

Garden Archaeology in Flanders. Developing a new archaeological discipline in Flanders at the *Neue Garten* in the Landcommandery Alden Biesen (Bilzen) and the garden of the Plantin- Moretus Museum at Antwerp

Brian Dix¹, Geert Vynckier², Tim Bellens³, Herman Van den Bossche⁴ & Ria Fabri⁵

1 Introduction

Archaeology in gardens and Garden Archaeology are separate approaches to studying the remains of the past, each with different aims. The first excavates objects and their contexts within garden sites, where they may have little chronological connection; the latter seeks to reveal evidence of ephemeral garden layouts and associated remains, which may include structures as well as biological material.

Although garden archaeology has been successfully applied throughout Europe for over two decades now, its entry into Flanders is more recent with two excavations at major historic garden sites. The first project, part of the preparation for a masterplan and restoration campaign, sought to determine the layout and nature of 18th-century garden paths in the *Neue Garten* (1786) at the Landcommandery 'Alden Biesen' in the Limburg province. The other project searched for evidence of the early 17th-century garden in the courtyard of the Museum Plantin-Moretus in Antwerp as part of a study for an *in situ* garden reconstruction.

Both sites fall under the coverage of the revised 1992 Valletta Convention on the Protection of the Archaeological Heritage as stated in article 1 point 3, which includes developed sites such as gardens. Historic gardens are therefore subject to the Valletta Convention directives⁶.

Each excavation was authorized by the Territory & Heritage Agency. The individual projects enabled the Flanders Heritage Institute to gain substantial and useful expertise in the very specialised and multidisciplinary field of garden archaeology, showing it to be much more than an instrument for reconstruction.

2 The use of archaeology for studying historic parks and gardens

2.1 Theory and practice

2.1.1 The value of using archaeology

Archaeological methods have many uses in the study of historic gardens and associated parkland⁷. Remote-sensing techniques, such as aerial photography and geophysical investigation and detection⁸, combine with careful field observation, mapwork and documentary analysis to identify abandoned sites or to discover the lost details of those that still exist. In addition to providing insight into earlier fashions of garden-making the results help us to understand the development of such places and the reasons for change, denoting how individual remains might be significant or important and thereby aiding informed management and future preservation and restoration⁹. Non-intrusive surveys of this kind have become the prerequisite of modern conservation plans and related policies¹⁰. At the same time, archaeological excavation can be carried out to clarify particular details or to provide specific information that may enable authentic repair or guide accurate reconstruction (fig. 1, fig. 34). The scope of such investigation ranges from examining individual garden features or their components to the recovery of complete parterres and other layouts¹¹.

It is now commonplace for archaeological assessment to underpin most bids for funding the repair and reuse of historical sites¹². The essential contribution of archaeology to good conservation management is becoming more widely recognised, with appropriate studies being carried out in historic parks and gar-

¹ Independent consultant garden archaeologist, 5 Idris Villas, Tywyn, Gwynedd LL36 9AW, Wales, United Kingdom, final editing English text.

² Heritage researcher Archaeology, Flemish Heritage Agency, Jekerstraat 10, 3700 Tongeren, final editing article, geert.vynckier@rwo.vlaanderen.be.

³ Urban Archaeologist, City Department of Archaeology, City of Antwerp, Francis Wellensplein 1, 2018 Antwerp, Tim.Bellens@stad.Antwerpen.be.

⁴ Heritage researcher, Flanders Heritage Institute, Koning Albert II-laan 19, 1210 Brussels, herman.vandenbossche@rwo.vlaanderen.be.

⁵ Special academic personnel of the University of Antwerp, History Department; member of the Centre for Town History; conservator of Antwerp cathedral, Ria.Fabri@ua.ac.be.

⁶ European Convention on the Protection of the Archaeological Heritage, Valletta, 1992.

⁷ Brown (ed.) 1991; Jacques (ed.) 1997; Dix 2000; Currie 2005.

⁸ Bevan 1994.

⁹ Roberts 1995.

¹⁰ Dingwall & Lambert 1997, 23-24; Dix 2009.

¹¹ Dix 1999, 372.

¹² E.g. English Heritage 2008a.

dens from Russia to Romania, for example¹³, as well as in other parts of Europe and the rest of the world¹⁴.

2.1.2 The survival of sites

There are many forms of historic gardens¹⁵. In places where they continue in use, part of the previous layout and other early components may still survive. They can be difficult to recognise because of later alteration, but careful analysis may show the influence of early landscaping upon subsequent form. At Apethorpe in the English Midlands, for example, the series of formal terraced gardens which Sir Reginald Blomfield laid out in the early 20th century partly preserves the outline of a sequence of gardens that developed from at least the end of the 17th century; consequently they may overlie related archaeological remains (fig. 2)¹⁶. Blomfield was the author of an influential book on *The Formal Garden in England*, published in 1892, and Apethorpe is therefore an important site to evaluate the approach and techniques of a great protagonist of the Edwardian revival of the formal style.

The fashion for laying out broad terraces across sloping ground was especially popular during Renaissance times and fitted well the feel for linearity and the love for matching conceits and symmetry. Contemporary gardening was transformed by new ideas of design, becoming more outward-looking and often incorporating a theatrical quality for which the great inequalities of a site might be viewed as an advantage rather than something to be avoided. Where the elevated nature of a site gave the opportunity to create a panorama of the wider landscape, it would be the normal prerequisite to negotiate the hillside with terraces, so providing an architectural unity that lent the house and garden cohesion.

Such monumental planning is attested in many places, which survive solely as archaeological sites¹⁷. Their houses often having been pulled down and the surroundings abandoned, the rigid



FIG. 1 Reconstructed parterre-layout of 1701-02 at the Privy Garden, Hampton Court Palace, England based upon archaeological evidence.

Gereconstrueerde parterre uit 1701-02 van de Privy Garden, Hampton Court Palace, Engeland, gebaseerd op archeologische bevindingen.

FIG. 2 Early formal garden remains incorporated into later design at Apethorpe Hall in Northamptonshire, England.

De vroege geometrische tuin is geïntegreerd in latere tuinontwerpen in Apethorpe Hall in Northamptonshire, Engeland.



¹³ Parshin 2005 (Solovki, Russia); Gyula 2001, 85-100 (Bánffy Castle, Romania); e.g. English Heritage 2008a.

¹⁴ Malek (ed.) 2013.

¹⁵ Turner 2005 en 2010.

¹⁶ Binney & Hills 1979, 20; Smith 2007, 98-100.

¹⁷ Dix 2011a.



FIG. 3 Garden earthworks at Chipping Campden in the English Cotswolds. Originally laid out in the early 17th century, the gardens were abandoned within only a few decades when the adjoining house was deliberately fired and destroyed during wartime.

Tuinreliëfvormen in Chipping Campden in de Engelse Cotswolds. De tuinen werden aangelegd in de vroege 17de eeuw. Na enkele decennia werden ze echter aan hun lot overgelaten toen het aangrenzende huis tijdens de oorlogsjaren in brand werd gestoken en vernield.

structure and geometry of gardens constructed during periods when a formal layout was fashionable have ensured that many related elements survive, though mostly bereft of their original planting and other detail. The earthworks of terraces and dried-out canals now largely mark them, together with lesser scarps and hollows denoting the lines of walls, fountain basins, and paths (fig. 3)¹⁸. Contemporary historical documents might help to date the remains, sometimes to within a short time span, and the analysis of the more closely dated sites offers scope for a typology which may assist with the interpretation of less well-documented places. These can also include sites that have been extensively redeveloped for other uses¹⁹.

Studies of short-lived gardens provide important information about contemporary trends in design. Their investigation can also help to define modern management needs, as well as contribute to strategies for analysing less well preserved gardens.

The monumental treatment of landscape is not confined to a single period, but recurs frequently. At Mentmore Towers in the English Home Counties, Baron Meyer Amschel de Rothschild spared no effort in converting the existing countryside for use as an estate in the 1850s²⁰. The house was built in the highest part of the site, where it was given greater prominence by being elevated on an artificial platform overlooking largely flat parkland stretching towards the Chilterns around the south (fig. 4). The terraces, which surround the mansion on three sides to create its vantage point, still form steep slopes that are connected by flights of stone steps to the parterres below. Although the individual gardens have lost most of their original planting and are now largely laid to lawn, the original path layouts survive as earthworks. The contemporary framework of avenues, woods and approach roads can also be detected but whilst the irregular plantations which line part of the carriage drive retain traces of previous ornamental shrub planting, there are only occasional hollows left by the trees of the former elm avenue.



FIG. 4 The commanding position of Mentmore Towers in Buckinghamshire, England ensures that the mansion is clearly visible from the plain below. *De dominante positie van de Mentmore Towers in Buckinghamshire, Engeland zorgt ervoor dat het landhuis duidelijk zichtbaar is vanuit de lager gelegen vlakke.*

¹⁸ Taylor 1983, 41-59; Everson 1989.

¹⁹ Johnson & Campbell 2010.

²⁰ Chadwick 1961, 188-192.

A sense begins to emerge, therefore, of elaborateness and scale, which might be manifested also in a luxury of architecture, sculpture and other art. So the garden, often with associated parkland, may express its owner's artistic philosophy and through its fashioned landscape can also define his architectural horizon. Some places were designed to be highly visible, others to be more private. The differences between individual sites may relate not just to size and means of wealth, but can also reflect varied concepts and at times esoteric symbolism²¹.

2.1.3 Types of site

Individual sites range in date from classical times and earlier antiquity through medieval to the 20th century²². In addition to buried sites and earthworks that once provided the setting for royal residences, castles and other great homes, they extend to the lost features of modern public parks (fig. 5). They include surviving town and cottage gardens as well as the remains of the elaborate formal layouts, kitchen gardens and parkland around country houses²³.

The designed landscape surrounding a country house might also contain avenues, clumps of trees, shelter belts and other parkland planting²⁴, often previously connected with further garden buildings and monuments that served as focal points of vistas or eye-catching features²⁵. A picturesque quality could be created through carefully contrived scenes, incorporating specially designed planting or altering the terrain in order to create lakes and raise hills from the excavated spoil (fig. 6). The Picturesque and the advance of Romanticism exerted great influence in European culture and its sentiments are still felt in rural planning and countryside protection as well as in landscape architecture²⁶.

FIG. 5 The outline of a former ha-ha boundary picked out by leaves gathered in the hollow that marks its course around the edge of Kensington Gardens, London.

De contouren van een voormalige ha-ha zijn duidelijk zichtbaar door de ingewaaide verzamelde bladeren, Kensington Gardens, Londen.



2.1.4 The role of archaeology

The recognition of patterns of spatial and chronological variation and the identification of how features may interrelate are essential to interpretation. Indeed, the value of the individual parts is greatly enhanced by this association, and with contemporary documentation provides an important insight into the attitude of former owners. The practical application of the evolution of such thought can only be understood, however, through an awareness of what had gone before and by understanding the effects of what came after. Likewise, it is difficult to grasp the significance of change without an appreciation of contemporary horticultural and tree-planting practices and their antecedents²⁷.

Archaeology is a powerful tool to discover the details of both earlier and later periods, as well as demonstrating the nature of change. The features associated with past water management, woodland planting, parkland and farm use, for example, are all part of the local landscape development (fig. 7). Together with the vestiges of earlier land-use and exploitation, they have influenced to varying extent the present ecology as well as social and economic history²⁸.

Comparative studies and the examination and recording of boundary types and related building forms, such as ha-ha walls, gates and bridges, which are often depicted in dated maps and mentioned in other documents, can be particularly informative upon the evolution of an individual estate (fig. 8)²⁹. Abandoned approach routes and winding carriage drives, which might still be lined by sunk fences or patent iron-railed fencing, build a picture of how the landscape may have been manipulated to impress, or even overawe the visitor. Similarly, consideration of the distribution

²¹ Dix 2011a, 170-173.

²² See for example Jashemski 1992 on ancient Roman gardens; Everson 1998 and Taylor 2000 for medieval.

²³ Taylor 1983; Taylor 1998; Bowden (ed.) 1999, 145-149.

²⁴ E.g. Taylor 1998, 95-115.

²⁵ Woodfield 1991.

²⁶ Hunt 2003; Cf. Turner 2005, 227-231.

²⁷ Phibbs 1991; Couch 1992.

²⁸ Williamson 1999, 252-258.

²⁹ E.g. Barnatt & Williamson 2005; Barnatt & Bannister 2009.



FIG. 6 Dried-out lake within the 19th-century romantic park at Bánffy Castle, Bonchida in Transylvania.
Uitgedroogde vijver in het 19de-eeuwse romantische park van Bánffy Castle in Bonchida, Transsylvanië.



FIG. 7 Part of a network of 15th-century and later canals which connect the island lakes on Solovki in the White Sea close to the Arctic Circle.
Deel van een 15de-eeuwse en later netwerk van kanalen dat de eilandmeren in Solovki aan de Witte Zee, dichtbij de poolcirkel, met elkaar verbindt.



FIG. 8 Distinctive type of local boundary on the Belsay Estate in northern England.
Typische lokale grens in het Belsay Estate in Noord-Engeland.

of traces of former cultivation and their relationship with later drainage and tree planting may enable the reconstruction of earlier field patterns and the identification of park influences.

As seen today, therefore, the landscape setting of many country houses is the product of several centuries of development. While nothing may be known of the house and gardens that preceded the current mansion, the surrounding parkland may nevertheless preserve traces of earlier use as well as the earthwork remains of previous settlement and related features³⁰. Some, like fishponds, may have been subsequently enlarged to form lakes and later avenues and woodland planting might occupy earlier headlands or respect other divisions. Together with occasional buildings, they were frequently linked to the house and each other by formal rides and other walks laid out within the estate boundaries.

Despite denudation and replanting, or the uncertainty of dating many individual features, the broad processes of earlier remodeling can often be traced. Whereas the progression between the different parts of a site may be sufficiently gradual that the join between the separate historical layers goes largely unnoticed, archaeological consideration of the individual landscape elements and associated historical map evidence will often show that the present appearance is made up of several layers³¹.

2.2 Avenues of enquiry

2.2.1 Archaeological research

Within existing parkland and other open land, previous layouts and their planting, given up for reasons of economy, the lack of labour to maintain them, or simply change of fashion, may be preserved beneath modern lawns and other development (fig. 9).

FIG. 9 The terraced parterre layout of the early 1700s is still apparent at Melbourne Hall in Derbyshire, England despite the loss of original planting. *De lay-out van de terrasparterre uit de vroege 17de eeuw is nog steeds aanwezig in Melbourne Hall in Derbyshire, Engeland, ook al is de oorspronkelijke beplanting verdwenen.*



Together with more prominent earthworks, low banks and scoops may denote the existence of earlier garden features, while evidence of large-scale earthmoving for previous landscape effect might be indicated by mottled cropmarks and pitting visible in aerial photographs or traceable on the ground through different grasses and other changes of vegetation.

Archaeology is an essential means to discover the character, date, condition and survival of these remains. As well as ensuring proper understanding of the history and function of the surviving garden elements, its results may add knowledge about the wider context that is crucial for site interpretation and management, particularly with respect to future use and development. The historic core of many gardens is still recognisable and typical elements of rigid landscape design can often be traced from the Middle Ages onwards³².

The potential for survival of former garden and park layouts can be determined by establishing when the basic structure of the site was laid out and what were the significant phases of development, indicating the form that each took and showing what remains of them.

Archaeological analysis and assessment should proceed through the following tasks:

- Primary documentary sources should be checked and all relevant maps, together with appropriate information from aerial photographs, high-resolution airborne laser scanning (LiDAR) and other data sets, need to be transcribed at a standardised scale onto a modern cartographic base. The recognition of patterns of chronological and spatial variation and the identification of how features may inter-relate are essential to interpretation. Their evolution and development

³⁰ Brown 1998.

³¹ Barnatt & Williamson 2005, 193–222.

³² Creighton 2009. See also van Buren 1986, 119 and fig. 2.

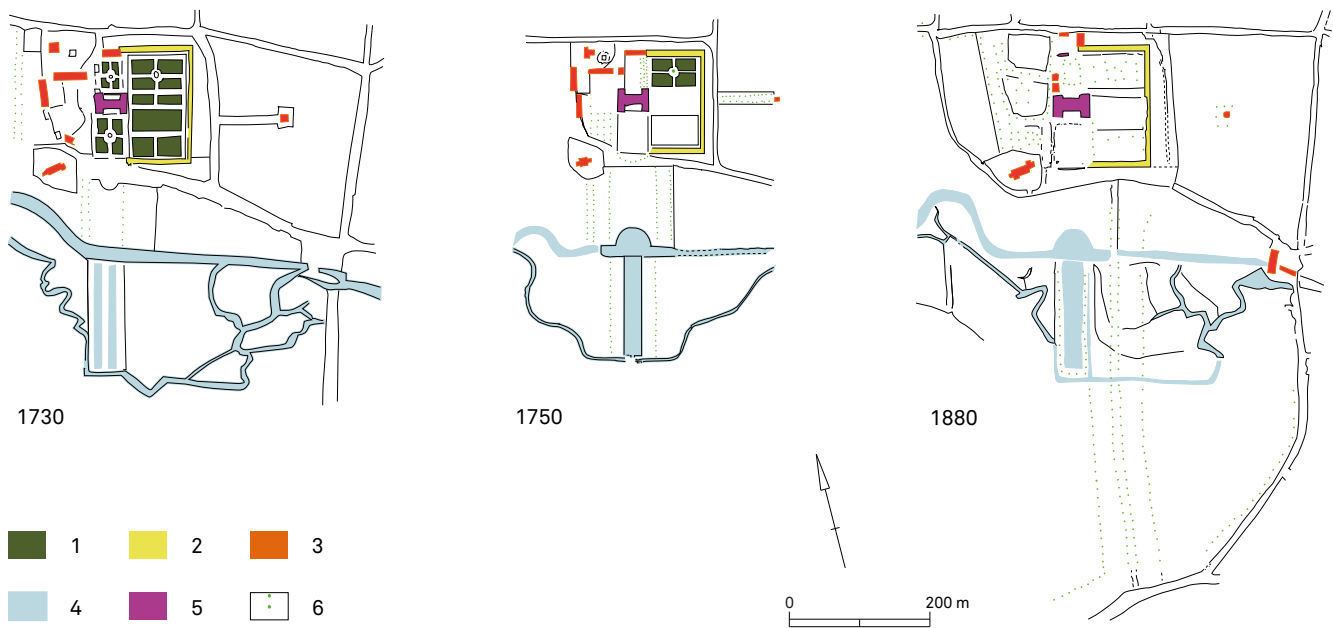


FIG. 10 Sequence of maps based on historical, topographical and archaeological evidence showing phases in the development of the gardens and surrounding landscape at Shaw House, near Newbury, West Berkshire, England. 1: parterres with geometrical planting of the formal gardens and grounds; 2: terraces of the formal gardens and grounds; 3: buildings; 4: watercourses; 5: Shaw House; 6: avenues and other tree planting.

Een opeenvolgende reeks van kaarten gebaseerd op historische, topografische en archeologische gegevens toont de ontwikkeling van de tuinen en het omliggende landschap van Shaw House, bij Newbury, West Berkshire, Engeland. 1: parterres met geometrische beplanting van de formele tuinen en gronden; 2: terrassen van de formele tuinen en gronden; 3: gebouwen; 4: waterwerken; 5: Shaw House; 6: lanen en andere boomaanplantingen.

can be reconstructed using a series of landscape regression maps to show the changing character at different times, and thereby define the intrinsic qualities of the site (fig. 10).

- A definitive topographical survey of any upstanding earthworks should be linked with the analysis of boundaries, surrounding walls and other built features of the gardens or parkland. It should incorporate the identification and recording of historic trees (fig. 11), with appropriate sampling by coring and slicing of dead specimens for dendrochronology and growth analysis. Studying the species, form and branch structure of surviving trees can give evidence of past function and use, as well as enable periods of planting or changes in pruning to be estimated. Variations in surface vegetation denoting former garden divisions and evidence for planting should also be mapped.
- A further tool of non-destructive investigation is geophysical prospecting (fig. 12). In favourable conditions both earth resistance measurement surveys and magnetometry have proved useful in tracing buried paths and flowerbeds, together with locating buried walls and ornamental features such as fountain basins.

- Archaeological excavation and kindred studies, including soil and related biological analyses, might be undertaken in order to increase understanding of the site as well as in relation to specific design proposals. Its scope can be either comprehensive or selectively targeted, according to individual requirements (fig. 13). It can be used to evaluate the extent and condition of surviving remains, thereby providing information upon the constraints of a site, or be undertaken to aid research and as an essential stage of reconstruction. As in all archaeological excavation, the quality of results depends upon the experience and knowledge of the individual excavator and the ability to distinguish what are often subtle differences of soil texture and colour.

While the detailed specification will vary according to site and circumstance, it is important that all work is undertaken to a consistently high standard. Although a number of different survey strategies may be employed, in every instance it is an explicitly archaeological exercise and should incorporate suitable recording and sampling techniques³³. A report must be prepared for each episode of fieldwork, summarising the scope of the work and the methodology adopted, and containing sufficient supporting information to validate its conclusions. It should be sustained by a properly ordered and accessible archive, comprising the detailed records of the fieldwork and analysis³⁴.

³³ Different surveying techniques are usefully reviewed in Bowden (ed.) 1999, 194–201.

³⁴ *Ibid.*, 167–188. Cf. also Fretwell 2001, 78–79.



FIG. 11 Remains of an old pollard oak in Warwick Castle Park, English Midlands.
Resten van een oude knoteik in Warwick Castle Park, Engelse Midlands.



FIG. 12 Geophysical survey using a resistivity meter.
Geofysisch onderzoek: elektrische weerstandsmeting op het terrein.

FIG. 13 Carefully targeted excavation revealing the foundations of steps that formerly connected separate garden areas at Ascott Park near Oxford, England. Scale rod 1-m long.
Doelgerichte opgraving naar de fundering van een trap die vroeger verschillende delen van de tuin verbond in Ascott Park nabij Oxford, Engeland. Schaallat met een lengte van 1 m.



2.2.2 Historical views

The study of the primary archival sources for the history of any place allows the individual stages of landscape development to be charted and sometimes closely dated³⁵.

A wide variety of pictorial sources for the former appearance of European gardens survives from later Medieval and Renaissance times onwards in a series of contemporary topographical views which show houses and their settings (fig. 14)³⁶. They comprise original drawings and paintings (fig. 15), together with engravings and prints made from them – even tapestry³⁷ – as well as more recent photographs preserved in family albums and other collections, or used in sales particulars and to illustrate articles on homes and gardens published in a variety of magazines, books and newspapers since the 19th century³⁸.

The quality of artist's depiction ranges from the naïve to the accomplished, sometimes with dimensional accuracy achieved through the device of a *camera obscura*, as appears to have been used by Balthasar Nebot in 1738 to portray the gardens at Hartwell House, near Aylesbury, England³⁹. The resulting series of

8 paintings, now belonging to the Buckinghamshire Archaeological Society, contain sufficient points of overlap that make it possible not only to determine the original viewpoints but to use their co-ordinates for a reconstruction of the overall landscape design. From detailed measurement it has been possible to make a three-dimensional model of the gardens as Nebot would have seen them⁴⁰. Similar series of views of other places with interlocking viewpoints could likewise be used to generate computer-based virtual reconstructions⁴¹.

The status of an individual drawing needs to be established in order to gauge its usefulness⁴². Some views may have been prepared to demonstrate the effects of proposed alterations and, therefore, they do not necessarily show something which was built. At Hampton Court Palace, for example, an early 18th-century bird's-eye view by Leonard Knyff shows a triangular garden containing a fountain at the south-eastern end of the Privy Garden⁴³. It is also illustrated in a separately published engraving, even though it appears never to have been constructed⁴⁴. Close physical examination of the area has failed to reveal associated earthworks or other remains and geophysical survey also proved negative.



FIG. 14 View of Ooidonk Castle in a late 16th-century parchment, Deinze, province of East-Flanders, Belgium (private collection Ooidonk Castle). *Zicht op het kasteel van Ooidonk op een laat-16de-eeuws perkament, Deinze, provincie Oost-Vlaanderen (Kasteel van Ooidonk, privéverzameling).*

³⁵ This can include oral history as well as maps and other documentary sources *cf.* Lambert *et al.* 1995.

³⁶ See for example Harris 1979; Strong 2000. Also Boudon 1991a.

³⁷ E. g. Mitchell 1999 on tapestries that show images of Enguien's garden features.

³⁸ Elliott 2004; see also Hobhouse & Wood 1988. For early garden photography see for example Forsyth 1983; Mott 1991. On the usefulness of picture postcards, see Elliott 2003.

³⁹ Strong 2000, 224–232.

⁴⁰ The model is currently displayed in the Staircase Hall at Hartwell. See further Throssell &

Rutherford 2008.

⁴¹ Almagro 2007.

⁴² Boudon 1991b, 129–131.

⁴³ Harris 1979, fig. 117.

⁴⁴ Harris & Jackson-Stops (ed.) 1984, 20–21; Jacques 1995, 34; Thurley 2003, 235.

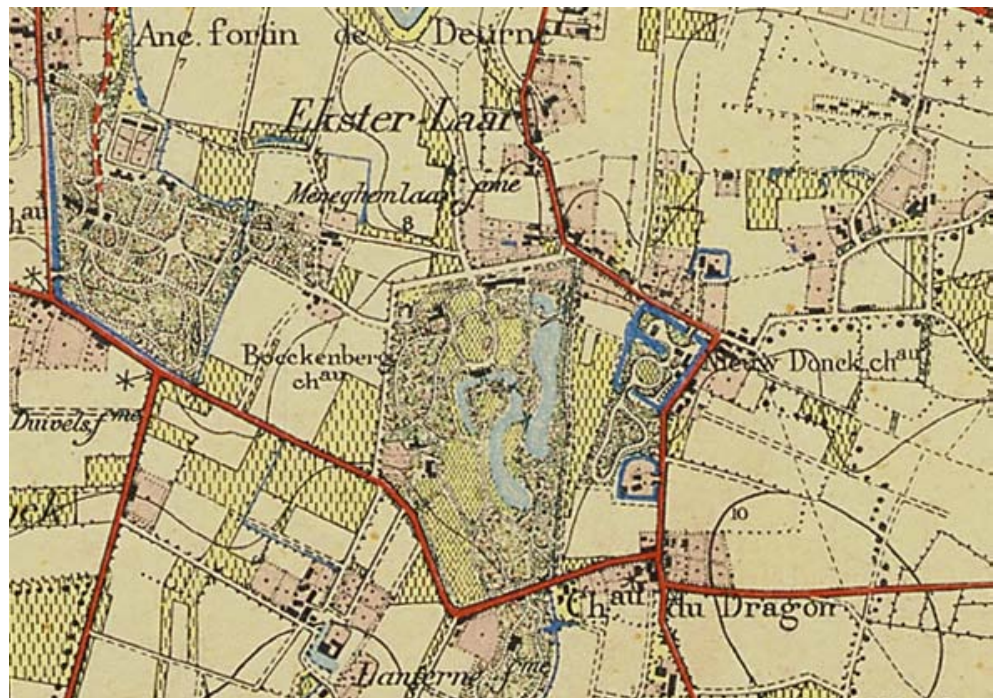
The depiction of other places may be similarly misleading. By copying the distorted images reflected in the 'Claude glass', a slightly convex tinged mirror beloved by the practitioners of the Picturesque, artists could easily give a false impression regarding the relationship between individual features and different parts

of the landscape⁴⁵. Likewise, the height of features and ruggedness of the terrain was sometimes exaggerated for effect. The careful enquirer should always be aware of the possibility for artistic licence.

FIG. 15 Gouache of 1917 of the parterre gardens at Hex Castle by Jos Damien, Hex, commune of Heers, province of Limbourg, Belgium (private collection Hex Castle).
Gouache uit 1917 door Jos Damien met de parterretuinen van het kasteel Hex, Heers, provincie Limburg (Kasteel Hex, privéverzameling).



FIG. 16 So-called *Dépôt de la Guerre*, sheet 15/4, of 1892 showing the Boekenbergpark, Deurne, district of Antwerp, province of Antwerp, Belgium. *Het Boekenbergpark op de Dépôt de la Guerre-kaart, blad 15/4, uit 1892, Deurne, provincie Antwerpen.*



⁴⁵ Hunt 2003, 72.

2.2.3 Maps

At first sight historical map evidence is invaluable. It can range from 16th- and 17th-century surveys through other manuscript estate plans and cadasters to printed county or other regional maps and the successive editions of modern maps issued since the 19th century (fig. 16)⁴⁶. It is important, however, to bear in mind that the first mapmakers were generally commissioned for particular purposes of surveying. Small scales and the constraints of comparatively primitive surveying methods frequently led to a loss of detail that might be compensated for by schematic representation. Some of the earliest maps, therefore, should be seen not so much as part of the discipline of cartography as it is practised nowadays, but rather as containing a quantity of reliable information that requires corroboration.

Likewise scale models, such as those in the series of *plans-reliefs* which were made previously for strategic use and military instruction, can be useful to show the context of individual gardens, although largely depicting them in a generalised way⁴⁷. Sometimes, however, they contain astonishingly accurate detail, as in the late 18th-century model of the Royal Naval Dockyard at Chatham on the River Medway in Kent⁴⁸ where the portrayal of the layout of gardens of Officers' Terrace has been confirmed by excavation⁴⁹.

Town and city maps often provide useful information about smaller gardens as well as larger estates (fig. 17). Relating the individual 18th-century surveys of London by Rocque and Cary with the modern detail of Ordnance Survey mapping, or even the Geographia Street Atlas, for example, shows how many ghosts of the capital's old estates and gardens survive in today's topography⁵⁰. Though some places have been completely built over, the lines of modern streets may perpetuate the avenues of their former grounds. Other sites can be traced where schools

and playing fields have sometimes cut them up, or they are partly preserved in golf courses and other open land. There might even be fragments of walls or the occasional pair of gate piers still to be identified (fig. 18). Site inspection, or fieldwork, to check for physical remains is the next step after historical map analysis.

2.2.4 Other documents

The high profile and status gardens of the aristocracy in the 17th and 18th centuries naturally attracted much attention, as was intended. They formed the logical focus of the burgeoning interest in all things botanical, and quickly became homes to the growing collections of plant specimens that were being gathered from around the world⁵¹. For some owners, therefore, gardens could be objects of scientific enquiry in addition to being used for recreation and as a stamp of status. Such close attention meant that a wealth of correspondence, memoranda, practical manuals, guidebooks, and other writings grew up around the art of gardening, as well as concerning the gardens themselves, together with their plants, and even the gardeners⁵².

Such primary sources can be more reliable than commissioned views and some maps, which cannot always be taken at face value and may show what their patrons wanted rather than an authentic state of affairs. Genuine mistakes, and occasional outright lies, are more easily recognised as inconsistencies when a series of letters or similar documents survives. The individual documents were written for a specific purpose, however, and even as records they often innocently omit details and whole episodes which may become central to the questions raised hundreds of years afterwards. In such situations, archaeological investigation may be the appropriate corroborative avenue of enquiry. Where there are no documents at all, it is the only means of establishing the history and nature of a site.



FIG. 17 View and map of the town of Ninove in the *Flandria Illustrata* of 1641 showing the presence of individual town gardens, Ninove, province of East-Flanders, Belgium. *Panoramisch zicht en plattegrond van de stad Ninove met zijn individuele stadstuinen in de Flandria Illustrata van 1641, Ninove, provincie Oost-Vlaanderen.*

⁴⁶ See for example Harley 1972. Also Boudon 1991b.

⁴⁷ de Roux *et al.* 1989; Warmoes 1997.

⁴⁸ Now at the National Maritime Museum in Greenwich, London.

⁴⁹ Longstaffe-Gowan 1993, 53–55.

⁵⁰ Harris 1990.

⁵¹ Chambers 1993, in particular chapters 6 and 7.

⁵² Lambert *et al.* 1995, 15–17.

2.3 Looking for evidence

2.3.1 Earthworks and other field remains

A full range of archaeological techniques can be applied to studying historic parks and gardens⁵³. In Britain, where there is a long tradition of field observation, probably the earliest archaeological record of garden features is the sketch plan that John Aubrey made of the remains of Rosamund's Bower in Woodstock Park in the 17th century⁵⁴. It is only in the last hundred years, however, that former garden earthworks have been widely recognised. Yet, whilst Alicia Amherst in her pioneering study of *A History of Gardening in England* (1895) identified fishponds, terraces and other relict features from historic gardens, it was not until the 1960s that systematic recording began⁵⁵. Since then many abandoned historic garden sites have



FIG. 18 Base of former garden gateway embedded in a later wall at Ashby de la Zouch, Leicestershire, England.
De basis van een voormalige tuinpoort in een latere omwallingsmuur in Ashby de la Zouch, Leicestershire, Engeland.

been identified and their layouts accurately surveyed, thereby supplementing other historical information or providing the only detail where records are lacking⁵⁶.

The types of site range from the large scale and well documented to the small and obscure, where earthworks may constitute the only evidence (fig. 19). The likelihood that individual sites were laid out at different times should warn against too simple an explanation of their cultural context⁵⁷, but the careful analysis of dated examples (or those places that may prove to be dateable) greatly enhances our understanding.

Together with the banks and ditches of former raised walks and moats, lesser scarps and other depressions may betray the presence of early garden features, marking the lines of walls and sunken paths. Previous flowerbeds can also be identified. Their remains have been recognised over a wide geographical area, ranging from the sloping terraces of a monastic garden on the island of Solovki, on the edge of the Russian Arctic Circle⁵⁸, to the geometrical layout of former colonial gardens in the USA⁵⁹.

2.3.2 Recording

Examples of abandoned gardens vary enormously in size, complexity and importance; and for some sites the field remains comprise the only evidence.

- Topographical survey should comprise the examination and recording of all physical traces of landscape development, from boundaries and woodland divisions to the identification and accurate surveying of other structures and earthworks. The details can be compiled in a GIS database⁶⁰.

All remains should be accurately measured by a full metric survey to show in a location plan the context of any surviving up-standing structures, wall foundations, pathways, garden layout and earthwork remains, thereby demonstrating their spatial relationship and relative heights. This should be augmented by a detailed earthwork survey to be undertaken of slopes and other visible archaeological remains (fig. 20). The results, which should include the extent and nature of any degradation, are most conveniently shown by hachures and contour plans accurately located on the metric base⁶¹.

In addition to being mapped, the elevations of standing walls should be photographed, with the results augmented by rectification, photogrammetry or drawn records as appropriate (fig. 21). Their individual nature should be described to include brick types and mortar joints, as well as other geological identifications and phasing information. The study should convey understanding of the plan form and its development, fabric and construction, fixtures and fittings, and the date or period of each phase of modification⁶².

⁵³ Currie 2005, 27-91.

⁵⁴ Colvin 1986, fig. 6.

⁵⁵ Taylor 1991, 1-3.

⁵⁶ Taylor 1983; Everson 1991.

⁵⁷ Williamson 1999, 247-251.

⁵⁸ Parshin 2005.

⁵⁹ E.g. I. Noël Hume 1974; Leone & Shackel 1990.

⁶⁰ Pert 2006.

⁶¹ English Heritage 2007.

⁶² See for example English Heritage 2006; Currie 2005, 45-52.



FIG. 19 Previous garden terraces preserved in pasture at Collyweston in Northamptonshire, England.
In grasland bewaarde voormalige tuinterassen in Collyweston in Northamptonshire, Engeland.

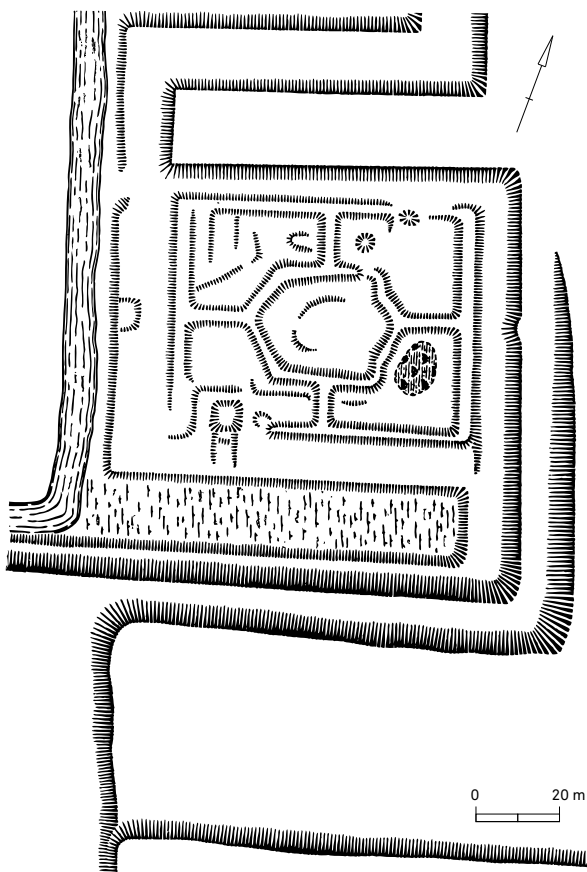


FIG. 20 Earthworks plan of an early 18th-century flower parterre in the gardens at Boughton House near Kettering, Northamptonshire, England. The remains were only 100–150 mm high when surveyed by the former Royal Commission on Historical Monuments England and have since been destroyed.

Plan met het grondverzet voor een 18de-eeuwse bloemenparterre in de tuinen van Boughton House bij Kettering, Northamptonshire, Engeland. De restanten waren slechts 100–150 mm hoog toen ze door de voormalige Royal Commission on Historical Monuments van Engeland werden opgemeten. Ze werden daarna vernield.



FIG. 21 Careful analysis of the form and fabric of surviving walls can lead to the identification of parts of lost structures such as this fragment of an 18th-century orangery now in the grounds of Shaw House School, Newbury in England.

Zorgvuldige analyse van de vorm en bouwwijze van de resterende muren kan leiden tot de identificatie van delen van verdwenen structuren, zoals dit fragment van een 18de-eeuwse orangerie op de terreinen van Shaw House School, Newbury in Engeland.

2.3.3 Other types of evidence

Through aerial photography the details of sites can be viewed as a unity and seen in their physical setting (fig. 22). Depending upon conditions, minute differences of surviving relief can be emphasised by shadow or lingering frost and surface water, so bringing new understanding to features that are vague or obscure to the observer on the ground. Similarly, aerial reconnaissance can reveal sites where the original topography has been destroyed and the only evidence is formed by soil- or crop-marks⁶³. Differences in vegetation and susceptibility to parching in dry weather may help to characterise previous planting arrangements. In the mid-1930s, for example, the then owner of Wotton House in Buckinghamshire, England directed his gardeners to restore an earlier geometric pattern of flowerbeds by observing them from the roof, and traces of old garden layouts have been similarly viewed elsewhere⁶⁴.

Former tree-sites within parkland may similarly be visible in the shape of the ground or can be denoted by different vegetation⁶⁵. When trees are felled, the stumps will subsequently rot and eventually leave hollows at their sites. Even where the stumps are dug out and the surface is made good afterwards, there will usually be a sufficient volume of root material, combined with settlement of the soil, to form depressions in subsequent years. Higher levels of fertility have often encouraged nettles and thistles to grow within the zone of rotted root material, allowing the plotting of long-lost sections of avenue (fig. 23).

The identification and analysis of such field remains can reveal the precision of the original laying out and show how conflicting geometries were resolved, as when avenues intersected. The reinstatement of some of these formal frameworks, like the early avenue-system in the Home Park at Hampton Court in West London⁶⁶, can revive an important visual amenity (fig. 24).

In addition to noting the instance of trees and other flora possibly associated with historical planting, the more general character of the vegetation and tree canopy should be assessed⁶⁷. Studying the species, form and branch structure of surviving trees and bushes can give evidence of past function and use, for example as pollards, pleached lines, or clipped topiary (*cf.* fig. 11)⁶⁸. Dates for planting or changes in pruning can be estimated and methods of cultivation might be suggested by the examination of knots and root structures⁶⁹. The remnant of an earlier field boundary is sometimes indicated by ancient trees, which were valued for their maturity as much as retained for timber benefit.

Important details can therefore be revealed by analysing the relationship of trees to other aspects of the natural and man-made landscape, which may show how the existing landform influenced development or was indeed changed by it. Interpretation is not always easy, however. For instance, where woodland covers what appears to be the remains of earlier ridge-and-furrow cultivation and the majority of trees have been planted on top of the ridges, it is possible that the corrugated surface effect was caused by deliberate trenching for drainage, as recorded at Mentmore Towers in the 19th century⁷⁰.

FIG. 22 Aerial view of the late 16th-century gardens at Lyveden in Northamptonshire, England showing how they relate to contemporary buildings and the wider landscape. In places soil marks denote where garden and earlier remains have been flattened by ploughing.

Luchtfoto van de laat-16de-eeuwse tuinen te Lyveden in Northamptonshire, Engeland, waarop duidelijk de relatie te zien is met eigentijdse gebouwen en het omliggende landschap. Hier en daar geven bodemmarkeringen aan waar tuinen en overblijfselen door ploegen geëffend werden.



⁶³ Wilson 1991. See also Binney & Hills 1979, 10-27; Taylor 1998.

⁶⁴ E.g. Steane & Dix 1997, 76; Dix 2012.

⁶⁵ Dix & Jacques forthcoming.

⁶⁶ Dix 2010, 18; Thurley 2003, 232-233 and fig. 231.

⁶⁷ Phibbs 1983, 167-168; Bowden (ed.) 1999, 149-150.

⁶⁸ Taigel & Williamson 1993, 23-29.

⁶⁹ Mitchell 1978, 25; Pigott 1989 en 1995.

⁷⁰ Chadwick 1961, 189.



FIG. 23 Former tree-positions can be identified through surface undulation and differences in vegetation. The careful recording of such traces can lead to the rediscovery of the rhythm and spacing of original planting.

De positionering van de verdwenen bomen kan afgeleid worden uit on-effenbeden in het maaiveld en verschillen in vegetatie. Het nauwkeurig registreren van dergelijke sporen kan leiden tot de herontdekking van de ritmering en plantafstanden van oorspronkelijke aanplantingen.



FIG. 24 Following suitable ground treatment new trees have been planted using historical positions in the reconstructed avenues in the Home Park at Hampton Court, West London.

Na een gepaste bodembehandeling werden nieuwe bomen aangeplant op hun historische plaats in de gereconstrueerde lanen in Home Park, Hampton Court, West Londen.



FIG. 25 Shade plot of resistivity survey results within part of the Privy Garden at Hampton Court Palace revealing the outline of historic plates-bandes. Shade plot using high pass filter (radius 5m Gaussian); plotting parameters: minimum -5 ohms, maximum 5 ohms, contrast factor 2 around the mean. Scale 1:1500, north at top; information provided by Northamptonshire Archaeology.

Via elektrische weerstandsmeting in een deel van de Privy Garden in Hampton Court Palace konden de contouren van de historische plantenperken zichtbaar gemaakt worden. Gradiëntenkaart waarop high pass filter werd toegepast (radius 5m Gaussian). Plotparameters: minimum -5 ohm, maximum 5 ohm met contrastfactor 2 rond gemiddelde. Schaal 1:1500, noorden bovenaan; informatie aangeleverd door Northamptonshire Archaeology.

2.3.4 Geophysical survey

Systematic geophysical prospection can be a valuable tool of non-destructive investigation, either to augment other forms of survey or to search across lawns and other grass swards, or even ploughed-out sites, where occasional parchmarks and soilmarks might be the only indication of lost features⁷¹. In favourable conditions both electrical earth resistance measurement surveys and magnetometry have proved useful in tracing buried paths and flowerbeds, together with locating garden walls and ornamental features such as fountain basins (fig. 25 and figs. 1 and 34)⁷². Depending upon the nature of soil conditions and sample spacing, the results can achieve extraordinary detail⁷³. Some locations may also cause a response to dowsing, although it is generally difficult to distinguish between different types of feature and results can vary enormously between individual practitioners⁷⁴.

The resistivity technique detects differences in soil moisture and is therefore especially useful for locating high-resistance features such as the compacted surfaces of earlier paths as well as buried masonry and drains. Conversely, enhanced water content creates low-resistance locations, often to be found in flowerbeds, tree pits and the sediments filling garden canals and ponds.

Magnetometry, which measures the contrast between the magnetic properties of buried features and those of the surrounding soil, is frequently used to add further detail. The technique is particularly sensitive to ferrous materials and can aid the identification of iron objects, like the buried posts of a former pergola, or distinguish between different types of drain. Flowerbeds have also been detected in suitable conditions, possibly where previous manuring has organically enriched the soil within them.

A reading interval of 1m x 1m is usually sufficient for the detection of most historic garden features, and a variety of data-treatment procedures can be used to enhance significant anomalies and present the results in graphic form⁷⁵. Sometimes the effect is confusing, particularly where a garden has been remodelled at different times and there is superposition of features from later phases. Their interpretation may therefore depend upon the availability of related historical information, as at Magdalen College, Oxford, where resistivity survey revealed a mesh of linear features belonging to garden layouts shown in a sequence of maps dating from the late 16th century to 1750⁷⁶.

2.3.5 Excavating historic gardens

Whereas the lost elements of successive phases of a garden's history may often be identified through the historical record and using non-intrusive surveys, the detail of their evolution can only be understood through appropriate archaeological excavation⁷⁷. The scope ranges from the comprehensive to the selective, targeting particular aspects either for the academic interest of the historical information alone or for assessing the veracity of a reconstruction⁷⁸. The investigation may be used to gather detailed information concerning site history and development, defining

⁷¹ English Heritage 2008b, cf. Volkman (ed.) 2011.

⁷² Aspinall & Pocock 1995; Cole *et al.* 1997.

⁷³ Woudstra *et al.* 2004.

⁷⁴ See for example Potter 2000, 40.

⁷⁵ English Heritage 2008b, 41-49.

⁷⁶ Steane & Dix 1997.

⁷⁷ E.g. Currie & Locock 1993 (Castle Bromwich); Dix *et al.* 1995 (Kirby Hall).

⁷⁸ Bell 1993 (Painswick).

the appearance at specific times⁷⁹, as well as to test the degree of survival of the buried layout to ensure that significant features are not lost or obscured during routine maintenance or repair. The excavation of paths, for example, can provide evidence for the material of their construction, together with details of their former dimensions, previous cross-section and original arrangement, as well as indicating their vulnerability to damage (fig. 26). Sampling strategies might therefore range from uncovering an entire formal layout in readiness for accurate reconstruction to the examination of the salient points and key features of the grounds⁸⁰.

Traces of plants associated with former garden features may be preserved in old pond-silts and other soil. They can include seeds, pollen and phytoliths (mineral particles formed within plant tissue), as well as macrofossils such as leaves, stems, wood and roots⁸¹. With the remains of molluscs, insects and vertebrates, such botanical information can improve knowledge of the former environment and supplement historical planting records⁸². Related studies of the soil itself may show the extent and nature of deliberate enrichment or other improvement, further indicating the original gardening practice (fig. 27)⁸³.



FIG. 26 Shallowly buried remains of a previous path at one corner of the 18th-century walled kitchen garden at Sugnall in Staffordshire, England. Scale length, 1 m.

Ondiep begraven overblijfselen van een voormalig pad in de hoek van de ommuurde groentetuin in Sugnall in Staffordshire, Engeland. Lengte schaallat 1m.



FIG. 27 Cross-section of an 18th-century flowerbed beneath a modern border at the Geffrye Almshouses (now Museum) in Shoreditch, East London. Layers of ash, charcoal and crushed chalk were deliberately introduced to improve soil quality. Scale rod 1-m long.

Profiel van een 18de-eeuws bloemenperk onder een moderne bloemenborder in Geffrye Almshouses (nu museum) in Shoreditch, Oost-Londen. Lagen van as, houtskool en fijngestampte kalk werden bewust toegevoegd om de kwaliteit van de grond te verbeteren. Lengte schaallat 1m.

⁷⁹ Although details of interpretation may sometimes be disputed, as at Aberglasney in Carmarthenshire, Wales - see Briggs 1999; Blockley & Halfpenny 2002.

⁸⁰ Currie 2005, 58-62.

⁸¹ Currie & Locock 1991, 87-90; Murphy & Scaife 1991, 85-93; de Moulins & Weir 1997, 42-4; Fish 1994; Miller & Gleason 1994, 33-7.

⁸² Murphy & Scaife 1991, 93-95; de Moulins & Weir 1997, 44-45; Dix 2011a, 157.

⁸³ Currie & Locock 1991, 84-87; Murphy & Scaife 1991, 83-85; Miller & Gleason 1994, 29-32. See also Dix & Parry 1995, 115-118.

2.3.6 Some garden excavations

The first modern reconstruction of ancient gardens to be based upon the recognition of the buried remains of former paths and planting beds took place in Pompeii. In the House of the Vettii the *viridarium*, or interior peristyle garden, was laid out along original lines revealed by excavation in 1894-95 (fig. 28)⁸⁴. Despite accurate layout, the choice and positioning of plants within the individual gardens was wholly conjectural and it was not until much later that attention was given to analysing the root holes left by trees and smaller plants⁸⁵. Only then did it become possible to identify ornamental effects and to distinguish separate uses between different parts of the garden⁸⁶.

The earliest archaeological excavations in more recent historical gardens were similarly confined to the recovery of structural details, such as the position of steps and location of boundary walls. Investigation was largely directed towards checking the salient points of a layout that might otherwise be documented



FIG. 28 An early example of a garden layout reconstructed from archaeological evidence in the House of the Vettii at Pompeii, Italy. *Een vroeg voorbeeld van een tuinontwerp in het huis van de Vettii te Pompei, Italië, gebaseerd op archeologische gegevens.*

by written or pictorial sources. At Stratford Hall, USA, pioneering work organised by the Garden Club of Virginia in 1930-32 showed where terraces, ha-has and paths had existed in the 18th century and led to their accurate reinstatement⁸⁷. The design of crosswalks in the contemporary gardens of the Governor's Palace in Williamsburg was likewise reconstructed from the discovery of steps and other foundations in the early 1930s (fig. 29)⁸⁸. Similar methods of garden investigation were first applied in England at about the same time⁸⁹. Excavations at Kirby Hall, Northamptonshire, after it was taken into state guardianship in 1930, led to a re-creation of what its garden may have looked like in the 17th century. As with other historical reconstruction at that time, much of the detail was conjectural and more modern excavation has shown how the attempted layout confused evidence of different periods, as well as introduced an inappropriate planting scheme (fig. 30)⁹⁰.



FIG. 29 The garden of the reconstructed Governor's Palace in Colonial Williamsburg, Virginia, USA is partly based upon the discovery of original 18th-century features but incorporates other elements designed for modern visual appeal.

De tuin van het gereconstrueerde Governor's Palace in Koloniaal Williamsburg, Virginia, USA, is deels gebaseerd op de ontdekking van de 18de-eeuwse tuinelementen, maar werd vermengd met nieuwe elementen om zo een meer hedendaags uitzicht te creëren.

⁸⁴ Sogliano 1898; Jashemski 1993, 153-155.

⁸⁵ Cooley 2003, 99.

⁸⁶ E.g. Ciarollo & Mariotti Lippi 1993.

⁸⁷ Lockwood (ed.) 2000, 68-72.

⁸⁸ Martin 1991, 49; Shurcliff 1937.

⁸⁹ Nail 1997, 4.

⁹⁰ Dix et al. 1995.



FIG. 30 Re-excavation of the Great Garden at Kirby Hall in Northamptonshire, England showed the inaccuracy of previous reconstruction in the 1930s.

De heropgraving van de Great Garden in Kirby Hall in Northamptonshire, Engeland bracht de onnauwkeurigheden van de reconstructie uit 1930 aan het licht.

The combination of a good historical record and clear physical traces has led to the reconstruction of some historic gardens with greater accuracy than was thought possible a few years ago⁹¹. Many earlier restorations took their designs from historical sources and were based upon the interpretation of former plans and views without the benefit of archaeology; or, where there was investigation, it was largely restricted to the examination of isolated features, with most reliance placed on contemporary documents⁹². Now, there is awareness of the value of tangible remains, for both research and veracity of reconstruction⁹³.

Archaeological excavation can be used to evaluate the extent and condition of surviving remains, thereby providing information upon the constraints of a site, and be undertaken subsequently as an essential stage of repair or reconstruction. It enables us



FIG. 31 Remains of an early gravel-and-clay hoggin path partially removed to expose a foundation layer of re-used bricks, Geffrye Museum, London. Scale 0.5 m long.

Resten van een vroeg pad opgebouwd uit een mengeling van kiezel en leem. Het werd deels weggegraven om een fundering van hergebruikte bakstenen bloot te leggen, Geffrye Museum, Londen. Lengte schaal 0,5 m.

to identify the original methods of ground preparation and the nature of building materials (fig. 31). Restoring former earth profiles becomes possible and the setting of paths and major architectural features, together with the accurate location of earlier tree pits and other planting arrangements are all revealed.

In tandem with the continuing US example of exploration at Williamsburg and nearby places⁹⁴, archaeology has developed a key role in the reconstruction of several European historic gardens⁹⁵. An early instance was at Het Loo in the Netherlands in the 1980s, where the layout of Baroque gardens at the former royal hunting lodge was reinstated using archaeological excavation to corroborate some of the historical details, albeit employing modern materials⁹⁶. Information contained in earlier engraved views was similarly confirmed by selective excavation in the park of the dukes of Arenberg at Enghien in Hainaut, where the previous arrangement of steps and other features has been revealed⁹⁷. Specially targeted investigation has also played a significant part in the restoration of terraced gardens at Aberdour in Scotland⁹⁸ and at Kloster Kamp, Kamp-Lintfort in Germany⁹⁹ among other sites, and continues to make an important contribution to projects elsewhere. These can be research-oriented as well as directed towards restoration and will sometimes include student participation and training¹⁰⁰.

91 Nail 1997; Nail 1998-99.

92 Cf. Harvey 1993, 37-41.

93 Dix 2010.

94 A. Noël Hume 1974; Brown & Chappell 1997, 72-73. See also Kelso 1992 and various papers in Kelso & Most (ed.) 1990.

95 E.g. Spycher 1991 and 1995 (Schloss Waldegg, Switzerland); Sauer 1995 (Schlosshof, Lower Austria); Seiler 1997 (Potsdam, Germany). Dix 1999, 370-372 and Currie 2005, especially 99-152 noting a selection of British sites.

96 Vliegthart & Erkelens 1988, 41-47; van

Asbeck 1991.

97 de Harlez de Deulin & Deramaix 1994-95.

98 Hynd & Ewart 1983.

99 von Detten 1993.

100 E.g. Prentice & Holmes 2001-02; Golembnik 2004; Dix 2010-11.

In France, for example, the archaeological approach has greatly increased knowledge of the Renaissance gardens at the chateau of Vallery, which were laid out in the mid-16th century but lost their ornamental form after becoming a vegetable allotment and orchard during the 18th century (fig. 32)¹⁰¹. Likewise, exploration of the abandoned Mahtab Bagh, or Moonlight Garden on the north bank of the Yamuna River directly opposite the Taj Mahal in India has shown how it was designed as a pleasure ground from which Shahjahan could view the great monument



FIG. 32 View across the so-called *Jardin d'Agrément* towards the Renaissance chateau at Vallery in modern Burgundy, France. The canal in the foreground and blind arcade forming the wall beyond date from the middle of the 16th century.

Zicht op de zogenaamde Jardin d'Agrément in de richting van het renaissancekasteel te Vallery in het moderne Bourgondië. Het kanaal op de voorgrond en de blinde arcaden die de muur erachter vormen dateren van het midden van de 16de eeuw.

he built to commemorate his beloved queen¹⁰². Other work in Mughal gardens includes excavations in Delhi within the enclosure surrounding the tomb of Humayun, an earlier ruler¹⁰³. Among royal gardens investigated elsewhere in Asia, lost features of an extensive complex of water gardens and related areas dating from the 5th century AD have been rediscovered at Sigiriya, 'the Lion Mountain', in Sri Lanka where excavations have been carried out since 1949 for the purpose of conserving and displaying the individual remains (fig. 33)¹⁰⁴.

Exact details of planting beds and former parterre design are generally better recovered by open area excavation (fig. 34). In Britain, several fairly intact garden plans dating from the 17th century onwards have been investigated for the purpose of reconstruction. They include town house¹⁰⁵ and other small gardens¹⁰⁶ in addition to those laid out for royalty and the aristocracy. Whilst the excavation of King William III's Privy Garden at Hampton Court Palace is best known¹⁰⁷, similar large-scale work has been carried out among other places at Audley End in Essex¹⁰⁸ and Witley Court, Worcestershire¹⁰⁹. In addition to giving precise dimensions of original features, such comprehensive investigation can show how the ground was prepared for staking out and creating the original design. It can also demonstrate the way in which the soil may have been treated to improve fertility (*cf.* fig. 27). However, whilst the nature of individual flower beds may suggest what types of plant they once contained – for example those with shallow roots or requiring a greater depth of soil to grow in – palaeoecological sampling does not often show where specific plants grew previously¹¹⁰. The reconstruction of planting arrangements therefore relies mainly upon other evidence and remains largely conjectural¹¹¹.

In addition to demonstrating the form of earlier gardens, archaeological excavation can be applied on a smaller scale to specific features within them, either for the purpose of conservation and repair or simply to provide better understanding of an individual structure (fig. 35). Floor plans have been recovered from a variety of lost buildings, ranging from ornamental structures incorporated into 18th-century and later landscape gardens¹¹² to more prosaic greenhouses. Details have also been recorded concerning their individual settings and access arrangements¹¹³, including the layout of paths and cultivated beds associated with ruined glasshouses used in kitchen gardens in the 19th and early 20th centuries¹¹⁴. Excavation has also uncovered details of abandoned Victorian ferneries¹¹⁵ in addition to earlier grottoes and the waterworks associated with them, together with more elaborate cascades (fig. 36)¹¹⁶.

Such case studies serve not simply to guide the future repair and reconstruction of garden features but also permit a better understanding of the history and sociology of garden design. The seeds so planted will continue to grow¹¹⁷.

¹⁰¹ Dix 1996; Dix 2011a, 155–162.

¹⁰² Fritz & Michell 2000.

¹⁰³ Nanda 2004.

¹⁰⁴ Bandaranayake 1997; Cooray 1997.

¹⁰⁵ Bell 1990 (Bath, England).

¹⁰⁶ Hall & Lear (ed.) 1992; Longstaffe-Gowan 1993, 52–73 (Chatham Dockyard, Kent).

¹⁰⁷ Dix & Parry 1995.

¹⁰⁸ Sutherill 1995, 34–35; West 1997, 87–88.

¹⁰⁹ Dix 2011b.

¹¹⁰ Murphy & Scaife 1991; de Moulins & Weir 1997.

¹¹¹ Woudstra 1995; Nail 1998–99, 3.

¹¹² E.g. Howes 1991.

¹¹³ Hughes 2006.

¹¹⁴ Hill 2006.

¹¹⁵ Potter 2000, 78–97 in particular 94–96.

¹¹⁶ E.g. Currie & Locock 1995 (The Gnoll, Glamorgan, Wales); Currie *et al.* 2003 (Upper Lodge, Bushy Park).

¹¹⁷ See '5.3 Related bibliography' for more information and a contextual inside.



FIG. 33 View from the palace rock at Sigiriya, Sri Lanka showing the central axial pathway and symmetrical layout of water gardens and other precincts. Archaeological excavations have shown that the complex was laid out between AD 477 and 495.

Zicht vanaf de paleisrots in Sigiriya, Sri Lanka op het centrale axiale pad en de symmetrische lay-out van de watertuin en de omliggende gebieden. Archeologische opgravingen toonden aan dat het complex werd aangelegd tussen 477 en 495 na Chr.



FIG. 34 The outline of original plate-bande trenches revealed by open area excavation in the southern half of the Privy Garden at Hampton Court Palace provided an accurate basis for reconstruction.

De contouren van de originele bloembedden die werden blootgelegd door de opgravingen in het zuidelijke deel van de Privy Garden in Hampton Court Palace leverden de basis voor een nauwkeurige reconstructie van de tuin.



FIG. 35 The floor of the Mausoleum at Painshill Park in north Surrey, England has been relaid using the results from previous archaeological investigation.

De vloer in het mausoleum in Painshill Park in north Surrey, Engeland werd heraangelegd op basis van de resultaten van eerdere archeologische opgravingen.

3 Two examples in Flanders

3.1 The *Neue Garten* at the Landcommandery 'Alden Biesen' in Limburg province

3.1.1 Historical context

The *Neue Garten* at Alden Biesen was created towards the close of the *Ancien Régime* for Land Commander von Reischach. The building history of Alden Biesen under the Teutonic Order ended with its creation. The development of gardens in early modern times began with the construction of a moated castle under Land Commanders Jan van Goer and Hendrik Reuschenberg in the second half of the 16th century and the building of a new church,



FIG. 36 Foundations and other substructures revealed by excavation beneath the Cascade which was built to a design by William Kent in about 1738 at Chiswick House in West London. Scale length, 2 m.

Tijdens opgravingen onder de waterval in Chiswick House in West Londen kwamen fundamenteën en andere constructies tevoorschijn die door William Kent rond 1738 werden aangelegd. Lengte schaallat 2 m.

farm and house for the bailiff under Land Commanders Huyn van Amstenraedt and Huyn van Geleen at the end of the 17th century. Land Commander Hendrik van Wassenaar laid out the French Gardens around 1700 and built the orangery. Land Commander Schönborn transformed the Renaissance castle into a noble residence and Land Commander Belderbusch took down the east wing of the forecourt, opening up the residence to the landscape. The creation of the *Neue Garten* was the last step¹¹⁸ in the development of Alden Biesen under the Teutonic Knights (fig. 37¹¹⁹).

When Land Commander Franz Nepomuk von Reischach (1730-1807) took office in March 1784, the idea quickly ripened to create a fashionable English-style garden on the north slope of the

¹¹⁸ Mertens 1995, 359.

¹¹⁹ From a postcard published by Ern. Thill, Brussels, private collection, Alden Biesen. With thanks to Mrs. Ingrid Willems (CJSM).



FIG. 37 View from the north towards the *Neue Garten*.
Zicht op de Neue Garten vanuit het noorden.

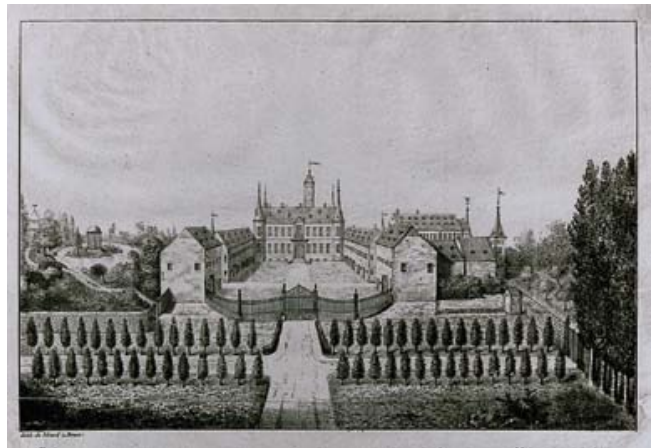


FIG. 39 View of the *Neue Garten* seen to the left of the Landcommandery in the *Prospectus van de Loterij van 1819*.
Zicht op de Neue Garten die zich links van de landcommanderij bevindt. Afbeelding uit de Prospectus van de Loterij van 1819.

Vliegenberg or Winterberg at Alden Biesen. At that time a strip of geometrical gardens existed beside the moat at the base of the slope. Uphill, along *Kasteelstraat*, a large partially walled orchard extended to the south and west with a central belvedere pavilion called ‘het Vliegentorentje’ at the highest point (fig. 38¹²⁰).

Initially the owners were looking for layers of clay in the vicinity¹²¹ as well as for a brickmaker to complete the walls but at the same time from 1785 on the search for attractive garden plants became a major concern¹²².

The *Neue Garten* was laid out between February-March 1786 and June 1787 according to a design by Ghislain-Joseph Henry (1754-1820), a well-known architect from Dinant. He made plans for a stone (*steenen*) Temple of Minerva, a Pineapple House to be built of 155 marlstones and small red bricks (*een annanashuijs in 155 mergelblokken en roode steentjes*), two new glasshouses (*broije huijsen*), a grotto in flint (*een grotte in vleeze steenen*), a river (fig. 39¹²³) with a piled revetment (*een revier gepiloteerd met pilotten*), a straw-thatched hermitage (*eremytagie*), a painted and single-roofed Chinese temple (*een met houten leijen gedekte, geverfde chinoisischen tempel*), straw-thatched Tartar houses (*tartaerse huijsen*) and two wooden bridges. A system of lead pipes (*looten buijsen*) brought water from a spring in the *Trompetters weijde* near the Maria Gate to the river in the garden. A stone-lined canal (*steenen canael*) directed the water from an overflow at the end of the river to a pond in front of the grotto and thence to the castle moat (*huijsweijer*). A cascade between an island with yews and the mount is also mentioned¹²⁴. It seems that Land Commander von Reischach was not keen upon statuary in the garden¹²⁵.

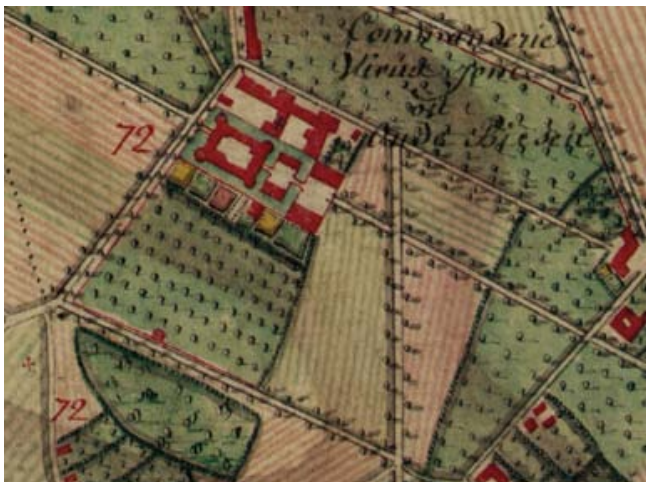


FIG. 38 Alden Biesen and the garden on the Count de Ferraris map 1771-1777, north at top.
Alden Biesen en de toenmalige tuin op de kaart van Graaf de Ferraris 1771-1777. De bovenzijde van de kaart is het noorden.

¹²⁰ Remacle Ieloup, *Vue du château et commanderie de Vieux-Jons* (ca. 1740) and the Count de Ferraris map (1771-1777), © NGI.

¹²¹ The brickmaker found suitable clay at the Hertenberg opposite the English garden.

¹²² Mertens 1995, 370, 377-379.

¹²³ *Afbeelding uit de Prospectus van de Loterij van 1819*.

¹²⁴ Mertens 1995, 372 and 375.

¹²⁵ *Idem*, 372.

All sorts of woody plants (*houdt en houdtgewasch*), one large and 93 small box trees (*palmeboomen*), 29 cartloads of poplars (*populieren*), 108 exotic trees (*vremde boomen*) from Mechelen, 200 spruces (*mastbomen*) and 1000 privets (*ligusterplanten*) were collected and planted¹²⁶.

After confiscation and auction during the French Revolution, Alden Biesen and its English garden became private property. The new owner was Guillaume Claes from Hasselt but with the transfer of ownership and the absence of adequate maintenance, the seeds of decay were already sown. A tourist guide dated 1814 still praised the garden for its interesting planting¹²⁷, so it would appear that many of the remarkable exotic species of trees and shrubs had survived the recent pillaging.

FIG. 40 The *Neue Garten* in summer 2007.
De Neue Garten tijdens de zomer van 2007.



FIG. 41 The self-seeded thicket in the *Neue Garten* in summer 2007.
Het spontaan gegroeid struikgewas in de Neue Garten in de zomer van 2007.



We know little about the period Claes-du Vivier-Roelandts. The analysis of the Alden Biesen archivist Jozef Mertens is undoubtedly correct: the decay of Alden Biesen was the result of the impoverishment of successive owners and their inability to preserve the built heritage. Over the years, many of the more fragile trees and most of the shrubs perished due to age, plant competition and increasing shade¹²⁸.

As for so many estates throughout the Great War and in the succeeding economic crisis rising staff costs reached the point where even minimal traditional maintenance was given up. In a moment of blind opportunism, the owner planted a large number of Canadian poplars hoping for short term financial return¹²⁹.

¹²⁶ Van den Bossche 1991.

¹²⁷ *Le guide des curieux qui visitent les eaux de Spa*, 1814, 77.

¹²⁸ Tom Wright, formerly of Wye College, London and The National Trust England, gave most shrubs a life expectation of 30-100 years. Examples of changing plant conditions: full sun/deep shade due

to mature tree canopies and normal soil/dry soil due to ruthless root competition.

¹²⁹ These Canadian poplars are to be cut and removed in the winter 2013.

Today the English garden at Alden Biesen has become a typical Hesbaye woodland area, where the relic of the 18th-century *Neue Garten* barely survives (fig. 40-41)¹³⁰.

Garden archaeology was therefore necessary to ascertain how far the historical map evidence is reflected by the actual situation.

3.1.2 Topography and geology

The *Neue Garten* of the Landcommandery is situated on the northern side of a small, enlarged hill running east to west (fig. 42-44)¹³¹. The buildings are located in the lowest part of the site

so that both the surface and groundwater drain into the surrounding moat (fig. 45). The soil on the hill consists of displaced sediments and in some areas the garden soil contains numerous fossil gastropod shells. According to a geological study in 2007, the shells have been reworked from shallow geological deposits: the base of the *Alden Biesen Sand and marls* and the top of the *Henis Clay*¹³². The impermeability of the clay allows the water-soaked sandy layers and overlying loam to slide down the slope, so that we can find in the garden different kinds of soils that have been displaced by landside. This instability of the soil was experienced directly, when a trench through the infilled canal around the temple suddenly collapsed¹³³.

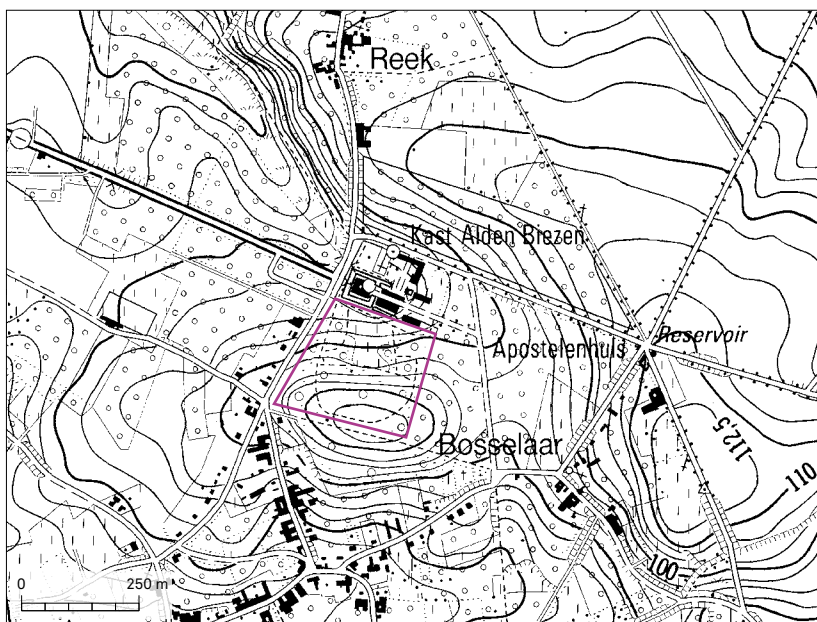


FIG. 42 The setting of the *Neue Garten* on the topographical map cf. fig. 67.

De afbakening van de Neue Garten op de topografische kaart cf. fig. 67.

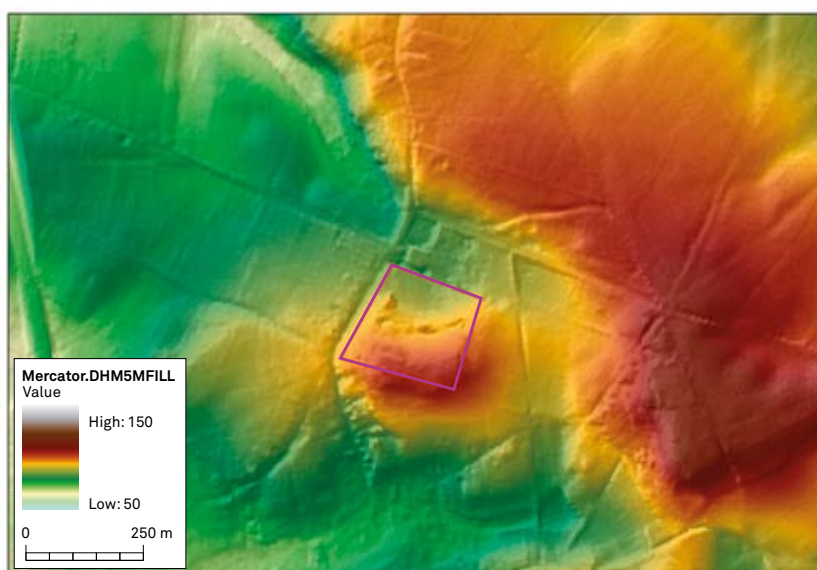


FIG. 43 Digital relief model of the *Neue Garten*.

Digitaal hoogtemodel met de afbakening van de Neue Garten.

¹³⁰ All photographs were taken by K. Vandevorst and G. Vynckier (Flanders Heritage Institute).

¹³¹ Maps made by K. Coussier (Flanders Heritage Institute) © 2006 Argis.

¹³² Dreesen & Dusar 2007, 17.

¹³³ We want to thank R. Dreesen (Geological Survey of Belgium) for reading and rewriting this paragraph.

3.1.3 Purpose of fieldwork

The objective of the excavation was to characterise the series of rides and paths which have been developed within the garden since its creation towards the end of the 18th century. Forty archaeological trenches, starting at the gates, were dug by hand (fig. 46) across individual routes which can be compared with path alignments shown in historic maps (fig. 47¹³⁴). A separate trench was excavated mechanically across the backfilled river channel close to the so-called Temple of Minerva (fig. 40¹³⁵).

Archaeological investigation was carried out in the *Neue Garten* at Alden Biesen from 16-20 July 2007¹³⁶.

FIG. 44 View of the hill from the southeast in 2007. *Zicht op de heuvel vanuit het zuidoosten in 2007.*



FIG. 45 View from the north towards the *Neue Garten* looking along part of the moat around the buildings of the Landcommandery (2007). *Zicht op de Neue Garten vanuit het noorden langs een deel van de slotgracht rond de gebouwen van de landcommanderij (2007).*



3.1.4 Excavation

3.1.4.1 General

Apart from the machine-dug trench across the former river channel (Trench 41) all trenches were excavated by hand and were generally 0.30 m wide and between 100 mm and 200 mm deep. Where present, historic path surfaces were cleaned and their surviving width was recorded in centimetres together with the depth below modern ground level.

3.1.4.2 Individual trench descriptions (cf. fig. 47)

⊙ Trench 1 (fig. 48, a¹³⁷)

Path of very hard natural clay with brick and mortar inclusions rolled into it; c. 2 m wide and 20 mm below the present surface.

¹³⁴ Survey by J. Van Laecke (Flanders Heritage Institute).

¹³⁵ The archaeologists were assisted by R. Roosen and J. Wijnants, archaeological technicians from the Flanders Heritage Institute.

¹³⁶ Van den Bossche & Vynckier 2010.

¹³⁷ Scale on the pictures 0.5 m.



FIG. 46 Excavating by hand.
Opgraven met de hand.

- Trench 2 (fig. 48, b)
Path of yellow-grey clay, 2.20 m wide and buried up to 50 mm deep.
- Trench 3 (fig. 48, c)
Path of moderately hard, compact yellow-grey clay, 1.90 m across, beneath shallow depth of humus, 20 mm deep.
- Trench 4 (fig. 48, d)
Path of moderately hard yellow-grey clay, 2.20 m wide and 40-50 mm below modern surface.
- Trench 5 (fig. 48, e)
Worn-out hollow path of moderately hard yellow-grey clay at depth of 40 mm; 2.20 m wide.
- Trench 6 (fig. 48, f)
Slightly hollowed or worn path of moderately hard yellow-brown clay with some admixture of blue-grey clay; 1.85 m wide and buried 20-50 mm deep.

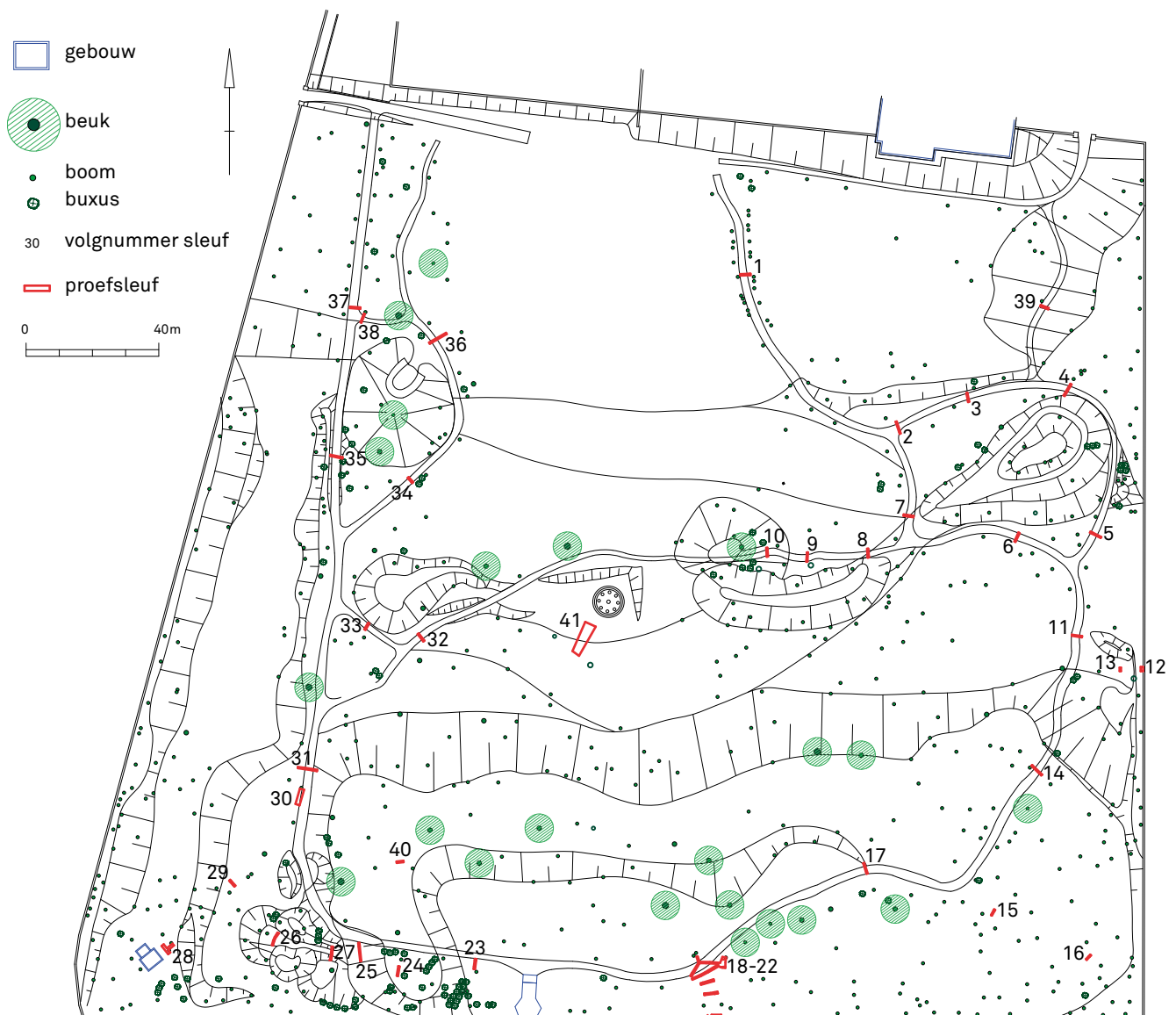


FIG. 47 Location of trenches.
Sleuvenplan.

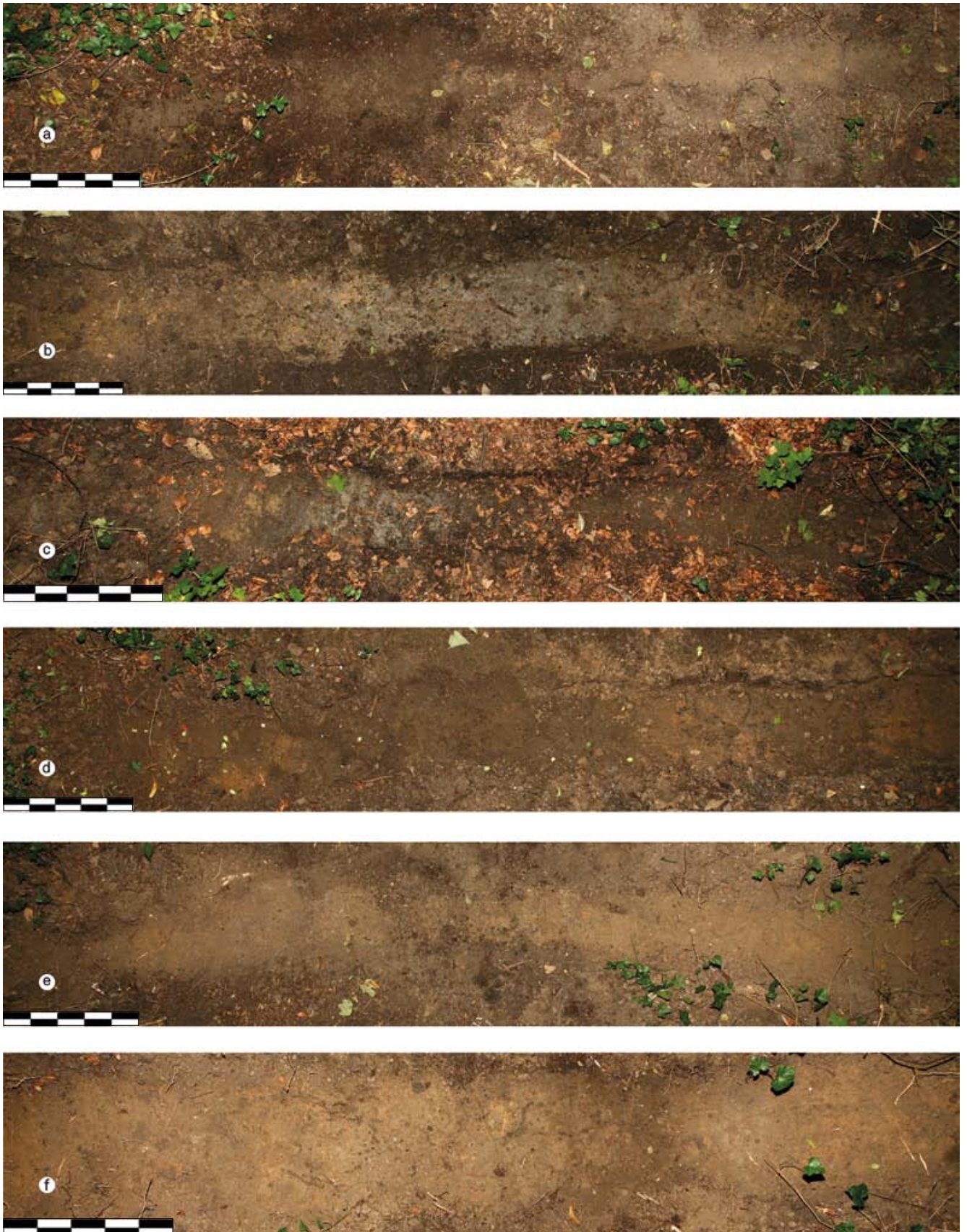


FIG. 48 a: trench 1; b: trench 2; c: trench 3; d: trench 4; e: trench 5; f: trench 6.
a: sleuf 1; b: sleuf 2; c: sleuf 3; d: sleuf 4; e: sleuf 5; f: sleuf 6.

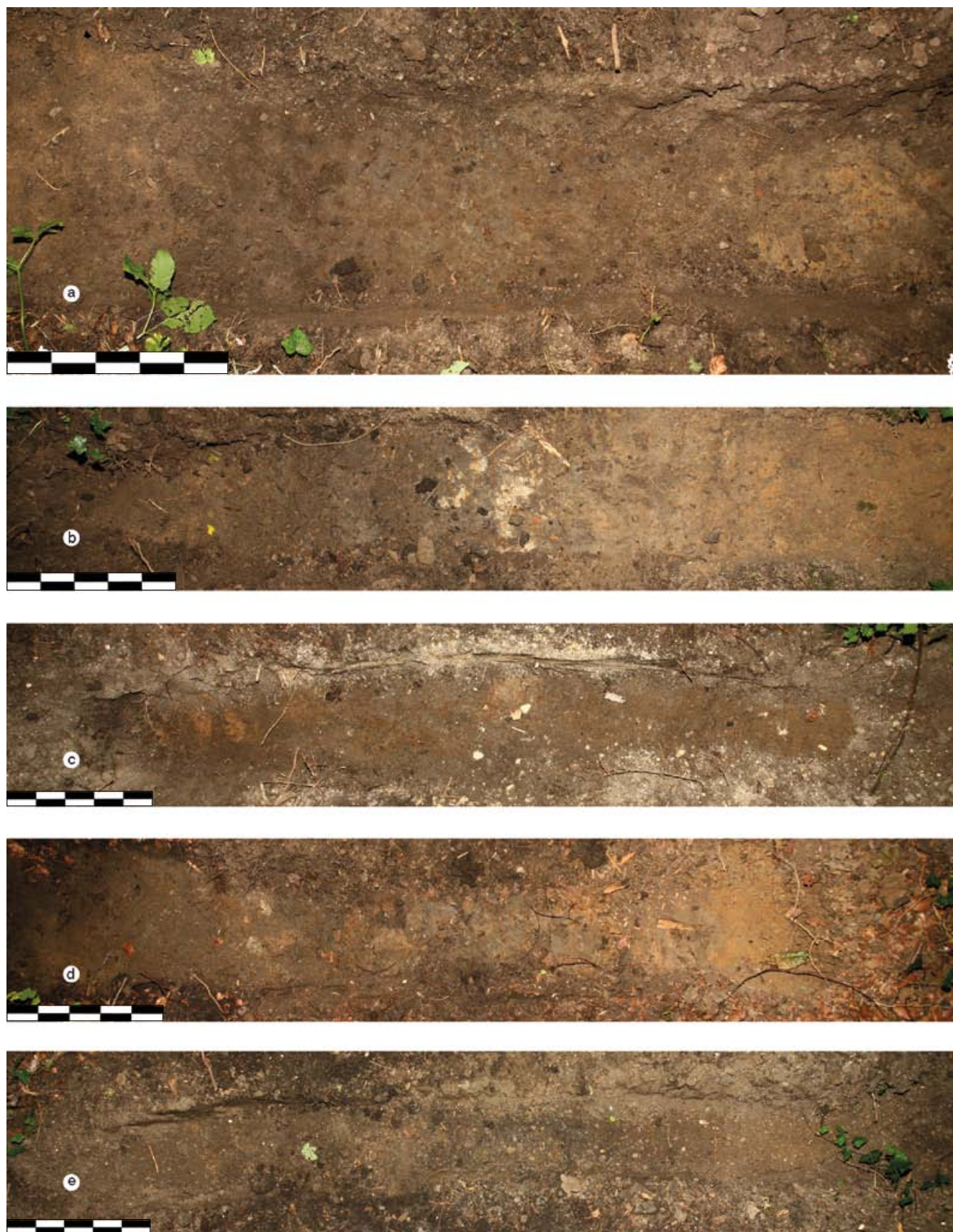


FIG. 49 a: trench 7; b: trench 8; c: trench 9; d: trench 10; e: trench 11.
a: sleuf 7; b: sleuf 8; c: sleuf 9; d: sleuf 10; e: sleuf 11.

- Trench 7 (fig. 49, a)
Narrow band of blackened, slightly soft natural clay, up to 1.30 m across and 60-90 mm below modern ground level.
- Trench 8 (fig. 49, b)
Fragmentary path of mixed yellow-grey and blue-grey clay with occasional brick pieces; surviving only 1.20 m wide at a depth of 40 mm.
- Trench 9 (fig. 49, c)
Path of hard yellow-grey and blue-grey clay, c. 2 m wide and buried 90 mm beneath a modern dump of lime and plastic resting on 20 mm thickness of old topsoil.
- Trench 10 (fig. 49, d)
Path of compact yellow-grey and blue-grey clay stained by rotted wood chips; 1.90 m wide and 30-40 mm below present ground surface.
- Trench 11 (fig. 49, e)
Path of compact blue-grey clay with finely comminuted shell, c. 2 m wide and up to 50 mm deep below present path level. A dark band along the west side may denote some form of ribbon planting.
- Trench 12 (fig. 50)
A sondage, 1.20 m x 0.80 m, excavated at the southern end of the inner face of the walled-up East Gate. The surroundings were found to have been disturbed to a depth of 230 mm in order to create the offset foundation supporting the brickwork blocking up the gateway.

By removing the original threshold, which was keyed into the adjacent gate pier at a depth of 90 mm below the current surface level, the construction works will have destroyed any evidence of a former driveway at this point.

- Trench 13 (fig. 51, a)
A small sounding, 1.00 m x 0.35 m, tested the presumed course of a driveway that may have led into the garden from the East Gate. No evidence was found, with only natural clay being located at a depth of 80 mm below the present surface.
- Trench 14 (fig. 51, b)
Path denoted by a spread of moderately hard blue-grey clay, 3.20 m wide and up to 150 mm below the modern path surface which has worn a hollow along its middle. A distinct band of clay and comminuted shell, 1.30 m wide, along the western side may represent a separate phase.
- Trench 15 (fig. 51, c)
A thin scatter of pebbles and brick, 1.00 m wide and just below the present surface, coincides with the modern path alignment and appears to share its recent origin.
- Trench 16 (fig. 51, d)
As Trench 15.
- Trench 17 (fig. 51, e)
Path, c. 2.20 m across, composed of soft blue-grey clay mixed with comminuted shell along the south side; up to 15 mm deep from the present surface where the spread has caused dark staining.

FIG. 50 Trench 12 at the east gate.
Sleuf 12 aan de oostpoort.





FIG. 51 a: trench 13; b: trench 14; c: trench 15; d: trench 16; e: trench 17.
a: sleuf 13; b: sleuf 14; c: sleuf 15; d: sleuf 16; e: sleuf 17.

◉ Trenches 18-22 (fig. 52, fig. 53, a, fig. 53, b, fig. 53, c)

Investigation at the garden entrance around the South Gate revealed a well-made road that filled the 3-m wide gap of the gateway and extended about 10 m into the garden before creating a T-junction with the straight alignment of an east-west drive or ride. The road was constructed within an excavated bed and comprised a series of carefully built-up layers (fig. 54¹³⁸ and 55). Rubble had been deliberately rammed on top of the natural subsoil to create a compact base of crushed brick 50-60 mm thick, above which there was a similar thickness of clay and soil. A layer of trampled mortar up to 25 mm deep had become pressed into the top before the introduction of a solid surface formed by further broken and crushed brick, up to 100 mm thick.

The strength of construction was presumably intended to overcome excessive wear by traffic around the entrance but may also in part have been a response to ground disturbance created by building the adjacent walls. The remains are now buried beneath 170 mm of topsoil at the entrance but their depth reduces to 140-150 mm after entering the garden (fig. 56). The present east-west path lies slightly north of its predecessor and partly on top of a later phase of construction indicated by a moderately hard blue-grey and yellow-grey clay surface containing comminuted shell at a depth of 70-80 mm below the modern level. The occurrence of similar material in the adjacent part of trenches 21 and 22 suggests that it may have been c. 2.50 m wide.

◉ Trench 23 (fig. 53, d)

The area immediately adjacent to the Belvédère pavilion contains dumps of waste material and clearly was disturbed during repairs to the building. The ground in front of the rebuilt steps has been similarly affected, destroying the relationship to the original driveway. Excavation at a point c. 12 m to the west re-

vealed a spread of clay with pieces of brick denoting the southern edge of the original drive beneath 180-200 mm of roots and soil approximately 2m outside the present path edge.

◉ Trench 24

A trench 3.00 m x 0.30 m was excavated between two approximately parallel rows of box planting to assess their relationship with any previous east-west path. There was no evidence for an earlier surface, however, and only natural subsoil was present beneath topsoil at a depth of 75-80 mm.

◉ Trench 25 (fig. 57)

A trench 5.50m x 0.40 m was extended southwards from the edge of the modern path at a point close to its north-east corner. An earlier alignment was denoted by a surface of hard, compacted yellow-brown clay, 2.20 m wide, which contains much finely crushed brick and mortar. It shares the same orientation as the hollow which leads to the causeway across the Hermitage Pond nearby.

◉ Trench 26 (fig. 53, e)

Excavation at the western end of the causeway over the Hermitage Pond exposed the surface of a wide drive or path, 3.10 m across and 100 mm below present level. Its composition of compact clay containing rounded pebbles and occasional brick fragments contrasts with friable clay along its southern edge and light yellow-brown clay at the edge of the causeway.

◉ Trench 27 (fig. 53, f)

Excavation across the hollow east of the Hermitage Pond revealed a hard clay surface containing small pieces of brick and mortar at a depth of 100-150 mm. Its original width of c. 2.30 m has been encroached upon by erosion or slumping of the adjacent sides.

FIG. 52 Northern profile of Trench 18 at the south gate. *Noordprofiel van sleuf 18 aan de zuidpoort.*



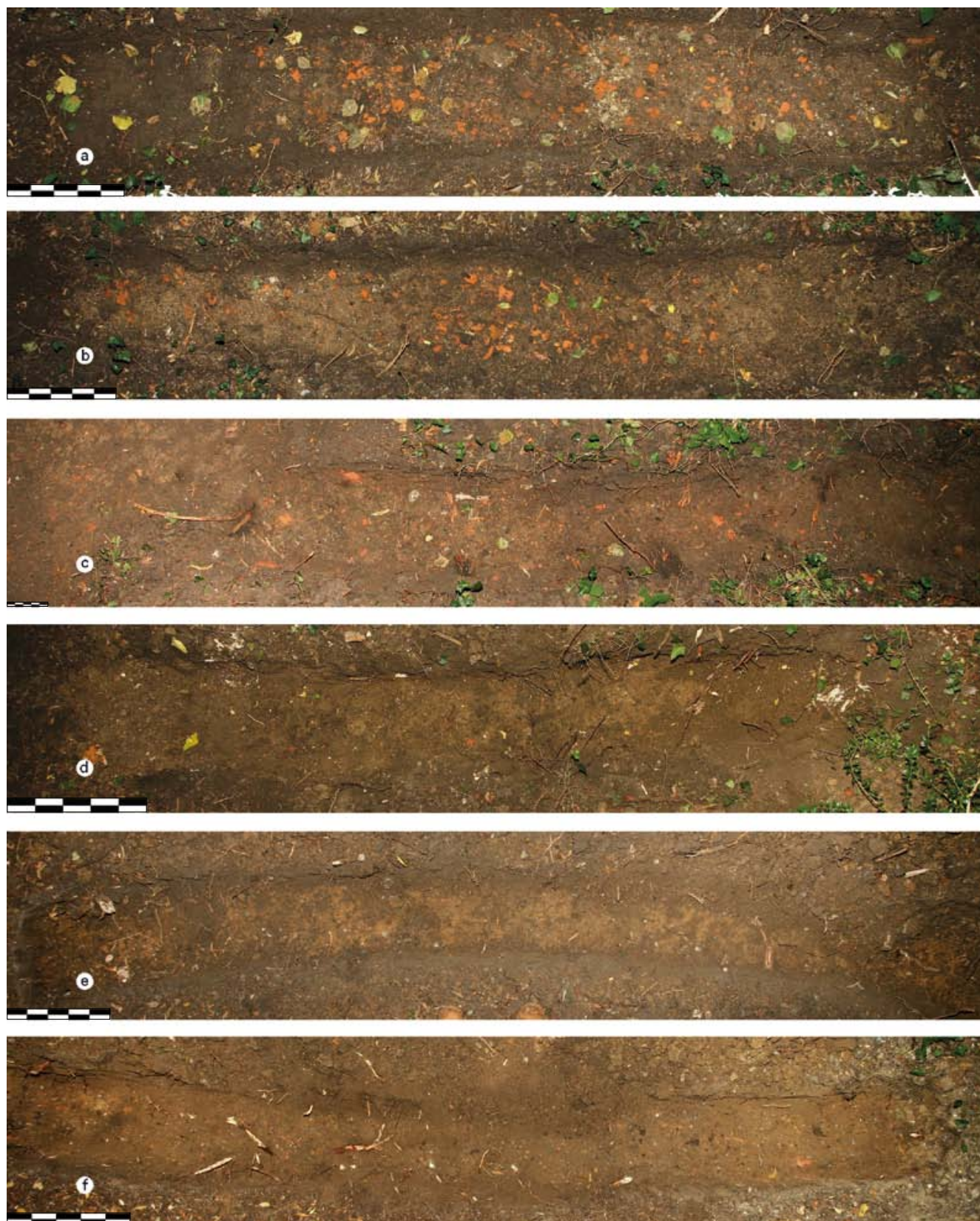


FIG. 53 a: trench 19; b: trench 20; c: trench 21; d: trench 23; e: trench 26; f: trench 27.
a: sleuf 19; b: sleuf 20; c: sleuf 21; d: sleuf 23; e: sleuf 26; f: sleuf 27.

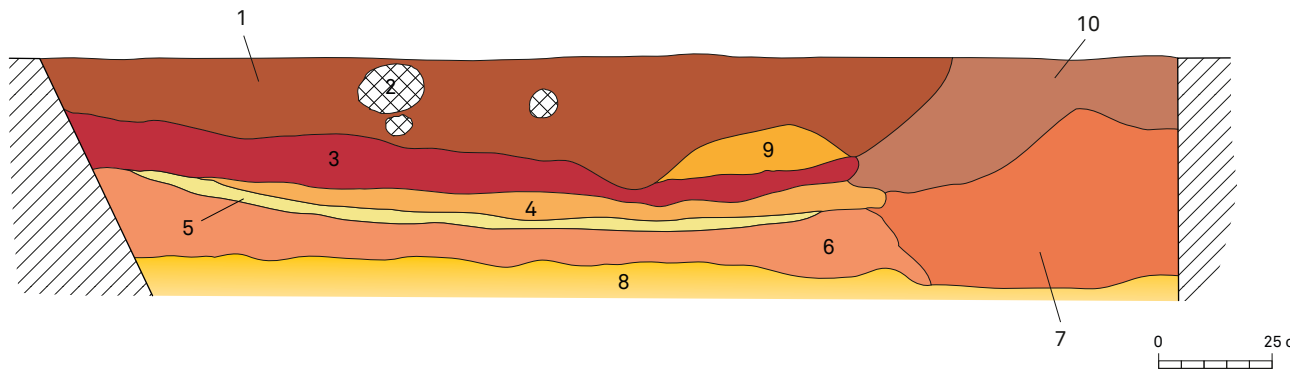


FIG. 54 Northern profile of Trench 18: 1: brown/dark brown topsoil with small fragments of white mortar and crushed brick; 2: tree roots; 3: solid red layer with fragments of crushed red bricks; 4: thin layer of yellow-brown with cream-coloured trampled mortar; 5: thin layer of yellow clay and small fragments of bricks and white-yellow mortar. 6: compact crushed red bricks; 7: reddish yellow-brown filling mixed with fragments of bricks and white-yellow mortar; 8: natural yellow-grey subsoil; 9: identical to layer 3 but more brown; 10: identical to layer 7 but browner.
Noordprofiel van sleuf 18: 1: donkerbruine bovenlaag met kleine fragmenten van witte mortel en bakstenen; 2: boomwortels; 3: compacte rode laag met fragmenten van rode baksteen; 4: dunne geelbruine laag met fragmenten geelbruine mortel; 5: dunne gele kleilaag en kleine fragmenten van bakstenen en witgele mortel; 6: compacte laag van gebroken rode baksteen; 7: rode geelbruine opvullingslaag vermengd met baksteenfragmenten en witgele mortel; 8: natuurlijke grijsgele bodem; 9: identieke maar bruinere laag als 3; 10: identieke maar bruinere laag als 7.

FIG. 55 Detail of the northern profile of Trench 18.
Detail van het noordelijk profiel van sleuf 18.



FIG. 56 View of Trench 18 inside the south gate.
Zicht op sleuf 18 aan de binnenzijde van de zuidpoort.



◦ Trench 28 (fig. 58)

A T-shaped trench, approximately 2.80 m x 0.75 m by 2.00 m x 0.60 m, was excavated to establish if a metalled path had once led around the yew trees outside the Hermitage. No evidence for this was forthcoming but at a depth of 160–180 mm very hard, blocky clay was consistent with having been rammed to form a platform for the building to stand upon. A similar kind of clay is visible as an exposure around the north-east corner.



FIG. 57 Trench 25.
Sleuf 25.

◦ Trench 29

A band of dirty clay with a few pebble and brick inclusions lies just beneath the present surface and coincides with the modern path; c. 1.20 m wide, but the edges are indistinct.

◦ Trench 30 (fig. 59)

A trench 4.60 m x 1.00 m was dug parallel to the outer edge of the western drive between two hornbeam trees to check for previous planting. There was no indication of intermediate spacing of trees and clean, undisturbed subsoil was exposed at a depth of 110 mm.



FIG. 58 Trench 28.
Sleuf 28.



FIG. 59 Opening Trench 30.
Het openleggen van sleuf 30.

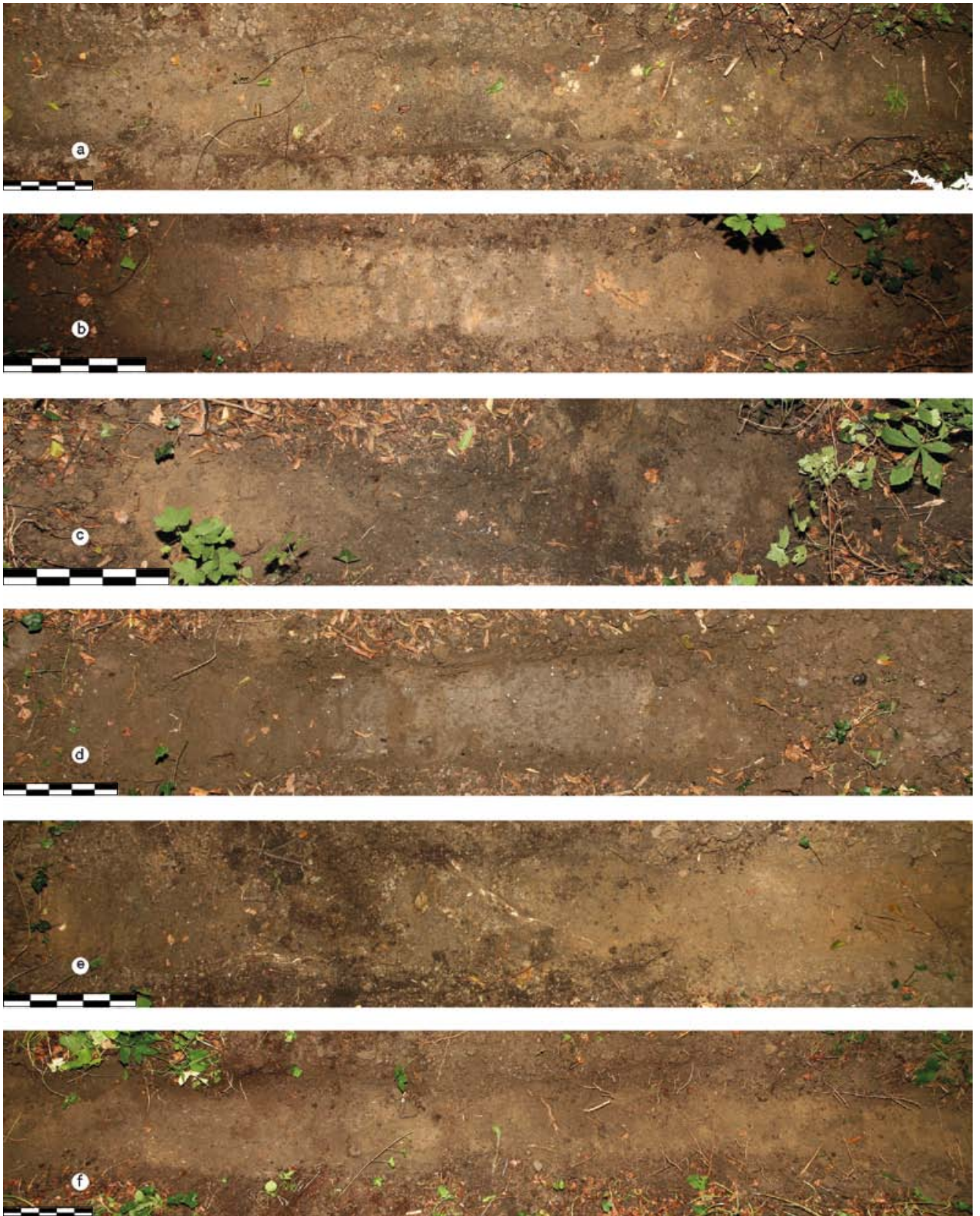


FIG. 60 a: trench 31; b: trench 32; c: trench 33; d: trench 34; e: trench 35; f: trench 36.
a: sleuf 31; b: sleuf 32; c: sleuf 33; d: sleuf 34; e: sleuf 35; f: sleuf 36.

◦ Trench 31 (fig. 60, a)

Path of compact yellow-grey clay with lumps of mortar and small pieces of brick at a depth of 110-120 mm forming a surface c. 2 m wide, which extends c. 1.10 m west beneath the present verge.

◦ Trench 32 (fig. 60, b)

A band of darkened natural clay, c. 1.20 m wide, coincides with the modern path just below its surface.

◦ Trench 33 (fig. 60, c)

The present path has caused a dark stain c. 1.00 m wide in the subsoil below but there is no evidence that the route was used historically.

◦ Trench 34 (fig. 60, d)

As Trench 33.

◦ Trench 35 (fig. 60, e)

Path of hard, compact yellow-grey clay with some blue-grey clay, also containing crushed brick and mortar; 2.70 m wide but encroached upon by the present verges at either side. An area of very soft planting disturbance occurs 0.60 m beyond the inner path edge.

◦ Trench 36 (fig. 60, f)

Path, 2 m wide, composed of moderately hard yellow-grey clay with occasional brick fragments at a depth of 70 mm below the modern surface. An area of homogeneous yellow-brown clay c. 2 m to the east may be connected with the former pond.

◦ Trench 37 (fig. 61 and fig. 62¹³⁹)

Path of moderately hard yellow-grey clay with occasional brick fragments, 120 mm deep and somewhat stained by rotted wood chips on the present surface; 1.80 m wide with a slight camber.

◦ Trench 38

The modern path has made a dark stain in the soft natural clay underneath; c. 1.50 m wide.

◦ Trench 39

The modern path has formed a band of hardened subsoil 1.50 m wide, but there is no evidence for an earlier route on its alignment.

◦ Trench 40

A trench 1.40 m x 0.30 m was excavated across part of the hollow that lies to the east and behind the Upper Grotto. A clinker or cinder surface was present at a depth of up to 160 mm beneath topsoil and leaf mould.



FIG. 61 Trench 37: northern profile.
Noordprofiel van sleuf 37.

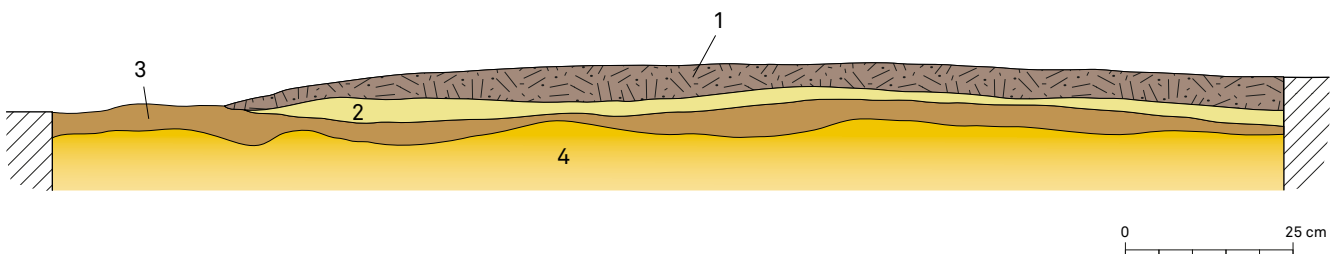


FIG. 62 Trench 37: northern profile: 1: wood chips (recent covering); 2: path in yellow-grey clay, occasional brick fragments; 3: grey-brown forest soil; 4: yellow-grey subsoil.

Sleuf 37: noordprofiel: 1: houtsnippers (recente aanvulling); 2: pad opgebouwd in geelgrijze klei en sporadisch enkele baksteenfragmenten; 3: grijs-bruine bosbodem; 4: geelgrijze bodem.

◦ Trench 41

A mechanically excavated trench c. 2.50 m wide x 10 m long was dug to the rear and slightly west of the Temple of Minerva in order to examine the old river channel (fig. 63). The unstable condition of the surrounding soils led to the side collapsing before detailed recording could be undertaken and the trench was backfilled immediately for safety reasons. The upper silts of the former streambed were exposed at a depth of 2.10 m below the modern surface where they appear to have accumulated within a channel approximately 3.60 m wide (fig. 64); their thickness could not be determined. The adjacent bank was revetted with wooden piles above which the side rose at an angle of c. 27 degrees from horizontal, creating a slope of approximately 1 in 2. A series of clays and subsoil had been dumped on top of the silt,

comprising 340-400 mm thickness of grey-brown clay beneath 280 mm of light brown clay with 260 mm of brown clay subsoil above. A further 790 mm of yellow-brown clay covered all beneath 300 mm of topsoil, providing a thick capping which also served as a levelling-out layer (fig. 65).

3.1.5 Discussion of results

The original garden has been cut into and partially levelled to ease the steepness of its natural gradient. A brick wall crowns the top of the slope and is joined by other walls (fig. 66) at each side to enclose an overall area of c. 7.5 ha (fig. 67). It originally contained productive areas as well as ornamental tree planting and a number of ornamental buildings and structures.

FIG. 63 Mechanical excavation of Trench 41 through the in-filled serpentine river located west of the Temple of Minerva. *Openleggen van sleuf 41 met de graafmachine dwars op de kronkelende rivier ten westen van de Minerva-tempel.*



FIG. 64 The profile and bottom of Trench 41 during cleaning. *Het profiel en de bodem van sleuf 41 tijdens het opschonen.*





FIG. 65 Southern profile of Trench 41 after partial collapse of the sides. *Zuidprofiel van sleuf 41 na het instorten van een deel ervan.*



FIG. 66 Wall at the east side of the *Neue Garten*. *Oostelijke tuinmuur van de Neue Garten.*



FIG. 67 Aerial view of the *Neue Garten*. *Luchtfoto van de Neue Garten.*

FIG. 68 Eastern section of the river.
Oostelijk deel van de rivier.



FIG. 69 Upcast from the construction of the northern part of the river.
Ophoping van grond van het uitgraven van het noordelijk deel van de rivier.



FIG. 70 Infilled river at the west side of the Neue Garten.
Opgevlude rivier in het westelijke deel van de Neue Garten.



The upcast of the construction of the serpentine river was mostly dumped around the eastern end and on its northern edge (fig. 68). Several mounds or small hills have been raised above the original ground level (fig. 69). The central river section is now largely back-filled (fig. 70), presumably because soft unstable ground threatened the existence of the island temple that was a major element of this part of the garden design (*cf.* Trench 41). Although now lacking its original context, the Temple of Minerva still remains the important focus, which is made more dominant by the presence of a backdrop of trees and thicket in contrast to the largely clean and open aspect it had previously (fig. 71).

Much of the surrounding parkland has grown into a garden in which the number of old trees has been swelled by spontaneously grown younger trees (fig. 72); if not survivors from the original planting, some of them are certainly replacements. The location of a handful of trees spread all over the garden coincides with historic alignments depicted in early maps. The short avenue formed by hornbeam trees towards the centre at the base of the slope (fig. 73) appears to have developed as a feature along the west side of the kitchen garden as defined by the oldest surviving plan drawn by Hansen in 1813 (fig. 74¹⁴⁰).

The original path is up to 2 m wide and was formed by rolling pieces of brick and mortar into the natural clay (Trench 1). By contrast, the present path (fig. 75) on the opposite side of the former kitchen garden lacks foundation and appears to be modern (Trench 39).

Hansen's survey shows other trees planted as part of a hedge that presumably bordered an area of cultivated ground now de-

noted by the lower surface level along the western side of the garden. The wide spacing of hornbeams still growing there preserves the hedgerow-alignment but excavation in the intervening ground (fig. 76) shows that no other trees were planted in-between (Trench 30). The adjacent straight drive shown in 1813 following the slope (fig. 77) is between 2-2.70 m wide and made of compacted clay with occasional brick and mortar fragments rolled into it (Trenches 31, 35 and 37). Its composition is not unlike that of the path to the west of the kitchen garden and both share a similar make-up with the straight drive that previously ran inside the southern end of the garden. All may date from the same period of construction.

The consistent path-width of approximately 2 m and homogeneous nature of its make-up exposed around the southern entrance into the garden (fig. 78) and in areas to the west (Trenches 18-22, 23, 25 and 27; possibly also 26) denote a carefully prepared driveway of crushed brick and mortar rolled into clay. After entering through the gate the path or ride turned at right angles to run approximately parallel to the boundary wall, thereby linking buildings along its axis as well as eventually connecting with the route downslope. The eastern arm and any associated buildings are largely lost under later vegetation but the western extent can still be traced, presumably passing in front of the Belvédère pavilion (fig. 79) and continuing towards the Hermitage (fig. 80) by crossing the pond which lies nearby (fig. 81). No evidence is apparent around the Hermitage itself, which appears to have been built upon a low platform of rammed clay (Trench 28). The present approach to it from the main western drive follows a convenient route (*cf.* Trench 29).



FIG. 71 The Temple of Minerva.
De Minerva-tempel.



FIG. 72 Parkland with a mix of old and young trees south of the *Neue Garten*.
Park met een mengeling van oude en jonge bomen in het zuidelijke deel van de Neue Garten.



FIG. 73 Hornbeam avenue on the west side of the kitchen garden area.
Het haagbeukpad aan de westzijde van de groentetuin.

FIG. 74 Plan drawn by Hansen in 1813.
Kaart getekend door Hansen in 1813.





FIG. 75 Path on the east side of the kitchen garden.
Pad aan de oostzijde van de groentetuin.



FIG. 76 View of the path close to Trench 30.
Zicht op het pad in de buurt van sleuf 30.



FIG. 78 The south gate.
De zuidpoort.

FIG. 77 Straight path on the west side of the *Neue Garten*.
Kaarsrecht pad aan de westzijde van de Neue Garten.

FIG. 79 The Belvédère beside the straight drive running along the top of the slope at the southern end of the *Neue Garten*.

De belvédère langs het rechte pad op de top van de helling in het zuidelijke deel van de Neue Garten.



FIG. 80 The ruined Hermitage.

De ruïne van de hermitage.



FIG. 81 Path across the dried-out pond between the Belvédère and the Hermitage.

Pad langs de opgedroogde vijver tussen de belvédère en de hermitage.



The historic pattern can be perceived in the 1813-plan, even though the surveyor may not have determined it entirely accurately and some changes of layout probably had already occurred (cf. fig. 74). The course of the western drive tallies with the straight alignment of hedges on that side of the garden and the line of the southern drive is depicted as it crossed the Hermitage pond and passed between adjacent land parcels. Modern excavation between two parallel rows of box planting in that vicinity however, showed that they were not connected with its alignment, although they might represent a secondary growth or later spread (Trench 24, cf. fig. 82). Further eastwards the boundary between parcels 362 and 364 lies on the presumed axis of the driveway and is in line with two buildings that are both now lost. It seems likely that the map shows the relict features of an earlier alignment that was partly abandoned as the landscape became altered and more sinuous trackways were made. The primary relationship between the largely formal layout of paths in straight lines and the southern entrance threshold suggests that they were coeval (Trench 18) and must therefore date from the creation of the garden enclosure.

The eastern continuation of the path along the southern end of the garden currently follows a curve (fig. 83) and is distinguished by its composition of a distinctive blue-grey clay that contains much crushed shell (Trench 17; also present in part of Trenches 21 and 22). The raw material appears to have been obtained from an outcrop further down the slope, where the eastern path is of identical construction and similarly winding (fig. 84, cf. trenches 11 and 14). The branch leading off to the south-east corner of the garden lacks proper foundation and is presumably modern (Trenches 15 and 16). Any evidence that may have existed for an early path surface at the eastern gateway (fig. 85, cf. trench 12) will have been destroyed when the original threshold was removed as part of blocking up the opening sometime after 1813 (Trench 12). However, examination of the presumed course of a driveway leading from the entrance revealed undisturbed natural clay only (Trench 13) and it is possible therefore that the surface was unmetalled.



FIG. 82 Rows of box between the Hermitage pond and the Belvédère.
Rijen buxus tussen de hermitage en de belvédère.



FIG. 83 The east end of the southern path.
Het oostelijke einde van het zuidelijke pad.

A separate path appears to have led around the serpentine river and still survives at its eastern end where it is up to 2.20 m wide (fig. 86). It is largely composed of moderately hard, compacted yellow-grey clay (Trenches 2-5) but also incorporates patches of blue-grey clay, particularly over the artificial mounds of upcast in the central area (Trenches 8-10; also Trench 6). This part of the route is shown in the *Dépôt de la Guerre* map of 1871 (fig. 87¹⁴¹) but it may already have existed for some time previously.

The later origin of the path that crosses the infilled river channel is differentiated by narrower width and slightly softer composition (Trench 7).

A machine-cut trench was located to the rear and slightly west of the Temple of Minerva in order to examine the old river channel (Trench 41). The silts of the former streambed were exposed at a depth of 2.10 m below the modern surface, where a thick clay capping has been introduced as a levelling layer above individual dumps of clay backfill (fig. 88). Despite the collapse of the trench due to soil instability, enough was observed to show that the base of the river had been over 3.50 m wide and was constructed with steep sides, which rose at an approximate angle of 27 degrees

from horizontal to form a slope with a gradient of almost 1 in 2, or 50%. The bottom of the sides appears to have been revetted with wooden piles.

The current paths around the western end of the former river lack clear edges and other distinct form, and are nothing more than a stain upon the underlying natural subsoil (Trenches 32-34). They appear to be wholly modern and caused by visitor use and wear rather than being part of a purposeful design. By contrast, the path immediately in front of the Grotto/Ruin (fig. 89) seems older and comprises a 2 m wide band of moderately hard, compacted clay with occasional brick fragments, which is not unlike the straight drive to the rear (Trench 36). The link between them has no foundation, however, and is another modern line that merely stains the underlying soft natural clay (Trench 38). Although there is no obvious location for the irregular-shaped pond that once lay in front of the Grotto/Ruin, as depicted by the 1813-survey, a homogeneous yellow-brown clay which occurs *c.* 2 m from the outer path edge may be connected with its backfilling. The evidence requires further investigation, together with the associated structure.



FIG. 84 Continuation of the eastern path down the slope.
Verder verloop van het oostelijke pad langs de helling.



FIG. 85 Blocked east gateway.
Afgesloten oostelijke poort.

¹⁴¹ Detail from *Dépôt de la Guerre. Carte topographique de la Belgique. 1865-1883*. Scale 1:20000. Map page 34/1.



FIG. 86 Path bordering the eastern part of the river.
Pad langs de rand van het oostelijke deel van de rivier.



FIG. 87 Detail of the *Dépot de la guerre* map, 1871.
Detail van de Dépot de la guerre kaart, 1871.



FIG. 89 The Grotto and build Ruine from the eastside.
De grot en gebouwde ruïne vanuit het oosten.

FIG. 88 The base of Trench 41.
De bodem van sleuf 41.

3.1.6 Summary and Conclusion

Although lacking direct dating evidence, the system of paths and rides in the *Neue Garten* at Alden Biesen can be placed in a relative sequence which can be compared with the historical map evidence. The earliest driveway system – and probably the basis of the original layout – still survives in the western half of the garden. It appears to be contemporary with the southern gate and associated walls that were constructed to enclose the garden; and served to link several of the buildings and other structures within it. The carriage drive largely followed a straight course and only the hornbeam avenue around the kitchen garden shows softening of the stiff lines. Elements of the early layout can be detected in the 1813-plan, together with less formal components and areas of land division designed to create irregular parcels. The most prominent feature is the serpentine river which crossed the middle ground. Its banks eventually proved unstable, however, and resulted in abandonment and backfilling around the temple island. A former circuit path still survives at the eastern end and matches the route depicted in the 1871-map, although it could have originated earlier. Part of the present course of the perimeter path around the south-east corner of the garden may also correspond with this mapping. Apart from the path outside the Grotto/Ruin, which may be contemporary with its construction, most of the other paths investigated seem to be of recent origin.

3.1.7 Management issues

The vestigial nature and shallow depth of the remains of most of the historic paths make them especially vulnerable to damage. Disturbance by destructive maintenance should be avoided wherever possible and careful consideration must be given to tree-felling and other clearance, and the access routes that may be needed for

these activities, particularly where these may cause erosion with the consequent loss of archaeological features and information.

Future programmes of landscape enhancement should be monitored therefore to ensure that significant features are not lost or obscured. At the same time, the individual proposals may afford an opportunity for further archaeological survey consistent with conservation objectives. In particular, there is potential for archaeological investigation of other features associated with the designed landscape, both around the water features and relating to ruined buildings and lost structures.

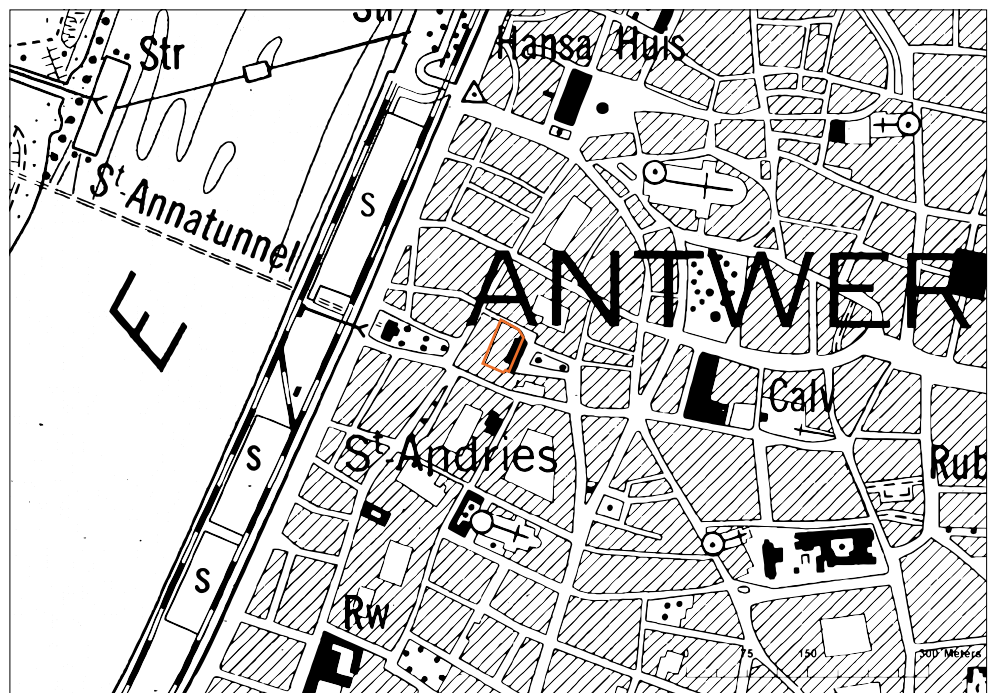
3.2 Archaeological research at the Plantin-Moretus Museum Garden, Antwerp

3.2.1 Historical context of the buildings and the Courtyard garden

The building complex of the Plantin-Moretus Museum (hereafter PMM) is located in the historic Sint-Andries area (fig. 90-92¹⁴²) and has a long and rich history. The present Museum Plantin Moretus originates from the *Officina Plantiniana*, founded in 1555 by Christoffel Plantin. It is the only surviving printing press and publishing house dating from the Renaissance and Baroque periods.

Its history began with the building called ‘De Gulden Passer’ between Hoogstraat and Vrijdagmarkt (fig. 93¹⁴³), which formerly belonged to the Spaniard Martin Lopez. After Plantin, generations of the Moretus family turned the building complex into a real city *palazzo*, with different wings in Flemish Renaissance style arranged around a rectangular courtyard combining housing

FIG. 90 Topographical survey showing the Plantin-Moretus Museum in Antwerp, North at top. *Topografische kaart met aanduiding van het Plantin-Moretus Museum in Antwerpen, met het noorden bovenaan.*



¹⁴² Maps made by K. Cousserier (Flanders Heritage Institute).

¹⁴³ Map made by J. Van Laecke (Flanders Heritage Institute).

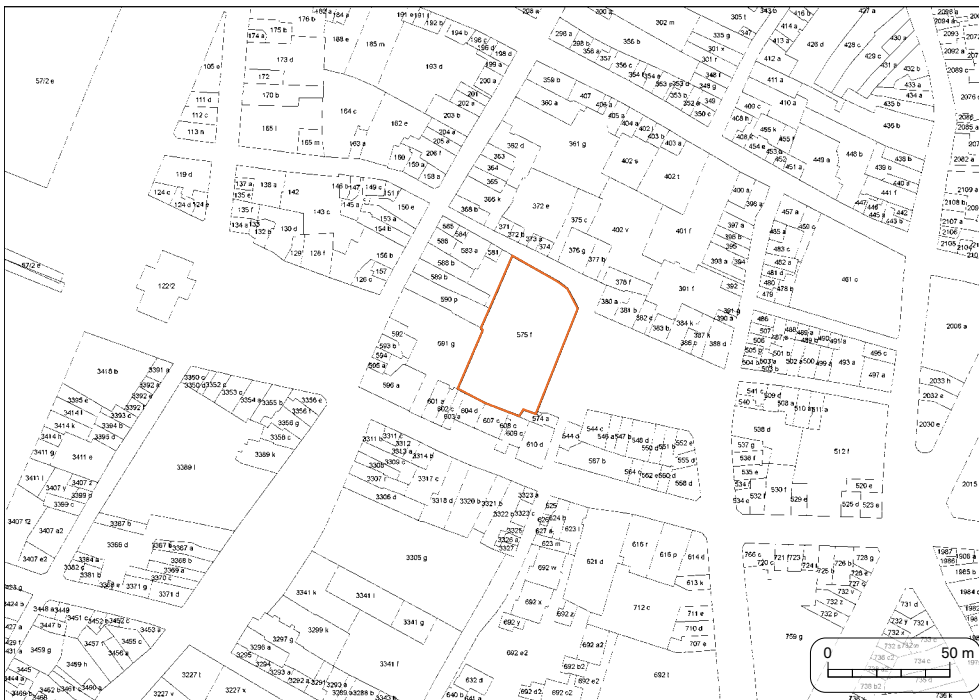


FIG. 91 Cadastral map showing the Plantin-Moretus Museum. *Kadastrale kaart met aanduiding van het Plantin-Moretus Museum.*



FIG. 92 Entrance to the Plantin-Moretus Museum at the Vrijdagmarkt, Antwerp. *Ingang van het Plantin-Moretus Museum aan de Vrijdagmarkt, Antwerpen.*

and working. The complex had a rich interior and there were already many visitors to it in the time of the Moretus residency. The PMM archives were listed as UNESCO heritage in 2001 and in 2005 the building complex was inscribed in the UNESCO World Heritage List.

Christoffel Plantin was famous among his contemporaries as a plant lover and from the 16th century onwards the enclosed garden reflected contemporary horticultural fashion¹⁴⁴.

It is not surprising that the Antwerp town house occupied by the Plantin-Moretus family had a garden. Quiet relaxation in a green environment within safe walls was a luxurious pastime which they could enjoy and many foreign travellers, who visited the city were enthusiastic about the splendid garden of the printing family's house. In 1657, a Bohemian clergyman, Adam Samuel Hartmann¹⁴⁵, found it "extraordinary beautiful" with "a small courtyard and a nice place under large vine leaves". Six years later the French diplomat Balthasar de Monconys described the gar-

¹⁴⁴ The love of plants can be traced in Plantins correspondence see Pérez 2002.

¹⁴⁵ Hartmann 1899-1900; de Monconys 1665, 2.

FIG. 93 Plan of the Plantin-Moretus site.
Plan van de Plantin-Moretus site.



den as “*une cour rectangulaire; au milieu de laquelle est un fort jolie petit iardin, dont les murailles sont tapissées de pampre fort agreablement, comme presque toutes celles de cette ville*”¹⁴⁶. Such brief descriptions however are not sufficient to provide an accurate picture of the garden.

What exactly did the garden look like? It is not easy to answer. Fortunately, study of family records reveals important details for the period between the second half of the 16th century and the late 18th century. There is even pictorial material, which is most unusual for town gardens at this time¹⁴⁷. The two sources are complementary. Without going into detail, it is sufficient that the information casts important light on the historical sequence, in particular during the 17th century when most development apparently took place.

The story begins in the second half of the 16th century. In 1573 the house had a herb or flower garden and a bleaching ground. There are no references to the shape of this early garden or what plants it contained. Three years later, a wooden fence was placed around the herb garden and around the so-called ‘gerstuin’, probably a lawn. This is the first indication that the garden was divided into several parts in accordance with contemporary recommendations. Later references to flowers in the Plantin garden record that the botanist Lobelius saw a particular daffodil there in 1581¹⁴⁸. Does this illustrate Plantin’s preference for ‘collection

flowers’ of rare and often expensive plants, of which 16th-century garden lovers and scholars were so proud?

There is more detailed information available for the layout and plants in the 17th-century garden when the Moretus family occupied the building complex (fig. 94¹⁴⁹). For instance, bills show that in 1638 the wooden fence was painted greyish blue and was surmounted by red balls. Later in the period, a ‘garden parterre’ was added. Purely by accident a bundle with a drawing of an unmistakably 17th-century garden design was found among the old records. This unique document in brown ink, with soft shades of yellow ochre, was probably drawn by someone standing on the first floor of the house, considering its remarkable bird’s eye perspective.

The drawing shows a garden parterre beside the living quarters. It comprises an elongated oval with an open circle in the centre. The ends form a trefoil or lobed arrangement accentuated by four small circles. The parterre has narrow beds at either end. Such parterres were normally planted with box or other green plants such as hyssop and pennyroyal or lavender and rosemary. It is not a surprise therefore that already in 1637 large quantities of box were being delivered to the house at the Vrijdagmarkt. The question whether the parterre was planted exclusively with box remains unanswered for it was the combination of various herbs which created desired differences in colour and height that often made these early garden parterres more attractive.

¹⁴⁶ Translation: “A rectangular courtyard, with a quite pretty little garden in the middle, in which the walls are covered with the most enchanting vines, as are most of the walls in this town.”

¹⁴⁷ Antwerpen 2002.

¹⁴⁸ Lobelius 1581a; Lobelius 1581b and not in Lobelius 1576; Lobelius 1591.

¹⁴⁹ Archives of the PMM. See also the contemporaneous literature on gardening: de Serres 1600; Estienne 1554; Estienne & Stevens 1566; Estienne & Liebault 1629; Franeau 1616; Fuchs 1542; Heyman 1603.

Behind the parterre, there seem to have been two areas, each of four square beds surrounded however by a long small bed. A primitively drawn fence surrounds this utility garden, which may be interpreted as a productive garden for herbs, flowers and vegetables. The drawing shows garden paths of various sizes running between the beds. The wider paths are clearly bordered by small trees.

From the 17th-century bills for garden plants acquired for the Moretus town garden, we can assume that some beds contained tulips – 115 were delivered in 1624 – as well as anemones. Supplies of Roman camomile may have been planted as a winter vegetable. The gardener also planted six unspecified fruit trees in 1637, most probably pears and apples. Are they those shown in the drawing? In the summer months, a pomegranate tree and six orange trees in tubs adorned the garden. According to the documents, this was in 1642 and 1649. In the latter year, a peach tree produced delicious stone fruit that abundantly filled the residents' plates. It cannot be deduced from the list of purchases if there were other fruit or ornamental trees in the garden, apart from a single ash. The maintenance of the vines required a lot of attention: they were regularly pruned and picking the grapes usually took half a day.

In 1694 a painting showing a fountain was placed in the gallery on axis with the centre-line of the garden, presumably adding a touch of feeling of opulence in addition to enhancing the perspective view.

Information about the garden in the 18th century is more scarce. Much expenditure was incurred in maintenance. In 1711 the parterre was rearranged but it is not known if the layout was changed or only the planting. The painting in the gallery needed

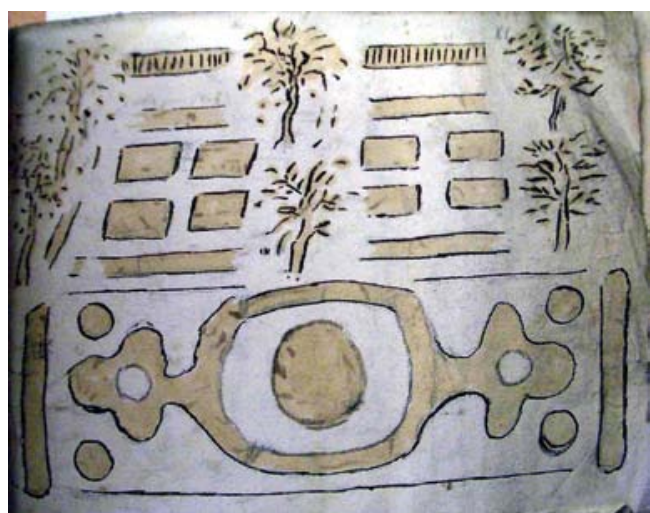


FIG. 94 Drawing of a 17th-century garden design preserved in the PMM archives.

Tekening van een 17de-eeuws tuinontwerp bewaard in het archief van het Plantin Moretus Museum.

restoration, presumably due to exposure to the elements. Even the plants were regularly replaced but the steward confined his description to a “bunch of flowers”, without providing more detail. Purchases of orange trees and laurel trees are explicitly mentioned, however.

This brief summary shows that, in spite of the rather limited quantitative information, the case study of the Antwerp town garden of the Plantin-Moretus house allows us a first-hand glimpse of a private town garden and confirms that the motto *‘ars naturam superat’* was probably visualized in the garden layout.

3.2.2 The archaeological approach (fig. 95)

In 2005 the Plantin-Moretus Museum initiated a project involving the restoration and re-creation of its enclosed garden based on its 16th- and 17th-century documents and a 17th-century drawing. As a monument inscribed in the UNESCO World Heritage List, the building complex has a long and fascinating history¹⁵⁰. In order to guarantee a scientific approach to the historic garden design, a steering committee of specialists in different disciplines was established by the museum. In addition to archival research, the committee felt that garden archaeology could reveal other useful information. A co-operative project was therefore planned between the Flanders Heritage Institute and the Department of Archaeology of the City of Antwerp.

In February 2006, the Flanders Heritage Institute carried out hand augering (fig. 96) to detect the presence of former archaeological layers and/or palaeobotanical fragments from the garden's predecessors¹⁵¹. About 20 core samples were spread across the entire garden, indicating anthropogenic layers up to 2 m below actual garden level. No topsoil or palaeobotanical inclusions were found, reducing the hope of finding remains of former garden layouts.

According to the steering committee however, archaeological research remained the only option to discover tangible remains of the former garden. Therefore in June 2008 the Flanders Heritage Institute and the City's Archaeology Department started archaeological excavations for a period of two weeks¹⁵². The excavations focused on the southern half of the enclosed garden as archaeologically the most valuable as well as the most threatened part.

The aim of the archaeological research was to trace, record and interpret material remains of the former garden(s), comprising any remains of past horticultural activities and indications of garden layout provided by flowerbeds and paths or palaeobotany. The results of the research were presented to the steering committee in order to contribute to the new historic garden design.

At the same time, the excavation team considered the project as a pilot study for garden archaeology in Antwerp, or urban garden archaeology in general. Particular emphasis was placed upon applied methodologies and on the relevance of urban garden archaeology in an interdisciplinary context.

¹⁵⁰ De Nave & Tijjs 2005.

¹⁵¹ This was undertaken by J. Bastiaens (Flanders Heritage Institute) at the request of the City of Antwerp to investigate if there were old garden levels.

¹⁵² Vynckier & Bellens 2008.

Archaeological fieldwork took place within the confined space of the Museum Plantin Moretus, and since the garden would not be recreated in the forthcoming year, excavations had to aim at minimal disturbance. This way the existing garden remained almost intact and visitors to the museum were not disturbed. By contrast, the excavations were considered an added value to a museum visit (fig. 97).

The existing garden was based on a Renaissance design (fig. 98¹⁵³) and had been created in 1992 in connection with the project *Antwerpen 1993 – cultural capital of Europe*. Its symmetrical layout comprised four compartments arranged around a central circle. Vines, roses, clematis and box trees reflected the historic Renaissance design.

The archaeological research was concentrated in the southern half of the garden as the most valuable and most threatened area. Methodology was adapted to fit with existing features, taking account of restricting elements such as museum visits and the capacity to store the excavated soil (fig. 99). In order to cause the least disturbance, only small excavation trenches were dug, each entirely by hand (fig. 100).

Trenches I-VI were dug east-west to evaluate local archaeological values, covering the largest possible area in the southern half of the garden. Next, trenches VII and VIII were dug to examine traces or structures found, connecting trenches II with IV, and IV with VIII. Trench IX was situated in the central path and Trench X next to the southern wing of the museum. Approximately 15 m² or 8 m³ were excavated.

FIG. 95 The courtyard garden before the start of the excavation.

De tuin op de binnenplaats voor de aanvang van de opgraving.



FIG. 96 Preliminary auger in.
Voorafgaande boringen.



FIG. 97 Museum visitors viewing the archaeological work.
Ook de museumbezoeker had toegang tot de archeologische opgraving.

Trenches are described from west to east with details provided only for excavated features. In trenches 1-6 a first excavation level was created by removing 300 mm of topsoil. This level was then lowered in order to examine excavated features, until 500 mm beneath the actual garden level. In trench 5, a third spit was

created at -600 mm. Upon completion all trenches were back-filled and the surface reinstated. Before closing the trenches, the City's Technical Department carried out a camera inspection of the excavated structures.

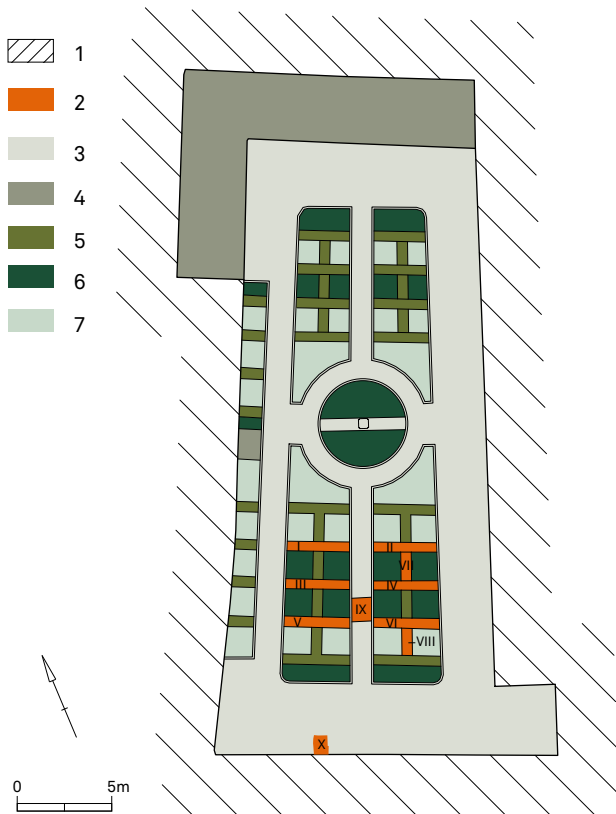


FIG. 98 Plan of the garden at the Plantin-Moretus Museum: 1: museum buildings; 2: trenches I-X; 3: paved paths; 4: paved gallery; 5: box hedges; 6: border with ivy; 7: flowerbeds.

Plan van de tuin op de binnenplaats in het Plantin-Moretus Museum: 1: museumgebouwen; 2: sleuven I-X; 3: geplaveide paden; 4: geplaveide galerij; 5: buxushagen; 6: borders met klimop; 7: bloemperken.



FIG. 99 The excavated spoil was stored in large big bags. *De opgegraven grond werd gestockeerd in stevige grote big bags.*



FIG. 100 Trenches I-X covering the southern half of the courtyard garden.

Sleuven I-X in de zuidelijke helft van de tuin op de binnenplaats.

3.2.3 Excavation

3.2.3.1 Stratigraphy and general description

By manually excavating up to 10 trenches, information about the stratification of the excavation site was gathered. In general, the stratigraphic structure is the same across the entire site.

The first 250–300 mm below modern garden level consist of dark brown-grey sand, providing topsoil for the current planting (fig. 101, 1). Next, a homogeneous brown sandy layer, approximately 200 mm thick, contains particles of brick, lime mortar and charcoal (fig. 101, 2). Then, from a depth of about 500 mm on, a heterogeneous layer of yellow and light brown sand, charcoal, brick and lime mortar debris is found (fig. 101, 3). Archaeological remains are situated at this level. At a depth of 0.90 m, the debris layer contains more brick fragments, and at 1.70 m a grey layer with brick fragments can be found.



FIG. 101 Stratification of the excavation site from the top down: 1: dark brown-grey topsoil; 2: homogeneous brown sandy layer; 3: heterogeneous layer of yellow and light brown sand with inclusions. *Stratigrafie van de opgravingsite: 1: donkerbruine bovenlaag; 2: homogene bruine zandige laag; 3: heterogene geelbruine tot lichtbruine zandlaag met inclusies.*

3.2.3.2 Individual trench descriptions (fig. 102¹⁵⁴)

◉ Trench I

The first excavation level showed a number of features: a 130 mm wide construction trench along the edging or border stones of the south-western compartment, filled up with sand and fine debris; a dark brown-grey colouring of sand with brick- and charcoal inclusions, about 100 mm wide; a brown-grey layer of sand with fragments of brick and lime mortar and a little charcoal; and a 200 mm wide building trench filled with dark grey sand and yellow mortar pieces. By lowering the excavation level, a brick and lime mortar construction was found, 500 mm wide. The upper part consists of roughly cut limestone blocks. Further investigation led to its identification as part of an old sewerage or drainage system, which is still in use today.

◉ Trench II

The first level showed a construction trench, 170 mm wide and cuts a dark brown-grey layer of sand; to the east a dark grey sand layer with yellow mortar fragments was found. Underneath a brick and lime mortar drain structure appeared, similar to the one found in trench 1.

◉ Trench III

This trench shows at the first level the same features as trench I, although they are cut transversely by a dark brown-grey sandy feature with brick and lime mortar fragments. This feature can be identified as the construction trench for the sewerage or drain-system, which indeed was found when lowering the excavation level.

◉ Trench IV

Similar to trench II; here too the features are cut by a brown-grey construction trench. Lowering the excavation level led to the discovery of the extension of the sewerage or drain-system.

◉ Trench V

This trench shows similar features as trench I.

◉ Trench VI

Similar features as trenches I and V.

◉ Trench VII

This trench shows the same structure as seen in trenches II and IV. A slight change in orientation of the built structure can be seen in trenches II and VII.

◉ Trench VIII

This trench connects to trench VI and shows no remains of built structures. Only a dark brown-grey layer was observed.

◉ Trench IX

Situated at the central garden path, between trenches III, IV, V and VI, trench IX shows where the two sewerage or drainage channels join. Building materials and techniques are similar to the built structures found in trenches I, II, III, IV and VII.



FIG. 102 Plan of trenches and excavated features at second level of cleaning: 1: bricks; 2: localised deeper excavation to level 3; 3: white/light grey mortar; 4: yellow mortar; 5: limestone covering; 6: brown/yellowbrown layer with inclusions; 7: dark brown construction trench related to recent paths; 8: slate.

Plan van de opgegraven sleuven in vlak 2: 1: baksteen; 2: gelokaliseerd dieper niveau van vlak 3; 3: wit tot lichtgrijze mortel; 4: gele mortel; 5: kalkstenen afdekstenen; 6: bruine/geelbruine laag met inclusies; 7: donkerbruine aanlegseufgerelateerd aan de huidige paden; 8: leisteen.

◉ Trench X

Situated near the southern wing of the building complex, trench X reveals the brick and lime mortar foundation of the building, without any horticultural remains or other indications.

FIG. 103 Dark brown sandy staining, possibly denoting a former planting bed. *Donkerbruine zandige aftekening die waarschijnlijk een voormalig plantbed aangeeft.*



FIG. 104 Trench III: linear remains indicating the location of the sewerage or drainage system. *Sleuf III: lijnvormig overblijfsel dat de plaats van het riolerings- of drainagesysteem aangeeft.*



3.2.4 Discussion of results

In trenches I-VI, beneath topsoil at level 1, the remains of a series of construction trenches were discovered. They can be related to the existing garden layout created in 1992. An overall brown sandy layer was found beneath, which could be seen as a levelling deposit. At the western side of the garden in trenches I, III and V a dark brown-coloured sand is interpreted as a former planting bed (fig. 103). It must be recent, however, since it is later than the homogeneous brown sandy layer. In trenches I-IV and VII linear features were observed relating to the construction of brick, limestone and lime mortar structures (fig. 104). These turned out to be a sewerage or (storm) drain-system, consisting of two channels emptying into a central collector (*cf.* fig. 100).

In trench III, the western duct was opened by lifting a cover stone. Inside, the drain consists of a brick floor and sides, covered by square blue-grey limestone blocks. Different mortars were used during the construction of the floor and sides, and the covering stones. The inside width varies from 80 to 110 mm, while the inside height is 180 mm. Outside, the sewer is approximately 500 mm wide. Both channels contain muddy silt (fig. 105). Remote-controlled camera inspection made clear that the channels are still connected to the garden drain gullies, rendering soil sampling useless. The western channel may have been built in two phases: the working drain appears to be built on top of another which, based on its stratigraphic position, seems older.

Archives help to date the sewerage system¹⁵⁵. Around the middle of the 18th century the enclosed garden struggled with flooding, so debris and sand were brought in to raise the ground level and a sewerage or a system of drains was constructed. It is tempting therefore to relate the excavated debris layer, the brown sand layer and the drainage arrangements with these activities. Indeed, sections indicate that the debris and sand layers are cut by drainage system, although we should mention that the older western channel is covered by a sand layer. On the other hand should we consider that the operational sewerage/drain system (fig. 106) is an adjustment of the 18th-century sewerage?

In trench V, a stone, brick and lime mortar construction shows an orientation that differs from the sewerage. Its use and date remain unclear.

Based on these findings, we may assume that the construction of the 18th-century infrastructure led to the destruction or partial loss of former garden layouts.

3.2.5 Summary and conclusion

10 small trenches spread across the southern half of the enclosed garden provided an indication of the soil profile and local archaeological values. Augering and stratigraphical studies showed that whilst anthropogenic layers extend at least 2 m below modern garden level they do not contain old topsoil or plant remains.



FIG. 105 Detail of a channel with muddy silt after removal of the cover.

Detail van een kanaal gevuld met modderig slib na het verwijderen van de bedekking.



FIG. 106 Detailed view of the sewerage or drain system.
Gedetailleerd beeld van de riolering of het afloopstelsel.

Archaeological research however revealed a number of structures, associated with a sewerage or system of drains in brick, limestone and lime mortar. Together with some of the excavated deposits they can be connected to archival sources which mention groundwork and the construction of sewerage to solve flooding problems during the 18th century. Other historical references cannot be corroborated but the excavations covered only part of the enclosed garden. On the other hand, 18th-century infrastructure works may have destroyed an important part of the former garden layout.

The fact that the recorded drainage system is still in use pleads for its conservation and functional integration into any future historical garden re-design.

4 Conclusion

Archaeology is an important analytical tool for understanding historic parks and gardens. In addition to showing what survives, it demonstrates the scale of accuracy of previous views and other early representations, including written descriptions as well as maps. It is therefore an essential means to establish precise details of former layout and form, enabling good conservation management and practice together with permitting accurate restoration where there is sufficient evidence.

Archaeological techniques, including the analysis of biological material and soil chemistry, increase our understanding of the former appearance of gardens in addition to broadening the scope of modern enquiry. In purely practical terms, the excavated ground plan can form the basis for accurate reconstruction, while copying the nature of the building materials that were originally used may enhance the authenticity of its setting. By careful investigation it should be possible to separate individual phases of site evolution, and from their individual characteristics help to identify trends and influences. Such knowledge fits well to the anthropological approach developed by US researchers, which seeks to recover motive and meaning from historic gardens as well as social context¹⁵⁶.

The scope of associated fieldwork ranges from complete or total area excavation to more selective investigation, which might target a specific aspect as an aid to reconstruction or solely for academic interest. Initially, many recent applications of archaeology in historic gardens were concerned with examining individual features so that they could be rebuilt accurately. A variety of buildings and other structures have therefore been investigated, ranging from early terraces through 18th-century pavilions and temples to recent bandstands, as well as including paths, pergolas and ponds¹⁵⁷. The detail provided by archaeology indicates what such features may have looked like and how they were constructed. It also shows how they related to each other in previous schemes of movement and sight, thereby increasing our understanding of original layout and spatial composition and often supplementing the information that historical records have to offer.

¹⁵⁶ Dix 1999, 373. See further Kealhofer 1999; Williamson 1999, 252-258.

¹⁵⁷ Dix 1997.

In addition to its suitability for the recovery of geometrical designs, involving regularity and symmetry, archaeological investigation enhances the understanding of less formal gardens and related landscapes through examination of lost buildings and abandoned carriage drives and other routes¹⁵⁸. Analytical fieldwork involving recognition of all relict features, including veteran trees and other vegetation, provides important insight into the significance of former planting and sightlines. At the same time, the demonstration of earlier patterns of land use extends our knowledge of the garden design by showing how existing features may have influenced later development, in some instances even giving it special meaning¹⁵⁹.



FIG. 107 The 'boulevard' or avenue of larch trees planted in 1935 during the period when Solovki was a Gulag concentration camp represents one occurrence in the island's multi-layered landscape. *De 'boulevard' of lorkenlaan uit 1935 toen Solovki een Goelag concentratiekamp was, toont een ingreep in het multi-gelaagd landschap.*

Most archaeological surveys combine several techniques, often involving aerial photography and geophysical prospection among other methods¹⁶⁰. In conjunction with documentary research such studies are essential in comprehending the development of any site. They should underpin related conservation policies and the site management plans based upon them, so ensuring that future repairs and other schemes for renewal take proper account of the significance of the archaeological and historical resource.

Whilst now a commonplace within British practice, archaeological research on historic parks and gardens was not always so extensive in other countries, apart from along the Eastern seaboard of the United States where a range of sites was investigated using similar field methods¹⁶¹. Following the faithful reconstruction during the early 1990s of the Privy Garden at Hampton Court Palace in England¹⁶², archaeology has been increasingly sought elsewhere as a research technique to support detailed understanding and interpretation. In addition to the work reported upon here, formal garden layouts have been investigated in France¹⁶³, Sweden¹⁶⁴, Finland¹⁶⁵, Poland¹⁶⁶ and Ukraine¹⁶⁷ among other places. The scope of the work undertaken ranges from recognition of surviving field remains to comprehensive below-ground investigation.

Fieldwork has also been carried out in different types of designed landscape, among which the Makarievskaya Pustyn (Makarii's Hermitage) Botanic Garden on the edge of the Arctic Circle typifies the kind of complex history that is often represented. Founded in 1822 and originally intended for spiritual seclusion, the area's microclimate was subsequently exploited for growing fruit and vegetables and it became a productive garden which also housed a factory for bleaching wax to use in making candles. Planting continued whilst it was part of the Solovki Gulag concentration camp (fig. 107) but periods of neglect followed until cultivation was finally revived in the 1970s. More recently, work has started on restoring some of the earlier plant-beds and reopening vistas as the garden's historical features and elements are rediscovered¹⁶⁸.

The cultural identity and meaning of individual gardens may therefore change just as much as their form and flora, which develops over time and differs from one place to another. Despite such diversity, all sites can benefit from being understood through a scheme of enquiry that values the evidence on the ground – *archaeology* – equally with that obtained from architectural, historical and ecological studies. The adoption of this methodology in several European countries as well as across the Atlantic and in parts of Asia attests to the growing international recognition of a multidisciplinary approach within the mainstream of gardens and parkland conservation. It is hoped that the results of recent archaeological research on historic gardens in Flanders will add to this changing outlook.

¹⁵⁸ E.g. Macve 2004, 32–38.

¹⁵⁹ Bowden 1998; Williamson 1998.

¹⁶⁰ E.g. Keevill & Linford 1998.

¹⁶¹ Yentsch & Kratzer 1994.

¹⁶² Thurley (ed.) 1995.

¹⁶³ Dix 1996.

¹⁶⁴ Frost *et al.* 2004.

¹⁶⁵ Luppi 2001.

¹⁶⁶ Morysinski 2005.

¹⁶⁷ Jankowski 2005.

¹⁶⁸ Parshin 2005.

Samenvatting ¹⁶⁹

Tuinarcheologie in Vlaanderen.

Een nieuwe archeologische discipline in Vlaanderen: de *Neue Garten* van de Landcommanderij Alden Biesen (Bilzen) en de tuin van het Plantin-Moretusmuseum in Antwerpen

Inleiding

Tuinarcheologie dient onderscheiden te worden van archeologie in tuinen. Laatstgenoemde onderzoekt via opgravingen objecten en hun contexten in tuinen. Tuinarcheologie daarentegen probeert bewijs te vinden voor tuinaanleg en de bijbehorende resten, nl. bouwkundige constructies zowel als biologisch materiaal.

Hoewel tuinarcheologie in Europa al twee decennia succesvol toegepast wordt, is ze in Vlaanderen pas recent geïntroduceerd met twee opgravingen van grote historische tuinen.

Het ene project probeerde de aard en de indeling van de 18de-eeuwse tuinpaden in de *Neue Garten* (1786) van de Landcommanderij Alden Biesen te bepalen ter voorbereiding van een restauratiecampagne. Het andere zocht naar sporen van de vroeg-17de-eeuwse tuin in de binnenhof van het Plantin-Moretusmuseum als onderdeel van een studie naar een 'in situ'-tuinreconstructie.

Beide opgravingen gaven het agentschap Onroerend Erfgoed de kans substantiële en nuttige expertise te vergaren in het erg gespecialiseerde en multidisciplinaire onderzoeksveld van de tuinarcheologie en toonden aan dat het veel meer is dan een instrument voor reconstructie.

Het gebruik van archeologie voor de studie van parken en tuinen

Archeologische methodes hebben vele toepassingen bij de studie van historische parken en tuinen. Naast het verschaffen van wetenschappelijke gegevens over sites en het identificeren van verlaten sites, ondersteunen ze het conserverings- en restauratiebeleid op essentiële punten.

Historische tuinen bestaan in vele vormen. Waar ze nog in gebruik zijn, kunnen delen van de vorige lay-out en andere elementen nog bestaan, zij het soms moeilijk herkenbaar. Zorgvuldige analyse kan de invloed van vroegere landschapsaanpassingen op de huidige vorm aantonen en de ontwikkeling van de tuin schetsen. Daarnaast kan de tuinarcheologie helpen bij het dateren van tuinen, de aanzet geven zelfs voor een tuintypologie, informatie leveren over historische tuinontwerpmodes en zelfs inzicht geven in de persoonlijke artistieke filosofie van de tuineigenaar.

De sites die het voorwerp vormen van de tuinarcheologie zijn zowel chronologisch als typologisch erg divers. Ze dateren van de vroege oudheid tot de 20ste eeuw en kunnen variëren van het zorgvuldig ontworpen landschap rond koninklijke domeinen, kastelen en andere grote residenties tot stadstuintjes; ook publieke parken, de uitvoerige formele aanleg rond landhuizen met bijbehorende keukentuinen en parkland horen tot het object van de tuinarcheologie. Deze sites bevatten allerlei sporen: aanleg van perken en paden, lanen, bosjes, hagen en andere aanplantingen, tuingebouwen en andere monumenten, terreinaanpassingen zoals terrassen, heuvels, kunstmatige meren, enz.

Om tuinen te interpreteren is het essentieel de patronen van ruimtelijke en chronologische variatie te herkennen en te identificeren hoe de verschillende elementen onderling verbonden zijn. De archeologie is een zeer goed hulpmiddel voor het ontdekken van de details van de kenmerkende onderdelen van de tuin uit verschillende periodes. De opeenvolgende lagen en dus de evolutie van de site kunnen enkel door de tuinarcheologie blootgelegd worden.

Het archeologische onderzoek dient uiteraard van een hoogstaande kwaliteit te zijn gedurende elke stap van het onderzoeksproces en de resultaten van het onderzoek moeten goed toegankelijk zijn. De archeologische analyse van een tuin zou de volgende stappen moeten doorlopen: onderzoek van alle gerelateerde historische en cartografische documenten; een topografisch onderzoek van opstaande grondwerken, gekoppeld aan analyse van tuingrenzen en architecturale componenten; dendrologisch en botanisch onderzoek; geofysische prospectie; archeologische opgraving met bijbehorende analyses.

Het historische onderzoek van primaire archiverende bronnen kan de individuele fases van landschapontwikkeling in kaart brengen en soms zelfs nauwkeurig dateren. Daarnaast zijn er verschillende picturale bronnen die in rekening gebracht moeten worden.

Ook historische kaarten, plannen en schaalmodellen zijn waardevol bronnenmateriaal en geven informatie over verschillende aspecten van tuinen. De oudste cartografen hadden echter betrekkelijk primitieve methodes en de oudste kaarten vragen daarom om bevestiging door andere bronnen.

Ten slotte vermelden we nog dat door de hoge status van vele eigenaars ook hun tuinen de nodige aandacht trokken en dus ook minder voor de hand liggende documenten, zoals correspondenties, handleidingen of toeristische gidsen belangrijke informatie kunnen verschaffen.

Twee voorbeelden in Vlaanderen

De 'Neue Garten' in de Landcommanderij Alden Biesen in de provincie Limburg

De ontwikkeling van tuinen in de Landcommanderij begon in de tweede helft van de 16de eeuw. De *Neue Garten* werd aangelegd tussen februari-maart 1786 en juni 1787 volgens een ontwerp van Ghislain-Joseph Henry. Het moest een modieuze Engelse tuin worden op de noordelijke helling van de Vliegen- of Winterberg. Het plan voorzag architecturale elementen, waterwerken, terreinalteraties en vele soorten planten. Het was de laatste stap in de ontwikkeling van Alden Biesen onder de Teutoonse ridderorde, want tijdens de Franse Revolutie werd het domein geconfisqueerd en kwam het in privébezit. Tijdens deze periode met wisselende eigenaars werd de tuin steeds meer verwaarloosd ten gevolge van verarming van de eigenaars en hun onvermogen om zelfs de gebouwen te onderhouden. Na de Eerste Wereldoorlog werd zelf het meest basale onderhoud veronachtzaamd en op een bepaald moment werden een groot aantal Canadese populieren aangeplant. De huidige tuin heeft het typische uitzicht van Haspengouws bosland en de 18de-eeuwse tuin is zo goed als verdwenen: tuinarcheologie was noodzakelijk om het historische kaartenmateriaal te verifiëren.

Zoals al gezegd ligt de tuin op een kleine, vergrote heuvel. De gebouwen bevinden zich in het laagste gedeelte en grond- en oppervlaktewater wordt zo afgevoerd naar de omliggende gracht. De instabiele bodem bestaat uit verschoven sedimenten en bevat lokaal talrijke fossiele schelpfragmenten.

Het doel van het veldwerk was het traject van de verschillende tuinpaden vast te stellen. 40 sleuven werden met de hand uitgegraven, beginnend vanaf de poorten, langsheen de individuele routes die de paden volgen op historische kaarten. Eén sleuf werd machinaal uitgegraven doorheen het opgevulde kanaal bij de zogenoemde tempel van Minerva. Het onderzoek werd uitgevoerd van 16 tot 20 juli 2007.

De opgegraven paden werden proper gemaakt, en hun breedte en diepte onder het moderne grondniveau werden opgetekend.

De opgraving verschaft een relatieve chronologie van de paden in de *Neue Garten*, die vergeleken kan worden met het historische kaartenmateriaal. Het vroegste oprijlaansysteem overleeft in de westelijke helft van de tuin en lijkt contemporain met de zuidelijke poort en geassocieerde afsluitmuren, die verschillende structuren in de tuin met elkaar verbonden. De oprijlanen liepen grotendeels volgens rechte lijnen, alleen de met haagbeuk afgeboorde laan rond de keukentuin verzachtte de stijve lijnvoering. Onderdelen van het vroege ontwerp kunnen gedetecteerd worden in het plan van 1813, net zoals enkele minder formele componenten. Het opvallendste kenmerk is de artificiële, kronkelende rivier door het midden van de tuin, die het tempeleilandje omgaf. De oevers bleken echter instabiel, wat resulteerde in een demping van de kanalen rond het eilandje. Een rondgaand pad in het oosten komt overeen met de afbeelding op de kaart van 1873, maar kan ouder zijn. Ook in het zuidoosten komt een deel van het grenspad overeen met deze kaart. Verder lijken de andere onderzochte paden – behalve misschien het pad bij de grotto – van recentere oorsprong.

De rudimentaire en ondiepe aard van de resten van de tuinpaden maakt hen extra kwetsbaar voor beschadiging. Bij het onderhoud dient hier dan ook rekening mee gehouden te worden en het lijkt aangewezen alle werkzaamheden in de tuin slechts onder vakkundig toezicht te laten plaatsvinden. Ten slotte toonde de opgraving aan dat verder archeologisch onderzoek van de waterelementen en de ruïnes interessante resultaten kan opleveren.

Archeologisch onderzoek in de Plantin-Moretusmuseumtuin, Antwerpen

Het gebouwencomplex van het Plantin-Moretusmuseum (PMM) heeft een rijke geschiedenis. Het komt voort uit de *Officina Plantiniana*, gesticht door Christoffel Plantin in 1555. Het is het enige nog bestaande druk- en uitgevershuis uit de renaissance en barok. Generaties na Plantin veranderden het gebouwencomplex in een echt stadspaleis, dat werk en wonen combineerde, met verschillende vleugels in Vlaamse renaissancestijl rond een rechthoekige binnenhof. De archieven van het PMM werden ingeschreven als 'UNESCO Memory of the World'-erfgoed in 2001 en de gebouwen verschenen in 2005 op de lijst van het UNESCO-Werelderfgoed.

Christoffel Plantin was een liefhebber van planten en de tuin weerspiegelde vanaf de 16de eeuw de horticulturele modes. De vele buitenlandse bezoekers waren enthousiast over de luxueuze tuin.

Hoe de tuin er juist uitzag is een moeilijk te beantwoorden vraag. Gelukkig kunnen we veel details ontdekken in de familiearchieven van Plantin-Moretus (vooral oude rekeningen leveren kostbare informatie) en is er ook contemporain afbeeldingsmateriaal. Zonder in detail te gaan bieden beide bronnen een belangrijke inzicht in de historische ontwikkeling van de tuin, in het bijzonder voor de 17de eeuw.

In 2005 zette het PMM een project op poten om de binnentuin te restaureren en te recreëren naar een tuintekening uit het tweede kwart van de 17de eeuw. Om een wetenschappelijke aanpak te waarborgen werd een multidisciplinair comité opgericht. Dat besloot dat tuinarcheologie een noodzakelijke aanvulling was op archiefstudie en dus startten de archeologische dienst van de stad Antwerpen en het agentschap Onroerend Erfgoed samen een project op. Dit leidde tot een aantal proefboringen in 2006. Daaruit bleek dat de bodem tot 2 m onder het actuele tuinniveau sporen van menselijke activiteit bevatte. Er werden echter geen paleobotanische resten, noch sporen van bovenste bodemlagen gevonden. Toch werd er besloten tot verder archeologisch onderzoek, omdat dit de enige mogelijkheid was om tastbare resten van de voormalige tuin(en) te ontdekken. In juni 2008 werd er begonnen met archeologische opgravingen in de zuidelijke helft van de binnenhof, de zone die beschouwd werd als het kwetsbaarst en meest waardevol. De opgravingen duurden twee weken. Het doel was materiële resten van de voormalige tuin(en) op te sporen, te registreren en te interpreteren en de resultaten te gebruiken om bij te dragen aan het nieuwe historische tuinontwerp. Tegelijkertijd werd het project door het opgravingsteam beschouwd als een pilootproject voor stedelijke tuinarcheologie. Daarom werd er bijzondere nadruk gelegd op de toegepaste methode en de relevantie van de tuinarcheologie in een interdisciplinaire context.

In totaal werden 10 sleuven met de hand uitgegraven om zoveel mogelijk stratigrafische gegevens te achterhalen. Uit de opgravingen bleek dat de stratificatie over de gehele site min of meer dezelfde is. Onder de bovenlaag, die 250-300 mm dik is, bevindt zich een homogene bruine zandige laag van ca. 200 mm, die partikels van baksteen, kalkmortel en houtskool bevat. Dan volgt een heterogene laag van geel en lichtbruin zand, houtskool, baksteenfragmenten en kalkmortel. In deze laag bevinden zich archeologische resten. Op een diepte van 900 mm bevat de laag meer bakstenen brokstukken en op 1,70 m vindt men een grijze laag met baksteenfragmenten.

De opvallendste vondst was die van een drainagesysteem, bestaande uit twee kanalen die uitmonden in een centrale collector. De meeste andere vondsten waren terug te voeren op de recentste tuinaanleg. De afvoer bleek bij nadere inspectie nog steeds te werken, wat het nemen van grondmonsters nutteloos maakte. Het drainagesysteem kan samen met de opgegraven lagen misschien in verband gebracht worden met de uit archieven gekende 18de-eeuwse niveauperhoging en afvoeraanleg, die dienden om overstromingsproblemen aan te pakken. Deze aanpassingen hebben waarschijnlijk de sporen van vroegere tuinaanleg vernietigd.

Andere historische referenties konden niet bevestigd worden, maar hierbij moet aangestipt worden dat slechts een deel van de tuin opgegraven werd, al is het door de 18de-eeuwse afvoeraanleg onwaarschijnlijk dat er nog oudere sporen over zijn. Het feit dat de oude drainage nog steeds werkt, pleit wel voor een behoud en functionele integratie in een toekomstige historische heraanleg van de tuin.

Besluit

Archeologie is een belangrijk hulpmiddel om historische tuinen en parken te begrijpen. Ze toont wat overgebleven is en bewijst of weerlegt de visie van andere bronnen. Om de details van tuinaanleg en -vorm vast te stellen, om tot een goed beheer te komen en om een degelijk restauratiebeleid te voeren, is de tuinarcheologie essentieel. Puur praktisch kan men zeggen dat het opgegraven grondplan als model kan dienen voor accurate reconstructie en dat door het gebruik van dezelfde materialen als degene die opgegraven zijn de authenticiteit van de site vergroot. Door zorgvuldig onderzoek is het verder mogelijk individuele fases binnen de ontwikkeling van de site te onderscheiden en hieruit modetrends en algemene evoluties af te leiden. De vele details die door de tuinarcheologie ontdekt kunnen worden, dragen verder bij tot het beter begrijpen van de culturele identiteit, ontwikkeling en betekenis van tuinen.

De groeiende toepassing van de tuinarcheologische methodologie in verschillende Europese landen, in de Verenigde Staten van Amerika en in delen van Azië getuigt van de groeiende internationale erkenning van deze multidisciplinaire aanpak. Hopelijk dragen de resultaten van de recente archeologische onderzoeken in Vlaanderen verder bij tot de ontwikkeling van de tuinarcheologie als wetenschappelijke discipline.

5 Bibliography

5.1 Early published works

DE MONCONYS B. 1665: *Journal des voyages de Monsieur Balthasar de Monconys, 6 dl, Enrichi de quantité de figures en taille-douce*, Lyon.

DE SERRES O. 1600: *Le théâtre d'agriculture et mesnage des champs d'Olivier de Serres, seigneur de Pradel dans lequel est représenté tout ce qui est requis et necessaire pour bien dresser, gouverner, enrichir et embellir la Maison Rustique*, Paris.

ESTIENNE CH. 1554: *L'agriculture et maison rustique*, Paris.

ESTIENNE CH. & STEVENS K. 1566: *De Landtwinninghe en de Hoeve*, Antwerp.

ESTIENNE CH. & LIEBAULT L. 1629: *L'agriculture et maison rustique*, Rouen.

FRANEAU J. 1616: *Le jardin d'hyver ou cabinet des fleurs*, Douai.

FUCHS J. 1542: *De historia stirpium commentarii insignes*, Bazel.

HEYMAN J. 1603: *De cleyne herbarius ofte kruydt-boexken*, Antwerp.

LOBELIUS M. 1576: *Plantarum seu stirpium historia....Cui annexum est adversariorum volumen*, Antwerp.

LOBELIUS M. 1581a: *Kruydtboeck*, Antwerp.

LOBELIUS M. 1581b: *Plantarum seu stirpium icones*, Antwerp.

LOBELIUS M. 1591: *Icones stirpium, seu plantarum tam exoticarum, quam indigenarum*, Antwerp.

5.2 Modern books

ALMAGRO A. 2007: An Approach to the Visual Analysis of the Gardens of Al-Andalus. In: CONAN M. (ed.), *Middle East Garden Traditions: Unity and Diversity. Questions, Methods and Resources in a Multicultural Perspective*, Washington, 55-73.

Antwerpen 2002: Antwerpen, een originele stadstuin rijker. Thien oraigie boomen sommigen met appelen belaeden, (exhibition cat.) Antwerp.

ASPINALL A. & POCOCK J.A. 1995: Geophysical prospection in garden archaeology: an appraisal and critique based on case studies, *Archaeological Prospection* 2/2, 61-84.

BANDARANAYAKE S. 1997: Sigiriya: research and management at a 5th-century garden complex. In: JACQUES (ed.) 1997, 78-85.

BARNATT J. & BANNISTER N. 2009: *The Archaeology of a Great Estate: Chatsworth and Beyond*, Oxford.

BARNATT J. & WILLIAMSON T. 2005: *Chatsworth: A Landscape History*, Macclesfield.

BELL R.D. 1990: The discovery of a buried Georgian garden in Bath, *Garden History* 18/1, 1-21.

BELL R.D. 1993: Archaeology and the rococo garden: the restoration at Painswick House, Gloucestershire, *Garden History* 21/1, 24-45.

BEVAN B. 1994: Remote Sensing of Gardens and Fields. In: MILLER & GLEASON (ed.) 1994, 70-90.

BINNEY M. & HILLS A. 1979: *Elysian Gardens. A strategy for survival*, London.

- BLOCKLEY K. & HALFPENNY I. 2002: *Aberglasney House and Gardens. Archaeology, history and architecture*, BAR British Series 334, Oxford.
- BOUDON F. 1991a: Illustrations of Gardens in the 16th Century: 'The Most Excellent Buildings in France'. In: MOSSER & TEYSOT (ed.) 1991, 100-102.
- BOUDON F. 1991b: Garden History and Cartography. In: MOSSER & TEYSOT (ed.) 1991, 125-134.
- BOWDEN M. 1998: The conscious conversion of earlier earthworks in the design of parks and gardens. In: PATTISON (ed.) 1998, 23-26.
- BOWDEN M. (ed.) 1999: *Unravelling the Landscape. An inquisitive approach to archaeology*, Brimscombe Port, Stroud.
- BRIGGS C.S. 1999: Aberglasney: the theory, history and archaeology of a post-medieval landscape, *Post-Medieval Archaeology* 33, 242-284.
- BROWN A.E. (ed.) 1991: *Garden Archaeology. Papers presented to a conference at Knuston Hall, Northamptonshire, April 1988*, Council for British Archaeology Research Report 78, London.
- BROWN G. 1998: Parklands as guardians of early landscapes: Highclere Castle, Hampshire. In: PATTISON (ed.) 1998, 7-12.
- BROWN M.R. & CHAPPELL E.A. 1997: Archaeology and garden restoration at Colonial Williamsburg. In: JACQUES (ed.) 1997, 70-77.
- CHADWICK G.F. 1961: *The Works of Sir Joseph Paxton 1803-1865*, London.
- CHAMBERS D. 1993: *The planters of the English landscape garden: botany, trees, and the Georgics*, New Haven & London.
- CIAROLLO A. & MARIOTTI LIPPI M. 1993: The garden of 'Casa dei Casti Amanti' (Pompeii, Italy), *Garden History* 21/1, 110-116.
- COLE M.A., ANDREW D.E.U., LINFORD N.T., LINFORD P.K. & PAYNE A.W. 1997: Non-destructive techniques in English gardens: geophysical prospecting. In: JACQUES (ed.) 1997, 26-39.
- COLVIN H.M. 1986: Royal Gardens in Medieval England. In: MACDOUGALL 1986, 7-22.
- COOLEY A.E. 2003: *Pompeii*, London.
- COORAY N. 1997: The restoration of the gardens of Sigiriya, Sri Lanka, *Tuinkunst* 2 (1996), 145-158.
- COUCH S.M. 1992: The practice of avenue planting in the 17th and 18th centuries, *Garden History* 20/2, 173-200.
- CREIGHTON O.H. 2009: *Designs upon the Land: Elite Landscapes of the Middle Ages*, Woodbridge.
- CURRIE C. 2005: *Garden Archaeology*, Council for British Archaeology Practical Handbooks in Archaeology No. 17, York.
- CURRIE C.K., FOSTER P. & WHITE K. 2003: Archaeological excavations at Upper Lodge, Bushy Park, London Borough of Richmond, 1997-99, *Post-Medieval Archaeology* 37/1, 90-125.
- CURRIE C.K. & LOCOCK M. 1991: An evaluation of archaeological techniques used at Castle Bromwich Hall, 1989-90, *Garden History* 19/1, 77-99.
- CURRIE C.K. & LOCOCK M. 1993: Excavations at Castle Bromwich Hall gardens 1989-91, *Post-Medieval Archaeology* 27, 111-199.
- CURRIE C.K. & LOCOCK M. 1995: The formal cascade at The Gnoll, *Welsh Historic Gardens Trust Newsletter* 8, 72-79.

DE HARLEZ DE DEULIN N. & DERAMAIX I. 1994-95: Le rôle de la gravure dans la restauration d'un jardin historique – la restitution de la balustrade du jardin des Fleurs dans le parc d'Enghien, *Bulletin de la Commission Royale des Monuments, Sites et Fouilles* 15, 117-122.

DE MOULINS D. & WEIR D.A. 1997: The potential and use of environmental techniques in gardens. In: JACQUES (ed.) 1997, 40-46.

DE NAVE F. (ed.) 1993: *De Botanica in de Zuidelijke Nederlanden (eind 15de eeuw-ca 1650)*, Antwerpen.

DE NAVE F. & TIJS R. 2005: *Het Complex Woning-Ateliers – Museum Plantin-Moretus. Bouwgeschiedenis*, Antwerpen.

DE ROUX A., FAUCHERRE N. & MONSAINGEON G. 1989: *Les Plans en Relief des Places du Roy*, Paris.

DINGWALL C. & LAMBERT D. 1997: *Historic Parks and Gardens in the Planning System: a Handbook*, Reigate.

DIX B. 1996: Vallery revealed/Vallery révélé, *European Gardens* 3, 28-31.

DIX B. 1997: *An Archaeological Evaluation of Red Cross Gardens, Southwark - May 1997*, Northampton.

DIX B. 1999: 'Of Cabbages-and Kings': Garden Archaeology in Action. In: EGAN & MICHAEL (ed.) 1999, 369-377.

DIX B. 2000: Archaeology in Historic Gardens. In: *The Building Conservation Directory 2000*, Tisbury, 11-12.

DIX B. 2009: The Hafod Archaeological Guidelines, *Gerddi* 5, 45-53.

DIX B. 2010: Tracing the Past: Archaeology and Garden Reconstruction. In: *Historic Gardens, Building Conservation Directory Special Report, 3rd edn*, Tisbury, 16-19.

DIX B. 2010-11: Gone but not forgotten, *Historic Gardens Review* 24, 30-34.

DIX B. 2011a: Experiencing the past: the archaeology of some Renaissance gardens, *Renaissance Studies* 25/1, 151-182.

DIX B. 2011b: 'Barbarous in its magnificence': the archaeological investigation and restoration of W.A. Nesfield's parterre design for the East Garden at Witley Court, Worcestershire, *Garden History* 39/1, 51-63.

DIX B. 2012: Striped Lawns with a Difference, *Historic Garden Review* 26, 30-31.

DIX B. & JACQUES D. forthcoming: *Field Archaeology of the Home Park Avenues at Hampton Court*, in preparation.

DIX B. & PARRY S. 1995: The excavation of the Privy Garden. In: THURLEY (ed.) 1995, 79-118.

DIX B., SODEN I. & HYLTON T. 1995: Kirby Hall and its gardens: excavations in 1987-1994, *Archaeological Journal* 152, 291-380.

DREESEN R. & DUSAR M. 2007: 33 miljoen jaar Alden-Biezen: een geschiedenis met verrassende wendingen, *LIKONA Jaarboek* 17/1, 6-19.

EGAN G. & MICHAEL R.L. (ed.) 1999: *Old and New Worlds. Historical/Post Medieval Archaeology Papers from the Societies' joint conferences at Williamsburg and London 1997 to mark thirty years of work and achievement*, Oxford.

- ELLIOTT B. 2003: A brief guide to the use of picture postcards in garden history, *Garden History* 31/2, 218-224.
- ELLIOTT B. 2004: Gardens Illustrated. In: ALFREY N., DANIELS S. & POSTLE M. (ed.), *Art of the Garden. The Garden in British Art, 1800 to the Present Day*, London, 40-47.
- ENGLISH HERITAGE 2006: *Understanding Historic Buildings. A guide to good recording practice*, Swindon.
- ENGLISH HERITAGE 2007: *Understanding the Archaeology of Landscapes. A guide to good recording practice*, Swindon.
- ENGLISH HERITAGE 2008a: *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment*, London.
- ENGLISH HERITAGE 2008²b: *Geophysical Survey in Archaeological Field Evaluation*, Swindon.
- EVERSON P. 1989: The gardens of Campden House, Chipping Campden, Gloucestershire, *Garden History* 17/2, 109-121.
- EVERSON P. 1991: Field survey and garden earthworks. In: BROWN (ed.) 1991, 6-19.
- EVERSON P. 1998: 'Delightfully surrounded with woods and ponds': field evidence for medieval gardens in England'. In: PATTISON (ed.) 1998, 32-38.
- FISH S.K. 1994: Archaeological Palynology of Gardens and Fields. In: MILLER & GLEASON (ed.) 1994, 44-69.
- FORSYTH A. 1983: *Yesterday's Gardens*, London.
- FRETWELL K. 2001: Digging for History. In: Reynolds F., *Rooted in History. Studies in Garden Conservation*, London, 63-83.
- FRITZ J.M. & MICHELL G. 2000: Archaeology of the Garden. In: MOYNIHAN E.B. (ed.), *The Moonlight Garden: new discoveries at the Taj Mahal*, Seattle & London.
- FROST K., JONSSON K. & PERSSON K. 2004: The Royal Kitchen Garden at Strömsholm Castle: evaluating archaeological methods, *Garden History* 32/2, 261-271.
- GOLEMBNIK A. 2004: Palac i ogrody w Wilanowie – badania archeologiczne Krajowego Ośrodka Badań i Dokumentacji Zabytków w sezonie 2003 [Wilanów Palace and Gardens – archaeological excavations by the National Centre for Historical Monument Studies and Documentation in 2003], *Monument* 1, 135-160.
- GYULA G.D. 2001: *A Bonchidai Bánffy-Kastély*, Kolozsvár.
- HALL E. & LEAR J. (ed.) 1992: Chatham Dockyard Gardens, *Garden History* 20/2, 132-152.
- HARLEY J.B. 1972: *Maps for the local historian. A guide to the British sources*, London.
- HARRIS J. 1979: *The Artist and the Country House. A history of country house and garden view painting in Britain 1540-1870*, London.
- HARRIS J. 1990: A tour of London's gardens with John Rocque. In: GALINOU M., *London's Pride. The Glorious History of the Capital's Gardens*, London, 102-121.
- HARRIS J. & JACKSON-STOPS G. (ed.) 1984: *Britannia Illustrata: Knyff & Kip*, Bungay.
- HARTMANN S. 1899-1900: Tagebuch Adam Samuel Hartmanns über seine Collectenreise im Jahre 1657-1659. Herausgegeben und erläutert von Rodregu Pruemers, *Zeitschrift der Historischen Gesellschaft für die Provinz Posen* 14, 15, 1900.

- HARVEY J. 1993²: *Restoring Period Gardens*, Shire Garden History series no. 1, Princes Risborough.
- HILL N. 2006: The Kitchen Garden at Audley End. In: English Heritage, *Diary of a Victorian Gardener: William Cresswell at Audley End*, Swindon, 141-161.
- HOBHOUSE P. & WOOD C. 1988: *Painted Gardens: English watercolours 1850-1914*, London.
- HOWES L. 1991: Archaeology as an aid to restoration at Painshill Park. In: BROWN (ed.) 1991, 73-82.
- HUGHES G. 2006: An archaeological excavation and survey at the Shell House, Cilwendeg, Pembrokeshire, *Gerddi* 4, 38-44.
- HUNT J.D. 2003: *The Picturesque Garden in Europe*, London.
- HUNT J.D. (ed.) 1992: *Garden History: issues, approaches, methods*, Washington.
- HYND N.R. & EWART G. 1983: Aberdour Castle Gardens, *Garden History* 11/2, 93-111.
- JACQUES D. 1995: The history of the Privy Garden. In: THURLEY (ed.) 1995, 23-42.
- JACQUES D. (ed.) 1997: The Techniques and Uses of Garden Archaeology, *Journal of Garden History* 17/1, 1-99.
- JANKOWSKI A. 2005: Ogrody siedemnastowiecznej rezydencji w Podhorcech – wyniki badań sondazowych [The gardens of the 17th-century residence in Podhorce – trial excavation results], *Monument* 2, 469-477.
- JASHEMSKI W.F. 1992: The Contribution of Archaeology to the Study of Ancient Roman Gardens. In: HUNT (ed.) 1992, 5-30.
- JASHEMSKI W.F. 1993: *The Gardens of Pompeii, Herculaneum and the Villas Destroyed by Vesuvius*; 2, New Rochelle.
- JOHNSON M. & CAMPBELL K. 2010: Elements of an 18th-century landscape revealed: excavations within the former gardens of Caroline Park House, Granton, Edinburgh, *Garden History* 38/1, 81-98.
- KEALHOFER L. 1999: Adding Content to Structure: Integrating Environment and Landscape. In: EGAN & MICHAEL (ed.) 1999, 378-389.
- KEEVILL G.D. & LINFORD N. 1998: Landscape with gardens: aerial, topographical and geophysical survey at Hamstead Marshall, Berkshire. In: PATTISON (ed.) 1998, 13-22.
- KELSO W.M. 1992: Landscape Archaeology and Garden History Research: Success and Promise at Bacon's Castle, Monticello, and Poplar Forest, Virginia. In: HUNT (ed.) 1992, 31-57.
- KELSO W.M. & MOST R. (ed.) 1990: *Earth Patterns. Essays in Landscape Archaeology*, Charlottesville & London.
- LAMBERT D., GOODCHILD P. & ROBERTS J. 1995²: *Researching a Garden's History: A Guide to Documentary and Published Sources*, Reigate.
- LEONE M.P. & SHACKEL P.A. 1990: Plane and Solid Geometry in Colonial Gardens in Annapolis, Maryland. In: KELSO & MOST (ed.) 1990, 153-167.
- LOCKWOOD A.G.B. (ed.) 2000²: *Gardens of Colony and State. Gardens and Gardeners of the American Colonies and of the Republic before 1840*, 2, New York.
- LONGSTAFFE-GOWAN T. 1993: Private Urban gardening in England, 1700-1830: On the Art of Sinking. In: HUNT J.D. & WOLSCHKE-BULMAN J. (ed.), *The Vernacular Garden*, Washington, 47-75.

- LUPPI P. 2001: Puutarha-arkologia Suomessa. In: HÄYRYNEN M. (ed.), *Hortus Fennicus – Suomen puutarhataide* [Garden art of Finland], Helsinki.
- MACDOUGALL E.B. (ed.) 1986: *Medieval Gardens*, Washington.
- MACVE J. 2004: *The Hafod Landscape. An illustrated history and guide*, Pontrhydygroes.
- MALEK A.-A. (ed.) 2013: *Sourcebook for Garden Archaeology: Methods, Techniques, Interpretation and Field Examples*, Bern.
- MARTIN P. 1991: *The Pleasure Gardens of Virginia from Jamestown to Jefferson*, Princeton.
- MERTENS J. 1995: De aanleg van de Engelse tuin in Alden Biesen door Landcommandeur Frans von Reisbach. In: 1786-1787, *Bijdragen tot de geschiedenis van de Duitse Orde in de Balije Biesen*, Bilzen, 359-389.
- MILLER N.F. & GLEASON K.L. 1994: Fertilizer in the Identification and Analysis of Cultivated Soil. In: MILLER & GLEASON (ed.) 1994, 25-43.
- MILLER N.F. & GLEASON K.L. (ed.) 1994: *The Archaeology of Garden and Field*, Philadelphia.
- MITCHELL A. 1978²: *Collins Field Guide: Trees of Britain & Northern Europe*, London.
- MITCHELL A. 1999: 'La Plus Belle Chose du Monde' and the Enghien tapestries at Dyrham Park and Maiden Bradley, *Apollo* 149, 33-37.
- MORYSINSKI T. 2005: 'Archeologia w procesie rewaloryzacji ogrodów. Trudne początki [Archaeology in the revalorization of gardens: difficult beginnings], *Ochrona Zabytków* 2005/3, 57-70.
- MOSSER M. & TEYSOT G. (ed.) 1991: *The History of Garden Design. The Western Tradition from the Renaissance to the Present Day*, London.
- MOTT T. 1991: Gardens and Photography. In: MOSSER & TEYSOT (ed.) 1991, 471-482.
- MURPHY P. & SCAIFE R.G. 1991: The environmental archaeology of gardens. In: BROWN (ed.) 1991, 83-99.
- NAIL S. 1997: In Pursuit of the Authentic, *Historic Gardens Review* autumn 1997, 2-9.
- NAIL S. 1998-99: The Triumph of the Authentic, *Historic Gardens Review* winter 1998-9, 2-7.
- NANDA R. 2004: A Tomb Brought to Life, *Historic Gardens Review* 13, 18-22.
- NOËL HUME A. 1974: *Archaeology and the Colonial Gardener*, Colonial Williamsburg Archaeological Series No. 7, Williamsburg.
- NOËL HUME I. 1974: *Digging for Carter's Grove*, Colonial Williamsburg Archaeological Series No. 8, Williamsburg.
- PARSHIN A. 2005: *Solovki Garden. Russia's Monastery, Gulag and Botanic Garden on the Edge of the Arctic Circle*, Moscow.
- PATTISON P. (ed.) 1998: *There by Design: Field Archaeology in Parks and Gardens. Papers presented at a conference organised by the Royal Commission on the Historical Monuments of England and the Garden History Society*, Swindon.
- PÉREZ D. (ed.) 2002²: *Benedictus Arias Montanus, Correspondencia conservada en el Museo Platin-Moretus de Amberes*, Madrid.
- PERT T. 2006: The Penllergare Cultural, Archaeological and Historic Landscape Database, *Gerddi* 4, 45-51.

- PHIBBS J. 1983: An approach to the methodology of recording historic landscapes, *Garden History* 11/2, 167-175.
- PHIBBS J. 1991: Groves and belts, *Garden History* 19/2, 175-186.
- PIGOTT C.D. 1989: Estimation of the age of Lime-trees (*Tilia* Spp.) in parklands from stem diameter and ring counts, *Arboricultural Journal* 13/4, 289-302.
- PIGOTT C.D. 1995: The radial growth-rate of yews (*Taxus baccata*) at Hampton Court, Middlesex, *Garden History* 23/2, 249-252.
- POTTER J. 2000: *Lost Gardens*, London.
- PRENTICE J. & HOLMES M. 2001-02: Searching in Spanish Soil, *Historic Gardens Review* autumn 2001-winter 2002, 13-16.
- ROBERTS J. 1995: Historic Parks and Gardens - Listing, Awareness and the Future, *Journal of Architectural Conservation* 1, 38-55.
- SAUER F. 1995: Gartenarchäologie in Schlosshof, *Die Gartenkunst* 7/1, 134-142.
- SEILER M. 1997: Investigation by qualified gardening staff. In: JACQUES (ed.) 1997, 61-69.
- SHURCLIFF A. 1937: The Gardens of the Governor's Palace, Williamsburg, Virginia, *Landscape Architecture* 27/2, 54-95.
- SMITH P. 2007: The Palladian Palace at Apethorpe, *English Heritage Historical Review* 2, 85-105.
- SOGLIANO A. 1898: La Casa dei Vettii in Pompei, *Monumenti Antichi dell' Accademia dei Lincei* 8, 233-416.
- SPYCHER H. 1991: Die archäologische Untersuchung des südlichen Gartenparterres. In: CARLEN G. (ed.), *Schloss Waldegg bei Solothurn (Château de Waldegg près de Soleure)*, Solothurn, 82-96.
- SPYCHER H. 1995: Gartenarchäologische Untersuchungen bei Schloss Waldegg, *Die Gartenkunst* 7/1, 120-133.
- STEANE J. & DIX B. 1997: Recent investigations into the history of the gardens, the Grove, the Water Walks and the Meadow, *Magdalen College Record* 1997, 75-86.
- STRONG R. 2000: *The Artist & the Garden*, New Haven & London.
- SUTHERILL M. 1995: *The Gardens of Audley End*, London.
- TAIGEL A. & WILLIAMSON T. 1993: *Know the Landscape: Parks and Gardens*, London.
- TAYLOR C. 1983: *The Archaeology of Gardens*, Princes Risborough.
- TAYLOR C. 1998: *Parks and Gardens of Britain. A Landscape History from the Air*, Edinburgh.
- TAYLOR C. 2000: Medieval ornamental landscapes, *Landscapes* 1/1, 38-55.
- TAYLOR C.C. 1991: Garden archaeology: an introduction. In: BROWN (ed.) 1991, 1-5.
- THROSSELL E. & RUTHERFORD S. 2008: Gibbs and the Formal Garden: Hartwell as depicted in the Nebot paintings. In: Bucks Garden Trust, *Gibbs & Gardening: the work of the 18th-century architect James Gibbs. Papers from the seminar held at Hartwell House in August 2008*, 12-22.
- THURLEY S. 2003: *Hampton Court: a social and architectural history*, New Haven & London.
- THURLEY S. (ed.) 1995: *The King's Privy Garden at Hampton Court Palace 1689-1995*, Apollo Magazine, London.

- TURNER T. 2005: *Garden History: Philosophy and Design 2000 BC-2000 AD*, London & New York.
- TURNER T. 2010: *Asian Gardens: History, Beliefs and Design*, London.
- VAN ASBECK J. 1991: The Formal garden at Het Loo. In: MOSSER & TEYSOT (ed.) 1991, 178-180.
- VAN BUREN A.H. 1986: Reality and Literary Romance in the Park of Hesdin. In: MACDOUGALL (ed.) 1986, 115-134.
- VAN DEN BOSSCHE H. 1991: De tuinen van Alden Biesen, een nieuwe hof naar oud model, *Monumenten & Landschappen* 10/3, 25-40.
- VAN DEN BOSSCHE H. & VYNCKIER G. 2010: Rijkhoven (Bilzen): Tuinarcheologie te Alden Biesen. In: CREEMERS G. & VANDERHOEVEN A. (ed.), *Archeologische kroniek van Limburg 2007, Limburg-Het Oude Land van Loon* 89/2, 124-126.
- VLIEGENTHART A.W. & ERKELENS A.M.L.E. 1988: *Het Loo, Paleis en Tuinen/Palace and Gardens*, Apeldoorn.
- VOLKMANN T. (ed.) 2011: *Geophysik in der Gartendenkmalpflege-Zerstörungsfreie Untersuchungsmethoden im Schlosspark Paretz*, Arbeitshefte des Brandenburgischer Landesamtes für Denkmalpflege und Archäologischen Landesmuseums 23, Petersberg.
- VON DETTEN D. 1993: Die archäologischen Untersuchungen im barocken Terrassengarten von Kloster Kamp. In: HANSMANN W. (ed.), *Der Terrassengarten von Kloster Kamp*, Arbeitshefte der Rheinischen Denkmalpflege 34, Köln, 39-62.
- VYNCKIER G. & BELLENS T. 2008: Archeologisch tuinonderzoek in Museum Plantin-Moretus, *Rapporten van het Stedelijk informatiecentrum archeologie & monumentenzorg* 4.
- WARMOES I. 1997: *Le musée des Plans-Reliefs. Maquettes historiques de villes fortifiées*, Paris.
- WEST J. 1997: Garden archaeology from a curator's point of view. In: JACQUES (ed.) 1997, 86-90.
- WILLIAMSON T. 1998: 18th-century landscapes in Norfolk, England. In: PATTISON (ed.) 1998, 47-55.
- WILLIAMSON T. 1999: The archaeological study of post-medieval gardens: practice and theory. In: TARLOW S. & WEST S. (ed.), *The Familiar Past? Archaeologies of later historical Britain*, London & New York, 246-260.
- WILSON D.R. 1991: Old gardens from the air. In: BROWN (ed.) 1991, 20-35.
- WOODFIELD P. 1991: Early buildings in gardens in England. In: BROWN (ed.) 1991, 123-137.
- WOUDSTRA J. 1995: The planting of the Privy Garden. In: THURLEY (ed.) 1995, 43-77.
- WOUDSTRA J., MERRONY C. & KLEMPERER M. 2004: The Great Parterre at Chatsworth: refining non-invasive archaeological methods as investigation techniques, *Garden History* 32/1, 49-67.
- YENTSCH A.E. & KRATZER J.M. 1994: Techniques for Excavating and Analyzing Buried Eighteenth-Century Garden Landscapes. In: MILLER & GLEASON (ed.) 1994, 168-201.

5.3 Related bibliography

- BALIS J. 1962: *Hortus belgicus* (exhibition cat.), Brussel.
- DE BACKER W. 1994: De tuin van het Rubenshuis in Antwerpen. Geschiedenis van een reconstructie, *Groen* 94/2, 12-40.

DE BACKER W., HUVENNE P. & VAN DEN BOSSCHE H. 1995: De tuin van het Rubenshuis in Antwerpen. Een historische evocatie, *Monumenten & Landschappen* 14/3, 41-55.

DE BUYSSCHER G. & DE BACKER W. 1993: Renaissance, tuinkunst in de Lage Landen in het licht van de botanische activiteiten van de "Officina Plantiniana". In: DE NAVE F. (ed.), *De Botanica in de Zuidelijke Nederlanden (eind 15de eeuw-ca. 1650)*, Antwerpen, 61-63.

DE BUYSSCHER G. & DE BACKER W. 1994: De tuin van het Rubenshuis in Antwerpen. Een schilderachtige tuin, *Groenkontakt* 94/2, 29-36.

DE HERDT R. (ed.) 2000: *Tuinen van Eden*, Gent.

DE JONG E.A. 2000: Gärten auf Papier. Hans Vredeman de Vries und sein 'Hortorum Viridariorumque elegantes & multiplicis formae von 1583. In: HÄRTING 2000a, 37-48.

DE JONG E.A. & DOMINICUS-VAN SOEST M. 1996: *Aardse paradijzen, de tuin in de Middeleeuwse Kunst van de 15de tot de 18de eeuw*, Gent.

DE MAEGD C. 2000: 'Was wächst und gedeiht, was spielt und balgt befreit, in Gärten aus Rubens' Zeit'. In: HÄRTING 2000a, 67-82.

DE NAVE F. & TIJS R. 2005: *Het Complex Woning-Ateliers-Museum Plantin-Moretus. Bouwgeschiedenis*, Antwerpen.

GORIS J. 1993²: *Lof van Antwerpen: hoe reizigers Antwerpen zagen, van de 15e tot de 20e eeuw*, Antwerp.

HÄRTING U. 2000a: *Gärten und Höfe der Rubenszeit im Spiegel der Malerfamilie Brueghel und der Künstler um Peter Paul Rubens* (exhibition cat.), Munich.

HÄRTING U. 2000b: Rubens' Garten in Antwerpen. In: HÄRTING U., *Gärten und Höfe der Rubenszeit im Spiegel der Malerfamilie Brueghel und der Künstler um Peter Paul Rubens* (exhibition cat.), Munich, 59-66.

LACK H.W. 2001: *Ein Garten Eden, Meisterwerke der botanischen Illustration*, Keulen.

MORFORD M. 1987: The Stoic Garden, *Journal of Garden History* 7, 151-175.

PLOMTEUX G. 1985: Over kastelen en buitenplaatsen, perken en..., *Monumenten & Landschappen* 4, 9-34.

TIJS R. 1999: *Renaissance en barokarchitectuur in België. Vitruvius erfenis en de ontwikkeling van renaissance en barok in de Zuidelijke Nederlanden*, Tielt.