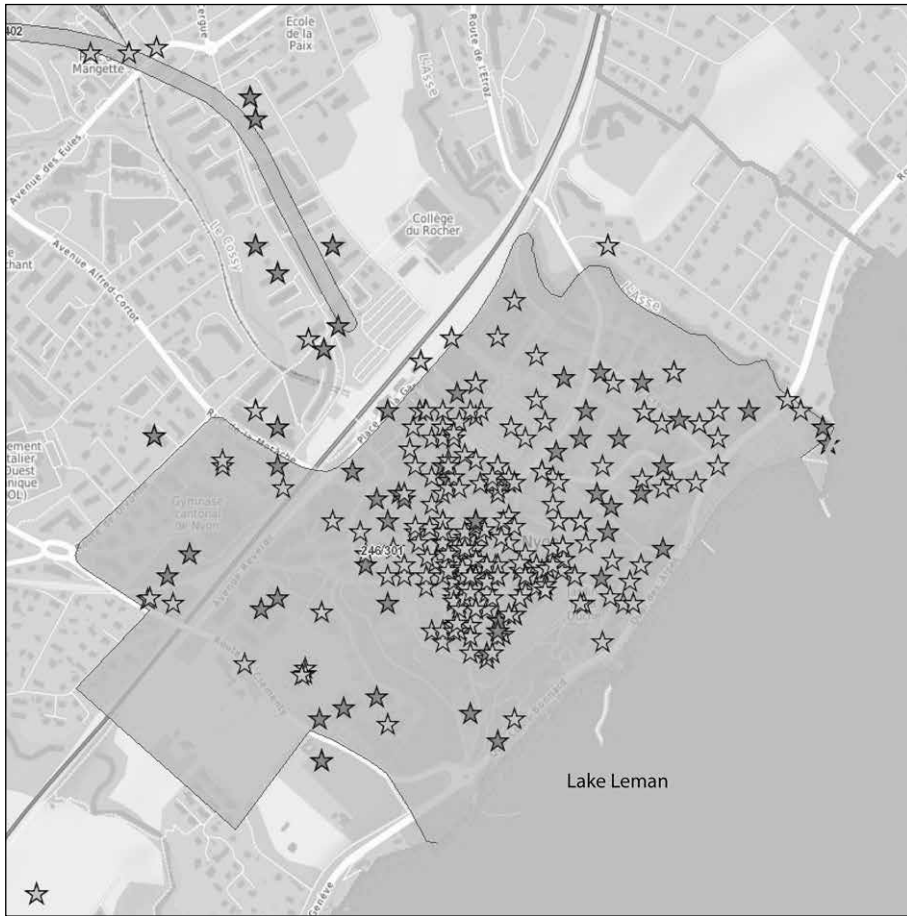2   Here we see the full scale of Swiss federalism.

Figure 2. Nyon's Urban Centre. The stars correspond to the numerous archaeological interventions. Excerpt from the Archaeological Map of Vaud (Archéologie cantonale).

relevance and the extent to which the information is updated. The *Régions Archéologiques* are described and mapped on the Archaeological Map, a database linked to a Geographic Information System for day-to-day management or scientific research. It also records recommendations and archaeological operations (Fig. 2). The creation of Régions Archéologiques is based on the presumption that archaeological remains exist within these areas. In urban areas it may be useful to create Régions Archéologiques in zones as yet untouched by construction in order assess projects which affect the remaining free spaces where there is no archaeological data. Indeed surveys which enable data collection are rare and quite inefficient in an urban setting, with existing structures in disuse or earmarked for modification. In terms of planning, the Archéologie cantonale (Cantonal Archaeology Department) tries to incorporate guidelines into land use planning dealing with large projects outside the Régions archéologiques. Requests are sometimes rejected due to the lack of legal framework requiring the integration of Archaeology into planning. The desire to predict archaeology is therefore limited and subject to the hazards of other state departments. Yet time and again it has been proven that these applications are valid.

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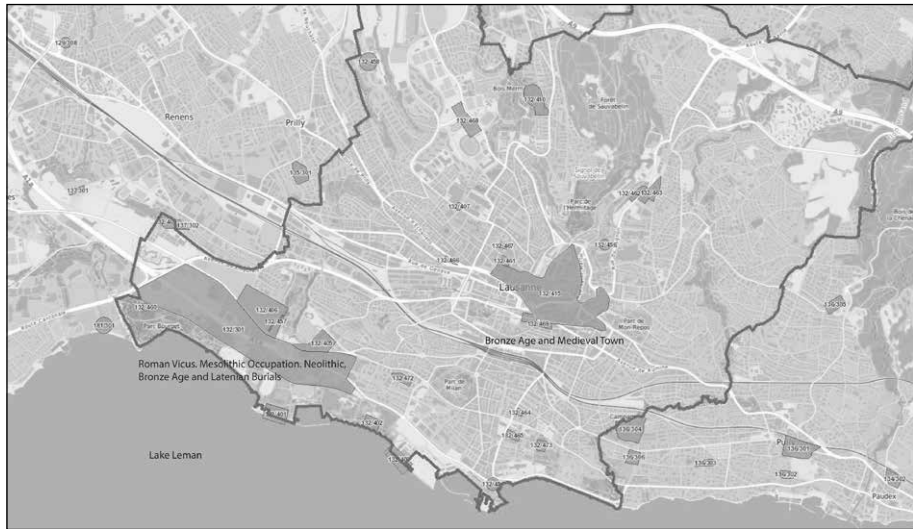
Figure 3. Principal Région archéologiques of Lausanne. Excerpt from the Carte archéologique (Archaeological Map of Vaud, Archéologie cantonale).

Surveys carried out within the confine of the development of the Tuilières district in Lausanne, outside of the Région Archéologique, were requested in the development plan and accepted *in extremis*, has resulted in the unprecedented revelation of a Bronze Age settlement. These elusive remains would not have been detected during building works and would otherwise have been wiped out by the bulldozer.

All ancient urban centres are protected by a perimeter which corresponds to a Région archéologique. These can be multiple as is the case with Lausanne, the capital of Canton Vaud, which comprises two distinct entities. One part to the north, corresponding to the medieval town and a Bronze Age settlement with the other part the Roman vicus on the banks of Lac Léman (Lake Geneva) adjoining and partially covering a Mesolithic settlement, Late Bronze Age burials, Neolithic graves and a La Tène cemetery also threatened by extensive development (Fig. 3). Other less substantial towns surrounding Lausanne are also exposed to urban development. Take Yverdon-les-Bains, the second largest agglomeration in the Canton (after Lausanne) whose Régions archéologiques (Archaeological Zones) protect post-built sites, La Téne settlements, Roman castrum and medieval town. There is the medieval town of Vevey, we have Nyon the first Roman colony in Switzerland and also a medieval town and then Payerne, a medieval town with origins in late antiquity but renowned for its Benedictine abbey. Small urban areas are also undergoing modifications which are potentially damaging to archaeological remains: the region protecting Orbe, a town founded in the Early Middle Ages, Avenches capital of the Helvètes and whose buried riches prove to be of continued importance and where real estate pressure is intense and Moudon, a probable Helvetic oppidum, Roman castrum and walled medieval town.

2.3 Courses of action
The *Archéologie cantonale* receives applications for planning permission for projects within the Région archéologique (Archaeological Zone). Article 47 of the LPNMS stipulates that
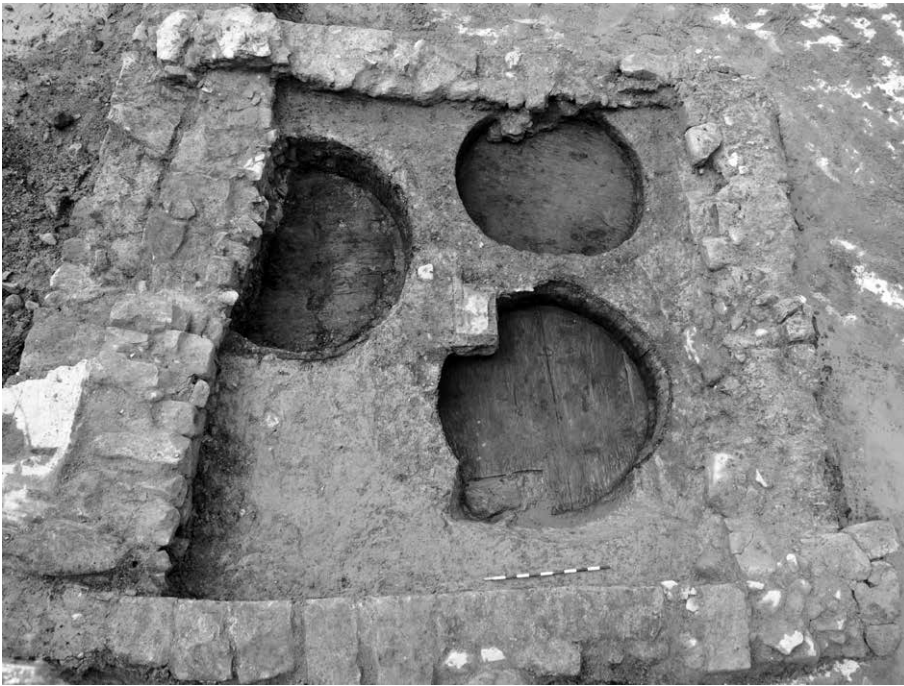
Figure 4. Lausanne. Rôtillon district. Excavation 2011. Spruce tannery barrels
(Archeodunum SA).

the department in charge of heritage specifies the provisional measures for its safeguard. These measures form part of the social authorisation which is one of the conditions for the issue of a construction permit. This may take the form of surveillance, surveys or archaeological excavation if the site is already known. Evaluation of urban projects use information contained in the Archaeological map (based on previous excavations) as a yardstick and also reference documentation. For historic towns a publication regarding the boundary walls of certain towns in the canton is used as a basis to evaluate the impact of development projects on this type of remains and helps to make decisions (Christe 1999, 301-318). Compound plans based on the old cadastre, created by the Histographic Museum of Lausanne in the first few decades of the twentieth century, also support the process. When potential development threatens archaeological remains, a field operation is set up.

In towns, with the exception of large plots of land on the outskirts, vacant plots are rare and it is mostly the (quite rare) transformation of districts which have resulted in large scale excavation. The Rôtillon district of Lausanne (Fig. 4) was entirely redesigned between 1996 and 2011 (Freudiger 2012) and led to the excavation of the medieval and modern tanneries district along the River Flon.[3] In Payerne, a plot barely altered until recently revealed a nucleus of medieval habitation which included lightweight house structures and a medieval store (Maroelli 2016). In Lausanne, the landfill of the train line Lausanne-Echallens-Bercher caused the excavation of a nineteenth century cemetery which was

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3 Excavation François Christe, BAMU-1996, Olivier Feihl, Archeotech SA-2004-2005 and Sébastien Freudiger, Archeodunum SA-2011.

known from the sources but which was thought to have been completely destroyed by recent urban construction.[4] Such extensive excavations of whole neighbourhoods is still quite rare and the explorations are mostly done by the trenches of public network renovations.

3 Urban restructuring work

3.1 Terms and conditions of interventions

The most frequent and emblematic projects of urban transformation are street layouts, public spaces and those which involve the alteration of underground networks. Now that the Canton has initiated a large number of these, this publication is conducive to an attempt to take stock of the complexity of monitoring within an urban context. Archaeological remains are threatened by projects which involve earthworks that cannot be altered. These are works of public and collective developments, subject to precise specifications. In such cases, the Canton systematically requests archaeological surveillance. The undertaking of archaeological survey prior to the works is very rare, because of the public nature of the areas. In the last decade, the surveillances, always located within a Région Archéologique (Archaeological Zone), has been almost systematically tackled by a private company. Prior to this, with the occasional exception, these were executed by the Archéologie cantonale (Cantonal Department of Archaeology), which did not allow for constant monitoring of earthworks. In practice, these cases engender administrative complexity as soon as an archaeological intervention is initiated. The primary reason is the difficulty in assuming the financial costs of archaeological monitoring. As stated previously, the costs lies with the town or city council and is never subsidised by the Canton. The presentation of a cost estimate from a private excavation company[5] often provokes a refusal that needs to be abated, often through heated discussion, while relying on fragile legislation and the sense of patrimony of the future contractor. The most common opposing argument is the absence of preserved artefacts, in an environment in constant evolution, specifically when revisiting the location of previous sanitation network construction. The heritage interest of this monitoring procedure is never obvious to the developer but sometimes evolves with the discovery of artefacts and remains. This process is unsatisfying for archaeologists working in the field, as they are dependent on the progress of construction , have intense technical constraints (such as the depth of excavation, the buttressing of sections which hinders their analysis) and work in a cramped space often crammed with pipes with their feet in water, whose dubious colour and odour is clearly indicative of its origin. Often archaeological remains, when discovered, are incomplete and their destruction is sometimes inevitable due to the nature of the situation. This mode of operation, which requires a subtle mix of diplomacy, discussion and persuasion, means that the results obtained – even if they are scientifically significant – may be inconsistent between sites.

3.2 The scientific results of archaeological trench operations

Monitoring of the replacement of drains in L'Isle (Fig. 5, n°1 and Fig. 6) has improved understanding about the wooden foundations of the fortifications which protected the little

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4   Excavation Sophie Thorimbert, Archeodunum SA-2017.
5   The two main companies are Archeodunum SA and Archeotech SA.

town at the beginning of the fourteenth century. These have been dendrochronologically dated to 1299, which has been linked to documentary sources describing the original construction.[6] Technical arrangements facilitated the avoidance of their destruction by passing the pipework below the archaeology. This monitoring project also revealed historic improvements near the banks of the Venoge; timber structures protected the town wall from flood water (Menna 2016). The archaeological surveillance of new sanitation installations in Rue des Moulins in Yverdon-les-Bains (Fig. 5, n°2) revealed remains with a sequence running from the Early Middle Ages to modern times, with habitation levels from the sixth century.[7] Although too difficult to connect the postholes to reconstruct houses (Fig. 7) they still provided dateable animal remains. The Early Middle Ages is mainly known in Canton Vaud through burial sites which make these finds so unique in character. Furthermore the extremities of a modern ceramic production site were uncovered providing equally unique information on the material culture (Andenmatten *et al.* 2016b). In Grandson, street repairs in the Rue Haute and the Rue Jean Lecomte, two main streets of the medieval town (Fig. 5, n°3 and Fig. 8), were revealed in sections of the ancient town situated between the eleventh century castle and the church which formed part of the Benedictine Priory of Saint-Jean-Baptiste.[8] Thanks to wide and deep trenches (Fig. 9), a cemetery with 126 inhumations associated with the church, smithy slag, old facade boundaries including a burnt level, could be excavated. The remains were all destroyed by the works with the exception of the town gate which was well preserved despite blocks having to be separated. These will be drawn out at ground level with an accompanying information board with details about the nature of the finds for the public. So this pipe revision work has uniquely brought to light the unprecedented remains of the noble town of Grandson (Pedrucci *et al.* 2017). In La Sarraz (Fig. 5, n°4), there was also a section of the town's enclosure wall discovered with an accompanying filled ditch, during similar street repairs, as well as a pit filled with organic material including about one hundred fragments of leather. [9] Similarly in Bex (Fig. 5, n°5), street remodelling and revision of drains in Rue du Midi, caused the partial excavation of a cemetery with 125 graves associated with the church of Saint-Clément (Antonini and Moret 2013).[10] In Rolle (Fig. 5, n°6), round-the-clock surveillance of earthworks led to the unearthing of the modern and contemporary remains of this town on the lake shore with sometimes from two metre high stratigraphies,[11] no medieval vestiges were found, most probably having been destroyed by successive reworking of the area. This surprising result shows the extent to which the town has been modified to obtain its modern form (Laurent 2013). Surveillances carried out in Orbe Grand Rue (fig.5, n°7) did not result in the quantity of remains that had been expected. [12] Only very few finds, even recent ones, were unearthed. Ancient plans as well as historical sources indicated an early medieval origin but no clues were uncovered to either confirm or deny the ancient texts. The levels were probably successively erased leaving no detectable trace for archaeologists (Liboutet 2015a).

6   Excavation Aline Andrey, Archeodunum SA-2015-2016.
7   Excavation Romain Andenmatten, Archeotech SA-2015-2016.
8   Excavation Anna Pedrucci, , Archeotech SA-2015-2016.
9   Excavation Fabien Krähenbühl, Archeodunum SA-2017.
10   Excavation Alessandra Antonini, Tera sarl, 2010.
11   Excavation Cécile Laurent, Archeotech SA, 2012.
12   Excavation Cathy Latour, Archeodunum SA, 2014.

Figure 6 (opposite page). L'Isle Wooden foundation of town wall from the 14th century (Archeodunum SA).

Figure 5. Map with the main urban surveillance trenches in the Canton Vaud (Archéologie cantonale).

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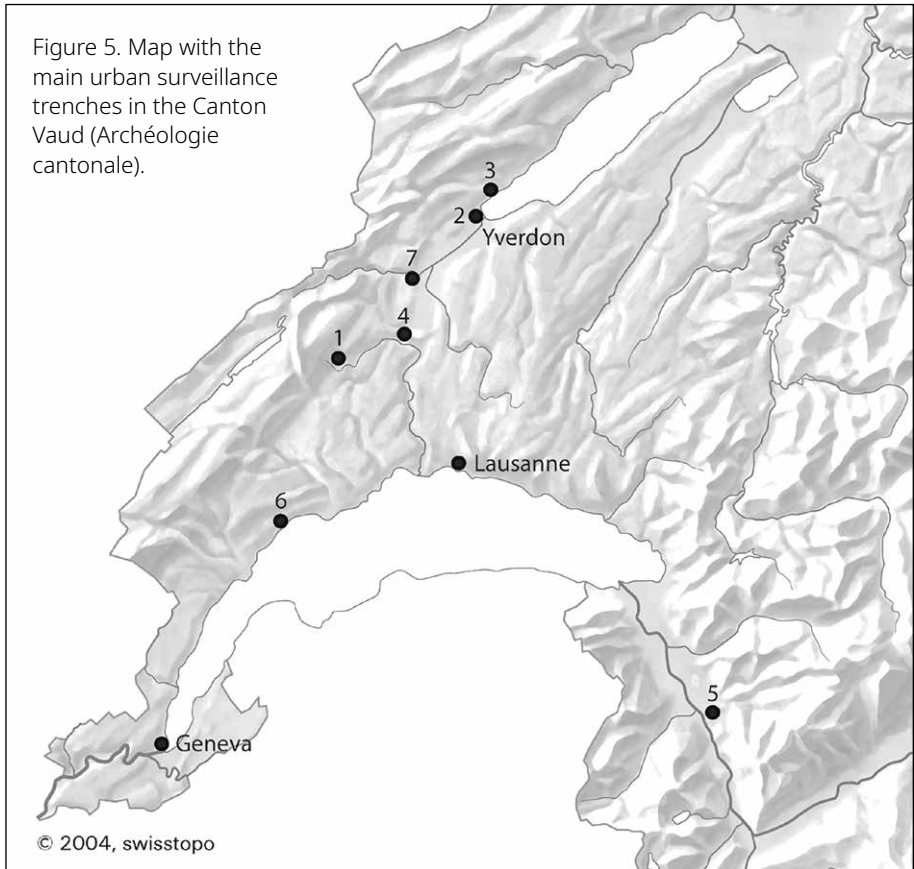

L'ISLE
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Figure 7. Yverdon Rue des Moulins. Early medieval postholes (Archeotech SA).

Figure 8. Grandson. Map of the town with the monuments and main discoveries of the trenches from 2015-2016. Cemetery, ancient habitation level, smithy remnants (Archéologie cantonale and plan courtesy of Archeotech SA).

Figure 9.
Grandson view of
trench excavation
(Archeotech SA).

3.3 Provisional assessment of the procedure

Beyond obvious scientific advances, it must be emphasised that projects are still difficult to implement in terms of administration. In fact heritage conservationists struggle to enforce the necessary conservation measures during the planning permission stage in order for the developer to obtain a construction permit. Often the construction site is already planned out and the budget finalised. The absence of a strict legal framework dealing with the financial responsibility ultimately leads to the contractor putting pressure on the authorities. Each construction is often preceded or accompanied by intense discussion concerning time frame, field work cost as well as post-excavation cost. In the end deadlines have to be compressed and choices made which could be detrimental to scientific understanding of the sites. Nevertheless archaeological excavations were undertaken and the results show that this approach does work. Water and sanitation restructuring work is common and archaeological surveillance of this enables us to investigate locations where more conventional construction projects do not occur. These examples of trench surveillance, with relatively small outlay, have often produced a wealth of information, contrary to the conventional wisdom that potential remains have all been destroyed by previous construction work. Certainly the structures unearthed are only partial, intertwined as a result of a construction history but also biased by urban transformation and more generally, the image that the town wished to present throughout the ages. The remains discovered in such contexts can either be preserved or destroyed during extensive excavations. In Lausanne structures of the old Archbishop's palace discovered during probes were not excavated but instead preserved as an archaeological resource. In Grandson the remains of the Porte de la Boucherie and the Porte de Giez

(gateways of the town) were only partially lost during the laying of pipe work as was also the case with the town enclosure walls of La Sarraz. In both cases information boards and even ground markings will be made to present and restore to the public the information gleaned through the construction work.

Outside the territory of Canton Vaud similar steps are taken. Remains of the Monastery of the Granval (Gerber 2009) were uncovered during archaeological surveillance of sanitation work beneath the pavement of the Rue Central in Moutier (Canton Bern). However opening up trenches in the urban street network is not entirely conducive for understanding the urban fabric. On this theme projects to renovate private buildings, whether civil or public, better address this issue.

4 Archaeological procedures in civil buildings

4.1 Context and operation

Aside from trench excavations, remodelling of the urban civil habitat confronts the heritage services with conservation and documentation issues. The Cantonal Department of Archaeology, through the Archaeological Regions, assures the protection and documentation of remains found below ground. Traditionally, above-ground structures are the responsibility of the Department of Sites and Monuments (Section Monuments et sites). This division of expertise hinder the creation of real structural archaeology operations and irredeemably, data is lost. Until relatively recently, the Department of Sites and Monuments commissioned structural analyses of buildings during renovation work. Currently, due to a reorientation of priorities, such studies are rare. Emphasis is instead placed on the conservation of elements *in situ*. Requests for analysis are not obligatory except in the cases where the building is already listed to grades 1 or 2. From grade 3 and beyond, the ruling of the Department of Sites and Monuments is only a recommendation that the local town or village authority, with whom the prerogative lies, can choose to follow or not. This results in old components being destroyed without having been documented according to structural archaeology methods. In instances where the impact is subterranean, the Cantonal Department of Archaeology requests an archaeological procedure in which documentation of the above ground structure is also included. The study of old buildings suffers therefore from the imposed division of below ground and above ground, which goes against the grain of the theory of buildings archaeology. This dichotomy is hardly efficient and almost absurd, when we consider that a building constitutes a whole. From a scientific perspective, structures should be considered from foundation to roof ridge, with the inclusion of the entire volume, as well as buried traces of its construction and its evolution within the space it occupies. Some sites have had different teams working on ground level and on the structure respectively. The results of this practice have been thoroughly examined and it is now a question of curbing this trend by combining skillsets and conducting comprehensive building studies. Canton Fribourg does not have this dichotomy: the directives are drafted mutually between the Department of Archaeology (SAEF Service archéologique de l'Etat de Fribourg) and the Department of Cultural Goods (Service des Biens culturels). Procedures on structures are entirely covered, both excavation and buildings archaeology, by the Department of Archaeology.
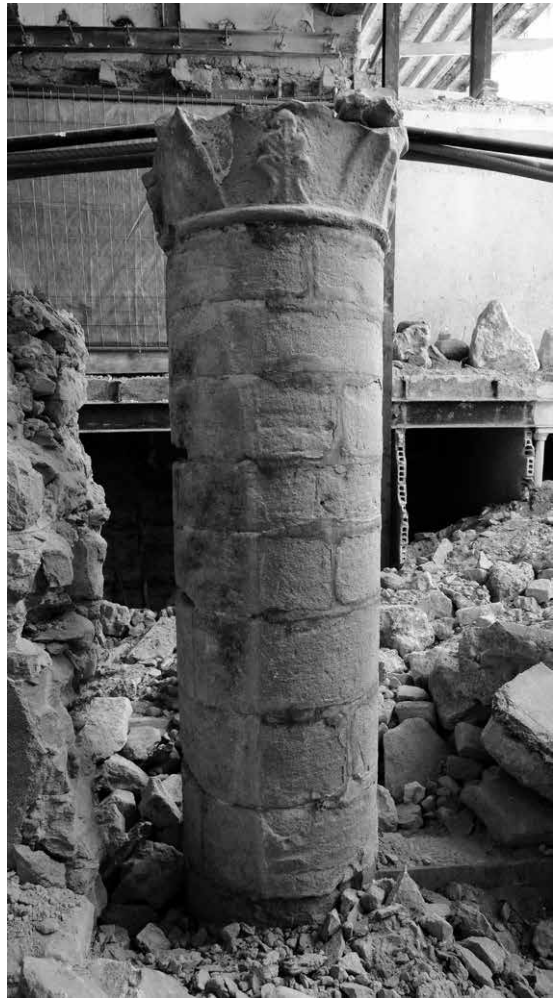
Figure 10. Lausanne Rue de Bourg 8. Photo of the capital UC27 with hooks and acanthus leaves dated from between the 13th and 14th Centuries (Archeotech SA).

4.2 The results of procedures on civil buildings

Nevertheless research has been carried out on urban civil buildings. These examinations have improved our understanding of the evolution of the urban fabric, and as more of this type of research is undertaken the processes of urbanisation will become clearer still. Let us consider procedures in the town of Morges, founded in the 13th century, Rue Louis de Savoie 51-53, Rue Louis de Savoie 58 and Rue Louis de Savoie 60 specifically. [13] In no's 51-53 the density of remains was significant and the oldest levels (postholes) were able to be documented in the depths of an elevator pit but the absence of artefacts meant they were undatable (Andenmatten *et al.* 2016a). Except these remains, the urbanisation of the plots was visible with a construction made of lightweight materials from the 17th century onwards in no. 51 while no. 53 was still vacant. Opposite these buildings, in Louis de Savoie 58, a structure emerged from thesixteenth century. At no's 58 and 60 the space had already been built on in the seventeenth century (Pradervand 2017). In Orbe, the

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13   Excavation Romain Andenmatten, Archeotech -2015-Excavation Aude-Line Pradervand, Archeotech-2017-Operation Jean-Blaise Gardiol, Sherlock'Home-2015.
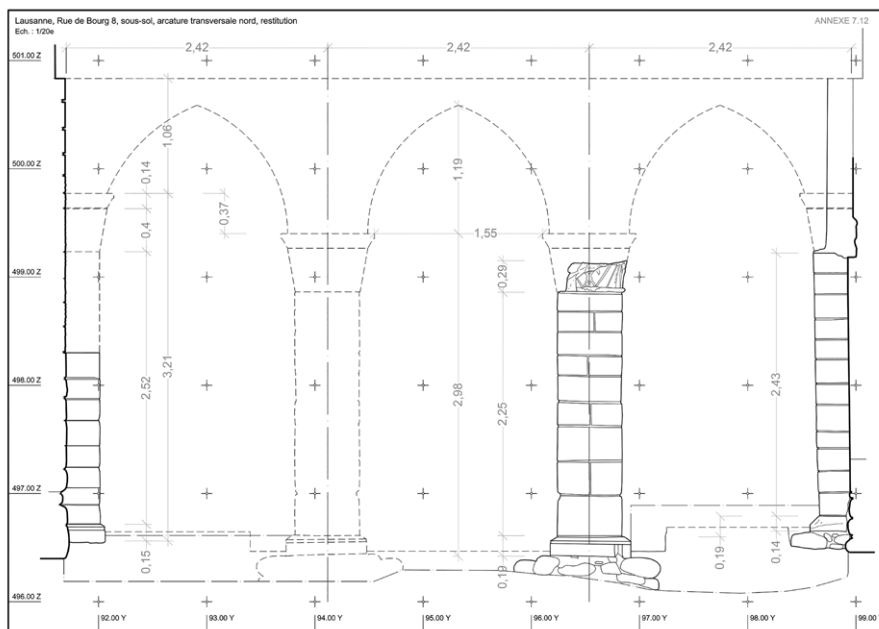
Figure 11. Lausanne Rue de Bourg 8. Reconstruction of the north transversal arch (Archeotech SA).

renovation of a large house structure, including a medieval tower, provided the means for its documentation and dating to theeighteenth century, as well as a completely unique section of the associated fortified town wall. The evolution of the building could therefore be reconstructed until the twentieth th century (Liboutet 2014, 62-73). [14] In Coppet, three archaeological interventions in buildings in the Grand Rue nos 16, 46 and 51, provided data on the town's fortification system as well as determining the evolution of the buildings themselves (Pedrucci and Glaus 2014a; Glaus 2014; Gardiol 2016). [15] In Lausanne, the remains of a cellar containing columns with capitals dated between the thirteenth and fourteenth centuries (Fig. 10 and Fig. 11) were discovered during an intervention at the Rue de Bourg (Glaus 2017), a rare and unprecedented discovery.[16]

4.3 Limits and obstacles

Currently town-scale summaries are not possible owing to an insufficient number of interventions to increase the amount of data. It is therefore necessary to undertake more research and launch both schematic syntheses and scientific study. Indeed archaeological management and intervention planning of urban projects can only improve. A cartographic synthesis of Yverdon-les-Bains, the second largest town in the Canton, is currently underway; this will incorporate all medieval and modern archaeological

14   Excavation Werner Stöckli, AAM-2012 and operation Marion Liboutet, Archéologie cantonale – 2013.
15   Excavation Anna Pedrucci, Archeotech SA-2013-Excavation Jean-Blaise Gardiol, Sherloch'home – 2014-
       Excavation Mathias Glaus, Archeotech SA-2013.
16   Excavation Mathias Glaus, Archeotech SA-2016.

interventions. Localised archaeological interventions already illustrates a clear absence of civil building intervention in the old town. We must look at recent projects such as the Rue du Lac (Pedrucci and Glaus 2014b) to find archaeological data on historic constructions. Geographic Information System data will nevertheless serve as a basis for a synthesis on heritage practices as well as scientific knowledge. It is absolutely necessary to extend this scheme to other towns beginning with Lausanne in particular. Beyond aspects of heritage, the management of urban projects suffers from the lack of reference studies concerning medieval towns but also concerning the medieval and modern eras in general (Liboutet 2015b). It is therefore a question of compensating for this absence with occasional specific studies but also with landscape studies which take into account that towns are part of a vast interdependent network.

5 Conclusion and perspectives on urban archaeology in Canton Vaud

Thanks to the Régions archéologiques that protects urban centres and imposes work within their confines, the Canton Vaud endeavours to ensure the archaeological documentation of construction sites, concerning the renovation of urban networks or building transformation. The lack of the formal application of the Valetta Convention in Switzerland does not prevent critical analysis and action on heritage. Thanks to cantonal legislation and process management, the means are provided to protect archaeological remains, to document these remains and to ensure the disseminating of knowledge. In Canton Vaud we have seen the prevalence of trench fieldwork and the unprecedented quality of data they supply. An effort must be sustained and all construction sites be overseen despite the administrative pitfalls. Concerning buildings, conservation and study should be the watchwords for this process before it is too late and ancient material disappears. Finally emphasis should be placed on scientific analysis in order to exploit the information that operations of rescue archaeology have delivered over time.

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Stratigraphy as a strategy, an approach to urban archaeological excavation. The example of Aosta, NW Italy

Claudia De Davide

Abstract

Recent excavations undertaken over the last 5 years in the modern suburbs of Aosta, beyond the limits of the Roman city wall, have allowed the possibility to use archaeological stratigraphy for the comprehension of the changing dynamics in the complex rural landscape of the Aosta Plain, from prehistory to modern times. Based on this experience it has been the intention to develop a stratigraphic approach to rescue archaeology that could be used in a predictive way for the planning and realization of future infrastructural transformations within the city. However it also imposes a reflection: should urban rescue excavation be used to continuously augment the archaeological knowledge, or should the emphasis be focused simply upon the protection of ancient stratigraphy?

1 Aosta: geographical and historical context

The Italian region of the Aosta Valley, located on the frontier with France and Switzerland at the foot of Mont-Blanc in the north-western Alps, has always represented an important cultural and historical crossroad, in control of the transalpine passes of Great and Little Saint Bernard. At the heart of this essentially mountainous territory is situated the city of Aosta, founded on a wide valley plain, delimited by two important watercourses, the Dora Baltea to the south and the Buthier to the east; powerful and unpredictable torrents which have strongly conditioned the development of human activity, being continually exposed to the threat of calamitous alluvial events.

Although occasional remains of Mesolithic activity have been found in the Aosta Valley (for a recent synthesis see Raiteri 2017, 1-10), principally in upland contexts, the earliest archaeological testimony for settlement on the Aosta plain itself dates to the late fifth millennium BC, with the first phases of occupation and agriculture at the site of Saint-

Martin-de-Corléans in the western suburb. This location is the scene of significant cultural developments, the site of a prehistoric ritual landscape in the early third millennium BC, which subsequently transformed into a megalithic funerary site, the use of which persisted into the Iron Age (Poggiani Keller *et al.* 2016, 9-58). An important contemporary sequence of prehistoric and protohistoric activity has recently been brought to light during the ongoing project for the enlargement of the regional hospital, situated in the suburbs to the north of the modern city. Here large scale excavations have permitted the documentation of the various phases of evolution of an organized rural landscape during the period from the fourth to the first millennia BC, with activity also taking place into the Roman period.

The Roman colony of *Augusta Prætoria* was founded on the Aosta plain in 25 BC, defended by the formidable city-wall still in large part visible today (Framarin *et al.* 2014, 157-210). Of the four original urban gates, the majestic and well-conserved *Porta Prætoria* remains particularly visible. Representing the eastern access to the city, this gate was imposed on an important axis leading to the triumphal Arch of Augustus, erected next to the Buthier Torrent along the road leading to Rome. The magnificence of the ancient city, with its regular sub-division in *insulae*, is still clearly recognizable today, only partially hidden by the transformations of the post-Roman period. Frequently, medieval buildings incorporate the remains of important monuments like the Forum with its highly scenographic *criptoporticus*, the public-baths and the theatre. The great Roman amphitheatre, built in this case within the confines of the city, was later superimposed by the construction of a convent.

The activities of modern Aosta still concentrate upon the historical centre; however from the nineteenth century onwards the growth of residential suburban developments enlarged the city to the north, east and west, whilst industry gradually occupied the area to the south along the river-banks of the Dora Baltea.

2 How preventive archaeology has influenced the recent development of Aosta. The cases of Caserma Testafochi, the Parini Hospital site and the Telcha project

Aosta, like most other historical cities, has been object of both old-style archaeological excavations and modern stratigraphically-based research, during the various phases of its urban development. More recently, between 2006-2011, important research excavations have been concluded in two of the principal town-squares, Piazza Roncas, situated at the *Porta Principalis sinistra*, the important northern city-gate *en-route* for the Great Saint Bernard's Pass and Switzerland (Framarin *et al.* 2008, 108-117; 2009, 53-64; 2010, 31-42; 2011, 42-53; 2013, 32-39) and Piazza Pope Giovanni XXIII, the 'area sacra', incorporating the Forum Temple with its *criptoporticus* (Framarin and Cortelazzo 2006, 131-137; 2009, 35-52). In addition to these extensive works, systematically planned by the local Cultural Heritage office, other nearby rescue excavations were undertaken, augmenting the comprehension of the complex urban stratigraphy of the various compartments of the city, already amply-analysed and documented during the 1970's by Mollo Mezzena (1988, 49-109). Extension of this stratigraphical approach beyond the city walls has only taken place more recently, with the observation of archaeological deposits in the various suburban zones. Generally this work was on a small scale 'rescue' basis, but with important exceptions like the eastern and western Roman cemeteries, and the 'Megalithic area of Saint-Martin-de-Corléans'. The decision of the Autonomous Regional Council of the Aosta Valley to undertake two major
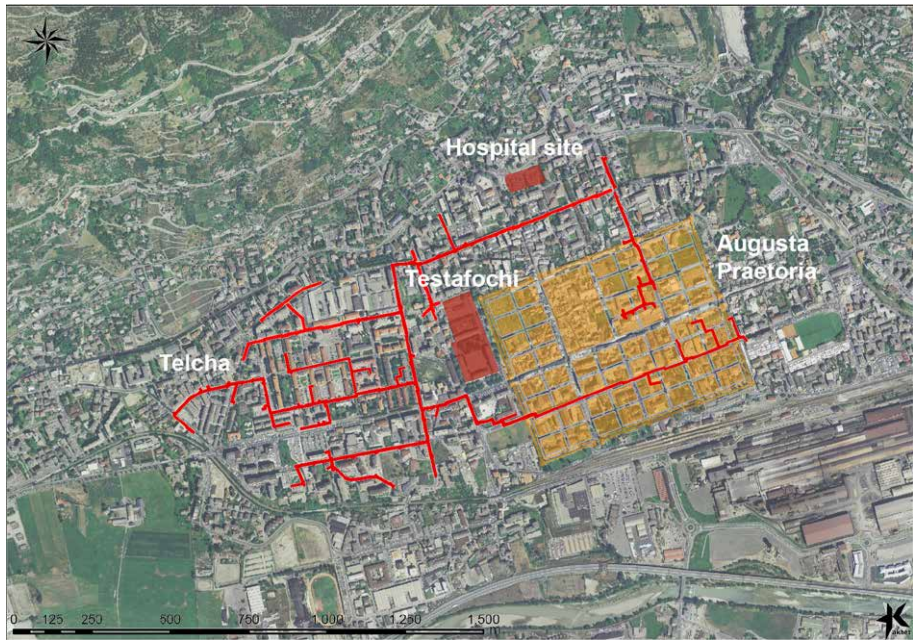
Figure 1. The modern city of Aosta. Locations of the principal recent archaeological works (in bordeaux), realized around the margins of the Roman city (in yellow), with the network of trenches of the project Telcha (in red) (Daniele Sepio for Akhet srl).

extra-urban construction projects prompted important new archaeological excavations from 2012 onwards. These have been significant in particular for the extension of the areas subject to systematic archaeological research, under the scientific direction of the local Cultural Heritage office (Struttura Patrimonio Archeologico della Valle d'Aosta).

The first project, associated with the construction of the 'New University of the Aosta Valley', is located immediately to the west of the city in an area previously occupied by the military barracks of the Caserma Testafochi (Framarin *et al.* 2011a, 64-76). The second, associated with the enlargement of the Umberto Parini Regional Hospital at the base of the hill to the north of the city, represents the development of an existing surface car-park, a site however imposed previously within the confines of the old town-cemetery (De Gattis and De Davide 2015, 14-15; Wicks 2016, 32-41). In addition to these two public works, it is important to consider the major archaeological contribution of a third large-scale project, this time in the private sphere, with the excavation of a network of deep trenches in order to install a new urban central-heating program in Aosta (the so-called Teleriscaldamento). This work, undertaken by Telcha srl, is an ongoing project which has allowed a much better understanding of the archaeological stratigraphy and geomorphology of in particular the western and northern suburbs of the city (Armirotti *et al.* 2017, 12-23).

Although the three interventions present very different characteristics and methodologies, together they have facilitated a large-scale systematic documentation of an important and uninterrupted stratigraphical sequence beginning in the third and fourth millennia BC and proceeding to the present day. The sheer variety and archaeological interest of the data accumulated, together with the exceptional discoveries made during these projects, allowed the addition of important – and occasionally totally unexpected –

elements to the story of the Aosta plain. However the principal merit of the research is to have facilitated both the reading of the ancient landscape in extension and the reconstruction of its transformation over the centuries.

The first investigations inside the barracks at Testafochi were informed by the results of a sediment core survey primarily undertaken for civil engineering purposes. An area of 15,000 square metres was investigated with 20 archaeological trenches. The resulting extensive stratigraphical analysis illustrated first the presence of an important geomorphology in this zone located immediately outside of the city wall. This area was previously believed to be flat, but was instead shown to be undulating; a morphology in all probability directly responsible for the original location of the western limit of the Roman colony. The archaeologists revealed a subsequent agricultural use of this open landscape. This land use continued until the late medieval period when first a military cemetery was imposed upon part of the field-system; the whole area was eventually transformed into a military parade ground in the nineteenth century.

The second project, connected with the enlargement of the Umberto Parini Regional Hospital, was located 500 metres to the north-east of the Testafochi, at the foot of the hill to the north of the Roman city, practically adjacent to the ancient road leading to Switzerland. In this case the need to maintain access to the hospital car-park meant that it was necessary to undertake an initial preventive archaeological investigation. This involved the excavation of five small-scale exploratory trenches. The preliminary results of this investigation determined the need for an extended archaeological excavation

Figure 2. Caserma Testafochi. The documentation and sampling of the stratigraphy of one of the archaeological trenches explored under the military parade ground (Akhet srl).
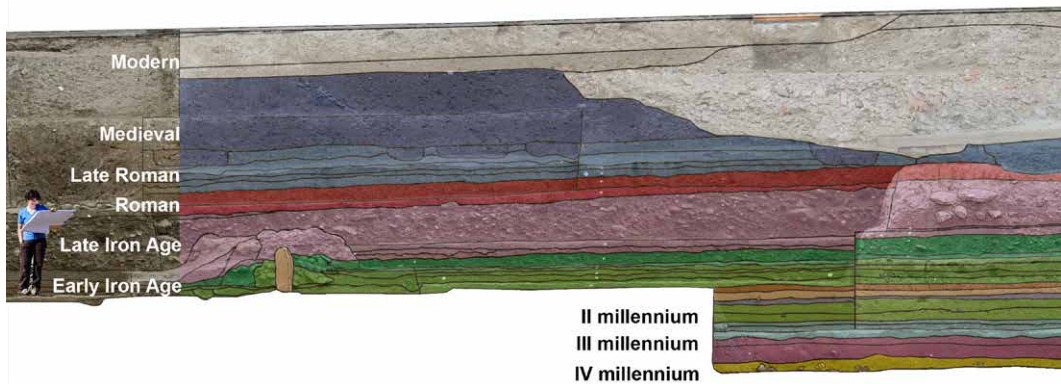
Figure 3. Hospital site. The archaeological interpretation of part of one of the principal sections of the site, coloured with respect to the main chronological phases identified during the project of archeologically-assisted excavation (Daniele Sepio for Akhet srl).

across an area of 5,000 square metres. During this second project, over 25,000 cubic metres of archaeological stratigraphy were excavated in a six-month period; the excavation removed all cultural material above the natural geological layer that was present across the site between 4.5-7.5 metres below the modern ground surface (Armirotti *et al.* 2019, 109-140).

The stratigraphical investigation enabled the recognition of a highly complex archaeological sequence, the upper portion of which was characterized first by the presence of the modern town cemetery, only partially cleared in advance with over 1000 burials remaining *in situ*. This was followed by an important period of building activity centred around the multi-phase development of a medieval chapel with its associated cemetery and also a hospice for pilgrimage. All of these elements were superimposed on the margins of a hitherto little-explored multi-phase Roman necropolis, developed along the eastern side of the road towards the Great Saint Bernard's pass.

The lower parts of the stratigraphy surpassed even this complexity with the recognition and documentation of a sequence of at least 11 superimposed rural landscapes dating from the third to the first millennia BC, each with its unique scheme not only of land division but also of irrigation. This cycle of agricultural activity was interrupted by the construction of a 130 metre-diameter stone circle during the Early Iron Age, and the construction of an associated major tumulus containing a warrior-burial dating to the early seventh century BC. These remains were of the utmost archaeological significance. Even at the beginning of this extraordinary sequence there still remains to be investigated what is in all appearances a prehistoric ritual landscape dating to the fourth and third millennia BC. The various landscapes revealed by the stratigraphic sequence at the hospital site were not only remarkably-conserved but also obviously clearly divided by a prominent series of important debris-flow and alluvial events. The highly visible nature of these deposits enabled the rapid identification of very extensive ancient landscapes (5,000 square metres), greatly-facilitating the interpretation of transformation of the countryside across the millennia.

The principal value of these two very large projects, distinctly separate but relatively close to each other, is to have allowed not only the extensive reading of well-conserved
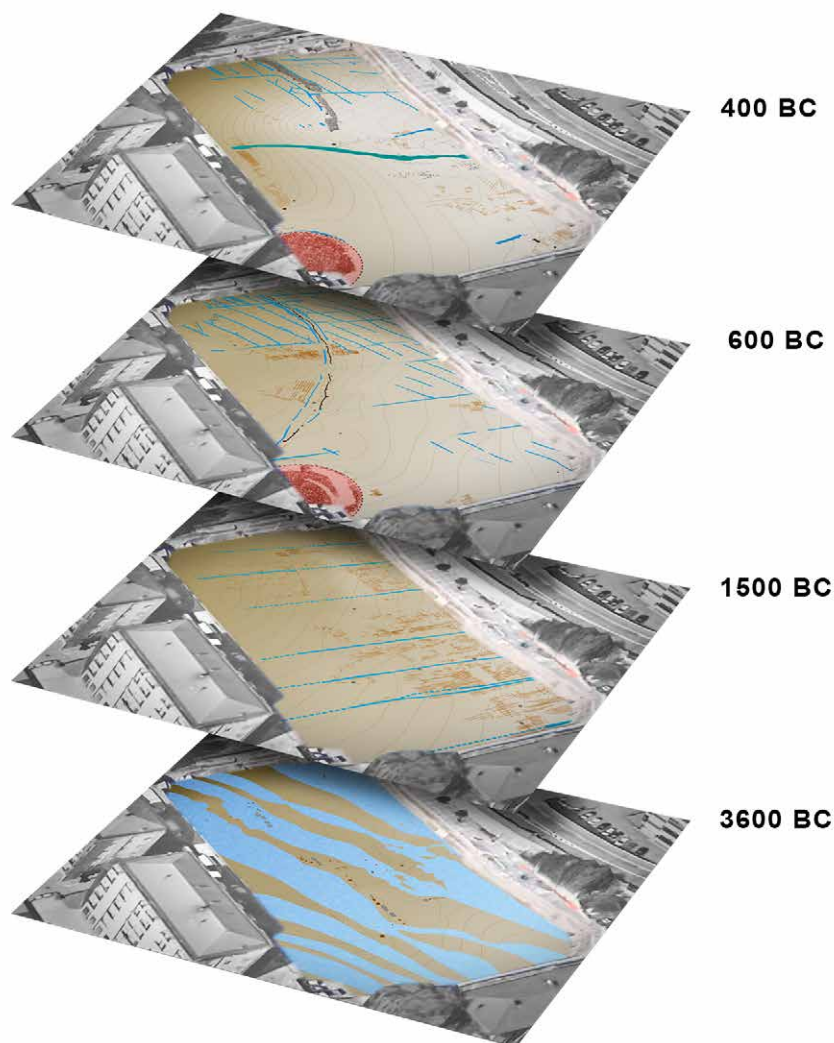
Figure 4. Hospital site. Reconstructions of some of the landscapes identified during the excavation: important archaeological elements (in red), traces of agriculture (in brown), irrigation channels and ancient streambeds (in blue) (Massimiliano Glarey for Akhet srl).

wide-scale archaeological stratigraphies, but also the documentation of the evolution of the complex rural landscape of the Aosta plain in a highly detailed manner. The various transformations imposed artificially by the primitive rural societies in this evidently instable valley-bottom environment often seem to represent the human response to the cyclical interference caused by episodic and calamitous natural events. In both cases the stratigraphical interpretations were supported by specialist sedimentological study, whilst only the hospital site has until now received associated bio-archaeological and radiometric analyses, with C14 dates broadly confirming the archaeological phasing of the site.

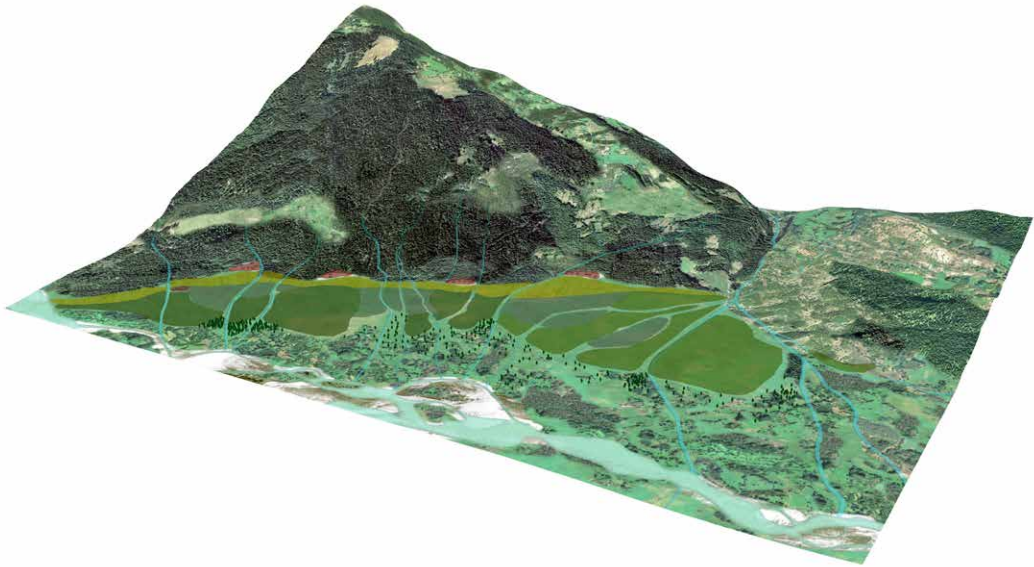MANAGING ARCHAEOLOGY IN DYNAMIC URBAN CENTRES

Figure 5. The reconstruction of the prehistoric landscape of the Aosta Plain deriving from the results of recent archaeological excavations (Daniele Sepio and Massimiliano Glarey for Akhet srl).

The extensive archaeological research undertaken in the Telcha urban central-heating program is of a very different nature to the other project described here. Rather than open-area excavations, it is based in narrow trenches of limited and variable depth, yet covering a notable proportion of the streets of the city and its suburbs; the trenches to date having covered a linear distance of over 5 kilometres. The archaeological documentation of these trenches has permitted a much more widespread reconstruction of the superimposed landscapes of the Aosta plain, being an essential and indispensable element of interconnection and control between specific ancient stratigraphies, in particular in the northern and western suburbs of the city. Here for example the archaeological interpretations of a series of relatively simple stratigraphical sequences have permitted the recognition of highly undulating natural landscapes characterized by relatively shallow but wide valleys, formed by the secondary torrents which have incised the mountainside to the north-west of the city; valleys made fertile and highly adaptable to agriculture by the continuous deposition of both colluvial and alluvial silts.

These valleys are divided by a series of previously unknown ridges, based upon the stony deposits of the ancient moraine to the west of the city and the delta of the Buthier torrent to the east. These raised areas were less easily adapted to agriculture, but found other uses in antiquity. For example they evolved into zones of settlement or necropoli, with the result that very important archaeological remains, in particular tombs, can find themselves in some areas very close to the modern street surface. The archaeological observation of the stratigraphy of the Telcha trenches, taken together with the important results of the two major excavation projects, have facilitated a much wider understanding of the evolution and dynamics affecting the ancient landscape. With the identification of other tumulus/zones of necropoli, and other examples of field-boundaries/irrigation

Figure 6. Telcha. The recovery of grave-goods (glass objects and a bronze mirror) associated with an early Roman cremation-burial; elements brought to light during the archaeological assistance for the installation of the central-heating conducts (Akhet srl).

channels, it has already been possible to extend the known landscape character and morphology evident in some of the more important chronological phases beyond the confines of the hospital site on the northern side of the city. Research into the Roman extra-urban landscape has benefited in particular from a series of new discoveries, permitting a more-informed reconstruction of the rural situation to the north and west of *Augusta Prætoria*.

3 From stratigraphy to archaeological strategy: thoughts around developing a methodology

The stratigraphical approach that has been applied to the documentation and interpretation of the ancient landscape during the previously-described and ongoing projects, and in particular to the reconstruction of the dynamics, both natural and anthropic, that have conditioned the various transformations of that landscape across the millennia, has greatly enriched the archaeological understanding of an ample portion of the Aosta Plain. At the same time the new data represent an instrument of analysis and of comparison that hopefully, in the long-term, can lead to the development of a predictive model in support of future urban infrastructural transformations across the city of Aosta. The observations made during the previously-described archaeological activities have allowed refinement of the strategy of intervention; an aspect already used during the more recent works of the *teleriscaldamento* project.

The first result has been the increased involvement of the private company Telcha in defining a strategy to support their future interventions, in particular to reduce the possible delays caused by what too often in the past were described as 'unpredictable

Figure 7. Telcha. An example of the installation of the rigid tubes of the Telcha project in Aosta (Akhet srl).

archaeological problems'. From the very beginning of the urban heating project an accurate mapping of the possible areas of archaeological 'interference' was made available, shared with the Telcha company and their project-staff. However it was immediately clear that for them, even in the context of a historic city like Aosta, the archaeological problem was to be considered only a minor element, secondary to the need to plan the passage of the long rigid central-heating conducts within what is in all-effects the labyrinth of modern underground services, mostly *in situ* already for many years, their locations frequently poorly mapped and even occasionally forgotten.

This absence of information and inadequacy of documentation obviously also impacted on the archaeological deposits, frequently already encountered and seriously compromised as in the cases of the ancient necropoli discovered under the road-surfaces during the Telcha project. As a result the executive phase of the Telcha project on-site became the principal moment when the validity of preliminary archaeological hypotheses were checked. This was based on the registration of previous discoveries in the archive of the local Cultural Heritage offices; a database in many cases devoid of the information

necessary to form an adequate assessment, an archive lacking important data regarding, for example, the real state of conservation, or of an actual continuing presence of the ancient remains themselves, frequently destroyed in the subsequent developments. Often the documentation of archaeological remains in Aosta did not have a precise geospatial reference,[1] and in many cases the most important information – the depth of remains below street level – was also lacking. As noted above, this information in particular is of fundamental importance in a zone strongly conditioned by an undulating ancient landscape like Aosta. This situation is invisible beneath the levelled modern ground surface of the suburbs: Roman tombs, for example, can be found at variable depths within the same zone. The western necropolis were found less than one metre below the street in one area, but less than 100 metres away were at a depth of more than 2.5 metres. Frequently it has been difficult to find useful archive information on situations encountered in previously-monitored interventions of the Cultural Heritage offices in which archaeology was not present.

Until recently such elements have reduced the possibility of following the horizontal extension of ancient landscapes hidden beneath the streets of Aosta. The archaeological research undertaken in the Telcha project has fortunately begun to change this situation and fill in some of the spaces in the documentary record, using the methodology of recording frequent stratigraphical columns at regular intervals along the length of the project's trenches. This has resulted in the documentation at a level of detail which can permit both the analyses of the archaeological materials encountered per layer and the eventual recognition and reconstruction of the principal archaeological horizons for each period. The stratigraphical reconstruction of the ancient landscapes of Aosta, gradually defined by the archaeologists during the ongoing work of the Telcha project, has been refined and evolved during the course of the project. It has changed from an initial phase in which archaeology was considered to be 'a problem to overcome', usually with pressure to conclude archaeological interventions in extreme rescue situations, to a second phase in which the archaeologist enters into a constructive dialogue with the representatives of the private company and their project co-ordinators, always under the scientific direction of the local Cultural Heritage office. This approach has permitted a shared and constant adaptation of project strategy, in particular looking to modify where necessary the depth of installation of the central-heating conducts or deviate minimally the direction of the trench, with the object of conserving the archaeological remains where they are known to be preserved, and consequently optimizing the work of the project.

For these interventions within a zone which has always represented a peripheral area – the suburbs of a city – the combination of a three-dimensional approach to the subsoil and in particular a correct analysis and interpretation of the use of the landscape in the different archaeological phases transform the reconstruction of the ancient landscape in a way which enables it to be used to predict likely archaeological outcomes in the future. The analysis of the use of the different parts of the ancient landscape, with for example raised areas of marginal terrain often being associated with settlement

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1   In recent years, Akhet srl has been involved in the reorganization of the archive system of the Soprintendenza of Aosta (Cultural Heritage offices) with systematic data input and revision of the topographical location of all sites and discoveries held within their archives; data pertinent to different chronological periods not always placed with precision. The work has been since utilized to create a new cartography of the city and its suburbs; work partially transformed in a GIS system (Framarin *et al.* 2011b, 77-83).

activity or cemetery, and low areas of easily irrigated fertile terrain being destined for agricultural use, permits the creation of a model. New archaeological data can be placed into this model as future projects take place – not only in these peripheral zones, but also inside the city itself, where pre-urban stratigraphical phases have already been identified but not fully understood, hidden by later developments.

4 Urban archaeology as a way to conciliate modern city development with social interest

The ongoing work briefly described in this article will continue to be developed and elaborated to create an ever more efficient analytical instrument, and furthermore it will be enlarged to incorporate the entire Plain of Aosta. This instrument will be used in a predictive way, in support of the planning and realization of future interventions with constant emphasis upon the protection of the ancient stratigraphy. The increase of detail will gradually allow the furnishing of risk-assessments for the various specific types of intervention which are more statistically-valid, even in contexts without evident archaeological value, utilizing interpolation of other known data.

In the light of the experience presented here, it is necessary to pause for reflection. Both in urban and extra-urban contexts, the rescue excavations have always been used as an instrument to improve the archaeological knowledge of a city or a territory, and also as an occasion to practice research. However the areas under consideration are frequently already compromised by previous infrastructure, in many cases lacking adequate archaeological documentation. The nature of the rescue activity, above all in the urban context, is determined in a major way by the type of infrastructure to be undertaken, frequently representing the installation of tubes, usually below busy street-surfaces. The rescue excavations, in the rare cases of finding archaeological remains in these conditions, inevitably signify a slowing-down of work, even when carried out by professionals working rapidly. This also means inevitably ulterior delays for the local population already disenchanted with works in the public domain. In these situations the archaeological works cannot be other than partial, with only rare possibilities to enlarge a trench to follow an important element.

Accepting this, there emerges the necessity to make a reasoned and ethically responsible choice to find the most appropriate way to address this type of situation in the urban context in the years to come, in particular in projects connected with the installation or substitution of subterranean conducts.

It would seem in fact opportune to proceed with the intent to preserve the archaeological stratigraphy wherever it is present, in particular in areas of most risk of discovery, using therefore the preceding archaeological knowledge to impose upon planners and executors of works an approach that delimits, where necessary, the depth of the installations so as not to disturb possible ancient remains where they are known to be conserved, even if only partially.

Looking to limit the quantity of future interventions in areas of guaranteed conservation of stratigraphy, would certainly help to direct vital economic resources, increasingly limited for archaeology, towards other less well-researched urban sectors where risk of unpredictable discovery is, by definition, inevitably greater. Alternatively these resources could be either directed towards the realization of projects of wider

amplitude and scientific value, or used in collaborations between the public and private sectors with the scope of illustrating the city's past to the modern citizen.[2]

The road ahead is not however without obstacles, but as happened in the case of the Telcha project in Aosta, this could be helped by conciliating private and public interests: on one hand the necessity for doing the work in rapid time in order to reduce the problems created for the city, on the other hand the archaeological desire for increasing knowledge to promote the public comprehension of our past.

Acknowledgments

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2   In the case of the Telcha project the collaboration between private and public sectors permitted the creation of a temporary exhibition of the results obtained, entitled 'Preventive archeology for the city of Aosta and the work for the urban central-heating project'. On this occasion were presented some of the important moments in the story of the city from prehistory to the present day, with an important public response, helping the citizen to understand the motivation for the project, placing the new discoveries within the same streets in daily use.

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Exploring the archaeological potential of the Esquiline hill in Rome

Valeria Boi

Abstract

The Esquiline hill, located in the South-East sector of Rome's historical centre, was a peripheral area of the ancient city: in the Republican period it was the site of largest necropolis of Rome, and it was later redesigned by the Imperial *horti*. The landscape of this district was dramatically altered in the aftermath of the Unification of Italy, when a regular urban layout completely erased the ancient morphology. Using an Archaeological Information System, a wide range of documents has been organically archived and connected in order to reconstruct the transformations of the Esquiline landscape. An altimetric and cartographic database has been created, comparing the results of excavations, altimetric data, iconographic and cartographic sources. The outcome is a map of the archaeological potential of the area, which can be used for locating its preserved archaeological deposits and for directing future archaeological surveys, preventive archaeology and town planning.

Keywords: Rome, Esquiline, archaeological potential, historical cartography, town planning.

1 Introduction

It is well known that the destruction resulting from the Second World War and the reconstruction which followed had a deep impact on European cities. It was necessary to completely rebuild all those buildings which had been damaged. The consequences of these reconstructions cannot be compared with any in the previous centuries. These intense building activities posed for the first time in the conscience of the Europeans the problem of the protection of the archaeological heritage which was emerging from the construction sites. It became necessary to develop regulations and procedures which, with minor modifications, are still in force today.

The urban transformations of the previous centuries are instead less known: we have fewer systematic records, which are more difficult to incorporate into modern

methodologies of archaeological documentation. In this respect, a peculiar case is represented by the Esquiline neighbourhood, located in the south-eastern sector of Rome's historical centre. This multi-stratified area is characterized by a continuity of occupation, spanning from the mid-ninth century BC to the present day. Today the area is fully developed and has an orthogonal urban layout, laid down immediately after Rome was proclaimed Capital of Italy, which dramatically altered the original morphology of the hill.

The Esquiline has been selected as case study for a PhD thesis aiming to compile a predictive map of its archaeological potential. The complex morphology of the area and the deep urban transformations make the Esquiline a perfect case study to verify the potentials of a map showing the location and the state of conservation of the archaeological deposits.[1] The aim of the map is to represent the complexity of the stratigraphy, while creating an easy accessible tool allowing the available data to be 'read', and to provide a reliable overview of the preserved archaeological deposits when planning any interventions which have an impact on the buried deposits. [2]

2 The archaeological potential in urban areas

Predictive modelling of archaeological potential began to be used in the late 1970s for identifying the locations of ancient sites, and is used both in archaeological research and Cultural Resource Management (CRM). Predictive maps in academic projects emerged from the tradition of processual archaeology, and are aimed at exploring potential areas for future research, helping to predict the location and density of archaeological sites. In CRM they are adopted by Heritage agencies and public administrations as a tool for optimizing the protection of archaeological remains prior to development activities (Kamermans 2011, 9; Verhagen and Whitley 2012, 49-50; Van Doesburg *et al.* 2017; for the Italian framework, see Serlorenzi and Boi 2013).

Sometimes the archaeological potential is wrongly mapped in relation to the archaeological risk, but there are significant differences between these two instruments that must be emphasised: the archaeological potential of a given area reflects the probability that archaeological remains may be preserved underground (Arnoldus-Huyzendveld and Citter 2014; Calaon and Pizzinato 2011; Guarnieri 2000; Hudson 1981). It is a permanent feature of a specific area which does not change until the stratigraphic context is altered. The archaeological risk, instead, is a contingent element, which changes in relation to the features of the underground modifications (Malnati 2011). If the archaeological remains are 3 metres below street level, the archaeological potential will always be the same, but the risk will change depending on the depth and characteristics of any required excavation works: the risk is higher when the depth is closer to 3 metres, but lower if it is shallower. New discoveries or, on the contrary, the destruction/removal of any archaeological remains will lead to a change of the archaeological potential of the area.

In contrast to studies mapping extensive extra-urban territories, the evaluation of archaeological potential in urban contexts requires detailed, high-scale reconstruction

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1   Phd Thesis defended at the University of Sassari in February 2016: 'Dall'archeologia della città all'archeologia per la città: il ruolo del potenziale archeologico nel progetto della città moderna. Il caso dell'Esquilino a Roma'. Open Access at: http://eprints.uniss.it/11223/.

2   The effects on the archaeological remains of the nineteenth century urban transformations was recently examined, from a slightly different perspective, by Bouwmeester *et al.* 2017, analysing the case of the Netherlands.

(Van Doesburg *et al.* 2017). Furthermore, the modern city often overlaps the ancient one, the presence of which is generally well known. The unknown factor, in this case, is not whether ancient sites are present, but the state of preservation of already known archaeological sites. If the areas have been recently intersected by deep excavations, it is possible to hypothesize that the archaeological stratigraphy is partially damaged or completely destroyed. When dealing with a city extensively investigated and documented by ancient sources, such as Rome, the issue it is not only to identify what is hidden underground, but rather how, where and why it is preserved or not.

3 Topography of the case study area

Rome city centre, a UNESCO World Heritage Site since 1980, extends over an area of approximately 14 square kilometres. It is crossed by the Tiber River and surrounded by the Aurelian walls, built between 270 and 275 AD (Fig. 1); within this area, starting from the eighth century BC, the earliest nucleus of the city developed and grew for centuries. Despite the significant contraction of the city in the Middle Ages, the Papal and the Renaissance city reused spaces, buildings and materials of the ancient one; from the fifteenth century the Popes promoted the first great expansion of the city (Spagnesi *et al.* 1992). The area within the walls saw its deepest transformation during the last thirty years of the nineteenth century, when Rome became the capital of Italy (Insolera 1962). This area thus contains some of the most complex urban stratigraphy in Europe, and requires specific strategies for managing its archaeological heritage, which is constantly threatened by the expansion of the contemporary city.

The case-study area is located in the south-eastern part of the ancient city and it corresponds roughly to the modern Esquiline District. The area remained uninhabited and almost undeveloped until modern times. During the Roman period, between the age of the Kings and the Republican period, it was a peripheral area, where the earliest and largest necropolis of Rome was located (Albertoni 1983). Later, during the Imperial age, it was occupied by aristocratic properties and notably the renowned *Horti Lamiani*, originally owned by Lucius Aelius Lamia who left them to the Emperor Tiberius, thus becoming part of the Imperial properties (Cima and La Rocca 1986; Cima and Talamo 2008; Hauber 2014).

After the fall of the Roman Empire, the Esquiline hill remained outside the new medieval city, which was mainly located in the valley near the Tiber and in the Vatican area. Until the second half of the nineteenth century, the Esquiline was an almost deserted area, occupied by convents, orchards and vineyards, as depicted by Nolli's map of Rome, dating back to 1748.[3] After the Unification of Italy, in 1871, this area became an 'Eldorado' for the real estate companies, due to its position quite close to the monumental centre and because it was basically undeveloped. In a few decades it was completely transformed into a new neighbourhood intended to house the officials of the new Italian State. By the end of the nineteenth century, the Esquiline was entirely occupied by a regular pattern of

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3   See the Histrical GIS project promoted by CROMA Lab of RomaTre Uiversity, accessible under registration, which offers a interactive, Hi-Resolution digital version of the Nolli map: http://croma.uniroma3.it/?contenuto=HGIS. A Open access interactive version of the map was published by the University of Oregon: http://nolli.uoregon.edu/map/index.html (Last consulted 4/4/2018).

Figure 1. Map of the case study area.

house blocks, as shown in the development plan map approved in 1883 (Pisani Sartorio and Quilici 1983).[4]

Today, the Esquiline is an intensively inhabited residential district, exposed to massive infrastructural interventions which affect the subsoil by intercepting the archaeological levels, as well as structural alterations to buildings through programmes of maintenance and restoration. Therefore this case study can effectively illustrate some of the problems associated with archaeological heritage management in a highly dynamic urban context, in which both the gradual overlapping of the previous cities and the removal of archaeological stratigraphy during the modern era must be taken into account during the evaluation of the archaeological potential.

4 The archaeological excavation in the Esquiline District

The main sources for the archaeological map of the case study area are the archaeological investigations: as mentioned above, the nineteenth-century excavations are particularly relevant both for their number and their extent. The main record of these excavations is represented by the *Giornali di Scavo* (Excavation reports) and by the publications edited by the engineer Rodolfo Lanciani, one of the key figures in the archaeology of Rome of that period. At the end of the nineteenth century, Lanciani became the secretary of the *Commissione Archeologica Municipale di Roma* (Archaeological Commission of the Municipality), which had been specifically created to systematically record the evidence brought to light during the excavation works for the development of new neighbourhoods

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4   http://www.archiviocapitolino.it/files/archivio/ripartizione_v_lavori_pubblici_-_piano_regolatore.pdf
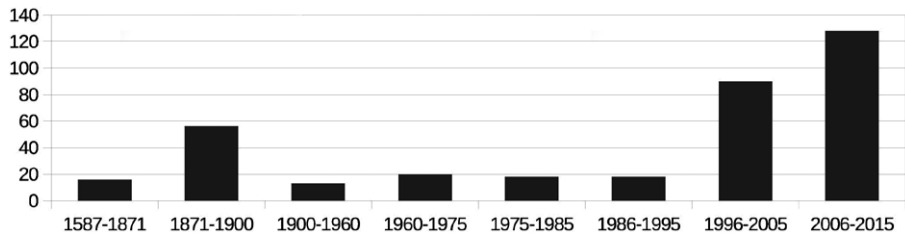   (Last consulted 4/4/2018).

Figure 2. Graph of the archaeological excavations per period in the case-study area.

(Palombi 2006). These crucial records, not always reliable when it comes to the spatial representation of the evidence, must be supplemented by more recent publications of specific sites, which have been critically revised in the last few decades (Giatti 2007; *Ead.* 2010; Barbera *et al.* 2010; Hauber 2014). More investigations have been carried out, especially since the early 1990s – following the Valletta Convention – when a specific provision of the urban planning regulation imposed mandatory archaeological assistance for all excavations carried out in the municipal area. These investigations are mostly of limited extent, but provide precious data because of the higher precision of the collected evidence. This can then be integrated with the more extensive, but also more inaccurate, data from the nineteenth-century excavations. Last but not least, one must take into account the recent investigations carried out for the construction of underground levels for existing buildings (Fig. 2). These brought to light new evidence from extensive areas, mostly regarding the Imperial phases of the *Horti* located in this sector of the city (Barbera *et al.* 2010).[5]

5 Historical maps and urban transformation

Because of the radical transformation of the Esquiline district in the last two centuries, one of the challenges in the data collection is the correct spatial representation of the identified evidence. This has required the use of a GIS, allowing a careful comparison between the modern maps and the earliest graphic documents. The historical maps are, in fact, the main evidence for understanding of the surviving evidence of the pre-modern urban layout. Rome in particular is a perfect experimental field since it was extensively documented by numerous artists and architects at different points since the Renaissance, thus creating an invaluable source of information (Frutaz 1962; Lugli 1998; Travaglini and Lelo 2013). Before the eighteenth century the only available views of the city are 'birds-eye' representations. The first geometrically correct map is dated to 1748, when Giovanni Battista Nolli drew the first map of the city based on a solid trigonometric grid, which can still be correctly overlapped onto the modern cadastral maps. This map (Fig. 3) is one of the most important cartographic documents for Rome, and because of its accuracy was used as a basis for the cadastral map of the Papal States, the *Catasto Pio Gregoriano*.[6] Nolli's

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5   See the Histrical GIS project promoted by CROMA Lab of RomaTre Uiversity, accessible under registration, which offers a interactive, Hi-Resolution digital version of the Nolli map: http://croma.uniroma3.it/?contenuto=HGIS. A Open access interactive version of the map was published by the University of Oregon: http://nolli.uoregon.edu/map/index.html (Last consulted 4/4/2018).

6   http://www.cflr.beniculturali.it/Gregoriano/gregoriano_intro.html (Last consulted 4/4/2018). See also Travaglini and Lelo 2013.
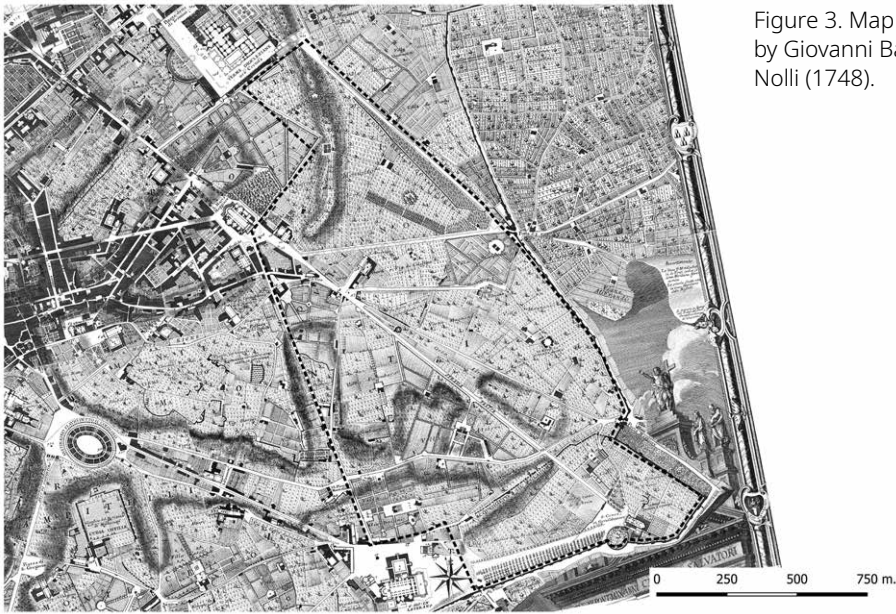
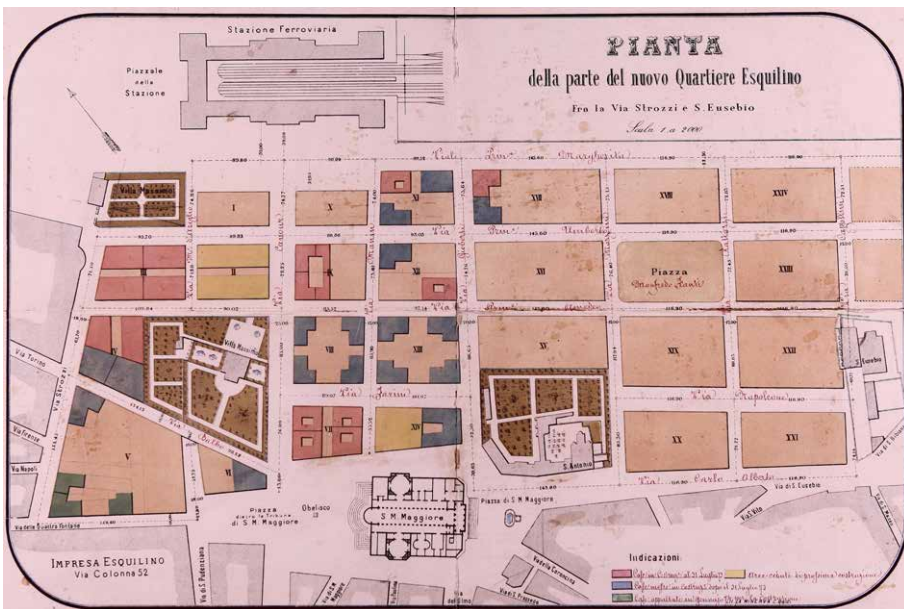Figure 3. Map of Rome by Giovanni Battista Nolli (1748).

Figure 4. Map of the North-west sector of the Esquiline from a development plan map drawn in 1873 (Archivio Storico Capitolino, Inv. 2856).

map allows us to assess the radical transformation of the Esquiline district, which in the nineteenth century was still occupied by vast gardens pertaining to convents and private properties. This was what the surveyors saw when they recorded the archaeological discoveries. But this also explains why it is so difficult today re-locating their drawings,
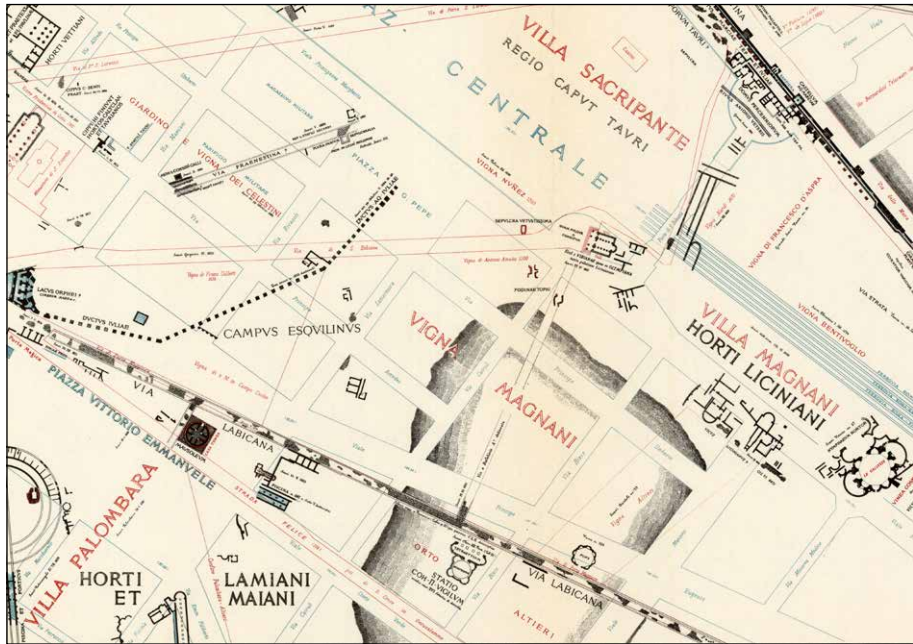
Figure 5. Lanciani's *Forma Urbis Romae* (table 24, detail). The nineteenth century city is drawn in red, the limits of the new blocks still under construction in blue, the ancient buildings in black.

since the relatively empty landscape of the time was subsequently transformed by the orthogonal grid of the blocks then under construction.

Often the surveyors of the Archaeological Commission – lacking accurate topographical references – described the location of the finds in their excavation reports with reference to the pegs delimiting the new roads under construction. These were placed at the vertexes of the Cartesian axes laid for the development plan approved in 1873 for the expansion of the city. The maps of the new neighbourhood under construction, held by the Historical Archive of the Municipality of Rome are another important cartographic resource which has been uploaded in the topographic database (Fig. 4).

Rodolfo Lanciani was the author of the most renowned map of that time: the *Forma Urbis Romae*, published between 1893 and 1902, immediately after the excavation works. Lanciani tried to organically expose the incredible number and complexity of the archaeological findings, with maps featuring multiple information layers, creating an *ante litteram* GIS. In his map, he included both the 1700s city, still visible at his time, and the emerging neighbourhood layout according to the new development plan (Fig. 5).

Lanciani's map also provided extensive detail on the archaeological evidence. The finds are often annotated with the years of the excavations, and sometimes also with their depth. Furthermore he also showed the evidence discovered during the non-systematic excavations of the previous centuries, supplied with a reference to the source. Some absolute elevations are also reported, either for the eighteenth-century finds or for those uncovered during the construction work that was then ongoing. This means that it is possible to quantify the considerable ground level modifications which resulted from

the new development plan. The attempt to integrate different evidence – often deriving from heterogeneous documents dated to earlier centuries which used different criteria to represent that evidence – generates many inaccuracies. These need to be known and understood when adopting the *Forma Urbis* as a topographical tool. Another factor in the lack of accuracy for which this document is blamed by modern scholars is the way in which Lanciani depicted the co-existence of two urban phases, one of which was still 'virtual' when the map was being drawn.

Many of the ancient structures represented by Lanciani were subsequently completely demolished, as it is also attested by the field reports of the time, therefore his map often represents the only evidence of a substantial portion of the archaeological finds for the Esquiline necropolis or the pavilions of the imperial *horti*. Another resource that allowed to integrate, and often mend, Lanciani's topographical inaccuracies is a little known corpus of maps, housed today in the *Archivio Disegni della Sovraintendenza Archeologica Comunale* (Archaeological Data Archive of the Municipal Superintendency of Rome – SBCAD), unfortunately showing only a portion of the case study area. The corpus encompasses 20 maps supplied by a general map (SBCAD, Invv. 2481-2500). It represents the archaeological evidence uncovered in each of the areas, framing it within the limits, drawn with a simple contour line, of the city blocks under construction. Clearly the map has been drawn at the same time of the one by Lanciani, but it is way more accurate when it comes to the representation of the archaeological evidence. The built up features are classified according to the building techniques, and the floors according to the revetments, using different colours codified in the legend. Even if there is no reference to the authors of the maps or to the time when they were drawn, it is possible to identify them with those commissioned to the architect Costantino Sneider by the Archaeological Commission; they were probably also used by Lanciani himself for his *Forma Urbis* (Palombi 2006, 164).

Sneider's maps are often referred to in topographical research on the Esquiline and in particular by those trying to reconstruct the nineteenth-century excavations. The first, who found them in the archive where they are still housed today, was Giovanni Pinza (1914): using these maps he was able to topographically frame some sectors of the Esquiline necropolis. Later Sneider's maps have been used to integrate the available evidence of the structures attributed to the *Horti Lamiani* for the exhibit opened in 1986 at Rome. In the catalogue of the exhibit a reconstruction map is included featuring evidence both from Lanciani's and Sneider's maps (Cima and La Rocca 1986, pl. 2). In more recent studies these maps are often referred to using previous works, hypothesizing that the original maps are now lost (Menghi, Pales 1999; Giatti 2007).

The maps are extremely important for locating the nineteenth-century excavations. They are very accurate, which was confirmed when the maps were georeferenced using the vertexes of some city blocks as control points. It was thus possible to highlight the difference between the drawn limits of the city blocks and the real ones; but at the same time a simple roto-translation, made to minimize the risk of the deformation of the original paper support, allows the accuracy of the representation of the archaeological evidence to be appreciated. Most likely the surveyor drew the map in a time close to when the actual excavation happened and was able to use, if not a first-hand drawing, primary information as the level of detail in the characterizations of the archaeological features testify. This accuracy is furthermore evident in the perfect correspondence of scale between Sneider's maps and the same archaeological evidence recorded in modern

Figure 6. Map of the Esquiline drawn by Costantino Sneider, detail of table 24 representing the pylons of an aqueduct, probably the *Aqua Iulia*; overlay with the archaeological map of the area.

Figure 7. On the right: map of the Esquiline drawn by Costantino Sneider, detail of table XVII (SBCAD 2497) representing part of a building pertaining to the *horti Lamiani* overlapping the same structures brought to light during an archaeological excavation in 2011. On the left: the same structures as they are represented in Lanciani's *Forma Urbis* (TABLE 24).

times. This can be easily seen if we try to compare the structures he represented and the recently-found archaeological evidence: for example in some pillars of an aqueduct, probably the *aqua Iulia* (Fig. 6), or in some structures of the *horti Lamiani*, for which the representation proposed by Sneider corresponds perfectly to that obtained after a recent excavation which brought to light again the same structures. Lanciani's representation, on the other hand, has problems both in scale and position (Fig. 7).

Some of the excavations recorded by Lanciani do not appear on the map. This suggests that Sneider's work took place in a limited time-frame and he did not witness the end of the construction period. In addition the matching of some details suggests that Lanciani used Sneider's work for his general maps, notwithstanding a certain degree of simplification due to the smaller scale in his representation, as already suggested by Palombi (2006, 164). The comparison between the two different representations of the very same feature indicates sharp differences between the two maps: Sneider shows exclusively what was brought to light, offering a representation as exact and accurate as possible, using probably the first hand drawings and descriptions made by the excavators. Lanciani, instead, aims at building a wider informative territorial basis: he represents not just the finds occurred while he was Secretary of the Commission, but also those brought to light in the previous years, starting from the sixteenth century, sometimes merging them with daring reconstructive hypothesis and hence introducing various inaccuracies to the maps themselves.

All maps, digitalised and geo-referenced, were uploaded in GIS. For the geo-referencing, a 'regressive' method was adopted (Lelo and Travaglini 2006): each map was geo-referenced starting from the one immediately preceding in time. This made it easier to identify those topographic details which remained unchanged between the two representations, and these were used as ground control points. It was then possible to go back from the present cadastral map, through the urban development plans and the 1800s archaeological maps, to the Nolli's map showing the area before urbanization.

6 Data processing and the archaeological map

Within the data collection phase, 349 interventions (excavations, surveys, etc.) were catalogued, for a total of 1150 archaeological finds, distinguished by chronology and function. To undertake this task thoroughly it was decided to adopt the database of the Archaeological Territorial Information System of Rome (SITAR) designed by the Archaeological Superintendency of Rome, the peripheral Office of Italian Ministry of Culture in charge of archaeological heritage management and protection in the territory of the Italian capital. The SITAR web portal, which can be freely consulted online, represents an extremely effective tool for assessing archaeological risk before any excavation and construction work, allowing urban development and archaeological heritage protection to be reconciled. [7] SITAR uses an extremely flexible data recording system, designed for storing heterogeneous information, which make it possible to describe the main elements related to the chronological-functional characterization, location and conservation status (Serlorenzi *et al.* 2012). These minimum data are generally available both for previous discoveries and for new acquisitions, and allowed to carry out some reflections about the quality of the data and to elaborate an archaeological map of the area, from which it has been possible to develop a map of archaeological potential (see below). The results of the research are extremely positive, but they are affected by the lack of homogeneity in the documentation. This is shown by the graph illustrating the position accuracy (Fig. 8): almost one-third of the structures can be georeferenced only approximately, and only future investigations will allow a better result.

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[7]   http://www.archeositarproject.it/ (Last consulted 4/4/2018). SITAR started in 2007 under the Scientific Direction of Mirella Serlorenzi.

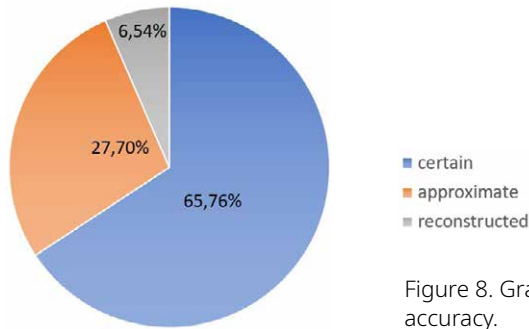MANAGING ARCHAEOLOGY IN DYNAMIC URBAN CENTRES

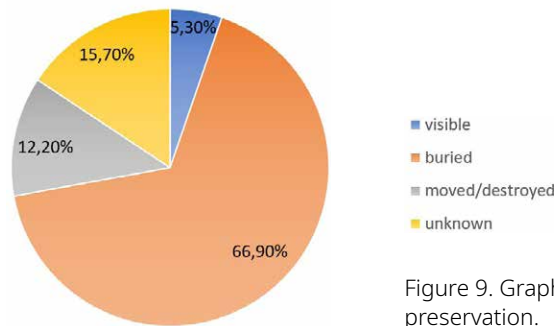Figure 8. Graph illustrating the position accuracy.

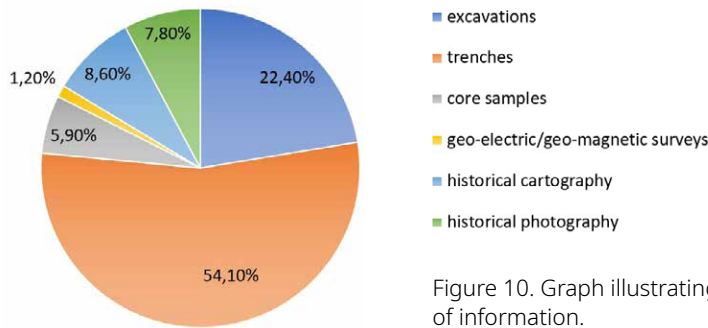Figure 9. Graph illustrating the state of preservation.

Figure 10. Graph illustrating the source of information.

Another interesting aspect of the research concerns the state of preservation of the structures (Fig. 9): only a very small minority of the Esquiline archaeological evidence can still be seen today, while more than 10% was destroyed or removed after excavation, both in the nineteenth-century works and in recent excavations. The vast majority of findings was buried after excavation. For this reason we cannot judge the real condition of a significant percentage (12%) of the archaeological remains until new excavations will take place in the same areas.

Although the quality of the documentation produced in the last decades of the nineteenth century means that it is not always possible to determine exactly the extent of the individual excavations, the examination of the plan of the remains makes clear how the whole district was investigated extensively in those years. In fact, the excavations of the nineteenth century affected large unbuilt areas delivering well preserved contexts,

Figure 11. Two images of the Church of S. Antonio (on the right in the first photo, from Becchetti *et al.* 1977) showing the modification of the ground level.

and are thus much more readable on the topographic map. In contrast the twentieth-century excavations concerned a few strips of land left free from the buildings – usually streets and courtyards – subject to preventive excavations during urbanization works, through trenches or trial excavations of limited size and depth.

More than half of the information comes from trenches, namely recent underground utilities, but a significant percentage of information comes from historical cartography, such as the examples noted in section 5 above, or from historical photographs (Fig. 10). The historical photographs in particular, enable the comparison between the past and present situations, especially for the ground level modifications, underlining in some cases the considerable lowering of the ground level between the nineteenth and twentieth centuries (Fig. 11).

A key element of the research is represented by the arrangement of the altimetric data. The data recording system provided by SITAR has been customised in order to adapt it to the specific needs of this research: cadastral or GPS data, today used in all archaeological reports and recorded in SITAR, are always comparable to each other. Therefore it is sufficient to archive the altitude above sea level, in order to have a reliable picture of the real situation; the examination of the altimetric data from the nineteenth-century sources, carried out through the comparison of the absolute altitudes attributed to points that remained unchanged, made it possible to highlight how the altitude above sea level adopted at the time have a difference of several metres from the present day. Moreover, this difference is not homogeneous across the case-study area and is difficult to relate to the levels of archaeological stratification. In addition, the maps showing elevation data above sea level are not even comparable with each other. In order to keep the raw data, and to be able to compare them with new evidence, it has been chosen to store

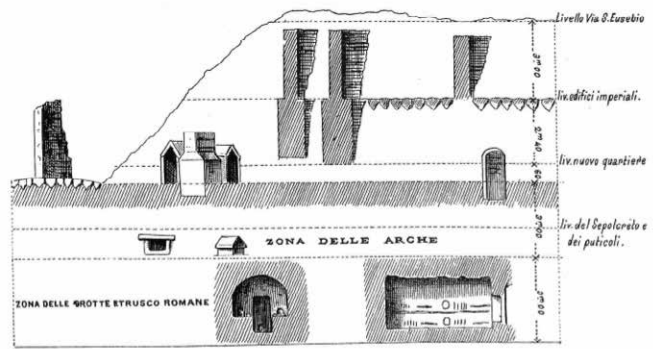MANAGING ARCHAEOLOGY IN DYNAMIC URBAN CENTRES

Figure 12. Section drawn by Rodolfo Lanciani, where the ground level of the new district ('liv. nuovo quartiere') is placed 5.4 metres below the nineteenth century street level, via di S. Eusebio (from Lanciani 1875, tav. XX).

both absolute and relative data, and recalculate them only when it was possible, always specifying the source.

The case-study area, which is now characterized by a slight slope, had in the past a highly articulated morphology and a strong slope from NW to SE. To allow the construction of the regular city blocks of the new district, the hill was systematically cut almost horizontally, thus destroying hundreds of ancient structures and moving hundreds of cubic metres of archaeological stratification. The strategy chosen for the construction of the district is clearly depicted by a section drawn by Rodolfo Lanciani, where the ground level of the new district is placed almost 6 metres below the level of the nineteenth-century street (Fig. 12).

7 The archaeological potential map

The mapping of the archaeological potential of the subsoil, which constituted the final step of the research, represents an attempt to use the collected data – which is heterogeneous and not necessarily coming from archaeological sources – to broaden the cognitive framework of this urban area and to create a useful tool in support of Cultural Heritage protection, to help assessing the archaeological risk. A better knowledge of buried archaeological structures and sites, in fact, helps planning urban transformations by taking into account in a better way the extent of the risk and avoiding the increase of costs and execution delays due to the unexpected modifications of development projects.

With the aim of reconstructing the altimetric transformations of the case study area, elevation points in the database have been distinguished on the basis of the archaeological evidence to which they refer: levels of arbitrary destruction, ground-levels and floors, foundations, and natural soil. Although not distributed homogeneously in the case-study area, these data have been extremely useful for providing information about the consistency and state of conservation of the buried stratigraphic deposit and therefore, in perspective of the archaeological potential: where a consistent lowering of the ground level is recorded, the ancient structures are preserved only at the level of foundations. On the other hand, where the archaeological remains are located at greater depth, we may assume that they are probably in a better state of preservation, or at least the

archaeological deposit has not been altered by contemporary anthropic action. In some cases this is because the ground level of the contemporary city has been artificially raised.

Even more precise elements for the evaluation of archaeological potential are obtained from the association between the altimetric data and those relating to the chronology of discoveries. In some areas the stratigraphic sequence is intact from post medieval phases until the natural soil. In other sectors the levels related to the most ancient phases of occupation are the only ones preserved, just below the contemporary level. In some cases, not even these are preserved, demonstrating the total loss of the archaeological stratification due to the anthropic action of the last 150 years (areas with no archaeological potential; the '*aree depotenziate*' in Hudson 1981). Moreover, the depth at which the ancient ground levels (floors, streets, etc.) are attested is important not only for archaeological protection purposes, but also for reconstructing the evolution of the landscape over the centuries, and it can be also seen by an historical-archaeological knowledge perspective (Fig. 13).

The elevation data relating to archaeological remains are not homogeneously distributed, so evaluation is more reliable in the areas in which there are a great number of excavation and elevation data; consequently the model will show the ancient landscape with good approximation. In other cases, the low density of high-quality data reduces the reliability of the model both for archaeological interpretation and protection purposes.

As already mentioned, although the inconsistency of the data means that the proposed reconstruction can be considered merely indicative, the map of the depth of archaeological remains can give some suggestions about the archaeological potential of the Esquiline area. The intensity of the nineteenth-century destruction had often suggested the presence of vast areas in which the ancient stratigraphy had been completely erased, where it should have been impossible to collect new data. Indeed, in some areas the medieval and Renaissance phases did not survive, although they are mentioned by historical sources, while Roman age levels have been preserved everywhere, though at different depths. In the highest part of the Esquiline hill, the archaeological remains are almost emerging from the present ground level, as recently confirmed by some excavations that brought the Roman structures to light again during the resurfacing of some streets. At the same time, following the gradual slope towards SE, the depth of the archaeological findings increases remarkably (Fig. 14).

By overlapping the archaeological resource map onto the depth map, it can be seen that most of the ancient structures were found in the highest part of the slope of the hill (Fig. 15). In the south-western slopes of the hill, the situation is extremely different: the findings are extremely sporadic, mainly isolated monuments depicted in historical cartography which are often already documented by the nineteenth-century excavations. This representation seems to show that these monuments still emerged after the end of the Roman Empire. Here the nineteenth-century earthworks did not lower the ground level, but raised it, in order to level the area before the construction of the new buildings; so the pre-existing archaeological structures were demolished in their emerging parts, while the buried remains were definitely sealed. So, paradoxically, the map confirms that the archaeological potential of the Esquiline area is greater in the sector of the hill where at present the finds are scarcer and less densely documented, while on the top of the hill – in which the majority of already known archaeological remains is located – only a few traces of the past phases are preserved and the possibility of making new significant discoveries is lower.
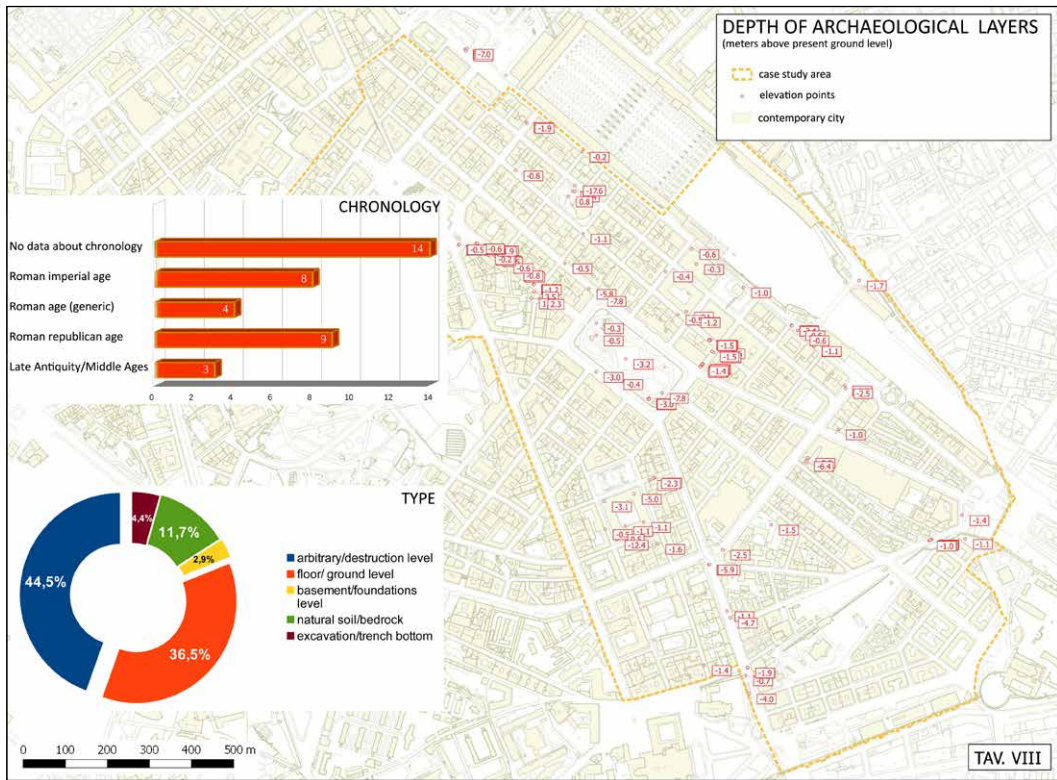
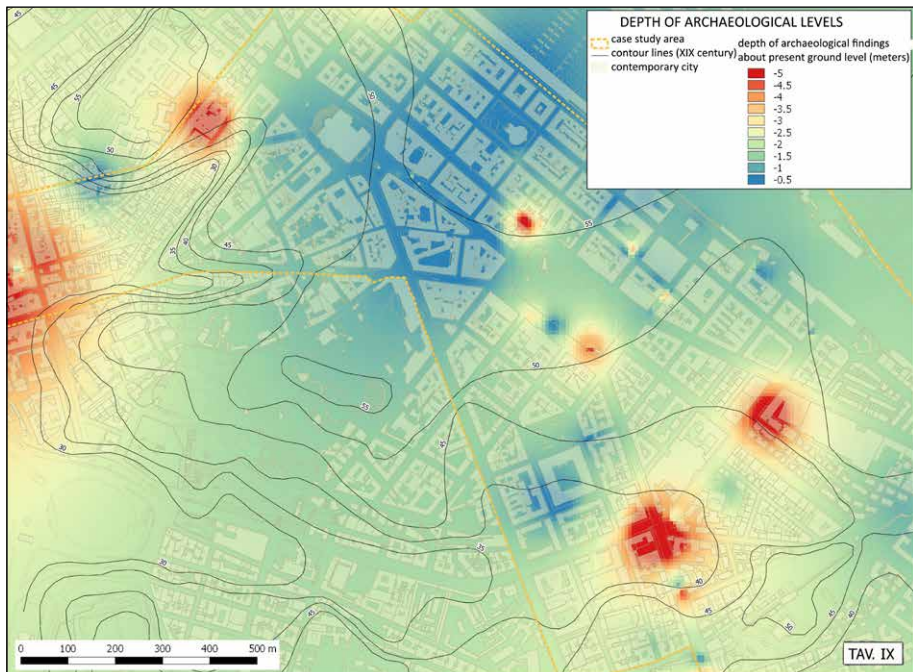Figure 13. Altimetric data.

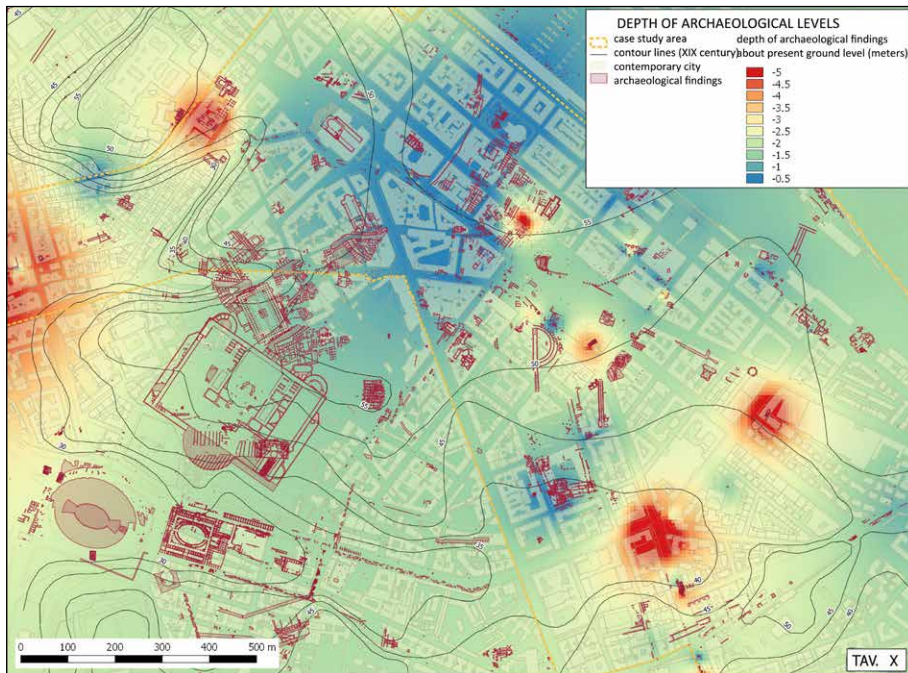Figure 14. Depth of the archaeological level in the Esquiline hill.

Figure 15. Depth of the archaeological level and archaeological map in the Esquiline hill. It is important to stress that the two areas where the deepest depth is highlighted, the red ones in the map, are related to recent excavations where archaeological evidence has been identified about 5 m below the contemporary ground level.

8 Conclusion

The realization of a 'predictive' map of the archaeological potential (see section 2 above), which was the initial objective of this research, had to deal with two main issues: the data quality and the main use of the final map – namely the protection of archaeological remains during urban development projects. The first point has already been discussed in sections 6 and 7 above, below the second issue will be discussed.

It is worth starting from one of the most well-known definitions of the aims of a predictive model: 'to predict the location of archaeological sites or materials in a region, based either on a sample of that region or on fundamental notions concerning human behaviour' (Kohler and Parker 1986, 400). Following this statement, Verhagen and Whitley (2012, 52-53; see also Verhagen 2007, 14) apply the term 'predictive' only to models which 'result in the quantitative estimate of the probability of encountering archaeological remains outside the zones where they have already been discovered in the past'.

Thus, we can say that the map of the depth of the archaeological deposits does not constitute a predictive model in the strictest sense: it does not match with this definition both for its extension (the case study area is relatively limited, about 1.5 square kilometres) and its content. This is because its specific purpose is not to suggest the presence of archaeological remains in non-investigated areas, but rather the location and state of preservation of already known archaeological remains. As noted above, the Esquiline hill was extensively investigated in the past and its monuments and historic-archaeological

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framework are well known. Thus the main questions that need to be answered are how the post-depositional alterations, notably the urban transformations of the last 150 years, have influenced the archaeological levels, and which are the best strategies for the protection of the underground archaeological heritage in this context.

On the other hand, predictive models applied to archaeological risk assessment have been often criticized because of their lack of spatial resolution. It has been concluded that if the map scale is too small, as is the case with studies undertaken on a regional scale, then they are not suitable for archaeological risk assessment (Kamermans 2011, 10; Van Doesburg *et al.* 2017, 159). Another critical aspect which has been pointed out is the fact that the models do not take into consideration the complexity of archaeological record (Kamermans 2010, 273). It is not by chance that in many European countries predictive models are not adopted as a risk assessment tool in territorial and urban development plans (Brandt *et al.* 2005; Carozza *et al.* 2005; Verhagen and Whitley 2012). In the Netherlands, on the contrary, predictive modelling applied to CRM has a long tradition and plays a vital role in the development policies, from national to municipal level. Since 2008 the responsibility for the production and management of archaeological policy maps has been completely assigned to municipalities (Van Doesburg *et al.* 2017, 156-158).

There were experiments with Italian archaeological potential maps applied to CRM between the 1980s and the 2000s in some Northern regions of the country: Lombardia (Brogiolo 1984), Veneto (Calaon and Pizzinato 2011), Emilia Romagna (Guarnieri 2000; Cardarelli *et al.* 2001; Gelichi and Librenti 2011; Malnati 2011), Toscana (Francovich, R. *et al.* 2001; Anichini *et al.* 2013).

These experiments were all based on the archaeological map of the case study area, which represents a simple summary of all known information. Also, they were all the result of a collaboration between Universities, commercial archaeology companies and Superintendencies to realize a tool aimed to help urban planning policies. In general they are all measures put in place in favour of public local authorities (Municipalities, Provinces, Regions), to support the collaboration between all the institutions involved in landscape management.

Their specific aim made them archaeological risk assessment maps, making it possible 'to measure the quality and quantity of what was still conserved' in the subsoil of the cities (Gelichi and Librenti 2011, 25). Thanks to these maps, it was hoped to go beyond the limits of the simple archaeological maps, usually made of randomly collected data, adding surveys and information specific to the aim of the map, giving the possibility to evaluate both the chance to gather new archaeological data and the archaeological value they can have, in terms of information quality and exploitation perspective (Gelichi and Librenti 2011, 25).

This new approach moved from Martin Carver's experiences in Europe (1983; 2003) and the study by Peter Hudson in Pavia, Italy (1981). These maps are called archaeological risk or potential maps, with a 'high predictive vocation' (Milanese 2001, 25), qualifying themselves as a tool to predict, at the high scale required by urban development, the consequences of excavations and to support urban planning. Unfortunately these tools are yet to be widely used by local authorities, who often prefer traditional archaeological maps, where no depths are usually recorded; however these are completely insufficient for a truly well planned archaeological resources management (Azzena 2004).

This study of the Esquiline district is inspired by these experiences. The analysis of all the archaeological information (depth, position, typology, chronology) gives a first idea of what will be found in a given area, in a word its archaeological potential (Fig. 15). As the map of the depth of the archaeological deposits represents interpolated information, for a valuable assessment of the risk it is necessary to associate it with the consultation of the altimetric database, containing all the raw data collected, allowing the operator to precisely evaluate the choices to be adopted on a 'case by case' basis.

A final reflection must be devoted to some practical issues and hopes for the future. Maps specifically aimed at CRM should be widely dispersed and regularly adopted over the whole national territory, at different scales and with different features appropriate to the territory and urban areas. Their projection, compilation and management should be devolved to all territorial agencies (regional-municipal), following national guidelines and standards. The costs should be shared among all the clients, in order to make them sustainable. Its management would not require complex technologies or high costs, but rather a different approach to the digital archiving and systematization of data which are normally collected in urban archaeology practice and held by the Superintendencies; if all the stakeholders (clients and subjects variously involved in CRM) would contribute to make the database up to date, this would provide a much deeper knowledge of the subsoil, and valuable information for the archaeological resources management.

In some cases the coincidence between new findings and already excavated structures is recognized only after the excavation, when time and money have been spent to re-discover already known archaeological remains. This should not be a surprise, since they are usually 'minor' elements, often without chronological and functional evidence, often left unpublished, but recorded only in field reports at the time of the discovery. The method and timing of the excavations carried out in urban contexts often do not permit a complete survey of all available resources because they are dispersed in many different archives requiring complex access procedures. For Italian laws, clients of the urban infrastructural works have to pay for a full archaeological risk assessment on every new project, commissioning to private companies or professionals a complex, expansive and time-consuming research in the archives of the Superintendencies, together with associated bibliographical research. A lot of relevant sources (old maps, historical photos, geological and landscape studies) are often neglected by the subjects in charge to compile the assessment, for lack of time, high costs and difficulties in accessibility of these resources. This results in more costly and less detailed risk maps. If the developers had at their disposal a map that was continuously updated, it would be possible to take into account the archaeological presence before the work began. Although archaeological remains appear to be encountered randomly, their distribution is actually quite predicable, and such a map would avoid the problems that these encounters create.

For this reason, the availability of Archaeological Risk maps combining information about known archaeological resources and potential new finds, managed by national-local authorities and widely accessible online, would be extremely helpful to make the Cultural Heritage Protection more efficient.

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Following the Developers – Salvage Archaeology and Urban Archaeological Management, The Israeli Experience

Jon Seligman

Abstract

This article details the development of salvage and preventative archaeology in Israel, since the mandatory period until today. Grounded in the framework of the pre-state legal instruments, and still set in an ethos where archaeological and cultural heritage are viewed as national, rather than commercial interests, Israeli archaeology is mostly conducted by archaeologists belonging to the statutory Israel Antiquities Authority. At the same time, developers have been required to pay, either in total or partially, for the 'clearance' of archaeological remnants. This has led to the limited entry of private contract archaeology, though restricted by the requirement for academic sponsorship.

The second part of the paper details systems of archaeological management in urban settings, utilised as a feature of preventative archaeology, to assimilate archaeological resources in urban planning. The primary tool introduced was the integration of ancient sites in master plans, to ensure that archaeology becomes community based and to guarantee an unexcavated archaeological reserve for the future.

Keywords: Israel, Salvage Excavation, Contract Archaeology, Archaeological Management, Antiquities Law, Urban Archaeology, Jerusalem.

1 Introduction

Statutory governmental or local institutions of archaeological management, legal instruments for the preservation and protection of ancient remains and some level of salvage or rescue excavation is almost certainly the universal experience of archaeologists through much of the developed world. However, the national character of the institutions; the provisions and power of law; the resources given to salvage archaeology, either by governmental allocation or through requirement by the developer; the diligence applied to overview the planning and development processes; the intensity of the requirement and application of salvage excavation and finally the national character, changes how salvage

excavation is applied in every country (Bozóki-Ernyey 2007; Demoule 2012; Florjanowicz 2016; Novaković et.al. 2016).

Given the wide scale discussion of salvage and preventive archaeology in Europe, and the debate concerning the benefits and drawbacks of state or publicly sponsored archaeology, as opposed to commercial or contract archaeology (Willems and van den Dries 2007; Kristiansen 2009; van den Dries 2011; Demoule 2016; Kristiansen 2016), the lack of intellectual deliberation on these subjects in Israel is striking. Israeli archaeology is known for vigorous and argumentative examination concerning every possible issue, but has strangely stood to the side of the discussion of these universal dilemmas of archaeological management. This and more, for the terms 'salvage' and 'preventative' excavation (Lasfargue 2009; Demoule 2012, 612; Carman 2015, 147-150) have no separate Hebrew equivalents, make practice of both unitary, as understanding of the difference requires the vocabulary. In reflection, the reasons may well be that we have been organisationally and legally grounded in a situation where these dilemmas are generally a non-issue, in that salvage and preventative archaeology, both separately and together, are relatively well funded directly by the state or public development, the employment prospects of archaeologists are mostly permanent and guaranteed through the state based archaeological system and budgets for publication and its wider distribution to the archaeological public are usually available. Though formally not part of the former socialist bloc, Israel emerged from an almost centrally organised economy only in the 1980s. Archaeology has been one of the sectors still seen as a national rather than a commercial interest, this ethos slowly changing over the past three decades. Private contract archaeology has emerged only in a limited fashion, often restricted by the legal requirement for academic auspices for every excavation in Israel and the indifference of the academic institutions to step outside the realms of research archaeology.

This paper will examine the experience of salvage archaeology in the State of Israel, especially during the past quarter century, since the establishment of the Israel Antiquities Authority.

2 Archaeology in Israel

Israel is a small county (22,072 sq. km.), approximately half of which is desert. With a growing population of close to 9 million, but estimated to rise to 18 million by 2059, a high residential density and a rapidly expanding economy, the pressure on both natural and cultural heritage resources is heavy. Furthermore, ancient Israel, as one of the cradles of all humanity and a major centre of the three great monotheistic faiths, is home to a dense archaeological heritage which comprises much of the land surface, either intensively as highly clustered sites or more loosely, through the entire manmade topography of ancient agriculture and terrace systems. The 30,000 registered archaeological sites, the earliest dated to 1.4 million years, and the myriad civilizations who have passed through or settled in the territory of Israel, have produced archaeological remains as complex as the Old City of Jerusalem and as simple as a rock-cut winepress. Furthermore, the intense layering of archaeological remains creates stratigraphy of innumerable phases and deposits up to 30 metres deep. The importance of these remains has drawn the attention of foreign scholars since the early 19th century, who conducted scores of excavations in the country. Since independence in 1948, most of the excavations have been conducted by Israeli archaeologists, though a limited number of foreign expeditions still conduct excavations in Israel.

3 The Legal Framework

With growing western interest in the antiquities of the Ottoman Empire, of which the territory of Israel was a part, legislation was approved to regulate issues relating to antiquities in the final decades of the nineteenth century. These laws defined antiquities, including both moveable objects and extant remnants; gave legal protection preventing the wanton destruction of antiquities; regulated excavations and the distribution of finds, and provided control over the ownership and trade in ancient artefacts. Further impetus was given with the formation of the British mandatory government under the aegis of the League of Nations in 1922. Article 21 of the mandatory order, inspired by the Treaty of Sèvres, specifically required the legislation of a law of antiquities and the creation of a competent department to manage archaeology and grant permits for excavation. In 1929 the Antiquities Ordinance was legislated, its provisions still forming the basis for current antiquities law in Israel. The Ordinance required citizens to coordinate work in archaeological sites with the Department of Antiquities and stipulated that the Department should document, schedule and register sites, thus necessitating the involvement of the Department in the planning process. Anglo-Saxon principles of private ownership were rejected when it came to ruling the 'natives', leaving monopolistic ownership of antiquities to the state. Private ownership of land in mandatory Palestine would only be for the use of that land for building, agriculture or other functionary requirements set by zoning. Antiquities found within that land belonged, and still do, to the state – the land owner's legal responsibility being to report the discovery of antiquities to the state.

When it came to the relationship, even the clash, between development and archaeology, the central clause of the Ordinance, replaced almost word-for-word in 1978 by clause 29 of the current Law of Antiquities, was the following:

'A person shall not carry out, or allow to be carried out, any of the following on an antiquity site, save with the written approval of the Director (of the Israel Antiquities Authority) and in accordance with the conditions thereof: building, paving, the erection of installations, quarrying, mining, drilling, flooding, the clearing away of stones, ploughing, planting, or interment; the dumping of earth, manure, waste or refuse, including the dumping thereof on adjoining property; any alteration, repair or addition to an antiquity located on the site; the dismantling of an antiquity, the removal of part thereof or the shifting thereof; writing, carving or painting; the erection of buildings or walls on adjoining property; and any other operation designated by the Director in respect of a particular site.'

With such an all-encompassing, even draconian law, the relationship with developers and land owners can be tense. With much of the land surface of the country scheduled as an archaeological site, all planning and development is required to be coordinated with the archaeological authorities. As we will see, while the law designated the legal framework for the process, both this instrument and the government did not allocate funds for the operation of the law or explicitly state how the result of the legal coordination, that is the requirement for excavation, should be funded. This issue will be discussed below.

4 A Brief Organisational History

The Israel Antiquities Authority, the Department of Antiquities of Jordan and the Palestinian Department of Antiquities and Cultural Heritage are all the successors of the British mandatory Department of Antiquities (Seligman 2011). The responsibility to form

a competent department to manage archaeology and grant permits for excavation was set out by the mandatory document, even though an embryonic antiquities protection department had been established by the British occupation forces in Jerusalem in 1920. Later the Department of Antiquities would develop into a proficient cultural heritage management body, staffed by a mixed group of British, Jewish and Arab professionals under British management operating throughout the mandatory territory of Palestine. Inspection was covered by local inspectors who submitted reports of finds and damage to antiquities due to the country's rapid development, to the central archives in the capital. Still, the majority of the research and excavations was conducted by British colonial archaeologists seconded to the Department.

Based on the data collated, decisions were made concerning the necessity for a new entity in the archaeological world at that time – the salvage excavation, though the term itself would only develop much later. During the years of British rule many what we would now deem as salvage excavations were conducted, under the auspices of the Department of Antiquities, the foreign schools of biblical study and archaeology that existed in the city, foreign archaeological delegations and through the newly emergent academic institutions of the Jewish community – the Hebrew University and the Jewish Exploration Society. A total of 140 excavations were conducted during the mandate, concentrating mainly on the excavation of major sites and the excavation of specific finds, especially ancient tombs, exposed during building work.

After the War of Independence in 1948, the Israel Department of Antiquities and Museums (IDAM) was founded as a wing of the Ministry of Education and Culture. Initially separated from the archives, library and collection of antiquities, which remained on the Jordanian side of the border, the new department was small and poorly equipped to cope with the massive development that occurred with the influx of new immigrants. IDAM remained a department of limited capacity, but the policy of salvage excavations, usually in the sense of excavation of remains discovered during construction, evolved during this period. During these years, from 1948 to 1990, IDAM paid for the costs of the excavation from its own funding, and cases are recorded whereby antiquities were destroyed due to the lack of possibility to excavate following budgetary constraints.

Following the Six Day War, Israel went through a new phase of development. Because of the immediate threat to the archaeological landscape and sites, IDAM became deeply involved in planning, by changing plans to preserve antiquity sites and calling for the execution of salvage excavation, in its modern sense, prior to development, the number of which greatly increased during these years. Furthermore, IDAM established a sub-agency to conduct a national systematic archaeological survey, with preference given to areas threatened with the immediate loss of vital archaeological data due to development. Still, IDAM remained small, the requirements for salvage work far out-striping its organisational and logistical capabilities and especially the available resources.

The weak and inefficient status of IDAM led in 1990 to major reform of the system of archaeological management in Israel. The Israel Antiquities Authority (IAA) was established as an independent government authority, outside the direct control of the Ministry of Education and Culture (now under the wing of the Ministry of Culture). The new dynamic IAA would become involved in long-term excavation of major sites and formed a large conservation unit to preserve the finds and sites. The nature of archaeological inspection changed, as the new organisation demanded to be involved in

the planning process from its inception, to set watching briefs at sites of development and demanded salvage excavation before development. This was a boom time for Israeli archaeologists, as the new staffing levels increase the workforce of the IAA to a level ten times that of IDAM. Furthermore, the IAA established an anti-looting unit to cope with the theft of antiquities and to control the trade in antiquities, which is legal in Israel, though restricted. In recent years the IAA has emphasised the involvement of tens of thousands of school pupils in excavations for various periods to increase social involvement, self-identity and youth empowerment.

5 The Development of Salvage Excavation in Israel

As noted above, the legal instrument and the organisational structure exist in Israel to protect antiquities and provide for salvage excavation. Indeed, most of the provisions stipulated by the European Convention on the Protection of the Archaeological Heritage – 1992 (the Valetta Convention) were adopted intuitively. Given the development and infrastructure pressures, especially in and around the cities in the dense centre of the country and especially in Jerusalem, the processes involved in archaeological management will be detailed. From early years IDAM had the legal powers to ensure that planning was coordinated and salvage archaeology was conducted. Budgeting for salvage excavations was extremely limited and IDAM had to prioritise, leaving many sites unattended and vulnerable to destruction without excavation.

With the founding of IAA no extra funding for salvage excavation was offered by government, leading the IAA to interpret the Law of Antiquities to allow it to charge the developer for the full cost of the excavation. Independently of concurrent trends already common in Europe, the IAA adopted principles that the developer pays for archaeology, leading immediately to a multiplication of the number of salvage excavations, which increased ten-fold to around 400 excavations every year (Figs. 1 & 2). Furthermore, the IAA greatly improved its research capabilities, as a consequence of the many excavations conducted, the ethical and legal obligation to publish the findings and to include detailed
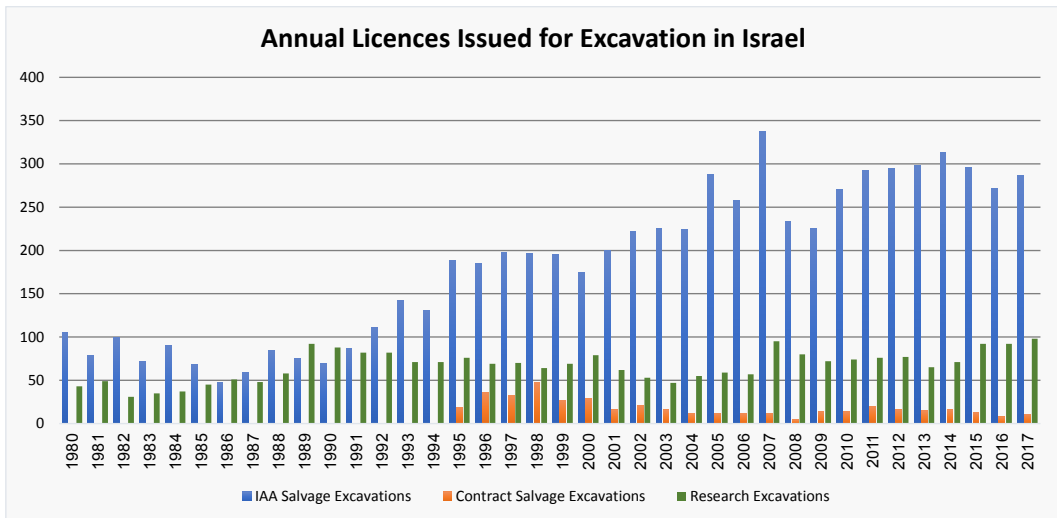

Figure 1. Table showing the growth of salvage excavations in Israel since 1980.
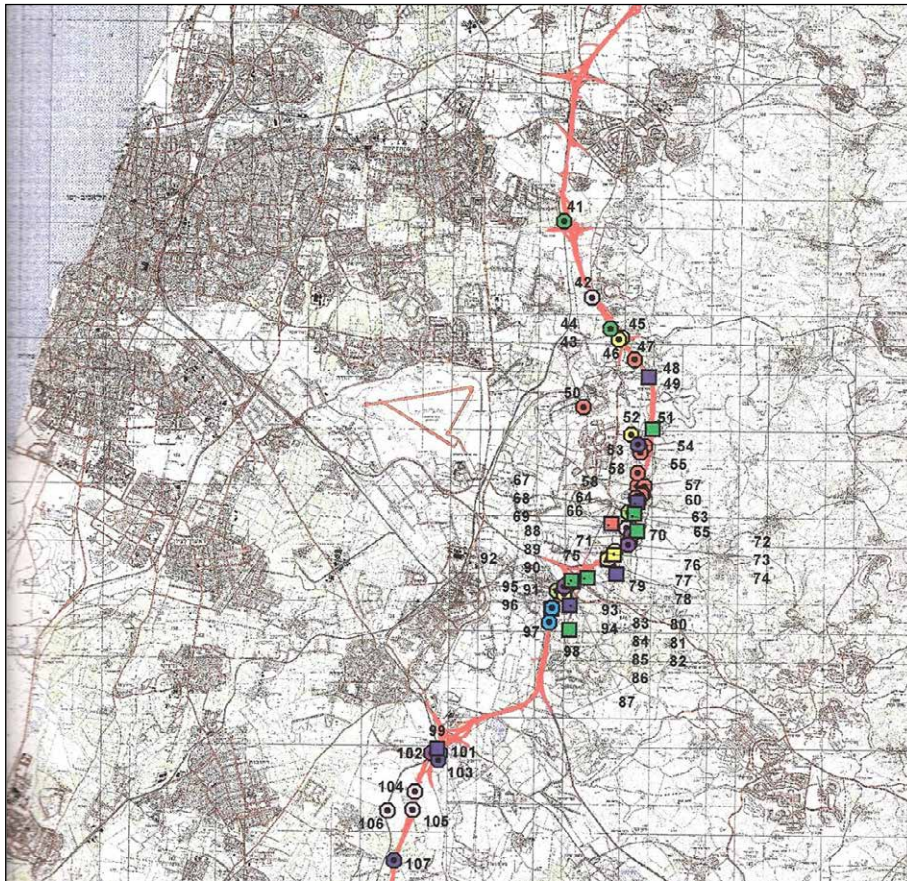
Figure 2. Salvage excavations clustered along the length of the Cross-Israel highway in the 1990s (Israel Antiquities Authority).

architectural, stratigraphical, artefact, chronological and historical analysis. Four publication series were developed, 'Excavations and Surveys in Israel' for preliminary and short reports; '*Atiqot*', a refereed series of archaeological studies; 'IAA Reports', a series of monographs detailing the larger and more important excavations of the IAA; and the Israel Archaeological Survey, a series of systematic survey catalogues. Today, all but the monograph series are published online.

However, together with the success of improved archaeological management, the IAA was charged with the accusation that it was maximizing its demands for archaeological documentation, while not prioritising what was important; of making unjustified financial demands in order to conduct excavations as a condition to release land for building and of misinterpretation of its powers according to the Law of Antiquities. During this stage, which reached a peak during the mid-1990s, the major problem was that the budgetary policy, which had actually been imposed on the IAA by governmental decision, was turning the preservation of the nation's archaeological heritage into something objectionable for sections of Israeli society. The policy had become counterproductive. While most development in Israel is governmental, thus budget for excavations for infrastructure

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and large housing projects was only a matter of transfer of funds from one branch of government to another, the major problem would arise with small municipalities and private developers, especially private home owners. Indeed, in many cases the demands made outstripped the financial capabilities of the smaller developer. In a now famous legal case in the mid-90s, the validity of the IAA's interpretation of the Law of Antiquities to use its provisions to charge money for 'clearing' the land of archaeological remnants, through salvage excavation, was challenged in the Supreme Court. The court ruled the legal interpretation null and void, sending the IAA back to the government who then set a series of license fees that would be paid by developers for various activities of the IAA, including excavation. The inequality in the system remained, though with much reduced costs incurred by the developer, it was perceived as tolerable by the public. Furthermore, in stark contrast to the systems adopted in Europe, where the legal authority charged with making decisions concerning salvage excavations is institutionally separated from that conducting the excavation, the IAA sets the conditions for archaeological excavation, while also carrying out many of the excavations that results from its decisions. This potential conflict of interest was identified by the State Ombudsman and then legally solved through the establishment of an appeal procedure through which possible conflict of interest could be mediated.

6 The Contribution of Salvage Excavations to Urban Archaeological Research

Modern cities cover many of the major sites of ancient settlement, such as Jerusalem (Seligman and Avni 2009), Jaffa (Peilstöcker 2011), Beth Shean, Ramla (Fig. 3), Acre etc. As a result, a huge number of salvage excavations have taken place over the past century. Rather than the more focused academic excavations, that set themselves clear research questions, these excavations are usually random, with little goal based prioritising of preferable archaeological areas, based on an archaeological understanding of the sub-surface. While each of these excavations is conducted as its own entity and published independently, the IAA has tried to set a publication strategy that gathers the results of the cluster of excavations at specific sites. Drawing on this information it is possible to establish a large open database, which can be queried to provide information for detailed chronological, spatial and thematic research, at a scale that few short term focused excavations can provide. Furthermore, geographical collation of excavation plans of these often tiny sondages, has aided better understanding of the ancient urban landscape, and has made its reconstruction possible, together with augmented spatial knowledge of its associated material culture.

7 Archaeological Management and Salvage Excavation in Israel Today

With 30,000 registered archaeological sites, covering just over half on the land surface, the IAA is involved in urban, housing and infrastructure planning, on the land and at sea, from the beginning of the planning process. Representatives of the IAA sit as observers on the planning bodies, informing the planners of the impact of planning on the archaeological resource. This reduces clashes between the development needs of society and the necessity to protect antiquities. Beyond this and independently, all plans are also submitted to the IAA for approval, where conditions for watching briefs, trenching, preliminary
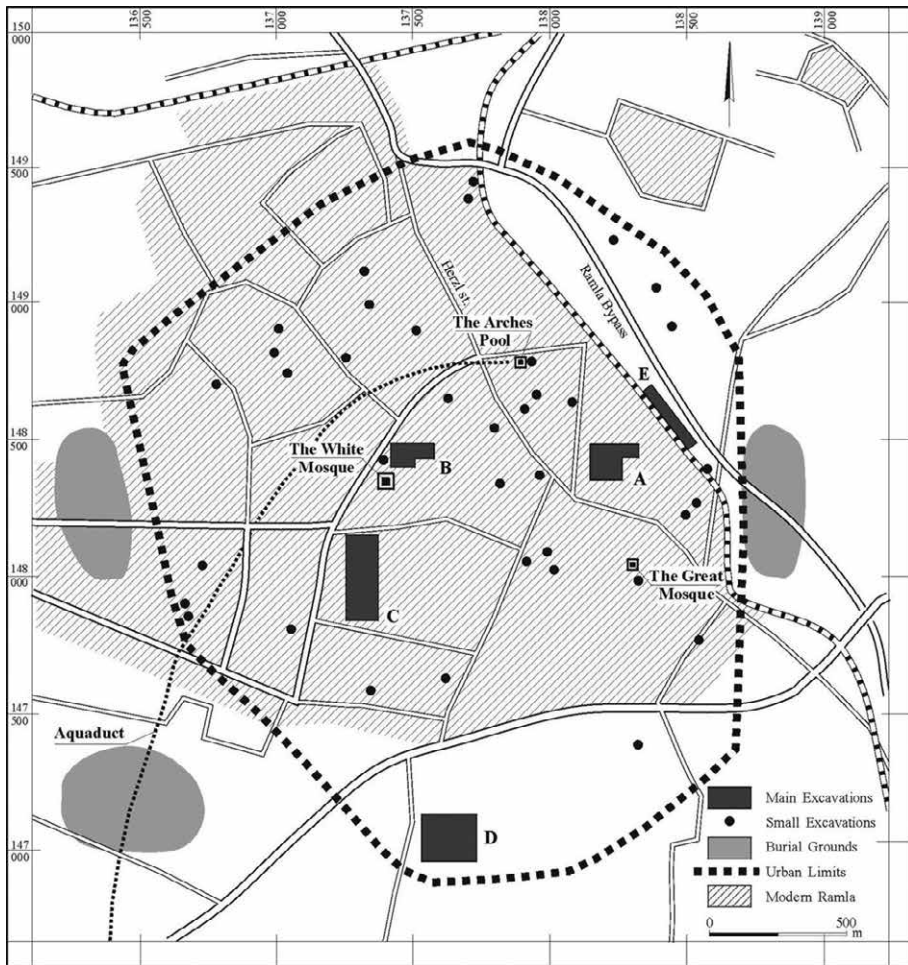
Figure 3. Collated data from the salvage excavations conducted in the city of Ramla (Israel Antiquities Authority).

excavations and salvage excavations are set out, or plans are rejected if the damage to the archaeological resource is considered unacceptable. Given that the cost of excavation is usual by a fee set according to the specific area of the excavation, the place for outside tendering is limited. Still, governmental development, for which a full costing is provided, can be sent to tender. To supply this demand, a small number of private archaeological contract firms have evolved, each required to receive the scientific auspices of one of the universities, for licenses are granted exclusively to accredited archaeologists with previous excavation experience, degrees in the profession, a certificate issued by the universities showing the archaeologist to have on-site training in archaeological methodology and under the umbrella of a sponsoring archaeological institution. Still, the vast majority, over 90% of the annual 250-350 salvage excavations, are carried out by the IAA (Figs. 4-7). Over time the number of private contract excavations has in fact dropped, usually because the financial viability of this kind of excavation proved borderline and the universities were

Figure 4. A salvage excavation in the streets of Jaffa (Israel Antiquities Authority).

Figure 5. Salvage excavations prior to building in the Ramot Shlomo neighbourhood of Jerusalem (Israel Antiquities Authority and Skyview).

Figure 6 (above). A salvage excavation in Jerusalem for the new line of the light railway (Israel Antiquities Authority and Skyview).

Figure 7. Deep salvage excavations close to the walls of the Old City of Jerusalem that required the developer to change his plans for the preservation of the site (Israel Antiquities Authority and Skyview).

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not prepared to take on the commitment of sponsoring excavation by third parties, while remaining legally responsible for the publication.

After the excavation has been completed, the IAA enters the next stage of cultural management. A number of possibilities are available, from documenting the finds and releasing the site for the removal of the remains for building; through covering the remains and allowing building over the site; to refusal to develop the site and confiscation for archaeological display, the final option used sparingly.

Even with this level of public control of archaeological management, the application was reactive. Surprisingly, even with the obligations of the law, the IAA was too often caught in a defensive situation, as statutory consultation was frequently conducted late in the planning process. As modification of a finalised plan is more difficult than actually influencing its creation, it was decided, in keeping with world-wide changes in the field of archaeological management, to adopt a pro-active approach. This coincided with the formulation of a series of master plans for the Jerusalem region and city. Rather than being outside the planning process the IAA would be part of it, setting archaeology as one of the aspects that need to be integrated in planning not only existing beside it. From this point forward, planners, architects, investors and local government would be provided with tools for the analysis and planning of archaeological sites as part of integrated holistic urban planning through
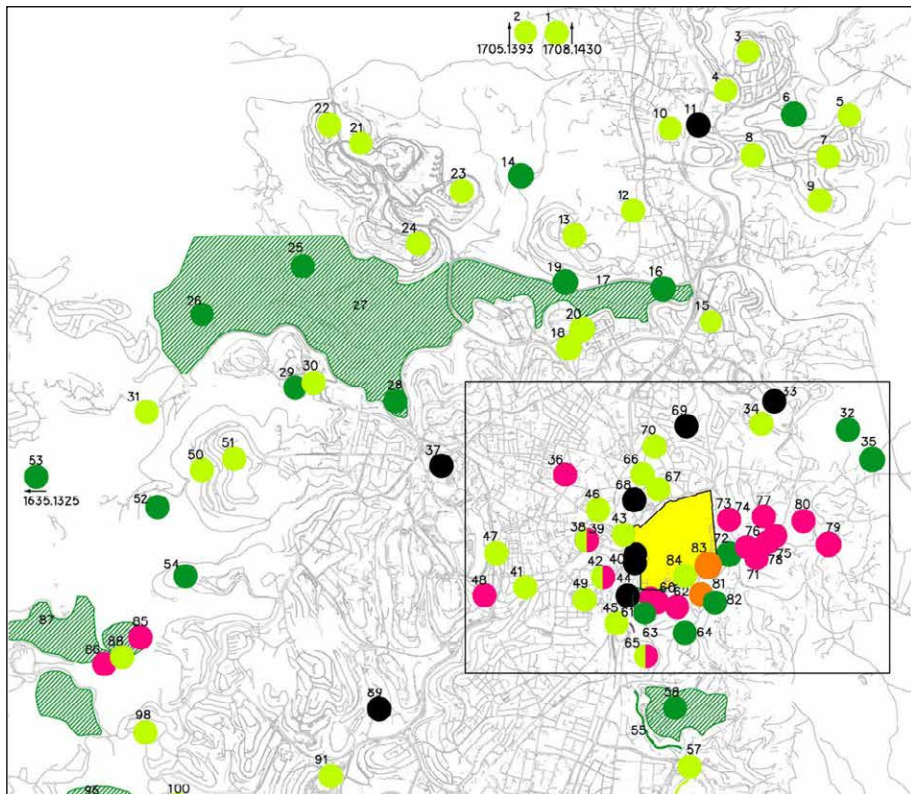

Figure 8. Sites selected and integrated in the Jerusalem Master Plan as an archaeological reserve (Israel Antiquities Authority and the Municipality of Jerusalem).

the inclusion of primary professional recommendations for excavation, conservation and development of the selected sites that are integral to the master plan.

8 Jerusalem as a Test Case

The change in the approach to archaeological management within the IAA coincided with the inauguration of the process by the Ministry of Interior and the Municipality of Jerusalem to update the master plans for the district around Jerusalem, for the city of Jerusalem and for the Old City of Jerusalem. Discussion with the Planning Departments to convince them of the need to include planning of the archaeological resource within the plans led to agreement to attach archaeological appendices to all three plans.

For each of the plans a multidisciplinary team of archaeologists, planners, architects, conservation and GIS specialists went through the list of thousands of scheduled sites and then defined the special sites in each geographical area, based on a series of set criteria.

Figure 9. Map of preserved excavations and monuments within the wall of the Old City of Jerusalem (Israel Antiquities Authority).
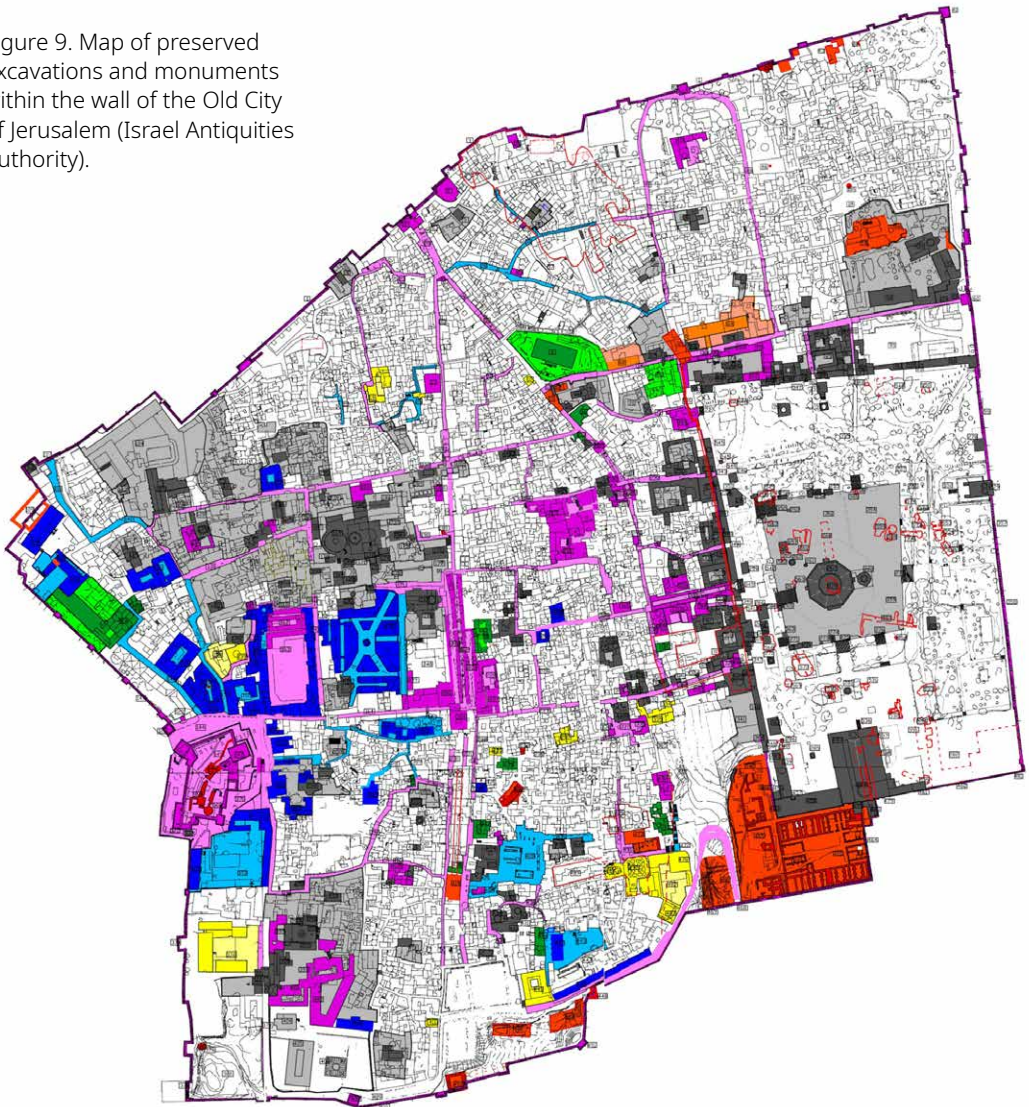
These criteria, which were registered on a GIS based card for each site, included scientific, historic, conservation, visual, touristic, geographic and landscape values. Emphasis was given to including sites from a wide range of periods, from prehistory up until the Ottoman Periods, and of various thematic types, such as farmhouses, monastic complexes, hamlets, villages, agricultural installations, landscape features and tells (archaeological mounds of multiple levels) etc. (Fig. 8). Based on the data assembled, the state of preservation of the sites and the urban or rural context of the locations, the future archaeological potential of each site was assessed for integration within the planning context, while guaranteeing an appropriate balance between the development needs of the city or rural district and the needs for archaeological preservation.

Because of the status specifically of the Old City of Jerusalem as a World Heritage site, prominence was given to: preserving the unique architectural character and community of the Old City and visual basin surrounding the walls; protecting unexcavated archaeological reserves; providing tools for the analysis and planning of archaeological sites for the editors of the master plan, planners, architects, investors and local government; and to provide professional recommendations for excavation, conservation and development of the selected sites.

The Old City of Jerusalem (Seligman 2009) itself is a multi-layered archaeological site, including within its walls major religious shrines of the three great monotheistic faiths, some 1000 individual monuments and the homes of 40,000 residents. For the Old City, integration of the needs of the community, together with the requirements to preserve the built culture, is paramount. Beyond setting up a GIS database to identify the 700 or so monuments within the walls of the Old City (Fig. 9), categorised by period, type and other values, the aim of the plan is to:

1. guarantee the conservation of the heritage in Jerusalem, including all physical and ethnographical components;
2. continue the existing civil, religious, cultural and institutional living patterns;
3. improve the quality of life and create a compatible environment for the benefit of inhabitants and visitors;
4. ensure sustainable conditions for pilgrimage whilst developing the cultural tourism within and without the Old City.

The policy adopted for the Old City allows limited building improvements and infill for public benefit and possibilities to renew services and amenities for both residents and visitors, while guaranteeing the preservation of the area's unique cluster of ancient monuments and important holy sites, through the creation of a management plan that is operated through a professional coordinating body to mediate between the public and the planning authorities.

9 New Challenges

As I write these lines, new challenges to the management of the archaeological heritage of Israel have appeared. The cost of financing archaeology, the lack of free capitalistic competition for tendering of archaeological work to private contractors that exists in many European countries and perceived delays to national infrastructure, as a result of the excavation of ancient sites prior to their destruction, have set in motion proposals

by the Ministry of Finance to change the structure of Israeli archaeology. Governed by neo-liberal notions of the primacy of budgetary constraints above all else and an almost religious fervour for the supposed advantages of a loosely regulated free market, these new proposals have the potential to unravel a system that for the last three decades has preserved ancient sites during a period of massive development, while raising Israeli archaeology to a level of high achievement through guaranteed publication and dissemination of the scientific results of salvage archaeology. Still, these changes, if they occur, have yet to play out, though the threat to the national archaeological resource, for the benefit of the few, rather than guaranteeing the interests of cultural heritage for the public at large, is real.

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Web Resources

Israel Antiquities Authority (IAA) – www.antiquities.org.il

IAA Conservation Department (includes the conservation policy of IAA) – www.iaa-conservation.org.il

IAA Publications – www.hadashot-esi.org.il; www.atiqot.org.il; www.antiquities.org.il/survey/new/

Israel Nature & National Parks Protection Authority (includes most WH sites) – www.parks.org.il

Society for Preservation of Israel Heritage Sites – www.shimur.co.il

Managing archaeology in dynamic urban centres: challenges and opportunities

Paul Belford and Jeroen Bouwmeester

The chapters in this book cover a lot of ground. Not just in terms of geography – although we stretch from the Baltic to the North Sea to the eastern Mediterranean – but also in terms of archaeological traditions and structures, methods, techniques, politics and resources. The book reflects some of the great diversity and vibrancy that comes with the meetings of the European Association of Archaeologists (EAA) from which it was developed. The initial session at Maastricht in 2017 formed the core of the book, but it was not until the following year in Barcelona that the EAA Urban Archaeology Community was formally inaugurated. Again there was great enthusiasm for the subject: as noted in the Introduction there is clearly an appetite for discussion not just of the research outcomes of urban archaeology projects but also the theoretical and methodological approaches that are being taken to understand and conserve this precious resource in different parts of the world. It is clear that there is a continuing need for archaeologists to discuss their work and share some of the problems and challenges. Indeed what is striking both about the papers in this book and also the conversations at and around the EAA, are the many things urban archaeology has in common. Five broad themes can be drawn out of this book and the wider discussion:

- challenges around preserving archaeological remains *in situ* – and the question whether doing this is desirable or necessary;
- pressures on time, resources and funding on even the most lavish urban archaeology project – and the compromises that need to be made;
- archaeology is just one area of public activity that is competing with many others – better transport, new housing, more tourism;
- urban archaeology is developing new techniques in modelling, researching and excavating urban sites – and understanding the archive of material already excavated;
- increasing pressure from politicians, funders – and from archaeologists themselves – to involve the general public in urban archaeology.

The first theme – of preserving archaeological remains *in situ* – is explored by several chapters in this book. Some very spectacular examples are highlighted, which raise the

question of where does preservation end and reconstruction begin? A great deal of time, energy and money has gone into finding engineering solutions to include these fragments of the past within modern infrastructure. Therefore the value of these things to society could be measured in financial terms – in a simple way the labour and materials that have been spent to secure their preservation. But what about their value in heritage terms? To some extent these remains are reconstructions of the past, and their value is diminished when they become simply pieces of brickwork on a plinth, separated from their original context. As archaeologists we understand the importance of context, and it is essential that we can articulate that context to people. Are the social and economic contexts of some of these fortresses readily apparent to people catching their train, parking their car or cycling through a bridge? Perhaps not at a level of detail, but the preservation of these remains at least puts down a marker for people to see that there was something here before – and to perhaps ask what it was, and why it was there.

The next two themes – essentially 'pressure' – run through the whole book, and are encapsulated in the phrase we have used in the title: these are 'dynamic urban centres'. Active, vibrant and busy around the clock, they are essential hubs in the modern world. Archaeologists have to work closely with engineers and other experts as part of multi-disciplinary teams. They have to embrace new ways of working too. It is also clear that a legislative framework on its own is not enough for archaeologists trying to achieve the best for the urban archaeological record. Competition with the other interests is tough; urban archaeology is expensive, and using new scientific methods makes it even more expensive. Perhaps the most important thing is to learn to compromise. The most successful urban archaeological projects – including some of those described in this book – have entailed complex negotiations about priorities; they have also benefitted from huge support by the local public and government. In these cases, there is an understanding of the importance of the remains and support for preserving them. Even so developers had to jump some big hurdles to open their minds to thinking in terms of preserving archaeology and integrating archaeological remains into their projects. For their part, archaeologists have learned to pick the battles they know they can win.

The governance of urban places is a question of balancing the different needs of residents, visitors and workers. Heritage (including archaeology) can be deployed for several political purposes, and some are conflicting – or at least give rise to tensions. For instance to counter perceptions of globalisation as a threat to national, local or civic identity, archaeology can be used to create a 'sense of place'; a way of articulating why Antwerp is different from, say, Vilnius, Hamburg or Norwich. Equally the same archaeology can be used to support the creation of a broader European identity: all of those places were Hanseatic trading centres and so fundamentally share common histories. Similarly heritage is often used as part of a package of 'culture' in its broadest sense to attract tourists. Tourists bring money, but they also bring additional stresses on the housing and infrastructure of urban places – this is a delicate balancing act which has caused cities like Amsterdam and Barcelona to rethink their priorities. Archaeologists have a duty to record all aspects of the past with equal care, but they are not politically neutral. Urban archaeology is a bit like the photograph album of a person with dementia. Things that happened have been forgotten, perhaps because they do not suit a particular narrative, but the record is there all the same.

All of the chapters in this book have emphasised the huge differences in legislation and systems between the different places. Indeed in some places – Switzerland and the United Kingdom, for example – there is a great deal of variation within the same country in the ways in which legislation protects archaeology from the threats of redevelopment. In every country there are traditions, and 'gatekeepers' of those traditions – they may be an older generation of 'city archaeologists', or academics, or city planners and politicians. Some of those traditions are helpful, others get in the way. Is 'preservation *in situ*' the ultimate aim? If so how will cities grow and develop? How indeed will archaeology grow and develop if there is no archaeology to be done since everything is preserved? Should urban archaeology simply continue to augment archaeological knowledge? In which case what about the archives of excavations already completed but never published? How well is the data kept, how well is it integrated with other data about our urban places? Knowledge is power – so how accessible is that knowledge? As noted above, the archaeological record constitutes the collective memory of the urban place. One of the challenges for urban archaeology is to understand that record, and also to preserve its memory (the archive) for the future.

These are some of the questions which this book has reflected on, with different emphasis across the various chapters. There are of course no easy answers. However this book, the meetings which have helped create it (and of course future meetings and perhaps future books) – are essential components of the debate. For if we want to make fundamental improvements to urban archaeology, we have to exchange knowledge among ourselves. We must also connect with the public, which brings us to the final point. In one sense our connection with the public is already there: in many countries urban archaeologists are employed directly by public bodies. Even in countries where archaeology is very commercially focused, such as the UK and the Netherlands, urban archaeology projects are regulated by public bodies, are often funded (directly or indirectly) by the public, and are always in the public eye.

However in all countries there are often barriers between archaeologists and the public they ultimately serve. Such barriers are in a sense a form of self-protection – on the one hand physical barriers are justified by 'health and safety' (or to prevent legal action), on the other hand intellectual barriers can be created by the use of technical language, or the protection of professional or employment status. However in the long term, it is in the best interests of urban archaeology to be able to tell stories about the past directly to the public. Only then will ordinary people recognise the real value of what we do. And it is those people after all, who vote for the politicians who create the legislation which protects archaeology. This is a challenge, but also an opportunity.

This book has taken rather longer to produce than we would like, but it is here. In the meantime the EAA Urban Archaeology Community has developed apace. The discussion we began in Maastricht has continued at subsequent EAA meetings, and also at interim events which the Community has organised; one has already been held in Rome, and another is being planned. We also have our own website, at www.urbanarchaeology.org. We are building a community to work together for a better urban archaeology now and in the future. The first steps have been taken, now it's time to stride forwards. We are looking forward to it!

About the contributors

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Dr Paul Belford is an archaeologist who has excavated in a number of European towns and cities. He holds a PhD from the University of York, and a BSc and MA from the University of Sheffield. Paul's main interests in urban archaeology are the development of early industrial centres at the end of the medieval period, and the creation and perception of urban landscapes in the eighteenth and nineteenth centuries. He is currently the Director of the Clwyd-Powys Archaeological Trust, a not-for-profit educational charity that provides regional planning and commercial archaeology services in Wales; he previously worked for an international private-sector heritage consultancy, and before that he spent ten years in charge of archaeology in the Ironbridge Gorge World Heritage Site. Dr Belford is a Member of the Chartered Institute for Archaeologists (MCIfA) and served on its Board from 2014-2020; he was elected a Fellow of the Society of Antiquaries of London (FSA) in 2008.

Christiane Bis-Worch

Specialising in medieval and post-medieval archaeology, Christiane Bis-Worch has been curator of the department for medieval and post-medieval archaeology at the CNRA since 2004. The CNRA is as an autonomous department of the National Museum for History and Art (MNHA). Its missions include the management of the archaeological heritage, archaeological investigations on site and publication and dissemination of the scientific results obtained in the Grand Duchy of Luxembourg. The CNRA also supports and supervises scientific research done by students (Bachelor, Master, PhD and post-PhD) in close cooperation with universities. Beside the research on a national and international level, the CNRA informs the public by publishing books, articles and brochures, by organizing conferences and by preparing permanent and temporary exhibitions.

Valeria Boi

Valeria Boi gained her PhD in Archaeology at the University of Sassari, withresearch focused on the evaluation of archaeological potential in urban areas. After ten years' experience as a professional archaeologist, since December 2017 she has been working for the Italian Ministry of Cultural Heritage and Activities and Tourism (MIBACT) as archaeological officer in the Central Institute for Archaeology (ICA). Her role primarily involves dealing with Archaeological Information Systems, preventive archaeology and

Open Access to archaeological information. She has authored or co-authored various papers on these themes, and in May 2017 co-organised a conference about 'Archaeological data: intellectual Property, access, dissemination' of which the proceedings are currently being published. Since 2010 she has been a member of the Italian Confederation of Archaeologists (CIA), a professional association seeking to promote the role of Cultural Heritage professionals in Italy.

Jeroen Bouwmeester

Since 2009, Jeroen Bouwmeester has been employed by the Cultural Heritage Agency of the Netherlands as a senior researcher of medieval and early-modern cities. He studied archaeology of northwest Europe at VU University in Amsterdam. After his graduation in 1997, he worked as a senior archaeologist at BAAC and as manager of Synthegra. During this period, Jeroen directed large-scale excavations near Zutphen (Bronze Age-Middle Ages). His research at the Cultural Heritage Agency focuses on the development of expectation models of suburban areas by combining historical, geographical, archaeological, and building archaeological data. He devotes special attention to the development of houses and other buildings in relation to urban planning, a topic which is being developed further in his PhD research.

Daan Celis

Daan Celis has studied archaeology and art sciences at the Vrije Universiteit Brussel (2010). His master thesis dealt with the tenth century AD earthen fortification wall of Antwerp. He contributed to the data processing and publication of the large-scale archaeological excavations at the 'Onze-Lieve-Vrouwbasiliek' of Tongeren (Belgium) and continued field work for a private archaeological agency at Tongeren. Since 2016 he has worked as an archaeologist for the city of Antwerp, with research projects on the oldest phases of the urban development of Antwerp and the Oosterweelverbinding. In the large-scale infrastructure project Noorderlijn he was responsible for the excavation of parts of thesixteenth century AD Spanish fortification walls and the Kipdorp site (2016-2019).

Claudia De Davide

Claudia De Davide is an experienced field archaeologist and CEO of Akhet srl. During her university-studies, she specialized in Roman archaeology, and in particular the reconstruction of phases of the 'Villa of the Auditorium' at Rome, undertaking experimental studies on functional and spatial analysis based upon the distribution of finds in destruction layers.

In collaboration with archaeologist David Wicks, she has specialized in the undertaking and organization of professional excavations, for example upon protohistoric sites in Puglia and upon deeply-stratified urban sites of Reggio Calabria. From 2006 onwards, she has lived and worked in the Aosta Valley. In the last few years, in collaboration with the Akhet team, she has been involved in archaeological impact and risk-assessments within this region, and in particular several large-scale high-impact urban archaeological projects, for example in the city of Aosta the enlargement of the Umberto Parini regional hospital and the urban central-heating programme; projects in which she has focused not only upon the analysis and optimization of the methodology of intervention, but also the evaluation of the social impact of archaeology in urban contexts.

Maarten Groenendijk

Maarten Groenendijk was a municipal archaeologist in the city of Gouda, the Netherlands, from 2002 to 2020. He is now the owner of Green Archaeology, a consultancy agency specialised in archaeology-friendly building methods. He is working on a PhD Thesis on the disturbance caused by piling through archaeological remains, due to be completed in 2020.

Veerle Hendriks

Veerle Hendriks studied archaeology at the Katholieke Universiteit Leuven (2006). In addition she completed a teachers' education (2006) and a bachelor degree in modern history (2008). She has been a field archaeologist in the Flanders region since 2008. From 2015 onward she has worked as an archaeologist for the city of Antwerp, with research projects on the Scheldt Waterfront and the citadel of the sixteenth century AD Spanish fortification. In the large-scale infrastructure project Noorderlijn she was responsible for the excavation of parts of the sixteenth century AD Spanish fortification walls and the Kipdorp site (2016-2019).

Thomas Höltken

Dr Thomas Höltken studied Pre- and Early History, Cultural Anthropology and Historical Geography. Between 1996 and 2010 he worked as Scientific Consultant on the excavation of the cathedral of Cologne. Since 2010 he has been Scientific Consultant, Romano-Germanic Museum/Office for Archaeological Preservation of Cultural Heritage of the City of Cologne.

Femke Martens

Femke Martens has studied archaeology at the Katholieke Universiteit Leuven (1996) and Conservation of Ancient Monuments and Landscapes at the Henry van de Velde Instituut in Antwerp (1997; now University of Antwerp). She completed a PhD (2004) focusing on the urban development of Sagalassos, a Graeco-Roman town in Asia Minor. From 1994 until 2011 she was involved as student, and later as postdoctoral researcher in this interdisciplinary research project. Since 2012 she has worked as an archaeologist for the city of Antwerp, specifically for the large-scale infrastructure projects such as IJzerlaan, Oosterweelverbinding (preparatory research) and Noorderlijn. As project leader for this last project she was responsible for the excavations of the Spanish fortification walls and the restoration of the Kipdorp site (2016-2019).

Marion Liboutet

Marion Liboutet studied Archaeology at the Panthéon-Sorbonne Paris 1 University and the University of Aix-Marseille. She devoted her theses to medieval cave dwellings in the south of France. After having worked in the field of rescue archaeology in France, notably in the Paris area, she joined the Ministry of Culture in 2007 and was assigned to the Regional Archeology Service of Lorraine, in the northeast of France. After relocating to Switzerland in 2010, she joined the Archéologie cantonale (Department of Archaeology) in Canton Vaud where she is Heritage Curator dealing with medieval and modern cases in particular.

Karen Minsaer

Karen Minsaer completed her studies in Oriental Archaeology and History of Arts at Leuven University with a specialisation on Middle Eastern archaeology at the Panthéon-Sorbonne in Paris (1989). During these studies and later as scientific researcher, she was member of the Belgian Archaeological Expedition in Iraq and Syria. Since 2002 she is working at the Archaeology Department of the city of Antwerp, where she started as project archaeologist for the sixteenth century fortifications. Later she became advisor responsible for the 'Forts and Lines', the Interreg IVA-project Flanders-Netherlands coordination. She worked on the activation of the States-Spanish lines in Antwerp, where three projects were added: 'Fort Lillo, the Emperor's Bastion' and the 'Kipdorp Bridge'. Since 2014 she leads the Archaeology Department. Her topics are heritage public awareness and the archaeological remains valorisation at infrastructural projects (the city fortifications, the Oosterweel tunnels and the Scheldt Waterfront).

Jan-Willem Oudhof

Drs. Jan-Willem M. Oudhof is senior advisor and managing partner at Buro de Brug. Since 2010 he is working on secondment at the municipality of Utrecht as archaeological project manager dedicated to the redevelopment of the Station area. As a medieval archaeological consultant he is specialized in complex projects were archaeology and civil engineering have to be combined on the same construction site (for example parking garages). He is currently also managing the archaeological research during the dike reinforcement between the city of Hoorn and the city of Amsterdam.

Edita Povilaitytė-Leliugienė

Edita Povilaitytė-Leliugienė is a scientific researcher at the Institute of Art as well as a PhD student at Vilnius Academy of Arts. Her research area is architectural heritage, for which she uses historical and critical methodological analysis from a multidisciplinary perspective. She examines the conservation, restoration and rehabilitation processes of medieval architecture combining different scientific data and disciplines such as archaeology, architecture, cultural heritage, construction, material, anthropology, history, sociology and other sciences. The subject of her PhD is 'Lithuanian architectural heritage research in 19th-20th century: the case study of Vilnius Upper Castle'. Edita was also one of three participants in a project exploring Modernity in Lithuania, funded by the Research Council of Lithuania: National Research Programme (2017-2019). Her contribution to the project ('Vilnius Art and Architecture in 1919-1939: Institutional Approach') was an analysis of the institutions which were responsible for heritage management and research, as well examining the processes of modernization in the architectural, archaeological and heritage management fields during that period. This work resulted in a monograph and a series of scientific articles reflecting the project theme. Edita is also the co-author of several books and peer-reviewed journal articles, including a monograph on the architect and architectural researcher Sigitas Lasavickas.

Jon Seligman

Dr Jon Seligman is Archaeologist and Director of External Relations and Archaeological Licensing for the Israel Antiquities Authority. His previous positions include seven years as the Director of the Excavations, Surveys and Research Department, twelve years as

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Prof. Dr Marcus Trier studied Pre- and Early History, Classical Archaeology and Historical Geography. He is Director of the Romano-Germanic Museum in Cologne, Head of Archaeological Conservation of the City of Cologne and Acting Head of the Cologne Archaeological Zone. In addition to many archaeological excavations in the city centre of Cologne, he was above all responsible for the excavations in connection with subway-line construction in Cologne.

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MANAGING ARCHAEOLOGY
IN DYNAMIC URBAN CENTRES

This book looks at how archaeologists in the early 21st century are dealing with the challenges and opportunities presented by development in archaeologically sensitive urban centres. Based on a session held at the 2017 EAA conference in Maastricht, the volume features case studies from across Europe and beyond – including Norway, Lithuania, Belgium, the Netherlands, the United Kingdom, Germany, Luxembourg, Switzerland, Italy and Israel.
The chapters look both at individual projects and larger thematic issues.

How has urban archaeology changed the ways in which archaeologists work? Is it possible to predict (and avoid or protect) sensitive archaeology in dynamic urban centres? Do technical solutions to preservation in situ actually work? How are the public involved and how do archaeologists promote public engagement? What are some of the issues and problems for the future?

This book is the first publication of the EAA Urban Archaeology Community, and its editors hope that it will provoke debate, and inform future developments in urban archaeology in Europe and beyond.