



Rijksdienst voor het Cultureel Erfgoed
Ministerie van Onderwijs, Cultuur en
Wetenschap

Nederlandse
Archeologische
Rapporten

065

Roman bathing in Coriovallum

The thermae of Heerlen revisited

K. Jeneson and W.K. Vos (eds.)

Roman bathing in Coriovallum

The thermae of Heerlen revisited

K. Jeneson and W.K. Vos (eds.)

Colophon

Nederlandse Archeologische Rapporten nr. 65
Roman bathing in Coriovallum
The *thermae* of Heerlen revisited

Editors: K. Jeneson (Thermenmuseum), W.K. Vos (Vos Archeo)

Authors: P.A.M. Beliën (DNB), R. Dreesen, F. van den Dries, L.M.B. van der Feist (ADC ArcheoProjecten), M. Groot (BCL Archaeological Support), S. Heeren (ACASA, VU University), S. Hoss (Small Finds), G. Jansen, K. Jeneson (Thermenmuseum), E.A.K. Kars (EARTH), J. Van Kerckhove (Aardewerk & Archeologie), J. Minis, J.J.W. de Moor (EARTH), R. Niemeijer, J. Orbons (ArcheoPro), B. van Os (Cultural Heritage Agency of the Netherlands), K. Peterse (PANSA), P. Picavet, M. Polak (Nijmegen University), M. Rappe, S. Schorn (Leuven University), G. Tichelman (RAAP), T. Vanderhoeven (EARTH), L. Verhart, W.K. Vos (Vos Archeo), G. White (Stadt Köln)

Authorisation: S.L.M. Stevens (Utrecht University, Department of History and Art History)

Illustrations: Thermenmuseum, A. Steen, Ph. Debeerst, the authors, unless otherwise stated

Cover image: The excavation of the Roman baths of Heerlen, 1940 (source: Thermenmuseum archives)

Editor of illustrations: M. Haars (BCL Archaeological Support)

Technical editor: E. Beukers, Utrecht

English translation: S. McDonnell, Utrecht

Design and layout: uNiek-Design, Almere

ISBN/EAN 978-90-5799-324-4

© Cultural Heritage Agency of the Netherlands, Amersfoort, 2020

Cultural Heritage Agency of the Netherlands
P.O. Box 1600
3800 BP Amersfoort
The Netherlands
www.cultureelerfgoed.nl

This research was supported by the Province of Limburg (Maastricht), municipality of Heerlen (Heerlen), Thermenmuseum (Heerlen), Cultural Heritage Agency (RCE, Amersfoort).



provincie limburg 

Content

| | | | | |
|---|-----------|--|---|------------|
| Foreword | 5 | 5 | Water supply | 85 |
| Summary | 6 | 5.1 | <i>(G. Jansen)</i> | |
| Samenvatting | 8 | 5.2 | Introduction | 85 |
| 1 Introduction | 11 | 5.3 | Water source/type of water | 85 |
| <i>(K. Jeneson)</i> | | 5.4 | Water use | 87 |
| 1.1 The Roman baths project | 11 | 5.5 | Quantity and quality of bathing water | 102 |
| 1.2 Research history | 12 | 5.6 | Waste water drainage | 103 |
| 1.3 The dataset | 24 | 5.7 | Possible location of the toilet | 109 |
| 1.4 Location of research | 25 | | General conclusions water supply | 111 |
| 1.5 Guidance | 25 | 6 Results of new fieldwork | | 113 |
| 1.6 Structure of the monograph | 25 | 6.1 | Results of new excavations (G. Tichelman) | 113 |
| 1.7 Acknowledgements | 26 | 6.2 | Geophysical survey (P.J. Orbons) | 121 |
| 2 History of the 1940-1948 excavation | 27 | 7 The immediate surroundings of the baths | | 125 |
| <i>(L.B.M. Verhart)</i> | | 7.1 | Physical geography and the water supply to the baths (J.J.W. de Moor) | 125 |
| 2.1 Introduction | 27 | 7.2 | The urban setting of the baths. Features and structures from the ROB excavations 1952-1957 (W.K. Vos) | 127 |
| 2.2 A long history of excavation in Heerlen | 27 | 8 Material culture of the bathhouse and its surroundings | | 135 |
| 2.3 Prelude in Leiden and a new archaeological system | 28 | 8.1 | Roman pottery (J. Van Kerckhove) | 135 |
| 2.4 Prelude in Limburg | 30 | 8.2 | Terra sigillata (R.A.J. Niemeijer and M. Polak) | 139 |
| 2.5 1940, a turbulent year | 33 | 8.3 | Coins (P.A.M. Beliën) | 141 |
| 2.6 Discoveries in Heerlen | 34 | 8.4 | Fibulae (L.M.B van der Feijst and S. Heeren) | 142 |
| 2.7 Leiden has to back down | 37 | 8.5 | Metal (S. Hoss) | 146 |
| 2.8 Van Giffen takes over | 40 | 8.6 | Animal bone (M. Groot) | 148 |
| 2.9 Completing the work | 41 | 8.7 | Ceramic building material (E.A.K. Kars and T. Vanderhoeven) | 150 |
| 2.10 Finally | 43 | 8.8 | Natural stone (R.J.M. Dreesen) | 153 |
| 3 Research framework | 45 | 8.9 | Glass (F. van den Dries) | 156 |
| <i>(K. Jeneson and W.K. Vos)</i> | | 8.10 | Latin inscriptions (J. Minis and S. Schorn) | 158 |
| 3.1 Introduction | 45 | 9 Reconstructing the history of the public baths of Coriovallum | | 161 |
| 3.2 Aim and approach | 46 | <i>(K. Jeneson, W.K. Vos and G. White)</i> | | |
| 3.3 Gaps in the knowledge | 47 | 9.1 | Introduction | 161 |
| 3.4 Research questions | 48 | 9.2 | Dating the baths | 162 |
| 4 Construction history and reconstruction | 51 | 9.3 | Phasing of the baths site and the bathhouse | 171 |
| <i>(K. Peterse)</i> | | 10 Synthesis. The public bathhouse of Coriovallum | | 189 |
| 4.1 Introduction | 51 | <i>(K. Jeneson and W.K. Vos)</i> | | |
| 4.2 Selection of research results on individual rooms | 51 | 10.1 | Introduction | 189 |
| 4.3 Reconstruction of the three-dimensional base | 70 | 10.2 | A new approach | 189 |
| 4.4 Relative chronology | 76 | 10.3 | A new perspective on the public bathhouse of Coriovallum | 191 |
| 4.5 Reconstruction of aspects of three-dimensional appearance | 80 | 10.4 | Recommendations | 199 |
| | | Literature | | 201 |
| | | List of appendices (digital) | | 207 |

Finally! Finally we have an integrated, comprehensive academic study of one of the most important archaeological monuments in the Netherlands: the Roman baths complex in Heerlen. This is a great achievement on the part not only of Heerlen municipal authority, Limburg provincial authority, the Cultural Heritage Agency of the Netherlands and the Thermenmuseum, which facilitated the research in both practical and financial terms, but also of an international group of highly dedicated and skilled researchers. Thanks to them, we now have thorough, detailed knowledge of the building, and the development, nature and use of the monumental bathing complex that for centuries was a hub of the community in Coriovallum. I firmly believe not only that this study is a milestone in Dutch archaeology, but that it will also make a significant contribution to the international debate on the complex social changes in the militarised northern border region of the Roman Empire. It will also be a vital resource that enables the Thermenmuseum – the only one of its kind in the Netherlands – to present the remains in a way that inspires the public.

On high days and holidays, and also on an ordinary weekday, the bathhouse must have been a microcosm of the complex society of the time. I can imagine villa owners from the surrounding countryside meeting their friends there; demobbed legionnaires getting together with their comrades; and members of *collegia* meeting up with their fellow ‘club members’. Perhaps officials from the municipal administration of Xanten treated their clients to a trip to the bathhouse in order to secure their support. Travellers of all kinds – officials, soldiers, merchants – will have visited the baths after a long, dirty and exhausting journey, desperate for a moment of relaxation and cleansing. Would women or slaves have had access to the baths? We don’t know. We casually

speak of ‘the Romans’, referring even to those who lived in these northern regions, though it is by no means certain that the concept had any significance back then. Social contact was determined to a large extent by legal status (citizen, free or enslaved), origin, ethnic affiliation, kinship, gender and age, so it is quite possible that not everyone will have embraced the bathing culture of the time.

This study cannot be seen in isolation from two other projects. The research was performed in conjunction with meticulous cleaning, consolidation and restoration work on the remains of the monument. The results are impressive. It is now more clear to visitors how the complex was set out and how the bathhouse worked. During this operation, the remains were once more studied closely *in situ*. This turned out to be a valuable exercise, not least because it was also combined with a small excavation. Many things that had been left uncertain by the study conducted by archaeologists Van Giffen and Bogaers were clarified, and many outstanding questions were answered. This study certainly requires a follow-up, in the form of the analysis of many other unpublished excavations in Roman Heerlen.

The third and final element of this triptych will be the most exciting, however. The consolidation and restoration of the remains and the expert analysis of the excavations since 1940 are to be topped off by the construction of a new museum. We greatly appreciate the fact that Heerlen municipal authority has made the necessary funding available. At this point we have only a rough idea of what the new museum will look like, but if it turns out as well as this broad-based new study, future visitors may consider themselves very lucky indeed!

Jos Bazelmans, head of the Cultural Heritage Agency of the Netherlands’ Archaeology Department

Summary

The Roman public bathhouse in Heerlen is unique in the Netherlands. The well-preserved remains at this archaeological site were excavated as long ago as 1940-1941, and an extensive research report was published in 1948. Yet many questions about the construction of the complex, the different phases and the functioning of the bathhouse remained unanswered. New research conducted in 2016-2019 with a team of almost thirty specialists from the Netherlands, Belgium and Germany, has now answered almost all those questions.

We now know, for example, that the bathhouse must have been built between AD 65 and 73. At that point it consisted of a core building with four bathing rooms (*apodyterium*, *frigidarium*, *tepidarium* and *caldarium*) in a row and a fifth adjacent circular room (the *laconicum*) to the west. All the heated rooms shared a single heating system. The *caldarium* had one hot water bath and the *frigidarium* had two cold water baths. The *apodyterium* was so large that people probably also exercised there. The complex did not have any walled outdoor spaces where visitors could exercise in this early phase. This bathhouse, measuring some 40 x 14 m, was built on the downward slope of an inclined plateau. The relief in the landscape provided a natural supply of water from the source of a stream known as Caumberbeek to the southeast of the bathhouse; the waste water drained away to the northwest, to Geleenbeek.

The bathhouse was by no means the first building in Coriovallum. The analysis of past ROB (State Service for Archaeological Investigations) excavations in the immediate vicinity of the bathhouse and the finds collected there made it clear that the first occupation dates from the Augustan period, around the beginning of the common era. Those early buildings were made of wood. The find material from this early phase is notable for its military character. This is hardly surprising, given the fact that at that time the region between the Meuse and the Rhine was affected by the Germanic wars. Coriovallum was built at the crossroads of two important Roman roads. The first is known nowadays as Via Belgica, and it linked the border region along the Rhine with the hinterland in Gaul; the second ran from Aquae Granni (Aachen) in the south, along the right bank of the Meuse, to the large legionary camp of Vetera in Xanten to the north. Coriovallum was thus directly linked to the two

coloniae later established on the Rhine: Colonia Claudia Ara Agrippinensium (Cologne) and Colonia Ulpia Traiana (Xanten).

The bathhouse was expanded in the late Flavian or Trajanic period. A wall was built enclosing the existing core building on all four sides and creating a complex four times larger than the original site, at around 2000 m². A portico and three extra rooms were added at the front, and two *palaestrae* were also created. This expansion was mainly designed to create more room for the social aspects of bathing culture. This shows that whoever was behind the expansion – the local elite, perhaps? – was particularly interested in the bathhouse as a ‘social space’.

The bathhouse existed for at least a century and a half in its extended form. During this time there was one extensive round of renovations to the foundations of the *caldarium* and *tepidarium*, possibly in response to damp problems. The town around the bathhouse flourished, as evidenced by the new stone buildings and the construction of a large complex in stone diagonally opposite the bathhouse. The boom in the local pottery industry is particularly striking. Coriovallum’s potters produced an especially wide spectrum of different forms. Artisans including butchers, tanners and millers (who milled grain on an industrial scale) plied their trade immediately outside the bathhouse. Bathers would go to the bathhouse for a range of treatments, which certainly included medical procedures.

In the second half of the third century radical changes occurred at the bathhouse. A wide, deep V-shaped ditch was dug at the front and back, parallel to the surrounding wall. There may have been a rampart or wall between the ditch and this surrounding wall. Fortifications such as these have been found dating from this period all along Via Belgica. Within these walls, the bathing complex underwent a thorough transformation. Walls were moved, the west wall of the *caldarium* was demolished to create a new *praefurnium*, and connecting arches beneath the suspended floor of the heated rooms were filled in. All these measures transformed the bathhouse from a *Reihentyp* (row type) to a *Blocktyp* (block type). The alterations from this period can easily be recognised by the shoddy execution and the use of *spolia*, many of which clearly came from other buildings

in Coriovallum. The bathhouse continued to operate in this form for at least another century.

The digging of the large ditch brought an end to the occupation immediately outside the bathhouse and it is likely that the population of the town declined dramatically. Find material from this phase shows that it once again assumed a more military character. It is in fact

remarkable that the bathhouse was still in operation, and indeed would remain open until the fall of the Western Roman Empire in AD 476. This indicates that the bathing ritual, in all its different aspects, remained important to the local population in the Late Roman period. The bathhouse thus played a key role in the life of Coriovallum for four centuries.

Samenvatting

Voor Nederland is het Romeinse publieke badhuis in Heerlen een unieke archeologische site. De goed bewaarde resten werden al in 1940-1941 opgegraven, en in 1948 verscheen een uitvoerig onderzoeksverslag. Toch stonden er altijd nog veel vragen open ten aanzien van de bouw, de fasering daarvan en het functioneren van het badhuis. Nieuw onderzoek, uitgevoerd in 2016-2019 met een team van bijna dertig wetenschappers uit Nederland, België en Duitsland, heeft op bijna alle vragen antwoord kunnen geven.

Zo is vast komen te staan dat het badhuis moet zijn gebouwd tussen 65 en 73 n.Chr. Het betreft dan een kerngebouw met vier badvertrekken (*apodyterium*, *frigidarium*, *tepidarium* en *caldarium*) op een rij en daartegenaan, aan de westkant, een vijfde, rond vertrek (het *laconicum*). Alle warme vertrekken werden door middel van één installatie verwarmd. Het *caldarium* had één warmwaterbad en het *frigidarium* had twee koudwaterbaden. Het *apodyterium* was dusdanig groot, dat daarin zeer waarschijnlijk ook gesport werd. Van ommuurde buitenruimtes om te sporten was in deze vroege fase nog geen sprake. Dit badhuis, met een afmeting van zo'n 40 x 14 m, is gebouwd op een aflopende flank van een hellend plateau. Dit reliëf zorgde voor een natuurlijke watertoevoer uit de bron van de Caumerbeek ten zuidoosten van het badhuis, en waterafvoer naar de Geleenbeek in noordwestelijke richting.

Het badhuis was bij lange na niet het eerste gebouw van Coriovallum. De uitwerking van de oude ROB-opgravingen van het terrein direct rond het badhuis en de daar aangetroffen vondsten heeft duidelijk gemaakt dat de eerste bewoning te dateren is in de Augusteïsche periode – zo rond het begin van de jaartelling. Overigens was toen nog sprake van houtbouw. Het vondstmateriaal uit deze vroege fase is opvallend militair van karakter, wat geen verbazing hoeft te wekken, aangezien de regio tussen Maas en Rijn in die tijd volledig in het teken stond van de Germaanse oorlogen. Coriovallum was ontstaan op de kruising van twee Romeinse hoofdwegen; de eerste staat nu bekend als de Via Belgica en verbond de grenszone aan de Rijn met het Gallische achterland; de tweede liep vanuit Aquae Granni (Aken) in het zuiden over de rechteroever van de Maas naar het grote legioenskamp Vetera

in Xanten in het noorden. Coriovallum was op deze manier direct verbonden met de twee later gestichte *coloniae* aan de Rijn: Colonia Claudia Ara Agrippinensium (Keulen) en Colonia Ulpia Traiana (Xanten).

In de laat-Flavische of Trajaanse periode is het badhuis uitgebreid. Door een vierkante ommuring te bouwen die aan drie kanten het toen bestaande kerngebouw omsloot, werd het complex in omvang viermaal zo groot en kreeg het een oppervlak van zo'n 2500 m². Naast een *porticus* aan de voorkant met drie bedrijfsruimten kwamen er twee *palaestrae* bij. Deze uitbreiding bood vooral ruimte aan de sociale aspecten van het baden. Dat laat zien dat voor degenen die achter de vergroting zaten – de lokale elite? – deze 'social space' bijzonder belangrijk was.

In de uitgebreide vorm bestond het badhuis minstens anderhalve eeuw. Eenmaal vond een ingrijpende renovatie plaats aan het fundament van het *caldarium* en het *tepidarium*, mogelijk als het gevolg van vochtproblemen. De stad rond het badhuis floreerde, wat te zien is aan de verstening van huizen en de bouw van een omvangrijk stenen complex schuin tegenover het badhuis. Opvallend is de bloei van de lokale pottenbakkersindustrie, die een bijzonder breed vormenspectrum produceerde. Direct buiten het badhuis zullen ambachtelijke activiteiten plaatsgevonden hebben, zoals de verwerking van vlees, het looien van leer, en het op industriële schaal malen van graan. In het badhuis kon de bader terecht voor een scala aan behandelingen, waaronder zeker ook medische ingrepen.

In de tweede helft van de derde eeuw vond een ingrijpende omvorming van het badhuis plaats. Rondom het badhuis, aan de voor- en achterzijde, werd een diepe en brede V-vormige gracht gegraven, die parallel liep aan de ommuring. Het is denkbaar dat tussen de gracht en de ommuring van het badhuis een wal of muur heeft gestaan. De aanleg van deze fortificatie is in deze periode overal zichtbaar in de steden langs de Via Belgica. Binnen de ommuring ging het badcomplex helemaal op de schop. Muren werden verplaatst, het *caldarium* werd aan de westkant opengemaakt om een nieuw *praefurnium* aan te leggen, en verbindingsbogen onder de zwevende vloer van de verwarmde ruimtes werden dichtgezet. Door al deze maatregelen ging het badhuis tot een

ander type behoren: het behoorde niet langer tot het rijentype, maar tot het bloktype. De ingrepen van deze periode zijn goed herkenbaar door de slordige manier van metselen en het veelvuldig gebruik van *spolia*, waarvan vele duidelijk afkomstig waren van andere gebouwen uit Coriovallum. In deze vorm fungeerde het badhuis nog minstens een eeuw.

De aanleg van de grote gracht maakte een einde aan de bewoning direct buiten het badhuis en het is aannemelijk dat het inwonertal van

de stad sterk terugliep. Het vondstmateriaal van deze fase laat zien dat de bewoning in de stad opnieuw een militair karakter kreeg. Het is opmerkelijk dat het badhuis nog steeds als zodanig functioneerde. Dat bleef zo tot de val van het West-Romeinse Rijk, in 476 n.Chr. Dit toont aan dat het badritueel, in al zijn aspecten, voor de lokale bevolking in de laat-Romeinse tijd onverminderd belangrijk bleef. Het badhuis heeft zodoende vier eeuwen lang een centrale rol gespeeld in Coriovallum.

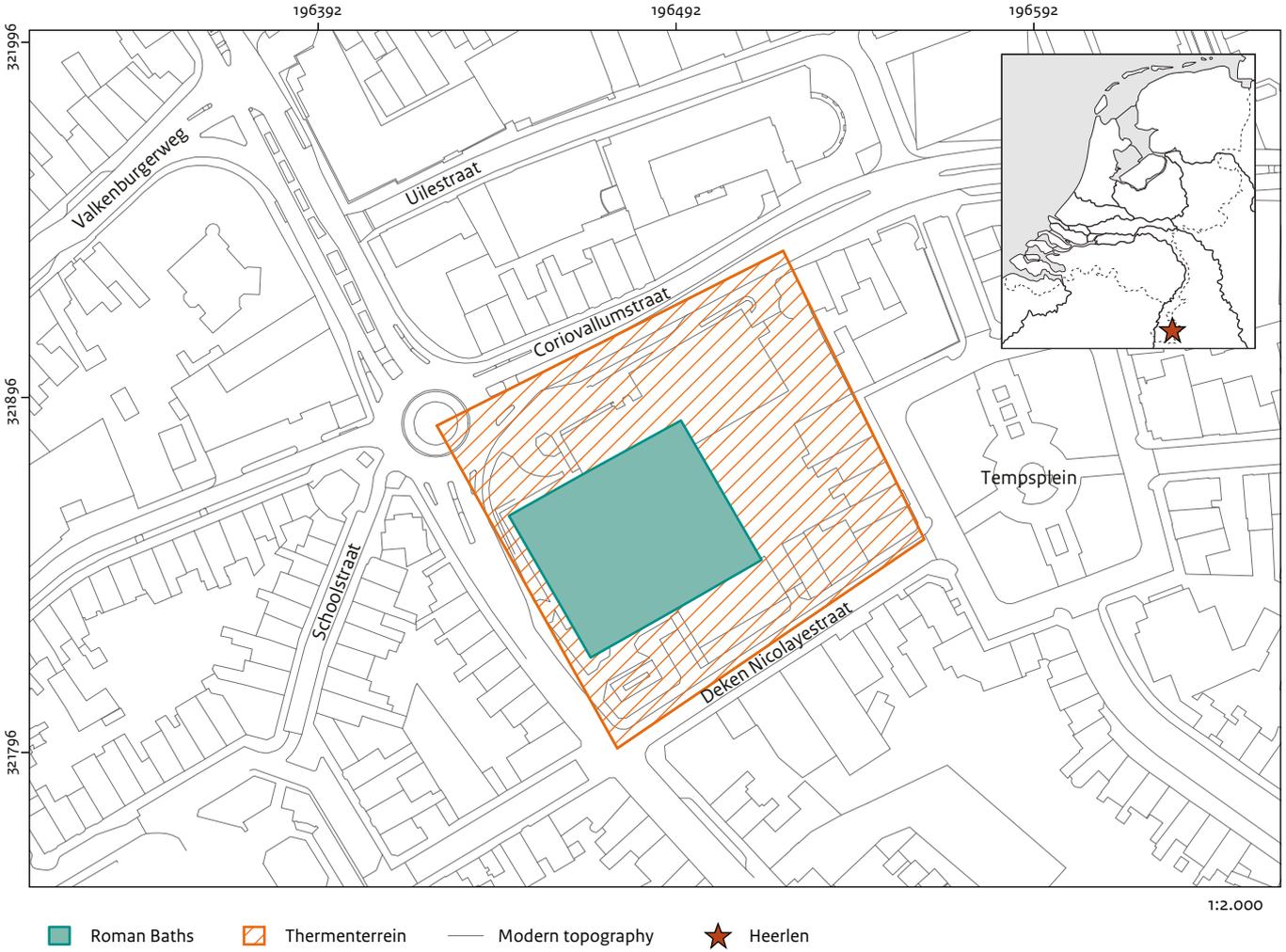


Figure 1.1 The Roman bathhouse and the 'Thermenterrein' site in the centre of Heerlen (source: W.K. Vos/M. Haars).

K. Jeneson

1.1 The Roman baths project

In the centre of Heerlen (southern Limburg province, Fig. 1.1), on a plot bordered by Coriovallumstraat, Kruisstraat and Deken Nicolayestraat, lie the remains of a Roman public bathhouse. Measuring 50 x 50 m, it consists of a main building with eight rooms, a portico at the front and two large walled outdoor areas on either side, one of which has a *natatio* and drainage channels, while the other has three multi-purpose rooms. The site was excavated in 1940-1941, and the results published in 1948 by A.E. van Giffen and W. Glasbergen.¹ The public bathhouse at Coriovallum is the best-preserved Roman building in the Netherlands and one of the most complete surviving Roman bath complexes in Northwest Europe (Fig. 1.2). It has been a listed archaeological monument since 2002.² The bathhouse has been incorporated into the Thermenmuseum, which was built over the monument.

The Roman baths were part of the *vicus* of Coriovallum, the Roman forerunner of Heerlen. The town stood at the intersection of two major Roman roads, one running west-east (the 'Via Belgica'), the other north-south (the 'Via Traiana').³ In fact, Coriovallum is one of the few towns in the Netherlands to feature on the Peutinger Map and the Itinerarium Antonini. Coriovallum was thus an important hub in the road network connecting the Roman province of Germania Inferior with the rest of the Roman empire and, more especially, the border (the *limes*) with the hinterland (Fig. 1.3). The Via Belgica was a road from the early Roman period, which connected the North Sea with the Rhine. It crossed the fertile loess zone of Northwest Europe, where the 'villa landscape', as it is known, was created in the Roman period. Grain was produced here on a large scale for the market.

The bathhouse has had a turbulent history. This is true not only of the time when it was actually in use as a bathhouse, but also during the period when it was discovered and excavated, and incorporated into a museum, as well as in the intervening years.

In 2013 serious damage to the monument was identified in 150 places.⁴ This mainly involved stones that had come loose, mortar that had



Figure 1.2 The Roman baths of Coriovallum today, in the Thermenmuseum (source: Thermenmuseum archives).

dried out, crumbling plasterwork and unstable support structures. Although the damage largely occurred after 1977, photographs and drawings from 1941 show that the bathhouse had already sustained considerable damage between 1941 and 1977.

The poor state of the monument was not the only cause for concern in 2013. Since the 1948 publication, there had been no scientific publications based on new archaeological research. Van Giffen and Glasbergen's reconstructions and interpretations were still being used at the museum and in public presentations, with the exception of the dating of the baths, which the museum had identified as half a century later. In recent years, the accuracy of the interpretation of the architectural remains of the bathhouse – both the phasing and the 3D reconstruction – has increasingly been called into question. Furthermore, it became clear that new data generated on several occasions at and near the baths complex since 1941 had never been analysed and interpreted. All in all, this led to a realisation that an evaluation of the state of knowledge of the bathhouse was just as urgently needed as the restoration.

Fortunately, it proved fairly easy to convince all those concerned (Heerlen municipal authority, Limburg provincial authority and the Cultural Heritage Agency of the Netherlands) of the need for new research to be conducted in parallel with the restoration of the baths complex, particularly because the knowledge

¹ Van Giffen 1948; Glasbergen 1948.

² Monument # 524991.

³ We do not know what the roads were called in the Roman period; these names were coined by researchers.

⁴ Restaura 2016.

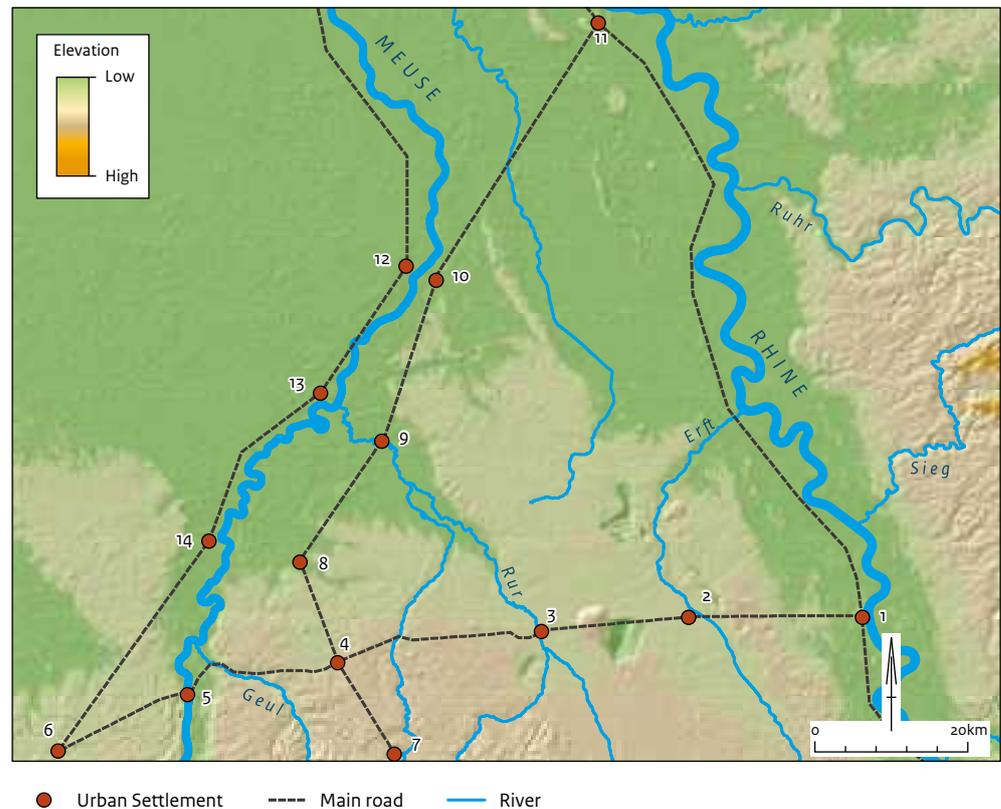


Figure 1.3 Position of Coriovallum, relative to other Roman roadside towns in the hinterland of the Rhine, 1 = Colonia Claudia Ara Agrippinensium (Cologne), 2 = Tiberiacum (Bergheim), 3 = Juliacum (Jülich), 4 = Coriovallum (Heerlen), 5 = Maastricht, 6 = Atuatuca Tungrorum (Tongres), 7 = Aquae Granni (Aachen), 8 = Teudurum (Tüddern), 9 = Mederiacum (Melick), 10 = Sablones (Venlo), 11 = Colonia Ulpia Traiana (Xanten), 12 = Blariacum (Blerick), 13 = Catualium (Heel), 14 = Feresne (Mulheim) (source: Thermenmuseum, K. Jeneson/M. Haars).

likely to be gained would be important not only in an academic sense, and for the management and stewardship of the bathhouse, but also for the public. An archaeological study was therefore launched in 2016, the results of which are presented in this publication.⁵

1.2 Research history

In 2015 the ‘story of the Roman baths at Coriovallum’ was still based on a single academic publication from 1948, *Thermen en castella te Heerlen-Coriovallum* by Groningen professor A.E. van Giffen and W. Glasbergen.⁶ Academic publications still refer to Van Giffen’s findings, and any maps or ground plans are always based on his reconstruction.⁷ It was therefore only logical to take Van Giffen and Glasbergen’s findings as the basis for the new

study. The 1948 publication consists of two parts: a presentation and interpretation of the excavation data by Van Giffen and a specialist analysis of the terra sigillata by Glasbergen. Besides overview maps and twenty photographs the publication also includes a map showing all features, a sections map, sections and detail drawings of masonry and *praefurnia*. The main conclusion of the study is that the Roman baths complex had two phases, the first in the mid-first century CE and the second in the early third century CE.⁸ The results of the investigation were transposed onto two phasing maps (each on two levels, aboveground and underground) and a three-dimensional reconstruction drawing by Heerlen architect F. Peutz.⁹

After Van Giffen and Glasbergen’s publication, no new archaeological research was carried out on the Roman baths until 2015. This does not however mean that no new data have been generated at the site since 1941.

⁵ See Jeneson and Vos, this volume Chapter 3 for the research framework of the project.

⁶ Van Giffen 1948, Glasbergen 1948. See also chapter 2 in this publication.

⁷ See for example Van Es 1972b, 124-125, Nielsen 1990, 21; Manderscheid 1988 fig. 177; DeLaine 1992, 262 and fig. 167e.

⁸ Van Giffen 1948, 235.

⁹ Van Giffen 1948, Plate V and XV.

¹⁰ Jamar 1975, 3. Jamar mentions the discovery and Peters’ theory, but the museum nevertheless continues to give 1940 as the year of discovery.

¹¹ Peters 1936, 13-18.

Various activities at and near the site on Coriovallumstraat yielded new finds between 1952 and 2000. The ROB (the forerunner of today's Cultural Heritage Agency or RCE) performed an open area excavation of the immediate surroundings of the Roman baths in the 1950s. In order to gain an insight into the long history of research at the baths complex, we will now present a chronological summary of everything that has happened at the site on the corner of Kruisstraat and Coriovallumstraat in Heerlen over the past 90 years.

1.2.1 1935: Discovery

Since it opened in 1977, the museum has told visitors that the Roman baths were discovered in 1940.¹⁰ This needs to be revised. The bathhouse was in fact discovered in 1935 by Piet Peters, municipal archivist and the town's archaeologist before the position officially existed. In 1936 Peters wrote an article for *De Maasgouw*, the journal of the Limburg History and Archaeology Society (LGOG), reporting that he had seen masonry and floors on a building site on the southwest side of the current Roman baths site. He interpreted part of it as the hypocaust of a bathhouse.¹¹

Peters (1865-1940) had been appointed municipal archivist in 1922, with the explicit task of noting and collecting all archaeological discoveries in the rapidly expanding mining town of Heerlen (Fig. 1.4). The town had established a Municipal Archaeology Service in 1921. A former teacher, Peters was a keen amateur archaeologist before his appointment, with a particular preference for the Roman period and it is thanks to his efforts that so many of the Roman finds in Heerlen were kept and recorded. He published detailed descriptions of many of his finds, particularly in *De Maasgouw*. He was in frequent contact with Jan Hendrik Holwerda, director of the National Museum of Antiquities (RMO), who occasionally went to Heerlen at Peters' request to view his

Figure 1.5 Peters' findings from Kruisstraat, on the 'Bergerode site' in 1935. Number 8 is probably the *laconicum*; the masonry that Peters interpreted as 'probably barracks' (7) is in fact part of a wall of the western *palaestra* (source: Peters 1936, 15.)



Figure 1.4 Piet Peters, who discovered the Roman baths in Heerlen, next to the stone urns discovered on Voskuilenweg in Heerlen in 1920 (source: Thermenmuseum archives).

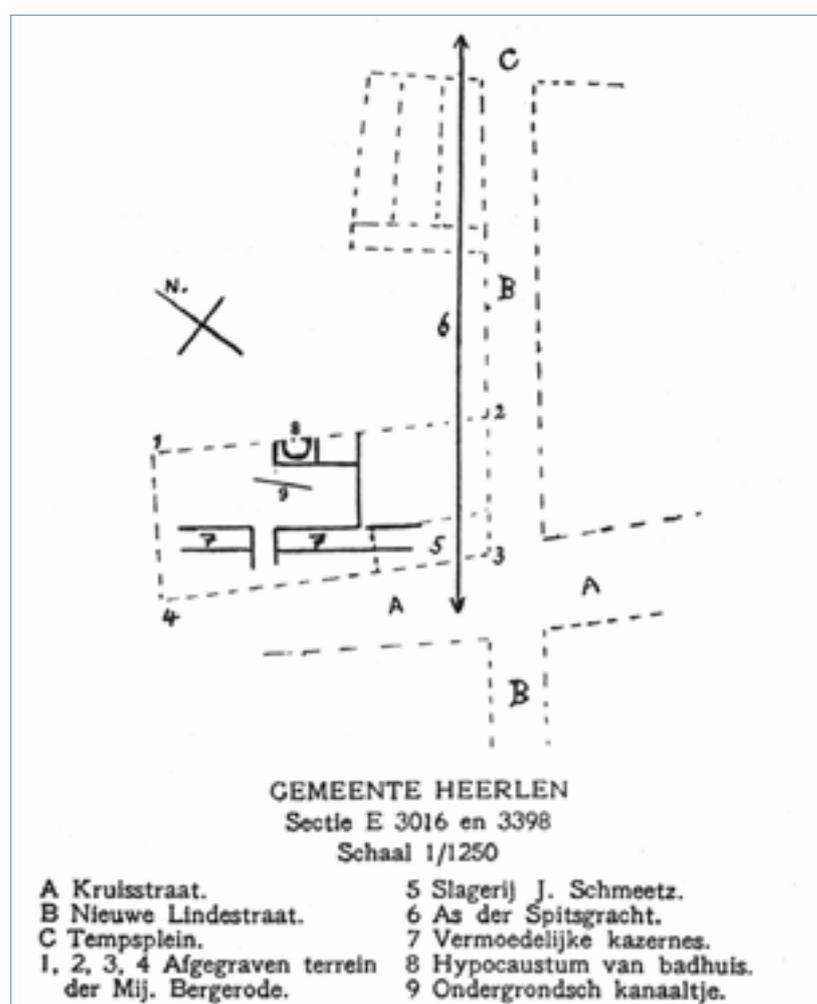




Figure 1.6 Picture of the exposed bathhouse in 1941, with the house built by Bergerode in the late 1930s visible in the top right corner (source: Thermenmuseum archives).

latest discoveries. It was Peters who posited that Coriovallum had originated as a military camp. He labelled a Roman V-bottom ditch, which had been transected at various spots in the centre since the late nineteenth century, as a ‘castellum canal’. He had interpreted Roman structures found between 1920 and 1930 during the construction of houses on Tempsplein, to the southeast of the Roman baths site, as a *praetorium* and predicted that there would also be a bathhouse. In his description of the remains found on part of the plot on Kruisstraat (the plot known as ‘Bergerode’, Fig. 1.5), Peters repeated this hypothesis, and interpreted part of the remains found as a hypocaust, possibly the *caldarium* of a bathhouse.¹²

A reconstruction of his findings shows that Peters had seen part of the round *laconicum*, and the drainage channel and some masonry belonging to the *palaestra*. The reconstruction also shows that the construction work in 1935 on the plot purchased by the company Bergerode had caused some damage. A lot of the earth covering more or less the entire western *palaestra* of the bathhouse was removed when the site was prepared for construction. A photograph taken during the preparation work shows that at least a metre of earth was excavated. Bergerode had bought the land to build houses on it. Photographs of the bathhouse taken in 1941 (Fig. 1.6) show that one new home was built, to the south of the *palaestra*. It is a miracle that only one house was built.

It is important to underline the fact that Peters was not a professional archaeologist, that he could only observe what was exposed

by construction work and that the masonry he saw still lay far below the surface at the time. He collected 44 finds to go with his observations, mainly stamped terra sigillata, glass (including window glass), pieces of mosaic, coins and metal, and above all fibulae. It is historically correct to regard Peters as the discoverer of the bathhouse, in 1935. Unfortunately, he died in January 1940, and was thus never able to witness its excavation.

It is important to record these events of 1935, because they suggest that, by the time of the excavation in 1940, a large proportion of the original site in the western part of the Roman baths site had disappeared. Further examination of the 1941 photograph (Fig. 3.4) confirms this. It shows that the ground to the rear of the site, near the core building, was higher in the centre than the surface to its left and right (the western *palaestra*). This is not, therefore, the natural relief of the site. The ‘Roman surface’ had probably been removed by this intervention.

1.2.2 1940-1941: excavations

Much has been written about what was actually the second discovery of the bathhouse in 1940. This includes publications by Jo Jomar. The details of all the developments are known thanks to the notes kept by Leo van Hommerich (1909-1976), town archivist from 1937 to 1974. He must have known of Peters’ 1935 findings. It can have been no coincidence that, after a fragment of pillar had been ploughed up in the field on Coriovallumstraat on 10 June 1940, he had a trial

¹² Peters 1936, 16-17.



Figure 1.7 Beckers with his excavation team of youngsters, 1940 (source: Thermenmuseum archives).



Figure 1.8 Beckers in the *tepidarium* (source: Thermenmuseum archives).

trench dug precisely where Peters believed he had discovered the *caldarium*. A photograph of this trial trench (see fig. 2.5) clearly shows the curved wall of what would later turn out to be the *laconicum*.

A week after the trial survey, on 24 June 1940, the excavation of the entire site commenced under the leadership of Limburg amateur

archaeologist H.J. Beckers. He had been assigned a group of ‘unemployed youngsters’ for the job. Van Hommerich oversaw the work on behalf of the municipal council, and he kept a journal. A year later, a field team from the Biological and Archaeological Institute at the University of Groningen, led by Van Giffen and Hendrik Brunsting (in the field), completed the

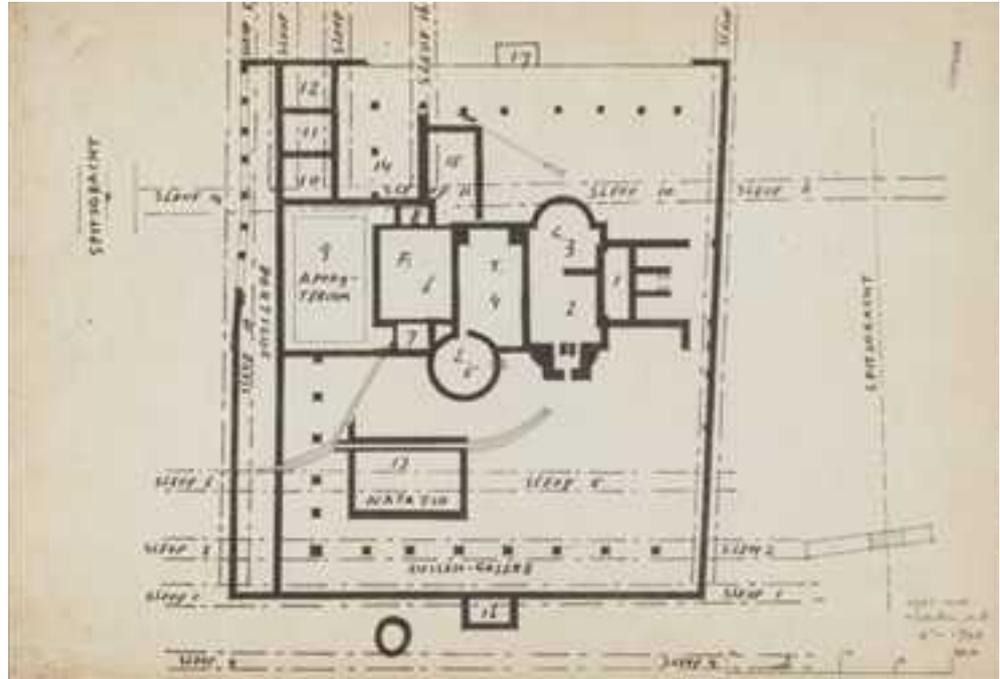


Figure 1.9 The map showing Beckers' 'prospecting trenches' (source: Thermenmuseum archives).

excavation. All further developments associated with the excavations of the Roman baths complex have been discussed by Leo Verhart (see chapter 2).

It is important to consider the nature of the fieldwork, as it also helps us understand Van Giffen's analysis and interpretation of the data. The excavations led by Beckers can hardly be called archaeological research. Beckers had the 'youngsters' shovel the fill in the core building out of the baths complex as quickly as possible – in this respect, the 1940 photographs speak for themselves (Fig. 1.7 and 1.8). Contrary to what was already standard practice at the time, no archaeological levels were exposed or sections made. It seems Beckers did have a number of 'prospecting trenches' dug to determine the size of the complex. The position of these trenches is indicated on a drawing in the museum's archaeological archive (Fig. 1.9).

During the 1940 campaign no plan or section drawings were made, and no notes were kept in the form of daily reports. Only Van Hommerich kept a journal of the excavations, but this does not contain any specialist archaeological observations. Van Giffen and Glasbergen revealed in their 1948 publication how they regretted the lack of expertise during the fieldwork performed in 1940. At the beginning of

his report, for example, Glasbergen stated that it had been very difficult to date the Roman baths on the basis of the terra sigillata, given the fact that the stratigraphical position of the finds had not been recorded.¹³

The method used to collect finds in 1940 was also inconsistent with standard procedure in archaeology at that time. The brief list of finds gives only a number, a rough object category and an approximation of the find spot ('in the *natatio*'). As one peruses the list, one is struck by the fact that most of the material collected was metal and terra sigillata, with the occasional large piece of worked natural stone or painted plasterwork (Fig. 1.10). Ordinary pottery, ceramic building materials and other 'worthless' material was barely collected, if at all. The find list indicates that a total of 778 finds were collected. The Thermenmuseum has 653 finds in its collection. Unfortunately, we do not know the whereabouts of the other 125 finds.

When the excavation team from the University of Groningen's Biological and Archaeological Institute arrived at the site in 1941, only a 14m-wide strip down the entire length of the bathhouse in the east *palaestra* remained untouched. Van Giffen had several sections cut here, and the stratigraphical position of material from these locations was

¹³ Glasbergen 1948, 238.



Figure 1.10 Several finds from the 1940 excavations (source: Thermenmuseum archives).

recorded. He also had other sections made, along the length of the portico on the front, for example, and on the sides of both *palaestrae*, and they too were recorded. It is important to emphasise that Van Giffen decided that the 1941 campaign should focus on recording as much as possible of what had been exposed in 1940, in both drawings and photographs.¹⁴ The goal was not therefore to complete the excavations. That is why, in the two *palaestrae*, only archaeological level 1 was exposed, and the majority of the features found there, although drawn on the map showing all features, were not sectioned or the remainder of the feature excavated. By current standards, therefore, the excavation of the bathhouse was never actually completed.

1.2.3 1948: publication of the excavations

Van Giffen and Glasbergen's publication *Thermen en castella te Heerlen-Coriovallum* ('Roman Baths and Castella at Heerlen-Coriovallum') was first published in 1948.¹⁵

In part 1, the report and working hypothesis, Van Giffen describes the remains of the building in detail using the photographs and fieldwork

drawings made by his field team in 1941. The description sums up the datable finds – the terra sigillata and coins – from each room. The chapter closes with a number of conclusions regarding the phasing and dating of the Roman baths. Van Giffen reconstructs two periods of construction, the first of which he dates to the Claudian period, 'circa AD 50', and the second 'circa AD 200' (Fig. 1.11).¹⁶ The second phase in fact encompasses major alterations to the complex. Van Giffen believed the reason for this was that the bathhouse had not functioned properly from the outset.¹⁷

In part 2 of the publication Glasbergen analysed the terra sigillata from the excavation, noting it consists mainly of stamped and decorated ware. In his summary he proposes, on the basis of the finds, that the occupation of Coriovallum must have begun around AD 47, and links this to Corbulo's activities in the Low Countries.¹⁸ According to him the baths remained in use to the end of the fourth century. This dating was based not only on the terra sigillata with wheel stamp decoration, but also on the most recent coin from the site, from Honorius, dated AD 393-395.¹⁹

Besides photographs and drawings of masonry and sections, the publication also includes a three-dimensional reconstruction

¹⁴ Van Giffen & Glasbergen 1948, 202.

¹⁵ Van Giffen & Glasbergen 1948, 202.

¹⁶ Van Giffen & Glasbergen 1948, 235.

¹⁷ Van Giffen & Glasbergen 1948, 234.

¹⁸ Van Giffen & Glasbergen 1948, 255.

¹⁹ Van Giffen & Glasbergen 1948, 261.

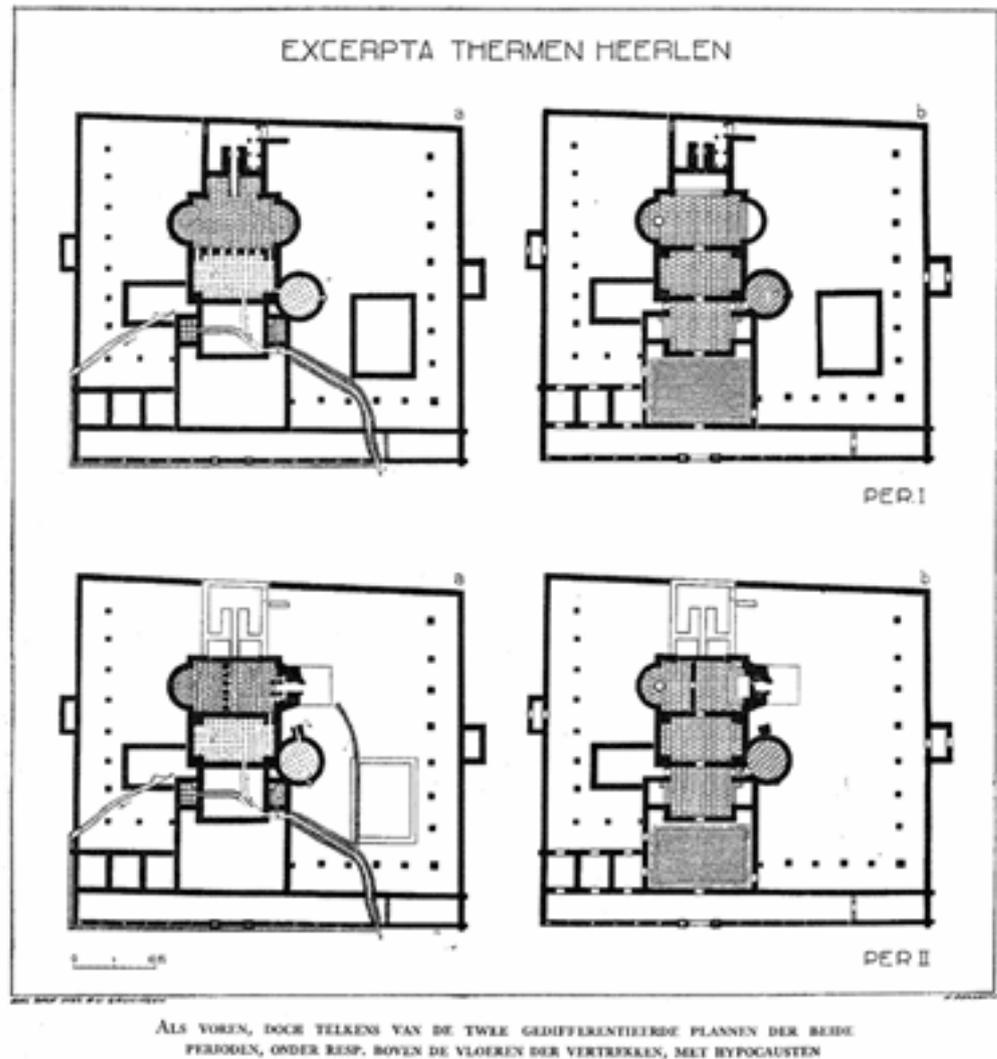


Figure 1.11 The phases of the bathhouse, as reconstructed by Van Giffen (source: Van Giffen & Glasbergen 1948, plate V).

of the bathhouse, drawn by Frits Peutz, a well-known architect from Heerlen. (Fig. 1.12).

1.2.4 1942-1957: bathhouse covered and partially re-exposed

When the University of Groningen team left Heerlen in late summer 1941, the bathhouse was still exposed. It was therefore at the mercy of the elements, and the local population of Heerlen proved to be one of the most destructive. During the excavations Van Hommerich had arranged for fencing and security guards, but after the work was done better protection was needed. The remains were therefore filled with straw and

covered with tar paper. This turned out to be inadequate, however, as evidenced by a letter Van Hommerich later wrote to the municipal authority, and it can also clearly be seen on a 1944 photograph, taken just after the liberation of southern Limburg (fig. 1.13). The straw was set alight several times and the Roman masonry was unable to withstand the destructive force of children playing on the site. Van Hommerich noted exactly which parts had since disappeared on copies of the section drawings of the various walls. They included the vertical masonry of the arches in the middle of the *caldarium*. A new covering was applied to the site in 1945, in the form of silver sand.²⁰

This covering was partially removed in 1952 when an excavation team from the State Service

²⁰ All the information about the management of the archaeological monument after 1941 can be found in documents written by Van Hommerich, which are in the archives of the Thermenmuseum.

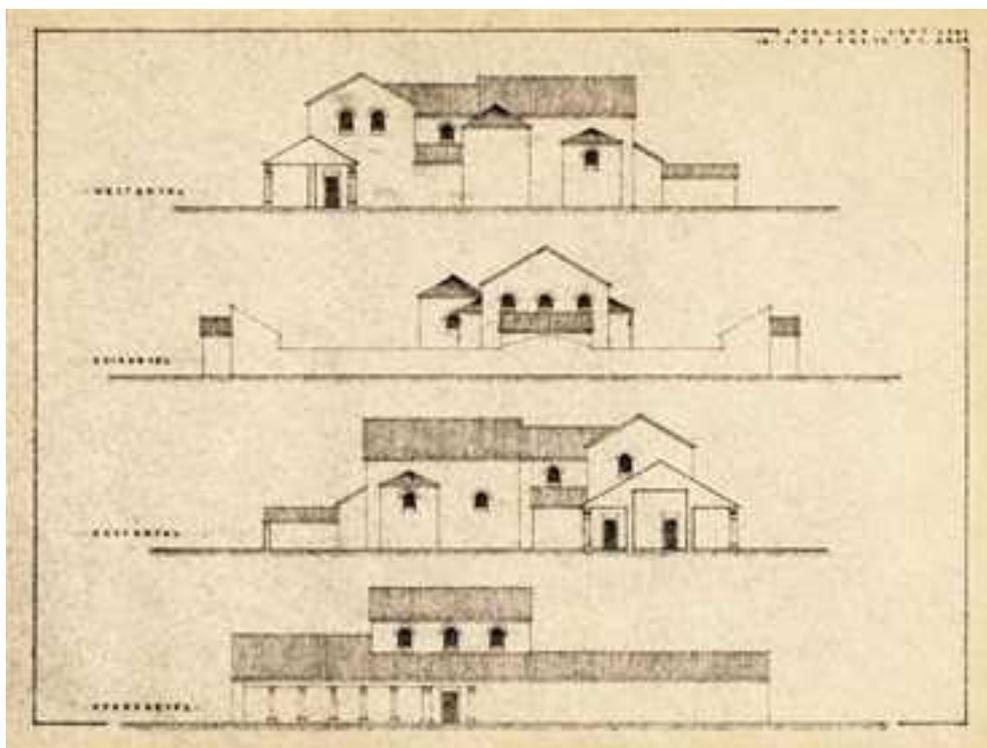


Figure 1.12 To produce a three-dimensional reconstruction of the bathhouse Peutz made an entire series of drawings showing views of the different façades. This is one of those drawings (source: Thermenmuseum archives).



Figure 1.13 The Roman baths shortly after the liberation, with an allied soldier standing in the *caldarium*. The straw and tar paper can be seen in a number of places (source: Thermenmuseum archives).

for Archaeological Investigations (ROB) came to Heerlen. The team was led by Jules Bogaers, who still worked for the ROB at the time.

ROB director P. Glazema had sent the team to Heerlen because the bathhouse had to be made 'presentable' for a conference of archaeologists



Figure 1.14 The bathhouse exposed for a second time in the early 1950s, by the ROB. Only the main building and the eastern *palaestra* were exposed; the *apodyterium* and *frigidarium* remained largely covered (source: Thermenmuseum archives).

in the Rhineland. Photographs from that time show that part of the main building was exposed again, and signs put up (Fig. 1.14). It was in this period that Bogaers excavated the immediate surroundings of the bathhouse during three campaigns, in 1952, 1954 and 1957. The details of these excavations, which were not analysed and interpreted until recently, are in the report by Wouter Vos (see appendix VII for the complete report and Section 7.2 for a summary). Heerlen also welcomed a number of visiting dignitaries during this period, including the young

princesses, who were given a guided tour by Bogaers. By that time the bathhouse was known throughout the Netherlands. There was even a model of the site at the Madurodam model village in The Hague.

1.2.5 1957-1975: the bathhouse covered again

When the ROB had finished in Heerlen Van Hommerich again had a layer of silver sand and topsoil laid over the remains of the building and its immediate surroundings, in anticipation of the construction of a museum over the bathhouse. This had already been discussed in 1940. Peutz had produced a design for the museum and it was expected that work would begin soon. Heerlen was still prosperous thanks to the coal mines in the region. The Ministry of Education, the Arts and Sciences had committed funding for a museum in the early 1960s. This was, after all, the most complete Roman building in the Netherlands. However, the actual construction of the museum suddenly looked less likely in 1966, when the ministry withdrew its funding commitment, without explanation. A year earlier the Minister of Economic Affairs,



Figure 1.15 The third exposure of the Roman baths, 1977. Jamar (holding the map) and Gielen can be seen on the right in the foreground (source: Thermenmuseum archives).



Figure 1.16 The exposure of the Roman baths in 1977. The digger was positioned above the *apodyterium* (source: Thermenmuseum archives).

Joop den Uyl, had announced the closure of all the mines. As a result, Heerlen found itself in a downward spiral of mass redundancies and sky-high unemployment. The construction of a museum over the bathhouse began to look less and less feasible. But in the early 1970s the people of Heerlen started a public campaign which they called ‘Roman Baths Open – Now or Never’, to call for the museum to be built after all.²¹

1.2.6 1975-1977: construction of the Thermenmuseum, bathhouse exposed for a third time

Given the dramatic developments in the mining region from the late 1960s onwards, it is in fact ironic that it was thanks not to the central government but to the State Mines (DSM) that in 1975 building work finally began on the long-awaited museum over the bathhouse. The modern design, featuring lots of steel in primary colours and – in typically 1970s fashion – aerated concrete blocks, was by the Peutz architectural agency, which since the death of Frits Peutz had been run by his sons. The building not only included a hall over the bathhouse and

two museum galleries, but also the municipal archives and reading room. The roof of the hall over the bathhouse was exceptional for that time. It is a ‘space frame’, which is self-tensioning. Thanks to the special roof structure, only four load-bearing pillars were needed, none of which touch the Roman masonry. After two years of construction, the museum was opened by Prince Claus in 1977. Unfortunately, Van Hommerich did not live to see the opening, as he had died in 1976, having retired in 1975. The town archivist – and curator of the new museum – was now Jo Jamar, a former student of Bogaers’.

The construction of the museum meant further intervention at the bathhouse site, which at that point was not a listed monument. Four holes had to be dug for the pillars supporting the roof, and a further four holes were needed to support the raised walkway over the eastern *palaestra*. The archaeological work was carried out by Joep Gielen, collection assistant at the new museum, who had already experienced many excavations in Heerlen as an amateur archaeologist; it was overseen by Jamar. The sections in the pits were drawn and the finds recorded and added to the museum’s collection. A group of volunteers from the national archaeology organisation AWN, led by Jamar

²¹ Cuttings from the *Limburgs Dagblad* newspaper of 1974 kept in the archaeology archive at the Thermenmuseum in a file named ‘Museum construction’.



Figure 1.17 The archaeological level exposed beside the large drainage channel in 1941 (source: Thermenmuseum archives; original photo by GIA Groningen).



Figure 1.18 The archaeological level exposed beside the large drainage channel in 2015 (source: Thermenmuseum archives).

and Gielen, removed the thick layer of topsoil and silver sand. Photographs of the work (Figs. 1.15 and 1.16) show that a crane was positioned on the covering layer, and the sand was removed

using a conveyor belt. Finds were collected during this operation, too, and this material was also added to the museum's collection.

Comparing 1941 photographs of the

palaestrae with those taken in 1977, one is immediately struck by the fact that on the earlier photographs the surface was considerably higher than in 1977. Pictures from 1941 (Figs. 1.17 and 1.18) clearly show that structures like the gutters and the footings in the western *palaestra* still lay beneath the archaeological level created at that time, while on the photographs taken in 2015 they protrude above the archaeological level (Fig. 1.18). Each time, the covering and uncovering of the site unintentionally caused the removal of part of the first archaeological level on either side of the core building. This explains why new finds were made whenever the covering was removed.

1.2.7 Find material from the Roman baths site

This description of the successive interventions at the site makes it clear that many finds have been collected from the Roman baths site over the decades. Table 1.1 lists the finds from the bathhouse itself, arranged by year/activity. The information is taken from the Thermenmuseum's collection registration system.

The table shows that the 1940-1941 investigation generated only a relatively small number of finds. The surface area excavated in 1940-1941 was around 2460 m², from which 653 recorded finds were collected. This equates to 0.3 finds per m². The ROB excavations of the surrounding area in 1952-1957 covered approximately 2670 m², and 10,000 finds were collected.²² This equates to 3.7 finds per m², meaning that over twelve times more finds were collected from each m² than in 1940-1941.

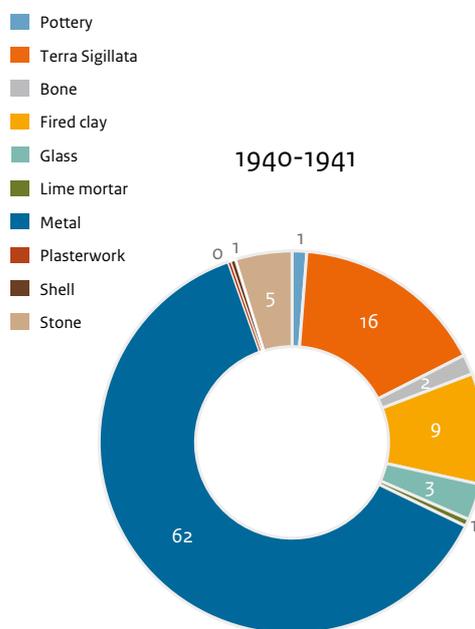


Figure 1.19 Categorisation of the total finds collected in 1940-1941, by material (source: Thermenmuseum collection management system).

If we look at the categories of material found, we notice that collection was selective in the 1940-1941 campaigns (Fig. 1.19). There was clearly a preference for metal and terra sigillata, as 62% of all finds were metal, three-quarters of them bronze, while terra sigillata comprised 16% of the finds. The high proportion of metal is all the more remarkable if we consider that metal detectors did not exist at the time. The reason must be the ease with which untrained field workers would be able to recognise this material, and the special reward Beckers promised the youngsters for any special metal and terra sigillata finds.²³

There is every reason to assume that the dataset of 1940/1941 does not provide a

Table 1.1 Number of finds from the bathhouse site by year/activity.

| Year | Actor | Activity | No. of finds | % |
|-----------|---------------------|---|--------------|-----|
| 1935 | Peters | Watching brief during construction work | 44 | 4 |
| 1940-1941 | Beckers, Van Giffen | Excavation of baths | 653 | 62 |
| 1958-1974 | Various | Purchase/donation of finds | 122 | 12 |
| 1975-1977 | Jamar, Gielen, AWN | Construction of museum, exposure of baths | 216 | 21 |
| 1980-2000 | Gielen | Site maintenance/unknown | 12 | 1 |
| Total | | | 1047 | 100 |

²² For precise figures and comments on the collection of finds during the ROB excavation campaigns in 1952-1957, see W.K. Vos, this volume Section 7.2 and Appendix VII.

²³ Communicated verbally by J. Gielen, 2015.

very reliable basis for dating and defining the function of the building. The method of collecting finds in 1940 was far from ideal, the precise find context of many of the finds is unknown and the Roman surface in the west of the site was unwittingly removed. It was therefore important to include all finds in any new investigation: not only the finds made after 1941 in the bathhouse itself, but also those from the ROB excavations in 1952-1957 in the immediate vicinity of the Roman baths.

There was a further reason for including this ROB dataset. This is a Roman bathhouse, which means it is likely to display an anomalous deposition pattern. The rooms in a bathhouse had paved or tiled floors and were regularly cleaned, perhaps even on a daily basis.²⁴ As long as a bathhouse was in use, there was no deposition of material within the building, as there would be in a settlement. This applies not only to the rooms in the main building, but also in the auxiliary buildings. The semi-open arcades had paved floors and the beautiful *palaestrae* were also well-maintained.²⁵ Material from the backfill of the bathhouse and, above all, from the backfill of the baths and the hypocausts (where the suspended floor has disappeared) cannot, therefore, have remained where it fell while the bathhouse was in use, with the one exception of the material in the drains. Items lost while bathing might have ended up in the drain when the baths were emptied.²⁶ It is therefore important to consider the depositional processes specific to a Roman bathhouse when interpreting find material, particularly if the finds are to be used for dating.

1.3 The dataset

The archives of the Thermenmuseum contain a large file on the baths site, with all the available documentation sorted by year. The file is available in both analogue and digital format. It includes, for example, all the photographs taken since the site was discovered, Beckers' original handwritten lists of finds, Van Hommerich's notebooks and several maps made by Gielen between 1977 and 2005. The museum's repository contains all the finds from the baths site since 1935. The objects in the 'Roman Heerlen collection' have always been properly

recorded, so the finds from each activity could easily be found.

The Groningen Institute of Archaeology (GIA), which succeeded the University of Groningen's Biological and Archaeological Institute, was asked to provide the original field documentation from Van Giffen's investigation. The drawings (plan, section and detail) made in 1941 are kept in the institute's archives. Since the originals could not be loaned, Heerlen municipal authority had high-resolution scans made. The GIA informed us that no daily reports or other written documents were available.²⁷

A great deal of detective work was required to gather together the original material from the ROB excavations in the 1950s. Though the finds turned out to be in the archaeological repository of the museum in Heerlen, a large proportion of them (including the animal bones and a lot of the small metal finds) had not been recorded. However, thanks to the good registration of the rest of the material, the collating of the unrecorded material into categories proceeded without any particular problems. The Thermenmuseum was given scans of the field drawings of these excavations, which are at the Limburg Provincial Repository. There was, however, no field documentation, and it was only discovered – quite by chance – some time later that the material was part of Bogaers' personal archive, which was in the safekeeping of Auxilia in Nijmegen at the time. In view of the fact that the original material could not be provided on loan, scans were made of as much of the analogue material as possible.

Given the fact that, at the start of the research project, not a single field drawing had been digitised, the digitisation and georeferencing of the scanned GIA plan drawings of 1941 and of the work pits dug by the ROB in 1952-1957 was an important step. The georeferencing of the drawings of the ROB work pits was a particular challenge, given that no information was available on the measuring system.

Another important step in the generation of digital data was the scanning of the bathhouse using a three-dimensional laser scanner, during which process 360° photographs were also taken. The scan proved a useful tool for the architectural survey, and provided a reliable baseline measurement of the monument prior to the restoration. Comparison of the 'plan drawing' generated from the three-dimensional

²⁴ See G. Jansen, this volume Chapter 5 and Appendix III, and S. Hoss, this volume Section 8.5 and appendix XIII.

²⁵ See G. Jansen, this volume Chapter 5 and Appendix III.

²⁶ See S. Hoss, this volume Section 8.5 and Appendix XIII.

²⁷ Communicated verbally by K. van der Ploeg of the GIA in Groningen.

data with that made by the Groningen team in 1941 also showed that the latter deviated from the actual situation at a number of important points. A tear in the middle of the original field drawing on A0 paper caused even greater distortion in some places. The laser scan allowed a correction of the 1941 field drawing, which was vital for the architectural survey and, ultimately, for the reconstruction of the bathhouse.

When the bathhouse was cleaned in 2017-2018 several new elements were discovered which Van Giffen had not mentioned in his 1948 publication. They included patches of weathering on the floor of the *apodyterium* and places where the outer wall of the *tepidarium* had been penetrated. All the new information was included in the architectural survey.

1.4 Location of research

Besides the normal procedure whereby specialists study find material in their own facilities, a number of specialists also set to work on location in Heerlen, performing the architectural, geophysical and physical geography surveys, the study of the water supply system and the trial trench survey. Ceramic building materials and natural stone were also studied on location in Heerlen, given that a lot of this material is still *in situ*, in the foundations and walls of the bathhouse. Large pieces of natural stone and ceramic building materials *ex situ*, which are not easy to transport, were examined at the Thermenmuseum's repository.

1.5 Guidance

Given the unique character of this research project, it was decided from the outset that an academic committee should be set up. The core of the committee comprised archaeologists Gary White (of Cologne municipal authority, Germany), Alain Vanderhoeven (VIOE, Belgium), Andreas Schaub (Aachen municipal authority, Germany), Wouter Vos (Vos Archeo, the Netherlands) and Tessa de Groot (the Cultural Heritage Agency of the Netherlands). The committee met several times

from 2016 onwards – either in full or in smaller combinations – to discuss various aspects of the project with those managing it. At the start of the research, the meetings mainly concerned the research questions and research framework, the methods to be used and the specialists who were to be brought in, while at the end of the process meetings considered the results of the individual studies and how they should be interpreted overall. The phasing and dating of the bathhouse were for example discussed at length with the members of the committee. If necessary, specific specialists were invited to discuss certain results in more detail. The committee members' expertise on Roman bathhouses and Roman stone buildings in Germania Inferior ensured a valuable exchange of ideas. The ultimate gains in terms of knowledge were certainly taken to another level thanks to work of the committee.

Since the bathhouse is a listed archaeological monument, the RCE was also an important partner in the research project, in its capacity as competent authority and with its responsibility for overseeing the restoration. Fred Brounen, archaeology consultant for the Limburg region, was the museum's first point of contact. Roman period specialist Tessa de Groot was involved in approving the project brief for the execution of the fieldwork, and was also a member of the academic committee. Various members of staff from the Agency were consulted on an ad hoc basis about specific categories of material or themes.

1.6 Structure of the monograph

Chapter 2 kicks off this publication with the 1940-1941 excavations. Leo Verhart not only examines the situation in Heerlen, but also places the investigation in a broader context: the developments in Dutch archaeology from the late 1930s to the early 1940s. Chapter 3 presents the research framework, its aims, the approach taken, and of course the main research gaps and corresponding research questions.

Chapters 4 to 8 present the new research results, with new data on the Roman baths complex itself in chapter 4, 5 and 6, data on the immediate surroundings in chapter 7, and the findings of all the material studies in chapter 8.

In all cases these are summaries of the complete reports, which can be found in the appendices. Chapters 4 and 5 are substantial summaries and therefore these contain footnotes and references, whereas Chapters 6, 7 and 8 are short summaries that do not contain footnotes and references.

The final Chapters 9 and 10 present the syntheses of the research results. Chapter 9 details the new dating and phasing of the bathhouse, and Chapter 10 takes stock of the knowledge gained from the new research project.

1.7 Acknowledgements

The new research on the Roman bathhouse was made possible first and foremost thanks to a generous grant from Limburg provincial authority. Heerlen municipal authority also provided funding and human resources. Tessa de Groot and Fred Brounen of the Cultural Heritage Agency (RCE) were closely involved in both the restoration and the investigation. The RCE also contributed financially to the publication of this volume.

The research project was under the general management of Sandra Uijlenbroek and Judy van Aken at Heerlen municipal authority. The lead academic on the project at the Thermenmuseum was curator Karen Jeneson. Wouter Vos was brought in to set

out a research framework in preparation for the study and is also co-editor of this volume. Joris Lanzing helped with the management of the project in 2016. Hans Thuis, director of the Thermenmuseum, provided vital help in the final stages to ensure the manuscript was completed in time.

The editors would like to thank the specialists involved in the project (in alphabetical order): Paul Beliën, Tim Clerbaut, Roland Dreesen, François van den Dries, Lourens van der Feijst, Maaïke Groot, Stijn Heeren, Stefanie Hoss, Gemma Jansen, Eva Kars, Julie Van Kerckhove, Joes Minis, Jos de Moor, Ryan Niemeijer, Ferry van den Oever, Joep Orbons, Kees Peterse, Paul Picavet, Rien Polak, Marc Rappe, Stefan Schorn, Gerard Tichelman, Timo Vanderhoeven, Leo Verhart. Volunteers Dierk Kamphuis and Rob Hamers had the difficult task of collecting over 10,000 objects from the archaeological repository at the Thermenmuseum; Sigrid Boemaars had the job of returning them all. Phillipe Debeerst took the photographs in chapter 8; Axel Steen took pictures of the bathhouse. Eelco Beukers edited the Dutch texts, that were then translated by Sue McDonnell. Gavin Williams and Gary White helped with the translation of technical terms. Jarno Pors and Liesbeth Theunissen of the RCE provided guidance and support in the final stages of preparing the manuscript. Saskia Stevens checked and authorised the final version. Her efforts were above and beyond the call of duty.

L.B.M. Verhart

2.1 Introduction

Archaeologists are known for deciphering the past by digging deeper and deeper into the ground and studying each layer. The same happened at the Roman baths at Heerlen, the investigation of which has consisted of a number of excavations conducted over a long period of time, each of which delved deeper into the ground. Furthermore, the area under investigation has expanded over time, giving us more insight into the context in which the complex existed.

Historians approach things differently. They also dig down, layer by layer, but their work takes place in archives. This is how we have explored the history of the first excavation of the Roman baths at Heerlen. Many assume that the first excavation was carried out by A.E. van Giffen. He was, after all, the first person to publish work on the Roman baths complex.²⁸ However, we know that he actually arrived at the site at a fairly late stage, and that the excavation had already turned out to be a tumultuous affair. The role of H.J. Beckers was pivotal in all this.²⁹ Beckers was a doctor practising in Beek and an amateur archaeologist. He was very driven, but his methods were not compliant with the standards of high-quality research, even at that time. His habit of registering only a few of the things he found is particularly problematic. It means that a great deal of knowledge about this site was lost in the very first stages of the investigation.

This was widely known in the archaeological world at the time. The intriguing question is therefore why Beckers was allowed to proceed and why it was ultimately (once the site had already been largely exposed) Van Giffen, of all people, who was put in charge of the investigation, for he was not a great expert on Roman archaeology. He was in fact busy working on the investigation in Valkenburg in Zuid-Holland province at the time.

To understand this, we have to dig deeper. These events occurred at a turning point in the history of Dutch archaeology. The role of amateurs was about to change, and the organisation of Dutch archaeology was to be thoroughly reformed. Furthermore, there were old scores to be settled.

2.2 A long history of excavation in Heerlen

The National Museum of Antiquities (RMO) in Leiden had long been aware of the fact that there were potentially interesting finds to be made in Heerlen. From 1840 onwards accounts appeared in newspapers of barrows, earthenware pots and possibly a sarcophagus.³⁰ In 1898 the museum performed its first excavation in the town, on the site known as De Tems Weiden, on Kreutzer Cats, where it investigated Roman kilns.³¹

Once J.H. Holwerda was appointed curator in 1904 the museum became much more actively involved in Dutch archaeology. In 1906 he received the first reports of Roman finds made by builder J. Arets in Heerlen.³² Holwerda appointed a correspondent, W.J.H. Römgens, a headteacher in Heerlen, to keep him informed of any finds made there. He duly received reports of a Roman grave on Geerstraat (1907). More kilns were discovered during work on the extension of a hospital (1908).³³ After that Holwerda's assistant M. A. Evelein went to Heerlen to do fieldwork. He reported both his discoveries and his hardships to his boss by letter, and published the results of his work shortly afterwards. Shortly afterwards he published the results.³⁴

In the cold winter of 1912 H. Martin went to Heerlen in late January to supervise the excavation work at Putgraaf, where more Roman roof tile kilns had been discovered.³⁵ This was followed in 1920 by the discovery of four sandstone sarcophagi containing some opulent artefacts on the Simons brothers' site behind the sanatorium on Vokuilenvweg east of Heerlen. The museum photographed the contents, but the objects remained the property of the owner.³⁶ That same year Holwerda wrote of a V-bottom ditch that had been revealed at the corner of Lindestraat.³⁷

In 1927 W. Goossens reported the discovery of the foundations of a heavy wall with six pillars nearby, which had been documented by P. Peters, the town's first municipal archaeologist.³⁸ The *Limburger Koerier* newspaper also carried a report of a find, considering whether it was evidence of Peters' castellum theory.³⁹

The potential presence of some impressive remains was demonstrated a short time later

²⁸ Van Giffen 1948; Glasbergen 1948.

²⁹ Jamar 1975, 1981; Jensen 2015; Hommerich 1975; Verhart 2012a.

³⁰ RMO archives, Pleyte-I archive, no. 19-7-3/36.

³¹ RMO archives, Pleyte-I archive, no. 19-7-3/36. This contains a map of the excavation site, a tracing of two kilns, a newspaper report, a letter from R. Jesse and a photograph of the kiln. The tracing of the two kilns is part of the 1912 investigation of the kilns on Putgraaf by H. Martin.

³² RMO archives, old finds archive, no. 6.1/19, p. 20; finds archive 6.1/15 A-H, Heerlen.

³³ Goossens 1909.

³⁴ Evelein 1909.

³⁵ RMO Annual Report 1912, 17.

³⁶ RMO archives, finds archive 6.1/15 A-H, Heerlen.

³⁷ Holwerda 1920.

³⁸ RMO archives, finds archive 6.1/15 A-H, Heerlen. See also chapter 1.

³⁹ *Limburger Koerier* 31-3-1927.



Figure 2.1 Roman wall discovered in 1928 in the hamlet of Caumer near Heerlen (source: National Museum of Antiquities, Leiden).

when in 1928 a tall standing section of wall was revealed in Caumer (Fig. 2.1).⁴⁰

And so it went on. In the 1930s the newspaper reports became ever more frequent. All the reports concerned Roman remains. In 1931, for instance, W.C. Braat investigated remains of foundations behind the town hall, possibly buildings belonging to a castellum.⁴¹ Peters summarised the most important results in 1936.⁴²

In 1939 a reconstruction of what the settlement in Heerlen might have looked like was published in the newspaper.⁴³ In June 1940, when a piece of derelict land on Kruisstraat was being reclaimed, the Roman baths complex was discovered – or rediscovered – and a new chapter was added to the archaeological history of the town. But though the RMO had been involved for decades, the museum now had to bow out. Times had changed.

2.3 Prelude in Leiden and a new archaeological system

2.3.1 National archaeology

To understand these changes, we must look back to the nineteenth century, when the foundations of the archaeological system of the twentieth century were laid. In 1887 the Minister of Internal Affairs issued an order for all archaeological finds to be reported.⁴⁴ The RMO in Leiden was to be notified of any discoveries immediately. Apart from being able to claim the finds if they were on government-owned land, the museum could also institute an excavation.

This rarely happened, however, as local collectors and societies were not happy for their finds to be taken off to Leiden. Any reports received tended to be late, generally when the finds were already in some display case or the find spot was so disturbed that any further investigation was pointless. This was how the museum saw things, though throughout the country the general consensus was that the RMO rarely showed any interest, and no one even

⁴⁰ RMO archives, finds archive 6.1/15 A-H, Heerlen.

⁴¹ RMO Annual Report 1931, 9.

⁴² Peters 1936.

⁴³ *De Limburger* 29-3-1939.

⁴⁴ Verhart & Amkreutz 2018.

came to look, let alone perform an excavation. These accusations were justified, as the museum lacked the funds, staff and – in many cases – the knowledge to perform this task adequately. Another approach was needed.

2.3.2 More staff

The RMO had only a small number of staff in the late nineteenth century. Nevertheless, the museum took some measures, though they amounted to nothing more than a drop in the ocean. This all changed in 1903 with the appointment of A.E. Holwerda as the new director. He advocated a radical and ambitious new approach and planned to get down to some serious work on Dutch archaeology, both in and outside the museum. In 1904 he appointed his son J.H. Holwerda to take on the task (Fig. 2.2).⁴⁵ Several experts were taken on and an excavation service was set up. More research was conducted in the field and the museum received a lot of external support. The shortage of qualified staff remained a problem, however.

This staffing problem appeared to be resolved in 1912 when ambitious young biologist A.E. van Giffen of Groningen University was appointed. However, problems soon arose in association with Van Giffen, culminating in a conflict in which more and more individuals and institutions became embroiled.⁴⁶ The prime minister even became involved in talks to resolve the conflict. Eventually, in 1917, Van Giffen returned to Groningen to investigate terps.

Though he initially started working in this area, Van Giffen was soon drawn to other interesting areas and subjects of research.⁴⁷ Groningen University recognised him as a man of high calibre, who deserved more opportunities.⁴⁸ A special institute, the Biological-Archaeological Institute (BAI), was established for him in 1919. Initially the BAI had few staff and limited finances, but from 1922, when he became director of his own institute, the opportunities began to grow. He managed to attract funding from other sources and recruit staff from unexpected places. His ambition was to perform research throughout the country, in competition with his former employers the RMO.



Figure 2.2 A young J.H. Holwerda drawn around 1905 by his wife P.N. Jentink (source: National Museum of Antiquities).

2.3.3 Initiatives to create a national organisation for archaeology

As the new institute took shape, the question of how the Dutch museum system should be reorganised was also being considered. At that time, museums were in charge of archaeology. There was a growing sense that the combination of art and history in museums was not appropriate. The Dutch Antiquities Association (*Nederlandse Oudheidkundige Bond*) had been the first to launch an initiative to set up a central scheme for museums and archaeology in the Netherlands, in 1918.⁴⁹ The key point in the first advisory report was that museums of art and history represented two separate disciplines and should thus operate independently. This may have been a good plan, but the museums whose collections combined art and historical artefacts were not happy with this prospect. They did not want to divest themselves of items in their collection, certainly not to any new National Museum of History. Opposition came from the museums themselves and from historians like J. Huizinga.⁵⁰

The plans would have been abandoned if a new ministry – the Ministry of Education, Arts

⁴⁵ Verhart 2018a, 2018b.

⁴⁶ Verhart 2005, 2018b, 2018c; Waterbolk 1976.

⁴⁷ Verhart 2016.

⁴⁸ Van Berkel 2017.

⁴⁹ Duparc 1975, 191.

⁵⁰ Huizinga 1920.

and Science – had not been created in 1918. The new ministry was keen to proceed and in 1919 established a committee to reorganise the museum sector.⁵¹ Its members were the directors of all the national museums and the archive sector. To increase its effectiveness, three sections were set up, including a committee for archaeological research.⁵²

A report containing findings and recommendations was submitted to the minister in June 1921. The first important point was the proposal that a Dutch Historical Museum be established. This was more or less a virtual undertaking, as in practice it would be spread over three locations: the art collection in Amsterdam, prehistory and early history in Leiden and ethnology in Arnhem.

The second important point in the report was the recommendation to set up a small Museum Council chaired by the head of the arts and science department, who would advise and assist the minister in the reorganisation process.

There were therefore plenty of plans. Nothing ever came of them, however. The small Museum Council that had been recommended became a large National Advisory Committee on Museums, established in 1922, with an independent chair, Leiden historian J. Huizinga.⁵³ Holwerda was the only archaeologist on the committee, and he was also secretary. Van Giffen was not a member.

2.3.4 In the spirit of

The committee set about its work.⁵⁴ The members had a duty of confidentiality, but Professor W. Vogelsang of Utrecht regularly informed Van Giffen of progress following meetings.⁵⁵ Draft regulations on archaeological excavations and the preservation of finds from prehistory and early history were completed in 1923.⁵⁶ It will come as no surprise to learn that the RMO was given core responsibility for the whole of the Netherlands, reaffirming the status quo. The regional institutions – the most important being the Kam Museum in Nijmegen, the BAI/Groningen Museum and the Frisian Museum in Leeuwarden – were to report to Leiden, but they also had their own responsibilities.⁵⁷

Naturally, the three most important regional

institutions had their objections. They drafted a joint response which was signed by the directors of the museums in Leeuwarden, Groningen and Nijmegen. Van Giffen did not sign, but he had helped draft the text.⁵⁸ The committee decided to talk to the signatories, and Van Giffen was also invited.

Their counterproposal involved more autonomy for the institutions affiliated to central government, the Kam Museum and the BAI. The RMO would retain its core task of compiling a complete overview of the successive cultures that existed in prehistory and early history in the Netherlands, but the proposal was for the BAI and the Kam Museum to administer their own 'region'. The RMO would only be able to perform investigations there after obtaining the permission of the 'managing' institution. To prevent any loss of information the national institutions would keep each other informed of their investigations. Local museums within the regions would report their investigations and discoveries to their regional institution.

This would mean the end of the RMO's central role and it would paralyse the regions administered by other institutions. Holwerda could not agree to that. The chair, Huizinga, made some changes to the draft proposal, but the opponents refused to approve them.⁵⁹ Huizinga informed the minister that the attempt to devise a new scheme had run aground and that the existing arrangements of 1887 should remain in force. He was however able to inform the minister that he had asked all those involved to collaborate in the spirit of the new arrangements.

The central scheme was finally shelved. The personal conflict between Van Giffen and Holwerda ruled out any prospect of a solution for almost two decades. It became a matter of waiting until the two of them vacated their posts.

2.4 Prelude in Limburg

2.4.1 The RMO in Limburg

This tug-of-war had little practical impact on actual excavations in Limburg. As we have said, the RMO was regularly involved in excavations

⁵¹ Duparc 1975.

⁵² Sarfatij 1972, 73.

⁵³ Duparc 1975, 195-200.

⁵⁴ Eickhoff 2003, 185.

⁵⁵ GIA Archives, letters archive, incl. letters received 16-1-1922, 14-5-1925 (Vogelsang).

⁵⁶ Eickhoff 2003, 183-187; Van Es 1972.

⁵⁷ RMO Archives, Holwerda and Huizinga draft regulations, 1923.

⁵⁸ GIA Archives, letters archive, letters received and sent 1923-1924.

⁵⁹ RO Archives: minutes of the National Advisory Committee on Museums 1923.



Figure 2.3 H.J. Beckers pointing out a number of bandkeramiek pots at his museum in the coach house of his home in Beek. The photograph was taken in the late 1930s (source: Beckers & Beckers 1940).

in Heerlen from the early 1900s, and it also performed investigations elsewhere in Limburg.

The scale was limited, partly because the RMO had to deal with local patriotism, which the museum despised. It sometimes created more problems for the RMO than at other times. In the early nineteenth century relations appeared to be improving and many activities were initiated in collaboration. There was fruitful collaboration with Roermond notary C. Guillon (1811-1873) and, to a lesser extent, with J.J. Habets (1829-1893).⁶⁰ Habets focused more on Brussels than on Leiden. But things took a turn for the better with the arrival of W. Goossens (1869-1933). He and Holwerda became close friends and together they carried out many excavations. There were never any problems about ownership. After an excavation performed and funded in collaboration, Holwerda would divide up the finds. Plaster casts were made of all important pieces. Half of the originals would go to the RMO and the other half to the Limburg History and Archaeology Society (LGOG). The plaster casts were thus a kind of 'mirror collection' that complemented the excavation assemblages of the two institutions.

After Goossens' death in 1933 the LGOG and RMO continued to work together productively, albeit less intensively.

2.4.2 Beckers of Beek

Collaboration with Beckers initially went well, too. He was a self-taught archaeologist. He had developed an interest in the subject in 1918, when he was already in his fifties.⁶¹ He built a collection, and was soon performing excavations, often with his son Gabriel.⁶² He financed many of the investigations himself and added the finds to his collection, which was displayed in the coach house of his GP practice (Fig. 2.3).

Within five years he published a survey of the occupation history of Limburg.⁶³ He organised an excursion to Savelsbos woods to view the finds from the flint mines. In the report he expounded various ideas about the flint finds. He believed that the items had been made by human hands, unlike the people from the west of the country, who were not convinced. He was referring to Holwerda.⁶⁴

Beckers worked mainly in southern Limburg, investigating settlements from the Stone Age (Linearbandkeramik, or LBK), Roman find spots and Early Medieval cemeteries. He made excursions to Afferden, Sint-Odiliënberg, Posterholt, Vlodrop, Echt, Helden-Panningen

⁶⁰ Jamar 1989, 1993.

⁶¹ Deriks 2000.

⁶² For example when the sarcophagus at Simpelveld was discovered; it ended up at the RMO (Holwerda 1931).

⁶³ Deriks 2000, 67-75.

⁶⁴ For details see Verhart 2017. See also Deriks 2000, 33. The date was 30-5-1923.

and Tienray.⁶⁵ All this digging, newspaper reports and information from Goossens meant the RMO had to be informed. Holwerda began corresponding with Beckers from 1925.⁶⁶

Beckers had a good reputation in the region, but elsewhere people were less enamoured of his work. This was because of his obstinacy, the fact that in the early stages he passed on little information and because of his personal collection. He did not inform others of his discoveries until he had been investigating for some time, or once the finds were already in his museum.

The problem with Beckers was not even that he performed excavations as a non-professional. That was quite common in those days. The problem was that he documented his finds so poorly. He rarely drew soil features and other geological phenomena. Often he only took photographs. His excavations did not comply with the academic standards of the day, so a lot of information was lost.

2.4.3 Van Giffen in Limburg

Beside the RMO and Beckers, Van Giffen was also active in Limburg. In 1923, the year when the central scheme for archaeology in the Netherlands was abandoned, he started excavating at Rijckholt. He hoped that this would not only yield new find material and academic insights, but also a new professional network. He was proved correct. One of his first contacts was pastor C. Kengen, who discovered Linearbandkeramik in Limburg. It is likely that Van Giffen and Beckers first met around that time, in Savelsbos woods, but they did not start corresponding until February 1925.⁶⁷

Contacts with the LGOG were more formal. Of course Van Giffen tried to persuade the board to help finance the Rijckholt investigation and they corresponded about the finds.⁶⁸ In Central Limburg, too, Van Giffen attempted to build a network of amateurs who could inform him about finds, similar to the successful correspondence system Holwerda had established from 1926 onwards, which he had expanded to cover almost the entire country.⁶⁹

2.4.4 Worsening relations

RMO curator A.E. Remouchamps worked with Beckers on the investigation of Roman occupation remains at the docks in Stein in 1926.⁷⁰ Several Bandkeramik pits also came to light during this investigation, but the partnership did not run smoothly.⁷¹ After the excavation Remouchamps received a letter from Beckers full – to Remouchamps' mind – of unfounded accusations, including 'northern complacency on the part of the museum'. The letter was forwarded to Goossens, who was asked to make recommendations.⁷² He replied that he was sorry that the two parties had lost confidence in each other and feared that the RMO had performed its last excavation in Stein.⁷³

There was indeed no follow-up to this excavation, although a limited investigation was performed in 1927.⁷⁴ In that year the two parties again began to fling accusations at each other. The gist of the complaints was that the preliminary excavators had removed finds to secure them for the collections in Leiden and in Beek.⁷⁵

Yet in 1928, after the death of Remouchamps, Beckers collaborated on a special edition of the journal *Oudheidkundige Mededelingen* dedicated to the deceased archaeologist.⁷⁶ Thereafter, relations grew worse following the publication of an article in the *Algemeen Handelsblad* newspaper of 12 September 1928 discussing the recent excavations in southern Limburg, all performed under the leadership of Beckers. At the end, the reporter highlighted the authorities' lack of concern with archaeology in Limburg and the fact that important finds were disappearing to Belgium. The article prompted the Minister of Education, Art & Science (OK&W) to ask the RMO for clarification.⁷⁷ In his response, Holwerda gave a detailed account of Beckers' obstructive behaviour.⁷⁸ There was now no chance of any further investigation in Stein. Leiden regarded Beckers as a headstrong individual who refused to cooperate, certainly with his superiors. Beckers also had little positive to say about his fellow archaeologists in Leiden.

⁶⁵ Beckers & Bekers 1940, 225-229.

⁶⁶ RMO Archives, letters archive: incoming correspondence 3-5-1923, 9-5-1923 (Goossens).

⁶⁷ GIA Archives, letters archive: letters received, 5-5-1930 (Beckers).

⁶⁸ RHCL, access number 17.10 LGOG archives, no. 474, letter received 27-11-1924; letter sent 30-7-1925 (BAI); no. 228, from letter sent 2-6-1938 (BAI).

⁶⁹ Verhart 2017.

⁷⁰ Beckers & Beckers 1940; Holwerda 1928a, 1928b.

⁷¹ Amkreutz & Van Wijk 2014.

⁷² RMO Archives, letters archive: letters received, 11-10-1926 (Goossens).

⁷³ RMO Archives, letters archive: letters sent, 18-10-1926 (Goossens).

⁷⁴ Holwerda 1928a, 4.

⁷⁵ RMO Archives, letters archive: letters sent, 22-01-1927 (Goossens). See regarding this incident the later letter from Braat to the mayor of Heerlen, 7-5-1940.

⁷⁶ Beckers 1928.

⁷⁷ RMO Archives, box 17.2.5/5 Curators 1928-1930, letter from OK&W, no. 4402, 25-9-1928.

⁷⁸ RMO Archives, letters archive: letters sent, 26-9-1928 (OK&W).

2.4.5 Van Giffen approaches Beckers

Van Giffen undoubtedly knew of the problems with Leiden. This opened up new opportunities for him. It was probably no coincidence that Van Giffen wrote to Beckers in 1929 saying that he would like to excavate a number of *hutkommen* (semi-sunken workshops) ‘in collaboration’.⁷⁹ Van Giffen was much more flexible about the issue of ownership. He wanted a representative portion of the finds for the BAI’s reference collection, and the rest could stay in Limburg. The two quickly came to an agreement and a small site in Stein was investigated in 1930. Beckers’ staff did the excavation work, and Van Giffen and his draughtsman arrived later to document everything.⁸⁰ The pits yielded LBK pottery, flint, stone adzes, whetstones and querns. Some went to Groningen and Beckers kept the rest.

After this the two archaeologists had little contact and Beckers enjoyed exclusive access. The RMO had enough to do elsewhere, and relations were not conducive to new collaborations.

2.5 1940, a turbulent year

2.5.1 Occupation

War broke out in September 1939. The Netherlands desperately tried to cling to its neutral position, but it was to no avail. On 10 May 1940 the Germans invaded the Netherlands. Unlike other countries, however, it was not placed under military command. Instead, a Reichskommissar was appointed for the Netherlands. Staff of the ministries, authorities and local councils initially remained in their posts. The ministers had left, but senior civil servants had not. They took over and were authorised to introduce new regulations. Though many of these regulations originated with the Germans, initially these civil servants were allowed a relatively large degree of freedom. The occupying forces hoped some form of ‘self-Nazification’ would occur, the Dutch adopting the ideas of the Nazis in all kinds

of areas, including archaeology.⁸¹

In the first few months of the occupation, several items were rationed. To keep the Netherlands supplied with food, as much land as possible had to be farmed. This meant reclaiming scrub (peatlands and heathlands), and also finding land to cultivate in urban areas. In Heerlen the local authority decided to cultivate some derelict land. This included an area between Coriovallumstraat, Kruisstraat and Deken Nicolayestraat. Ploughing work that commenced there on 18 June 1940 soon uncovered the remains of the Roman baths.⁸²

2.5.2 New regulations after all

Meanwhile, the personal animosities that had determined archaeology policy in the Netherlands for decades had come to an end for the time being. Holwerda had retired in 1939. The ministry had made a renewed attempt to reorganise Dutch archaeology. The head of the ministry’s Art and Science Department, J.K. van der Haagen, had held informal talks with the RMO in spring 1939. The consultations were formalised when, in August 1939, W.D. van Wijngaarden was appointed director.⁸³ Leiden curators W.C. Braat and F.C. Bursch had drafted an initial version of new regulations and, after several rounds of consultations with Van Giffen, Van Wijngaarden and Van der Haagen, agreement was reached in spring 1940 (Fig. 2.4).⁸⁴

The main points in the new regulations were that two institutions would have a role in policy on archaeological research and that a series of regional institutions throughout the country would work with them. The two central institutions were the RMO and the BAI. The BAI would focus mainly on the northern provinces; the RMO would cover the rest of the country. The regional institutions would have to request approval in order to qualify to collaborate with the central institutions.⁸⁵

A National Committee for Archaeological Investigations (Rijkscommissie voor het Oudheidkundig Bodemonderzoek: RCOB) would also be established, with representatives from both institutions, plus external members. The committee would discuss and coordinate policy and consider where excavations should

⁷⁹ Beckers & Beckers 1940, 78.

⁸⁰ Beckers & Beckers 1940, 78–81.

⁸¹ Eickhoff 2003, 12.

⁸² Jensen 2015, 34.

⁸³ Eickhoff 2018.

⁸⁴ Verhart & Amkreutz 2018; Verhart 2012b.

⁸⁵ In the original plan there were to be three national institutions, as Museum Kam in Nijmegen had also been earmarked for that role, but director Holwerda refused to cooperate with the plans and withdrew, no doubt to the relief of all involved.



Figure 2.4 From left to right: W.C. Braat, J.H. Holwerda and F.C. Bursch in the late 1930s in the central courtyard of the National Museum of Antiquities in Leiden (source: National Museum of Antiquities, Leiden).

be carried out. The committee, chaired by N.J. Krom, had five members. The other members were Van Wijngaarden, Van Giffen, Van der Haagen and H.E. van Gelder (director of the Gemeentemuseum in The Hague).⁸⁶

Another innovation was the central documentation centre, the National Office for Archaeological Investigations (Rijksbureau voor het Oudheidkundig Bodemonderzoek: ROB), which would be housed at the RMO in Leiden. The ROB would also handle publicity on archaeology. This would include awareness-raising and measures to increase public support. Curator Bursch was appointed director, and he would also act as executive secretary of the RCOB, with no voting rights.

The new regulations were announced by the highest representative of the Dutch government at the time, General H.G. Winkelman, on 24 May 1940. The RCOB was installed in The Hague on 6 June 1940.

The regulations not only covered the formal organisation of archaeology policy, it also included some points that would have major implications for archaeological practice. The most important and most radical was the ban on just anyone performing excavations. This applied to private individuals, local museums, associations and societies. Non-private parties could continue to excavate if they acquired

official status. This could be granted by the RCOB, which effectively gave it the right to collaborate and issue recommendations. The involvement of the RCOB guaranteed that excavations would meet a certain academic standard. Any conflicts that arose could be resolved by the RCOB. In practice, the regulations barely worked, however, because there were insufficient funds and staff. Almost forty requests for official status were received in the first year, some of them from Limburg, but only a few could be processed.⁸⁷ Not a single Limburg institution was recognised in 1940.

2.5.3 Hands full

Although the German invasion had happened quickly, many buildings had been reduced to rubble. There was great devastation in Rotterdam and around sites of major military and strategic importance. In the Zuid-Holland village of Valkenburg, which lay close to a military airfield, the entire centre had been destroyed.⁸⁸ Middelburg and Rhenen had also suffered a great deal of damage.

The devastation gave archaeologists an ideal opportunity to conduct investigations, but where were they to begin? In the first six months this question regularly came up at meetings of the RCOB and at the start of 1941 it was decided that the work should be divided, as there was not enough manpower.

Braat would be responsible for Middelburg.⁸⁹ Another project was Valkenburg, which Van Giffen would investigate with his BAI.⁹⁰ Bursch and the ROB would focus as much as possible on smaller projects and new discoveries. They hoped that local organisations would take the initiative, but this was difficult initially because so few had been granted official status.

2.6 Discoveries in Heerlen

2.6.1 A highly inopportune moment

In the midst of this organisational transition, the Roman baths complex in Heerlen was discovered. A team happened upon Roman

⁸⁶ Jaarverslag RCOB 1940, 3-4.

⁸⁷ Jaarverslag RCOB 1940, 5.

⁸⁸ De Hingh & Vos 2005, 23-27.

⁸⁹ Braat 1941, 1942; Van Heeringen, Hendrikk & Mars 1995, 23-28.

⁹⁰ De Hingh & Vos 2005; Verhart 2013.

remains on Coriovallumstraat on 18 June 1940 that appeared to be part of a wall, plus a section of decorated pillar (Fig. 2.5).

The municipal works department was closely involved in the discovery. After consultations between L. van Hommerich (1909-1976) – the successor to Peters, who had died that January – and mayor M.F.G.M. van Grunsven (1896-1969), it was decided that a trial excavation should be performed. It lasted three days, and clearly revealed encircling foundations and standing walls.

It appears that archaeologists in Heerlen were already aware of the changes to the archaeological system, as a telegram reporting the find was sent to the ROB in Leiden on 21 June. No response came, however.⁹¹ This is hardly surprising, as the RCOB had been installed only two weeks earlier. There was much to be discussed before the new committee could really get down to work. After avoiding contact with each other for 25 years, representatives of both Groningen and Leiden were now at the same table. They included Van Giffen, one of the key players in the protracted conflict. They would now have to take joint responsibility for Dutch archaeology.

There was a lot of mistrust and suspicion, and neither side had really come to terms with the bad relations of the past. The report of the first meeting in a letter from Bursch to Van Wijngaarden is illustrative.⁹² He had the impression that Van Giffen was in fact pressing for decentralisation and that he was surreptitiously trying to sabotage everything he could. Bursch closed by concluding that RMO staff would have to remain constantly alert.

Another important point concerned the duties and responsibilities of the ROB and its relationship to the RCOB.⁹³ Staff also had to be recruited and the offices had to be furnished. In the initial period the new body relied heavily on the support of the RMO, which released a lot of staff to perform duties at the National Office.

The regional institutions also had to gain official recognition. Most were not keen to submit an official request at first. This was partly because they feared it meant relinquishing their independence and freedom. There was mistrust, some people wanted to wait and see, and the accreditation procedure in Leiden was not going smoothly. The number of officially recognised regional institutions was very low in 1940,



Figure 2.5 Discovery of the Roman baths in Heerlen in June 1940, overseen by L. van Hommerich (right) (source: Thermenmuseum archives).

though it did rise to almost 40 in 1941.

The ROB and RCOB did not therefore have much clout in the first six months of their existence. In this sense, the discovery in Heerlen came at a highly inopportune moment.

2.6.2 Heerlen seeks its own solution

The delay in response from the RCOB in Leiden to the report of the find in Heerlen on 21 June meant the local authority had to seek other solutions. It did not want to allow any further delay. Since P. Peters had died in January and his successor Van Hommerich did not have the required expertise and staff, the local authority had to look for another experienced archaeologist.

One logical step would have been to contact the LGOG in Maastricht, but the local authority decided against this.⁹⁴ The mayor elected instead to consult the famous doctor Beckers. It need come as no surprise that he was chosen, as he was the best-known archaeologist in Limburg.⁹⁵ Beckers was willing to take on the task.⁹⁶

⁹¹ This report has not been found in the RMO archives. Part of the archive is kept at the museum and part at the National Archives in The Hague. The vast majority was however destroyed in September 1944, when Bursch was about to flee to Germany. A lot of correspondence was sent to his home address. There is also said to have been a telephone call to Leiden. (GIA Archives, letters archive: letters received, 17-9-1946 (Van Hommerich)).

⁹² RMO Archives, letters archive: letters received, 2-7-1940 (Bursch).

⁹³ Verhart 2018d.

⁹⁴ No correspondence on this matter has been found either in the LGOG archives, or in the local authority archives in Heerlen.

⁹⁵ At this time Beckers and his son were finishing a book on the archaeology of southern Limburg (Beckers & Beckers 1940). It was partly financed by the Ministry of Education, Art & Science. Van Giffen wrote the preface.

⁹⁶ Van Hommerich 1975, 96.



Figure 2.6 Curious members of the LGOG visit the excavation of the Roman baths in Heerlen in 1940-1941 (source: Thermenmuseum archives).

He set to work leading the investigation on 24 June, assisted by a group of young people who had been made available by the local authority. Van Hommerich also assisted. The municipal architect F.P.J. Peutz would provide additional information on the architecture of Roman structures and the origin of the clay used for the columns in the hypocaust.⁹⁷

2.6.3 Concerns

On 26 June, less than two days after Becker had begun, a representative from Leiden, curator W.C. Braat of the RMO, came to Heerlen to ascertain the situation in response to the find report. Van Hommerich later said that Braat could not believe his eyes.⁹⁸ Braat referred to it in passing in a letter he wrote a few days later to Holwerda, who lived in Nijmegen. He thought the excavation worthwhile and felt it was a shame that the RMO had not managed to get to work there quickly. The ‘famous Dr. Beckers’ was now on the job, fortunately assisted by the municipal architect, Mr Peutz, who was greatly enjoying the work and would be sure to plot everything. Braat had given some input in the form of a few suggestions, in order not to tread

on Beckers’ toes, as he thought it all a rather amateurish affair.⁹⁹

Braat was not the only person in the archaeological world who was concerned about the standard of the investigation.¹⁰⁰ Much later, Van Giffen wrote in his report on the excavation that in retrospect it was regrettable that Beckers had not had help from people with expertise at an earlier stage.¹⁰¹ What he did not say was that Beckers had written to him several times during the excavation campaign with a request to come and view the situation for himself, but Van Giffen had not done so.¹⁰² This is remarkable, because in the preface to the book by Beckers and his son it is possible to discern, reading between the lines, that Van Giffen had his doubts even before the excavation of the Roman baths.¹⁰³ He had a great deal of praise for all that Beckers had achieved in Limburg, but also highlighted his independence and the differences of opinion when it came to assessing and drawing conclusions on finds and discoveries. Van Giffen closed with an expression of understanding for Beckers’ ‘local patriotic feeling’.¹⁰⁴ Despite his concerns, Van Giffen did not write any harsh words about Beckers.

While the archaeological world was slightly concerned, but remained at a distance out of necessity, the excavation site evolved into a

⁹⁷ Van Hommerich 1975, 97.

⁹⁸ Van Hommerich 1975.

⁹⁹ RMO Archives, letters archive: letters sent, no. 432, 01-7-1940 (Holwerda).

¹⁰⁰ This is clear from a letter that Van Wijngaarden wrote to the local authority a year later (RMO Archives, letters archive: outgoing letter 17-5-1941 (Heerlen local authority)).

¹⁰¹ Van Giffen 1948, 201.

¹⁰² GIA Archives, letters archive: letters sent, 12-4-1940, 9-7-1940, 7-9-1940, 11-10-1940; letters received 17-4-1940, 9-7-1940, 11-10-1940, 26-10-1940 (Beckers).

¹⁰³ Beckers & Beckers 1940, 5-6.

¹⁰⁴ Beckers & Beckers 1940, 6.

real public attraction.¹⁰⁵ Many people went to Limburg on holiday, as the borders were closed. While there, they would be sure to visit the Roman baths complex. The provincial council also visited the excavation and the LGOG organised an excursion for its members (Fig. 2.6).¹⁰⁶

2.7 Leiden has to back down

2.7.1 Land parcelling in Limburg

After a difficult start, in the second half of 1940 and early months of 1941 the RCOB began to exert steadily more control over archaeology in Limburg as it recognised more and more local institutions. The LGOG became responsible for southern Limburg.¹⁰⁷ The museums in Venlo, Tegelen, Asselt and Roermond received accreditation for their regions.¹⁰⁸ An organisation established by Beckers was also given official status, guaranteeing the preservation of his own collection.¹⁰⁹ He would take responsibility for Geulle, Ulestraten, Spaubeek, Beek, Elsloo, Stein, Urmond, Geleen and Schinnen.

The situation in Heerlen remained a problem, however, and was regularly discussed in Leiden during this period. In the summer of 1940 things had been left to run their course there. The RCOB had little taste for engaging in the important Roman baths project with the amateurish Beckers, and Van Giffen had no time, as he was busy in Valkenburg. But the alarming reports could not simply be ignored. Something had to be done.

2.7.2 Consultations in Heerlen

At a meeting of the RCOB in autumn 1940 it was therefore decided that a visit should be made to Heerlen to discuss further investigations and preservation of the site. The members of the delegation indicated the importance of the matter and the problems they expected to encounter. Krom, the chair, was one member. Van Wijngaarden also went along, as director of the RMO – which would conduct the further investigations – and the third member was Van

Giffen, as the alternative candidate.

On 12 November the gentlemen gathered round the mayor's conference table, along with Beckers, Peutz and Van Hommerich.¹¹⁰ There were three important points on the agenda: continuation of the investigation, preservation of the site and the publication. In the meantime, the excavations were still in full swing, and the investigation was not halted until 25 November.¹¹¹

A large area had been exposed in the summer of 1940, but the work was far from complete. The Heerlen contingent were keen to continue the following spring. Both parties shared this view, but the execution proved to be an obstacle. The RCOB insisted that further excavation should take place in close consultation with experts from one of the national institutions.¹¹² Beckers had taken responsibility that summer and he could not simply be sidelined. At the same time, no national institution wanted to work under the leadership of a private individual. It was therefore a difficult matter, on which the gentlemen were unable to reach agreement at that point.

The second subject of discussion was the preservation of the site over the winter. The remains of the building might be damaged by frost. Various proposals were discussed, and placing a canopy over the remains was the preferred option, the other option being to cover it with sand, which would have to be removed later. A wooden canopy would be expensive, however, and wood was difficult to obtain.¹¹³ One alternative would be to cover it with straw, and then tar paper, which would cost only a tenth of what a wooden canopy would cost. The straw and tar paper were applied in December.¹¹⁴

The third subject discussed may have been a little premature, for it was about the publication of the work. The somewhat one-sided arrangements make it clear that it was the Heerlen contingent who raised the subject. Van Hommerich would be responsible for the first part, writing a summary of the Roman occupation history to explain the context of the Roman baths. In the third and final part of the publication Peutz would examine the architecture of the complex. The middle part, describing the excavation results, would be a co-production by Beckers and the academic lead on the excavation. Given the backgrounds of and relations between the individuals involved,

¹⁰⁵ Van Hommerich 1975, 99.

¹⁰⁶ Van Hommerich 1975.

¹⁰⁷ Van Hommerich 1975, 17.

¹⁰⁸ Jaarverslag RCOB 1941, 1. Venray is also mentioned in the text, but a list shows that this was a mistake, and should have read Venlo.

¹⁰⁹ Jaarverslag RCOB 1941, 1-2.

¹¹⁰ The consultations must have taken place on Tuesday 12 November, not on 5 November (Jeneson 2015, 35; Van Hommerich 1975, 94). On 9 November 1940 Van Wijngaarden wrote that he would be travelling to Heerlen with Krom the following Tuesday (RMO Archives, letters archive: letters sent, 9-11-1940 (Heerlen local authority)).

¹¹¹ Jeneson 2015, 38.

¹¹² Jaarverslag RCOB 1940, 5.

¹¹³ RMO Archives. See Beckers, Peutz and Van Hommerich's report of 19-11-1940, appended to the letter received 9-12-1940 (Heerlen local authority).

¹¹⁴ RMO Archives, letters archive: letters received, 9-12-1940 (Heerlen local authority).

it is not surprising that this publication never materialised.

In March 1941 Beckers revealed he was not keen on working with Leiden, and approached Van Giffen.¹¹⁵ He asked whether he might work with the BAI, but did not mention Heerlen.¹¹⁶ Van Giffen, who assumed that Beckers was referring to some future collaboration, thought he meant an excavation of a Frankish cemetery near Stein or a Medieval pottery kiln in Brunssum. Van Giffen supposed that Beckers would work with the RMO on an exceptional case such as that in Heerlen.

2.7.3 Leiden steps up

In April 1941 the director of the museum in Leiden informed the mayor of Heerlen that curator Braat would come to Heerlen to discuss the details of the investigation and the collaboration with Beckers.¹¹⁷ Van Wijngaarden outlined his vision of how the collaboration would work. Beckers and the RMO would set to work more or less together. The local authority would take on ten staff, the costs of which would be covered by the RMO, and work would begin in mid-May. He asked whether the winter cover had already been removed, and if not, requested that the local authority take responsibility for removing it.

Krom, chair of the RCOB, had sent a similar letter to the mayor several days before, in which he also outlined the background.¹¹⁸ Krom recalled the visit to Heerlen in November and the fact that the committee had been convinced that a trained archaeologist should be appointed to advise and assist Beckers. Braat was nominated, in consultation with Van Wijngaarden. Krom explained the choice, saying: 'It is however *not at all* the idea that we should in any way divest this deserving archaeologist of leadership of the project (in which capacity we fully appreciate Dr. Beckers) nor to exercise any supervision of him. We hope merely to help him benefit from the knowledge of another, and so to enter into collaboration'.

Braat was already in Limburg at that point. Van Wijngaarden informed him of the plan to start work in Heerlen in mid-May and instructed him as to how they might best collaborate.¹¹⁹

Van Wijngaarden deemed it wise to make an appointment with Beckers and the mayor. During their discussions, Braat was above all to make clear that it was not the idea that the RMO should take over the project, or supervise those conducting it. The museum hoped to achieve results in collaboration.

2.7.4 Collaboration fails

The meeting took place in Heerlen on 5 May. It ended in fiasco. Braat reported back to his director on 7 May 1941.¹²⁰ All hope of a good outcome was lost and he referred to Beckers as 'a madman'. He enclosed a copy of the letter he had already sent to the mayor, with his account of the meeting (box 1).

After Braat returned to Leiden he spoke to Krom, the chair of the RCOB. Braat suggested putting Van Giffen in charge, as Beckers might perhaps listen to someone older. Braat had not yet put this idea to the mayor, because he wanted to discuss it with Van Wijngaarden first. Even if Beckers were to leave the project, Braat was not keen to take on responsibility for the investigation, as he would be open to the charge of personal ambition.

After consultation with Braat Van Wijngaarden contacted Krom and then set out a proposal in an attempt to turn the tide. The investigation could be led by Beckers. Braat would be consulted if necessary. Furthermore, Braat would be able to undertake activities on his own initiative, such as mapping the complex, in which case Beckers would be furnished with a duplicate drawing.

This new approach meant that the finds could remain in Heerlen, but that the RMO would no longer pay for the staff.¹²¹ The mayor's response was brief. This would not resolve the matter and he would contact the RCOB. Excavations did not therefore commence on 27 May.¹²²

A final attempt to involve Braat in the investigation also failed. Krom had visited Beckers and found him willing to collaborate after all. Braat would be given the opportunity to produce a good plan of the site. But when Braat wrote to Beckers on the matter, the latter sent a very rude reply.¹²³ There was now no question of Braat and Beckers collaborating. Another solution would have to be found.

¹¹⁵ GIA Archives, letters archive: letters received, 5-3-1941 (Beckers).

¹¹⁶ GIA Archives, letters archive: letters received, 10-5-1941 (Beckers).

¹¹⁷ RMO Archives, letters archive: letters sent, no. 193, 19-4-1941 (Heerlen local authority).

¹¹⁸ Krom sent a copy of the letter to Van Wijngaarden (RMO Archives, letters archive: letters received, 16-4-1941 (Krom)).

¹¹⁹ RMO Archives, letters archive: letters sent, no. 196, 24-4-1941 (Baat).

¹²⁰ RMO Archives, letters archive: letters received, not numbered, 7-5-1941 (Baat).

¹²¹ RMO Archives, letters archive: letters sent, no. 260, 19-5-1941 (Heerlen local authority).

¹²² RMO Archives, letters archive: letters received, 23-5-1941 (Heerlen local authority).

¹²³ This letter was not found in the RMO Archives.

Box 1 Letter from RMO curator W.C. Braat to M.F.G.M. van Grunsven, mayor of Heerlen (Wednesday 7 May 1941)

Laag-Keppel, 7 May 1941

Dear Sir,

On Monday morning, in the presence of Mr Van Hommerich, I held talks with Doctor Beckers, during which this gentleman expounded his position with much cursing and invective and immediately, with his very first words, destroyed my hope that perhaps, with a great deal of tact on my part, there might be some collaboration between myself and him. I began by expressing my delight at the fact that he was fully recovered from his illness this winter and then informed him that I was considering beginning with the excavation on 26 May. That immediately set the match to the powder, for Beckers erupted. 'You will begin? No sir, I will begin, I am in charge of this work.' I tried to placate him, to no avail. He then asked how I actually imagined we would collaborate. I attempted to explain to him that I expected it would be very pleasant. It would of course be completely idiotic if he, who could well be my father, as it were, were to act as some kind of assistant. 'No, I wish to add, you are only here to observe....', in such terms did he couch his answer. Then I said, 'If for example I might suggest our excavator Bosch...' but I got no further, for Beckers began to exclaim again, 'Bosch, that thief, he will not enter the site'. I pointed out that that was a sickening remark. It in fact referred to an earlier attempt to collaborate with Doctor Beckers on the part of my predecessor Remouchamps. They excavated something, I think the *hutkommen* in Steyn, and I would assume that they agreed that the finds should be added to Doctor Beckers' collection. However, some creature of Beckers', a certain Tony Jansen, had on several occasions removed shards that had been found that day and secretly taken them to Beckers. Remouchamps had found that highly unpleasant and therefore instructed Bosch to pocket important items. Beckers noticed this, who accused Bosch of being a thief. When I pointed out to Beckers that there had been no question of Bosch

wishing to keep those things for himself, he said, 'Oh yes, he wanted to steal them for Leiden'. Again, a curious assumption that the National Museum of Antiquities wished to steal from Beckers. Anyway, I have recounted in detail what happened so that you can imagine that, with the best will in the world, it is not possible to keep the peace with a person such as this. I attempted in all manner of ways to make Beckers see reason, convince him that I truly am not a man who wishes to play boss, and that I had no intention of taking the credit, but all to no avail. Next week, when I return to Leiden, I will discuss this with Professor Krom, the chair of the committee, which will then have to decide what is to happen. It is of course impossible that a curator from the National Museum of Antiquities should work as an assistant to an amateur archaeologist. If the museum performs an excavation, it is the scientific officer and, ultimately, the Director, who is responsible to the Government for the results of the work. My personal feelings are of no consequence in the matter.

It is highly regrettable that the investigation of the most important Roman ruins in our country has been entrusted to a dilettante who, as I suspected after my visit last year, has probably irreparably destroyed a number of important pieces of information. The proposed compromise was designed to prevent further calamity, without any insult to Mr Beckers, but collaboration is impossible with a man such as he, who cannot even keep the peace with me.

Doctor Beckers told me that Professor Krom was to visit him soon. That is very timely, as he will be able to hear from both sides how this dispute came about.

Mr Van Hommerich, who has done his utmost to act as intermediary, for which I am very grateful to him, was present as a witness.

I have written to you of this immediately, Mr Mayor, because you are interested in the matter as a whole and Beckers may well have already revealed to you his view on the matter.

Yours sincerely,

C. Braat

2.8 Van Giffen takes over

2.8.1 The RMO's involvement ends for good

That solution would eventually involve bringing in Van Giffen. When Van Wijngaarden informed Mayor van Grunsven that the talks had failed, he suspected that RCOB chair Krom would now ask Van Giffen to take over.¹²⁴ After all the problems, this was not an entirely satisfactory solution. Firstly, Van Giffen was barely qualified in Roman archaeology and, secondly, Van Wijngaarden realised that this move was an attempt to 'exclude Leiden from southern Limburg'. He expressed his fear that if Beckers were to get his way, it would become increasingly difficult for the RMO to carry out work in southern Limburg in the future. He closed his letter by announcing that he would not send any of his people to Heerlen before it was certain when the excavation work would begin.

Things went as Van Wijngaarden had predicted. Krom invited Van Giffen, on behalf of the RCOB, to lead the investigation in Heerlen. Shortly afterwards, in late June, Holwerda came on his own initiative to take a look. He wrote in a letter to Van Wijngaarden that he had heard that the RCOB had overreached itself and that Van Giffen was now to be made lead investigator.¹²⁵ He could not imagine this, and he felt that the committee had submitted, cap in hand, to an archaeological charlatan, and Van Giffen was in fact using the committee and the Office to exclude Leiden. He despondently continued that the committee and the Office were in fact destroying the Leiden museum. Holwerda had also heard that the local authority wanted to build a canopy over the excavation and establish a museum. He doubted whether the find was that valuable. By way of consolation, Holwerda wrote that the mayor of Heerlen also regretted the fact that Braat was no longer playing any role in the investigation.

Van Wijngaarden agreed only partially with Holwerda.¹²⁶ To his way of thinking, the RMO had not overreached at all. Of course, Braat had not managed things very well, but Beckers could not have the lead in an investigation. He had angled for this from the very beginning, and

sabotaged any collaboration with the RMO. But Van Wijngaarden had to admit that the RMO no longer had any involvement in the matter, and that Beckers now had a free hand, in the guise of collaboration with Van Giffen.

Just before 24 June 1941 Van Giffen, Beckers and others involved in the investigation met to discuss how to proceed. All the creases had been ironed out, and the investigation could begin.¹²⁷

2.8.2 A Groningen archaeologist in Roman Limburg

Van Giffen started work on 2 July 1941. He had mainly performed prehistoric and post-historic excavations in the past. His knowledge of Roman archaeology was limited. He had excavated on Domplein in Utrecht, and in spring 1941 he had started work in Valkenburg, in Zuid-Holland province.¹²⁸ One complicating factor was that he had not yet completed his work in Valkenburg when he planned to start in Heerlen.

He was rarely in the field himself, but was represented by a highly experienced excavation team and his assistant Hendrik Brunsting. Almost all his staff were now working on excavations far from their usual domain in the three northern provinces. Van Giffen tried to visit the excavation once a week, and Brunsting wrote to him weekly to keep him updated on progress.

A week after work commenced Beckers received a letter from Van der Haagen, also a member of the RCOB.¹²⁹ The letter provides some insight into what had been going on. Van der Haagen regretted that the collaboration between Leiden and Beckers had not gone smoothly over the past few months. He wanted to explain that this slight problem had resulted from a misunderstanding (box 2). Braat had not been tactful, but that was because he was working on the assumption that the RMO still had the lead in the investigation. Van der Haagen expressed the hope that Beckers would work constructively with Braat and Van Giffen. This conciliatory letter from Van der Haagen may have worked. At any rate, relations between Beckers and Van Giffen remained cordial during the second year of the investigation. The majority of the site had been exposed and Van Giffen focused on observing details,

¹²⁴ RMO Archives, letters archive: letters sent, 26-5-1941 (Heerlen local authority).

¹²⁵ RMO Archives, letters archive: letters received, without number, 20-6-1941 (Holwerda).

¹²⁶ RMO Archives, letters archive: letters sent, no. 35, 2-7-1941 (Holwerda).

¹²⁷ GIA Archives, letters archive: BROB correspondence 1940-1950, outgoing letter no. 366, 24-6-1941 (RCOB).

¹²⁸ Hoekstra & Wynia 1997; De Hingh & Vos 2005.

¹²⁹ The letter to Beckers has survived in the form of a copy enclosed with a letter from Van der Haagen to Van Giffen: GIA Archives, letters archive: letters received 10-7-1941, enclosure (Ministry of Education, Art & Science).

Box 2 Extract from a letter from RCOB member J.K. van der Haagen to H.J. Beckers (Thursday 10 July 1941)

I know that you were outraged at Dr. Braat's remarks and, being fully cognisant of the previous history in this matter, I understand this completely. In the meantime I have ascertained that Braat also greatly regrets the incident. I have known him for many years, since my student days, and know that he likes nothing better than friendly collaboration with all kinds of groups and individuals working in this field. Now, regrettably, the unfortunate circumstance occurred that Dr. Braat departed for Heerlen without apprising himself of the details of the arrangements made. Under these circumstances it is also understandable that he said what he believed he had to say. After all, he knew no better than that the Leiden museum would have the actual lead. After I apprised him thoroughly of the past history, he also understood your position.

Fortunately, it has nevertheless proved possible to find a solution that has caused no disadvantage to the excavations themselves. Meanwhile, I should be delighted if that which occurred had no further detrimental impact on the relationship between yourself and Braat. I have asked him to consider going to view the excavations when Professor Van Giffen is also there, and I believe I can trust that, after reading the above, you will be willing to view the remains with the two gentlemen and consult with them on this matter.¹³⁰

carefully mapping the features and remains found, and digging trial trenches and cross-sections. Only on the east side was there one small part that remained undisturbed where excavations could still be carried out (Fig. 2.7). There was a lack of documentation. Beckers had made few drawings, and various details had not been documented. In every letter he wrote to Brunsting, Van Giffen would ask a series of questions and give instructions as to what to do. Brunsting followed the instructions closely and answered the questions precisely, often in the form of drawings, sketches and short descriptions that he sent to Groningen. He mentioned Beckers only occasionally in his



Figure 2.7 Excavation work being performed by staff of the BAI in 1940-1941 (source: Thermenmuseum archives; original photo by GIA Groningen).

answers. Brunsting sometimes approached him in order to answer one of Van Giffen's questions.¹³¹ Beckers and Van Giffen rarely wrote to each other anymore and most of their contact will have been verbal, during Van Giffen's visits to the excavation site. This may be why there was no further conflict.

2.9 Completing the work

2.9.1 Report

The investigation was wrapped up on 15 November 1941. The idea was that the first reports would be completed soon afterwards. Initial plans had been made to turn the Roman baths complex into a museum. But work on processing the investigation progressed slowly. At the end of 1943 Bursch discovered that Van Giffen had arranged with the mayor for Brunsting to write everything up, but Bursch thought that this might also be the responsibility of the ROB.¹³² The question of who exactly would do what slowed down the entire proceedings. Furthermore, the organisation in Groningen was busy with other excavations. A year later Bursch visited Heerlen and heard from Van Hommerich that nothing had been done. He asked Van Giffen to clarify matters.¹³³

¹³⁰ As far as is known, Braat never visited the excavation again.

¹³¹ GIA Archives, letters archive: letters received 8-8-1941 (Brunsting).

¹³² GIA Archives, letters archive: BROB correspondence 1940-1950, letter received, no. 430, 1-12-1943 (Bursch); letters archive: outgoing letter, 4-12-1943 (Van Hommerich).

¹³³ GIA Archives, letters archive: BROB correspondence 1940-1950, letter received, no. 101, 31-8-1944 (Bursch).



Figure 2.8 One of the two models of the Roman baths in Heerlen made in 1943 (source: Thermenmuseum archives).

Nothing further happened for a while. Shortly afterwards, the southern Netherlands was liberated. The rest of the Netherlands remained under the control of the Germans, which meant there was no contact for six months. Bursch fled to Germany on 3 September and would never return to the ROB.¹³⁴

models.¹³⁹ One would be for Heerlen and the other would be given to the RMO, which in exchange would transfer the model of Kaalheide Villa to Heerlen. However, it was unclear to the RMO and the BAI who held copyright on the Heerlen models. In June 1943 Van Grunsven resolved the matter by awarding copyright to the official excavation leader and investigator of the Roman baths, Van Giffen (Fig. 2.8).¹⁴⁰

It became clear on the afternoon of 2 February 1943, when fire broke out in the *praefurnium*, that measures would have to be taken to protect the excavation site. According to the police report, the fire was caused by children playing at the site. Their identities were known.¹⁴¹ The damage from the fire was not extensive, but the firemen had walked over the material covering the site, thus causing some damage to the remains. Fortunately, the site was insured for 30,000 guilders.¹⁴²

By the end of 1945 the site looked desolate. The remains of the wall were still covered with straw and tar paper, and the planned canopy had not materialised, let alone any sign of a museum building.¹⁴³ The Netherlands had other concerns. The damage caused by the war had to be repaired, and the country rebuilt. A cheap solution had to be found to cover the site, in anticipation of better times ahead. In September

2.9.2 Management, preservation and fire

Once the entire complex had been exposed, the next question was of course what would happen now. At an early stage, the idea of building a canopy over the entire site had been discussed, both to protect it and to make it accessible to the general public. Plans were needed. A start was made in December 1941. Van Giffen was asked to write a memorandum on the preservation of the Roman baths, and his findings were positive.¹³⁵ His recommendations were also sent to the ministry, with a request for funding.¹³⁶

In the years that followed, plans were made for a model.¹³⁷ Brunsting studied the terra sigillata and Mathieu Daniels took responsibility for determining the coins.¹³⁸ In 1943 Van Giffen received the sum of 500 guilders to make two

¹³⁴ Verhart 2018d.

¹³⁵ GIA Archives, letters archive: BROB correspondence 1940-1950, outgoing letter no. 867, 3-12-1941 (Heerlen council).

¹³⁶ GIA Archives, letters archive: BROB correspondence 1940-1950, outgoing letter no. 901, 18-12-1941 (Ministry of Education, Art & Science).

¹³⁷ GIA Archives, letters archive: letters received, 10-01-1942, 7-5-1942, 13-5-1942, 8-6-1942; letters sent, 23-4-1942, 29-7-1942 (Van Hommerich).

¹³⁸ GIA Archives, letters archive: letters sent, 27-11-1942 (Van Hommerich).

¹³⁹ GIA Archives, letters archive: letters received, 31-3-1943 (Van Hommerich).

¹⁴⁰ GIA Archives, letters archive: letters received, 27-6-1944 (Van Grunsven).

¹⁴¹ GIA Archives, letters archive: letters received, 6-2-1943 (Van Hommerich).

¹⁴² GIA Archives, letters archive: letters received, 6-2-1943 (Van Hommerich).

¹⁴³ It was not until 1946 that the council received 6000 euros from the Ministry of Education, Art & Science for the preservation of the listed site (GIA Archives, letters archive: copy of a letter sent from Heerlen local authority to the ministry, 26-6-1946).

1945 Van Wijngaarden sent a report by Heerlen local authority's archivist about the covering of the Roman baths to Van Giffen, asking his opinion.¹⁴⁴ The most realistic solution would be to cover it with silver sand and hope that things would take a turn for the better. The local administration asked the Ministry of Education, Art & Science to contribute to measures for the permanent preservation of the site, the costs of which had been estimated at 16,280 guilders, according to Van Giffen. The members of the RCOB unanimously agreed that this was the best solution.¹⁴⁵ Work to cover the site with silver sand began on 1 October. The ministry had promised the necessary funding.¹⁴⁶

2.9.3 Publication

When Brunsting left Groningen on 1 March 1946 to take up a position as curator at the RMO, he had spent years processing the Heerlen investigation. His efforts had not led to any tangible result, however.

Things got moving when a new assistant employed in Groningen, W. Glasbergen, threw himself into the task of writing up the Heerlen material. He soon produced an eleven-page summary of the finds from the Roman baths site. A great solution had also been found for the high costs of printing. The journal *L'Antiquité Classique* intended to publish a celebratory issue for Belgian archaeologist H. Van de Weerd of Ghent. Lecturer and later professor at the University of Ghent, S.J.L. De Laet, allowed Van Giffen to contribute to this special issue. The paper was published in 1948, and included a reconstruction drawing by Peutz.¹⁴⁷ Van Hommerich was delighted with the result and congratulated Van Giffen and Glasbergen on their achievement.¹⁴⁸ He had written a report for the local newspapers and later sent several clippings to Groningen.¹⁴⁹

Van Giffen received 600 reprints and the plates for printing the illustrations. The latter turned out to cost 1100 guilders extra, and he asked if Heerlen could help cover the costs.¹⁵⁰ The council agreed.¹⁵¹ In March 1949, 450 reprints were sent to Heerlen.¹⁵²

2.9.4 The end

Van Giffen was at the height of his power in 1951. He was director of the BAI and the new State Service for Archaeological Investigations (Rijksdienst voor het Oudheidkundig Bodemonderzoek: ROB), professor in Groningen and Amsterdam and he had a seat on every committee that had anything to do with archaeology. He was 67 by now. As a professor he was allowed to work until he turned 70, but as head of the ROB he was just an ordinary civil servant, which meant he should have retired already. Given his special role in archaeology, the Ministry of Education, Art & Science had agreed to let him remain in his position for longer. But his exceptional situation had to be reviewed every year. On 1 January 1952 the Ministry notified him that it no longer wished to extend his employment at the ROB. Van Giffen attempted to prevent the Ministry from retiring him, arguing that he was allowed to continue working as a professor, but to no avail, and P. Glazema became his successor.

The fact that Van Giffen believed he had been wronged became apparent when the site next to the Roman baths complex had to be investigated in 1952. Van Giffen heard that the investigation was being conducted by the ROB, circumventing him and the BAI.¹⁵³ It was 'contrary to the normal view on such a matter, and furthermore an example of the deliberate sidelining of his institute under false pretences'. He did not explain what he meant by this, but he would have liked to have continued, as he was still very interested in the Roman baths complex from an academic point of view.¹⁵⁴

2.10 Finally

Many of the difficulties that arose during the investigation of the Roman baths in Heerlen in 1940 and 1941 originated in the long-running conflict between Holwerda and Van Giffen, between Leiden and Groningen. When Holwerda withdrew it seemed it might be possible to make a new start, but past wrongs continued to dominate relations. There was a great deal of mistrust, and others were also

¹⁴⁴ GIA Archives, letters archive: BROB correspondence 1940-1950, incoming letter, no. 395, 8-9-1945 (Van Wijngaarden).

¹⁴⁵ GIA Archives, letters archive: letters received, 3-4-1946 (Van Grunsven).

¹⁴⁶ GIA Archives, letters archive: letters received, 1-10-1946 (Van Hommerich).

¹⁴⁷ GIA Archives, letters archive: letters sent, 6-8-1948, 3-9-1948; letters received, 19-8-1948 (Peutz).

¹⁴⁸ GIA Archives, letters archive: letters received, 7-12-1948 (Van Hommerich).

¹⁴⁹ GIA Archives, letters archive: letters received, 12-2-1949 (Van Hommerich).

¹⁵⁰ GIA Archives, letters archive: letters sent, 10-12-1948 (Van Grunsven).

¹⁵¹ GIA Archives, letters archive: letters received, 12-2-1949 (Van Hommerich).

¹⁵² GIA Archives, letters archive: letters sent, 25-3-1949 (Van Grunsven).

¹⁵³ GIA Archives, letters archive: letters sent, 25-3-1948 (Van Grunsven).

¹⁵⁴ The ROB investigation is examined in chapter 4.

dragged into the conflict.

The excavations in Heerlen took place at a turning point in Dutch archaeology. A new institution for archaeology policy was established, the role of amateur archaeologists diminished, the RMO lost its position of dominance and some of its influence, and the BAI in Groningen, run by Van Giffen, became more important.

We should not underestimate the role that the characters of the protagonists played. The staff of the RMO frequently revealed themselves to be somewhat formal civil servants with little willingness to make concessions, and a tendency to cling inflexibly to a position once adopted. Doctor Beckers was a difficult, stubborn man who was quick to make his views known. Many were wary of him and this left him free to go his own way.

Collaboration was problematic throughout. Van Giffen was highly ambitious and Heerlen was the perfect opportunity for him to increase his influence on Dutch archaeology. But in fact Heerlen happened too soon. He was in Valkenburg in the province of Zuid-Holland, a case he had wanted to pursue for thirty years. He was not able to start work in Heerlen until 15 April 1941, precisely in the period where tensions between the RMO and Beckers had reached such a pitch. The distance, the war and the huge amount of work also presented problems.

Van Giffen turned out to be a good choice,

despite his limited experience in Roman archaeology. He was in an authoritative position vis-à-vis Beckers and in the second year of the investigation there were no problems. But there was not much more to excavate. Although Beckers would play a role in analysing and writing up the excavation, it was ultimately Van Giffen who published the results, along with his new assistant W. Glasbergen.

This brings us to the end of the multi-layered history of the first investigation of the Roman baths in Heerlen. Though this chapter has focused largely on Beckers, Van Giffen and the RMO, we must also acknowledge the remarkable role of Heerlen local authority. At that time it was not common for a local authority to play a leading role in the investigation, preservation and publication of archaeological sites. It was often a matter of just one individual at a local authority with an interest in archaeology, but at Heerlen the local authority was involved on a broad front, from the mayor to the municipal architect and archivist. Furthermore, these three also took responsibility for the preservation of the site and the publication of the results. Their efforts to preserve the Roman baths in Heerlen for future generations and to create a museum setting for the remains was truly visionary. They were perhaps unaware that their efforts opened up opportunities for valuable research by later generations of archaeologists. We are greatly indebted to them for those efforts.

3.1 Introduction

Although the Roman baths of Coriovallum appear to have undergone a regular archaeological process of discovery, excavation and publication, further analysis of the events at and near the site since 1935 has shown that there were many different operations, the majority of them performed with no research question or scientific method, with no professional field staff, and in some cases even without a plan. And although the 1948 publication is remarkably detailed as regards descriptions of all remaining elements – remarkable because Van Giffen only had the 1941 drawings and photographs for his analysis and interpretation of the results, since the baths were covered in sand by then – it does not consider important questions about the baths complex, on matters like the water supply, the landscape, the construction techniques used and the origins of the building materials. Jamar already referred to the lack of such information in a publication for the general public.¹⁵⁵

It is at any rate certain that only a small

proportion of all the finds from the Roman baths site were examined by specialists – i.e. the coins and terra sigillata – and included in Van Giffen’s analysis and interpretation.

In the past few decades, doubts have also been raised about the interpretation of certain elements of the bathhouse, such as the two *exedrae* outside the *palaestrae*, which Peutz interpreted as small entrances (perhaps service entrances) in his reconstruction.¹⁵⁶

Furthermore, Roman archaeology, like any other branch of scholarship, has developed further since the publication of Van Giffen and Glasbergen’s report, not least thanks to the many technological innovations now used in the field and during interpretation. Dating with the help of ¹⁴C, dendrochronology and optically stimulated luminescence (OSL), and the analysis of pottery fabric using electron microscopy – techniques now regarded as standard practice – were not yet possible in Van Giffen’s day. We also know much more about public bathhouses from the Roman period, given that the number of known sites has grown, and in many places new research has been performed on this type of site, particularly in Northwestern Europe.



Figure 3.1 The Roman baths at Coriovallum immediately after the excavations in 1940-1941 (source: Thermenmuseum archives; original by GIA Groningen).

¹⁵⁵ Jamar 1981, 9.

¹⁵⁶ Van Giffen 1948 does not mention the *exedrae*.

3.2 Aim and approach

In light of the above, the new project aimed to take full advantage of the research potential of the entire body of archaeological data from the Roman baths site and its immediate surroundings (the 'Thermenterrein site'), thereby making sure all methods and techniques available would be employed.

To ensure that all of the open questions regarding the baths and its surroundings would be answered, a good research framework needed to be defined. It was of course based on the publication by Van Giffen and Glasbergen and the questions concerned the bathhouse, the material culture of the site, the surrounding area (the old ROB excavations) and the *vicus* of Coriovallum. The research framework was drawn up by external archaeological consultant Wouter Vos and coordinated with the museum's curator, Karen Jeneson, the members of the academic committee, including a representative of the Cultural Heritage Agency of the Netherlands (RCE), and various archaeological specialists.

A normal tendering process was used to request offers for individual specialist analysis projects from researchers in the Netherlands, Belgium and Germany. The research framework served as a guideline. Seventeen specialist studies were performed between 2015 and 2019. Besides the usual analyses of the different types of find material, such as pottery, coins and natural stone, analyses were also performed by the kind of specialists not usually deployed for the Roman period in the Netherlands, including an analysis of the water supply in and around the bathhouse, epigraphical analysis of inscriptions found in and around the baths, and the architectural survey. Archival research was also performed on all the proceedings surrounding the excavations of 1940 and 1941.

For some categories of material more than one specialist was deployed, such as natural stone, pottery and metal. The tendering procedure also included students, who had already studied material from the Thermenmuseum's collection, in order to give them the opportunity to participate in the new research on the bathhouse. This proved possible in three cases: Marc Rappe (Universität

Köln, Germany) for the fibulae, Paul Picavet (Université de Lille, France) for querns and mortars, and Joes Minis (University of Leuven, Belgium) for the epigraphic evidence.

Two parties set about conducting a new field study of the building, involving a geophysical survey and a trial trench survey. At the start of the study, it was expected that a large number of questions from the research framework could be answered with a non-destructive investigation in the form of an architectural survey of the archaeological remains, a desk-based study of all available documentation, such as drawings and photographs, and a geophysical survey. When the research framework was set out, however, it became clear that certain questions would require further excavation work in the bathhouse. As was already mentioned before, only one archaeological level was exposed in 1940–1941, and the features were not examined any further at the time, i.e. no sections were made and the remainder of the feature was not excavated. No find material was therefore collected *in situ* from these features, with one important exception being the finds that the team from Groningen collected during their fieldwork in 1941 from the portico of the eastern *palaestra*, where two floor levels were identified and from which datable finds were collected.¹⁵⁷ An expert meeting with the academic committee in May 2016 resulted in a selection of specific research questions which it was expected could be addressed only through destructive research. These research questions were taken from the research framework already set out, and were eventually incorporated into a project brief for a trial trench survey.¹⁵⁸ The brief consisted of an invitation to tender for the fieldwork, with prerequisites and methods defined in accordance with the requirements of the competent authority (for the Roman baths, this is the Cultural Heritage Agency). Of course the key requirement was that the disruption be kept to a minimum. All the ideas and recommendations put forward by the academic committee were incorporated into the project brief, and once it had been approved by the competent authority, the excavations were able to commence in January 2017.

¹⁵⁷ Van Giffen & Glasbergen 1948, 226.

¹⁵⁸ Vos & Lanzing 2016.

3.3 Gaps in the knowledge

3.3.1 Knowledge gap 1: the dating of the bathhouse

The first gap in the knowledge concerns the dating of the bathhouse – not only its construction and date of final use, but also the date of the alterations. In his popular science publications for the Thermenmuseum of the 1970s and 80s, Jamar simply adopted Van Giffen's interpretation of the rooms as well as the proposed phasing. He did however differ on one point: the date of construction. Van Giffen had assumed that construction began 'around AD 50', whereas Jamar dates it to circa AD 100. This is notable, given the fact that Bogaers, too, assumed a construction date in the mid-first century AD, based on archaeological datable material from the excavations around the baths.

Jamar's anomalous construction date can probably be attributed to the influence of German architectural historian H. Christ. In November 1959 he gave a lecture in Heerlen on the question of dating the Roman baths, a report of which appeared in the bulletin of a local history society.¹⁵⁹ Christ, who was a professor at the Rheinisch-Westfälische Technische Hochschule (RWTH) in Aachen in the 1950s, made it clear that he had little faith in the dating methods of archaeologists, and proposed that the dating of a Roman structure should be based primarily on study of the remains of the building.¹⁶⁰ He therefore compared the ground plan of the main building with that of similar bath complexes, all from a military context along the Rhine, and particularly those in Xanten and Mainz, and came to the conclusion that the Roman baths in Heerlen were virtually identical to those bathhouses. Thus, he proposed, the construction date must also be the same as those of Xanten and Mainz, namely AD 101-104/106. Christ expressed no opinion on the date of the second phase of construction, however, which Van Giffen put at around AD 200.¹⁶¹ With an end date of AD 400, according to Van Giffen's analysis, the altered bathhouse remained in operation for some two centuries.

3.3.2 Knowledge gap 2: the reconstruction of the bathhouse

The second gap in our knowledge of the baths complex concerns the reconstruction. One key question was whether the entire complex was built at once, or whether there were several phases of development. It was also important to establish how often alterations were made, as there were indications that several rooms had been adapted at various times, and this could have important implications for the chronology of the building. There were also questions concerning how the individual rooms should be interpreted, as in the case of the *exedrae* around the two *palaestrae* mentioned above. Finally, the three-dimensional reconstruction was also a key issue, since the reconstruction both of the individual chambers – both internal and external – and that of the entire bathhouse complex, per construction phase, had been called into question. Chronology had to be considered here, too.

3.3.3 Knowledge gap 3: the functioning of the bathhouse

The third gap concerned the functioning of the complex: the water supply, the heating and the bathing itinerary. The questions concerning the water system related to the supply and drainage of water to and from the bathhouse, the heating of water and the system that distributed water inside the bathhouse.

3.3.4 Knowledge gap 4: the bathhouse in the vicus

In the very first chapter of his publication, Van Giffen examined the relationship between the baths complex and the immediate vicinity,¹⁶² but he focused mainly on the *castella* proposed by Peters. The fourth gap in the knowledge concerned the location and role of the baths complex in the *vicus* of Coriovallum. This is connected to the fact that, 150 years after the first archaeological discoveries, the vast majority

¹⁵⁹ Christ 1959.

¹⁶⁰ Quote from Christ 1959, 113: 'Let me close with the following principle: the architectural analysis should take precedence, not the excavation.'

¹⁶¹ Van Giffen & Glasbergen 1948, 235.

¹⁶² Van Giffen & Glasbergen 1948, 203-206.

of the Roman find spots in Heerlen have still not been analysed and interpreted. There is still no reconstruction of Coriovallum based on published research concerning important locations like Het Zwarte Veldje, Templesplein, Geleenstraat and Raadhuisstraat. It is still unclear what Coriovallum must have looked like in the Early and Late Roman period. This gap in the knowledge not only relates to the built-up part of Coriovallum, but also to the four cemeteries. It is known that occupation activity continued here for over four centuries, and Van Giffen himself referred to this fact.¹⁶³ Of course this lack of knowledge about Coriovallum as a town seriously hampered our understanding of the role of the baths in the *vicus*, particularly considering the chronological aspect. The analysis and interpretation of the ROB excavations overseen by Bogaers was therefore an important first step in the reconstruction of the town, and it yielded new knowledge about how the bathhouse functioned in its immediate environment.

3.3.5 Knowledge gap 5: the finds from the bathhouse

As we have said, only a portion of the finds from the baths complex were examined. Of the finds from the 1940-1941 excavations, only the terra sigillata and the coins were analysed, while none of the other finds (from 1935 and the period after 1941) were. Analysis of all the material from the baths site – including the material from the ROB excavations of 1952-1957 – has generated a lot of new information about the bathhouse itself and its location and role in the *vicus*. Given the fact that a bathhouse has a different deposition pattern, as mentioned earlier, information from the vicinity was important for the dating of the complex.

3.4 Research questions

A research framework was devised in order to guide the new study. It contained all the unanswered questions relating to the bathhouse and its immediate surroundings. The questions concerned its genesis, extensions and

alterations, and its function, use and the dating of the many contexts and finds that had not been analysed or published.

The questions were grouped into three categories:

- A general questions about the bathhouse and its context;
- B specific questions about individual rooms in the bathhouse;
- C analysis questions about specific categories of material.

These three categories are discussed in more detail below.¹⁶⁴

3.4.1 Category A

Category A comprised forty research questions about the bathhouse as a whole and about the complex's immediate surroundings, the *vicus* of Coriovallum.

Given the gap in the knowledge concerning the context of the bathhouse, 18 questions related to this aspect. Eleven concerned Coriovallum as a whole: its physical structure, development, the nature of the occupation (military or civilian), the economic structure, religious life (including the cemeteries) and its relationship with the surrounding area. Seven questions on the bathhouse's physical position in the *vicus* and its surrounding area, such as the soil and the water resources, were also included.

The research framework included 22 questions on the bathhouse as a whole, divided into three themes: chronology and construction history, parts of the building, and physical state and degradation. Twelve questions were set out on the chronology and construction history of the bathhouse, covering matters like the original floor level, the method of construction, phases of construction and of course the dating of the bathhouse. The second theme included seven questions about the building materials used – natural stone, ceramic building materials and mortar – and about walls, doors and thresholds. Due to the deterioration of the site between 1941 and 2015, the research framework also included three questions on degradation and restoration.

¹⁶³ Van Giffen & Glasbergen 1948, 206.

¹⁶⁴ See Vos, this volume Appendix I for the complete document.

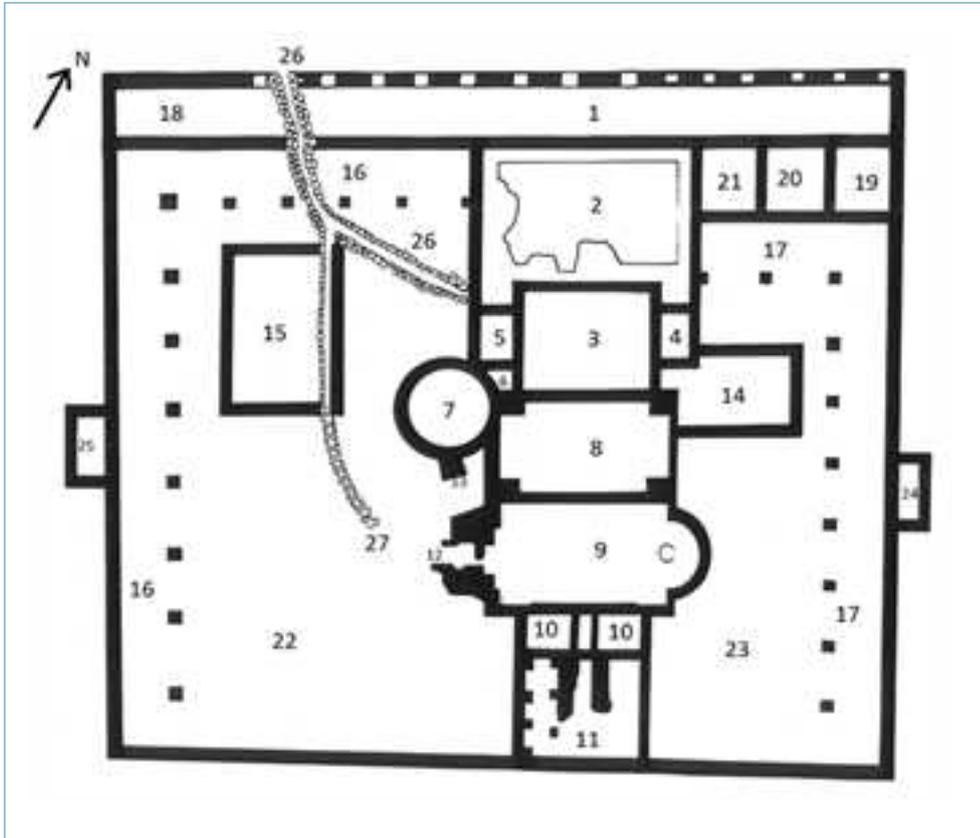


Figure 3.2 Plan of the bathhouse with numbered rooms (after Van Giffen & Glasbergen 1948, plate III, source: Vos Archeo, this volume Appendix I).

3.4.2 Category B

The second category in the research framework consisted of questions about the individual rooms in the Roman baths complex. They were based on the ground plan by Van Giffen, including the names and any interpretations he gave, even where it was suspected that his interpretation was incorrect.¹⁶⁵ Since some of the rooms identified by Van Giffen actually consist of more than one individual chamber, another system was introduced alongside this, in which all separate chambers were given a unique number (Fig. 3.2). In Van Giffen's *frigidarium*, for example, four chambers have now been identified: two cold water baths, the space between the two baths and the passage from the cold room to the *laconicum*. Where there was clearly a connection between individual chambers, however, the questions were grouped. Questions B21 to B34, for example,

concern the four chambers that comprise the *frigidarium*.

Category B comprises a total of 140 research questions concerning thirteen chambers or rooms (groups of chambers) (Table 3.1).

3.4.3 Category C

In addition to the questions in the first two categories, which mainly concerned the bathhouse, a third category was also compiled. This category referred specifically to the finds from the Roman baths site – the baths complex itself plus the immediate surroundings – which was excavated by the ROB in the 1950s. It included both general questions about all the finds, and specific questions on different categories of materials, such as pottery. Many of the questions were naturally related to matters such as dating and function. There were five general questions, plus eight on the ordinary

¹⁶⁵ Van Giffen & Glasbergen 1948, plate III.

Table 3.1 Number of research questions per room/chamber in the Roman baths complex.

| Chamber/room | Room number | Number of questions |
|--------------------------------------|------------------------|---------------------|
| Entrance and portico | 1, 18 | 12 |
| Apodyterium | 2 | 8 |
| Frigidarium and piscinae | 3, 4, 5, 6 | 14 |
| Sudatorium and praefurnium III | 7, 13 | 10 |
| Tepidarium | 8 | 11 |
| Caldarium, alveus and praefurnium II | 9, 10, 12 | 16 |
| Praefurnium I | 11 | 8 |
| Latrine | 14, 29 | 10 |
| Natatio | 15 | 9 |
| Porticus palaestrae | 16, 17 | 12 |
| Tabernae | 19, 20, 21 | 6 |
| Palaestrae | 22, 23 | 2 |
| Cloaca | 24, 25, 26, 27, 28, 29 | 22 |

(source: Vos Archeo, this volume Appendix I).

pottery, six on natural stone, six on bricks and ceramic building materials, four on plasterwork and mortar, two on glass, seven on metal and six on animal bone material. When analysing

and interpreting the material, the specialists were asked to refer to all the research questions of relevance to them, including those from categories A and B.

4 Construction history and reconstruction

K. Peterse

4.1 Introduction

More than seventy years after Van Giffen's publication first appeared, the remains of the Roman bathhouse have again been studied in order to ascertain its construction history.¹⁶⁶ The aim of the research was to identify the structural development of the complex, in as much detail as possible. To this end, the remains currently visible were observed and analysed, with a particular focus on evidence suggesting the order in which the structure was built. This analysis is based entirely on what can be observed with the naked eye, plus details from excavation documentation, particularly the section drawings and detail drawings of masonry, as well as the photographs of the 1940 and 1941 excavations in the collections of Groningen University and the Thermenmuseum. Where possible and useful, the composition of the mortar and plaster layers was also described on the basis of a visual inspection. The research focused primarily on walls and floors, including a critical examination of the individual elements of which they were constructed. Specific features of individual building materials and elements, such as the *tegulae* that were used, are discussed by others elsewhere in this publication and in the appendices.

The result is an analysis of the visible remains of the building, leading to conclusions regarding the development of the structure, expressed in terms of a relative chronology where possible. Descriptions of individual rooms and the building as a whole are presented. The result automatically reassesses the conclusions drawn in the past by Van Giffen and others concerning the history of the development of the bathhouse.

The study of the construction history provides an insight into the development of the bathhouse, and it has also produced a three-dimensional image from the level of the Roman living floor upwards. Several key aspects of the spatial structure of the bathhouse have been reconstructed to a limited extent. The answers to the relevant research questions are based first and foremost on indications of the three-dimensional shape suggested by the archaeological remains. They are also based on remains of similar complete and

partially preserved complexes elsewhere in the Roman Empire – largely, but not exclusively, the northwestern provinces – and on what can logically be deduced from these remains. Sources from antiquity, such as Vitruvius' *De architectura*, were also consulted.

The research on the construction history is presented first, with a selection of research results for each room. A full account of the observations and the research based on them can be found in the research report (in Dutch only), available digitally as appendix II. After the architectural remains have been interpreted, the embedding of the bathhouse in the subsoil is described, along with any indications of the development of the building. This part ends with conclusions concerning the relative chronology of the bathhouse. This is followed by a brief review of several important aspects of the appearance of the bathhouse.

4.2 Selection of research results on individual rooms

4.2.1 Portico

The north foundation wall was laid to support the columns of the portico, including an architectural feature that accentuated the central axis of the bathing suites – the core of the building. The columns and their bases rested on blocks of Norroy limestone, which were in fact also part of the foundations. The eastern part of the north foundation wall still includes six of these basal blocks. It is not certain that the columns actually continued into the western part of the room identified as a portico, though it is likely. If the configuration continued along the entire north side of the complex, the architectural feature in the central axis of the core building would have been off-centre relative to the portico. Van Giffen saw this as a problem, which served as a basis for his hypothesis that six *intercolumnia* must have stood not only to the east of this feature, but also to the west, and that the remaining space on the west side must have housed a latrine.¹⁶⁷ However, no archaeological evidence of this has been found to date.

The surviving basal blocks of the columns and

¹⁶⁶ This is a summary of K. Peterse, this volume Appendix II.

¹⁶⁷ Van Giffen 1948, 209.



Figure 4.1 There are triangular gaps where the *opus spicatum* meets the mortar floor (source: K. Peterse).

a section drawing showing a longitudinal section of a large proportion of the portico suggests that the floor of the portico was made of *opus signinum*. The floor had a shallow gradient in the eastern part of the portico. If the architectural feature had been in alignment with the axis of the bathing rooms, the floor in the portico must have been at 113.85 m NAP. From here, towards the west, the floor followed the gradient of the natural soil to a greater extent, though not entirely. If we assume that the portico was accessible along the entire length from the space in front of the bathhouse, the floor in the part to the west of the main drain must have more or less followed the profile of the ground surface in front of the bathhouse.

Excavations in and around the bathhouse have revealed many ornamental architectural features. Not a single one of them is still *in situ*. We know that during excavations column bases and fragments of columns were positioned in places where they were suspected of having originally been located. To prevent architectural ornaments from being incorrectly attributed to the bathhouse or specific places in the bathhouse, photographs and drawings of the excavations were studied critically, and particular

attention was paid to what Van Giffen wrote about these features. The conclusion is that only one architectural ornament can be attributed with certainty to the portico, as it consistently appears in the excavation photographs, was recorded in excavation drawings and was attributed by Van Giffen to a specific place in the portico. This feature is a base with a double torus moulding of Norroy limestone, which must have been part of a Tuscan column.

4.2.2 Apodyterium

The north, east and west foundation walls of the *apodyterium* interlock and thus form a structural unit, made of *opus incertum* executed in a shoddily manner. They are casing walls. The east wall was built in a fairly irregular manner, and its base is positioned against the vertical cut through the soil. The west wall is more regular. The top section can be regarded as a simple *opus incertum* construction. The difference in execution between the east and west walls is associated with the fact that the bathhouse is built on a site that slopes down to the



Figure 4.2 Stone bench and footrest in the *apodyterium* of the Forum Baths in Pompeii. The secondary footrest stood on the mosaic floor (source: K. Peterse).

northwest. The east foundation wall lay partly below the undisturbed soil, while the visible part of the west wall lay above this level and bordered a raised area.

The *apodyterium* is connected to both *piscinae* in the *frigidarium* by means of reconstructed stonework (masonry). As a result, it is not possible to ascertain on the basis of the masonry whether the *apodyterium* is the same age as the *frigidarium*, or later.

The floor of the *apodyterium* consists of carelessly laid *opus spicatum* surrounded by a 90 cm wide mortar floor with an inlaid geometric motif. The combination of *opus spicatum* and a mortar floor with a decorative motif is unusual, as floors made of *opus spicatum* would generally be laid from wall to wall in rooms that were not used to receive visitors and where many people would pass through, such as latrines, kitchens and service corridors.¹⁶⁸ In a number of places triangular gaps can be observed at the point of transition between the *opus spicatum* and the mortar border. They resulted from the fact that the bricks forming the edge of the *opus spicatum* are set at an angle (Fig. 4.1). These triangles were filled with the same material – probably a

lime mortar – used between the *opus spicatum* bricks. This material does not continue into the mortar band.

If in an earlier phase the *opus spicatum* had covered the entire floor, these triangular gaps would not exist. This means that the *opus spicatum* floor was laid later than the mortar band. The poor quality of the joints between the *opus spicatum* and the mortar floor, made using fillers, suggests that the mortar floor and the *opus spicatum* were not laid as part of the same construction process, but at some interval.

This raises the question of why, when the central part of the floor was replaced with *opus spicatum*, the mortar floor at the edge of the room was left in place. It is quite possible that there was a wooden bench along the walls, with a wooden footrest in front of it, like the stone bench and footrest in the *apodyterium* of the Forum Baths in Pompeii (Fig. 4.2). The bench and footrest together are approx. 90 cm deep there. If the *apodyterium* did indeed have such a bench and footrest, there was no need, when the floor was replaced, to also replace the part under the bench, as the bench and footrest would be kept in place and used afterwards.

¹⁶⁸ K. Peterse, this volume Appendix II.



Figure 4.3 The westernmost part of the floor of the *apodyterium* has subsided substantially (source: K. Peterse).

It is interesting to note that the floor on the east and west sides of the *apodyterium* has subsided, but the central part has not (Fig. 4.3). The edge of the subsidence is more or less in line with the east and west walls of the core chamber of the *frigidarium*. This suggests that the central part of the floor was laid on a harder surface than the east and west parts, which is consistent with the results of the ground-penetrating radar survey performed by an external party.¹⁶⁹ The harder subsurface might consist of remains of an earlier phase of the *apodyterium*. The study of the construction history, which is based on visible remains, cannot provide any definitive conclusion on this matter.

4.2.3 Frigidarium

The *frigidarium* was built in the same building sequence as the *tepidarium*, as evidenced by the fact that there is no building joint between the north wall of the *tepidarium* and the east wall of the *frigidarium*, despite differences in execution. The south wall of the west *piscina* also abuts the

foundation wall of the *laconicum* without any building joint. This shows that the *frigidarium* and the *laconicum*, too, were built in the same sequence of construction.

The centre of the two *piscinae* does not lie precisely on the east-west axis of the *frigidarium*, but approx. 20 cm to the north. The east wall of the core chamber of the *frigidarium* gives no reason for this offset, because when it was built the only breach in this wall was the entrance to the *piscina*. Furthermore, when the east *piscina* was built, no neighbouring room needed to be taken into account. The reason for the offset must therefore be linked to the west wall. On this side there was an opening to the south of the entrance to the *piscina*. The offset may have been introduced to allow for an opening of a certain width. However, the threshold shows that the opening did not extend across the entire space available. It is therefore more likely that the reason for the offset was the desire for a certain minimum width in the small intermediary space linking the *frigidarium* and the *laconicum*. In that case, the *laconicum* was already taken into consideration when the *frigidarium* was built, confirming that the two were built simultaneously, as argued above.

¹⁶⁹ J. Orbons, this volume Appendix V.



Figure 4.4 Remains of the mosaic floor in the northeast corner of the *frigidarium* (source: K. Peterse).

The foot of the walls of the core chamber had water-resistant plasterwork. The remnants show that there were up to six layers. The first layer adjoined the water-resistant subfloor made of *opus signinum* (see below), making the join between the wall and floor more watertight. The join also had a water-resistant raised cordon, generally a slanted edge at the point where the floor meets the wall. It was made of mortar containing an excessive amount of finely ground ceramic material. There was no raised cordon wherever there was an opening. We can conclude from this that the opening to the *tepidarium* can only have been located in the wide breach (closed in the 2018 restoration) in the south wall. In the original situation, there cannot have been any opening in the southern part of the east wall, as traces of a raised cordon were found there.

Up to six layers of plasterwork were applied to the inside of the walls of the *piscinae*. The fourth is part of a more extensive renovation. This fourth layer of plaster is the last one to have a new raised cordon where it adjoins the floor. It has also been ascertained that the drainage block installed secondarily in the north wall of the west *piscina* corresponds with this layer.

The floor in the core chamber has several phases. The bottom layer consists of *opus signinum*. This is an underfloor, which was never a living floor. A mosaic floor was laid over the underfloor (Fig. 4.4). It consisted mainly of white *tesserae* of Kunrade stone. A narrow band of *tesserae* made of Belgian marble from Theux was laid 60 cm from the walls, to distinguish

between a central floor area and a peripheral zone. At a certain point the mosaic floor and the underlying layer of lime were partially broken up. After the floor had been repaired with a coarse *opus signinum*, a new underfloor was laid. This consists of a thin layer of mortar containing lots of fine ceramic material. *Lateres* of approximately one by one and a half feet (29.6 x 44.4 cm) were laid in a brickwork pattern in the wet mortar. Clear traces of wear suggest that this floor was in use for a long time. Some of the *lateres* were replaced with *bipedales*, particularly in front of the west *piscina* and the entrance to the *apodyterium*.

4.2.4 Laconicum

The masonry shows that the entrance to the room was on the northeast side, at the point where a small intermediate space linked the *frigidarium* and the *laconicum* (Fig. 4.5).

It has been observed that in the air vent between the hypocaust of the *tepidarium* and *laconicum* the bottom layers of the stonework continue uninterrupted from the north corner reinforcement in the *tepidarium* to the inside of the *laconicum*. It thus follows that the air vent was there from the start (see *tepidarium*) and that the *laconicum* and the *tepidarium* belong to the same phase of construction.

At some point radical alterations were made. The *laconicum* was given a new *praefurnium* of its own, for which an opening was made in the



Figure 4.5 The place where the door sill of the entrance lay can be seen in the circular wall of the *laconicum* (source: Delfttech/K. Peterse).



Figure 4.6 The circular wall of the *laconicum* was breached when *praefurnium* III was installed (source: K. Peterse).

surrounding wall (Fig. 4.6). To prevent the hot air from flowing away to the hypocaust of the *tepidarium* the air vent between the two rooms was bricked up. Further openings were made in

the masonry on the north and northwest sides, possibly to allow fumes to escape. The purpose of the alterations was essentially to achieve a more direct supply of hot air, thus raising the



Figure 4.7 The mortar in the masonry of the *tepidarium* has varying (source: K. Peterse).

temperature in the hypocaust. This suggests a change in the function of the room.

The inside of the surrounding wall has traces of mortar from approx. 90 cm above the underfloor of the hypocaust. These are not likely to be traces of regular plasterwork, as they begin at the bottom of the *suspensura*, which is no longer present. They are more likely to be traces of the *suspensura* or of some system of wall heating that has not survived.

Almost all the *pilae* on the underfloor of the hypocaust are square. They supported *bipedales* on which the mortar floor of the *suspensura* was laid. The *pilae* and thus also the *bipedales* they supported are set out in the direction in which one would enter the room.

4.2.5 Tepidarium

The *tepidarium* was built in a construction pit which began at the north wall and extended in a southerly direction to the south wall of *prae-furnium* I (see below). Foundation walls were built around the edge of the pit, leaving the remaining space for the hypocaust. The profile of the pit, dug straight down into the loess, was used as the casing for the foot of the foundation wall on the east and west sides. The same method was used for the east part of the north wall. Above the foot the outside of the foundation wall has a skin of irregular rubble masonry.

The inner face of the foundation walls and

both sides of the south wall consist of a variant of *opus latericium*, with broken *tegulae* rather than *lateres* as building stones. The use of ceramic building material was associated with the need for the walls to be heat resistant. Ceramics can withstand high temperatures much better than limestone. The use of *tegulae* as ceramic building stones rather than *lateres* can be explained by the fact that the latter were not commonly used as building material for walls in Coriovallum and the surrounding area in the first and second century, whereas *tegulae* were in plentiful supply.

The fact that red painted flanges of *tegulae* have been found as building material in the masonry and that, besides fragments of *tegulae*, pieces of curved ceramic building tiles – probably *imbrices* – have been found in the walls suggests that material was reused to build the walls.

It has been observed that in the walls of the *tepidarium* (including the four reinforced corners) the *tegulae* interlock alternately with those in the adjacent wall over a short distance at the corners. The walls and the corner reinforcements are thus a single structural unit, which means they belong to the same phase of construction. Nevertheless, differences in the composition of the mortar have been observed (Fig. 4.7). Since the walls and the corner reinforcements all belong to the same phase of construction, the differences in the composition of the mortar are probably not significant and indicate that the different batches of mortar used during construction were not meticulously made following a single recipe.



Figure 4.8 Secondary plasterwork on the west wall of the *tepidarium* and on part of the circular wall of the *laconicum*. The plasterwork was applied to prevent rising damp (source: K. Peterse).

The excavations showed that six of the seven openings in the foundation wall between the *tepidarium* and the *caldarium* had been fully or partially closed.¹⁷⁰ The opening furthest to the west, closest to *praefurnium* II, always remained open.¹⁷¹ This means that, after most of the openings were sealed, the *tepidarium* still received a limited supply of hot air, and will therefore have remained part of the bathhouse.

A layer of plaster 1.5 to 2 cm thick was applied to the outside of the east and west foundation walls of the *tepidarium*, *caldarium* and *alveus*, starting at 113.09 m NAP. It starts at 36 cm above the underfloor of the hypocaust, and therefore well below the ground surface at the time. This suggests that the plasterwork served a physical rather than an aesthetic purpose – namely to protect against rising damp. The fact that there was a damp problem is evidenced by the salt deposit at the foot of the inside of the foundation walls. It has been ascertained that the masonry to which the plaster layer was applied was partially built directly against the profile cut into the loess. This means that the plaster can only have been applied later, and that the wall must have been re-exposed for the purpose. This will have involved digging a trench an estimated 60 to 100 cm wide along the east and west walls. When the trench was dug, part of the wall of the *laconicum* will unavoidably have been exposed at the point where it met the trench. Plasterwork was found only on this part of the exterior of the *laconicum* (Fig. 4.8).

4.2.6 Caldarium

The *caldarium* originally consisted of a rectangular main chamber, the *alveus* and two *apsides*. The east apsis has survived, as have the remnants of the west apsis. The fact that the rectangular main chamber, the *alveus* and the two *apsides* form a unit has been determined on



Figure 4.9 *Tegulae* used as bricks extend alternately from one wall into the other, showing that both walls belong to the same phase of construction (source: K. Peterse).

¹⁷⁰ Van Giffen 1948, 214. See also drawing 5047 (GA 8 10 Heerlen 21 1941) and drawing 5038 (GA 8 10 Heerlen 12 1941).

¹⁷¹ Van Giffen 1948, 214.



Figure 4.10 A circular feature in the underfloor of the hypocaust in the former west apsis of the *caldarium* indicates the spot where the foundation of a stone *labrum* once stood (source: K. Peterse).

the basis of structural connections, the *tegulae* used as building stones alternately extending a short distance from one wall into the other (Fig. 4.9).

The *caldarium* underwent radical alterations at some point, the west apsis being transformed into *praefurnium* II and *alveus* II. The installation of a new *praefurnium* naturally required the demolition of the pedestal of the *labrum* (see below) and corresponds to the sealing of the opening between the two reinforcements in the south wall. This would have shut off the supply of hot air from *praefurnium* I to the *caldarium*. At the same time, the introduction of a dividing wall split the *caldarium* into an east and west half. The latter will still have been used as a *caldarium*, given the fact that it bordered on the new *praefurnium* II, while the former probably became a *tepidarium*.

There is a single layer of plasterwork on the east and west walls, continuing the plaster on the east and west walls of the *tepidarium*. At the point where the north part of the west wall adjoins the apsis, the plasterwork starts at 113.0 m NAP, approx. 100 cm below the level of the *suspensura* and well below the ground surface of the time. We have discussed above the fact that the plasterwork was applied to combat rising damp (see *tepidarium*). As in the *tepidarium*, the plasterwork is on masonry that was built directly against a profile cut vertically into the soil. The outside of the wall was thus not accessible, so no plaster could be applied there. This could only have been done subsequently and would

have required a trench to be dug along the wall.

The inside of the foundation walls had plasterwork that had been made heat-resistant and damp-resistant by the addition of finely ground ceramic material and clay. We must bear in mind the fact that the hypocaust was full of hot, moist air. Without any further measures, this would condense on the relatively cold foundation walls, and capillary action would draw the moisture up the wall, damaging the murals. By applying plaster containing clay on the interior walls, it was possible to significantly reduce the likelihood of condensation forming on and in the wall, thus preserving the murals for longer. This effect is evidenced by the fact that the foundation walls of the *caldarium* clearly have fewer salt deposits than those of the *tepidarium*, which had no plaster layer on the inside.

The underfloor of the hypocaust has a top layer of *bipedales* laid in a stretcher bond pattern. One striking detail is the holes made with a wooden or metal peg in the *bipedales* laid on the underfloor prior to firing. There are at least five holes in each *tegula*, in several different configurations. It is theoretically possible that the *tegulae* were produced in order to create hollow walls for the heating system using spacers. The holes would then have been for metal pegs that would anchor the *tegulae* to the wall. However, the *tegulae* would have had to have been significantly thinner for this application. Furthermore, the number of holes – more than four – and the way they are configured, are not compatible with this theory.



Figure 4.11 The extension of the hot air duct to the south edge of the *caldarium* can be seen in the hypocaust of the *alveus* (source: K. Peterse).

The holes are much more likely to be associated with the firing process.¹⁷²

Traces suggesting a circular foundation for a *labrum* have been found at the transition point between the central chamber and the west apsis. The *labrum* must have been removed when *praefurnium* II and *alveus* II were installed, after which the underfloor was sealed (Fig. 4.10).

4.2.7 Alveus

The *alveus* was originally a niche-like space in the *caldarium*. *Tegulae* used as bricks that extend alternately into the adjacent wall indicate that the east, south, west and north walls were a structural unit, and thus belonged to the same phase of construction. The north wall initially consisted of a relatively short east and west part, both of which ended with a reinforced jamb that flanked the opening between the hypocaust of the *caldarium* and the *alveus*.

The original arrangement was adapted multiple times. For example, a hot air duct was created in the hypocaust of the *alveus* that

linked the north side of the *furnus* with the south side of the *caldarium* (Fig. 4.11). This extension of the hot air duct meant that the hot air did not disperse until it was under the *suspensura* of the *caldarium*, rather than under that of the *alveus*. In a subsequent alteration, the wide opening between the hypocaust of the *alveus* and the *caldarium* was walled up. This was an important event in the development of the bathhouse, as it effectively decommissioned the *alveus* and *praefurnium* I. We can assume that all the structural measures introduced to allow the *alveus*, or the *praefurnium*, to function, date from before the *alveus* was blocked off. This applies, for example, to the application of the plasterwork at the base of the exterior walls.

Remains of pinkish-brown to greyish-pink plasterwork have been found on the inside of the walls belonging to the first phase of the hypocaust. It contains ground ceramic material and probably also clay, which made the plaster heat-resistant and – if clay was indeed added – damp-resistant. The plasterwork would have significantly reduced the likelihood of condensation forming and the damp rising in the wall.

¹⁷² K. Peterse, this volume Appendix II.



Figure 4.12 The mortar in the west wall of *praefurnium* I is also found on the wall surface, where it has seeped out into vertical, more or less smooth patches. This suggests that this part of the west wall was built against the vertical cut into the soil, which served as casing for the wall (source: K. Peterse).

4.2.8 Praefurnium I

Praefurnium I was built in the same construction pit as the *alveus*, the *caldarium* and the *tepidarium*, though the bottom of the pit had to be excavated a further 40 cm for the *praefurnium*.¹⁷³

The exterior of the east, west and south walls butted directly against the vertical cut in the soil, which functioned as casing for the wall. This is indicated by the fact that on the outside of the wall the mortar is not only between the *caementa*, but also on the surface of the wall, where it seeped out into more or less smooth patches (Fig. 4.12).

The *furnus* is a separate element, positioned against the centre of the north wall. The masonry shows that the *furnus* was altered or repaired many times. The side walls, which border the stoking chamber, butt against the north wall of the *praefurnium*.

The damp-proof plasterwork applied to the outside of the east and west walls of the *alveus*, the *caldarium* and the *tepidarium* is not found



Figure 4.13 The damp-proof plasterwork on the west wall of the heated rooms ended at the transition from the *alveus* to *praefurnium* I (source: K. Peterse).

¹⁷³ Peterse, this volume Appendix II.



Figure 4.14 The south wall of the west *palaestra* (source: K. Peterse).

on the west wall of the *praefurnium* (Fig. 4.13). Two larger fragments of plasterwork on the east wall have however been preserved. The fragment to the south was applied from the ground surface of the time, while the fragment to the north, at the transition to the *alveus*, begins more than 30 cm lower. The absence of plasterwork on the west wall and the height at which it begins on the east wall suggest that the plaster on the east wall was not a measure to combat rising damp. This is understandable, given the function of the room and the lack of murals.

The *praefurnium* shows traces of several floor levels. Van Giffen's observations show that the last floor consisted of ceramic tiles.¹⁷⁴ The top lay at 113.13 m NAP. The *opus signinum* floor that lay 3 cm lower found to the west of the *furnus* could represent the penultimate phase. The earliest floor was at the foot of the blocks of sandstone in the western part of the room.¹⁷⁵ Wooden supports will have rested on these blocks, possibly for a cold water tank, as Van Giffen surmised in the case of the north blocks.¹⁷⁶

¹⁷⁴ Van Giffen 1948, 220; excavation drawing 5049 (GA 8 10 Heerlen 23 1941); photograph 1941-197 (Groningen collection).

¹⁷⁵ In excavation drawing 5049 (GA 8 10 Heerlen 23 1941), a fragment of floor has been drawn between the sandstone blocks in Van Giffen's colour code for tile grit, the bottom of which is at virtually the same level as the bottom of the blocks. The top of this fragment of floor is at 112.87 m NAP in drawing 5049.

¹⁷⁶ Van Giffen 1948, 221.

4.2.9 West palaestra

The *palaestra* was situated on ground that sloped downwards in a northwesterly direction. This can be seen in the foundations of the south wall, which were laid deeper, in stages, towards the west. By contrast, the foot of the masonry, which is set slightly back from the foundations, is more or less at a constant level in the east half of the wall – 114.01 m NAP at approx. 3 m from the west wall of *praefurnium* I. This suggests that though the west *palaestra* may have been created on sloping terrain, the ground in the southern part of the *palaestra* was virtually horizontal.

The masonry on the side of the south wall facing the *palaestra* was *opus vittatum simplex* made of Kunrade stone (Fig. 4.14). The exterior was made of irregular broken stone, however. This difference in execution suggests a difference in height between the *palaestra* and the higher ground to the south. Given the natural contours of the ground, this difference was particularly apparent in the eastern part of the south wall.

The west wall of the *palaestra* is in a poor state of preservation. Large parts have been



Figure 4.15 The north wall of the west *palaestra* butts against the *apodyterium* (source: K. Peterse).



Figure 4.16 The southeast corner of the west *palaestra* (source: K. Peterse).

removed. However, enough has been preserved to be able to conclude that there was no building joint between this wall and the south wall of the *palaestra*, and that they should therefore be regarded as a single unit. The extension on the west side, the *exedra*, is also part of this unit.

Only the west half of the north wall has a base that stands forward of the stonework above it. It differs from the rest of the wall in terms of its structure and the *caementa* and mortar used. Like the stepped deepening of the foundations of the south wall, the base can be seen as a

measure related to the downward slope of the site towards the northwest. On the east side the north wall butts against the *apodyterium* (Fig. 4.15).

The foot of the foundation of an L-shaped pillar or column configuration was found in the *palaestra*. In terms of the execution of the stonework and the mortar used, there is a subtle difference between the first five bases on the north side, viewed from the west wall of the *apodyterium*, and the other bases. The ninth and tenth column bases are in line with the north

and south walls of the *exedra*.¹⁷⁷ They mark the centre of the *palaestra*. Furthermore, the ninth base corresponds to the south wall of the *natatio*.

The opening that Van Giffen assumed existed between the west *palaestra* and *praefurnium* I must have had steps or a ramp that gave access to the lower level of the *praefurnium*.¹⁷⁸ The excavations this would have required right in front of the opening appear to have been associated with the construction of a small retaining wall described by Van Giffen that has since disappeared. This was approx. 175 cm from the south wall of the *palaestra*.¹⁷⁹ These excavations must have meant that the foundations of the south wall were not laid deeper at that point, in order to create an adequate retaining structure between the low level of the surface near the opening in the west wall of *praefurnium* I and the much higher level to the south of the south wall of the *palaestra*. However, the foundations of the south wall were not dug deeper near the assumed west opening, though this was the case at the opening in the east wall of the *praefurnium* that was later sealed (Fig. 4.16). Despite what Van Giffen surmised, there was therefore no opening in the west wall of the *praefurnium* when the south wall of the *palaestra* was built. Another possibility is that the opening was part of the original version of the *praefurnium*, and that it was closed when the *palaestra* was created.

4.1.19 Natatio

Given the major difference in the mortar and the fact that the south and north walls are conjoined to the east walls by different methods, the east wall must belong to another, earlier phase of construction (Fig. 4.17). There is no evidence that the east wall ever continued as far as the south or north wall of the west *palaestra*. The east wall of the *natatio* is probably the remains of a former retaining structure or terrace wall. When the west *palaestra* was created and the northwestern part of the construction site was raised for the purpose, this retaining structure would have become superfluous. Only the part of this structure that could be reused as the east wall of the *natatio* was left intact.¹⁸⁰

The original bottom of the pool lay at 112.58 m NAP in the northwest corner. The depth was not constant. Nielsen indicates that a depth of 150 to 200 cm was common, but that some swimming pools were only 100 cm deep.¹⁸¹ Examples from Pompeii and Herculaneum have a bottom 100 to 150 cm below the adjacent floor level.¹⁸² We must assume that the *natatio* had a rim that protruded approx. 30 cm above the floor level of the *palaestra*.¹⁸³ If we assume the *natatio* was 120 to 130 cm deep, relative to the floor level of the west *palaestra*, the area around the *natatio* must have been at an elevation of $(112.58 + 1.20 \text{ or } 1.30 =) 113.78 \text{ to } 113.88 \text{ m NAP}$. This estimate is virtually the same as the level of the bathhouse, which is at least half a



Figure 4.17 *Natatio*, view from the north with, on the left, the east wall and the drain installed later (source: K. Peterse).

¹⁷⁷ In a verbal communication, Nathalie de Haan highlighted the *exedrae* in the Terme Centrali in Pompeii. Since they do not adjoin an exterior wall, they had no openings.

¹⁷⁸ Van Giffen 1948, 221; photograph 1941-151, 1941-191 (Groningen collection).

¹⁷⁹ Discerned in excavation drawing 5030 (GA 8 10 Heerlen 5 1941).

¹⁸⁰ See 4.4.2 Chronology of the main structural units, East wall of *natatio*.

¹⁸¹ Nielsen 1993, 154-155.

¹⁸² K. Peterse, this volume Appendix II.

¹⁸³ Verbal communication from N. de Haan.



Figure 4.18 East side of the *natatio*. From the bottom: to the lowest black line: secondary bottom of the *natatio*; between the two black stripes: backfill on secondary bottom; above the top black line: west wall of drain (source: K. Peterse).



Figure 4.19 Northwest corner of *natatio* with raised cordon (source: K. Peterse).

metre higher than the ground surface prior to construction. According to the stratigraphical survey by Gerard Tichelman the ground surface in the northwestern part of the west *palaestra* (trench 1) lay at approx. 113.30 m NAP prior to construction, though we should note that the ground surface close to the west wall of the west *palaestra* might have been 15 cm lower.¹⁸⁴

It seems the ground was raised when the west *palaestra* and the *natatio* located there were constructed, particularly in the northwestern part of the *palaestra*.

The *natatio* fell into disuse even before the bathhouse entered its final phase. There is a thick layer of earth on the bottom of the *piscina* that is permeated by smaller stone rubble, and

¹⁸⁴ G. Tichelman, this volume Section 6.1 and Appendix IV.



Figure 4.20 Transition in the main drain from the relatively shallow to the deep section, into which the drain of the *natatio* most probably emptied (source: K. Peterse).

even occasionally with sherds. This layer served as a basis for a drain that probably linked the secondary *alveus* above *praefurnium* II with the main drain (Fig. 4.18). When it was installed, the east foundation of the *natatio* was used as one of the sides of this channel.

The inside of the walls was finished with two layers of plaster. Remnants have been preserved, particularly in the northwest corner. The top layer has a smooth surface on which dark patches – probably pigment residues – can be seen. The plasterwork also has traces that suggest the painted interior of the *natatio* was marked with a painted vertical band in a different colour in the northwest corner. We can assume that this was also the case in the other corners (Fig. 4.19).

4.2.11 Main drain

The *frigidarium*, including the two *piscinae*, was part of the first phase of construction (see above) and must have had a drain from the start. The drain beneath the *frigidarium* displays

no evidence of several phases of construction (apart from the different cover in part of the east section). The part of the drain that lies under the *frigidarium* is therefore regarded as part of the first construction phase of the bathhouse.

In the west *palaestra* the main drain consists of two parts, of different widths and depths. The eastern part is relatively wide and shallow compared with the southwestern part. The transition between the two comes after the point where the water from the *natatio* most probably drained into the drain (Fig. 4.20). The visual inspection found that, at the opening in the west wall of the *apodyterium* and the south wall of the portico, the drain was initially the same width, 59 cm. The opening through the south wall of the portico was later lowered by approx. 20 cm over a width of more than 30 cm (Fig. 4.21). This deeper level corresponds to the narrower but deeper part of the drain, which means that the wider, shallower eastern part of the drain is earlier than the southwestern part.



Figure 4.21 Original and secondary opening for the main drain through the south wall of the portico (source: Delfttech/K. Peterse).

4.2.12 Praefurnium II and alveus II

The walls of the apsis were used as much as possible for *praefurnium* II. The west side of the *praefurnium*, for example, is in line with the outside of the former apsis. The start of the north and south foundation wall of the apsis, including the plastering, was also maintained and incorporated into the *praefurnium*. The stonework of the *praefurnium* was laid against and over that of the apsis and also against the plasterwork on the remains of the apsis wall. The plasterwork is therefore earlier than the *praefurnium*.

The alterations included the creation of an *alveus* at the transition from the *praefurnium* to the *caldarium*. It rested on the *suspensura*. To support the heavy load, relatively sturdy pillars were built in the hypocaust, positioned in such a way that they also extended the stoking chamber.

There is backfill on both sides between the back wall of the *alveus* and the west exterior wall of the *praefurnium*. These two areas of backfill are symmetrical to the axis of the stoking chamber. They form a gap of 71 x 253 cm through the stoking chamber in the surrounding masonry, which is higher. This cannot have

been the bottom of a water tank, as there is no water-resistant plasterwork. The two areas of backfill are more likely to have been associated with something that ran through the stoking chamber. It has been assumed in this study that a metal hot water cauldron used to supply the *alveus* stood in the gap.

4.2.13 Praefurnium III

There is a *praefurnium* on the south side of the *laconicum*. The stonework abuts the *laconicum*. The stoking chamber was connected to the hypocaust of the *laconicum* by a hole made in the wall. Observations have shown that the *praefurnium* was a later addition.

4.2.14 East palaestra

The south and east walls, including the *exedra* that is part of the same structural unit as the east wall, must be regarded as a single unit, despite the fact that the southern part of the east wall has been robbed down to and into the foundation layer. No building joints have been observed in the sometimes sparse foundation



Figure 4.22 Southernmost base in the pillar configuration in the east *palaestra* (source: K. Peterse).

remains. The walls also have the same structure and both the south wall and the *exedra* contain *caementa* of lime tufa on their visible side. This type of stone occurs only occasionally in this building. The east and north walls also belong together, as evidenced by the structural link between them. The unity of the east and north walls is also evident in the position of the *exedra* at the centre of the *palaestra*. The symmetrical positioning suggests that the north wall of the *palaestra* was taken into account. The south wall, like the north wall, abuts the core building of the bathhouse, as Van Giffen had also observed.¹⁸⁵

There are ten column bases in the *palaestra* that form an L shape. The six bases to the south on the east side are the best preserved. A slab of grey quartzitic sandstone has been incorporated into the foot of the sixth, seventh, ninth and tenth bases, forming part of the foundations. Their shape would make the sandstone slabs ideal for spreading the point load of a pillar or column over a larger area.

There is a grey-brown heterogeneous substance on both slabs of sandstone at the foundations of *caementa* made of Kunrade stone (Fig. 4.22). This is part of a backfill spread on the original bottom of the construction pit over a large proportion of the long wing of the portico. Above this backfill is a layer on which – or rather

in which – the basal block stands. The floor of the long wing of the portico, since dug up, would have been laid on this sporadically preserved layer.

On top of each of the basal blocks is an imprint roughly 1 Roman foot (29.6 cm) square, with a mortise in the centre (Fig. 4.23). This suggests that the blocks supported square pillars rather than columns. The sixth and seventh bases are positioned in such a way that the pillars they supported were in line with the side walls of the *exedra*. The same correspondence was also found in the west *palaestra*.

No floor remains were found during the visual inspection of the east *palaestra*. However, Van Giffen mentioned two floors of ‘red rubble’, which further stratigraphical analysis identified in the zone between the column configuration and the east exterior wall. The lowest floor lay at 114.30 m NAP, the highest at 114.60 m NAP.¹⁸⁶

Sections Q and O in one of the excavation drawings show two parallel features made of ‘red mortar’, the top layer of which can be regarded as the floor level, on the basis of two control analyses. The floor between the third and the tenth base lay at approx. 114.28 to 114.63 m NAP. This rise of approx. 35 cm is more pronounced than the upward slope of the undisturbed soil – the soil excavated prior to construction – by approx. 17 cm. The core

¹⁸⁵ Van Giffen 1948, 207.

¹⁸⁶ Van Giffen 1948, 226; drawing 5075 (GA 8 10 Heerlen 48 1941) section Q and section O (= Van Giffen 1948, pl. 13, sections B and 4).



Figure 4.23 Imprint of a square pillar on the top of the sixth basal block of the pillar configuration in the east palaestra (source: K. Peterse).

building, whose level varies from 113.87 to 114.00 m NAP, gives no reason for the extra rise in the floor. This suggests that in the second instance a more direct link was created between the east *palaestra* and the higher adjacent area immediately to the east or south of the bathhouse.

4.2.15 Extension ('latrine')

The south wall of the extension was built against the plasterwork on the east wall of the *tepidarium*. The extension is therefore more recent than both the core building and the plasterwork applied at some later point (see *tepidarium*).

Van Giffen suspected that the extension was accessible from the *frigidarium*.¹⁸⁷ As pointed out in the analysis of the *frigidarium*, however, there were traces of a raised cordon at the assumed opening. This suggests that this part of the wall was closed, at least initially. It is however possible to imagine an opening between the extension and the *tepidarium*, though it could not have been any wider than 80 cm at this point.

If the extension was indeed a latrine, a gutter must have run along large sections of the north,

east and south walls. No trace of any gutter has been found here. Nor is there any evidence of a structural relationship between the exposed drain and the extension. This study of the construction history offers no indication as to the function of the extension.

4.2.16 Three rooms

The three rooms are between the south wall of the portico and the north wall of the east *palaestra*. We have already noted that the *exedra* in the east *palaestra* was positioned in the centre of the east wall, and that the *exedra* must be regarded as part of the original design of the east *palaestra*. This indicates that these three rooms were taken into account when the east *palaestra* was built. They, in turn, will not have existed without the portico. This all suggests that the portico, the three rooms and the exterior walls of the east *palaestra* form a single unit.

The three rooms butt against the east wall of the *apodyterium*. In order to build the south and north wall against the *apodyterium*, the loess soil on which the bottom part of the east foundation wall of the *apodyterium* was laid had to be dug out

¹⁸⁷ Van Giffen 1948, 225.

at this point. This suggests that the *apodyterium* must have been almost or fully complete when the group of three rooms was built.

4.3 Reconstruction of the three-dimensional base

The present study focused first and foremost on tracing the structural development of the bathhouse. In this respect, the fact that the structure stands on a sloping site is of particular interest. At the time of the excavations the ground level close to the southeast corner of the bathhouse was approx. 3 m higher than the northwest corner.¹⁸⁸ It was important in the context of the study to understand what bearing this substantial difference had on the design of the bathhouse. That is why the first step was to attempt to reconstruct the floor or ground level of each room and the two *palaestrae*. To do this, we needed to know precisely how the stonework was laid. In many cases, this is indicated by the ground level that formed the basis of the wall. Knowledge of the correlation between the execution of the stonework and the ground and floor levels can sometimes provide evidence that allows the different phases of construction to be reconstructed.

4.3.1 Slope of site

Before considering how the bathhouse and its individual rooms were embedded in the ground, we first investigated the natural slope of the site immediately prior to construction on the basis of the 1941 excavation drawings, particularly the section drawings.

When the section drawings were studied it immediately became clear that the terrain within the walls of the complex provides only limited information about the elevation and slope of the ground. Human intervention during the construction of the bathhouse and in the subsequent period disturbed the natural soil profile. Such interventions – a partial raising of the ground level in the west *palaestra* and a partial excavation in the east *palaestra* – were mentioned in the analysis of the *palaestrae*. This is examined in further detail below.

The terrain immediately outside the walls of the complex offers more insight into the natural elevation and slope of the ground. Generally speaking, the soil is less disturbed there, so the slope of the undisturbed soil could be discerned in a number of section drawings (Fig. 4.24). This applies to the entire south and east side, and most of the north side, from the northeast corner to the main drain. On the north side the undisturbed soil slopes upwards in an easterly direction from 112.74 m NAP near the drain to 113.62 m NAP in the northeast corner of the complex.¹⁸⁹ From there, the undisturbed soil continues to slope upwards in a southerly direction. The highest point – at 114.66 m NAP – occurs on this side approx. 10 m before the southeast corner, where the undisturbed soil has been found to lie at 114.19 m NAP. Along the south edge, the soil rises first to a maximum of 114.74 m NAP in the line of the west wall of *praefurnium* I. From this point, it falls to 114.09 m NAP approx. 7 m before the southwest corner.

The level of the undisturbed soil in the northeast corner has been derived from the section drawings and identified as 113.62 m NAP. The elevation close to the northwest and southwest corners was obtained by linear extrapolation. The undisturbed soil must have had an elevation of approx. 112.60 and 114.00 m NAP respectively at these points. On both sides the ground reaches its highest level – 25 and 47 cm higher respectively than the corner where the undisturbed soil lies at 114.19 m NAP – before the southeast corner. It is not clear what this implies. It appears that the level of the undisturbed soil did not progress in linear fashion towards the southeast corner, but made a leap of around 30 cm. This occurred in a narrow zone between a point in the southwest wall just over 5 m west of *praefurnium* I and a point in the east wall approximately 4 m south of the *exedra*. The fact that the southeast corner is clearly lower could be the result of human intervention. One of the excavation drawings shows a 60 cm wide robber trench of a wall that was in line with the east wall of the complex.¹⁹⁰ If this interpretation is correct, the original level of the undisturbed soil close to the southeast corner will not have been much above 114.54 m NAP.

Starting at the north and west side of the complex, the slope of the undisturbed soil was an average of 3.1 cm per metre in a north-south

¹⁸⁸ As indicated by the contour lines in drawing 5026 (GA 8 10 Heerlen 1 1941).

¹⁸⁹ The elevation of 113.62 m NAP is the average of values derived from section drawings 5075 (GA 8 10 Heerlen 48 1941) and 5079 (GA 8 10 Heerlen 52 1941), namely 113.59 and 113.64 m NAP.

¹⁹⁰ Excavation drawing 5075 (GA 8 10 Heerlen 48 1941), section Q. The bottom of this feature lies at 113.79 m NAP. Section N in the same drawing also has a trace of a wall structure, which ran parallel to the south wall of the complex, but was narrower and built on a higher elevation, at 114.02 m NAP.

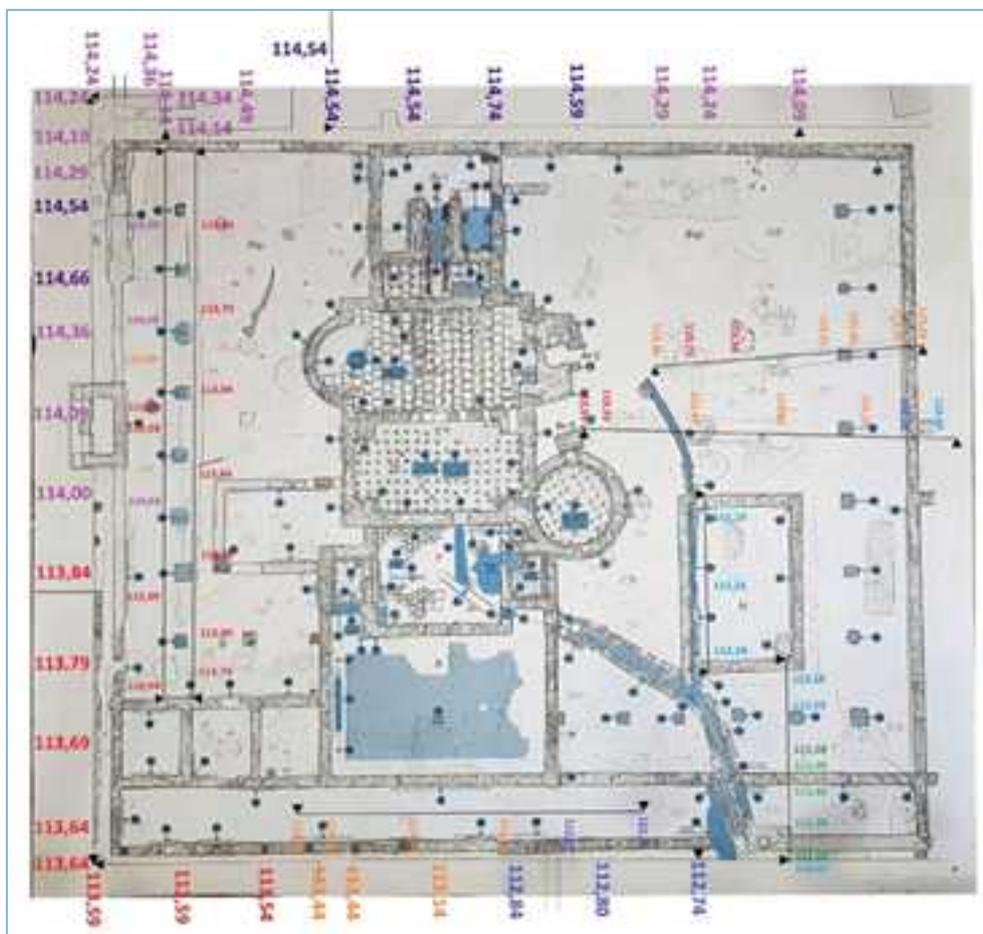


Figure 4.24 Level of the undisturbed soil derived from the 1941 excavation drawings; the colour scheme, based on intervals of 50 cm, clearly shows the progression from high (purple) to low (green) (source: Thermenmuseum archives / K. Peterse).

direction, and 2.0 cm per metre east-west. If the Roman ground surface ran more or less parallel to the undisturbed soil, this means that the southeast corner was up to 2 m higher than the northwest corner immediately prior to the construction of the complex. The 1 m difference between the situation in the Roman period and in the modern era occurs mainly in the northwestern part of the site, and is likely to be the result of erosion or human intervention.¹⁹¹

4.3.2 Embedding of the complex in detail

Once insight had been gained into the natural slope of the ground immediately prior to construction, attention turned to the correlation between the execution of the stonework and the

heights of the floors and ground levels within the complex.

Exterior walls of *praefurnium I*

It is possible to see in the east, south and west walls of *praefurnium I* that the foot of the wall was built against a vertical cut through the soil. In the base of the wall the mortar is not only found between the *caementa*, but also on the face of the wall, where it has seeped out and formed vertical patches. This has occurred almost as far as the top of the surviving masonry, at approx. 113.90 NAP, in the eastern part of the south wall. This is also the level at which the standing wall of the *praefurnium* begins. Two sections cut perpendicular to the south wall show that the undisturbed soil made contact with this wall at 113.89 and 113.79 m NAP at the time of the excavations.¹⁹² The sections

¹⁹¹ It has been discerned from section drawing 5082 (GA 8 10 Heerlen 55 1941) that the undisturbed soil 1070 and 3170 cm west of the interior face of the east wall of the portico lay at 113.44 and 112.76 m NAP respectively. According to the same drawing, at the points in question the first archaeological layer was laid at 113.54 and 113.02 m NAP. Drawing 5026 (GA 8 10 Heerlen 1 1941) indicates that the ground surface at the time of the excavations was 114.10 and 113.05 m NAP respectively. The difference between the ground surface at the time of the excavations and the undisturbed soil was therefore 66 and 29 cm respectively. The difference between these points in the modern ground surface is 105 cm, and the difference in the undisturbed soil is 68 cm.

¹⁹² Sections K and L in excavation drawing 5073 (GA 8 10 Heerlen 46 1941).

show that the level of the undisturbed soil rises to 114.19 and 114.29 m NAP between 1 m from the south wall and 1 m further to the south, the highest value having been recorded furthest to the east. Apparently, a diagonal cut was made in the undisturbed soil as well as any topsoil present at the top of the section lying above the level at which the standing wall starts.

The part of the west wall built against the vertical cut through the soil reached 113.74 m NAP, consistent with virtually all of the surviving height of the wall. This level is also consistent with the 113.89 and 113.79 m NAP elevations discerned from the sections for the south wall. We should bear in mind that the *praefurnium* was built on ground that sloped down to the northwest. As on the south side, the actual level of the undisturbed soil will have been higher than 113.74 m NAP. This is confirmed by the nearby eastern part of the south wall of the west *palaestra*. The bottom of the foundations of this section of wall lies at 113.72 to 113.79 m NAP, and the standing wall begins at 114.01 m NAP. Evidence that the stonework based on the standing began was more or less at ground level in the southern part of the west *palaestra* is presented below.

The east wall, up to approx. 114.00 m NAP, was built against a vertical cut through the soil. Above this elevation, up to approx. 114.20 m NAP (and perhaps even slightly higher), the wall shows traces of rendering that more closely resemble a layer deliberately applied to the masonry than a continuation of the mortar that has seeped out into vertical patches common in the lower part of the wall. It is clear in the east-west section immediately to the south of the south wall of the bathhouse that the undisturbed soil lies at the same level both before and after the point where it meets the east wall of the *praefurnium* and the south wall of the bathhouse. We may therefore assume that the level of the undisturbed soil along the southern half of the *praefurnium's* east wall will have been little different from that in the eastern half of its south wall.¹⁹³ In the east wall the rendering that is assumed to have been applied to the stonework reaches up to 114.20 m NAP. This is fairly consistent with the level of the undisturbed soil at a distance of 1 m from the south wall (114.19 and 114.29 m NAP), and is at any rate more consistent than at the top of the section of wall built against

the vertical cut through the soil. The rendering can be regarded here as a measure to combat damp in the part of the wall that was below ground. If the undisturbed soil did indeed meet the east wall at approx. 114.00 m NAP, during construction the top part of the undisturbed soil – the part that was higher than the bottom of the standing wall – will have been cut off at an angle on the edge of the section, as it was by the south wall.

Eventually the floor of the east *palaestra* was lowered, as evidenced by the surviving plasterwork on the southern part of the east wall of the *praefurnium*, the bottom of which lies at 113.99 m NAP. This level must have been achieved by levelling the ground, as is also apparent in the section along the east wall of the *palaestra* (see below). During this process, a layer of undisturbed soil was removed in the southern part of the east *palaestra*. The strong indication that a higher ground level was taken into account when the east wall of the *praefurnium* was built than was the case in the southern part of the east *palaestra* suggests that the *praefurnium* and the east *palaestra* are not part of the same phase of construction.

East wall of the *apodyterium*

In the analysis of the *apodyterium* a difference was noted between a base built against the vertical cut through the soil and a higher part executed with the help of a casing. The transition between the two lies by the three small rooms between 113.43 and 113.50 m NAP. The bottom of the north wall of the east *palaestra* lies at approx. 113.35 m NAP at the point where it adjoins the east wall of the *apodyterium*. An indication of the elevation of the undisturbed soil at this point can be derived via linear extrapolation from the section of undisturbed soil directly north and east of the complex. The elevation of the undisturbed soil at the point immediately to the south of the point where the south wall of the portico meets the east wall of the *apodyterium* has been calculated as 113.49 m NAP.¹⁹⁴ The same method was used to establish that the undisturbed soil immediately to the north of the point where the north wall of the east *palaestra* meets the *apodyterium* lay at 113.58 m NAP, a value that must also be regarded as indicative.¹⁹⁵ Based on these values, the transition in the stonework mentioned above lay just below the top of the undisturbed soil, while

¹⁹³ Section R in excavation drawing 5080 (GA 8 10 Heerlen 53 1941).

¹⁹⁴ Based on section I in excavation drawing 5075 (GA 8 10 Heerlen 48 1941) and section U in excavation drawing (GA 8 10 Heerlen 52 1941).

¹⁹⁵ *Idem*.

the north wall of the east *palaestra* cut approx. 23 cm into the undisturbed soil at the point where it meets the *apodyterium*.¹⁹⁶

West wall of the *apodyterium*

In the west foundation wall of the *apodyterium* a difference was observed between the bottom half, which is not very consistently executed, and the upper half, which is more regular. In the bottom half the mortar on the wall surface has not however seeped out to form flat patches. This means that the base was not built against a vertical cut in the loess soil, and that the top of the undisturbed soil close to the west wall will not have been much higher, if at all, than the visible foot of the wall, which lies at 113.05 m NAP immediately to the south of the point where the main drain passes through it. An indication of the elevation of the undisturbed soil close to this point and in the middle of the west foundation wall can be derived from the section of undisturbed soil immediately to the north and east of the complex. This suggests that the top of the undisturbed soil at these spots lay at 113.02 and 112.96 m NAP respectively.¹⁹⁷ Although both these values are indicative, it is indeed likely that the undisturbed soil was no higher than the foot of the west foundation wall that can be seen today.

East wall of the *frigidarium*

In the southern part of the east wall of the *frigidarium* a discrepancy was observed between a base and the masonry above. The base gives the impression of having been built against a vertical cut through the soil, whereas the upper part of the wall is free-standing stonework. The transition point between the two lies at 113.65 m NAP. An indication of the elevation of the undisturbed soil at this point can be derived from the section of undisturbed soil immediately to the north and east of the complex. This suggests that the top of the undisturbed soil lay at 113.71 m NAP.¹⁹⁸ Based on this indicative value, the transition between the base and the higher part of the wall was just below the top of the undisturbed soil.

West side of the *laconicum*

On the west side of the foundation wall of the *laconicum* there is a difference between the base and the upper part of the wall. In the base the mortar is present not only between the

caementa, but also on the surface of the wall, where it has seeped out into vertical patches. This suggests that the masonry was laid against a straight section through the soil. The base reaches 113.41–113.46 m NAP. An indication of the elevation of the undisturbed soil in the zone between the *laconicum* and the southeast corner of the *natatio* has been obtained by means of linear extrapolation from the section of undisturbed soil immediately to the south and north of the complex, which puts it at 113.49 m NAP.¹⁹⁹ This value is consistent with the level of the undisturbed soil immediately to the south of the *laconicum*, for which section drawings show values between 113.52 and 113.54 m NAP.²⁰⁰

Zone north of *natatio*

One of the excavation drawings includes a section extending from the north wall of the *natatio* to 50 cm beyond the foundations of the pillar configuration in the portico.²⁰¹ According to the drawing the bottom of the north wall of the *natatio* lies at 112.20 m NAP.²⁰² The drawing also shows that the undisturbed soil immediately to the north of the *natatio* lies at 112.18 m NAP. It then makes a sudden drop to 111.60 m NAP on the north side of the foundations of the pillar configuration in the *palaestra*. From there, it slopes down to 111.48 m NAP at the foundations of the column configuration in the portico. Just past these foundations, the top of the undisturbed soil rises abruptly to 112.23 m NAP.

The level of 112.18 m NAP immediately outside the north wall of the *natatio* is significantly lower than would be expected from the natural slope of the undisturbed soil.²⁰³ A layer of undisturbed soil has thus been excavated here. This is also true of the zone between the pillar configuration in the *palaestra* and the foundations of the column configuration in the portico, where the undisturbed soil is up to 75 cm lower than immediately to the north of the bathhouse. One explanation for the localised excavation of the undisturbed soil might be the deepening of the second, northwest section of the main drain, which must have meant that the walls of the drain had to be rebuilt, for which additional space would need to be made.

East wall of east *palaestra*

It can be seen in one of the excavation drawings showing a soil section directly east of the pillar configuration that the undisturbed soil by the

¹⁹⁶ Sections N, O and Q in excavation drawing 5075 (GA 8 10 Heerlen 48 1941) show that the foundations of several wall cut 15 to 65 cm into the undisturbed soil.

¹⁹⁷ Based on section I in excavation drawing 5075 (GA 8 10 Heerlen 48 1941) and section U in excavation drawing 5079 (GA 8 10 Heerlen 52 1941).

¹⁹⁸ Based on section I in excavation drawing 5075 (GA 8 10 Heerlen 48 1941) and section U in excavation drawing 5079 (GA 8 10 Heerlen 52 1941).

¹⁹⁹ $112.72 + 4.4 \times (114.29 - 112.72) / 9 = 113.49$ m NAP. Based on section R in excavation drawing 5080 (GA 8 10 Heerlen 53 1941) and section U in excavation drawing 5079 (GA 8 10 Heerlen 52 1941).

²⁰⁰ Section O in excavation drawing 5077 (GA 8 10 50 1941).

²⁰¹ Excavation drawing 5077 (GA 8 10 Heerlen 50 1941).

²⁰² This concurs with excavation drawing 5079 (GA 8 10 Heerlen 52 1941), which puts the bottom of the north wall at 112.19 m NAP.

²⁰³ Based on section I in excavation drawing 5075 (GA 8 10 Heerlen 48 1941) and section U in excavation drawing 5079 (GA 8 10 Heerlen 52 1941) the undisturbed soil at the northeast corner of the *natatio* should have been at 112.88 m NAP. Calculated on the basis of linear extrapolation from section R in excavation drawing 5080 (GA 8 10 Heerlen 53 1941) and section U in excavation drawing 5079 (GA 8 10 Heerlen 52 1941) the undisturbed soil at the northeast corner of the *natatio* should have been at 113.07 m NAP.

north wall inside the portico lay at 113.94 m NAP, and at 114.12 m NAP 280 cm from the south wall, a difference of 18 cm.²⁰⁴ The level of the undisturbed soil corresponds, within a small margin, to the level at the top of the foundation layer, and thus to the start of the standing wall. The top of the foundations lies at 113.90 m NAP by the north wall, and will have been at approx. 114.10 m NAP by the south wall.²⁰⁵ Based on the section in the excavation drawing, the levels are 4 cm and 2 cm lower respectively than the undisturbed soil. If we compare this with another section drawing, which shows the slope of the undisturbed soil immediately to the east of the east wall of the *palaestra*, we find that when the *palaestra* was created the prepared ground sloped upwards to a lesser degree towards the south than the natural ground level.²⁰⁶ This suggests that the ground was levelled. This would have involved the removal of a layer of undisturbed soil that grew thicker towards the south. Comparison of the section in the *palaestra* with that on the outside shows that the excavated area began just outside the north wall of the east *exedra*.²⁰⁷ The conclusion that the level of the undisturbed soil was the result of excavation is supported by three additional observations:

1. The north side of the standing part of the south wall of the east *palaestra* is carelessly executed in *opus vittatum simplex*, while at the same height the south side consists of broken and irregular stones which, given the way the mortar has seeped out to form vertical patches, must have been laid against a vertical cut through the soil.
2. At the east *exedra* the top of the foundations lies at 113.99 to 114.04 m NAP. The inside of the standing wall is carelessly executed in *opus vittatum simplex*. The outside, by contrast, consists of shoddily executed broken stone masonry, the bottom part of which, up to approx. 114.20 m NAP, has been built against the vertical cut through the soil.²⁰⁸ Close to the point where the north wall meets the *palaestra*, there is no longer any difference between the two sides of the east wall, both being executed in *opus vittatum simplex*, a technique of lesser quality. Apparently, the top of the foundations was so high here relative to the adjacent ground outside the building that the exterior of the foot of the standing wall no longer needed

to be built against a section through the soil. This is consistent with the observation that the undisturbed soil, which slopes upwards from north to south, reaches a level of 114.00 m NAP just before the north wall of the *exedra*.²⁰⁹

3. One of the excavation drawings includes a section cut from a point 130 cm outside the east wall of the east *palaestra* to 300 cm west of this wall.²¹⁰ It was made slightly to the north of the second foundation of the east pillar configuration, viewed from the south. At the start of the section the top of the undisturbed soil lies at 114.62 m NAP.²¹¹ From there, it descends to 114.44 m NAP at the point where it meets the 60 cm-wide robber trench of the east wall. Just past this feature the undisturbed soil lies at 114.22 m NAP. From there, it declines further to 114.04 m NAP at the end of the section.²¹² These values show that the undisturbed soil drops by 22 cm by the east foundation wall, suggesting that the ground in the *palaestra* was excavated. The undisturbed soil slopes downwards by 13.8 cm per metre from the outside towards the wall, while the slope inside the wall is 6.0 cm per metre. In particular, the substantial slope outside the east wall suggests that the top of the undisturbed soil which abutted the foundation trench had been excavated.

²⁰⁴ Section in excavation drawing 5075 (GA 8 10 Heerlen 48 1941 = Van Giffen 1948, pl. 13, section B).

²⁰⁵ The reading of 114.10 m NAP was taken close to the middle of the south wall of the *palaestra*.

²⁰⁶ Section I in excavation drawing 5075 (GA 8 10 Heerlen 48 1941).

²⁰⁷ According to sections Q and I in excavation drawing 5075 (GA 8 10 Heerlen 48 1941) just over 1 m north of the north wall of the east *exedra* the level of the undisturbed soil lay at 114.02 m and 114.00 m NAP respectively. From this point, the two sections steadily diverge towards the south.

²⁰⁸ The elevation of 114.20 m NAP is consistent with the average elevation of the undisturbed soil just before (114.00 m NAP) and just after (114.36 m NAP) the *exedra*, see section I in excavation drawing 5075 (GA 8 10 Heerlen 48 1941).

²⁰⁹ Sections I and Q in excavation drawing 5075 (GA 8 10 Heerlen 48 1941).

²¹⁰ Section O in excavation drawing 5075 (GA 8 10 Heerlen 48 1941).

²¹¹ Section I in excavation drawing 5080 (GA 8 10 Heerlen 53 1941) gives 114.66 m NAP for the same point.

²¹² The same value is given in section Q in excavation drawing 5075 (GA 8 10 Heerlen 48 1941).

4.3.3 Floor levels in the bathhouse

The height of the floors has already been mentioned in the analyses of the individual bathing rooms. The mortar floor in the *apodyterium* lies at 113.90 to 113.92 m NAP. Van Giffen gives 114.00 m NAP as the floor level of the *tepidarium*. The same level was identified for the original *opus signinum* floor of the *alveus*. Apparently, the floor in the bathhouse was theoretically laid at one level, with the rooms in the southern part of the complex approx. 10 cm higher than those on the entrance side. This might be related to the fact that the structure was built on a site that slopes down to the northwest.

Two rooms do not have the common floor level of 113.90 to 114.00 m NAP. Remains of the mosaic floor in the *frigidarium* lie at 113.71 to 113.76 m NAP, an average of some 20 cm below the level of the other rooms. One explanation

for this might be that the floor was laid lower to prevent water flowing from the *frigidarium* into the *tepidarium* and *apodyterium*. Bear in mind that only the *frigidarium* had a drainage hole in the centre. It is however also possible that the floor was laid lower to more closely follow the natural ground surface. This is not compatible with the higher level of the mortar floor in the *apodyterium*, unless we assume that this room was added to the bathhouse later. If so, when the *apodyterium* was built the floor of the *frigidarium*, by then raised with ceramic tiles, might have been taken into account.

The second exception is the portico. We have already deduced that the floor of this room reaches its highest level – 113.92 m NAP – on the east side. From that point, it slopes down to 113.85 m NAP at the architectural feature that lies in line with the axis of the bathing rooms. The floor then declined further in a westerly direction, more or less parallel to the slope of the undisturbed soil.

4.3.4 Ground level of palaestrae

West palaestra

Several observations give an indication of the ground level in the west *palaestra*. The foundation of the south wall of the *palaestra* logically follows the downward slope of the site to the west. The part in *opus vittatum simplex*, which is set back slightly from the base, does not however decline with the natural ground level. This must mean that the ground level in the *palaestra* was constant (or virtually constant) from east to west. The height at which the *opus vittatum simplex* begins – 114.01 m NAP – is an indication of the ground level on the south side. Since there are only 22 to 29 cm of foundations below the point from which the wall is set back, it is quite possible that the floor level on the south side was lower than 114.01 m NAP.

Another indication can be found by the west wall of the *apodyterium*. Here, the offset in the wall lies at 113.85 m NAP. The mortar floor in the *apodyterium* (at 113.90 to 113.92 m NAP) adjoins more or less at this level. These last values were measured on the east side of the room, incidentally, where the offset in the masonry lies 5 cm higher than on the west side. It would

not have been logical to lay the floor of the *apodyterium* lower than that of the adjoining level in the *palaestra*, certainly not if we consider that the level in the northern half of the west *palaestra* must have been attained by raising the ground.²¹³

In summary, the above suggests that the level of the offset in the wall will not have differed much from the floor level in the *palaestra*. This conclusion is supported by an observation near the pillar or column base in the southwest corner of the *palaestra*. This base, which is made of broken and irregular stone and cannot have been the top of the foundation, currently reaches 113.76 m NAP. The ground level must have been higher at this point. The *natatio* also gives an indication of the ground level in the northwest corner of the *palaestra*, at 113.78 to 113.88 m NAP.²¹⁴

East palaestra

In determining the ground level, a distinction must be drawn between the L-shaped portico and the open area of the *palaestra*. It has already been ascertained that the former had a floor that was probably made of *opus signinum*, which sloped up from north to south. It has also been argued that the portico must have had a lower floor in its first phase. The original floor level on the short arm of the L-shaped *palaestra* to the west would logically have been the same as the level of the mortar floor in the *apodyterium*: 113.90 to 113.92 m NAP. The same might be true of the eventual floor level. The floor of this short arm will have sloped upwards to the east to above the level of the undisturbed soil in the northeast corner of the *palaestra* (113.94 m NAP). If Van Giffen's interpretation is correct, the bottom layer of 'red mortar' in the section drawing in question does indeed represent the earliest floor level, which lay at 114.04 m NAP in the northeast corner of the portico.²¹⁵ At the same point the top of the eventual floor lay at approx. 114.28 m NAP. The floor level in the long arm of the portico gradually sloped up from the northeast corner to approx. 114.63 m NAP at the south wall of the *palaestra*. The layer of 'red mortar' that Van Giffen defined as an earlier floor lay some 30 cm lower. It is not until approx. 8.5 m from the north wall of the *palaestra* that the floor starts to rise more steeply than the undisturbed soil.²¹⁶

There are also indications of the ground level

²¹³ See 4.3.1 Slope of site.

²¹⁴ See 4.2.10 *Natatio*.

²¹⁵ Section Q in excavation drawing 5075 (GA 8 10 Heerlen 48 1941).

²¹⁶ Section Q in excavation drawing 5075 (GA 8 10 Heerlen 48 1941).

in the open part of the *palaestra*. The standing wall set back from the foundations in the east wall of the *apodyterium* suggests its floor lay at 113.90 m NAP. A further indication lies in the fact that the standing masonry in the east wall of the most westerly of the three rooms on the north side of the *palaestra* begins at 113.87 m NAP. There is another indication in the south part of the *palaestra*, where the foot of the surviving plasterwork on the east wall of *praefurnium I* lies at 113.99 m NAP. From here, the ground must have sloped gently upwards to the east. There is no indication that the raising of the floor level in the portico was accompanied by a raising of the ground level in the adjacent open part of the *palaestra*.

4.4 Relative chronology

4.4.1 Three main structural units

The study of the construction history of the bathhouse focused considerable attention on the question of which walls and rooms form units. Particular note was taken of the way the walls are conjoined. In several places it was found that stones in one wall protrude several centimetres into an adjacent wall. This interlocking suggests a single structural unit: the walls were built at the same time, as part of the same sequence of construction. Such a unit has been identified in the *tepidarium*, including the corner reinforcements, the *caldarium* and the two apses, the *alveus* and *praefurnium I*, with the exception of the stoking chamber. We should note that differences in the mortar were not always found to be significant. In the walls of the *tepidarium*, in particular, obvious differences could be observed in the compositions of mortar used in the same construction sequence.

There was also evidence that the core chamber of the *frigidarium* and the two neighbouring *piscinae* were built at the same time. Furthermore, we observed that the circular wall of the *laconicum* is part of the same unit as the west *piscina*. Finally, we found that the opening to allow hot air to pass between the *tepidarium* and the *laconicum* belonged to the original phase of construction for these

two rooms, which links them chronologically to other chambers with which they in turn form a unit. This allows a core building to be distinguished extending from the *frigidarium* to *praefurnium I*.

The other walls have no structural connection with the identified core, though some connections might not be authentic, or they might have disappeared due to subsequent excavation work. The south wall of the east *palaestra* butts against *praefurnium I*. The same must also have been true of the south wall of the west *palaestra*. The two walls were therefore built after the core building. The parts of the east and west walls of the *apodyterium* that conjoin the *piscinae* in the *frigidarium* are modern. The south part of the east wall dates from the period immediately after the excavations, and the south part of the west wall is part of the 2018 reconstruction. It is not therefore possible to draw any conclusions about the chronological relationship between the *apodyterium* and the core building on the basis of the masonry.

The relationship between the *apodyterium* and the two *palaestrae* is also important. The north wall of the west *palaestra* butts against the *apodyterium*, as does the north wall of the east *palaestra* and the north wall of the group of three rooms, the *tabernae*. These walls were therefore built after the *apodyterium*. This refers, incidentally, to the order of construction, not necessarily to different phases of construction. It has also been ascertained that both *palaestrae*, the east one including the group of three rooms, and both including the *exedra*, form a unit in themselves. Since it is difficult to imagine the ‘*tabernae*’ without the portico, and both the east wall of the east *palaestra* and the west wall of the west *palaestra* are part of the same structural unit as one of the side walls of the portico, the *palaestrae* and the portico must post-date the construction of the *apodyterium*. Again, this does not necessarily indicate a different phase of construction.

4.4.2 Chronology of the main structural units

The above allows us to outline the overall development of the bathhouse. The relationships between three structural units

– the core building, the *apodyterium* and the *palaestrae* with the portico – are essential. We know that they were built in this order, though we cannot rule out the possibility that the core building and the *apodyterium* were built at the same time. It is unclear how much time passed between the construction of the different units. It is possible that building joints indicate a practical phasing of a continuous construction process that has no bearing on the chronology, but they might also suggest different phases of construction. Because no stratigraphical survey was performed specifically geared to answering this question, this will require further analysis of the built structures.

Relationship between core building and east *palaestra*

We have been able to deduce on the basis of the masonry and three section drawings from the time of the excavations that the undisturbed soil close to the east wall of *praefurnium* I initially lay at approx. 114.20 m NAP or even slightly higher. However, the ground surface was eventually 113.99 m NAP here, as indicated by the plasterwork. There are more indications that the site was levelled when the east *palaestra* was made. This involved excavating part of the undisturbed soil in the south half of the east *palaestra* (see above). *Praefurnium* I cannot belong to the phase of construction that included this levelling operation, because it was built on a higher level of undisturbed soil. Since the levelling is associated with the east *palaestra*, we may assume that this *palaestra* was added to the core building during a later phase of construction. The same therefore automatically applies to the west *palaestra*.

East wall of *natatio*

It was concluded in the analysis of the *natatio* that the east wall must belong to another, earlier phase of construction than the three other walls. There are several options that might explain the east wall. It could be the remains of a structure that stood there before the bathhouse was built, or it could be part of a structure that existed at the same time as part of the bathhouse. Finally, it could have belonged to the first (or at any rate an early) phase of the development of the bathhouse.

We can reject the first option out of hand. It is highly unlikely that just a single wall of a

hypothetical stone structure from the period before the construction of the bathhouse would have been left standing, to be used later as a wall of the *natatio*.

The second option is less unlikely. It is in theory possible that a perhaps smaller structure initially stood beside the core building of the bathhouse and that it was demolished when the western *palaestra* and *natatio* were created. A single wall of this structure was retained in full or in part because it could be used as the east wall of the planned *natatio*. This interpretation implies that the west *palaestra*, and thus also the east *palaestra* and the portico date from a later phase of construction than the core building of the bathhouse.

The third option views the east wall as part of an earlier phase of the bathhouse. We should bear in mind that the wall is on the northwest side where the undisturbed soil is at its lowest. Nevertheless, the core building – and in fact the entire bathhouse – was designed more or less horizontally. It is therefore quite possible that the east wall is a remnant of a former retaining structure or terrace wall. This would have abutted and stabilised the raised area to the northwest, which bordered directly on the bathhouse. When the west *palaestra* was constructed, involving the raising of the ground in the northwest part, this retaining wall or terrace wall would have become superfluous. According to this theory, the part of the structure that could be reused as the east wall of the *natatio* was retained. This option also implies that the west *palaestra*, and thus also the east *palaestra* and the portico do not belong to the same construction phase as the core building of the bathhouse.

We should add that the east wall does not show any sign of side walls and that, viewed from the south, it stands in a zone of the site where the undisturbed soil lies progressively deeper than the level of the core building. The third option is therefore regarded as the most likely, as it is most compatible with the archaeological remains. This option, and also the second option, implies that the west *palaestra*, and thus also the east *palaestra* and the portico belong to a later phase of construction.

Relationship between *natatio* and west *palaestra*

It was concluded in the analysis of the *natatio* that the ground surface around the pool

must have been at approx. 113.78 to 113.88 m NAP. This suggests that the building of the *natatio* must have involved the raising of the surrounding area, or that it was dug in already raised soil. Since the raising of the ground level would require the exterior of the *palaestra* to act as a retaining structure, the west *palaestra* cannot have been created after the *natatio*. This also follows from the fact that the south wall of the *natatio* is in line with the nine pillar or column foundations and the north wall of the west *exedra*, which lay precisely in the centre of the *palaestra*. It seems very likely that the position of the *natatio* was located in accordance with the design of the *palaestra* or was part of it from the outset.

It has been argued above that the east wall of the *natatio* is a remnant of an older structure, which was partially demolished when the west *palaestra* was created. The fact that only a specific part was retained must mean that it immediately assumed a new function in the creation of the *palaestra*, as part of the *natatio*. The west *palaestra* and the *natatio* must therefore be regarded as contemporaneous.

Relationship between *apodyterium*, west *palaestra* and the drain

In the analysis of the main drain it was observed that the width of the opening in both the west wall of the *apodyterium* and the south wall of the portico is 59 cm. The former accommodates a drainage channel with a net width of 42 to 45 cm, clearly more than the 32 cm measured in the oldest part of the drain beneath the east half of the *frigidarium*. Arguments have been presented suggesting that the relatively wide drain originally continued to the south wall of the portico. It has also been observed that the masonry of the drain is aligned with the openings revealed in both the west wall of the *apodyterium* and the south wall of the portico. These walls thus both interrupt the drain. It is therefore unlikely that the wide drain was laid before the west wall of the *apodyterium* and the south wall of the portico – and thus also the west *palaestra* – were built. After all, if it were earlier, the walls would have been built over the drain rather than parts of the drain demolished, the wall built, and then the drain repaired. In conclusion, therefore, the openings in the two walls were aligned with the relatively wide

drain, and this drain is not earlier than the west wall of the *apodyterium* and the south wall of the portico that flank it. The wide drain is not however later than these walls, as the openings are aligned with the broad drain. The west wall of the *apodyterium*, and thus the *apodyterium* itself, could however be earlier if the 59 cm wide opening had been created secondarily. The current state of the masonry – virtually completely reconstructed – means that this can no longer be verified.

The conclusion to be drawn from this analysis is that the core building, the *apodyterium* and the two *palaestrae* including the portico were not built in one single main phase of construction. The oldest part of the bathhouse is the core building. To the northwest of this there was originally a structure or, more likely, a retaining or terrace wall. No definitive conclusions can be drawn as to the chronological position of the *apodyterium* relative to the core building, because of the current state of the masonry. By contrast, it has been determined that the room must have been fully or partially complete when the *palaestra* and portico were built. The study of the masonry does not allow any definitive conclusion as to the time that elapsed between the construction of the *apodyterium* and the *palaestrae*. The two *palaestrae* and the portico were added to the core building in a second major phase of construction. This phase also included the *natatio*, the east wall of which can be regarded as a remnant of the retaining or terrace wall mentioned above. If the *apodyterium* also dates from the second major phase of construction, the subsidence found in the east and west part of the floor might suggest that the predecessor to this room was narrower, and that it was connected to the east and west wall of the core chamber of the *frigidarium*.

4.4.3 Connected alterations

Apart from the two main phases of construction, the bathhouse also underwent several rounds of alterations. This has already been alluded to in the analysis of the individual rooms. In most cases there is no concrete evidence that would allow the alterations in the various rooms to be attributed to a single

series of alterations. One exception, however, is a radical transformation of the heated rooms. During these alterations, *praefurnium* I and the *alveus* were abandoned, as shown by the bricking up of the link between the hypocausts of the *caldarium* and the *alveus*. A replacement *praefurnium* was installed in the west apsis of the *caldarium*, where the new *alveus* was also located. This must have happened when the secondary drain in the west *palaestra* was laid. The flow of air from *praefurnium* II would have been hampered by the foundations of the *labrum*, which was at the point of transition between the core chamber of the *caldarium* and the west apsis, and which will have been demolished for that reason. During the alterations the *caldarium* was split into an east and a west part, their hypocausts linked by openings in the dividing wall. The west part will still have been a *caldarium*, given the fact that it was adjacent to the new *praefurnium*, while the east part probably became a *tepidarium*. Six of the seven openings in the foundation wall between the original *caldarium* and *tepidarium* will probably have been partially or completely closed at the same time. The most westerly, closest to *praefurnium* II, always remained open. So the original *tepidarium* was still heated, albeit to a lesser extent. It remained in use at the bathhouse, at any rate. This all suggests a change to the bathers' route through the core of the bathhouse.²¹⁷ These radical alterations were followed by smaller changes, such as the extension of the mouth of *praefurnium* II towards the west, and the construction of a surround using large blocks of tufa.

The *laconicum* also underwent a major change when it acquired its own *praefurnium*. To prevent the hot air from flowing away to the original *tepidarium*, the link between the hypocausts of the two rooms was bricked up. The stonework of *praefurnium* II and *praefurnium* III are so different that it is not likely they belonged to the same phase of construction.

The abandoning of *praefurnium* I and the original *alveus* gives a *terminus ante quem* for structural alterations related to the original function of the two rooms. This applies to the water-resistant plasterwork that has survived on the west wall of the *alveus*, which also covers the exterior walls of the *caldarium* and *tepidarium*. The stratigraphical survey performed by Gerard Tichelman dated the water-resistant plasterwork

to the late second or third century.²¹⁸

The major alterations also give a *terminus ante quem* for the decommissioning of the *natatio*. The secondary drain, which will have connected the new *alveus* to the main drain, runs through the *natatio*. There, it lies on a layer of backfill covering the bottom of the *natatio*. The presence of this layer and the fact that the drain was laid through the pool and not alongside it indicates that the *natatio* was no longer in use when the heated rooms were transformed.

Ceramic tiles were laid on several floors at a later stage. This applies to the *frigidarium*, the *tepidarium* and the bottom of the *alveus*. It is not clear whether this was the result of more extensive renovations, or of separate processes in individual rooms.

4.4.4 Summary

Five phases can be distinguished on the basis of the above analysis (Fig. 4.25).

Phase 1: core building constructed; a narrower predecessor is assumed to have stood at the location of the surviving *apodyterium*; the east wall of the later *natatio* was part of a terrace or retaining wall.

Phase 2A: surviving *apodyterium* (light blue) created in core building.

Phase 2B: core building with *apodyterium* extended, with addition of two *palaestrae* and *natatio*; phases 2A and 2B may represent two different points in the same sequence of construction, the *apodyterium* being added first.

Phase 3: extension of the hot air duct beneath the *alveus*; improvements to the drains from the *natatio*; changes to the entrance to *praefurnium* I; damp-proof plasterwork on exterior walls of core building must have been applied before phase 4.

Phase 4: major round of alterations: *praefurnium* I and *alveus* I no longer used and separated from the *caldarium* by a new wall; west apsis of *caldarium* transformed into *praefurnium* II and *alveus* II; air duct between hypocausts of *caldarium* and *tepidarium* largely closed off; drain from *alveus* II laid along east side of *natatio*; *natatio* abandoned; *praefurnium* III installed for *laconicum*; air duct between hypocausts of *laconicum* and *tepidarium* closed off.

²¹⁷ Dodt 2003, 167.

²¹⁸ G. Tichelman, this volume Appendix IV, Section 6.1, results of new excavations, trench 8.

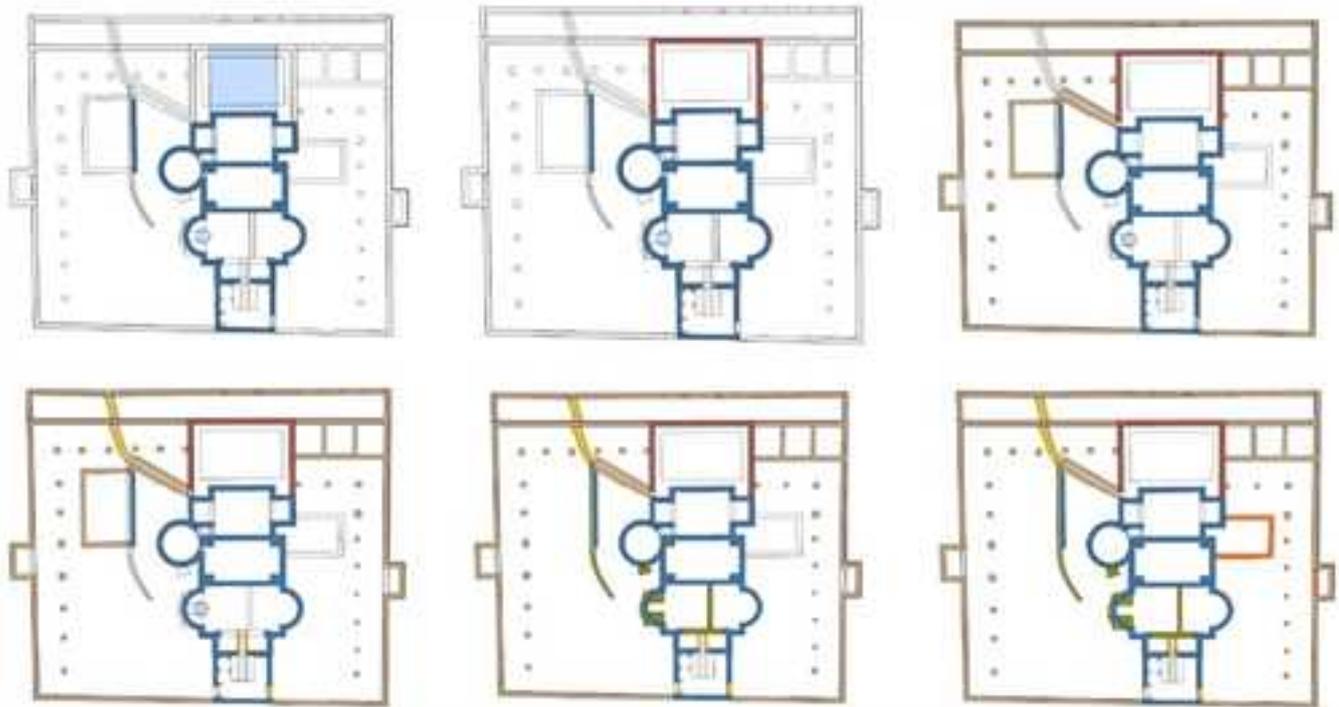


Figure 4.25 The relative chronology of the bathhouse (source: K. Peterse). Construction phase 1 = indicated in blue, construction phase 2A = indicated in red-brown, construction phase 2B = indicated in light-brown, construction phase 3 = indicated in ochre, construction phase 4 = indicated in green, construction phase 5 = indicated in orange.

Phase 5: extension in east *palaestra* built; portico in east *palaestra* raised from that point; east *exedra* adapted to raised level.

4.5 Reconstruction of aspects of three-dimensional appearance

Building on the reconstruction of the three-dimensional base of the bathhouse, a concise study considered several key aspects of its three-dimensional appearance. The relevant research questions relate to the building mass, the roof plan and the façades.

4.5.1 Research questions related to building mass and roof plan

What is the significance of the four reinforced corners in the tepidarium?

Van Giffen drew attention to the four reinforced corners in the *tepidarium*. He believed they indicated that the *tepidarium* was taller than

the other parts.²¹⁹

Rooms with four reinforced corners have been found in other Roman bathhouses. One example is the *tepidarium* at the small thermal baths at Cambodunum-Kempton, which dates to the second half of the first century AD.²²⁰ The reinforcements tend to be regarded as indicating a groin-vaulted ceiling, particularly if the space in the centre between the corner reinforcements is more or less square. Examples are room II at the Thermes à la palestre in Gigthis and rooms III and F at the large South Baths at Timgad.²²¹ The space between the corner reinforcements would then work as a foundation arch or niche, depending on the height. It is clear that the presence of reinforced corners was not always associated with a groin vault, however. This is evidenced, for example, by the Villa at Oplontis, where the centre of the *caldarium* does not have a groin-vaulted ceiling, despite the corner reinforcements. Instead, it has a stuccoed non-load-bearing ceiling in the form of a gently inclined saddle roof.

Reinforced corners combined with a vaulted structure produce a particular spatial effect and have the benefit of transferring the load from

²¹⁹ Van Giffen 1948, 213.

²²⁰ Weber 2000, 71-72 and figures 112a, 112b and 113a.

²²¹ Krencker 1929, 187-189; 228-231.

the roof structure via the corners to the floor, which could sustain a considerable load. The sections of wall between the reinforcements would then in principle only need to support themselves, so they could have lots of windows. Van Giffen's claim that the corner reinforcements indicate that the *tepidarium* was taller than the other bathing rooms is not supported by any evidence.

How were the heated baths – particularly the *tepidarium* and the *caldarium* – covered and what would have been seen of the cover outside?

Few rooms in Roman architecture are so closely associated with a specific ceiling structure as the *tepidarium* and the *caldarium* of a bathhouse. The many surviving examples of these rooms in the towns around the Gulf of Naples that were buried by the Vesuvius eruption almost all have a barrel-vaulted ceiling. The question is what implications this almost automatic assumption has for the bathhouse in Heerlen. Did the *tepidarium* and *caldarium* there also have a vaulted structure, or are there indications of another kind of roof structure? And if it is likely to have been a vault, was it structural or merely decorative?

Van Giffen's publication includes a reconstruction of the bathhouse produced by architect Frits Peutz, in which the *caldarium* and *tepidarium* have a saddle roof covered with *tegulae*. The ridge is in line with the longitudinal axis of the core building. The *frigidarium* has the same, albeit that the ridge of the roof is slightly lower. Peutz was apparently convinced that the *caldarium* and the *tepidarium* did not have a barrel-vaulted ceiling. The reconstruction of the Roman bathhouse at Weissenburg is more recent. It is based on the conviction that the bathhouse had structural barrel-vaulted ceilings which were visible on the outside. The barrel vault was not therefore concealed by a saddle roof. The two reconstructions reflect a debate in archaeology and highlight a fundamental difference of opinion on a matter that has a crucial bearing on the appearance of the bathhouse.

We know for certain that structural barrel vaults visible from the outside were used. The best known example of this in a bathhouse is perhaps the Hunting Baths in Lepcis Magna. A less well-known example is the Terme Santa Venera in Pozzo ad Acireale, Sicily. Roman

funerary architecture also included barrel vaults visible on the exterior, many examples of which can be seen at the cemetery on Isola Sacra immediately to the northwest of Ostia. However, no remains of structural, externally visible barrel vaults have been preserved in bathhouses in the northwest provinces of the Roman empire. The question is, therefore, whether they ever existed here. Inge Nielsen takes the view that though vaults will have been used in the northwest provinces, they will always have been protected by a roof because of the wet climate.²²²

Apart from the climate, the structure of the bathhouse also gives rise to doubts as to whether structural, externally visible barrel vaults were used in Heerlen. In his reconstruction of Kastellbad Walldürn, Dietwulf Baatz suggests that vaults would have been unlikely given the relatively thin walls, and he assumes instead that there was a layer of wooden beams with a saddle roof above it.²²³ We should bear in mind that the walls of the bathhouse in Heerlen are no thicker than those of the bathhouse in Walldürn, and that Baatz's misgivings apply here, too.

The constructive aspect is considered in depth by Lynne Lancaster. She comes to the conclusion that in a concrete barrel vault the thickness of the walls will never in theory be less than one tenth of the net width of the span, with a minimum of two Roman feet (59.2 cm).²²⁴ In this respect the *tepidarium* in Heerlen is a borderline case, and the *caldarium* in fact exceeds the minimum requirement. The standing walls in the *tepidarium* are 60 cm thick, while the span of the room is 554 cm. In the *caldarium* the standing wall on the north side is 60 cm, and on the south side 69 cm; the span of the room equals 633 cm.

Another indication of the spanning structure lies in the four corner reinforcements in the *tepidarium*. They often, though not exclusively, occur in combination with barrel vaults and – above all – groin vaults (see question 1).

Considering the above, it may be quite reasonable to assume that the outer shell of the spanning structure was a roof covered with *tegulae*. Given the corner reinforcements in the *tepidarium*, this room and also the *caldarium* will have had a vaulted ceiling, which may have been only decorative. In his text on bathhouses Vitruvius describes such a structure, consisting

²²² Nielsen 1993, 76: 'But it is doubtless wrong here to depict the vaults as being unroofed, because the wet climate must have required saddle roofs to protect them.'

²²³ Baatz 1978, 90-91: '[...] sind bei der leichten Bauweise des Bades keine Gewölbe angenommen worden, sondern hölzerne Flachdecken. Sie erhielten in den geheizten Räumen eine besondere Isolierung von der Art, wie Vitruv beschrieben hat.'; Nielsen 1993, 76.

²²⁴ Lancaster 2005, 133: 'The ratio between wall thickness and free span in all the buildings is in a range of 1:4,8 to 1:10,9. Only rare examples go over a 1:10 ratio [...]' en 'The minimum thickness for a wall supporting a concrete barrel vault was 2 RF (= size bipedales).'

of iron bars or arches hung from wooden beams, over which slabs of terracotta were laid.²²⁵ Remains of a barrel vault suspended from a layer of wooden beams have been found in the Roman villa at Silberberg in Bad Neuenahr-Ahrweiler and other places.²²⁶

At what height did the barrel vault in the *caldarium* begin?

Unusually, several of the individual rooms in Heerlen have distinct parallels in the Mediterranean region, in terms of their floor plan and layout. This is particularly true of the *caldarium*. It is therefore reasonable to use the extra information provided by the generally much better preserved Mediterranean examples in our reconstruction, though it is important to verify that the room and the selected reference are indeed comparable.

The *caldaria* of public bathhouses preserved in Pompeii and Herculaneum have both constants and variables. The latter include the height of the room to the start of the vaulted ceiling, and also the degree of daylight admitted. The earlier *caldaria*, from the time of the Late Republic, are relatively low and dark, while the *caldaria* from the final decades of the existence of the two towns are relatively high and light. *Caldaria* appear to have undergone significant development in this respect, in particular, linked to the development of translucent but not transparent glazing in the first half of the first century AD.²²⁷ The use of more and larger windows meant that the sun could play a greater role in heating the bathing rooms and maintaining the temperature.²²⁸

As more and larger windows were used, the walls of the *caldaria* were built higher. While in Late Republic baths the height of the walls up to the bottom of the vault would be around 2.5 m, the most recent baths in Pompeii and Herculaneum (Terme Centrali in Pompeii and Terme Suburbane in Herculaneum) have walls over 4.5 m high.

The next question we must consider is whether the bathhouse in Heerlen is comparable with the Late Republic baths of Pompeii and Herculaneum, or with the more recent baths built in the last few decades before the eruption of Vesuvius. The fact that window glass was found in several places during the excavations indicates that this important innovation was also used in Heerlen. We can

expect the vaulted ceiling in the *caldarium* to have started at a height greater than 2.5 m, but no higher than 4.5 m.

4.5.2 Research questions related to the façades

What degree of transparency should we assume for the façades of the bathhouse?

Well-preserved examples in Pompeii and Herculaneum are often used as points of reference in the reconstruction of *caldaria* and *tepidaria*. The well-documented Late Republic forum baths in these two towns have been used as sources of information on numerous occasions in the past. The rooms in these bathhouses are relatively low and also dark, as they have almost no windows. As remarked above, it is probably more reasonable to compare the bathhouse in Heerlen with later baths from the period shortly before the eruption of Vesuvius. These had a relatively large number of bigger windows with panes of translucent moulded glass.²²⁹ Since the aim was to allow sun in, and men bathed in the afternoon, we may expect that the façade that faced the west *palaestra* was relatively transparent.²³⁰

What was the finish on the façades?

Remains of plasterwork have survived on the exterior walls of the core building of the bathhouse in Heerlen. As explained above, this plasterwork was applied mainly for technical purposes, to prevent damage as a result of internal condensation and rising damp. There is no evidence as to what the finishing of the exterior walls and their colouring might have been. It is however generally assumed that the plinth of a bathhouse in a context such as that in Heerlen would have been red, while the higher section of the exterior wall would have been white.²³¹

What was the order of the columns in the portico, and how high were they?

Only one of the elements of columns excavated can be attributed with certainty to the bathhouse. It is a column base with a double *torus*, which must have been part of a Tuscan pillar. The maximum diameter of the base, that

²²⁵ Vitruvius, *De architectura* 5.10.3.

²²⁶ Fehr 1993, 52.

²²⁷ De Haan 2010, 37 cites Seneca, *Epistulae* 90, 25: 'We know that certain devices have come to light only within our own memory – such as the use of windows which admit the clear light through transparent tiles.' (translation: Richard M. Gummere, Loeb Classical Library, 1920).

²²⁸ Double glazing was used in the Terme Suburbane in Herculaneum.

²²⁹ Overbeck & Mau 1884, 237 on the heated rooms in the Terme Centrali in Pompeii: 'Jeder der drei bis jetzt besprochenen Räume hat drei große, gewölbte Fenster auf die Palaestra.'

²³⁰ Baatz 1978, 90 says of Kastellbad Walldürn that most of the window glass was found in the destruction layer on the west side of the bath, the side facing the late-afternoon sun.

²³¹ Baatz 1978, 90 says of Kastellbad Walldürn: 'Der Außenverputz des Bades war wenigstens im Sockelbereich der Mauern hellrot getüncht, wie einige zum Teil in situ befindliche Verputzstücke zeigten. Bei der Rekonstruktion wurde eine hellrot getünchte Sockelzone angenommen, darüber ein weißer Anstrich, der vielleicht an einigen Stellen – etwa am Haupteingang – noch eine farbige Architekturmalerie getragen haben kann.'

of the bottom *torus*, is 44 cm. The diameter of the bottom of the column is 33 cm.²³² Based on a common ratio between the diameter of the bottom of the column and the height of the

column of $1:6\frac{3}{4}$ tot $1:7\frac{1}{2}$, the columns in the portico were between 223 cm and 247.5 cm high.²³³ This is equivalent to between $7\frac{1}{2}$ and 8 Roman feet.

²³² Drawing 5059 (GA 8 10 Heerlen 33 1941).

²³³ Peterse 2005, 290 and note 26.

5.1 Introduction

A Roman bathhouse could not function without water.²³⁴ A reliable source of water was therefore a prerequisite to ensure that the bathhouse could operate as planned. Another requirement was a good network for distributing the water through the bathhouse, ensuring that it went to the right place. Efficient drainage was also needed to prevent flooding. Roman bathhouses could not therefore operate without a good water supply and drainage system.

The water also provided a pleasant visual and acoustic experience in the bathhouse. Water would flow into the baths from beautiful fountains, causing attractive rippling on the water surface. In every sense, water was the essence of the bathhouse and the bathing experience.

The elements of the bathhouse at Coriovallum associated with the water supply were surveyed and analysed between November 2016 and June 2017. This is not of course the first Roman bathing complex whose water supply has been studied. Research on the water systems of Roman bathhouses has been taking place for a long time. The three-volume standard work by Garbrecht and Manderscheid provides an excellent framework for analysing the water elements of the bathhouse at Coriovallum, and comparing them with other Roman bathhouses.²³⁵

A research framework setting out a large number of research questions was drawn up for the archaeological research on the bathhouse site in Heerlen in 2016. The questions focus mainly on the structural aspects of the building and on dating. Other questions were needed as a basis for the reconstruction of the water supply and drainage of a bathhouse, applying to the entire complex, concerning the relationships between the different rooms, and how the baths were used. In other words, where was the water actually needed?

The most important questions addressed were:

1. What type of water was used at the bathhouse?²³⁶
2. How was this water distributed through the bathhouse (both cold and heated)?
3. At what points in the building, including the toilet, might the water have been used?
4. What was the water quality like and what was the standard of hygiene at the bathhouse?

5. How were waste water and rainwater disposed of?

These questions are discussed in the analysis below (see also appendix III). The room numbers in the bathhouse are indicated with a hashtag (#) and can be found on the ground plan published in the research framework (see appendix I).

5.2 Water source/type of water

The Romans used four types of water: rainwater, groundwater, water from springs and water from streams or rivers. The choice of a particular type was determined not only by availability, but also by the different properties of all these types of water (and their benefits and drawbacks).

In the Roman period these different types of water were often used alongside each other, and for different purposes, in view of their different properties. The question is: what type was used at the bathhouse in Heerlen?

5.2.1 Rainwater

Rainwater was collected on roofs and stored in underground cisterns. This water was soft (calcium-free) and thus, for example, ideal for washing. One drawback was that only limited amounts of rainwater could be collected and it was in short supply in the summer and early autumn, when it was most needed. There is barely any surviving archaeological evidence of rainwater collection during the Roman period in the northern provinces, so this subject has barely been studied.²³⁷ A bathhouse required large quantities of water all year round. It was almost impossible to meet this demand using rainwater alone. A rainwater tank would usually suffice for a normal household, but a bathhouse used considerably more water. Though the bathhouse at Coriovallum and its covered porticos had a large roof area on which to collect rainwater, this is unlikely to have been enough to keep the baths supplied all year round. People still needed to bathe in the summer, when there was considerably less rainfall. As far as we know, no bathhouses were supplied by rainwater alone.

²³⁴ This is a summary of G. Jansen, this volume Appendix III.

²³⁵ Garbrecht & Manderscheid 1994.

²³⁶ In this study, 'bathhouse' refers to the entire building, and bath or baths refers to the part of the bathhouse where there was hot or cold water.

²³⁷ Burgers 2001, 46.

5.2.2 Groundwater

Groundwater was raised from wells. The taste of the water differed from one place to another, as did the amount available. Close to a river, for example, the groundwater supply is fairly constant, but in other areas there is a possibility that wells will dry up in the summer. The depth of the water table can also be a drawback. The Romans had no difficulty drawing groundwater from a depth of 8 to 10 m, but any deeper and it became unpleasant to have to draw water every day by hand.

The Romans were not the only one to dig wells. People had been doing so in our region since the Early Bronze Age. Burgers analysed Roman wells in Great Britain.²³⁸ They were round or square and some were reinforced with a wooden structure, wine barrels, wickerwork or stone. Fully excavated wells have been found to have a diameter of 63 to 310 cm; their depth varied from 1.19 to 16.5 m.

It was quite common for Roman baths to be supplied only by groundwater.²³⁹ The wells at the bathhouses in Pompeii were up to 30 m deep. It took a lot of effort to dig and reinforce wells that deep. The water was hauled to the surface using a water wheel and bucket chain driven by a treadmill worked by an animal or a slave. The buckets were emptied into a tank, from which the water was distributed

throughout the bathhouse in pipes. Three wells were dug in the immediate vicinity of the bathhouse at Coriovallum. One of them (W2) was immediately beside the bathhouse site, in the southwest corner, while the two others (W2 and W3) were slightly further away from the bathhouse.²⁴⁰ None of these wells appears to be associated with the bathhouse, though they do indicate that it was common for wells to be dug. The bottom of each well has been identified, and lies at a maximum depth of approx. 6 m. This was not an uncommon depth for a Roman well.

5.2.3 Water from springs

The use of spring water had several advantages for a bathhouse: it flowed day and night, was in plentiful supply and it was suitable for distribution via a pressurised pipe system to the places where it was needed, with the added benefit that the pressure meant fountains could spout water.

It is quite possible that, like other towns in the region, Coriovallum transported water from a spring to the settlement to feed a network of pipes. The water could have come from the sources of the Caumberbeek, which was less than 2 km away, and was 15 m higher than the Roman town.²⁴¹ The discharge of the Caumberbeek is now an average of 11.5 l/s,²⁴² and the water flows



Figure 5.1 Heerlen: 30 cm section of lead water pipe (source: National Museum of Antiquities, Leiden).

²³⁸ Burgers 2001, 46-63.

²³⁹ See Jansen 2002, 132, 170, note 71 for Ostia; Jansen 2002, 20-22 notes 56 and 62 for Pompeii; Horn 2008, 72-73 for Zülpich.

²⁴⁰ For the numbering of the wells, see Vos in this publication, Section 7.2 (Fig. 3) and appendix VII.

²⁴¹ Information from landscape architect Ben Taken.

²⁴² Thanks to Peter Hulst of water supply company WML.

slowly, continuously, and therefore reliably. It is not however certain that Coriovallum used this source. There is for example barely any evidence that Coriovallum had a network of water pipes, as only one piece of lead water piping approx. 30 cm long has been found (Fig. 5.1).²⁴³

The route by which the water reached the town, and what the water pipeline between the spring and the town looked like, are also unclear. Remains of pipes from the Medieval period and evidence on old maps have been used to form a hypothesis about the possible route of a water pipeline to Coriovallum.²⁴⁴ Theoretically, it could have been transported from the source to the town via an underground, stone-lined, covered channel, as at the villa at Voerendaal.²⁴⁵ The channel could however have had a wood or ceramic lining.

5.2.4 Water from streams

Romans seldom preferred water from rivers or streams. The streams that flowed directly alongside Coriovallum lay much lower than the town itself. They included Geleenbeek, which lay 10 m deep in a valley. Obtaining water from here would entail a huge effort, especially if an entire bathhouse had to be supplied.

A number of historians have identified the Caumberbeek as the source of the water supply to the bathhouse.²⁴⁶ It is however strange that they do not mention the source of the stream as the supply. The Romans will have used the pure source, as they were not generally keen on using surface water because of possible contamination by people living upstream, and the fact that the water became muddy after rainfall.

5.2.5 Conclusions

Based on this analysis of types of water source, it seems unlikely that the first inhabitants of Coriovallum, around the time of Augustus, will have immediately built an aqueduct – a pipeline to bring the water from a spring to the town. They will initially have dug wells, and when the bathhouse was built the baths were probably first filled with groundwater. After a time, an aqueduct may have been constructed

for the Roman settlement. This would not have been unique in this region, as evidenced by the aqueduct at Villa Voerendaal Ten Hove, and those at Tongeren, Cologne and Jülich.²⁴⁷

5.3 Water use

Water was needed in many places in the bathhouse. Besides the various baths, there were other places where water was used that are no longer evident today. Hot water was supplied to some places, cold to others. The baths that used cold water are discussed first, followed by those that used hot water; the remaining points of water use, most of which will have had a cold water supply, are then discussed.

5.3.1 Cold water baths

The *frigidarium* (#3) contained two small built-in cold water baths, the *piscinae* (#4 and #5). The floor and wall coverings in the *frigidarium* were water-resistant, the floor having been originally covered with mosaic, and later with large and small tiles. The join between the wall and floor was sealed with a strip of *opus signinum* in order to prevent leaks (Fig. 5.2). The walls were covered with layers of *opus signinum*. This all suggests that a lot of water was splashed around there. Both *piscinae* were rectangular, almost equal in size, though they did differ slightly.

Eastern *piscina* (#4)

Access to the eastern *piscina* was via a 32-35 cm high step at the front. The bather would then jump into the water from the side, or descend a set of steps into the bath. These steep steps were made of tiles covered with *opus signinum*. At 47 cm, the drop of the final step was quite big. The corners of the walls have a vertical sealing strip that was applied during the final phase of construction (Fig. 5.3).

It is unclear where the water entered the *piscina* and where the overflow was situated. In most *piscinae* the water flowed into the bath from the back, opposite the side where the bathers entered the water. Sometimes it cascaded down a small set of steps, but it would usually flow from an opening in a statue or from

²⁴³ The pipe belongs to the National Museum of Antiquities, Leiden (no. I 1910/10.10).

²⁴⁴ See De Moor in this publication (Section 7.1) for the map by Ben Taken setting out a possible route.

²⁴⁵ Willems & Kooistra 1987, 36; Willems & Kooistra 1988, 143-44; Schut, in prep.

²⁴⁶ See De Moor in this publication (Section 7.1) for a list of quotations.

²⁴⁷ For Tongeren: Ponzetta, De Winter & Wesenmael 2002; 2003. For Cologne: Grewe 1986. For Jülich: Perse 2013



Figure 5.2 Photograph showing an overview of the *frigidarium*, with the tiled floor (#3) and the seal made of *opus signinum* (source: Thermenmuseum, A. Steen).



Figure 5.3 Overview of the eastern *piscina* (#4). The stairs can be seen in the top right and the drain at floor level (source: Thermenmuseum, A. Steen).

the mouth of a mask.²⁴⁸ The statues would stand at the back of the *piscina* in a niche in the wall, or on the corners or edges of the bath itself. The overflow would have had to be situated on the same side as the main drain under the *frigidarium* – at the front, therefore. The water may have run over the floor into the drainage hole furthest to the east.

The drain used to empty the *piscina* regularly

has survived. The floor slopes slightly downwards (13 cm) to the drain in the middle of the western wall.²⁴⁹ The 9 cm hole was probably sealed using a wooden or stone stopper wrapped in cloth.²⁵⁰ The drainage pipe slopes downwards and joins the main drain under the *frigidarium*.²⁵¹ The material of which it was made is not visible. It is quite possible that the water was drained via a lead pipe approx. 2.5 cm thick, with a wide flange,

²⁴⁸ Garbrecht & Manderscheid 1994, A 77-82.

²⁴⁹ Van Giffen 1948, 212.

²⁵⁰ See also section 5.5.1.

²⁵¹ Van Giffen 1948, plate VII, sections A and E.



Figure 5.4 Heerlen: the lead pipe with 'flange' (source: G. Jansen).



Figure 5.5 Photograph showing an overview of the western *piscina* (#5) (source: Thermenmuseum, A. Steen).

23 cm of which has remained preserved and was found in Heerlen (Fig. 5.4).²⁵² The flange meant the pipe could be fixed between the wall and the layer of plaster or *signinum*. The signs of breakage around the drainage hole suggest something was removed from there.

We can assume that the *piscina* would hold

some 5.000 litres of water. This is based on its internal dimensions (260 x 182 x 92 to 108 cm). The volume of the stairs has to be subtracted from this. Assuming that the water flowed continuously, a multiple of this volume would be required each day to keep the *piscina* full.

²⁵² The pipe belongs to the National Museum of Antiquities, Leiden (no. I 1910/10.10).



Figure 5.6 Photograph showing an overview of the western *piscina* (#5). In the top left are the steps, at the front is the drain to the main drain of the bathhouse (red arrow). Situation in 1941 (source: Thermenmuseum archives; original photo by GIA Groningen).

Western *piscina* (#4)

The western cold water bath was built slightly differently (Fig. 5.5). It has three steps rather than two, so they are less steep. The steps themselves are made of stone, rather than tiles, and completely covered with *opus signinum*. The floor has a rather carelessly laid pattern in *opus spicatum*. The drain is also different. The hole was cut out of a block of stone, and the *signinum* layers are thicker (up to 16 cm). Despite the slight differences in construction, when filled the *piscina* will have appeared more or less the same to visitors. Only an observant bather would eventually notice that it was easier to step down into this *piscina*.

Here, too, it is not clear how the water entered the bath or where the overflow was, because the edge has not survived. It is assumed that it flowed in at the back via a statue. The overflow was probably not on the front, but on the central drainage side of the bath. The overflow water could have been conducted to the central drain via a pipe that passed diagonally through the wall. The bottom of the *piscina* sloped down to the north, and the water ended up in the large drain 40 cm below via the cleaning drain. The *opus signinum* around the drain is gone and the floor is broken, so it is possible that a lead pipe was pulled out here, too. An impression can still be seen in a photograph in Van Giffen's report (Fig. 5.6). The *opus spicatum* floor seems to be a repair, which itself appears to have been

repaired later with a number of stones. On the bottom, against the west wall, there is a strange protruding stone which would probably have been inconvenient for bathers. Its function is unclear. It could be that there was once a drain there that was later sealed.

This *piscina* could hold 5800 litres of water, based on its internal dimensions (250 x 192 x 73 to 122 cm). This is more than the other *piscina*, mainly because the bottom lies 14 cm deeper.

5.3.2 Outdoor pool (*natatio*) (#15)

The large concrete slab with a raised edge in the western *palaestra* can only belong to the outdoor pool, or *natatio* (Fig. 5.7). The solid foundation, the steps and the drain, which connects with the main drain, confirm this.

The *natatio* required a lot of water. An outdoor pool would be 1.0 to 1.5 metres deep.²⁵³ Van Giffen observed the edge of the pool up to a height of 75-115 cm.²⁵⁴ The maximum height is now 71 cm. We can use the 115 cm height to calculate the volume of the pool. With an area of 9.15 x 5.55 m, the *natatio* would hold 58,000 litres of water, five times as much as the *piscinae* in the *frigidarium* together.

The floor of the *natatio* was made of coarse *opus signinum* – a concrete floor, in other words – 50 cm thick.²⁵⁵ There is no raised cordon along the join to prevent leaks (as found in the *frigidarium*). The sides are plastered. The black or blue plasterwork *in situ* suggests that the inside of the *natatio* may have been painted blue, as in other outdoor pools. The inside of the pool was first plastered, and steps were later built against the side, possibly after the plaster had hardened, not necessarily in a later phase of construction.

The location of the rectangular *natatio* is interesting. Outdoor pools were generally in front of the *frigidarium*, central to the axis of the bathhouse. They were rarely built to the side, as the pool was here, in the *palaestra*. In Coriovallum, this may be because the length of the site did not allow room for the *natatio* to be built in front of the *frigidarium*.

Almost nothing remains of the system for supplying and draining the water. The supply system never consisted simply of a water pipe. Generally, it would flow into the pool from a

²⁵³ See Garbrecht & Manderscheid 1994, A 21-22.

²⁵⁴ Van Giffen 1948, 224.

²⁵⁵ Van Giffen 1948, 224.



Figure 5.7 Photograph showing an overview of the *natatio* (#15), with the steps visible in the back left (source: Thermenmuseum, A. Steen).



Figure 5.8 The drain at the bottom of the *natatio* (#15) indicated by the red arrow. It emptied into the main drain (source: Thermenmuseum, A. Steen).

decorative fountain statue, which was usually positioned opposite the steps. This would be on the east side here, though the inflow may have been on the south side, which would mean that bathers saw the fountain as soon as they entered the portico. There are also other factors that would support the hypothesis that it was positioned on the south side. This is, for example, closer to the central water

distribution point of the bathhouse (see below). Furthermore, the entry point of the water is usually opposite the drain. One would expect this to have been in the northwest corner, given the slightly sloping ground surface, though in fact it was in the northeast corner, where it joined the large drain (#26) from the cold water baths. The drain can no longer be seen at the inside of the pool, as the later drain from the

hot water baths was built over the drain from the *natatio*. It can however be seen at the point where it joins the main drain (Fig. 5.8). The *natatio* drain is 28 cm high and 20 cm wide. It emptied into the main drain 15 cm above the bottom. The depth of the pool bottom and the depth of this drain were presumably the reasons for the 30 cm drop in the main drain at this point. The height of the overflow from the pool cannot be reconstructed precisely, because the edge of the pool has not survived. The position of the drain on the north side is a further argument for placing the fountain that supplied the water on the south side.

The outdoor pool was known as the *natatio* in Latin, which translates as swimming pool. By our standards, however, these pools were not deep enough to swim in, though many texts refer to swimming in the outdoor pool of a bathhouse. Despite the fact that it was not deep, people would jump in. A book used to teach schoolchildren Latin and Greek at the time of the Early Empire contains a dialogue between a father and son, in which the father says, 'Jump into the outside pool. Swim!' and the son later says to his father, 'I've done it.'²⁵⁶ In a similar text, a bather says, 'Let's go outside to the pool and let me jump in so I can swim'.²⁵⁷ The philosopher Seneca (first century AD) also referred to people jumping into the swimming pool with a loud splash.²⁵⁸ The dull concrete monolith that now lies in the *palaestra* of the bathhouse in Heerlen would therefore once have been full of life.

The *natatio* was decommissioned at some point. It was filled (either deliberately or otherwise) and the standing walls appear to have been demolished down to ground level. Only part of the east side survived above ground. Remarkably, at some later date a drainage channel (#27) was created against the inside of the pool wall. The east side of the former *natatio* served as one side of the channel, while the other was built on top of the backfill in the former pool.²⁵⁹ Why the outdoor pool was closed is difficult to say. It might have been because of the large quantity of water needed to fill it. Perhaps the source was providing less water, or another building in Coriovallum was demanding more, leaving less for the bathhouse. We can only guess at the real reason.

5.3.3 Hot water

Water for the hot baths had to be treated before use. It had to be heated and then mixed with cold water to obtain the correct temperature. This was a labour-intensive process, which required various actions and equipment. In the bathhouse in Heerlen two hot water baths were found in the *caldarium* (#9) – a southern *alveus* (#10) and a western *alveus*. They were not used at the same time. The western *alveus* has not been given a separate number. At some point the southern *alveus* was bricked up and no longer used, while the western *alveus* was built in the existing *caldarium*. They therefore represent two phases: first the southern *alveus* and, after it was closed and sealed off, the western *alveus*. Each *alveus* had its own *praefurnium*.

Southern *alveus* (#10)

The underlying hypocaust floor is still fairly intact, but little of the bottom of the *alveus* has survived, apart from a small piece of the south side and part of the thick *opus signinum* in the western corner. This is where we would expect to find the drain from the bottom of the bath, but none is present, unfortunately. Since the edges of the *alveus* are missing, it is not possible to say where the water entered and left the bath. Nor can the relationship between the room and the bath be seen: we are left in the dark as to how bathers would step down into the *alveus*. We can however reconstruct the surface area of the bath: 6.60 x 2.62 m = 17 m². An *alveus* is generally smaller than a *piscina*.²⁶⁰ This is because of the difficulty of heating the water, and the maximum capacity of the boiler. In Heerlen, however, the *alveus* is larger than the two *piscinae* together (approx. 10 m²). The reason is not clear, but perhaps the colder northern climate has something to do with it.

Western *alveus* (no room number)

Like the southern hot water bath, little of the later western *alveus* has survived. The hypocaust floor beneath it is still partially intact, and the reinforcements applied to support the new (heavier) bath are clearly visible. The only thing remaining of the *alveus* itself is a thick piece of *opus signinum* from the floor and the west side. There is no drain here, either. Given the small

²⁵⁶ *Colloquia Monacensia-Einsidlensia* 10a-u. Translation from Dickey 2017, 89.

²⁵⁷ *Colloquium Celtis* 55a-64b. Translation from Dickey 2017, 93.

²⁵⁸ *Epistulae* 56, 1-2.

²⁵⁹ For more discussion of the channel, see section 5.5.1.

²⁶⁰ Garbrecht & Manderscheid 1994, A 26-32.

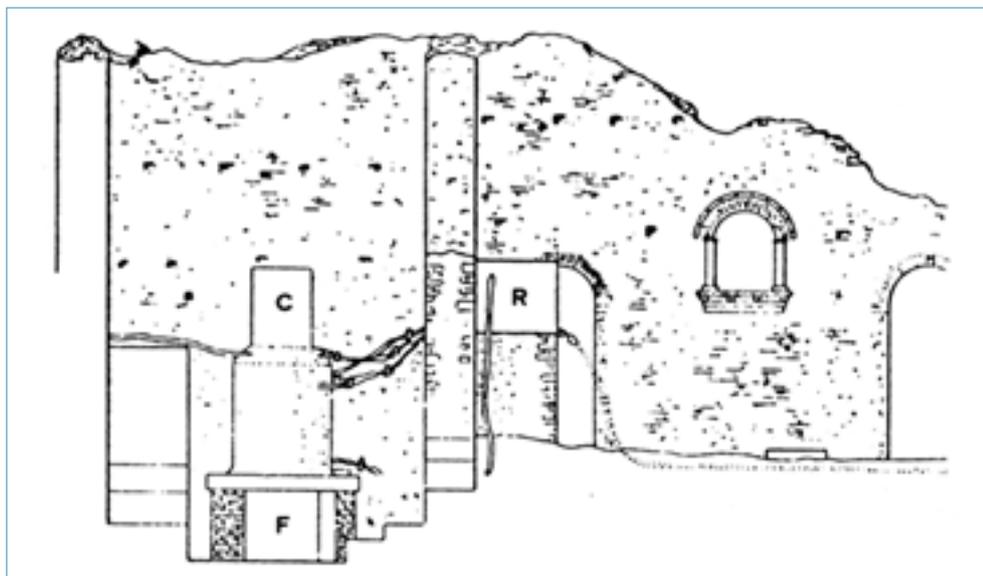


Figure 5.9 Boscoreale: illustration showing the cold water tank, which was also a distribution tank (right), with the boiler on the left (source: Broise & Scheid 1987, Fig. 145).

amount of remains that have survived, it is not possible to properly calculate the area of this bath, though it is estimated to have been around 5.5 m², making it considerably smaller than its predecessor.

Furnaces (*praefurnia*) and boilers

Wood was burnt in the *praefurnia* to heat the bath chambers. The boilers used to heat the water for the *alveus* were also housed here. We have information on these boiler systems because a) Roman authors refer to them, b) the complete system has been excavated and c) remains and parts of such installations have been found in many Roman bathhouses.

Three authors in antiquity wrote about this system used for heating water in bathhouses. Vitruvius mentioned the use of three bronze boilers, Faventius two lead boilers with bronze bottoms, and Palladius spoke of a single lead boiler with a bronze bottom.²⁶¹

Whatever the case, the boilers and tanks associated with them are seldom encountered in archaeological excavations, because the costly lead and bronze of which they are made would have been stolen, melted down or sold once the bathing complex was no longer in use. It should therefore come as no surprise that the only complete system was found beneath the lava of Vesuvius, in a private bath at the villa of Boscoreale.²⁶² This system consisted of a central

distribution tank, a high cold water tank (or intermediate tank) and a boiler above the fire (Fig. 5.9).²⁶³

The intermediate tank for cold water (84 x 91 x 64 cm) was supplied with water from the building's central water system. There was an opening a few centimetres above the bottom from which a lead pipe with a tap led to the hot water boiler. There was a similar pipe with a tap that led directly to the hot water bath in the *caldarium*. There was a drain in the form of a lead pipe with a tap between the side and the bottom that allowed the tank to be emptied for cleaning purposes. The tank from the villa of Boscoreale had an extra pipe that led to the *labrum* in the bath chamber itself.

Lead tanks of this type have been excavated at only four other Roman baths: in Fiesole (Italy),²⁶⁴ in Rome (in the form of a large lead plate with a lead strip and openings for supply and drainage bearing the name of a plumber, Valerius Calonicus),²⁶⁵ in Schleithem (Switzerland)²⁶⁶ and in Heerlen. Here, close to *praefurnia* I (#11) and II (#12), one large and several smaller fragments were found (Fig. 5.10).²⁶⁷ According to Garbrecht and Manderscheid the smaller fragments were found near *praefurnium* II (#12) and the large piece by *praefurnium* I.²⁶⁸ This led Manderscheid to conclude that the largest piece had been dragged there and left, and that the smaller pieces had remained at the spot where the tank

²⁶¹ Vitruvius, *De architectura* 5.10.1; Faventius, *De diversis fabricis architectonicae* 16; Palladius, *Opus agriculturae* 1, 39.

²⁶² Broise & Scheid 1987, 97-100.

²⁶³ This is consistent with Palladius' description.

²⁶⁴ Garbrecht & Manderscheid 1994, C 80-81, Fiesole Museo Archeologico inv. 729.

²⁶⁵ Garbrecht & Manderscheid 1994, C 22-23.

²⁶⁶ Information communicated personally by Gary White (Cologne).

²⁶⁷ Garbrecht & Manderscheid 1994, B 183-184.

²⁶⁸ Garbrecht & Manderscheid 1994, B 183-184.



Figure 5.10 One of the large fragments of the lead boiler from Heerlen (source: Centre Ceramique Maastricht (photo), Thermenmuseum, P. Delnoy (drawing)).

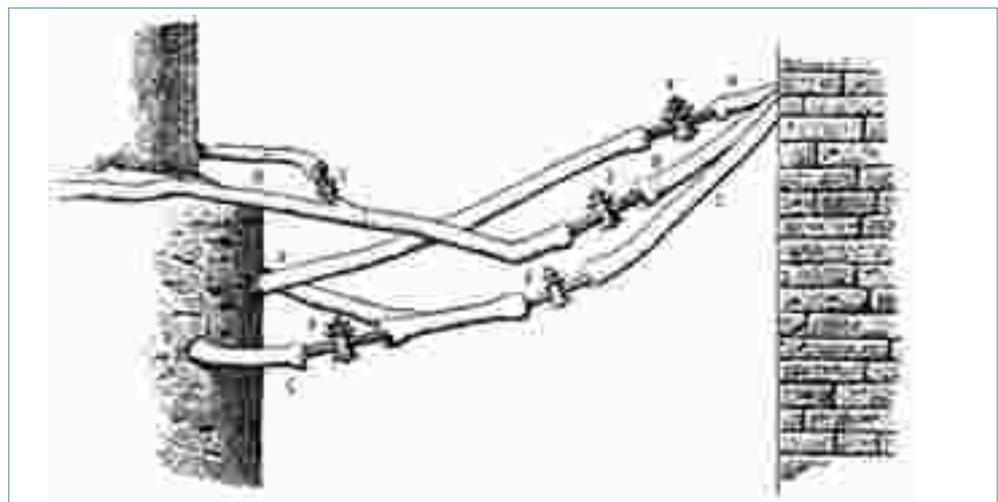


Figure 5.11 Boscoreale: several pipes and taps connecting to the boiler (the side of the bath is shown on the right) (source: Pasqui 1897, Fig. 45a).

had once been installed. In other words, the tanks belonged to *praefurnium* II. It would have been strange if a large lead tank had been left in *praefurnium* I, which was no longer in use.

There is no doubt that the tank was large, as the biggest fragment measures 65 x 53 cm, making it roughly the size of the tank at Boscoreale. A lead tank of this type would generally be made of a single plate of folded lead. It would not have a lid. A lead strip would be applied to join the sides. The lead would first be heated until it softened and then the two parts would be stuck together. They would remain stuck once they had cooled.

The small lead figures on the tank are a remarkable recent find. As Jeneson noted, they were not made specially for this tank, but were already on the lead plate used to make it.²⁶⁹ Such images are not uncommon on lead tanks. They

have been found mainly in the form of round medallions on lead tanks from Pompeii.²⁷⁰ The boiler system at Boscoreale also had a decorated lead tank: a central lead distribution tank which was found standing on a pillar in the house. The lead water tanks from Pompeii were decorated because they were in the central lobby of the house, like the central lead distribution tank from Boscoreale. Perhaps the figures on the tank from Heerlen were originally part of a tank that was visible to the public.

If we go back to the furnace installation at Boscoreale we see the lead hot water boiler at a lower level, just above the flames. Its lower position meant it could easily be filled from the cold water tank. There were service steps beside the boiler that led up to the edge of the boiler. At Boscoreale an earthenware lid was found that lay on top of the boiler, to reduce

²⁶⁹ Jeneson 2017, 111.

²⁷⁰ Muscettola 1982.



Figure 5.12 *Praefurnium I* (#11), view of the left wall (west wall) with holes, possibly associated with the support for the boiler (source: G. Jansen).

heat loss. All the boilers found are made of lead, though this metal is not really heat resistant, and melts at 327 °C.²⁷¹ Protection was therefore needed at the bottom in the form of a bronze basin with a lipped edge. Several of these have been found, such as that from Künzig, which has many visible repairs, necessitated perhaps by the great heat to which it was exposed. A boiler would be surrounded by masonry that provided insulation and so assisted the heating process. Remains of such a surround have rarely been found, though the foundation on which the boiler stood has often survived. The boiler stood above the fire on monoliths that surrounded the furnace door, or on iron supports attached to the side walls of the fire tunnel.²⁷² Both the surround and the steps give an idea of how high the boiler was. The boiler at Boscoreale has a diameter of approx. 47 cm and is 183 cm high. Boilers had several pipes for the supply and distribution of water (Fig. 5.11), connected to the cold water tank and the hot water bath in the *caldarium*, for example. The pipe from the cold water tank enters the boiler roughly halfway up. But there was also a pipe with a tap just above the bottom, which could be used to empty the boiler. This pipe was not right at the bottom, as a small amount of water would always have to be kept in the boiler to prevent the bottom

from burning through. The boiler had to be maintained, of course, as referred to in an inscription from *Metallum Vipascense* (Lusitania) from the early second century AD.²⁷³ It instructs the caretaker to scour and grease the boiler once a month.

The pipes from the cold water tank and boiler at Boscoreale indicate that both hot and cold water was supplied to the hot water bath. Both pipes have taps and they joined together before entering the hot water chamber. The taps were operated in the service room, where the water was mixed to obtain the right temperature. Once the bath was full it had to be continually topped up, as water was lost due to splashing and due to people stepping in and out of the bath. The water would also cool down. Servants therefore had to keep an eye on the temperature and add hot water if necessary, so the boiler would have to be in operation continually.

What was the situation at the bathing complex in Coriovallum? The southern *alveus* (#10) was heated by a boiler in *praefurnium I* (#11). The height of the bottom of the boiler is indicated by the holes on the inside of the western fire tunnel, which is where iron bars that supported the boiler may have been attached (Fig. 5.12). The position of the holes, and therefore of the support, is beneath the floor of

²⁷¹ Garbrecht & Manderscheid 1994, A 34.

²⁷² Panhuysen (1996, 42) refers to metal remains by the *praefurnium* of the bathhouse in Maastricht, and calls them ventilation grilles, though they were probably iron bars on which the boiler stood.

²⁷³ *CIL II* 5181.



Figure 5.13 Impression made by the support for the lead water tank beside *praefurnium* II (#12), north side (source: G. Jansen).

the *alveus*. To the right and left of the fire tunnel there is enough room for the water tanks that would have regulated the cold water supply to the bath. In view of the more robust structure found to the west, it is likely that there was a larger distribution tank there, while to the east the smaller lead tank that supplied water to the boiler may have been mounted in a masonry surround. No steps leading to the top of the boiler or tank have been found, so a ladder may have been used.

In *praefurnium* II (#12) the boiler is also likely to have been positioned straight above the fire tunnel. Impressions forming a 75 x 250 cm rectangle can be seen here on both sides of the internal wall of the *praefurnium* (Fig. 5.13). This must have been the support for either a cold water tank or a boiler. Given the position above the fire tunnel and close to the *alveus*, the latter seems more likely.²⁷⁴

5.3.4 Other cold water supply points

Water was not only needed for bathing. It was also used for *labra* (overflowing basins in the bath chambers) and for fountains and collection basins. Remains of both have been found in

Heerlen. Water may also have been needed for other features that have not been found. The things actually found are discussed first below, followed by some hypothetical additional uses of water.

Labrum

A large piece of a round *labrum* was found on the Roman baths site in Heerlen (Fig. 5.14). A *labrum* is a wide, shallow basin on a pedestal.²⁷⁵ Many Roman baths had them, and some had several. Most were made of marble. The one from Heerlen is made of Namur stone, and has an elegant decorative feature consisting of concentric circles (Fig. 5.15). The stone basin was very heavy, and stood on a large masonry column. Traces of lime or mortar can be seen on the bottom and side of the *labrum* from Heerlen, indicating the height of the stonework. At 124 cm the external diameter of the basin was relatively small compared to *labra* from Pompeii, for example.²⁷⁶ Water would generally bubble up from a hole in the centre of the basin. This was not the case here, however, and we can assume that a fully sealed basin of this type would have been filled by water flowing from an outlet in the wall.²⁷⁷ The water would then flow over the edge onto the floor, wetting the space in which it stood.

²⁷⁴ Garbrecht & Manderscheid 1994 (B 183) draw the same conclusion.

²⁷⁵ Cf. White 2010, 154-156.

²⁷⁶ Garbrecht & Manderscheid (1994, B 184) describe this *labrum* and quote a diameter of 126 cm, whereas Van Giffen (1948, 215-216) had an external diameter of 130 cm. Manderscheid (2009, 44-49) mentions *labra* in Pompeii with diameters of 145 to 237 cm.

²⁷⁷ Garbrecht & Manderscheid 1994, B 184.



Figure 5.14 Fragment of the *labrum* in Heerlen (source: Thermenmuseum, Ph. Debeerst).



Figure 5.15 Pompeii, Forum baths: stonework base beneath a large *labrum* (source: W.K. Vos).

Labra are common in *caldaria*, though they would also be located in other rooms at the bathhouse, and sometimes in the toilet area. The Heerlen *labrum* was originally situated in the western *schola* of the *caldarium*, where a

round foundation for a *labrum* was found under the hypocaust floor (Fig. 5.16).²⁷⁸ When the western *alveus* was built here at a later stage and a furnace was installed in this *schola* the *labrum* and most of the foundation were moved. It is

²⁷⁸ Cf. Peterse in this publication, Chapter 4, Fig. 4.10.



Figure 5.16 Remains of the round foundation of the *labrum* in the eastern *schola* of the *caldarium* (#9) (source: Thermenmuseum, A. Steen).

not clear where it was moved to, but it was still present at the bathhouse until the final phase, otherwise it would not have been conveyed all the way to the northern portico.

Water basins

In 1940 two large stone fragments of rectangular basins with decorated fronts were found in the northern part of the bathhouse (Fig. 5.17). They are made of Norroy limestone and come from two different basins, as they are both front left corners.

The basin is of a known type, which was supported by a base or two legs and occurred in Roman bathhouses from around AD 100 until the fourth century.²⁷⁹ There is none remaining *in situ* in Rome, as they were used for fountains or sarcophagi in the Medieval period. Such basins have been found in a *caldarium* in only two bathhouses in the entire Roman Empire.²⁸⁰ They were used earlier in Pompeii, but were smaller and often placed in gardens or courtyards as attractive basins for collecting fountain water. The basins from bathhouses are generally only decorated on the front, or on the front and one side, and their function was the same as it was in a garden: to collect water from a fountain.

We can conclude that water basins as such occur in Roman bathhouses, though they are

certainly not a standard feature. Manderscheid and Garbrecht do not discuss them in their standard reference work.²⁸¹ It is therefore highly unusual for them to have been found in Heerlen. The Heerlen basins are both the same height and their rim is the same thickness (8 cm on the side, 6 cm on the front), but the thickness of the sides differs and the decoration of the bas-relief on the front is not identical. They may have been positioned symmetrically so that they could be seen together. There is still a small amount of *opus signinum*, with pink mortar, on one of the basins. It might be possible to ascertain the rooms where they were located on the basis of this. The basins were at least 106 cm wide (front) and at least 54 cm deep (towards the rear). Both were 41-42 cm high. As far as we are able to ascertain, they were 26-27 cm deep. We do not know whether the water flowed over the edges as a kind of curtain, or there was an overflow in the middle or on the side.

Other uses of cold water

Water was used at other places in the bathhouse, too, for drinking, for washing feet, for decorative fountains, in shops and for the maintenance of the building and gardens.

Water for drinking. Bathers would often spend hours at the bathhouse, and all the sweating

²⁷⁹ Ambrogi 2005, 59-60.

²⁸⁰ Ambrogi 2005, 45-48.

²⁸¹ Garbrecht & Manderscheid 1994.



Figure 5.17 The two fragments of basins from Heerlen that would have collected water from fountains (source: G. Jansen).

would have made them thirsty.²⁸² It is not clear where drinking water was available or supplied. It could have been in a shop or restaurant, or at a drinking water fountain, possibly even in the form of a *labrum*.

Water for washing feet. Many people walked around barefoot or in sandals, but they had to clean their feet before entering one of the baths. Separate basins were available for the purpose at some Roman baths, filled with water that overflowed from the cold water bath.²⁸³

Water for decorative fountains. Many bathhouses also had fountains that were there not to fill the baths, but merely for visual pleasure. There may have been some in the *exedrae* in the two porticos of the *palaestrae* (#24 and #25), or in the niches in the back wall of the *apodyterium* (#2). The two rectangular basins discussed above may have been used in either of these locations. The niches in the *apodyterium* would be the best option, as visitors would then have a view of them both when they entered the complex. The proximity of the bathhouse's main drain would also make this location likely.

Water for the shops. There were shops at the front of the bathhouse, to the north. They will also have needed water, particularly if one of these rooms was a *thermopolium* where visitors could buy food. Water would be needed to wash

vegetables, cook the food, dilute wine and wash up dishes and beakers.²⁸⁴

There is no tangible evidence in Heerlen that bathers were offered drinking water, or water to wash their feet. Nor is it clear whether any of the shops used water. This is, however, highly likely, and will have had some bearing on the amount of water needed.

Maintenance of the bathhouse. A bathhouse had to be cleaned every day.²⁸⁵ This was in fact monitored by the authorities, in Rome at any rate, during the Republican era. The duties of an *aedilis* included checking whether the baths were clean.²⁸⁶

The floors of the bathhouse at Coriovallum were made in such a way that they were easy to keep clean. The *apodyterium* (#2), for example, had a floor designed to withstand heavy use, made of *opus spicatum*. Around the edges – where the floor perhaps did not need to be so tough – there was a strip of *opus signinum*, with mosaic pieces in a pattern. This floor was easy to clean. The floor in the *frigidarium* (#3), covered with small and large tiles in the final phase, was also easy to clean. The chamber was set out in such a way that it was not a problem if it became wet, with a sealing strip of *opus signinum* to prevent leaks. The floor sloped towards the three drains in the centre of the room, which led

²⁸² Garbrecht & Manderscheid 1994, A 23.

²⁸³ Garbrecht & Manderscheid 1994, A 48-50.

²⁸⁴ Garbrecht & Manderscheid 1994, A 51-52.

²⁸⁵ Garbrecht & Manderscheid 1994, A53-55.

²⁸⁶ Seneca, *Epistulae* 86, 10.



Figure 5.18 Door sill of the sweating room (#7) (source: Thermenmuseum, A. Steen).

to the main drain.

The floor of the *laconicum* (#5) has not survived, but the sill is still there. It has a low ridge that would conduct water from the sweating room to the room with cold water baths (Fig. 5.18).

The floors of the other bath chambers (the *tepidarium* and *caldarium*) have not survived, so it is not clear how they would have been cleaned.

The furnace chambers also had to be cleaned. The lead tanks had to be cleaned regularly, as did the boiler.²⁸⁷ If the water was calcium-rich, calcium deposits would have to be removed from the tanks and pipes, and pipes would sometimes have to be replaced.

Maintenance of plants and trees in the gardens. It is difficult to demonstrate whether Roman bathing complexes had gardens, but they are mentioned in several texts and inscriptions.²⁸⁸ An inscription at a bath gymnasium at Salamis refers to the laying of a new garden within the walls of the bathhouse. DeLaine usually locates the garden areas beside the *natatio*, where there was room for plants and flowers. She suspects that if a bathhouse had two *palaestrae*, one would be a garden or lawn. This would therefore be a possibility at the bathhouse in Heerlen. There might also have been trees in a *palaestra* to provide visitors with shade as they played sports, though no evidence has ever actually been encountered. Whether the bathhouse at Coriovallum needed extra water for a garden is uncertain. If there was no lawn in the *palaestrae*, but a floor made of lightly compressed earth, it would have been pleasant for guests in the

summer if it were sprayed with water.

Water was needed for all the activities described above. No evidence has been found for most of them in Coriovallum. It is however certain that there were hot and cold water baths. A *labrum* and fragments of basins to catch the water from fountains have also been found, though we do not know where precisely they stood. Nevertheless, we can explore how the water reached them.

5.3.5 Distribution of water through the building

As explained above, it is likely that the bathhouse was connected to the running water supply system of Coriovallum. We can expect the water to have entered at a higher point of the site, like the southeast corner, though *praeefurnium* I (#11) would also have been a suitable place. At that point, there is likely to have been a central (also elevated) distribution tank from which the water could be piped to all extraction points in the building (Fig. 5.19). To generate sufficient pressure in the pipes, the distribution tank would need to be higher than the places where the water was used. The system at Boscoreale had a distribution tank 48 cm wide and 32 cm high. It had an open top and was made of lead. A distribution tank might also take the form of a small stonework reservoir. If the water supply from the urban pipeline to the bath was poor, the reservoir would need to

²⁸⁷ *CIL* II 5181; see also Garbrecht & Manderscheid 1994, A, note 258.

²⁸⁸ DeLaine 2018, 166 and also the reference to Grimal 1943, 273-275.

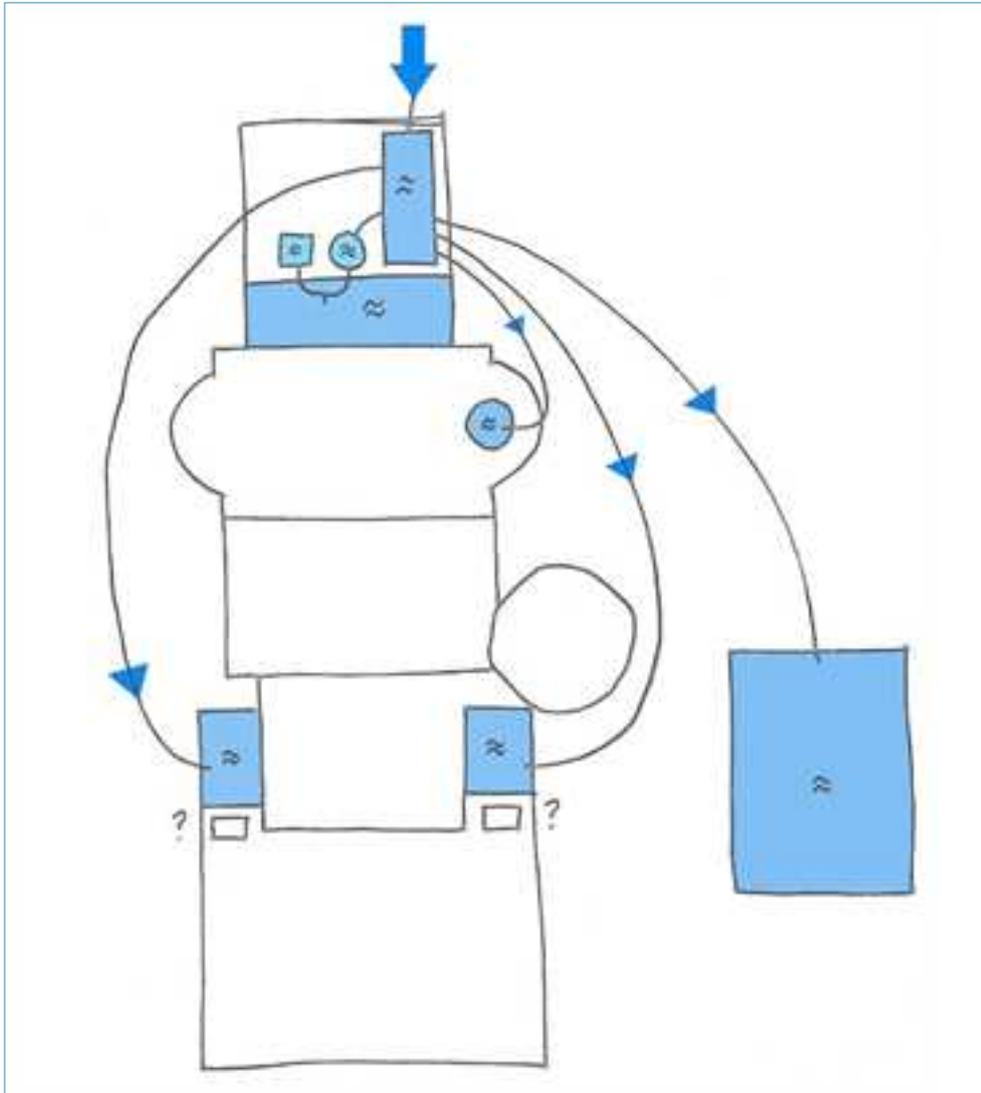


Figure 5.19 Diagram of the water distribution system in the bathhouse (source: G. Jansen).

be larger. At night, when no running water was needed, the reservoir could be filled. This buffer would mean that there was enough water to refill all the baths in the morning. There might have been such a reservoir in *praefurnium* I (#11), where large stones on the west side may have supported something heavy. This is the only place in the building where evidence of an elevated tank has been found, and it is also in a perfect place, where staff could not only easily operate the tank, but the water could also be distributed effectively (Fig. 5.19).

Others have suggested that the two small extensions on the sides of the baths site (#24 and #25) were the bases for small, elevated tanks. This is not logical, however, as they are

far away both from the place where the water entered the site, and from the places where it was needed. The western extension is probably also too low to supply some parts of the baths.

The water would be piped under pressure through the bathhouse from the reservoir or distribution tank. There were two ways of doing this: a system of lead pipes and bronze taps, or a system of wooden pipes. Terracotta pipes were not suitable for transporting water under pressure.

A system of lead pipes would have bronze taps. The Romans had control taps and end taps. Control taps were mounted in the pipeline to regulate the distribution of water. They were often positioned close to the point where the



Figure 5.20 Nijmegen: bronze mixer tap. (source: National Museum of Antiquities, Leiden).

water entered; in Boscoreale there was a control tap near the distribution tank. End taps, where water would be extracted, are less common. They were similar to the taps we have today. In the Rhine-Meuse region 23 complete or partial bronze taps have been found.²⁸⁹ Several of them were end taps, some were even mixer taps. This last type of tap could supply hot or cold water, or mix the two. They were therefore ideal for a bathhouse (Fig. 5.20). No bronze taps or lead pipes – not even fragments – were found at the bathhouse in Heerlen, however.

Wooden pipes could also be used to pipe water under pressure through the building. They were made of hollowed out tree trunks joined together with iron bands. Examples of iron bands used for this purpose have been excavated at the villas of Voerendaal, Maasbracht and Holzkuil.²⁹⁰ All were found in the vicinity of the bathhouses there. The bands have an extra ridge on the outside, which appears to have been designed to help the iron penetrate the wood to a certain depth. Two iron bands were found in Heerlen. It is not certain whether they were part of a water pipe or of wheel hubs, the latter being the current interpretation. They have no ridge, but neither do the bands from the villa at Holzkuil.

5.4 Quantity and quality of bathing water

In terms of water quantity, we might question whether the discharge of the Caumerbeek spring (19 l/s) was great enough to supply Coriovallum and the bathhouse. The flow of water directed to the bathhouse can be seen as a kind of stream

that was guided to different rooms and then came together again in a drain. The water flow could not be turned off with a single main tap, but was guided to specific rooms by opening and closing various taps. Though the flow of water to certain rooms could be closed off so that the bath could be cleaned or repaired, the continuous flow through the complex as a whole could not.

The inscription from Metallum Vipascense, quoted earlier in the discussion of the maintenance of the baths, also addresses the need to have sufficient flowing water in a bathhouse. The inscription instructs the caretaker to ensure there is enough flowing water to reach the highest marks in the boilers and the *labrum*, for both the men and the women.²⁹¹

A large quantity of water would not necessarily mean the bathhouse was clean and hygienic.²⁹² Romans were not aware of the existence of bacteria, and so did nothing to combat them. Bathwater was not disinfected, and neither were the bathing rooms. Many Roman texts refer to dirty bathwater and bathing rooms, caused partly by Roman bathing practices. The oil bathers scraped off their skin (*gloios*) not only ended up on the floor and walls, but also in the bathwater. It is not clear how dirty bathers were when they entered the bath. A daily visitor will have been less dirty than a monthly visitor, and a member of the elite would be less dirty than an agricultural labourer. They did not, at any rate, clean themselves before stepping into the bath. Martialis (first century AD) makes various jokes about people washing their backsides in the water, thus contaminating it.²⁹³ He also refers to people going into the bath wearing make-up and perfume.²⁹⁴ This would all foul the bathwater. Marcus Aurelius (second century AD) also talks of poor-quality bathwater; in fact he refers to water full of *gloios*.²⁹⁵

The water was not only dirty, it was also full of dangerous bacteria. Scribonius Largus (first century AD) recommends certain plasters that do not fall off in the bath.²⁹⁶ We can infer from this not only that plasters would occasionally be found in the water, but also that people went to bathe with open wounds. This is also suggested by a recommendation from Roman doctor Celsus (first century AD), who advises people with wounds to bathe in order to prevent gangrene.²⁹⁷

Continuously flowing water and cascading

²⁸⁹ See Schut 2009; 2012.

²⁹⁰ Voerendaal (Willems & Kooistra 1988, 143); Maasbracht (Driessen 2017, 165-167); Holzkuil (Tichelman 2005, 155-156).

²⁹¹ *CIL* II 5181; Fagan 1999, 325.

²⁹² See Fagan 1999; idem 2000; Jansen 2011b.

²⁹³ Martialis, *Epigrammata* 2.42, 2.70, 6.81.

²⁹⁴ Martialis, *Epigrammata* 3.3.

²⁹⁵ Marcus Aurelius, *Meditations* 2.24.

²⁹⁶ Scribonius Largus, *Compositiones* 214.

²⁹⁷ Celsus, *De medicina* V. 26.28d.

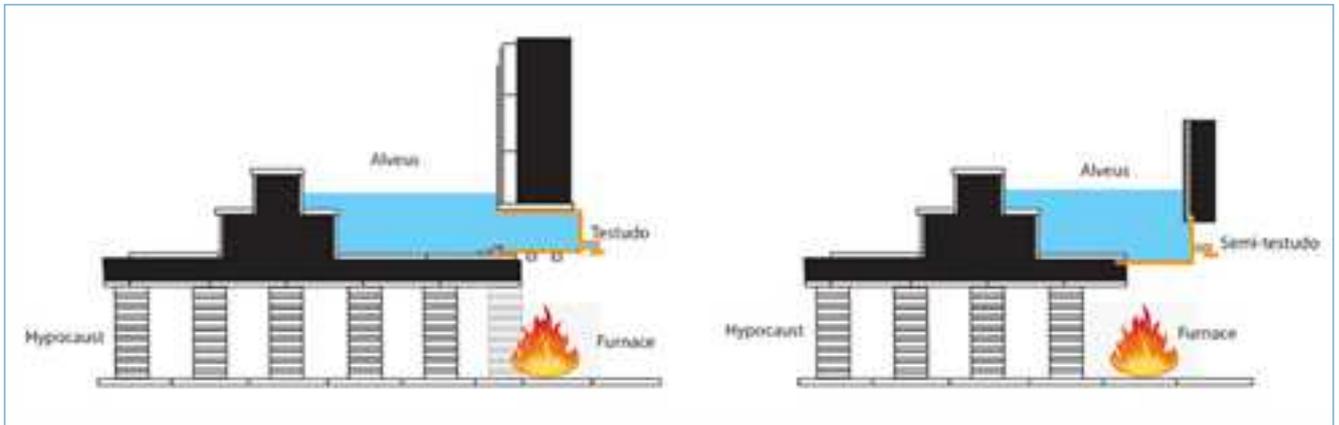


Figure 5.21 Schematic drawing of the drain of a hot water bath via a *testudo* (left) and a *semi-testudo* (right) (source: S. Maréchal).

water would of course help reduce the contamination. A Roman anecdote makes it clear that the Romans themselves were also troubled by the fact that the water was not entirely clean: ‘The people of Cyme, expecting an honoured foreign ally to visit them and wanting to honour him with clean water in the baths, but having only one pool, filled it with clean hot water and put a perforated grille down the middle in order to keep half the water clean for the awaited guest.’²⁹⁸ The bathing chambers could also be dirty and full of pests, generally cockroaches.²⁹⁹

It is thus clear that a large quantity of flowing water would not in itself guarantee clean bathing water and a clean bathhouse. It remained vital that the bathhouse be cleaned every day.

5.5 Waste water drainage

It was of course a challenge to fill the baths with water, but it was no less of a challenge to discharge the dirty and excess water without flooding the bathhouse. This applied not only to the bathwater, but also to rainwater that fell on the building and the site. The overflow from the baths, the *labrum* and the fountains was not a problem. They produced a continuous but small flow which simply had to be guided away. It was more difficult to discharge all the bathwater, particularly water of the *natatio*, each day, as this would suddenly burden the main drain with a huge volume of water. The same applied to the drainage of rainwater.

Compared with this, the amount of cleaning and boiler water that needed to be disposed of was a mere fraction. All this waste water could be drained via covered stonework channels or terracotta pipes.

5.5.1 Used water from the baths

Discharging the bathwater was a daily activity, and could easily be planned.³⁰⁰ Not all Roman baths were drained in the same way, though there were several common solutions.³⁰¹ The first was to lay a stonework underground drain on the side opposite where the water entered the bath. This structure was highly suited to cold water baths, but could be problematic for hot water baths, given that there was a hypocaust beneath the floor. Any stonework drain under the raised floor would block the flow of hot air. Other solutions were therefore used for hot water baths. If the bottom of the bath was at the same level as the floor of the *caldarium* the bath could be emptied via a drain in the floor, from the side of the bath. The water would thus first run over the *caldarium* floor to a drainage hole in the *frigidarium*, from where it would enter an underground drain.³⁰² The drain could also be positioned in such a way that the water flowed directly into another space, such as a service corridor. There was also a third option. In a recent study Sadi Maréchal concluded that many hot water baths were emptied via the *testudo* or *semi-testudo*, a tortoise-shaped bronze vessel positioned between the bottom of the bath and

²⁹⁸ Philogelos 163. Translation by Dickey 2017, 116.

²⁹⁹ Pliny the Elder, *Naturalis historia* 11.99.

³⁰⁰ Garbrecht & Manderscheid 1994, A 59-64.

³⁰¹ Garbrecht & Manderscheid 1994, A 65-66.

³⁰² Maréchal 2017, 180.



Figure 5.22 The main drain (#26) breaks through a pre-existing exterior wall of the bathhouse (the flat stones along the top are a modern reconstruction) (source: Thermenmuseum, A. Steen).

the hypocaust. The bathwater would be drained on the furnace room side, where there was a tap to regulate the flow (Fig. 5.21).³⁰³

The floor of a hot or cold water bath generally sloped down towards the drain, and the slope would continue towards the main drain. In contrast to what one might assume, the bath drain was often a lead pipe, but it could also have been made of earthenware.

The drains of the baths were closed in various ways. The simplest way was to use a stopper or plug made of wood or stone, perhaps wrapped in cloth.³⁰⁴ Stoppers made of metal or cork were also used.³⁰⁵ This was not, of course, a hi-tech solution. A more ingenious system has been found in fourteen Roman baths.³⁰⁶ There, the drain had a small bronze cover which would be kept closed by the weight of the water. The cover could be lifted using a small chain, opening the drain. This could be done from outside the bath, so the bathhouse servants did not need to diver under the water to open the drain.

The overflow from the *labrum* and the water that splashed on the floor of the *caldarium*, for example, also had to be disposed of. The drains of the bathhouse at Coriovallum have been only partially preserved. There is nothing left of the

drain from the *alvei* (#10 and west side #9). In the *natatio* (#15) it is possible to see how the drain from the bottom of the pool connects to the main drain (#26). The drains of the *piscinae* (#4 and #5) in the *frigidarium* have survived intact. No remains of the advanced system using a cover can be seen there.

It was not generally easy to drain water from a bath as the main drain could only be laid under the cold rooms. As explained above, beneath the warm and hot rooms a pipe would have hampered the flow of air under the floor. The architect had to consider this fact, and evidence of this can be seen at the bathhouse in Heerlen. Two stonework drains can currently be seen. The large main drain (#26) conveyed the water from the two *piscinae*, the waste water from the *frigidarium* floor and the water from the *natatio* to the area beyond the perimeter of the bathhouse. The largest volume of water came from the *natatio*, of course. A smaller drain laid at a later date (#27) also carried water from the area of *praefurnium* II to the main drain.

The large main drain (#26)

The remarkable thing about the main drain is that it does not run straight through the

³⁰³ Maréchal 2017.

³⁰⁴ Hedinger & Leuzinger 2002, 105-107.

³⁰⁵ Garbrecht & Manderscheid 1994, A notes 283 and 284.

³⁰⁶ Garbrecht & Manderscheid 1994, A 61-64, Fig. 8.



Figure 5.23 The main drain (#26) line with a terracotta plate on the bottom, and covered by a large stone slab. Situation in 1941 (source: Thermenmuseum archives; original photo by GIA Groningen).

bathhouse to a sewer external to the site. This is partly because it had to collect water at several points in the bathhouse, and also because it had to take the path of least resistance, avoiding large obstacles. The drain does at first run in a straight line beneath the floor of the *frigidarium*, but soon turns to the northwest to proceed beside the western *piscina* (#5). It then passes through the existing wall and straight to the drain from the *natatio* (Fig. 5.22). There, it curves between two columns and proceeds to the outer wall of the portico, which explains the cut in the wall's foundations there. The drain appears to have been installed after the foundations were laid. This raises a number of questions, such as why was the drain not laid first, and the walls built over it? Or was the drain cut through the foundation because the *natatio* was added later, and the drain had to be laid deeper? Or did the drain have to be enlarged to cope with all the water of the *natatio*?³⁰⁷

The main drain of the bathhouse starts at the eastern *piscina* (#4). This drain is lined with roof tiles on the bottom, has stonework sides and is covered in stone slabs (Fig. 5.23). The first water that emptied into the drain came from this *piscina*, discharged when the bath was cleaned,

and probably also the water that continuously overflowed from the pool. The drain then runs beneath the *frigidarium* floor where it collected waste water from the floor of this room via three holes positioned in a perfectly straight line. A slight impression of a square lid, which has now disappeared, can be seen around each of these holes (Fig. 5.24). This was probably a plate decorated with rosettes and small holes which served as a grate. Such covers are common in *frigidaria* (Fig. 5.25). The western part of the *frigidarium* floor has been disturbed. It is unlikely there were more drainage holes here, as after the last hole the drain bends towards the northwest, from which point the remains of the drain are not preserved.

It cannot be seen again until the northwest corner of the *frigidarium*. Here, it received water draining from the western *piscina*. The drain was also widened from 29 to 60 cm in this short stretch from the eastern *piscina* (#4) to the outer wall of the bathhouse, as well as being deepened from 45 to 66 cm.

On his ground plan Van Giffen drew a drain from the *tepidarium* (#8) to the main drain. This cannot now be seen. Hypothetically, the waste water from the *alveus* (#10) may have ended up

³⁰⁷ See also K. Peterse, this volume Chapter 4.



Figure 5.24 The main drain (#26), detail with visible indentation in which the decorated grate would have sat (source: Thermenmuseum, A. Steen).



Figure 5.25 Ostia, Forum Baths: examples of decorative grates over drains (source: G. Jansen).

on the floor of the *frigidarium* via the floor of the *caldarium* and the *tepidarium*, possibly flowing over the sill of this chamber, and then have been conveyed to the drain drawn by Van Giffen via a grate (no longer present). In his contribution to this publication, Peterse reconstructs the sill between the *tepidarium* and the *frigidarium* and places it precisely above or at the start of this drain. The *laconicum* (#7) also drained onto this part of the floor of the *frigidarium*, as evidenced by a low ridge (10 cm high) in the sill (Fig. 5.18). This water might also have flowed away via the drain sketched by Van Giffen.

From the point at which the drain passes through the exterior wall of the bathhouse,

the bottom is laid with large blocks of Norroy limestone. It has no cover from here on, though it must have had one originally, to prevent people from falling in. If the cover were made of slabs of stone, they may have been burnt in one of the lime kilns excavated at the site after the building was decommissioned. At the *natatio* the drain bends to catch the water draining from the pool. From this point, it is also deeper (Fig. 5.8), probably because the bottom of the *natatio* was deeper. The later, smaller drainer from *praefurnium* II (#27) also empties into the main drain here. Waste water would thus be collected together before leaving the site.

It is unclear how the relatively low, narrow



Figure 5.26 The small drainage channel (#27), partially built over the east wall of the *natatio*, view to the south. 1941 situation (source: Thermenmuseum archives; original photo by GIA Groningen).

main drain would be kept clean. It was too small for a human being to crawl through it to scrub the walls and floor. It could be that the covering slabs could be removed at regular distances to clean the drain and remove any blockages.

Small drain (#27)

A small channel partially covered with tiles runs from *praefurnium* II (#12) to the main drain (Fig. 5.26). Drains from *praefurnia* are common, and would have been used not only to remove the water from boilers and tanks, but also the ash from the furnaces along with this water.³⁰⁸ This drain might also have removed waste water from the later *alveus*. It was probably just below the Roman ground surface, or perhaps the covering tiles were just visible. The workmanship of the channel is shoddy, with excessive amounts of mortar and irregularly cut stones. It also consists partly of the east

wall of the *natatio*, which was no longer in use when the channel was created. The bottom and the west side of the channel are positioned over the fill of the *natatio*. The bottom consists of *tegulae*. One *tegula* was placed against the side of the *natatio* and a small wall without foundations was built at the end of the tile. It would seem that the fill collapsed after construction and the entire west side of the channel subsided. The weight of the small wall caused the tile to tilt. The route of this drain was determined by the wall of the *natatio* and the position of the main drain. The channel is 29–33 cm wide on average, with an occasional narrower 24-cm section (not including mortar).

Eventually all the waste water from the bath emptied into a ditch and drained off the plateau, possibly towards the Geleenbeek.

³⁰⁸ Garbrecht & Manderscheid 1994, A 67–68 and note 315.

5.5.2 Rainwater drainage

During a rain shower the site of the bathhouse, with an area of almost 2.500 m², would have a lot of rainwater to handle. The rain that fell not only on the roof, but also on the courtyards, had to be drained away to prevent flooding and stop the courtyards from becoming muddy.

The portico roofs at the entrance and in the *palaestrae*, and the roof of the bathhouse itself, are estimated to have had an area of 1.250 m². The Romans did not have roof gutters, so the rainwater would have dripped from the portico roofs into a channel below, which would carry it away. This gutter would generally be made of stone, cement or *opus signinum*. The portico on the entrance side probably drained into a gutter below, which is shown on Van Giffen's drawing, but not described in his publication. The rainwater from this gutter would probably drain directly into the main drain, which exited the bathhouse at this point.

The rainwater from the portico roofs of the two *palaestrae* would also fall into a gutter below. Van Giffen refers to a one-metre wide gutter in front of the column base in the eastern *palaestra* (#23).³⁰⁹ He does not say what it was made of. It must have been at the Roman living floor level, but is no longer visible now, as the current ground surface is lower than that in the Roman period. There would have been a greater flow of water at the corner of the portico, which fell onto the courtyard further from the building. There would therefore generally be extra paving at this point, to protect the *palaestra* floor. This cannot be seen in Heerlen, though it is likely to have existed. The gutter in the eastern *palaestra* appears to join with a drain issuing from chamber #14 at this particular point. The gutter was encountered in a section made by RAAP.³¹⁰ To our surprise, the RAAP survey suggests that this gutter did not run from the bathhouse to the corner of the portico, but in fact went in the opposite direction, from the portico to the bathhouse. The gutter itself could not be seen, but a dark rectangular fill was visible. The drain seems to have taken the form of a rectangular wooden gutter.³¹¹ In the northeast corner of the portico the drain passes under the portico floor and empties into the gutter at the front of the building mentioned above.

There is likely to have been a similar drainage system for rainwater in the western *palaestra*. Van Giffen does not refer to a gutter here, though he did include a drain in the northwest corner on his ground plan. This is the lowest point of the courtyard, precisely where one would expect to find a drain from such a gutter.

The rainwater that fell on the bathhouse itself also had to be disposed of. Where two roofs met an earthenware pipe would often convey the rainwater to an underground drain. This vertical drainage pipe would usually be incorporated into the wall, but none has been identified in Heerlen – not surprising, since the wall remains are below the level of the Roman living floor. The drain from room #14 on Van Giffen's ground plan mentioned above might have conveyed water from the roofs of the bathhouse to a drain outside the complex.

Rain would also fall on the *palaestrae*, which together had an area of approx. 1.250 m². It is important in terms of understanding the drainage to determine what these courtyards looked like. Research has shown that most courtyards in Roman bathhouses across the Roman Empire were paved, with mosaics, *opus spicatum*, stone or marble slabs.³¹² A surface made of compacted earth or grass would have been more comfortable for playing sports. According to Karen Jeneson (and previous curators), the surface was made of compacted soil. Water could have drained away via terracotta pipes. The sections of pipe, which would usually be thrown on a potter's wheel, would be connected and then sealed with mortar to create a watertight drain. The Roman Baths Museum has a number of terracotta pipes in its collection. Most of them are not Roman. Two flanged pipes, which were not fired until completely hard, but were also not made on a potter's wheel, may be Roman, however (Fig. 5.27).

Many assumptions have been made concerning the water supply system, less of which has been preserved than of the drainage system. Thanks to its lower position, the latter has been reasonably well preserved and can therefore be mapped out. There must also have been a toilet connected to this drainage system, but where was it located?

³⁰⁹ Van Giffen 1948, 225.

³¹⁰ See Tichelman in this publication, Section 6.1.

³¹¹ Cf. the northern profile of trench 3 (Tichelman in this publication, Section 6.1) and also Van Giffen 1948 Pl. XIII, section C.

³¹² DeLaine 2018.



Figure 5.27 Possible Roman terracotta pipes with flange, from the repository of the Roman Baths Museum (source: Thermenmuseum, Ph. Debeerst).

5.6 Possible location of the toilet

A toilet was a standard facility in a Roman bathhouse.³¹³ Evidence of how normal it was to use a toilet at the bathhouse is provided by a schoolbook text from the Early Empire, in which a father and son enter a bathhouse and the father asks his son, ‘And do you want to come to the toilet?’³¹⁴

The toilet at a bathhouse would generally be in a separate room that had a deep gutter along the wall, with a row of seats above. At the bathhouse of the villa at Voerendaal, for example, a toilet of this design has been found that would accommodate six people.³¹⁵ At the bathing complex the toilets might be in the bathhouse itself, in the garden or in the *palaestra*. Sometimes they were by the entrance. If the toilets were in the peripheral zone, they would be accessible to both bathers and passers-by. It seems the Romans were keen to provide such facilities for as many people as possible.

Generally speaking, toilets were in a secluded, infrequently visited part of the complex, discretely located away from the route that bathers would take, or at the end of a corridor or portico. Some were well camouflaged behind a

small building or structure. The entrance would not be in line with the route people commonly took. To reach the toilet, one would often have to turn a corner, so it was not possible to look in accidentally. The toilet was in an isolated or peripheral location not only to keep it out of sight, but also because of the smell or urine and faeces.

A Roman toilet would only function properly if it had a good supply of water and good drainage. Water was needed to flush the toilet. It did not need to be clean water, and in many bathhouses the drain from the *natatio* or from the *piscinae* in the *frigidarium* would be connected to the gutter beneath the toilet seats. The overflow from the pool and baths flowed continually through the gutter. Though this was not enough to really flush the toilet clean, it would keep the bottom of the gutter wet and prevent faeces from sticking to it. When the baths and pool were cleaned each day, and the entire baths/pool was emptied, a large amount of water would enter the gutter, flushing it clean in one go. Nevertheless, most gutters under toilet seats are 40 to 50 cm wide, big enough to send a slave in to clean it by hand. A toilet also required clean water for the shallow gutter that ran in front of the user’s feet, which they could use to clean themselves. Sometimes there was

³¹³ Garbrecht & Manderscheid 1994, A 25-26; Van Vaerenberg 2000-2001; idem 2011; Jansen 2011a.

³¹⁴ *Colloquia Monacensia-Einsidlensia* 10a-u. Translated by Dickey 2017, 88.

³¹⁵ See Braat 1953, 60.

also an extra basin in the toilet room, containing water that users could clean themselves with, using a sponge or a small jug. There was no toilet paper. The water from the gutter at the users' feet drained into the gutter beneath the seats. Eventually, all this water was conveyed off the baths site via a large drain, along with the urine and faeces.

Few toilets have been excavated at Roman bathing complexes in our region. The toilet at the bathhouse in Zülpich is the closest. There, the toilet was in an extension of the portico in the *palaestra*, and a reconstruction drawing suggests it was also accessible from outside the bathhouse. This toilet was flushed with the overflow from the cold water baths.³¹⁶

But what about the toilet at the bathhouse in Heerlen? Nothing resembling a toilet has been excavated, though all kinds of locations have been suggested over the years. The six most commonly suggested options are discussed below.

5.6.1 Option 1: Van Giffen's latrine

The drain from room #14 to the portico led Van Giffen to identify this as a *latrina* – a toilet. But a drain on the outside is not enough to identify a room as a toilet. There also has to be a gutter along the inside of one of the walls, above which users would sit. There is no such gutter.³¹⁷ Furthermore, this room appears to be a later addition to the bathhouse, as it stands at a much higher level than the rest of the building. Little remains of it, apart from a thin layer of foundations. This was also the conclusion of the RAAP excavation.³¹⁸ Finally, at 32 m², the room is rather large for a toilet.

5.6.2 Option 2: The two rooms in the porticos

It is possible that the two small rooms (#24 and #25) in the two porticos around the *palaestrae* were toilets. The size of both (9.8 m²) is at any rate what one might expect of a toilet room at this bathhouse. At an average width of 70–80 cm per seat, each room could have accommodated four users, giving a total of eight. The rooms

were aligned with the *palaestra*. They are not positioned symmetrically, though they are in the middle of the east and west *palaestra* respectively. The columns of the two porticos are so far apart at this point that the small rooms would have afforded a view of the *palaestrae* – or perhaps the reverse was the intention, that it was possible to see what happened in these rooms from the *palaestrae*.

This of course makes these rooms less likely to have been toilets. There would never be a direct view into a toilet, and a toilet never had a view. No gutter was found, no water supply, no drain, and there are no vestiges of mounts for the seats on the walls. These rooms probably served another purpose. One possibility is that they were *exedra* where bathers could sit and chat. This would be appropriate for their position, halfway along the route through the portico. *Exedra* for philosophers are well-known features of Roman baths. Visitors would have an uninterrupted view from the *exedra* between the two columns to the *palaestra* (line of sight). It is also possible that there was something worth seeing in this room, such as a statue or fountain. Visitors would have a good view from the *palaestra*, and when they were walking through the portico. It was not, however, the location of a toilet.

5.6.3 Option 3: The channel in the *natatio*

The channel running along the east wall of *natatio* (#27) could be a toilet gutter. Given its size and position, room #15 is a swimming pool, not a toilet. Van Giffen reported that there was more than 50 cm of concrete beneath it.³¹⁹ This is an excessively heavy foundation for a toilet. There seem to have been steps to the west that descended into the room. This also suggests a swimming pool. The structure in the northwest corner might be interpreted as a small water basin, rather than stairs. But even if this is the case, the basin is on another level (too low), and much too far from where the toilet seats would have been.

It is unlikely that the drain (#27) laid later (after the *natatio* had been decommissioned) against the east wall of the pool was part of a toilet. The thick east side wall of the *natatio* could easily have supported toilet seats, but

³¹⁶ Horn 2008, 90–91, 125.

³¹⁷ Bouet 2009, 417–418.

³¹⁸ Tichelman in this publication, Section 6.1.

³¹⁹ Van Giffen 1948, 224–225.

the covering tiles found over this gutter during the excavation rule out its use for a toilet. The tiles can be seen in several photographs of the excavation (incl. Fig. 5.27), and Van Giffen drew them on his ground plan. Furthermore, the drain is very narrow for a toilet, at an average of 29 to 33 cm wide – 24 cm at its narrowest point – even without *opus signinum* or other cladding. A person could never have passed through here to clean it. The drain would also have carried only a small quantity of water – the capacity of the hot bath. It is doubtful that this would have been enough to efficiently flush out the toilet gutter.

5.6.4 Option 4: In one of the three ‘shops’

The three ‘shops’ or *tabernae* in the northeast corner (# 19, 20 and 21) are all the same. This would be a good location for a toilet, slightly off the route of the bathers, and immediately accessible on entering the building. But no evidence whatsoever has survived. There is no floor, and no drains. Van Giffen did draw a drain from the middle shop on his ground plan, but this empties into the open gutter at the front. A drain from a toilet (containing faeces) that one had to step over as one entered the building would not really project the right image. No parallels have ever been found for such a location in a bathhouse anywhere in the Roman Empire.

5.6.5 Option 5: The room to the northwest of the front portico

Van Giffen believed that room #18 to the northwest of the portico, beside the entrance, could also be a toilet.³²⁰ The room is at the lowest point of the baths site, so the flow will have been perfect. The room is away from visitors’ route through the complex, which would be a normal location for a toilet. It is however strange that the main drain of the bathhouse does not run through this room, in the form of a gutter beneath the toilet seats, as is usual in bathhouses. If this had been the case, the water from the cold baths and the *natatio* could have flushed the toilet. No drain at all has been excavated in this room. It is possible that it

lay at a higher level, and has now disappeared.

The room is large, at around 40 m², which seems too big for a toilet at a bathhouse of this size. If this was a toilet, with seats only along one wall (not all the walls), i.e. the south wall, and 70–80 cm allowed for each person, there would have been room for sixteen people. This is a reasonable number for this bathhouse. The walls have not survived, only the foundations on which they once stood, so no traces of mounts for the toilet seats have been found.

5.6.6 Option 6: Toilet outside the bathing complex

Wouter Vos has suggested that the toilet might have been outside the area studied. A small survey by Karen Jeneson of baths of the *Reihentyp*, the type of bathhouse found in Heerlen, revealed that no toilet has ever been excavated inside a bathhouse of this kind.

5.6.7 Conclusion

Of all locations suggested for the toilet, the room to the northwest of the portico by the entrance (#18) would, despite all the uncertainty, be the most logical. Its position is the deciding factor: this is the lowest point of the site, where the main drain leaves the building. It is also a discrete location, far away from the route visitors would have taken through the complex. Bathers could access it via a door in portico #15, and passers-by (outside the bathhouse) could enter via portico #1.

5.7 General conclusions water supply

This study of the water supply to the bathhouse in Heerlen considered how the water arrived at the bathing complex, how it was distributed through the bathhouse, what exactly it was used for, and how the waste water was disposed of.

In its first phase the bathhouse may have been connected to the groundwater supply via a well. When the town acquired a piped water supply that brought in water from the spring

³²⁰ Van Giffen 1948, 209.

that fed the Caumerbeek, the bathhouse was also connected, and it was possible to supply a large *natatio* with water. It is likely that the water entered the bathhouse at a high point, from which it could easily be distributed to the points where it was used, possibly from a stonework reservoir in *praefurnium* I. It is not possible to say how the water was then distributed through the baths site, as the pipes would have lain above ground, and little of the bathhouse above the ground surface has survived.

The parts where the water was used have however been preserved. They include the location of the boilers in the *praefurnia*, the hot water baths (*alvei*), the *labrum*, the cold water baths (*piscinae*) and the swimming pool (*natatio*). The toilet also needed a water supply, though it has not been possible to identify its location for certain.

The most extraordinary of the isolated finds

connected with the use of water are the lead plates of the water tank from the boiler room. Such remains have been found in only four other places in the Roman Empire. The two decorated stone basins for collecting fountain water, which were found on the site of the bathhouse, are more common, though not in bathhouses. They were therefore also a surprising find.

Since the part of the bathhouse below ground is so well preserved, there was little need to hypothesise about the drainage of water from the site. The main drain collected the waste water from the two *piscinae* and the *natatio*. Later, after *praefurnium* II and the new *alveus* were installed, and the *natatio* was closed, a smaller drain also emptied into the main drain. It conveyed the water from the new *alveus* and its boiler. All the waste water, including rainwater, was collected together in one drain that discharged it from the site.

6.1 Results of new excavations

G. Tichelman

6.1.1 Context, conditions and scale of survey

At the request of Heerlen municipal authority, between 8 January and 24 February 2017 and on 8 January 2018, RAAP performed an archaeological field evaluation at the Thermenmuseum.³²¹ The evaluation took the form of a trial trench survey. It was performed as part of the further investigation of the chronology and building history of the Roman baths site and its immediate surroundings, which was launched in connection with major conservation activities and the planned renovation of the museum. The main goals of the trial trench survey were to obtain scientific information about the use and history of a number of spots on the site, and to ascertain the condition of the physical remains.

The trial trench survey was very labour-intensive as the clay was very dried out, the researchers had to dig by hand and all the disturbed earth had to be sieved. Once dug, the trenches were excavated by hand, using a trowel and small and larger picks. The earth was

removed from the site in buckets and carried through the museum to be sieved in the inner courtyard. The finds were dried, separated, counted and entered into a database. Though working inside the museum provided protection from the freezing conditions outside, the light was very poor for archaeological fieldwork. In order to recognise features and finds properly, spotlights had to be used at all times. For photographs to be taken, extra spotlights were needed to prevent shadows from obscuring parts of the image.

A project brief was drawn up prior to the survey, with research questions for each trench (1-46).³²² The brief initially envisaged seven trenches: three in the western *palaestra* three in the eastern *palaestra*, and one in *praefurnium* I. Ultimately, one of the trenches planned for the western *palaestra* was not dug, and other locations were documented instead (trenches 8-11, Figs. 6.1-6.3), for which additional research questions were devised (47-55).

Trenches 1-6 were approximately one metre wide and between three metres (trench 3) and 8.5 metres (trench 4) long. The extra locations were small trenches dug by Van Giffen (in the 1940s) or by the museum (in the 1980s) (trenches 7, 8 and 9), and two locations where something had been discovered during conservation work (trenches 10 and 11).

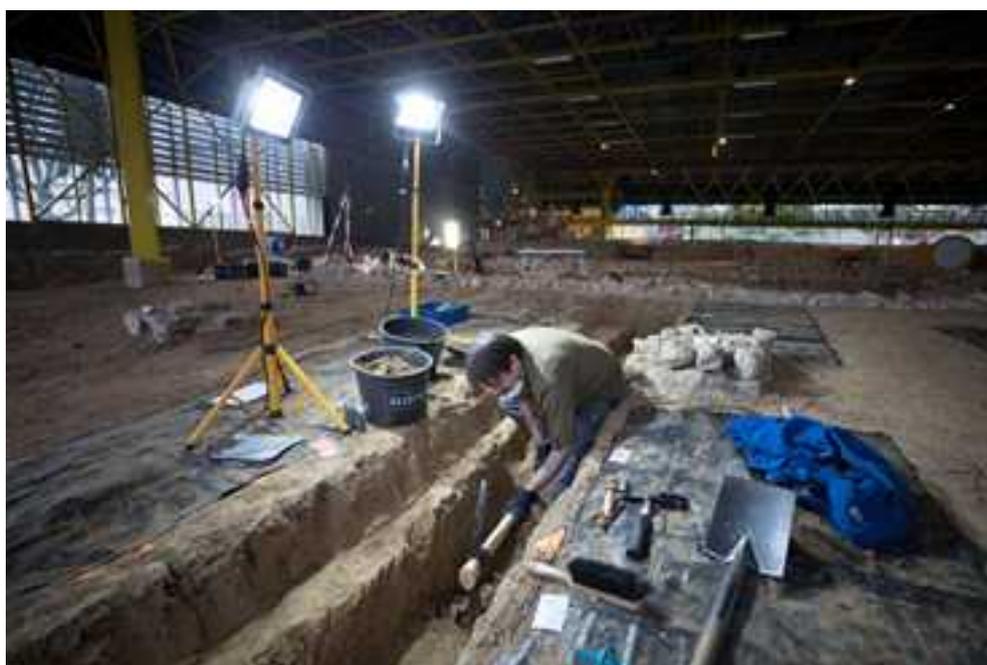


Figure 6.1 Fieldwork in trench 1 (source: RAAP, G. Tichelman).

³²¹ This is a summary of G. Tichelman, this volume Appendix IV.

³²² The project brief is included in the complete report.



Figure 6.2 Fieldwork in trench 4 (source: RAAP, G. Tichelman)

Trenches 1 and 2 were in the western *palaestra* and were intended for the investigation of the stratigraphy and chronology between the western *palaestra* and the *natatio* and the northern portico. Trenches 3, 4 and 5 were in the eastern *palaestra*. In trench 3, the ditch in the northeast part of the eastern *palaestra* was investigated, a ditch that Van Giffen believed to be the drain from a latrine. Trench 4 was immediately beside the foundations of a pillar of the eastern portico, and was intended for investigation of the stratigraphy and chronology between the eastern portico and the *caldarium*. Excavation results on trench 8, immediately to the south of trench 4, were also used for this purpose. Trench 5, close to the bricked-up eastern entrance to *praefurnium* I, provided an opportunity to investigate why the entrance to *praefurnium* had been closed off. This question was answered using the results from trench 7. Trench 6 was in the western wing of *praefurnium* I, and was intended for the investigation of the remains of floors and pillar bases. Trench 9 was a small trench against the eastern external wall of the *tepidarium*, where some remarkable finds were made in the 1980s, but there was no documentation of the plan or section. Work was performed in trenches 10 and 11 at later dates, in July 2017

and January 2018. This involved the sampling of charcoal layers in *praefurnium* II and the lifting of a stone slab in the *cloaca*, in the western *palaestra*.

In the newly dug trenches 1-6, the loose top layer (S9500) was first removed in order to document a baseline situation (face 0), which largely concurred with Van Giffen's 1948 excavation drawing. Recent material was also occasionally found in the loose top layer. After further deepening (by approx. 10 cm per work face), in most trenches the undisturbed subsoil was soon encountered, generally at archaeological level 1 or 2. In trench 2, however, the undisturbed subsoil was found only from 1.20 m below the current surface, as a result of a raising operation. It was usually possible to recognise the features from Van Giffen's excavation drawing immediately in the archaeological levels, and some old sections from that time were also identified. Some 'new' features were also unexpectedly discovered in trenches 4 and 6. Disappointingly, some recent disturbances were found in trenches 1, 3 and 4. These finds, in the form of ditches with twentieth-century clay piping, came as a surprise because it was thought that there had never been any construction at this site, with the exception of a single historical farmhouse.

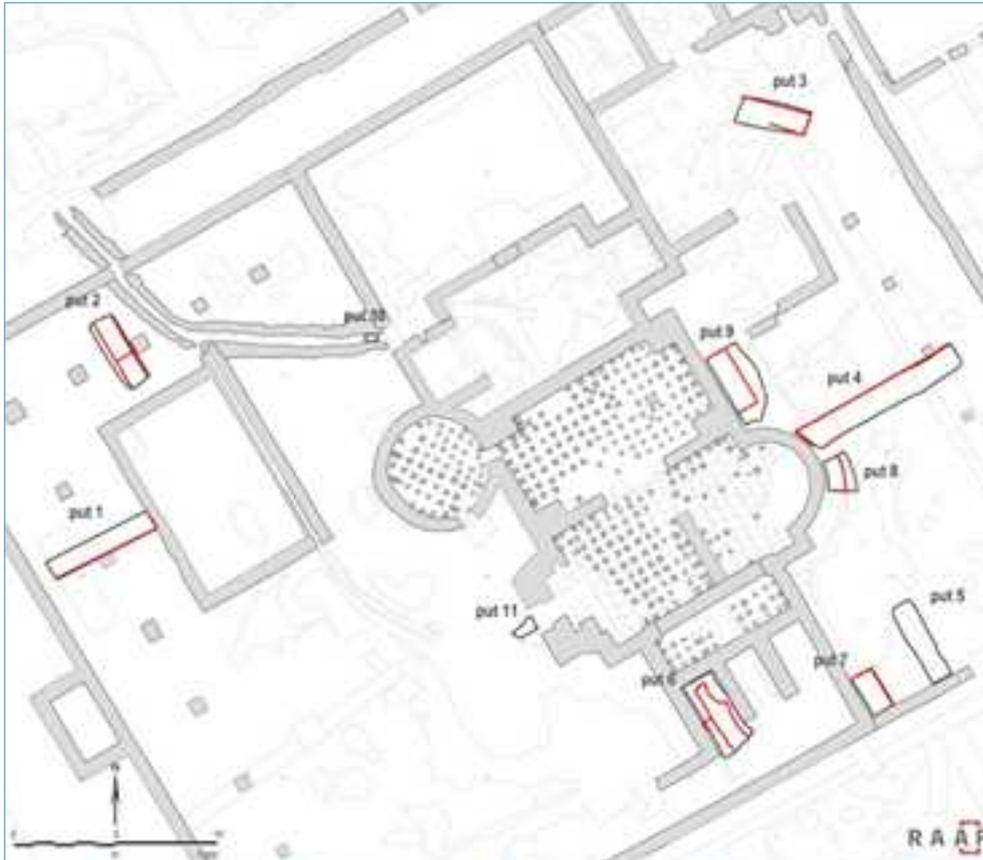


Figure 6.3 The Roman baths with a cleaned-up version of a plan drawing by Van Giffen in light grey showing only foundations (no discoloration) (Van Giffen 1948) and the position of the trenches, with documented sections shown in red (source: RAAP, G. Tichelman).

It turned out, however, that Van Giffen himself had decided to have the pipes laid when drainage problems occurred.

6.1.2 Landscape and stratigraphy

Heerlen lies in the Heerlen Basin, which differs from the rest of the South Limburg loess region. In this basin the loess layer varies in thickness between two and five metres, though in places it exceeds eight metres. The Roman Baths Museum itself stands on a slope to the northwest of the Basin. To the west is the valley of the Geleenbeek, while to the north of the Roman baths there is a dry valley oriented east-west, which culminates in the Geleenbeek valley. Loamy brick soil has formed in the loess since the start of the Holocene. Two different brick soils are distinguished: an

intact one ('radebrikgrond') and an eroded one ('bergbrikgrond'). The intact and phased profile sometimes has a residual A horizon and usually an E horizon and a complete Bt horizon. As a result of slope erosion, some profiles are lacking the A and E horizons, and generally also part of the Bt horizon. This loess has been carried down the slope and deposited at the bottom as colluvium. Like the E horizon, this colluvium contains no clay, and virtually no soil; it is classified as vague soil.

Given that the location has already been fully excavated down to the foundations of the bathhouse, the Bt or BC horizon lies at the current ground surface over almost the entire site. In almost all the documented profiles in trenches 1-9, a residual Bt horizon of a *radebrikgrond* or *bergbrikgrond* was still present, though in some cases there was none. In trenches 7 and 8 the Bt horizon was barely preserved, and only a BC horizon in fact



Figure 6.4. Pillar foundation on top of the remains of a lime kiln in trench 2 (source: RAAP, G. Tichelman).

remained, while in trench 6, in the *praefurnium*, there was only a C horizon. Information from the profiles, in particular, including a hypothetically intact loess profile, was used to reconstruct the level where the natural surface must have been before the bathhouse was built. This information was used for a comparison with the assumed level of the Roman surface.

6.1.3 Results of the trial trench survey

Trench 1

In trench 1 the ditch along the *natatio* wall (S24) which featured on Van Giffen's excavation plan turned out not to be a foundation trench of the *natatio* wall, but in fact a separate, parallel ditch. The few pottery finds from the ditch could not be dated any more accurately than Middle Roman A (AD 70-150). The *natatio* wall did not therefore have a foundation trench, and must have been built from the inside out. The foundation of a pillar of the western portico was documented in the centre of the southern trench profile, but only a small part remained (down to approx. 15 cm). The foundation consisted of a single layer of irregular, poorly fixed pieces of limestone, with barely adhering mortar and grit.

No phasing was identified. The elongated trench in the western portico (S1), also known from Van Giffen's plan, is only 10 cm deep now, and has a flat bottom. The feature has been dated to the Flavian period on the basis of the pottery, but its function remains unclear.

Trench 2

In trench 2, a layer of disturbed soil (non-recent disturbance) containing a relatively large amount of limestone was encountered from the start. It was not until a depth of approx. 1.20 metres below ground level that undisturbed natural subsoil was found, and only in the south of the trench. The foundation of the pillar of the northern portico was found to be embedded in this raised or applied soil layer, resting partly on undisturbed subsoil and partly on the remains of an older lime kiln. (Fig. 6.4) The fill of the lime kiln has been dated by ¹⁴C analysis to the first or second century, while the raised layer is from the second or third century. The foundation itself most probably dates to the third century, on the basis of a single sherd of a beaker with a metallic sheen.

Trench 3

It was not possible to reconstruct the drop of the ditch in this narrow trench. Van Giffen did however manage to do so, over a distance of 2.5

metres, with the aid of three sections. The ditch does not decline towards the northeast and is not therefore a drain, but will in fact have been used to supply water.

Trench 4

In trench 4 the pillar foundation (S77) of the eastern portico was found to consist of four phases, though it is unclear whether these are phases of use or of construction. The lowest (or oldest) phase is a foundation consisting of one layer of rounded pieces of limestone, the second of a flat monolith of quartzitic sandstone placed on top of this. Similar monoliths have been found in several other pillar foundations from this portico, though not in all of them. This suggests that the eastern portico might not have had the same number of pillars in all phases. There is a layer of soil with inclusions of pottery, ceramic building materials and natural stone on top of the monolith, indicating a period when there was no foundation (phase 3). On top of this, and cutting into this layer, lies the final foundation (phase 4): a footing course containing mortar, limestone and rubble, on which a cube-shaped block of Nievelstein sandstone was placed. It is possible that phases 1 and 2 are part of the same foundation, while phase 3 might indicate the levelling that preceded phase 4. It is not possible to give precise dates for any of the phases. Van Giffen identified two phases in the foundation (our phases one and two being the first, and our phase 4 the second) and linked these to two floor levels in a north-south section some 50 cm to the east. This is plausible. He dated the two floor levels to the Claudian-Neronian period, and believed that a covering layer indicating the eastern portico was no longer in use dated from after AD 200.

Some 40 cm of a hole or ditch preserved immediately to the south of the foundation (S17) has been dated relatively early, to between AD 70 and 110, on the basis of pottery. In the far west of trench 4, against the *caldarium* wall, a ditch (S12) was identified that had not been included in Van Giffen's ground plan. The ditch was preserved down to a depth of about 60 cm beneath the surface, and had straight sides some 50 to 70 cm apart. It was possible to study the relationship between the ditch and the *caldarium* wall down to the deepest level in trench 8. In the southern profile of trench 8 it

was found that the bottom of the *caldarium* wall lies at 112.29 m NAP, whereas the rendering on the outside of the wall begins at around 113.0 m NAP. The bottom of the Roman trench (S12) lies at 112.91 m NAP. There is a layer of mortar at the bottom of the ditch that grows thicker from east to west (2-15 cm), as it nears the *caldarium* wall. When it reaches the *caldarium* wall, it is precisely at the level from which the wall is rendered. It is thus highly likely that the ditch was dug in order to apply this rendering, probably to prevent condensation from forming inside the wall as a result of temperature differences between the heated interior and the undisturbed soil outside the building.³²³ Finds from a trench or ditch cross-cut by S12 have allowed these repairs to the *caldarium* to be dated to the late second or third century.

Trench 5

The position of trench 5 was changed, in consultation with the competent authority. The idea was that the location of this trench would allow investigation of a staircase that is believed to have led from there to the eastern entrance, the stairwell having been filled in later. Van Giffen's ground plan of the excavation shows a rectangular discoloration at this spot, positioned at an angle leading to the entrance. After archaeological level 0 was exposed, the work in trench 5 was discontinued, however, as the profiles in trench 7 showed that the discoloration cannot be the fill of a stairwell (see below).

Trench 6

In the plane of trench 6 (in the western wing of *praefurnium* I), post features and several post- or stakeholes were found. Van Giffen had already identified stakes such as these, which do not appear to form any clear pattern or structure, in the southern part of *praefurnium* I. The stakeholes did not yield any datable find material, but ¹⁴C analysis of charcoal from one of the stakeholes has shown that they must date from between AD 130 and 330. These are not therefore features from before the construction of the bathhouse, but from the period when the bathhouse was in use (perhaps created during alteration work?) or thereafter. Their function remains unknown. They may be traces of demolition work when *praefurnium* I or the bathhouse was decommissioned. In that case,

³²³ See also K. Peterse, this volume Chapter 4.

they might have been made bars inserted into the ground to loosen the concrete floors.

In the eastern trench profile of trench 6 a sequence of three successive floor levels (S64, S63/33 and S34) was documented, separated by two clayey raised layers. ¹⁴C analysis of charcoal from these raised layers dates the one between floors 1 and 2 to between AD 1 and 130, and that between floors 2 and 3 to between AD 130 and 230. The profiles also show that the pillar bases in this room were positioned there after floor 1 was laid, but before floor 2 was laid. The most likely explanation for these pillar bases is that they connected with the foundations for tanks containing hot, cold and mixed water. The mixed water could be let into the hot water bath.

Trench 7

Trench 7 (2 x 1 m) is a trench dug by Van Giffen outside the eastern entrance to *praeefurnium* I, which had been bricked up. The profile of the east side of the trench suggested a filled stairwell, but this turned out not to be the case. The eastern profile, only one metre to the east of the bricked-up entrance, turned out to be entirely natural. Given the fact that the door sill of the bricked-up entrance now lies almost a metre below the surface, and at least 1.35 metres below the Roman surface, there cannot have been an ordinary staircase here. Only a steep slope could have led up to this entrance, similar to a shaft or chute to a coal cellar in nineteenth- or twentieth-century houses. This entrance was probably therefore only used for the supply of fuel, not as a staff entrance. Why the entrance was bricked up remains unknown. A change probably occurred that led to fuel being supplied by another route, perhaps from the western *palaestra* or via an entrance or shaft in the southern wall.

Trench 8

See trench 4.

Trench 9

In the plane of trench 9, as in trenches 4 and 8, the Roman trench dug for the rendering of the external wall of the *caldarium* was identified (S67). There, the ditch was cross-cut by a large trench (S68) that accounted for the rest of trench 9. In the northern profile, S68 was cross-cut by a trench or ditch (S71). Above S68 was a foundation (S89) that must therefore date from

after S68. S89 is the southern foundation of the room that Van Giffen interpreted as a latrine (Fig. 6.3). The fact that the part of S89 leading to the *tepidarium* wall is missing suggests that S71 is responsible for the disappearance of the foundation there. The large trench S68 has been dated to (at least) the third century, on the basis of the pottery, so features S89 and S71 must be more recent.

Trench 10

The investigation of trench 10 focused on the uppermost (and easternmost) metre of the *cloaca*, where it issues from the *apodyterium*. The elevation measurements suggest, as expected, that the ditch sloped downwards to the northwest. The stones in the southern wall of the ditch were removed in order to lift one slab in the bottom. This not only allowed the phasing of the ditch to be investigated, but also the primary function of the Norroy stone slab, and whether there are any inscriptions on it. No phasing was identified in the *cloaca* structure; at this spot, no older phase of the *cloaca* was identified. A shard from the first century AD was however found beneath the slab. The stone does not bear any inscriptions, though a bevelled edge on the top of the stone suggests it had a primary architectural function elsewhere. What exactly this primary function was (a door sill, perhaps?) remains unclear.

Trench 11

Trench 11 was dug to examine some discoloration identified by Restaura during cleaning work on *praeefurnium* II.³²⁴ An elongated, 10cm-wide area of fill containing a large amount of charcoal (S99) was visible in the horizontal plane between the wall structures of *praeefurnium* II. It was adjacent to a rectangular discoloration with heating traces of orange-brown clay (S104). The red-fired clay suggests there was a narrower fire tunnel at this spot; the band of charcoal probably indicates the place where the wall from this structure must have been. Both the red-fired clay and the charcoal layer continue in the profile beneath the southern tufa wall of *praeefurnium* II. The blocks of tufa in the southern kiln wall structure are on top of the layer of charcoal here, so the charcoal provides a post quem date for the construction of *praeefurnium* II. The charcoal turned out to be remarkably late, dating to between AD 390 and 540.

³²⁴ Small samples were also taken of the floors in the *caldarium* and *tepidarium*, but they proved unsuitable for ¹⁴C analysis.

6.1.4 Reconstruction of the Roman surface

Research questions were asked concerning the elevation of the Roman surface for both the eastern and western *palaestrae*. To answer these questions, the boundary between shoddy (irregular or 'ugly') and regular (or 'neat') masonry was examined in walls and foundations. Where the work is shoddy, this was probably an invisible part of a wall or pillar – the part below the surface, in other words. Comparison with the reconstructed elevation of the original surface before the bathhouse was built based on the natural soils found (see above) then gives an indication of the extent to which the site was excavated or raised in preparation for construction. If we compare the reconstructions, it is clear that some 20 to 50 cm was excavated from the area of the eastern *palaestra* prior to construction (particularly in the southeast). The surface does not appear to have been altered in the western *palaestra*, with the possible exception of the far northwest part, where the ground was probably raised slightly.

6.1.5 Preservation of the physical remains of the Roman baths

Generally speaking, the archaeological remains and the natural clay in which they stand have suffered from the dry conditions inside the museum. The clay is very desiccated, and is cracked in many places, both in its natural state and where it has been disturbed (in soil features). It is not until some considerable depth, from approx. 30-40 cm below the surface, that the loess becomes less dry. Harder types of rock, such as Norroy and Kunrade limestone, are mostly in good condition, but softer rocks, including softer pieces of Kunrade limestone and tufa easily crumble. Moderate to severe crumbling has certainly occurred in several layers of mortar, particularly the less adhesive type. The surviving floor levels in *praeurnium* I (trench 6) were in reasonably good condition, but this spot must be protected from further disintegration. Inorganic find material is in a relatively good state of preservation. This material does not appear to have been exposed

to the same erosive processes as those common in the fields of South Limburg today where, as a result of centuries of ploughing and fertilisation, most of the organic material has disappeared, and inorganic material has deteriorated. Surprisingly well-preserved bone fragments suggest that the preservation conditions for this category of material are very good, probably as a result of the large quantity of chalk present in the form of stones and mortar.

Old photographs and scans of old excavation drawings from the 1940s were examined for things of particular interest, and the spots themselves were investigated to see whether the archaeological remains have since disappeared. Pictures from 1935, for example, show that a layer of no less than 1.50 to 2 metres was excavated over the entire western side of the Roman baths site, to prepare the plot for construction work.³²⁵

Until now, it was assumed that mainly the eastern *palaestra* lay beneath a thick layer of colluvium, but this appears to be true of the western *palaestra* too. Old plan drawings of the area around trench 3 suggest that the eastern *palaestra* wall cross-cuts the ditch issuing from Van Giffen's latrine, though this cannot be confirmed on the basis of this drawing alone. It would also seem unlikely, because it would mean that the eastern *palaestra* wall (at this point) dated from after AD 240. At trench 7, it was found that there was more render on the outside of the *praeurnium* wall than there is today, and that the southern *palaestra* wall had one more layer of stones. A photograph showing the southern *palaestra* wall in the western *palaestra* and the wall parallel to it, which marks the western entrance to *praeurnium* I, is also interesting. This wall, which also appears in Van Giffen's excavation drawing, consisted of several layers of stone, but it has now disappeared. Finally, the discovery of several recent disturbances caused by clay pipes in trenches 1, 3 and 4 came as a surprise, because there has never been any construction on the Roman baths site. It became clear that these sewage pipes date from after the excavation of the bathhouse. They were laid on Van Giffen's orders to prevent flooding.

³²⁵ Thanks to K. Jeneson for this discovery.

6.1.6 Find material and samples

The find material consists of pottery, ceramic building material, metal, natural stone, bone, glass, mortar and painted plasterwork. It was collected in large numbers ($n = 4762$), but the finds are mostly small, as they were collected by sieving. Following a scan after the fieldwork was complete, it was therefore decided that not all finds from the trenches should be examined further. Only the pottery, bone and ceramic buildings material were examined.

Pottery

The vast majority of the pottery finds ($n = 566$) date from the middle Roman period and were collected in Heerlen. This Middle-Roman Heerlen spectrum (AD 70-230) is dominated by form types and pottery categories from c. AD 70-120. Only seven fragments can be attributed to the second half of the Middle Roman period (c. AD 120-230), and only six to the third century. Fine tableware dominates the spectrum. Almost 35% of the entire spectrum consists of terra sigillata, terra rubra, terra nigra, bronzed earthenware and, above all, painted ware. Such a large proportion of dining and drinking ware is not at all typical of the pattern found at an 'ordinary' consumption site, whether it be rural, urban or military. Serving ware (pitchers) is also very well represented, accounting for almost 30%. This is also inconsistent with the regular pattern, but quite logical for a bathhouse, a place where people would eat and drink, as well as bathe. The fact that virtually no vessels for transporting or large vessels for storing food and drink were found is also consistent with this picture.

Animal bone

The animal bone ($n = 679$) appears to consist not only of consumption waste. Cattle were the most commonly occurring type of animal found in the trial trench survey, though the proportion was much lower than across the baths site as a whole. Pigs and sheep or goats were much better represented in the bathhouse than over the entire site. There are three possible explanations for this. One is that the material from the bathhouse was partly collected by sieving, while the material from the baths

site and the area immediately surrounding it was originally collected by hand (in the 1940s and 50s). Secondly, the difference might be connected with the greater importance of consumption in the bathhouse. In places where food is prepared and consumed, we can expect to see cattle underrepresented and pigs and sheep or goat overrepresented. This explanation is however at odds with the conclusion that the skeletal elements are from the less fleshy parts of these animals. Finally, a difference in the species profile may be related to date differences. The material from the Roman baths site and the immediate surroundings date from the first to fourth or fifth centuries, while that from the bathhouse itself dates mainly from the first and second centuries. The bone material did not provide any evidence of local industry.

Ceramic building material

A selection of the ceramic building material ($n = 958$) was subjected to further examination. This consisted only of finds from closed contexts, not from the loose upper layer or from recent disturbances. Eight main fabric groups were distinguished for the broader investigation of the Roman baths as a whole, seven of which were found during the trial trench survey. The eight types of fabric are made of three types of clay. The range of fabrics and forms can be explained by functional differences, different producers or suppliers, and/or different use phases. Since the bathhouse was in use for such a long time, and ceramic building material was recycled, it is difficult to distinguish different use periods. The contexts, which are not sharply delineated, and the limited number of fragments of ceramic building materials analysed mean that it is not possible to precisely date the fabrics.

Soil samples

Eight soil samples from features were assessed for valuable botanical macro-remains, and 21 for material suitable for ^{14}C analysis. The botanical samples contained few macro-remains, if any, so no analyses were performed. Two charcoal analyses and one ^{14}C analysis were eventually performed, however. This allowed certain fills to be dated to the Early Roman period, Middle Roman period or Late Roman to Medieval period. One charcoal sample contained remains of silver fir, which must have been imported

(possibly from southwest Germany). The other sample, from the lime kiln, was 100% beech.

6.1.7 Conclusions

After the loose top layer had been removed, the features in Van Giffen's 1948 excavation drawing could generally be recognised immediately, and several old sections from that time and a number of 'new' trenches, post- and stakeholes were also discovered. As can be expected of a site that has been excavated down to its foundations, undisturbed subsoil was found almost immediately in most trenches. Almost no vertical chronostratigraphical information is present, therefore.

Nevertheless, datable find material, ¹⁴C analysis and the cross-cutting or covering of features allowed us to reconstruct several absolute and relative dates of features, and answer a number of research questions. Despite the fact that the finds were highly fragmented, they did provide some valuable information. The pottery gave a fairly precise date for some features and we now have a better idea of the state of more vulnerable find categories (both pottery and bone). The samples yielded little botanical information, but they did allow ¹⁴C analysis, which produced some important dates.

The archaeological remains and the natural clay in which they are situated have suffered in the dry conditions of the museum. This is particularly true of the softer rock types and mortars. The other organic and inorganic find material is in a relatively good state of preservation. A surprisingly large amount of well-preserved bone was found, for example.

6.2 Geophysical survey

P.J. Orbons

An archaeological geophysical survey was performed in 2017 and 2018 to ascertain what structures might be present in the subsurface of the Roman baths complex in Heerlen.³²⁶ As many of the accessible parts of the site as possible were investigated, using all kinds of geophysical surveying equipment. The work was performed by P.J. Orbons (senior archaeological and senior

geophysics specialist) and Ferry van den Oever of Saricon, who was responsible for the ground-penetrating radar survey.

6.2.1 Methods used

A combined approach was taken to the area under investigation. All the flat areas of substantial size were surveyed using ground-penetrating radar and equipment for measuring ground conductivity (EM, Fig. 6.5). Several areas were also investigated using a magnetometer, but the steel frame of the museum building meant that this did not produce any useful results. No resistivity survey was performed, given the dryness of the area under investigation.

EM survey

The EM survey was performed using a CMD-Mini-Explorer. Virtually the entire area of the bathhouse was surveyed, as most of the site is easily accessible, and the EM equipment used was portable, allowing readings to be taken without causing any damage to the structures.

Ground-penetrating radar

The GPR survey was performed on most of the bathhouse, apart from the *apodyterium* and the *frigidarium*, because the measurements could have damaged the floors there. It was not possible to take GPR readings in the *tabernae* as the rooms are too small.

6.2.2 Results of the EM survey

The results of the EM survey refer to three different depths.

The measurements down to 50 cm below the ground surface revealed several structures. Right-angled structures can be seen in the southern part of the western *palaestra* and in the eastern *palaestra*. Zones of low resistance (in blue) can be seen along the four pillars supporting the roof and the three steel supports for the footbridge. A linear structure was found in the *tepidarium* and the *caldarium*. The traces of a structure oriented more or less north-south was identified in the *apodyterium*.

³²⁶ This is a summary of J. Orbons, this volume Appendix V.



Figure 6.5 Electromagnetic survey being performed at the Roman Baths Museum (source: ArcheoPro, J. Orbons).

The readings extending to 100 cm below the ground surface revealed similar patterns (Fig. 6.6). The perpendicular structures in the western *palaestra* were less prominent, however. In the eastern *palaestra* the linear structure was more pronounced than in the 50 cm reading.

The readings down to 150 cm below the ground surface showed that the structures in both the western and the eastern *palaestra* have disappeared.

These structures can be interpreted as follows:

- The readings were to some extent distorted by the metal of the steel supports of the roof and footbridge. The steel fence around the bathhouse also caused a lot of distortion.
- Lines indicating metal were found in the hypocaust of the *tepidarium* and *caldarium*. This might be a metal pipe.
- There are perpendicular linear structures in the western and eastern *palaestrae*. In the western *palaestra* these structures do not extend beyond 50 cm below the surface, while in the eastern *palaestra* they extend a little deeper, to 1 m. They are probably the result of small anomalies in the subsurface. They might be walls or foundations, or more compacted areas beneath the foundations.

- There is also a clear structure that issues from the northern side the *natatio* and continues into the western *palaestra*.
- There is a strip of high resistance on the north side of the *natatio*, which connects with the drains towards to north. This might have been a connection between the *natatio* and the drain.
- Unidentified perpendicular structures were seen in the three *tabernae* and on the south side of the portico.
- A zone of high resistance was found in the *apodyterium* and *frigidarium*. The reason for this is unclear. The analysis of the history of the building suggested the possibility that the side sections were built later. The geophysical survey might confirm this.

6.2.3 Results of the ground-penetrating radar survey

To analyse the measurements taken by ground-penetrating radar, the data from a depth of 65 cm below the ground surface were compiled into a single image in the horizontal plane (time

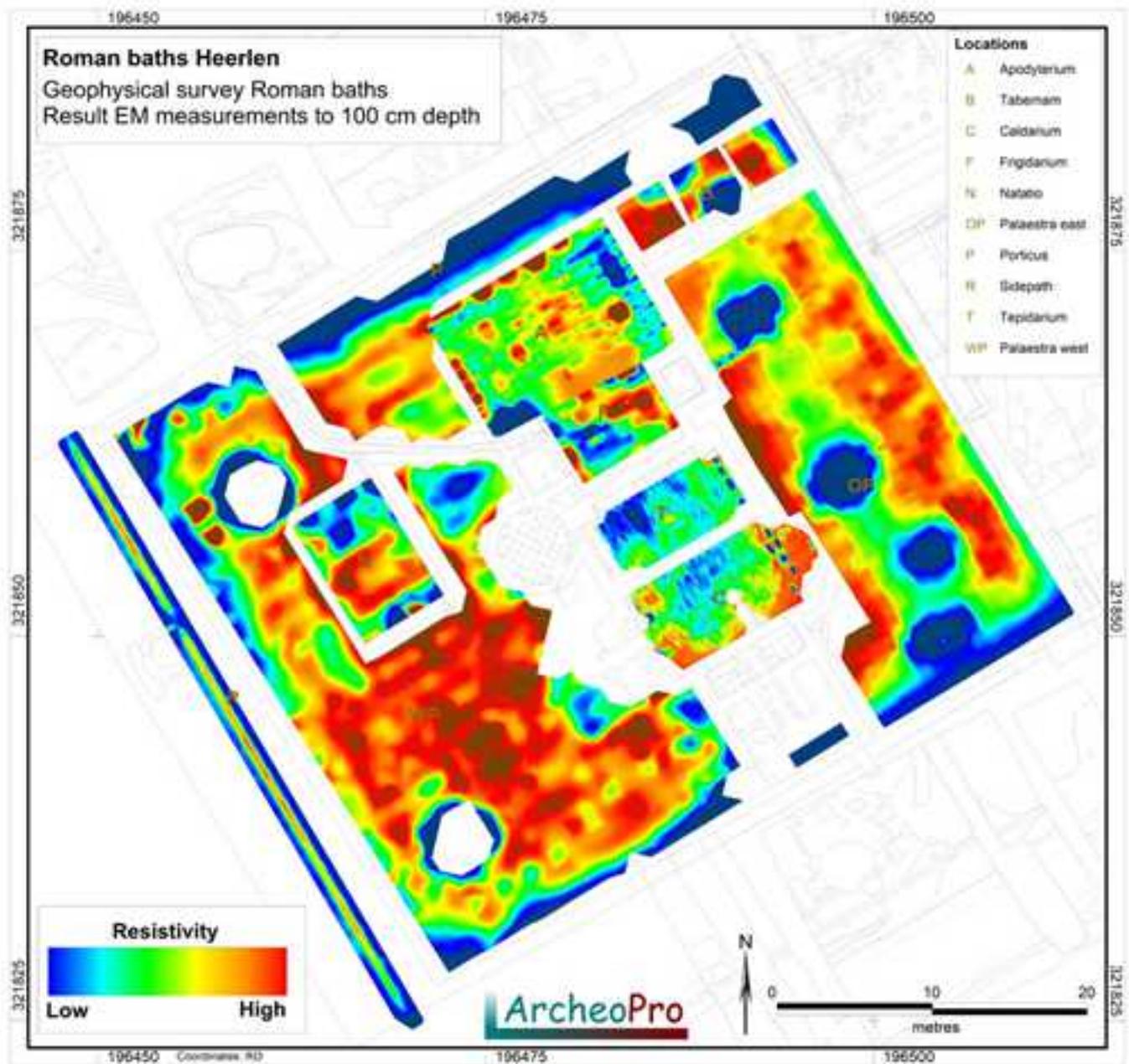


Figure 6.6 The results of the geophysical electromagnetic survey (source: ArcheoPro, J. Orbons).

slice). At the location of the *natatio* the data from 45 cm below the ground surface were used, because the *natatio* lies deeper.

In the western *palaestra*, around the pillars supporting the roof of the museum and around the pillars in the eastern *palaestra*, there are reflections that are associated with the foundations of the pillars. Modern disturbances caused by a modern pipeline in both the western and eastern *palaestrae* can also be identified.

This sewage pipe was encountered during excavations and can readily be recognised in the readings.

In addition, structures visible in the readings from several places suggest foundations or walls in the subsurface. They occur in both *palaestrae* and in the portico. The structure that enters the *natatio* from the western *palaestra* can also be recognised in the readings.

Outside the bathhouse, on the footpath, three

radar lines 44 m long were investigated using vertical radar profiles, rather than a horizontal time slice. This showed several reflections that correspond to the known extension in this area. These reflections suggest the presence of walls in this area.

6.2.4 Conclusions

The GPR and EM surveys performed by ArcheoPro show that several structures still exist beneath the excavated bathhouse. Unknown structures exist in particular beneath the *palaestrae*. The survey also revealed new detailed information, such as the presence of structures around the *natatio* and by the *apodyterium*. The possible metal pipe in the *caldarium* and *tepidarium* is another valuable piece of additional information.

7 The immediate surroundings of the baths

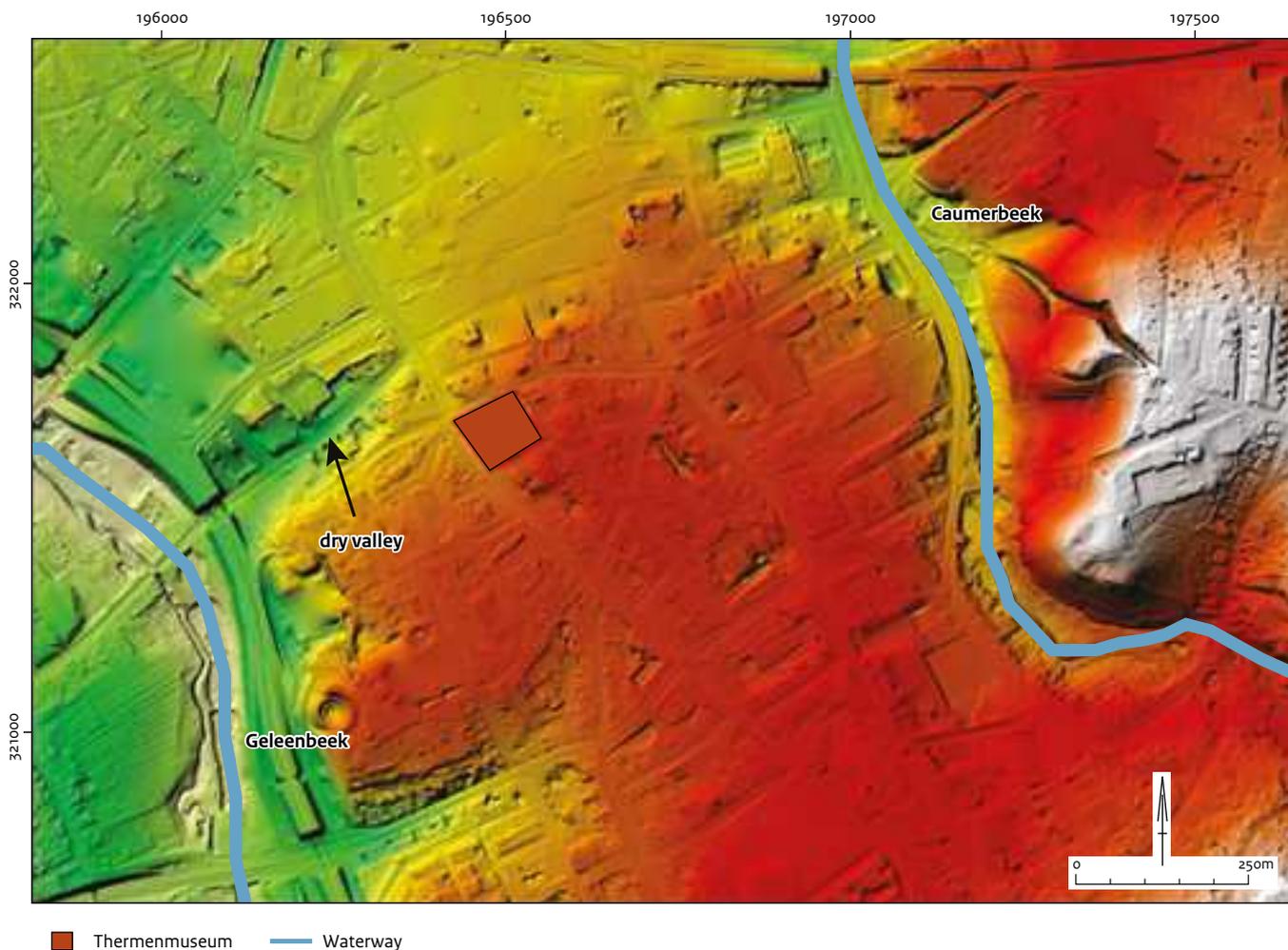


Figure 7.1 Detailed elevation map showing the position of the Roman baths (indicated by the red star) relative to the stream valleys of Geleenbeek and Caumerbeek (source: <https://ahn.arcgisonline.nl/ahnviewer>, M. Haars).

7.1 Physical geography and the water supply to the baths

J.J.W. de Moor

The study of the physical geography focused on two research topics: how the Roman baths complex was situated in the landscape and the water supply to the complex.³²⁷

7.1.1 Landscape

Roman Coriovallum is situated in the typical loess landscape of southern Limburg, with its plateaus and its deep stream valleys. More specifically, Coriovallum lies in the Heerlen

Basin, where marine deposits from the Tertiary are covered with a thick layer of loess. During the Holocene a Luvisol with Bt horizon, typical of the loess regions, developed in the loess.

In geomorphological terms, the landscape at the Roman baths complex site consists of a fairly flat plateau in the southern part of the Heerlen Basin, with the stream valleys of Geleenbeek and Caumerbeek on either side. The Roman baths complex lies exactly on the northern edge of this flat plateau and Coriovallum extends further to the north of the edge of the plateau. To the south, the plateau inclines slightly upwards and follows a clear step in the relief to a terrace of the former East Meuse river that lies at a higher level. A dry valley descends towards the Geleenbeek to the west from the plateau on which the baths complex is situated.

³²⁷ This is a summary of J.J.W. de Moor, this volume Appendix VI.



Figure 7.2 The reconstructed position of the proposed water supply to the baths complex on the elevation map, starting at De Erk farm (A) and ending at the Roman baths (A') (source: <http://ahn.arcgisonline.nl/hoogteprofiel>, M. Haars).

There were two important reasons for building Coriovallum at this location. First, the spot lies on the edge of the Heerlen Basin, with a view over its immediate surroundings, with good access to the surrounding area on several sides. The second reason is the presence of two streams that could supply water. Furthermore, there were loess soils in the vicinity suitable for farming, and clay soils for the production of pottery.

The deposition of colluvium in southern Limburg took place in two phases, one in the Roman period and one in the Middle Ages. Given the fact that Heerlen was a town in the Roman period, it is likely that there was enough farmland in the surrounding landscape to grow wheat, among other things. However, there is a risk of erosion on such fertile loess soils, which

can lead to flooding and mudflows (colluvium formation).

During this research, we had the unique opportunity to observe the soil profile in the bathhouse ourselves. It became clear that the original, pre-Roman soil structure – with a Bt horizon typical of the loess regions – is still partially intact, and that erosion processes associated with colluvium probably played only a limited role here.

7.1.2 Water supply

There were several options for ensuring a continuous supply of water to the bathhouse. The first was to use groundwater from a well.

The water table is currently at 10 m below surface (bs), though it is possible that the water management authorities have artificially lowered it, and that the water table was considerably higher at the time of Roman Heerlen. An indirect, but clear and striking piece of evidence for a different level at that time is the depth of Roman wells, which did not extend beyond 6 m bs.

The second option would have been to use natural springs related to the geological situation. The springs in the vicinity of the bathhouse are mainly situated in the valleys of Geleenbeek and Caumerbeek. There are no springs at the bathhouse site itself, however, so the likelihood that springs were used to supply water is very small.

The third option would have been to use natural streams near the bathhouse: Geleenbeek and, more especially, given its higher location, Caumerbeek. Several authors pointed to this possibility in the 1950s and 60s, referring to a water pipe or watercourse of Roman origin that must have run from the Caumerbeek to the Roman baths. This was taken up more recently by B. Taken of Coöperatie Landschapsplanning, and incorporated into a research proposal for IBA Parkstad.

The watercourse (also known as ‘the Vlot’) is believed to have started at De Erk farm and continued to the north, mainly along Akerstraat. It probably branched off at Nobelstraat towards the baths, via today’s Templesplein. Technically speaking, the Romans would not have found it difficult to create such a structure, as they could have largely followed the natural relief. This hypothesis is difficult to test, however, as no trace of any watercourse or water pipe has been found in this densely built-up area today.

7.2 The urban setting of the baths.

Features and structures from the ROB excavations 1952-1957

W.K. Vos

The ROB (State Service for Archaeological Investigations) excavated the features and structures in the vicinity of the Roman baths in 1952-1957.³²⁸ The investigations yielded important results that have contributed to

the broader research into the history of the Roman bathhouse. Most of the baths complex itself was excavated during the war, by A.E. van Giffen and others (see chapters 2 and 3). At that time, surveys were also conducted outside the complex, albeit on a limited scale only. These investigations, and several earlier reports and finds, suggested that there were many remains from the Roman period in Heerlen.

The first large-scale excavation of these Roman remains was performed in the 1950s. This work around the bathhouse was headed by J.E. Bogaers, who worked for the ROB at the time. However, the analysis of the features, their archaeological interpretation and the reports of these ROB excavations around the bathhouse have never been completed. They were re-examined as part of the recent research on the Roman baths and surrounding area, and have now yielded significant information on this part of Roman Heerlen (Coriovallum).

7.2.1 Building features

The investigation focused on a more or less contiguous area excavated to the north, east and south of the bathhouse. More than twenty trenches of varying sizes were dug. In many of the trenches, only two levels were excavated, but in a few places as many as six levels had been dug. The difference between the highest and lowest stratigraphical levels was more than 1.5 m in some cases. There were numerous archaeological features and structures, and they were very diverse, including pits, ditches, postholes, soil layers, road ditches and many other types of soil feature. The main features can be interpreted as buildings, roads and a ditch.

Remains of buildings were found to the north and east of the bathhouse. They were built of stone, and standing masonry several dozen centimetres tall was found during the excavations (Fig. 7.3). The contours of several individual houses could be discerned in the remains of the walls, which were 40-50 cm wide. The houses vary in size and possibly also in function. The houses had an elongated shape and were built in consecutive rows, as ‘striphouses’. The most striking features of the

³²⁸ This is a summary of W.K. Vos, this volume Appendix VII.



Figure 7.3 Remains of a stone building exposed during the ROB investigation in 1956; view to the south (source: Thermenmuseum archives; original photo by ROB).

stone structures are, firstly, a deeper part in the centre of the houses that can be interpreted as a cellar and, secondly, the building line along the front of the house plans at an oblique angle to the longitudinal axis.

The houses were approximately 7 m wide. Their lengths are mostly unknown. Although we have information on up to 13 m of ground plan, it is clear they must have been much longer, continuing well outside the area excavated. It is not known how far they extended, but given parallels of this type of strip-house, it may have been as far as 30 m, or even 70 m.

It appears at first that we recognise little of the layout of the Heerlen houses. We know from other find spots that houses of this type consisted of a portico and workshop at the front, or street end, a central or residential section with several rooms that may be arranged along a corridor, and a rear section where there would be a garden and possibly auxiliary buildings, small-scale workshop and a well. The plots may have been surrounded by fences. At the front – beneath the workshop – there would often be a cellar, although it might also be located elsewhere in a *vicus* house.

Many of these elements are difficult to discern in the Heerlen data. Nevertheless, it appears that the front range of the houses was excavated, which had a portico or veranda, as well as

parts of the shops and the residential area (Fig. 7.4). House 3 is the most complete example, providing information on some of the individual interior spaces. House 2 includes the remains of a cellar with walls 70 cm thick, and a ceiling over 2 m high. Unfortunately, we have no information on specific find material or on interior elements of the cellar, such as the sills of windows or niches.

Besides remains of stone buildings, traces of wooden posts were also found at deeper levels. The configurations of these rows of posts, along with parts of wall ditches, unmistakably represent the ground plans of half-timbered houses or wattle-and-daub structures. Some of these features lie beneath the walls of the stone buildings described above. They were not from the same occupation layer and do not connect to the stone foundations, because pole foundations are not needed beneath walls in the loess. Furthermore, the postholes, post rows and ditches are regularly cross-cut by the features of the stone buildings. For this reason alone, they cannot be from the same habitation phase. They therefore stood here before the stone structures.

The precise ground plans of the wooden buildings are not easy to reconstruct (Fig. 7.5). It is for example unclear whether walls were shared between buildings, or each structure

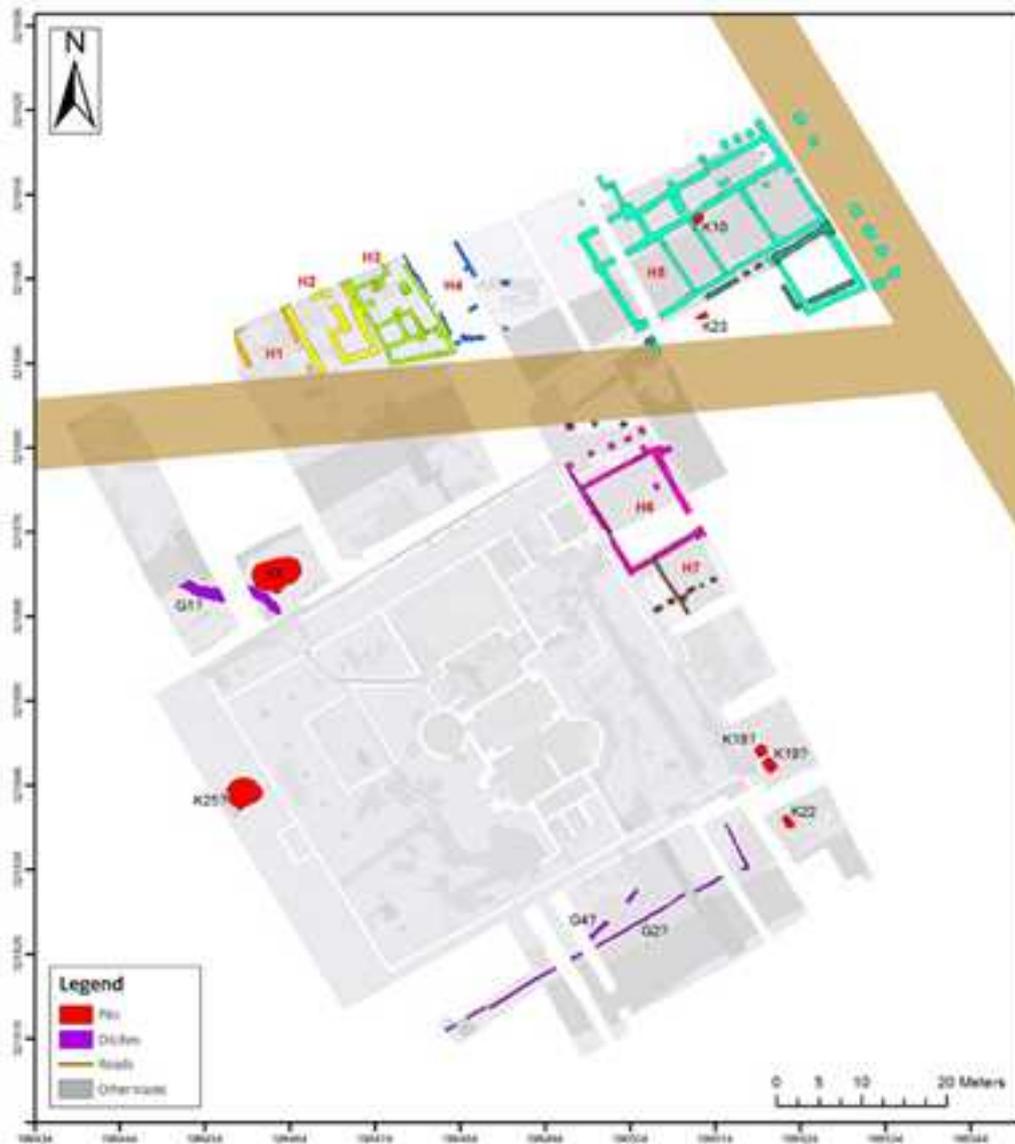


Figure 7.4 Reconstructed occupation phase for the stone buildings in the vicinity of the baths in the period AD 100-250 (source: W.K. Vos).

had its own dividing wall. Another notable feature is the cross-cutting of some postholes, which suggests that there must have been more than one phase of wooden structure. There are also traces of wooden buildings with a different orientation from the later wood and stone buildings. They might be attributed to an earlier occupation phase. Parallels can be found in the research in Valkenburg (Zuid-Holland) or Nijmegen St. Jozefshof for the reconstruction of the striphouses. Timber framing seems to be the norm, though compact clay blocks ('rammed earth'), or structures with wooden

supporting beams are also a possibility.

Besides these characteristic *vicus* houses, less clear ground plans have also been identified, including in the area to the east and northeast of the Roman baths. One remarkably large building has been identified at the corner of what appear to be two streets. This stone structure, referred to in earlier publications as a *statio* or *mansio*, had a *porticus* and a well in what is assumed to be its inner courtyard. Bogaers published this structure, but the data have never been further analysed. Analysis of the field drawings revealed a wooden-built



Figure 7.5 Reconstructed occupation phase for the wooden buildings in the vicinity of the baths in the period AD 50-100 (source: W.K. Vos).

predecessor beneath this one, too, probably from two different occupation phases.

7.2.2 Other settlement structures

Other interesting features around the Roman baths site (Fig. 7.5) are a ditch (G2) to the south (perhaps for the water supply or drainage?), a large number of pits containing bone fragments and horn cores (tanning?) to the east, and several roads. One of the roads ran east-west to

the north of the Roman baths. It was diagonal to the perpendicular axes of the bathhouse, and the houses described above stood beside the gravel track to the north. Few structures have been identified to the south of the road and, combined with the presence of a large quantity of gravel, this suggests that there was an open space or square here, most likely intended to emphasise the monumental character of the entrance to the Roman baths complex. Whether this was actually planned as such is doubtful. The street was not at any rate the main east-west route from Cologne to Boulogne-sur-Mer,



Figure 7.6 Cross-section of the V-shaped ditch drawn during the ROB investigation at the Roman baths site in the 1950s (photo: Thermenmuseum archives; original by ROB).

but a secondary route. *Insulae* were undoubtedly planned at an early stage, when plots were assigned in the *vicus*. The diagonal road may have been 'integrated' at some point, i.e. when the bathhouse and corner building already existed. The orientation of the *insula* remained the same, and it seems that the building line of the façades facing the street was simply adjusted.

A road running north-south possible from Xanten to Aachen falls just outside the excavated area, and can be demonstrated only indirectly by the above-mentioned boundary of the corner building, for example. Traces of this north-south route have however been identified elsewhere in Heerlen, though how it continued to the south, past the bathhouse, remains a matter of debate.

We can draw some conclusions about the precise dates of the streets. Given its slanting orientation relative to the bathhouse and the houses, it may be that the oldest road was not built until after the first phase of construction at the bathhouse, sometime in the early Flavian period. Nevertheless, there must have been thoroughfares in Heerlen prior to this time, probably already under Agrippa, in the early first century AD. How they relate to the road(s) at the Roman baths site remains unclear.

The east-west road remained in use at least

until a deep V-shaped ditch transected the route (Fig. 7.6). Given its function, and the find material, the ditch can certainly be dated to Late Antiquity, when many open urban settlements developed into more enclosed sites (*burgus*). The enclosure may have been in the form of a wall, as in Maastricht or Tongeren, but nothing has been found in Heerlen to suggest this. There is also no sign of any palisade, but a deep V-shaped ditch could have helped to protect the settlement. The date of the ditch fill suggests it must have been dug sometime in the third or fourth century. We have the impression that the bathhouse, and probably also other structures to the east of the complex, were brought together in some kind of refuge. This was apparently necessary, though it is not entirely certain that the Roman baths would still have been used as such at the time. A small military unit may have been stationed at the site enclosed by the ditches, which measured an area approx. 200 x 60 m. However, no concrete evidence of this unit has been found.

Dating the features around the bathhouse in Heerlen is not a simple matter. Bogaers recorded a number of fire and heightening layers in profiles, attributing them to six phases of occupation (Fig. 7.7), but these could barely be traced in the excavated stratigraphical levels at the Roman baths site. This is not only because

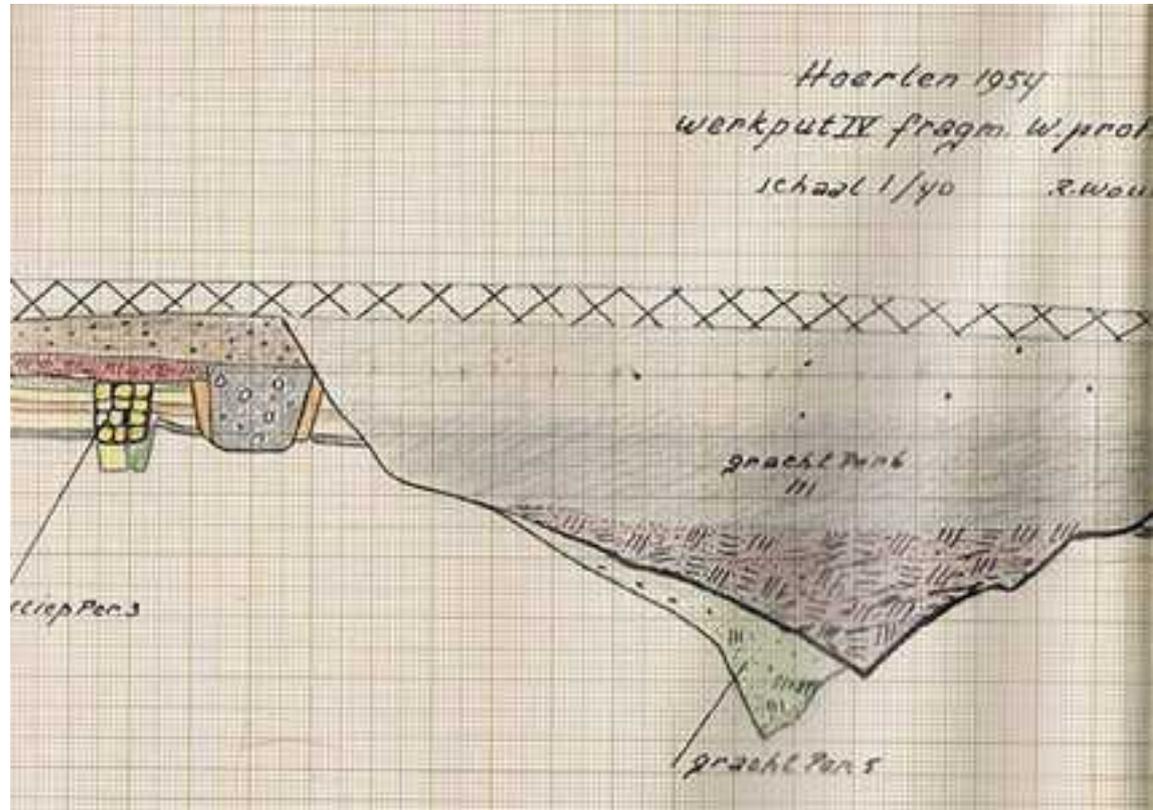


Figure 7.7 Coloured drawing of an idealised profile from an ROB daily report by field technician R. Woudstra (source: Bogaers' archive in Nijmegen).

of the method of excavation, but also because of earlier layers of material, the cross-cutting of soil features and the mixing of finds from different occupation periods. To summarise, in terms of chronology we can suggest that a first-century occupation phase may have begun in the Augustan period. There were indeed wooden buildings around the place where the bathhouse would later be built. We suspect that building in stone did not commence at the site until the Flavian era. Stone buildings stood at the site until well into the second or third century. After that, a deep V-shaped ditch was dug around the bathhouse and another zone to the east of the bath.

7.2.3 Conclusions

The analysis of the features excavated by the ROB has at least positioned the baths complex more firmly in the Roman urban environment of Coriovallum, and the Roman baths site in

particular. The meaning and context of the bathhouse in its immediate environment have thus been more precisely interpreted. One example supports this conclusion: the discovery of a pit, dated to the Flavian period, containing remains of a mosaic. The pit (K14) is highly significant, assuming that the mosaic tiles (Fig. 7.8) come from the baths and therefore allow an indirect conclusion to be drawn as to the presence and demolition of part of the bathhouse. The baths undoubtedly underwent many phases of alterations, certainly more than Van Giffen suggested. The first may have occurred in the Flavian era at the latest, which gives an indirect indication of the origin of the complex. It is tempting to put the initial phase of building in the middle of the first century, on the basis of this information and background. No further information can be obtained on this matter at this stage, but it is precisely this kind of data that might have major implications for the research on the baths and their urban setting.

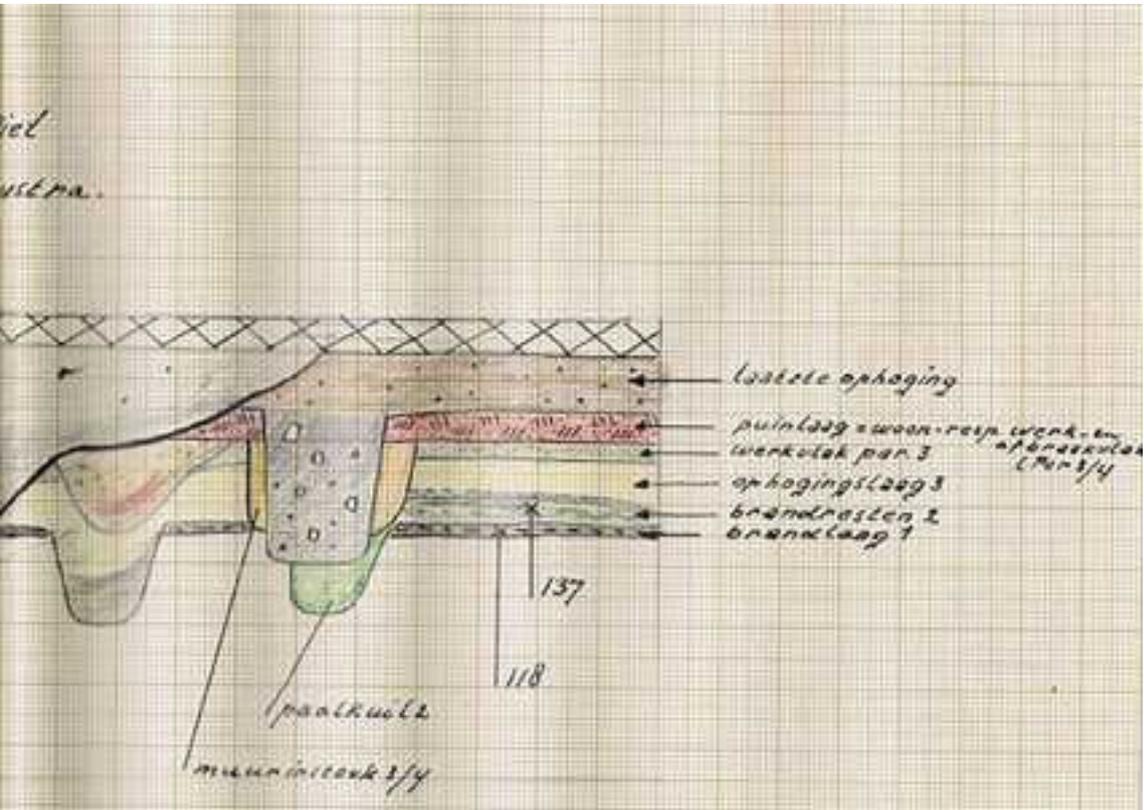


Figure 7.8 Part of the remains of the mosaic floor from pit 14, which has been dated to the Flavian era (source Thermenmuseum, Ph. Debeerst).

8 Material culture of the bathhouse and its surroundings

8.1 Roman pottery

J. Van Kerckhove

8.1.1 Introduction

This summary sets out the conclusions of the analysis of the pottery collected over the years in the vicinity of the bathhouse, and the analysis of the pottery collected during the trial trench survey performed at the Roman baths site in 2017.³²⁹ Both analyses form part of the investigation and restoration of the Roman bathhouse in Heerlen. The terra sigillata was not considered in this particular study, as a separate report is devoted to it.

The research questions specified by the client which had a bearing on the pottery analysis can be summarised as follows:

- What can we conclude about the origins and the decline of Coriovallum? Is there any evidence of military activity?
 - Were any finds typical of a bathhouse made and, if so, where? From what period do they date? Do these finds differ from the material found in the structures in the immediate vicinity of the bathhouse?
 - What can we conclude about pottery production in the *vicus*?
 - From what period do the finds made in features in the area surrounding the bathhouse, (i.e. the Roman baths site) date, and how should we interpret them?
-

8.1.2 Method

After a quickscan of all the pottery collected in the vicinity of the bathhouse over the years, a selection was made for analysis. The selection focused on finds which have both an old find number (assigned by the excavator) and a 'catalogue number' with which they have been recorded in the Thermenmuseum's collection. These are large fragments, many of which are in fact virtually complete objects. The fact that almost all of them are rims suggests that collection in the field was selective and/or a selection was made afterwards (when the finds were processed). All of the pottery from the trial

trench survey was analysed.

In order to address the research questions, the pottery spectrum from the Roman baths site was studied from three perspectives: origin, function and chronology. Specific variables were entered in a database for this purpose: pottery category, fabric, form and form type. Any decoration, (soot) deposits and charring, and the rim diameter, were also recorded. The number of sherds, the weight, the minimum number of individuals (MNI) and the estimated vessel equivalent (EVE) were also noted for the purposes of quantification. All sherds were examined, using a binocular, low magnification stereo microscope with a magnification from X10 up to X40. The vast majority of the pottery from the Roman baths site consists of locally produced Heerlen ware. In order to categorise them as Heerlen pottery, the sherds from the Roman baths site were systematically compared, using the stereo microscope, with reference samples of production material described for a review paper.

8.1.3 Results

The pre-Claudian period

The earliest pottery spectrum at the Heerlen Roman baths site bears a great resemblance to the early occupation layers of other places founded *ex nihilo*, such as Tongeren and Liberchies. The first generation of pottery consumers had Roman-style (or, rather, Mediterranean) eating and drinking habits, with no continuity in native consumption patterns in the form of locally made hand-shaped pottery. This Mediterranean style of consumption among the very first inhabitants of Coriovallum can be explained by the annexation policies applied in our regions from the Augustan period onwards, whereby the Romans annexed areas and established new settlements. The first residents had strong ties to the military network, and their eating and drinking habits were very 'Roman'.

Comparison with the earliest, 'purely military' sites in our regions (Hunerberg and Kops Plateau) is problematic. The two military sites in Nijmegen probably date from an earlier period. Furthermore, their purely military character has produced a specific spectrum: a mainly military spectrum of terra sigillata and a large quantity

³²⁹ This is a summary of J. Van Kerckhove, this volume Appendix VIII.



Figure 8.1 Pompeian-Red ware plates from Campania (Italy), type Peacock 1/Goudineau 16/Oberaden 21a (source: Thermenmuseum, Ph. Debeerst).

of thin-walled beakers. The spectrum of terra sigillata and thin-walled pottery is different at the Roman baths site. Only one Augustan piece of thin-walled pottery was found.

Yet the consumers at the Roman baths site had access to the same imperial exchange network as the residents of military sites and early settlements throughout the pre-Claudian period. Pottery was after all imported from all over the empire to meet the needs and wishes of the first consumers at Coriovallum. Amphorae were brought in to supply them with wine, from Campania (Italy) and other places. This wine was mixed in delicately made mixing bowls (*kalices*) of terra nigra. People with a Mediterranean lifestyle preferred wine to native beer. As in Italy, people drank from beakers (thin-walled ware, terra sigillata, terra rubra, terra nigra) and food was served on plates and dishes (terra sigillata and terra nigra). Mortaria were imported from Aosta and Lyon for the new methods of preparing food, which involved grinding herbs and making sauces. Drinks (probably wine) were also poured from a new type of vessel: the flagon. Early versions of 'cork urns' found at the Roman baths site in significant numbers were typical of the Augustan-Tiberian period. They have been interpreted as terrines in which paté was transported from the Meuse region of

Belgium to the militarised zones along the lower limes. The most striking examples for this period are the platters in Pompeian-Red ware (Fig. 8.1), some of which have a lid, which were found in large numbers.

These platters, imported from Campania (Italy), were used for baking bread. The platters at the Roman baths site do indeed all have soot stains on the outside. They are found in our regions only at settlements that can be dated to the start of the common era. Fairly finely executed jars in grey wares with a highly characteristic coarse fabric – Rhineland granular grey ware – were used for cooking. There were two types of this ware, one that can probably be ascribed to the Cologne/Xanten region, and the other possibly to the Mainz region. The Rhineland granular grey ware form types found occur mainly at the *castella* of Oberaden and, to a lesser extent, Hofheim.

The early finds come mainly from the northern part of the Roman baths site, from the ditch, from house H5A and from house 1. There is no compelling evidence that they are associated with the earliest phase of use of the building that housed the baths.

The period between c. AD 40 and 70

The Claudian-Neronian period at the Roman



Figure 8.2 Colour-coated beaker in Heerlen ware, type CC-HEERL-BE4, the Heerlen equivalent of the beaker Greene 20.5 from Lyon (source: Thermenmuseum, Ph. Debeerst).



Figure 8.3 Colour-coated beaker in Lyon ware, type Greene 20.5, the Lyon equivalent of the beaker CC-HEERL-BE4 from Heerlen (source: Thermenmuseum, Ph. Debeerst).

baths site is also characterised by a large quantity of imported material, another trend that can be explained by the fact that Coriovallum had access to the same imperial network as the soldiers stationed at the limes along the Lower Rhine. Products continued to be imported from the Mediterranean region (amphorae, mortaria, colour-coated ware from Lyon), but Rhineland ware also comes to occupy a prominent position in the spectrum. This is reflected above all in the grey cooking ware, which may come from the region around Cologne. Tableware (particularly in terra rubra and terra nigra) remains well represented in the spectrum. In this period, too, tableware appears to have a wide range of origins.

The Claudian-Neronian component is spread across the entire site, but again there is a concentration in the northern part (in house H5 and in pits K11 and K24, among other places).

It is highly likely that Heerlen ware was introduced around c. AD 50. We must first highlight the colour-coated beaker CC-HEERL-BE4 (Fig. 8.2), which was produced in the oldest kiln found so far in Heerlen. The similarities with its counterpart from Lyon are unmistakable (Fig. 8.3). Early beakers with such a characteristic

groove on the outside of an everted rim were not made in production centres like Cologne, Jülich, Soller (Kreis Düren), Tongeren or Tienen, but are only known to originate from Lyon. They are well-represented among the material at the Roman baths site. With its characteristic orange-brown surface, the beaker dates up to c. AD 100/120. The mortarium MOR-HEERL-M18, which was made in Heerlen, also has a counterpart from Lyon, and even from Aosta in northern Italy. Mortaria of this form type (Oberaden 72) are generally dated to the first half of the first century. The first imitations made at Cologne and Heerlen can probably be dated to c. AD 50. The small colour-coated bowl Hofheim 22 in Heerlen ware probably dates from this period too. Such bowls were produced in northern Italy, Lyon and later also in Cologne.

It is difficult to quantify the pottery from this period, given the longer lifespan of some fabrics and form types. The Rhineland granular grey ware mentioned above had its peak in the period between c. AD 40 and 70, but a more fine-walled version is characteristic of the pre-Claudian period, and a thicker-walled version of this fabric continues into the early second century. The colour-coated beakers and bowls in

Lyon ware are typical of the Claudian-Neronian period, but their relative exclusivity means they account for only a small proportion of the total pottery spectrum at the Roman baths site. As a result, it is unfortunately difficult to compare quantified data with those from sites like Tongeren and Nijmegen. However, the fact that there is definitely an exotic spectrum from this period and the fact that production in Heerlen began in this period (and, furthermore, imitated form types from Lyon) suggests an important phase of activity at the Roman baths site, as is also the case at Tongeren and Nijmegen.

The period between c. AD 70 and 175

The explosive growth in Heerlen ware between c. AD 70 and 120 may have been driven by the popularity of the bathhouse. Thanks to the pottery survey at the Roman baths site, the number of Heerlen form types has doubled relative to the 2014 summary. Interestingly, the fine tableware, flagons and mortaria, in particular, are present in many different form types. At the Roman baths site, too, the fine tableware (terra nigra, terra rubra, colour-coated) and the flagons account for a considerable proportion of the spectrum: 21% and 16% respectively. These two functional groups can be expected to be well represented in an urban context like the Roman baths at Coriovallum. Nevertheless, the quantity of tableware, in particular, is very high, even for a *vicus* context. This peak in drinking and dining ware suggests it was used at the bathhouse. This hypothesis is supported by finds that are known to have been collected inside the bathhouse. Several colour-coated beakers and terra nigra dishes (dated to the period between c. 70 and 120) were retrieved during work performed in 1940-1941. Fragments of colour-coated Heerlen beakers, terra rubra, terra nigra and flagons were collected during the trial trench survey performed at the bathhouse, too. All these finds date from the period between c. AD 50/70 and 120, the first major phase of production at Heerlen. It could be that the production of pottery in Heerlen (which was characterised from the start by a huge variation in form and function, and above all by colour-coated ware and smooth-walled flagons) was triggered by the construction of the bathhouse. Large numbers of visitors to the bathhouse would after all have prompted an increase in the

consumption of Heerlen ware. Some 18% of the colour-coated Heerlen ware can be dated to the consumption phase AD 70 to 120.

Another group of finds that may have been used in the building housing the baths are the many mortaria with traces of soot on the inside. In some cases the sherds are thoroughly coated in soot, and have thick deposits. Some mortaria have soot imprints of irregular 'globular' objects. It may be that incense was burned or the mortaria may have been used as fire bowls for lighting parts of the building. The rim diameter is generally between 30 and 44 cm, so they are not noticeably larger than the mortaria without soot. However, none of the really small mortaria have traces of soot. The mortaria date from the early Roman period (roughly Claudian) into the third century, and they are distributed over several excavation pits.

This study has shown that the consumers at the Roman baths site and the bathhouse mainly opted for products made in Heerlen. The visitors to the Roman baths complex will not, however, have been the only people to buy Heerlen ware. The spectrum (from c. AD 50) is highly similar to that of the important production centre of Cologne (in terms of the number of kilns, pottery spectrum and number of form types). Both of these production centres had access to very high-quality clay. Previous research has shown that the Heerlen potters used Brunssum clay. We can conclude that pottery for the Roman baths site was supplied mainly by local Heerlen producers virtually throughout the Middle Roman period (c. AD 70-175). Interestingly, the well-known nearby production centres, such as Cologne, Nijmegen, Tongeren and the Meuse region of Belgium are almost entirely absent from the spectrum. The only 'competitors' were products from Jülich and the region around Dürer (Soller), which were in close proximity to each other.

In the period between c. 120 and 175, too, the majority of the pottery consists of Heerlen ware. The colour-coated ware now has a black covering layer rather than an orange one, and consists above all of a wide spectrum of beaker types. Colour-coated dishes remained immensely popular at the site in this period. The large quantity of colour-coated ware from this period (80% of all colour-coated ware) indicates the importance of drinking and dining ware at the Roman baths site in this period,

too. Jars, bowls and dishes with a heart-shaped profile are the most common among the coarse wares, as they are in the Rhineland. However, the striking thing about the Heerlen ware is the large number of different types of mortaria: no fewer than 24. As with Soller mortaria, the spouts are often in the form of stylised animal snouts, which suggests close ties with this region of production. It is not yet clear how we should interpret the diversity of mortarium types at the Roman baths site, or the clear similarities with the mortaria from Soller (Kreis Düren). This may reflect specific consumption patterns at the Roman baths site that are difficult to interpret, and may even be associated with the bathhouse.

The third and fourth centuries AD

As in Cologne, from the end of the second century the local ware declined in importance in favour of Mosel and Eifel ware. This shift in production and distribution networks is difficult to interpret at this stage. The trend continued into the third century. In the case of tableware we see some attempts to produce a local variety of black-slipped ware, but the majority of this pottery was produced in Trier and the Argonne. The coarse ware was made mainly in centres in the Eifel region such as Urmitz.

The fourth-century pottery spectrum, found mainly in the large V-shaped ditch, is entirely dominated by coarse ware from Mayen and black-slipped wares from Trier. Regional Late Roman products are entirely absent. Such quantities of Mayen ware are known only from Late Roman fortified sites. Along with the deepened V-shaped ditch, the coin spectrum and the results of the terra sigillata analysis, this substantiates the theory that a Late Roman fort existed at the site.

8.2 Terra sigillata

R.A.J. Niemeijer and M. Polak

8.2.1 Material

The terra sigillata found at the site of the Roman baths was studied as part of the Thermenterrein research project.³³⁰ A total of 3,246 fragments were determined, divided among 2,471 object numbers. These items come from various

collections. Some of them are from the 'thermae collection', which mainly comprises finds collected during the first excavation of the Roman baths complex in the 1940s. The largest proportion comes from the ROB (State Service for Archaeological Investigations) excavations of the 1950s, which took place mainly outside the building housing the baths.³³¹ Some sherds are from other collections, and the precise origin of a small proportion is unknown.

Find material was collected very selectively during the excavation of the bathhouse in the 1940s. The terra sigillata from this collection consists of 165 fragments from at least 69 individuals, divided among 108 object numbers. Almost all the fragments are decorated in some way, or have an internal potter's stamp. During the excavations in the 1950s over 2900 fragments of 1667 reconstructed individuals divided among 2216 object numbers were retrieved from the excavation trenches to the north, east and south of the bathhouse. They were mainly rims and bases, but the collection also includes some wall fragments that can be assigned to a form. In many cases the documentation does not allow us to attribute the find to a precise context, so much of the terra sigillata material must be regarded as stray finds.

8.2.2 Procedure

A quickscan of the terra sigillata was first performed in order to roughly sort the material by origin (Italic, South Gaulish, Central/East Gaulish) and record any potter's stamps or decoration. All the terra sigillata was then classified using standard works for the various main groups and the results entered into an Excel spreadsheet, noting 28 variables. This list was then linked with the context information available.

During the process of determination, we gained the impression that matching sherds were often distributed over several object numbers. To test this hypothesis, the South Gaulish terra sigillata was grouped by form and systematically adjusted. Although matching fragments could certainly be identified, they were not so great in number as had been suspected during determination. We therefore decided not to

³³⁰ This is a summary of R.A.J. Niemeijer & M. Polak, this volume Appendix IX.

³³¹ See Chapter 1 and Section 7.2.



Figure 8.4 Fragment of a Late Roman bowl Chenet 320 with roller-stamped decoration (source: Thermenmuseum, Ph. Debeerst).

continue the matching experiment.

The Central and/or East Gaulish sigillata was however spread out by form, with the focus on distinguishing between different production centres on the basis of the fabric. Any matching fragments identified were noted.

Distinguishing production centres on the grounds of fabric alone is a tricky affair. Where there was no other evidence such as a potter's stamp, decoration or, in some cases, a profile, no production centre was entered in the database.

8.2.3 Conclusions

The analysis of the material was based on a series of general and specific research questions concerning, among other things, date, distribution and use, and the relationship between the Roman baths site, the rest of Roman Heerlen and the wider region.

Just over 1% of the terra sigillata comes from Italy and Lyon, 50% comes from South Gaul, no more than 7% is from Central Gaul and at least 41% comes from East Gaul, a fifth of which is Late Roman. The distribution among the production areas makes it clear that most of the material dates from the first century AD and that

the second and third centuries are clearly better represented than the fourth and fifth centuries. There are no major peculiarities in the form spectrum, other than that there appears to be a shift from small to medium-sized bowls from the first to the third centuries.

The potter's stamps and decoration give a more accurate picture of the chronological composition of the collection, at least until the second half of the second century. After this potter's stamps were no longer used and decorations are less easy to date because there are fewer well-dated find assemblages than in the first and second centuries. The earliest sigillata from the site of the Roman baths dates to the time of Augustus, but probably does not pre-date the common era. A remarkably large amount of sigillata ended up in the soil during the reigns of Claudius and Nero. Compared with Tongeren, the closest civilian settlement for which sufficient data are available, there is less sigillata from the Flavian period (69-96) and the second century. The sigillata does not provide clues to the development of the Roman baths site in the third century. The roller-stamped sigillata suggests that most of the Late Roman activity occurred in the fourth century, at any rate from before the third quarter of that century, and continuing thereafter (Fig. 8.4). If



Figure 8.5 Large part of a cylindrical beaker Dragendorff 30 with a scroll ornament dated c. AD 45-70. The bottom right half of a carefully drilled hole can be seen, which served to repair the evidently once broken beaker with a lead or copper-alloy strip (source: Thermenmuseum, Ph. Debeerst).

there was any activity still in the fifth century, it will not have been for long.

The most striking pattern in the spatial distribution of the sigillata is the over-representation of pre-Flavian sigillata in the north and northeast of the site. This will be related to the early finds from the former 'Zwarte Veldje', which borders on the northern side of the site, and is close to the Boulogne-Cologne road. The Late Roman sigillata comes largely from two ditches. Other than this, the spatial distribution gives us few insights, as material from earlier periods was repeatedly dug up during building and rebuilding work, and fragments from a single vessel were spread over considerable distances during demolition and levelling work. Moreover, the collection of sigillata at the site of the bathhouse appears to have been selective, with a preference for large and decorated fragments.

More than fifty fragments have traces of repair (Fig. 8.5), wear and weathering. These pieces are not evenly distributed over time, but appear to reflect periods when there was a smaller supply of sigillata. Identification marks have been scratched onto 24 pieces: eleven on South Gaulish sigillata and thirteen on Central or East Gaulish ware. Large quantities of such

graffiti are typical of military find assemblages, and a considerable quantity of early graffiti from the baths site might support the hypothesis that Heerlen has military origins. Since actually less than 1% of the sigillata fragments have been marked, however, and none of the pieces in question can be dated earlier than the second quarter of the first century, the graffiti provide no arguments in support of this assumption.

8.3 Coins

P.A.M. Beliën

The collection of the Thermenmuseum includes 869 single coin finds and a hoard consisting of precisely the same number of coins.³³² All were found in the bathhouse and the area immediately adjacent to it.

The relatively large number of coins makes the Roman baths site an important find spot in numismatic terms. A large proportion of the single finds (321) come from the excavations conducted by A.E. van Giffen in the baths themselves and the site immediately adjacent to the Roman bathhouse. The greatest portion (506 coins) was collected during the ROB (State

³³² This is a summary of P.A.M. Beliën, this volume Appendix X.

Service for Archaeological Investigations) excavation in the 1950s, headed by J.E. Bogaers. Besides these coins, the collection also includes 42 single finds of another origin and a hoard consisting of 869 antoniniani, the latter found in 1975 when the Thermenmuseum was built.

The coins from the Bogaers and Van Giffen excavations were identified by A.N. Zadoks-Josephus Jitta, curator of the former Royal Coin Cabinet, in 1961-1962. In 2016 all 869 single coins finds (apart from one missing coin) were re-examined, measured and weighed as part of the new archaeological investigation of the Roman bathhouse. Where necessary, identifications were changed and/or attributions adjusted to reflect new insights. 747 coins could be identified with a large degree of certainty (86.0%). It was possible to determine at least the reign during which they were minted, or which coin type they represent.

After the identifications were checked, the coin assemblage from the Roman baths site was compared with coin assemblages from well-dated sites in the Lower Rhine and Meuse region. A start date for the Heerlen find assemblage was also suggested. The extent to which the finds from Heerlen resemble or differ from coin finds from Gallia Belgica and Germania Inferior/Secunda was then considered, as well as possible explanations for any similarities or differences.

The Heerlen coin spectrum was also used in an attempt to identify a chronological pattern that might shed light on the different phases (and functions) of the find assemblage. An analysis of the spatial distribution of the coin finds over the site was used in an attempt to obtain a better understanding of the date and function of the different parts of the complex, including the bathhouse and the large V-shaped ditches.

Coriovallum was situated at a crossroads, and it was no island. The Heerlen coin series therefore correlates with general numismatic trends identified in Gallia Belgica and Germania Inferior/Secunda. Important differences have been identified for two periods, however. The relatively large number of coins excavated from the Augustan period (27 BC-AD 14) suggests that coin loss at the site began at that time (Fig. 8.6). By comparing the Heerlen coin series with those from other sites, we have been able to determine that coin loss probably began in the period AD 9-15. The second difference is

that a relatively large number of coins from the Claudian period (AD 14-68) have been found, which is probably related to the construction or rebuilding of the building housing the baths (Fig. 8.7). A considerable number of coins were lost at the Roman baths site up to approximately AD 170, which suggests undiminished and continuous activity there. After this the northwest of the Roman Empire experienced more difficult times in economic terms, and barely any coins from this period have been found at the site. The local economy recovered at the time of the Gallic Empire (AD 260-274), and the coin numbers rise spectacularly. We must however consider the fact that there was not only an economic recovery, there were also changes in the Roman coin system that meant large numbers of low value coins came into circulation. Coin loss continued uninterrupted from AD 260 to the latest Roman coins, that give the coin assemblage at the Roman baths site a *terminus post quem* of AD 393 (Fig. 8.8). Since the supply of coins to our region ceased shortly thereafter, the coin finds do not tell us how long the site continued to be occupied.

Since Roman coins could have been used by many types of people for different purposes, they do not give any clear indication of the function and use of the individual spaces within the bathhouse, or specific parts of the site. It was not possible to analyse the coins found inside the building because the exact find spot of many coins is not known, and because only a modest number of coins have been found within the walls of the bathhouse.

The data on all coins have been entered in NUMIS, the Dutch coin finds database finds, and can be accessed online (<https://nnc.dnb.nl/dnb-nnc-ontsluiting-frontend/#/numis/>).

8.4 Fibulae

L.M.B van der Feijst and S. Heeren

Last century 287 brooches (garment pins or fibulae) were found at the bathhouse in Heerlen and in the immediate vicinity (*Thermenterein*).³³³ Thanks to its large size this collection has great information value and provides good additional evidence for dating the *vicus* with the Roman baths complex.

The Heerlen brooches were previously studied

³³³ This is a summary of L.M.B. van der Feijst & S. Heeren, this volume Appendix XII.



Figure 8.6 Halved as (left: obverse; right: reverse) of Augustus (27 BC-AD 14), struck in 7-3 BC in Lyon (inv.no. 9517, NUMIS 1126010). The halving of bronze coins was a typical Augustan phenomenon (bronze; 4.22 g; 24.9 mm) (source: P.A.M. Beliën).



Figure 8.7 Copy of an as (left: obverse; right: reverse) of Claudius (41-54), struck c. AD 41-54 in Gaul (inv.no. 7417, NUMIS 1125787). During the Claudian period there was a lack of low value coins in the western parts of the Roman Empire. This problem was solved by using locally produced copies alongside official Roman coins (bronze; 4.67 g; 24.9 mm) (source: P.A.M. Beliën).



Figure 8.8 Bronze coin (left: obverse; right: reverse) of Honorius (393-423), struck AD 393-395 in Lyon or Arles (inv. no. 3342, NUMIS 1125468). This is one of the three latest coins found at the site of the Roman baths (bronze; 1.06 g; 12.2 mm) (source: P.A.M. Beliën).



Figure 8.9 Late Roman crossbow brooch with decorated foot (source: Thermenmuseum, Ph. Debeerst).



Figure 8.10 Fragment of a simple first-century Gaulish brooch with broad bow type 16b (source: Thermenmuseum, Ph. Debeerst).

Table 8.1 The fibulae from Heerlen, Thermenterrein by main type, period, origin and spectrum.

| Type | Variants | Heerlen | Baths | Spectrum |
|--------------------|---|---------|-------|----------|
| <i>Early Roman</i> | | | | |
| 10 | Knot brooches | 1 | | C4 |
| 11 | Early spoonbow brooches | 1 | 1 | B6 |
| 11 | Late spoonbow brooches | 1 | | C4 |
| 13 | Collar brooches | 2 | 1 | C1 |
| 16 | Simple Gaulish Brooches | 14 | 4 | C1 |
| 17 | Early 'knickfibeln' | 9 | 4 | C5 |
| 17 | Late 'knickfibeln' | 4 | | D4 |
| 18 | Bow brooches | 5 | 3 | C5 |
| 19 | Angular knobbed wire brooches | 3 | 2 | D2 |
| 20 | Early eye brooches | 1 | 1 | C5 |
| 20 | Later eye brooches | 4 | 3 | D4 |
| 21 | 'Knickfibeln' with internal cord | 1 | | D3 |
| 22 | Wire brooches with arched bow, internal cord | 12 | 2 | D2 |
| 23 | Spring-cover collar brooches | 1 | | C1 |
| 24 | Spring-cover collar brooches with angular bow | 5 | 1 | C1 |
| 26 | Rosette brooches | 1 | | D1 |
| 30 | Alesia brooches | 1 | 1 | C2 |
| 30 | Aucissa brooches and derivatives | 5 | 3 | C3 |
| 31 | Hod Hill brooches with side wings | 7 | 2 | D6 |

Table 8.1 The fibulae from Heerlen, Thermenterrein by main type, period, origin and spectrum.

| Type | Variants | Heerlen | Baths | Spectrum |
|---------------------|---|------------|------------|----------|
| 32 | Hod Hill brooches with undivided bow | 1 | | D6 |
| 33 | Early Hod Hill brooches with profiled bow | 2 | | D6 |
| 33 | Late Hod Hill brooches with profiled bow | 7 | 5 | E5 |
| 34 | Hinged collar brooches | 2 | | D6 |
| 35 | Hinged rosette brooches | 1 | | D6 |
| 37 | Early flat plate brooches | 1 | 1 | D5 |
| 38 | Early hinged decorated plate brooches | 2 | 1 | D5 |
| 41 | Omega brooches | 1 | | C6 |
| | | 95 | 35 | |
| <i>Middle Roman</i> | | | | |
| 43 | Dagger brooches | 3 | 1 | E5 |
| 45 | Almgren type 15 brooches | 69 | 29 | E1 |
| 46 | Almgren type 16 variant brooches | 34 | 15 | E1 |
| 47 | Almgren type 16 brooches | 15 | 6 | F1 |
| 48 | Broad hammered wire brooches | 14 | 6 | F1 |
| 51 | Knee brooches with head-plate | 1 | | F4 |
| 55 | Enamelled hinged bow brooches | 2 | | E2 |
| 57 | Umbonate brooches | 2 | 1 | E2 |
| 57 | Enamelled hinged plate brooches var. | 1 | 1 | E4 |
| 57 | Late enamelled hinged plate brooches | 2 | 1 | F3 |
| 67 | Long hinge-arm brooches with head pendant | 1 | | F6 |
| | | 144 | 60 | |
| <i>Late Roman</i> | | | | |
| 68 | Crossbow brooches | 4 | 3 | G1 |
| 74 | Two-piece Armbrust brooches | 1 | | G4 |
| 78 | Supporting arm brooches | 1 | | G6 |
| | | | | |
| | Fragments | 42 | 19 | |
| Total | | 287 | 117 | |

(source: L.M.B van der Feijst and S. Heeren)

by J.K. Haalebos. Our comprehensive study of tens of thousands of brooches from private, municipal, museum and provincial collections, found in the Netherlands and surrounding areas in Belgium and Germany, was published in 2017: *Prehistoric, Roman and Medieval Fibulae from the Low Countries* contains both a typology for the study area and an analysis of location-specific collections (spectrums). The Heerlen collection is included in the latter. The collection was also studied by M. Rappe, a former student at the

University of Cologne. His research data were published in a report.³³⁴ Roughly speaking, the determinations are fairly consistent, apart from a few items and a disparity in the total number of pins. We will therefore stick to our own determinations and typology.

None of the studies drew a precise distinction in terms of the origins of the brooches. This is because of the way the assemblage came about. The precise origin of only some of the Heerlen brooches is known: 117 were found at

³³⁴ M. Rappe, this volume Appendix XI.



Figure 8.11 Incomplete second-century Romano-British chatelaine brooch with enamel (source: Thermenmuseum, Ph. Debeerst).

the site of the Roman baths (the complex itself and the immediate vicinity) or elsewhere in the *vicus*, accounting for over just a third of the entire assemblage. When it comes to the rest, we only know that they were found in Heerlen; exactly where is not clear. Given the uncertain origins of most of the other brooches, it makes little sense to make comparisons within the assemblage. The composition of the group from the bathhouse does however strongly resemble the entire collection of brooches from Heerlen (Table 8.1).

In the earliest phase of Heerlen 95 brooches were lost, some of them dating from before the common era. The assemblage also includes a large group of Gaulish pins from the Augustan period (C1). Such brooches are not commonly found at rural sites. This might suggest that the Roman army was involved in founding Coriovallum, though another explanation might lie in Heerlen's southern location. A small number of Alesia and Aucissa brooches found at the Thermenterrein clearly have a military character. It might be that the situation in Heerlen is analogous to that in the town of Tongeren, which is believed to have been founded and structured for military reasons, but later became a civilian settlement.

In the first century AD we see a low proportion of military brooches. Though the proportion of supraregional military types (E5) is slightly higher in the Middle Roman period, we must see this in association with the large group of regional brooches with an internal chord (F1).

Only a few pins have a certain initial dating in the 3rd century. This period is thus poorly represented. A small group of Late Roman fibulae provide evidence of a military character in the 4th century, possibly continuing into the early 5th century.

8.5 Metal

S. Hoss

During the various excavations at and around the Roman baths complex in Heerlen a total of 674 metal objects (coins, plus fibulae and a fragment of a lead boiler) were retrieved from many different contexts.³³⁵

In comparison with other Dutch excavations, this quantity of metal finds at first appears to be quite small, but this is easily explained if we consider the fact that the excavations mainly took place at a time before metal detectors were used. It is therefore likely that very small objects were not found. It is also likely that – at least during the early excavations – finds that appeared unimportant (such as nails and scrap metal) were simply discarded. This is particularly regrettable, as these finds probably included many items that could have told us more about the construction of the building housing the baths, such as T-shaped nails and clamps used to mount *tubuli* in bathhouses. Drops of lead or other material might also have provided evidence of metalworking in the vicinity.

In the report, the finds are described and grouped according to their form and function, as is common in publications on metal objects. Noteworthy among the finds is the large number of personal accessories (115 ± 3). This is not surprising for a bathhouse, because this group of objects would be used either for personal grooming like tweezers or the beautiful *strigil* discovered (Fig. 8.12), or worn as jewellery in the baths, such as rings, hairpins, bracelets and necklaces (Fig. 8.13). Some of the objects will have been lost while bathing, and probably ended up in the building's drainage system.

³³⁵ This is a summary of S. Hoss, this volume Appendix XIII.



Figure 8.12 Bronze scraper (strigil) made from several parts (scraper, shank, handle with lead filling). On the handle are two small tabula ansata-shaped stamps, one containing the name of the manufacturer: T A P P I (= T(itus) Appius) and the other depicting the staff (caduceus) of the god Mercury (source: Thermenmuseum, Ph. Debeerst).

Similar objects have often been found in the drainage systems of other Roman bathhouses. Another interesting feature is the relatively high proportion of finds of a military nature.

Unfortunately, the precise context of the majority of the interesting finds is unknown. Only one find (cat.no. 83, a cosmetic instrument) can be attributed with any certainty to the period of use of the Roman baths, as it was found in the primary drainage channel. Only objects found in the drains from the various baths or in the large drainage channel from the toilet can be attributed to the period when the bathhouse was in use. The floors of the bathhouse were made of stone or covered with mosaics, and were cleaned daily, so no metal objects will have been left behind there.

Generally speaking, the finds from the excavations of the bathhouse can be described as typical settlement waste, which probably ended up in the baths complex due to secondary displacement after the baths closed. The fact that a large number of objects are typical of those found in the drains of bathhouses – hairpins, jewellery, cosmetic instruments etc. – suggests that some of the finds probably originally came from the drainage system. However, the 1940-1941 excavation is poorly documented and so we can no longer identify which objects came from drains and which belong to settlement waste that ended up on the bath complex site as a result of secondary displacement.

The metal finds have been dated to between



Figure 8.13 Golden ring with a carnelian intaglio-gem with an ibex (source: Thermenmuseum, Ph. Debeerst)

the early first century and AD 500. Here, the large percentage of finds from the early first century is particularly remarkable. This is not common in *vici* elsewhere in the Netherlands and Germany. It is however typical of other *vici* along the road now known as Via Belgica.

The nature and high value of a large portion of the metal finds is not uncommon for a prosperous *vici* at an important crossroads. Nevertheless, some finds show that Coriovallum was more prosperous than ordinary *vici* in the Netherlands and Germany. These include the gold and silver jewellery, the large quantities of metal tableware and, above all, the remains of metal statues, including the fact that some of them were gilded. Though the 'Römische Grossbronzen am UNESCO-Welterbe Limes' project has shown that such statues were more

common in the northwestern provinces than had been assumed, they were certainly rare at a *vicus*.

The fairly large number of military finds is probably also related to Via Belgica, which was often used to move troops (see for instance Fig. 8.14). The concentration of military finds dated between AD 150 and 250 might indicate that these finds may be remains of a temporary military post at Coriovallum itself, or perhaps a relatively small battle at the site.

Unfortunately, the object that was long thought to be a spearhead of a signum for the special units of the *beneficarii* turns out neither to be a spearhead, nor to have decorations that resemble the symbol of the *beneficarii*. There is therefore no evidence that *beneficarii* were stationed at Coriovallum.

8.6 Animal bone

M. Groot

A zooarchaeological analysis of the animal bones collected around the bathhouse in the 1950s was performed in 2016.³³⁶ The animal bones from the Roman baths site are interesting above all because of the urban character of Heerlen. Only a few Roman towns and *vici* in the Netherlands have been subjected to a zooarchaeological analysis. Although the material comes from the immediate vicinity of the bathhouse, it is probably not directly related to it. The bone material can however provide evidence of activities around the bathhouse, helping us obtain a more complete picture of the *vicus*. The animal bones from the area around the Roman baths can also provide information on Heerlen's food supply and the role that the *vicus* played vis-à-vis the surrounding countryside.

All the animal bone material that could be attributed to this excavation has been analysed. It was gathered by hand, so the material consists mainly of large fragments, and both smaller fragments and remains of birds and fish are underrepresented. It is possible that finds were selected in the field with a bias towards large, identifiable fragments. The state of preservation is relatively good. Even the many years spent in the repository have not had a negative impact. Where possible, the species and element of each fragment was determined. If it was not possible

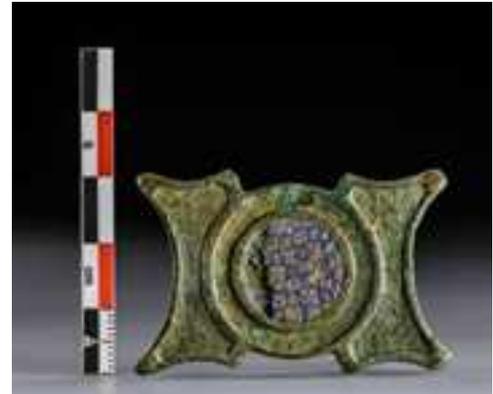


Figure 8.14 Bronze mount of the Roman soldier's belt decorated with *millefiori* enamel in a chequered pattern of white, blue and red (source: Thermenmuseum, Ph. Debeerst)

to identify the species, the fragment was placed in one of two size categories: medium-sized mammal or large mammal. No small mammals such as cats and small rodents were present. Quantification was based on the number of fragments and the total bone weight. Age was determined on the basis of the eruption and wear of teeth and molars from the lower jaw, and epiphyseal fusion on long bones from the limbs. Any gnawing marks, traces of burning or butchering marks were noted.

A total of 675 fragments were analysed. 80% of the animal bone from Heerlen has been determined at species level. This is a high proportion, and probably reflects selection during collection. Cattle dominate the 544 fragments whose species has been determined, followed by pigs. Bearing in mind the fact that cattle are larger than pigs, it is quite clear that cattle were the most important source of meat for the *vicus*. Other domesticated animals present include sheep or goats, horses, dogs and chickens. The only wild mammals of which remains have been found are red deer and roe deer. The relative proportions of meat supplied by cattle, pigs and sheep or goats are consistent with other urban centres in the region. The ratio of species shows that the proportion of cattle and sheep or goats declines in the later period, as the proportion accounted for by pigs increases.

Cattle and sheep or goats were slaughtered mainly when mature. There is no evidence that livestock was kept in Heerlen. Although beef formed a major component of the diet, cattle

³³⁶ This is a summary of M. Groot, this volume Appendix XIV.



Figure 8.15 Fragments of antler representing waste from antler working (source: Thermenmuseum, Ph. Debeerst).



Figure 8.16 Long bone fragments of cattle, representing waste from the production of marrow, fat or glue (source: Thermenmuseum, Ph. Debeerst).

were not kept with the primary aim of producing meat. They were used for stockbreeding and for traction and to provide manure. It was not until they were nearing the end of their lives that they were brought to the town from the surrounding countryside to be slaughtered. Sheep appear

to have been kept for wool and meat, and their milk may also have been used. Pigs were generally slaughtered when young, though nearly fully grown, with a peak in the second year. Suckling pig was not eaten in Heerlen.

Various activities that involved processing



Figure 8.17 Remains of heads of sheep, possibly representing tanning waste (source: Thermenmuseum, Ph. Debeerst).

animal resources took place around the bathhouse. The number of fragments of antler suggests that artefacts were fashioned from antler in Heerlen (Fig. 8.15). Fragments of the limbs of cattle, found mainly in pits 16 and 17, can be regarded as waste from the production of marrow, fat or glue (Fig. 8.16). A concentration of horn cores from cattle in house 1A is waste from the processing of horn or from tanning. The overrepresentation of elements of the head and feet of sheep and goats is evidence that the skins of sheep or goats may have been tanned in the vicinity of the bathhouse (Fig. 8.17). There is also clear consumption waste in house 6 in the form of cows' ribs and waste from smoked beef. In most contexts we find a mix of butchering and consumption waste, with perhaps some waste from industrial activities. One industry for which no evidence has been found in the area surrounding the Roman baths is the manufacture of artefacts from bone.

The industrial processing of such animal resources was associated with the food supply. Cattle were the main source of meat in Roman towns in Northwest Europe. They were taken to the town alive to be slaughtered by professional butchers. Meat would be consumed fresh or smoked. The abattoirs not only supplied meat, but also raw materials for tanning, horn

processing, bone processing and the production of marrow, fat and glue. The analysis in Heerlen shows that these industries could be located in the middle of town. Although industrial waste may have been deposited secondarily in town, it is more likely that it was not transported over large distances. The low percentage of bones with gnawing marks suggests that the waste was quickly buried, and did not lie at the surface for long. This suggests that industries that caused a bad smell (leather, stinking horns) were located immediately beside the bathhouse. People may have felt differently about bad odours and meat processing waste in the past, regarding it simply as a part of everyday life.

8.7 Ceramic building material

E.A.K. Kars and T. Vanderhoeven

The majority of the remains of the bathhouse in Heerlen consists of ceramic building material.³³⁷ This encompasses all ceramic elements of a building, including roof tiles, bricks, floor tiles and parts of the heating system and drainage pipes. Unlike other building materials, ceramic materials from each separate round of production have their own unique fabric. Each fabric has a specific composition of clay

³³⁷ This is a summary of T. Vanderhoeven, E.A.K. Kars & B.J.H. van Os, this volume Appendix XV.

and organic or mineral additives. The precise proportions of the various raw materials depend on the type of clay, the type of additives and the intended application. Research into the different fabrics and their origins can help us understand the production and logistics of ceramic building material in the Roman period.

8.7.1 Research method

The study looked at four different contexts, recorded in four different datasets: material from the museum collection at the Roman baths site (133 items), *ex-situ* material (approx. 600 items), material from the 2017/2018 excavations (958 items) and *in-situ* material (approx. 12,000 items). The material from the different contexts was collected, analysed and documented in different ways.

The *ex-situ* material was used to categorise all the fabrics present. This dataset was used for macroscopic analysis, intensive sampling and XRF analysis to verify the fabric categories. This categorisation was used to produce a comparison set at fabric group level that was in turn used for *in-situ* analysis. In the study of *in-situ* material, it was decided that walls should not be comprehensively documented, but sampled by documenting several one-metre wide cross-sections. Fifteen were selected by quickscan, distributed over all rooms. When it came to the floors, the various shapes and fabrics present were considered. The hypocaust systems (the *pilae* made of *bessales*) were documented in their entirety and quantified. Given that the majority of the *in-situ* material is built into the brickwork, it was not possible to document all the forms.

8.7.2 Conclusions

The fabric analysis found 25 fabrics that were macroscopically categorised into eight different groups (Fig. 8.18). These fabric groups are made of three different types of clay. Group A is most probably made from the Reuver Base Layer (Waalre Formation). Group B probably comes from the Brunssum Base Layer (Kieseloolite Formation). The third group encompasses the



Figure 8.18 From left to right, and from top to bottom: fabric group A, B, C, D, E, F, G and H. (source: T. Vanderhoeven, E.A.K. Kars & B.J.H. van Os, this volume Appendix XV, 21-22).

other fabrics, C, D, F, G and H, which are most probably from the Tegelen Base Layer (Waalre Formation). The fabrics can be chemically distinguished from each other on the basis of their differing illite and iron contents. All three types of clay were abundantly available within 30 km (Fig. 8.19).

In the material analysed, it is possible to distinguish clearly between *in-situ* material, from the foundations and several floors of the bathhouse, and *ex-situ* material. The former is most common in fabric groups B, D and G, the forms consisting mainly of *tegulae* and floor tiles. No material that gives any insight into the above-ground structure of the bathhouse was found *in situ*.

Ex-situ material encompasses the more diverse collection of forms and it dominates fabric group A. Material found *ex situ* cannot definitely be ascribed to the bathhouse, as it may constitute waste from nearby buildings. It cannot therefore be used to draw conclusions about the original structure.

Pieces of ceramic building material bearing different stamps were found in group A. The stamps are both civilian and military

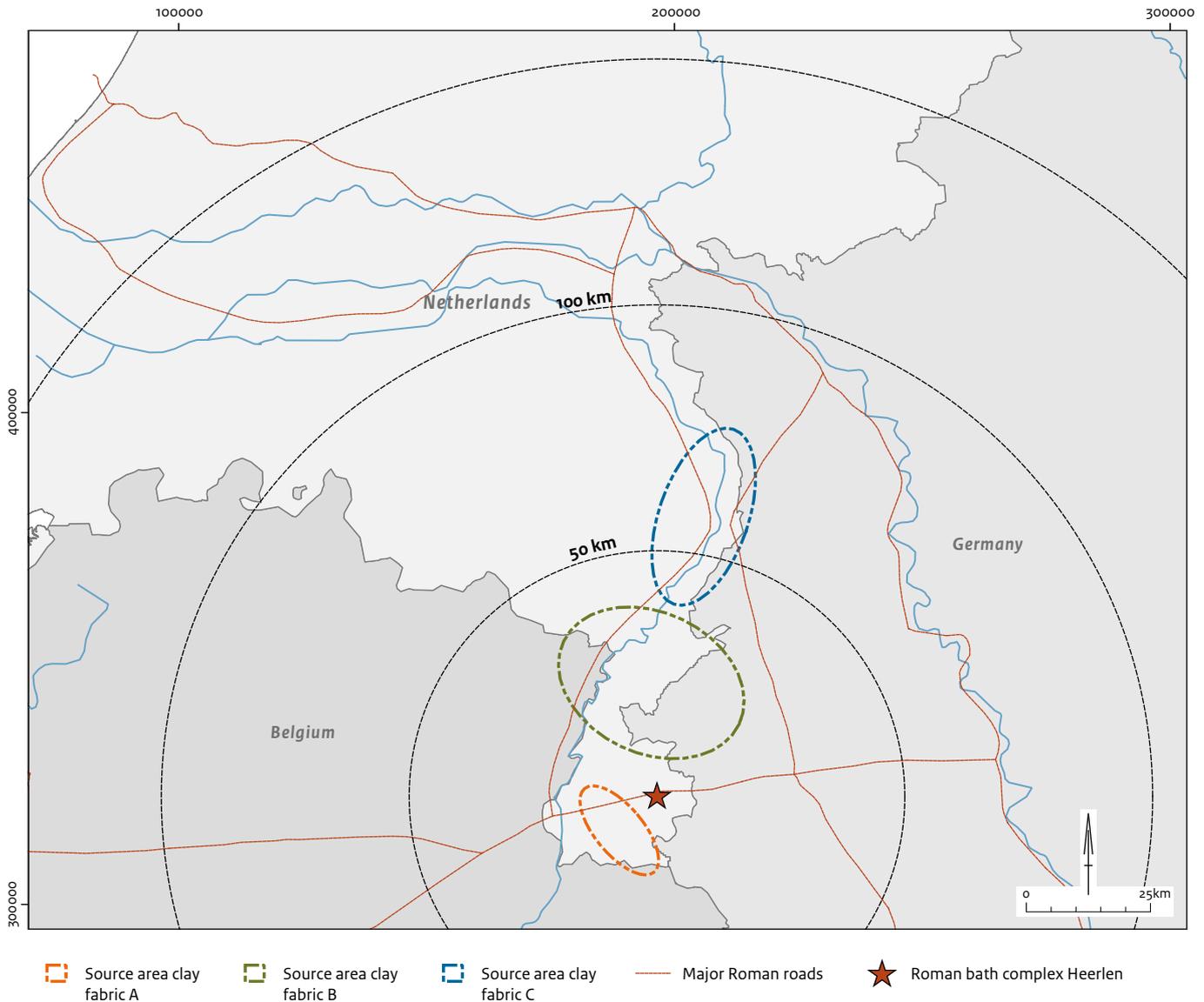


Figure 8.19 Heerlen and the areas of origin where clay might have come from. (source: T. Vanderhoeven, E.A.K. Kars & B.J.H. van Os, this volume Appendix XV, 36, Figure 8/M. Haars).

(CTEC, MHF and L.XXXVV) (Fig. 8.20). This is striking. It is generally assumed that the stamp refers to the manufacturer. It is possible that different manufacturers used the same source of clay. This does not however explain why the tempering of the fabric, with its specific inclusions, hardness, finishing and surface treatment are so similar. The hypothesis that a stamp refers to a manufacturer is thus thrown into question. It could be that the stamp referred not to the manufacturer, but to the name of the merchant, builder or client. The presence of different stamps on the same fabric suggests that these are not from a small local

tile maker, but from a large regional production centre. Given the distribution of material with fabric A found to date, this production centre must have been located close to Heerlen.

It was also observed that material with the stamp L.XXXVV in Heerlen and Aachen differs from ceramic products of the thirtieth legion from Xanten, Nijmegen and the area along the *limes*. These last products all have the stamp LEGXXXVV and a different fabric. The fact that ceramic building material with different stamps and fabrics were produced for or by the thirtieth legion in different regions gives us an insight into how the army was organised.



Figure 8.20 *Bessalis* with partial stamp [L.XX]XVV and imprint of a human left foot (source: Thermenmuseum, Ph. Debeerst).

Further research is needed to ascertain whether production was simultaneous.

8.8 Natural stone

R.J.M. Dreesen

Both *in-situ* macroscopic analysis (with the naked eye and using a hand lens) and petrographical analysis (by means of plane polarized optical microscopy) were performed for the identification of the different stone types used in the Roman bathhouse at Heerlen.³³⁸ The microscopic analysis of a series of thin sections cut from representative samples of the inventoried stone types allowed us to corroborate our macroscopic identifications. Moreover, carbonate microfacies and micropalaeontological analysis of thin sections of particular limestone types enabled proper identification and geological provenancing.

Unlike Van Giffen (1948), who reported only a few types of natural stone, we have been able to identify a much broader lithological spectrum at the bathhouse in Heerlen. Moreover, we also noticed a striking difference with Tongeren and Maastricht, where a larger spectrum of Roman building and decorative stones is present.

Irregular roughly hewn or cut (sawn) regularly shaped blocks of exclusively local stones were used for the building of the bathhouse, i.e. rock types from quarries located nearby (in the vicinity of Heerlen) and within the *civitas Traianensum*. In descending order of frequency and importance these are: Kunrade stone, calcareous tufa, Nivelstein sandstone, Maastricht limestone and an unnamed quartzarenitic sandstone. The dominant use of Kunrade stone is striking. This stone is present everywhere in the bathhouse, mostly combined with calcareous tufa (Fig. 8.21). Equally striking is the virtual absence of flint, Maastricht limestone and Carboniferous sandstone, which are the dominant building stones at Roman Tongeren and Maastricht.

Both local and regional white-coloured stones were used for monumental parts, such as columns and capitals, and for decorative architectonic elements or inscriptions, e.g. in the *porticus* and in the *palaestrae* of the bathhouse. Besides the Kunrade stone described above, we also identified Nivelstein sandstone, an ash-white quartzarenitic sandstone quarried in the vicinity of Heerlen, and Norroy limestone, a creamy-white pseudo-oolitic limestone imported from Lorraine, Northern France (Fig. 8.22). The latter two stone types might well have

³³⁸ This is a summary of R. Dreesen, this volume Appendix XVI and P. Picavet, this volume Appendix XVII.



Figure 8.21 Piece of ashlar from the southern wall of the bathhouse, consisting of cut blocks of Kunrade stone (white) and sawn blocks of porous calcareous tufa (beige) over an inner wall of rough blocks of Kunrade stone (source: R. Dreesen).



Figure 8.22 Fragment of column made of Norroy limestone with traces of brownish-red ochre paint (bathhouse *lapidarium*) (source: Thermenmuseum, Ph. Debeerst).

been good alternatives for the more expensive Mediterranean white marbles.

Fine-grained black limestones, e.g. Belgian black marbles, were used for more luxury

decorative purposes. A marble *labrum* was made of a particular black variety of Meuse Limestone (Namur black marble), whereas the black *tesserae* used in the mosaics lining the rectangular brick



Figure 8.23 Fragments of the black-and-white mosaic floors of the bathhouse, consisting of white Kundrade stone and black marble from Theux (source: Thermenmuseum, Ph. Debeerst).

pavement in the *apodyterium* and *frigidarium* are made of black marble from Theux. The white *tesserae* in the same black-and-white floor mosaics are made of the local Kundrade limestone (Fig. 8.23). The re-use of large blocks of Norroy limestone in more recent building phases, such as in the drainage channels (*cloaca*) of the bathhouse, is also quite remarkable.

Large volcanic tuff blocks (Römer Tuff), finally, were exclusively used as refractory materials, lining the walls of the two *praefurnia*.

With the exception of one small piece of white saccharoid marble, no other Mediterranean white or coloured marbles have been found in Heerlen.

Different varieties of Kundrade stone (a particular compact limestone facies of the Late Cretaceous Maastricht Formation) are present within the bathhouse, reflecting the heterogeneous character of this particular local building stone: either fine- to coarse-grained, glauconite-rich or glauconite-poor, silty or sandy, slightly to very porous, fossiliferous or not. The stone used to be quarried in several small, supposedly underground quarries near Kerkrade and Ubachsberg, in the area between Valkenburg, Heerlen and Aachen. The time-equivalent Maastricht limestone (also known as 'mergel') found in Heerlen was probably

quarried near Valkenburg.

Calcareous tufa, the second most frequent building stone used at the bathhouse, is Holocene in age. It is actually still being formed through precipitation of calcite from bicarbonate-rich spring waters in Southern Limburg (Mergelland).

The Nivelstein sandstone is Miocene and forms plurimetric lenticular quartz-rich sandstone bodies at the top of white quartz sands of the Heksenberg Member (Breda Formation). This particular sandstone crops out near Kerkrade and Herzogenrath, along the Dutch-German border.

The Norroy limestone ('Lothringer Kalk') was quarried in the Côte de Moselle, Lorraine, Northern France. It is Bajocian (Middle Jurassic) in age and belongs to the Formation à Polypiers supérieur. Roman quarries have been found at Norroy-Pont-à-Mousson, a township located along the Moselle river between Metz and Nancy. Its widespread occurrence in the northwestern territories of the Roman Empire may be related to riverine transport and to the presence or influence of the Roman army.

The black limestones (Belgian black marbles) used for the *tesserae* and the *labrum* are both from the Lower Carboniferous (Visean). They were imported from the neighbouring *civitas*

Tungrorum, more especially from stone quarries in Theux (near Spa) and in the vicinity of Namur (Meuse valley).

The volcanic tufa blocks were presumably imported from the Vulkaneifel area. Nine of the ten quern and millstone fragments found in the bathhouse area have the same provenance.³³⁹ They are made of basalt-like lava and were probably transported overland from the Mayen workshops (Germany) or by combined overland and fluvial transport: via the Rhine between Mayen and Cologne and then along the main road leading to Bavay and Boulogne (France). The remaining fragment is made of a coarse arkosic sandstone, originating from the Ardennes massif. The quern and millstone supply to Heerlen was thus overwhelmingly from the Rhenish region, as is the case in Tongeren, where 86 % of the querns and millstones follow the same trade pattern. Domestic subsistence milling with small hand-driven querns remains omnipresent. Nevertheless, animal and water mills allowed the scale of cereal processing to be increased, to sustain an urban population that at this stage did not take part in activities related to food preparation. The location of certain large millstone finds downhill from the Heerlen bathhouse can be linked to its water supply, suggesting the presence of several still unidentified watermills.

8.9 Glass

F. van den Dries

A reasonable quantity of Roman-period glass was found during the excavations of the bathhouse in Heerlen in the 1940s, and above all during the investigation of the surrounding area in the 1950s, known as the ‘Bogaers excavations’.³⁴⁰ The purpose of this study was to acquire a good overview of the glass found then, both at a detailed level (traces in excavation pit) and in terms of the entire assemblage at the Roman baths site (bathhouse and surrounding area). Heerlen city council therefore had a number of research questions compiled in a ‘research framework’ to provide a basis for interpreting this category of material.

The glass from the research area in question consists of 272 object numbers. Most of the

material (n=252) is from the excavations by A.E. van Giffen and, more especially, J.E. Bogaers. A small proportion (n=20) was found during the trial trench survey performed inside the bathhouse in 2017. The fact that the ‘old’ excavations yielded a relatively large number of large, thick-walled fragments, and fairly few small, thin-walled fragments is striking. This was undoubtedly a result of the excavation technique and collection method used at the time, which is confirmed by the small to very small fragments found during the 2017 investigation.

For the purposes of description, the glass was divided into a number of different use categories. The six categories are: architecture, eating and drinking, cosmetics and pharmaceuticals, packaging and transport, jewellery and ornamentation, and other objects. The forms were identified using typologies drawn up by Isings and on the basis of classifications used in Kaiseraugst (Augusta Raurica) in Switzerland.

Generally speaking, the glass finds conform to the pattern expected at bathhouses. Material found at the Roman baths site at Coriovallum includes window glass, personal ornamentation, utensils for eating and drinking, glass objects used for personal grooming and finds associated with sport and leisure. Some social differentiation can be discerned within these groups, in the sense of more or less expensive versions of certain objects. Some of the material gives the impression that it was collected selectively.

The majority of the glassware is in natural blue-green glass. There is only a small quantity of coloured glass. Almost all the glass was undecorated. Carafes, bottles and beakers are common and only one example of engraved decoration was found. The striking thing about the glass finds from the Roman baths site in Heerlen is the large quantity of window glass (Fig. 8.24), and the large number of ribbed bowls (Fig. 8.25). Given the function of the building, it is no surprise that a lot of window glass was found. There is in fact an overrepresentation of window glass in the entire assemblage, mainly of the matt/glossy type. The bathhouse appears to have been glazed from the moment it was first built.

One special type of window glass has great significance for the reconstruction of the

³³⁹ See P. Picavet, this volume Appendix XVII.

³⁴⁰ This is a summary of F. Van den Dries, this volume Appendix XVIII.



Figure 8.24 Two fragments of window glass from the Thermenterrein site (source: Thermenmuseum, Ph. Debeerst).



Figure 8.25 Fragment of a ribbed bowl of dark blue glass (source: Thermenmuseum, Ph. Debeerst).

building. This is a fragment of a domed window pane. It is probably from the middle of the cupola in the *laconicum*, and would have admitted light to the sweating-room as an *oculus*.

The glassware is distributed 'normally' (i.e. regularly) across the site.

There are few pre-Flavian forms (pre-

dating AD 69) such as modelled glassware (*keramikähnliche* forms), *zarte Rippenschalen*, Hofheim beakers and coloured glassware. The glassware increases in number in the second half of the first century, and is well-represented from the Flavian period (69-96) onwards. There are large numbers of ribbed bowls and

some dishes and bowls from the first and early second centuries, but fewer beakers and carafes. The reverse is true of the subsequent period (second-third century). Barely any forms associated with the serving of food have been found, but there are more related to drinking, particularly beakers, and especially those of the Isings 96 type. From c. AD 300 the number of finds decreases and the form spectrum narrows. Late barrel jugs such as *Frontinus*, *Felix*, *EQVA* and the like are absent. The variety of beakers is also small. As mentioned above, there are many Isings type 96 and variations on this. However, *unguentaria* continue to be present, suggesting that bathing continued at the site.

We can conclude on the basis of the glassware studied that an argument can be made for a start on construction of the bathhouse around AD 80. A reduction in the number of finds has been observed at the transition from the third to the fourth century. However, glass finds show that the bathhouse was still in use in the fourth century. No post-Roman material has been identified among the finds.

The glass finds do not show any strict division in the nature, use or function of the glass. Nor is it possible to give a clear answer to the question of whether the glass found was from objects used by men or women, or by soldiers or civilians. There are no finds that point to local production or working of glass.

8.10 Latin inscriptions

J. Minis and S. Schorn

For the present report, examinations were carried out of all inscriptions on stone and metal as well as of the brick stamps found on the site of the bathhouse, or those that are certain to have originated from this site.³⁴¹ Stamps and graffiti on pottery were not included in the examination. The inscriptions have been edited, translated, and provided with critical and palaeographic apparatuses. The commentary deals with palaeography, language, and form of the texts and evaluates the inscriptions as sources for the history of the *vicus* of Coriovallum and the bathhouse. As far as possible, the results obtained have been interpreted in the larger regional context. In

the synthesis at the end of the report, some inscriptions on stone and metal that were found elsewhere in Heerlen and not treated in detail in the report are also included in the consideration, in order to be able to offer a clearer picture of the contribution of the inscriptions to our knowledge of Coriovallum. We believe that the following results of the epigraphic study are particularly noteworthy:

8.10.1 Architectural history of the bathhouse

The very fragmentary Tiberius Claudius inscription (Fig. 8.26) probably represents the building inscription of an early construction phase of the bathhouse, perhaps the first construction phase. It is not unlikely that the man mentioned is the emperor to whom the building might have been dedicated. The inscription may have mentioned other individuals who were responsible for the execution of the construction works, or it may have commented on the structural design. Brick stamps of the Thirtieth Legion testify to a construction phase between 118/122 AD and probably no later than 160 AD. However, they do not prove that military personnel from this Legion were involved in the construction. One or perhaps two other (and very probably later) building measures document bricks stamped with 'CTEC' and 'MHF', which can be dated to the second half of the second and the first half of the third century. The renovation of the bathhouse by the *decurio* of Colonia Ulpia Traiana (Xanten), Marcus Sattonius Iucundus, may have proceeded in the second half of the second and third centuries, as suggested by the palaeography and language of his dedicatory inscription (Fig. 8.27).

It is very unlikely that we can identify this man with the *primipilus* of the Third Legion, known from another inscription, as it was done as part of older research. In light of this, the *terminus post quem* of 260 AD for the construction work based on this identification is no longer valid. The history of the region suggests a renovation at the beginning of the third century at the earliest, but such a renovation is still conceivable even until as late as the great incursion of the Franks in the year 276, though hardly after that

³⁴¹ This is a summary of S. Schorn & J. Minis, this volume Appendix XIX.



Figure 8.26 Two fragments that were possibly part of a building inscription for an early building phase of the public baths (source: Thermenmuseum, Ph. Debeerst).

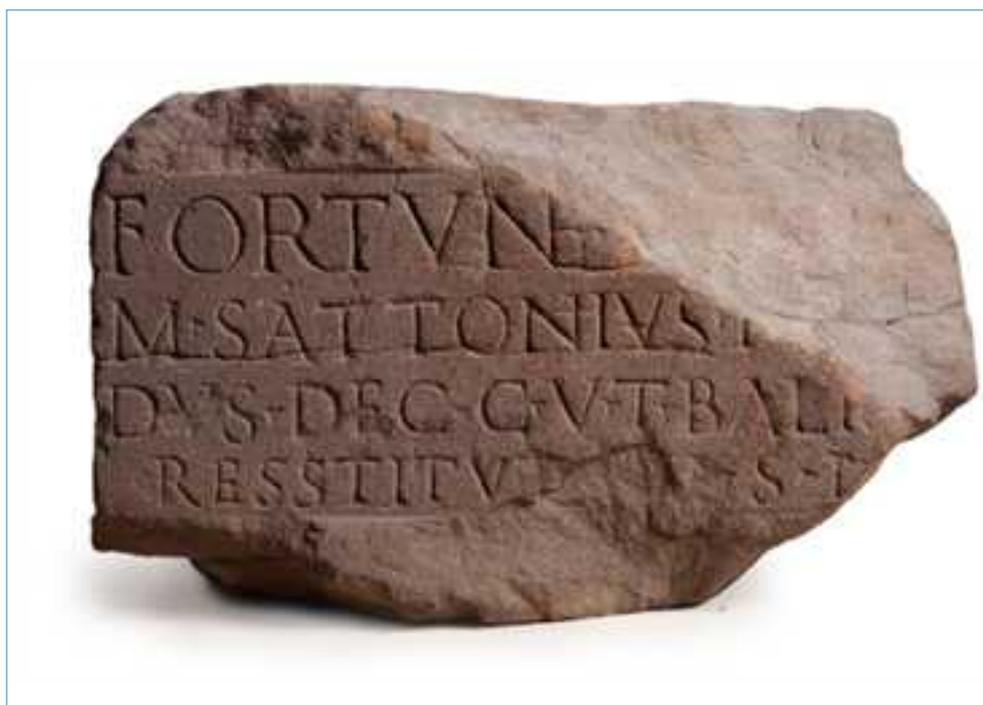


Fig. 8.27 Dedication inscription by Marcus Sattonius Iucundus related to a renovation of the public baths (source: Thermenmuseum archives).

date. The use of the verb *restituere* in this text calls to mind the large, archaeologically attested alterations which changed the form of the bathhouse from *Reihentyp* to *Blocktyp*. However, such an identification is only one of several interpretations.

8.10.2 The 'military character' of Coriovallum

The inscriptions prove that Coriovallum and its bathhouse were subject to a considerable military influence, although Coriovallum was a civilian *vicus* in itself. The tombstone of

M. Iulius³⁴² is evidence that this veteran of the Fifth Legion (from Vetera/Xanten) had settled in the Coriovallum area before 40 AD. The Fortuna cult in the bathhouse – attested by two dedicatory inscriptions and a fragment of a statue – also suggests the presence of military personnel or veterans, as well as perhaps a breastplate with the owner's inscription *A tessera militaris* found near the bathhouse³⁴³ testifies to the presence of active military personnel on site, although neither this nor other evidence provides sufficient proof that soldiers were stationed in Coriovallum. The *tessera* also testifies to the local recruitment of military personnel.

8.10.3 Religion and medicine

The stone inscriptions of the Fortuna cult dominate in religious terms, while the addressee of one altar is no longer recognisable. The aforementioned breastplate is decorated with the head of Minerva Coriovallum and its bathhouse probably played a role in medical care provided to travellers and the local population. This is also indicated by

the prominence of the Fortuna cult, and this assumption is confirmed by the discovery of the oculist's stamp of L. Iunius Macrinus on Valkenburgerweg.³⁴⁴

8.10.4 Administration, trade, and society

Due to the 'Sattonius' inscription (Fig. 8.27), there is a high probability that Coriovallum was part of the territory of Colonia Ulpia Traiana in an administrative sense. A leaden label which was found near the bathhouse³⁴⁵ and documents the delivery of 30 kilograms of a bark product, may be related to leather-tanning activities near the bathhouse. This interpretation is supported by the results of Maaïke Groot's zooarchaeological study, which also found evidence of tanning there.³⁴⁶ The tomb inscription of Ammulva (Fig. 8.28) is interesting from an onomastic point of view. It is also evidence of the gradual Romanisation of the indigenous (Sunucan?) population, since it is written in Latin and follows Roman convention in terms of form and iconography, while the onomastic material is still completely Germanic.

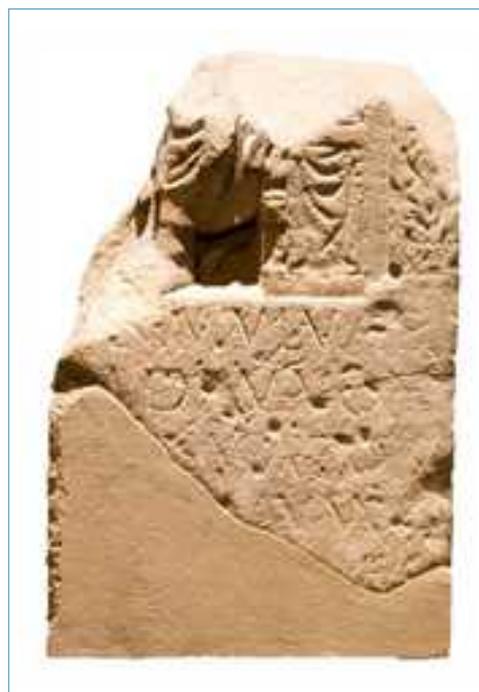


Fig. 8.28 Inscription on a tombstone for Ammulva (source: Thermenmuseum, A. Steen).

³⁴² CIL XIII 8711.

³⁴³ Minis & Schorn 2018, No. 1.

³⁴⁴ CIL XIII 10021.109.

³⁴⁵ Minis & Schorn 2018, No. 3.

³⁴⁶ See M. Groot, this volume ch. 8.6 and Appendix XIV.

9 Reconstructing the history of the public baths of Coriovallum

K. Jeneson, W.K. Vos and G. White

9.1 Introduction

As indicated in Chapter 3, the dating and reconstruction of the bathhouse were significant knowledge gaps. Based on terra sigillata and coins, Van Giffen gave a construction date for the bathhouse of AD 50, and a final date of AD 400, and he reconstructed a single radical round of alterations, which he dated to around AD 200.³⁴⁷ There have always been doubts as to the scale and date of the alterations, but over the past few decades researchers have dated the construction work to the early second century AD.³⁴⁸ One of the main goals of the study was therefore to ascertain if Van Giffen was correct. This chapter collates and analyses all the archaeological and structural research results in order to determine whether this was the case.

The dating of the bathhouse is based on an analysis of three factors: the architecture, the dating and phasing of structures in the immediate vicinity of the bathhouse, and of course the finds collected at the baths site. This includes the material from the ROB (State Service for Archaeological Investigations) excavations in 1952-1957, material found in the bathhouse when the museum was built in 1975-1977 and subsequently, and material from the 2017 trial trench survey.

The most crucial factor defining the date of the bathhouse is its architecture. Comparative research on public bathhouses in recent decades has shown that a wide variety existed throughout the Roman Empire. The form of the building depended on things like the nature of the baths (those resembling a thermal spa with a natural source of hot water, as opposed to ordinary bathhouses supplied with cold water), the target group (military or civilian), the location in the Roman Empire and the date.³⁴⁹ One important reason for this variety lay in the fact that bathhouses were not required to observe strict guidelines in terms of the form of the building (unlike sanctuaries and buildings that served a political or administrative purpose, such as basilicas). Of course a bathhouse had to meet certain requirements in terms of heating, and the supply and drainage of water, but other than that the architect was free to design a bathing complex in accordance with the wishes of his client.³⁵⁰ Trends can therefore

be discerned in the architecture of bathhouses, more and more of which have been identified in recent decades. By looking at various architectural features, such as the number of *tepidaria*, the location of the *laconicum* and the presence or absence of a *schola labri*, it is possible to determine the period when a bathhouse was built.³⁵¹ A comparative analysis of the architecture of the bathhouse in Coriovallum is therefore the first step in the dating process (see 9.2.1).

It is likely that the construction and use of the bathhouse had an impact on the immediate vicinity of the baths. There would be 'regular' deposition of material in the surrounding neighbourhood, in contrast to the interior of the bathhouse itself, which would be cleaned regularly. The material found during the excavations in 1952-1957 is therefore a more reliable source for dating than material from the bathing complex itself, even though finds were collected selectively and it is not always entirely clear which feature or layer they came from. The results from the analysis of the 1952-1957 excavations were therefore also considered in the dating of the bathhouse (see 9.2.2).

Of course we cannot overlook the dating of find material from the Roman baths site itself. In our analysis of the results of the various specialist studies, however, we must not lose sight of the fact that this material comes from the entire site, thus from the bathing complex itself and from adjacent plots. Much more material has now been analysed than was accessible to Van Giffen and Glasbergen. This includes material from the ROB excavations in the 1950s, of course, and also the many finds collected when the museum was built. The trial trench survey performed in 2017 produced new dating evidence for features and structures in the core building and the two *palaestrae*. Given the fact that all finds encountered were collected during this survey, and their precise context is known, this material is very reliable as a source of dating information. Of course this new information has also been taken into account (see 9.2.3).

Once the find material had been dated, the dating of the complex could begin. The first step was to determine a relative chronology and the various phases of construction. Here, too, the results of several studies were relevant. The starting point was the building

³⁴⁷ Van Giffen 1948, 233.

³⁴⁸ E.g. Jamar 1981, 9.

³⁴⁹ See for example Nielsen 1990; DeLaine 1990; Rebuffat 1991; Bouet 2003, with references.

³⁵⁰ Bouet 2003, 5.

³⁵¹ Bouet 2003, for example, uses all these elements to compile a typology.

itself. The study of the construction history clearly showed where evidence of the different phases of the construction process can be seen. Major alterations were identified, which must have been pre-planned, as well as smaller ad hoc changes, such as repairs to parts of the bathhouse. This produced a relative chronology.

To proceed from this survey of the construction history based on successive phases of building activity to an absolute chronology, all the dating evidence on the bathhouse and its surroundings was analysed and related to the structural changes identified. During this process the likelihood of various scenarios was discussed and their merits assessed.³⁵² One important additional factor was the history of this part of the Roman Empire, given that it is likely that important events in the region had an impact on the development of Coriovallum and one of its most important public buildings, the bathhouse. The new phasing not only refers to the bathhouse, but also to the area immediately surrounding it.

9.2 Dating the baths

9.2.1 The architectural evidence

Roman baths were largely functional buildings specifically designed to serve the requirements of personal hygiene according to the prevalent customs of the society, as well as offering the remedial facilities needed to alleviate everyday ailments. Additional amenities and enclosed leisure areas were usually included in the layout, particularly in public baths, reflecting the social aspects of a visit to the baths.

To keep the functionality and the standard of cleanliness at a level expected by visitors required regular maintenance and care. This often precluded any significant accumulation of deposits and finds over the often lengthy period during which a Roman bathing complex would be used. This, and the removal of tiles, building stones and metals in the post-Roman period, has led to a general lack of stratified finds, making most Roman baths notoriously difficult to date. Nevertheless, some progress has been made in recent years in attempts to determine significant chronological changes

when comparing the building plans of public and military baths. The following examination employs this approach in dating the baths in Coriovallum. Because the designs of villa baths were more strongly dependent on the individual tastes and financial resources of their owners, they will not be considered here. Similarly, the spacious bathing spas with their large pools, their array of specialised facilities and their distinct social functions comprise a special group that is also deemed unsuitable for comparison.

The essential architectural concept behind the baths at Coriovallum comprises a suite of bathing rooms (*caldarium*, *tepidarium*, *frigidarium*), which adjoin the furnace/boiler room (*praefurnium*) to the southeast and are aligned one behind the other along the long central axis of the main building. The progression of bathing rooms is characterised by successively lower room temperatures and terminates at the northwest end of the series in a spacious changing room (*apodyterium*). In his work on Roman baths, D. Krencker defined this type of arrangement as ‘*Reihentyp*’ (row type) and recognised it as a major group within bathhouse architecture.³⁵³

The bathhouse at *Coriovallum* certainly belongs to this general type, but also shows some distinctive features in terms of the architectural relationship between the large axial rooms, which seem to conform to a particular pattern. The most obvious of these features is that, if we disregard the ancillary facilities, both of the heated bathing rooms are contained in a single block, both rooms sharing the same axial length and breadth. The *frigidarium* however, although having the same length, is not as wide. Additionally, the last of the row of rooms, the *apodyterium*, is much larger than the *frigidarium* and has a rectangular floor of *opus spicatum* covering the central area of the room. These features are common to a group of baths located in the region straddling the German-Swiss border.³⁵⁴

The oldest bathhouse in this group is the legionary baths at the fortress at Windisch (Vindonissa) in Switzerland (Fig. 9.1). The first period of this bathhouse was built by the 13th legion (before AD 41) and replaced an earlier bathhouse located to the southeast. No structural details of an interior division in the *frigidarium* relating to this initial phase were found. However, it can be assumed that the 21st

³⁵² In July 2019 the academic committee discussed all research results and jointly determined the absolute chronology of the bathhouse and its immediate vicinity.

³⁵³ Krencker 1929, 177–178.

³⁵⁴ White 1999, 226. Dating has since been modified.

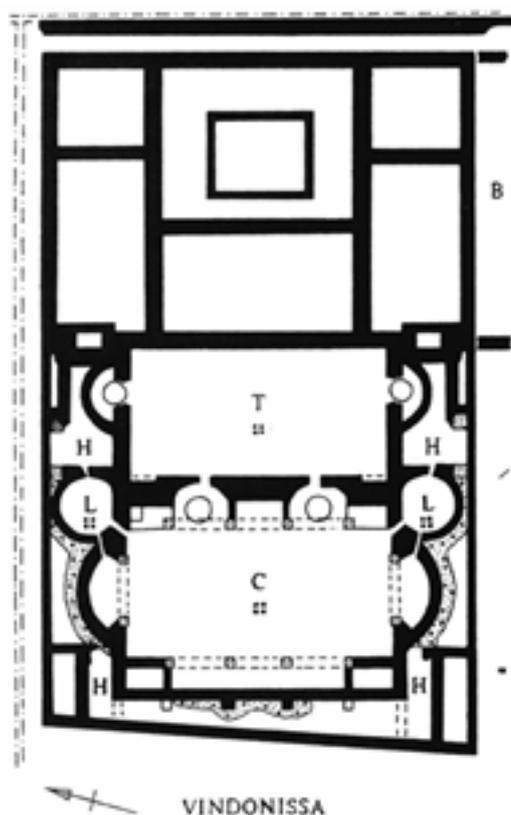


Figure 9.1 The second period of the legionary baths in Vindonissa (Source: Zienkiewicz 1986, Fig. 29).

legion, which took over in about AD 45, would continue to use the baths, which were quite newly built.

The second period, in which the *frigidarium* underwent changes in its internal arrangement, concerns us more closely. It was divided into a smaller room adjoining the *tepidarium* followed by a larger hall containing a central pool.³⁵⁵

The similarity in the layout of the *frigidarium* between the baths at Vindonissa and the urban bathhouse in Coriovallum, albeit on a much larger scale, is certainly striking. During a final stage of the military usage of the baths the dividing wall was taken down and the central pool enlarged so that it nearly filled the room, leaving only a heated ambulatory around the outside.

Smaller bathhouses belonging to this group have been identified in Hüfingen (Brigobannis) and in Schleithem (Juliomagus). The bathhouse in Brigobannis (Fig. 9.2) is located on the east side of the Black Forest to the south of the Breg, a source tributary of the Danube, and

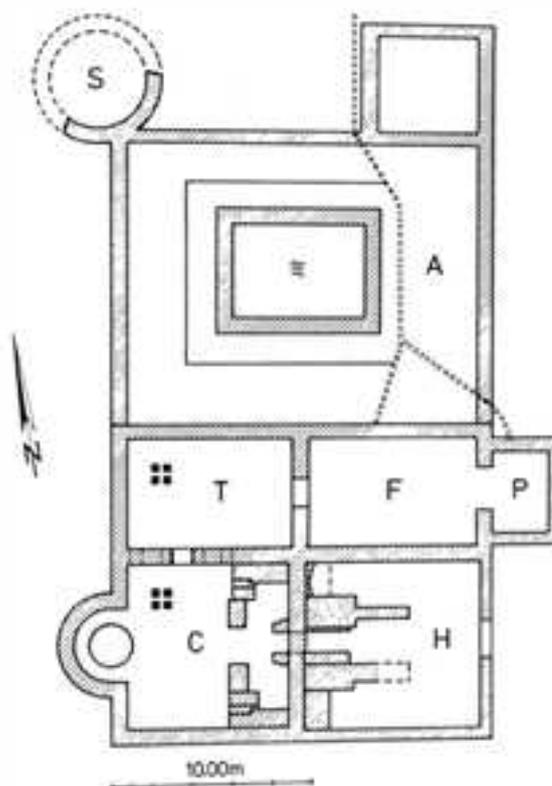


Figure 9.2 The military baths in Brigobannis (source: Mayer-Reppert 1995, Fig. 24).

is associated with a Roman fort. Juliomagus lies in the northern region of the Klettgau, between Brigobannis and Vindonissa, and is within a civilian settlement (Fig. 9.3). Although the original plan at Brigobannis was definitely based on a much earlier form known as the 'Blocktyp' (block type), the *apodyterium* with its central water feature was added later.³⁵⁶ The floor of the water basin was laid out in the same manner as the central area in Coriovallum, with *opus spicatum*. The floor of the *frigidarium* in Brigobannis had been similarly treated.

Due to the various building activities that took place at Juliomagus, the baths are not easy to interpret. Figure 9.3 shows the second phase (with later alterations). Phase 2 seems to have been the renewal of a previous building that had been largely burnt down. Nevertheless, the heated bathing rooms were readily identified by the remains of the hypocaust found in each room. The *caldarium* was discovered resting against the northeast bank of the Zwerenbach. The room had a heated water basin on one

³⁵⁵ Laur-Belart 1930, 68, Abb. 3.

³⁵⁶ The extension is a later addition that according to the general finds and coins could be early Vespasian (Revellio 1937, 27-28; Eckerle 1970, 5).

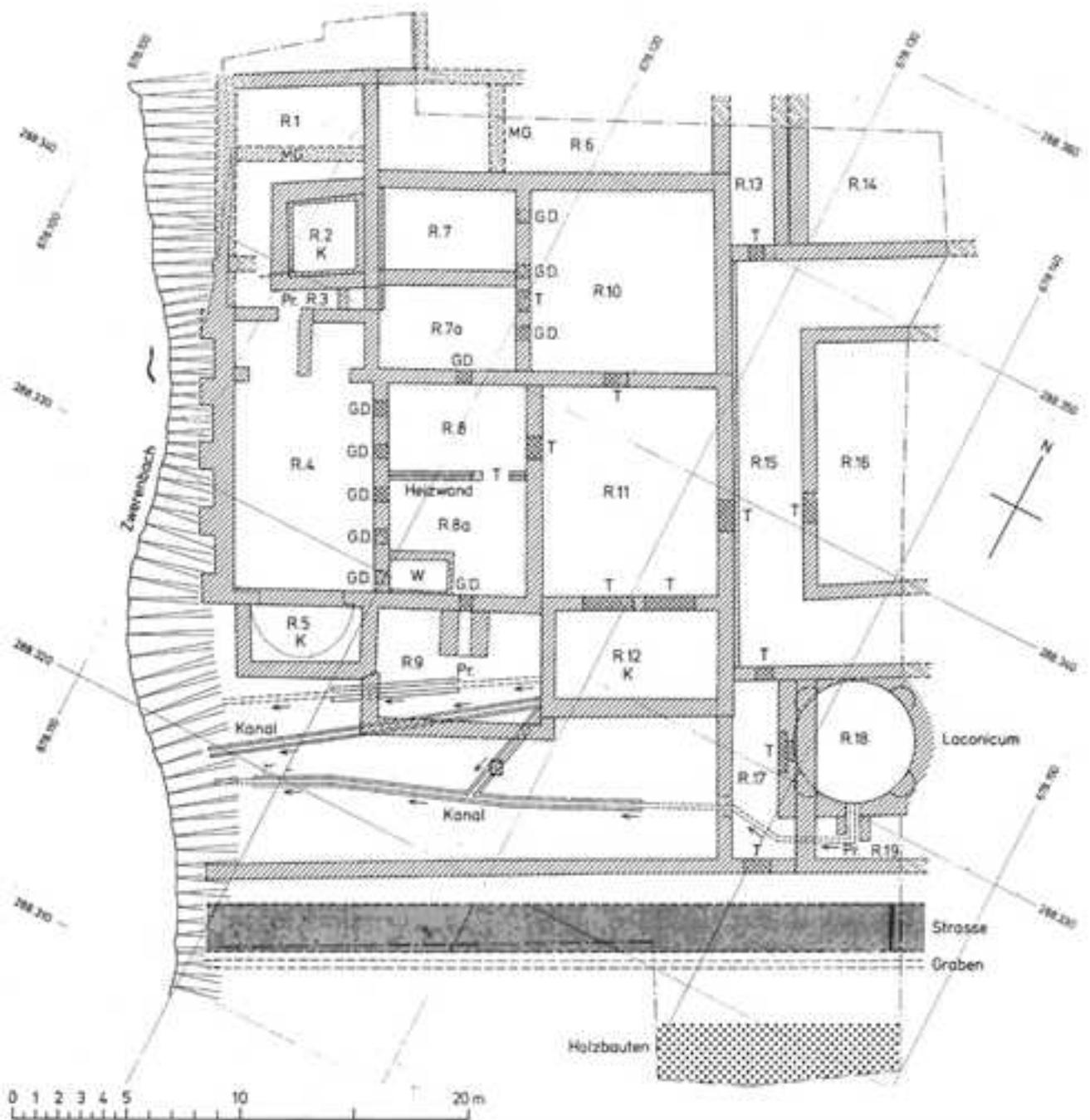


Figure 9.3 The civilian baths in Juliomagus (source: Bürgi 1989, 12).

side and an apse with a foundation for a *labrum* on the other. At some point the outer wall had become unstable and was later moved further away from the bank and supported by buttresses. Originally the *caldarium* could have been built with a *praeurnium* to the southwest and perhaps also with other bathing facilities. The *frigidarium* had one water basin to the

southeast, which was later enlarged. Finally there is an open area or large hall with a central recreational area surrounded by a walkway.³⁵⁷

When trying to affix a date to this architecture it becomes clear that reference must be made to the general building sequence in Vindonissa as it is understood today. Whereas the initial stone construction phase within the fortress

³⁵⁷ Bürgi 1989.

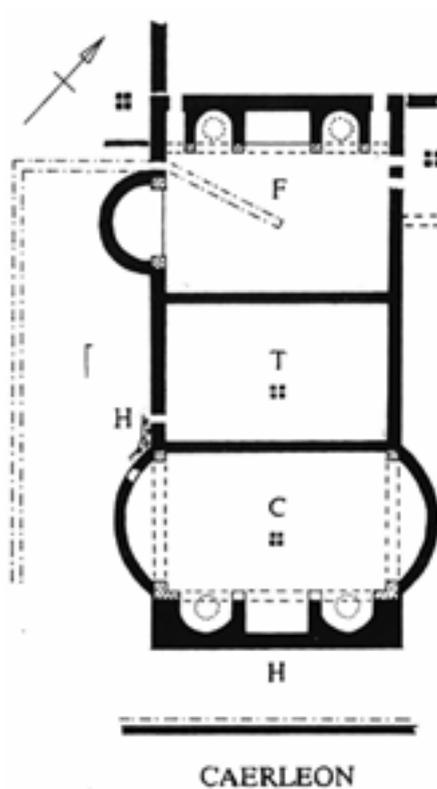
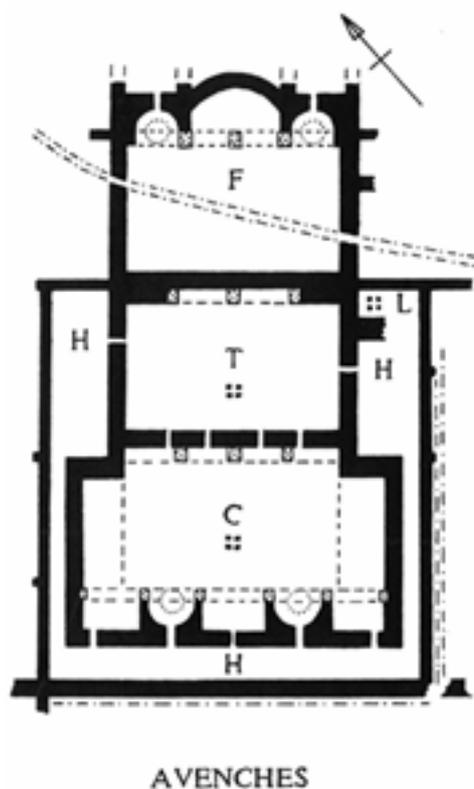


Figure 9.4 The civilian baths in Aventicum (source: Zienkiewicz 1986, Fig. 29).

Figure 9.5 The Isca Augusta legionary baths (source: Zienkiewicz 1986, Fig. 29).

was mainly the work of the 21st legion at the time of Claudius, the second rebuilding in stone appears to have taken place immediately after the disturbances during the years AD 68-70, and was carried out by the 11th legion. Noticeably, in the second phase the buildings retained the same alignments and dimensions as the earlier buildings, and only the interior divisions and functions were altered.³⁵⁸

It is very likely that the need to rebuild or repair the structures at this time, and indeed the desire of the new troops to incorporate their own requirements into the buildings, was also a factor behind the second phase of building work on the baths. This would most probably also apply to the extension of the small bath at Brigobannis and could then be associated with the expansion of the fort and the arrival of a new garrison. The ruins of these baths delivered several stamped tiles of the 11th legion. The renovation of the baths in the civilian settlement at Juliomagus, which lies on the route from Vindonissa to Brigobannis, is definitely of the same period, though perhaps one or two years later, given the absence of any sign of a water

basin in the area adjoining the *frigidarium*. A similar situation is attested for Coriovallum, although the remains at both places may require closer archaeological inspection regarding this point.

Evidence of changes in building styles, which would define the exact limits within which this architectural configuration should be placed, is more readily available for the time of its replacement by a new concept than for its first appearance. A completely new style to that of the Coriovallum bathhouse was introduced when the three major bathing rooms were all altered so that their dimensions were identical and incorporated into the main building block. Such architectural designs were recognised by J. Zienkiewicz as a new concept, whose latest forms together create a distinctive group (Figs. 9.4-9.6).³⁵⁹

Additional bathhouses have since been included in this group, such as Rottweil/Arae Flaviae and nearby Zunsweier, two military buildings in Baden-Württemberg.³⁶⁰ All of these bathhouses are dated no later than the middle period of Vespasian (AD 73-75).

³⁵⁸ Trumm 2010, 49.

³⁵⁹ Zienkiewicz 1986, 115.

³⁶⁰ White 1999, 227, 239.

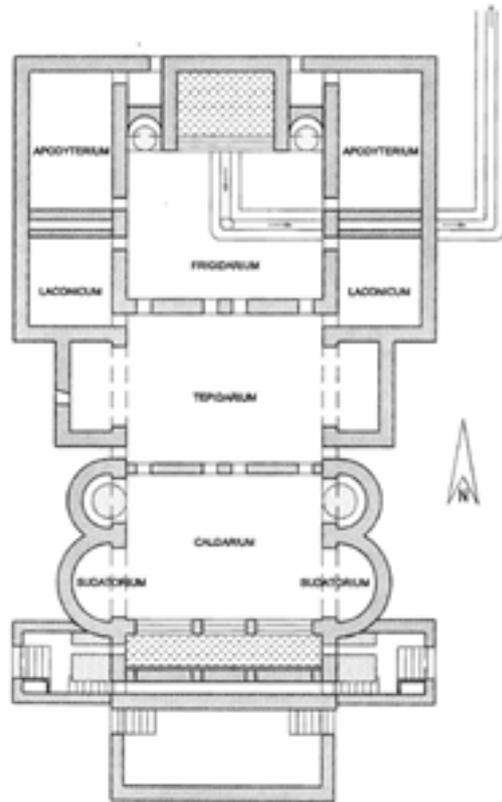


Figure 9.6 The Arae Flaviae legionary baths (source: White 1999, Fig. 10).

This provides a *terminus ante quem* for the earlier group, to which Coriovallum belongs. Although the late Neronian baths at Exeter were once included in the later group, fulfilling the criterion of having the *frigidarium* within the main building, the design of the cold bathing room and the adjoining *apodyterium* is unclear.³⁶¹ They are more comparable to the baths at Juliomagus, especially as the heated rooms are also significantly wider than they are long. It would seem that Exeter was perhaps a geographical variation of the earlier group. The foundations, alcoves or actual remains of stone bowls (*labra*) with running water for the bathers have been found in all these bathhouses. Such facilities were not encountered in newly built public or military baths after Vespasian.³⁶²

In view of the comparative evidence based on the architectural concept relating to the *frigidarium* and *apodyterium* it does seem that the baths at Coriovallum belong to a recognisable group that began in late Neronian times and was superseded in the mid-Vespasianic period by a further conceptual development.

The baths at Coriovallum remained almost

unchanged over the long duration of their use. It is worth noting that, when the *palaestra* was extended, the new *natatio* was given the same outer dimensions as the central tiled area of the *apodyterium*. This gives rise to the speculation that there might once have been a water feature in the middle of the room, which may then have been replaced with the tile flooring. Additional data would be needed to substantiate this hypothesis.

9.2.2 Dating evidence from the vicinity of the bathhouse

The report on the investigation of the immediate vicinity of the bathhouse of Coriovallum can be found in Section 7.2 and Appendix VII. It is in fact the analysis of the excavations performed by the ROB in the 1950s. A relative chronology has been derived from the analysis of the features and structures distinguished and the dating of the find material from these features. The dating information provided by this material is important for the interpretation of the bathhouse in its context, all the more so given the fact that very few finds have survived in the bathhouse itself, and readily datable material is scarce.³⁶³ The analysis focused on three moments in time:

- the earliest occupation around the site where the baths are located;
- the point when that occupation and the site where the bathhouse stood were linked; in other words, the incorporation of the bathing complex into the urban environment;
- the decline of that same occupation in the vicinity of the bathing complex.

A contextual analysis of the surrounding area such as this might potentially provide evidence that helps us understand and explain the chronology of this part of the *vicus*, including the plot on which the bathing complex was built. The bathhouse did not stand alone, after all. It was situated in an urban environment, and was a functional part of it. The rise and fall of the bathing complex undoubtedly occurred in parallel with developments in the *vicus* of Coriovallum.

The earliest features appear to be associated with buildings erected before the bathhouse was in use. The finds suggest they date from the

³⁶¹ Bidwell 1979.

³⁶² The negative evidence from the central baths at Pompeii, which were still under construction when the volcano erupted in AD 79, is significant in this context.

³⁶³ See previous chapters describing issues associated with specific finds from the bathhouse.

Augustan period, but their function cannot be identified, unfortunately. The features consist of many postholes that held wooden posts. The wooden structure (H5A) might have been just as impressive as the later stone building, as timber framed buildings with plastered walls can very closely resemble rendered stone structures. The wooden building was on the north side of the later bathing complex and extended over a broad area. It is suspected that there was more than one phase of construction within the post configuration. Unfortunately, however, it proved impossible to identify any clear distinctions during analysis of the complex excavated in the 1950s.

The ground plan definitely differs from the classic, elongated *vicus* house, though that does not help us to identify its function. Nothing points specifically in a particular direction, except perhaps for the nearby well (W1), which was situated beside, or maybe even 'in' the complex. This suggests the boundaries of the structure possibly lay in the unexcavated northern section. The features related to a later stone structure (H5) at virtually the same spot also offer some guide, as does the position of the crossroads of the assumed north-south and east-west roads – Via Traiana from Trier via Aachen to Xanten, and the road from Boulogne to Cologne via Tongeren. Could it be that this was a large public building which stood at the intersection of these two major roads? If we assume this to be the case, functions like inn, horse exchange or sentry post are potential options.

It is not certain when the first characteristic elongated *vicus* houses were built in the area under study. Traces of wooden structures have been found on both the north side (H1A, H2A, H3A) and the east side (H6A, H7A) of the later (?) bathing complex. The buildings from all these phases of wooden construction – i.e. the various early, Augustan and also the pre- or early Flavian wooden structures – stood significantly lower than the subsequent stone buildings, the difference being approximately 40 cm. The stone houses were built later on the same sites as the wooden houses, and eventually stood at the same floor level as the Roman bathing complex. It therefore seems likely that all the wooden structures were earlier than the bathhouse, though the differences are relatively small. We therefore suspect that distinctive

Streifenhäuser or strip-houses were first built in wood in the region around the time when the bathhouse was built.

The construction of the first stone houses cannot be precisely dated, unfortunately. We suspect that this coincided with the transformation of the bathing complex, with the major alterations that created *palaestrae*, the portico and the *natatio*. The fact that this involved conversion of an earlier version of the bathhouse is evidenced by a piece of mosaic floor found in a nearby pit (K14), and by a large pit (K24) that was used for lime extraction.³⁶⁴ These two pits date from the late first century. Given the fact that they contained building material from the bathing complex, and waste from the baths, they have been associated with a round of alterations at the bathing complex.

It is also interesting to note that the stone remains of the houses, like the bathhouse foundations, and also the gravel on the most recent road, all have a base that lies at approx. 114 m NAP. This is significantly higher than the previous phases of construction. This redevelopment of the site of the complex will have been accompanied by the raising or levelling of the entire surrounding area – a major operation. This is not an unknown phenomenon; a similar redevelopment also took place in Bonn.³⁶⁵ It could be that the builders used the floor level of the bathing complex as their reference point. The road running east-west was moved, putting the strip-houses at an angle to the road, judging by the front façades of the stone buildings. This retained the axes of the original first-century layout, but the fronts of the houses were no longer parallel to these axes (nor were they parallel in a westerly direction, on Coriovallumstraat/Valkenburgerweg). As a result, the bathhouse does not at first appear to lie on a thoroughfare, and access seems to deviate substantially from the Roman street pattern. But this came about due to a later infrastructural measure, which meant that eventually the grand front of the bathing complex faced an open triangular area covered in gravel – a square, in other words.

It is not possible to say, on the basis of the features and the finds, how long the stone building remained in use after this. A break in the occupation occurred when the Late Roman V-shaped ditch was dug (in two phases). This cannot at any rate have been simultaneous

³⁶⁴ W.K. Vos, this volume Section 7.2 and Appendix VII (Fig. 4.42, Fig. 4.43, Fig. 4.44).

³⁶⁵ White 2012, 112.

with the stone corner building H5, or with the road that ran east-west. Whether the stone strip-houses (H1-H4) were still in use cannot be said for certain, though we believe it is not very likely, mainly because the road they faced can no longer have been used by that time. Finds from the backfill of the ditch give a compelling *terminus post quem* for the demolition of the stone buildings, because when the ditch was dug across the previously inhabited area, material from earlier periods also ended up in the backfill. This was at any rate noted as such during the excavations. As a result, very early and very late find material was collected and documented from the same context. Finally, the Late Roman ceramic finds from the ditch are linked to the period when the ditch was in use, as they give a *terminus post quem* for the fill of the ditch, probably some time in the fifth century.

9.2.3 Datable material culture

Earliest material

The earliest pottery from the Thermenterrein site suggests activity began in the Augustan period.³⁶⁶ The material displays similarities with the earliest phases of other settlements along the road from Boulogne to Cologne (now known as Via Belgica) founded *ex nihilo*, such as Tongeren and Liberchies. But there are also similarities with early *castella* such as Velsen 1, Oberaden and Hofheim, which do not incidentally all date from the Augustan period. There is virtually no hand-formed pottery.

The start of activity in the Augustan period is confirmed by the earliest terra sigillata forms – Conspectus 18 and 22 – which date from between 10 BC and AD 20, while the earliest stamps suggest activity commenced around the beginning of the common era.³⁶⁷ The presence of Arretine ware, albeit only a small quantity, is striking, as this is rare at non-military sites in the Rhine hinterland.

The earliest coins from the Thermenterrein also suggest activity commenced there under Augustus, and put the starting date at AD 9-15.³⁶⁸ The relatively small percentage of AVAVCIA coins and the larger number of altar I coins is interesting, as it puts the start of coin loss in the late-Augustan phase. Another remarkable fact is that many of the Augustan copper coins have

been halved or have a counterstamp; 30% of the altar coins have for example been halved. This high proportion is comparable to that found at Roman forts that were in use in the Augustan period, and is much higher than the percentages found at Tongeren and Liberchies, for example. All in all, the series of Augustan coins from the Thermenterrein bears a strong resemblance to the series of coins commonly found at Roman forts on the Rhine. The earliest activities at Coriovallum are therefore associated with the military.

Among the fibulae found, an early spoonbow brooch and an Alesia brooch provide evidence that would support a start date for activity at the Thermenterrein in the second decade BC.³⁶⁹ The early material includes a remarkably large number of Gaulish garment pins that are not often found in a rural context. Pins of the Alesia and Aucissa type are clearly military, and may indicate the involvement of the Roman army in initial activities at the baths site, even though only a small number of these pins were found. Simple Gaulish brooches are strongly represented in the earliest group of pins, which is consistent with finds at other early military sites along the Rhine, although we should point out the possibility that this is due to Gaulish influences. In this category of material, too, it is worth noting the similarity with the development of Roman Tongeren.

The metal finds other than fibulae category also includes several finds that suggest a starting date ‘early in the first century’. The large number of finds from this early period is remarkable, and exceptional for a small civilian centre in the Netherlands. It is however consistent with the picture at similar centres along the road from Boulogne to Cologne.³⁷⁰

The earliest Roman glass found at the baths site is pre-Flavian, in the form of ribbed bowls. One quite unusual piece is a fragment of a ‘circus beaker’ from the second half of the first century AD.³⁷¹ This sherd was found not in its original context but in the Late Roman V-shaped ditch to the north of the bathhouse.

Most recent material

The pottery presents a picture of activities at the baths site continuing into the fourth or even the beginning of the fifth century AD. Very large quantities of Mayen ware were found, particularly in the backfill of the Late Roman

³⁶⁶ J. Van Kerckhove, this volume Section 8.1 and Appendix VIII.

³⁶⁷ R.A.J. Niemeyer & M. Polak, this volume Section 8.2 and Appendix IX.

³⁶⁸ P.A.M. Beliën, this volume Section 8.3 and Appendix X.

³⁶⁹ L.M.B. van der Feijst & S. Heeren, this volume Section 8.4 and Appendix XI.

³⁷⁰ S. Hoss, this volume Section 8.5 and Appendix XII.

³⁷¹ Cf. Haalebos 1995, 68 for Nijmegen and Vos, Blom & Hazenberg 2010, 127 for an example from Woerden.

ditch. The researcher highlights the fact that this type of pottery has been found in such numbers only at Late Roman fortified sites. A large amount of pottery with a metallic glaze produced in Trier was also found. Interestingly, virtually no regional Late-Roman pottery was found. The latest terra sigillata date from the late fourth or early fifth century, and this material was also found predominantly in the Late Roman ditch, although sherds were also found in the backfill of the bathhouse. No graffiti were found on this material.

In terms of the coins, the most recent one found at the Thermenterrein site gives a *terminus post quem* of AD 393. It is not possible to say on the basis of the coins how much longer activity will have continued, as the supply of coins to the region ceased in the late fourth century.

The most recent fibulae indicate activity at the Thermenterrein in the fourth and fifth centuries, although the number of garment pins is small. This is however a common pattern in the Netherlands. All the Late-Roman fibulae except one can be attributed to military officers, and as such this category of material also suggests the site had a military character in this period.

Finally, the latest examples from the ‘other metal objects’ category also suggest that activity at the site continued into the fifth century.

AD 40-70

One particular period stands out in the datable material found at the baths site: AD 40 to 70. This roughly coincides with the reigns of Claudius and Nero. The material, found in large quantities, arrived in Coriovallum via the same networks that supplied the large military camps. A lot of the material is rare for the Netherlands, and is almost never found at non-military sites. The objects include mixing bowls (*kalices*) and strainers, thin-walled beakers from Italy, coarse ware terrines, red ware platters from Pompeii and lids from Campania. A lot of material was imported from the Rhineland, too, including cooking wares from the region around Cologne. Pottery production began in Heerlen around the mid-first century, and expanded dramatically in the Flavian period.

The terra sigillata specialist highlighted a significant departure from the normal pattern in the region in the period AD 40-70. From the Claudian period onwards, there is a sharp increase in the amount of terra sigillata found at

the site, which reached a high point in the reign of Nero. The growth was in fact more rapid in Heerlen than in either Tongeren or Vechten.

The fact that activity at the baths site increased from AD 40 onwards is also confirmed by the study of the coins. A second peak in the loss of coins can be identified in the Claudian period, particularly if the dataset for this period is compared with the general picture of coin circulation in the region. Interestingly, the material includes a large number of imitations, much greater than is normally found. The coin spectrum at the baths site returned to normal in the Neronian and Flavian periods, conforming once more to the general pattern in the region.

Results of trial trench survey

The trial trench survey performed in 2017 specifically addressed issues associated with the dating of the bathing complex. This was the first opportunity since 1941 to gather datable material from a known context and stratigraphy in the two *palaestrae* and *praefurnium* I. This yielded new information significant for the dating of the bathhouse.

Trench 2, to the north of the *natatio* and the west of the main drain and one of the footings of the portico provided insight into the structure and dating of the west *palaestra*. In this trench, the clean, undisturbed soil was found to be lying 1.20 m beneath the current ground surface. It is likely that this was the original Roman floor level. A lime kiln was found at this level, the remains of which lay partially under a footing that had been built to support a pillar in the portico around the west *palaestra*. Material found in the backfill of the lime kiln has been dated to the Flavian period. The raised layer, which contained many small pieces of Kunrade stone, also included Flavian material. Trench 1, to the west of the *natatio*, also yielded find material from the Flavian period. During the investigation of the main drain, the lifting of the first stone slab revealed a small sherd of terra sigillata that has been dated to the first century AD. The earliest material from the west *palaestra* is therefore Flavian, and it is thus logical to conclude that this *palaestra* was created in that period. Given that the two *palaestrae*, the portico and the three rooms #21, #22 and # 23 are part of a single structural unit, this same date applies to all these rooms. Since the study of the construction history also showed that the

core building of the bathing complex is earlier than the surrounding *palaestrae*, this observation suggests that the first phase of the baths must be dated to the pre-Flavian or early Flavian period. No later material has been found in the west *palaestra*. This can be explained by the fact that this part of the site was prepared for construction work in 1935. This involved excavating at least a metre of the original subsurface archaeology (and possibly more), causing the loss of the higher, more recent layers.

Trenches 4, 5, 7, 8 and 9 to the east of the bathhouse shed new light on the development of the *palaestrae* located there. The section in trench 4, for example, beside one of the footings in the east portico, clearly showed that there must have been at least two phases of use, separated by a layer of rubble. This layer could not be dated, unfortunately. The footing course in the second phase consists of reworked *spolia*. Four of these stones closely resemble the heavy footings on the west side of the *furnus* in *praefurnium* I, which are still *in situ*. It is therefore possible that at some point after *praefurnium* I was decommissioned these stones were reused to replace the original footings in the east *palaestra*. Trial trench 4 also showed that a secondary trench was dug prior to the application of a layer of mortar on the foundations of the heated rooms.³⁷² Late-second- and third-century material was found in the backfill of the trench. The mortar cannot therefore have been applied before the end of the second century. Given that this layer of mortar is also found on the exterior of the south *alveus*, it is clear that this room – and therefore also *praefurnium* I – was in use to at least the end of the second century. The major alterations to the bathhouse, which involved the decommissioning of *praefurnium* I and the south *alveus*, cannot therefore be dated any earlier than the end of the second or beginning of the third century. The backfill of the feature which ran along the east wall of the *tepidarium* contained building rubble, including large pieces of ceramic building material, Kunrade stone, fragments of *opus signinum*, painted wall plaster and pieces of a black-and-white mosaic floor set in pink mortar. This feature is no earlier than third century. Given that it covered the hole cut in the foundations of the *tepidarium* wall, this date also gives a *terminus*

post quem for the hole. The masonry of room #14, the extension to the *tepidarium* and *frigidarium*, is also on top of the feature filled with building rubble, so was built after this feature was filled.

Trial trench 6 showed that *praefurnium* I had three floors. Enough charcoal was retrieved from the layers between the floors to obtain ¹⁴C datings. A raised layer was applied before AD 130, and extra footings were added at the same time. The dating of the second raised layer, under floor 3, is less clear; it lies somewhere between AD 130 and 330. In combination with the information from trial trenches 4 and 9, this suggests that *praefurnium* I was in use from the first to the third century. This information, combined with the date of the application of the mortar to the heated rooms, including the south *alveus*, suggests that the major alterations to the bathhouse did not take place any earlier than the late second or early third century.

At some point a large block of tufa was positioned in front of *praefurnium* II. The layer of charcoal beneath this block suggests that this could not have happened before AD 390.

Besides absolute dates, the trial trench survey also yielded new information on the relative chronology of the east *palaestra*. The section in trench 4 beside the footings in the portico showed that there must have been at least two phases. The layer of rubble between these two phases cannot be dated, unfortunately. It is however clear that the footings in the later phase consist of reworked *spolia*. The shape and dimensions of four of them are consistent with the heavy footings still *in situ* on the west side of the *furnus* in *praefurnium* I. It is therefore possible that the footings from the east side of the *furnus*, which is now ‘empty’, were used to replace the original footings in the east portico after *praefurnium* I was decommissioned. The second phase of the footings in the portico might therefore date from the same phase as the abandonment of *praefurnium* I. The survey in trenches 5 and 7 to the east of *praefurnium* I showed that the east entrance cannot have been contemporaneous with the south wall of the *palaestra*, as there would have been too little room for a staircase to the east. The study of the construction history concluded that the east *palaestra* and its surrounding wall were not created at the same time as the *praefurnium*. The east entrance to *praefurnium* I will probably

³⁷² See G. Tichelman, this volume Section 6.1 and Appendix IV.



Figure 9.7 The very first building on the Thermenterrein in the Augustan phase (source: W.K. Vos/M. Haars).

have had a staircase from the south which had to be removed when the wall around the *palaestra* was built in a later phase. The east entrance was probably sealed when the east *palaestra* was created.

9.3 Phasing of the baths site and the bathhouse

9.3.1 Phase 1: Before the bathhouse

There was occupation at the Thermenterrein site from the early Augustan era, although we do not know the precise nature of it. Traces of an elongated building oriented southwest-northeast have been discerned (H5A; Fig. 9.7). It might have been part of a larger complex

whose function is not clear. Interestingly, however, a stone building with roughly the same dimensions was built at almost the same spot, and we know that this building was not the average elongated *vicus* house, or a Mediterranean-style *domus* or townhouse. Furthermore, the boundaries of the building do not appear to lie within the area excavated, and the structure may have continued to the north. It is thus interesting to consider a well found there, as it may have been located in an open courtyard of the building. The size of the structure is not at any rate consistent with a 'normal' *vicus* house, and it is thus more likely to have been a public building that provided some kind of service. The building, an impressive rendered timber-framed structure, was also in a striking location, at the crossroads of Via Traiana and Via Belgica, as they are now known. It must therefore have been accessible from several directions. Partly for this reason, it can be interpreted as a *mansio* or another building with a public function. It would also make sense for a roadside settlement such as a *statio*, *mutatio* or sentry post for *beneficarii* to have been located at such a spot.³⁷³ This corner building was probably planned in the period when the layout of the *vicus* was designed. The layout was fairly strictly ordered, consisting of elongated insulae along streets and alleys in a more or less perpendicular arrangement, as was normal in a Roman town (or large village).

The Early Roman period was a very turbulent time in the northwestern Roman Empire. During Augustus' Germanic offensives the Rhineland was a front for several battles from AD 16 onwards, under the command of Drusus, Tiberius and Germanicus. The hinterland served as a logistical support zone for the fighting legions on the right bank of the Rhine. Marcus Agrippa was an important figure in the region at this time. He was not only a general and a confidant of Augustus, he was also appointed governor for the second time around 19 BC.³⁷⁴ This enabled him to order the construction of a road system designed mainly to expedite troop movements. One of these roads led from Lyon to the Rhine, near Cologne. But the road from the North Sea via Tongeren to Cologne also dates from the Early Roman period.³⁷⁵ Another road, from Trier to Xanten via Aachen, ran through Heerlen, too; it dates from the Augustan period.³⁷⁶ New Roman settlements were established along these roads, including Augusta

Treverorum (Trier),³⁷⁷ Atuatuca Tungrorum (Tongeren),³⁷⁸ Aquae Granni (Aachen), Traiectum ad Mosam (Maastricht),³⁷⁹ Juliacum (Jülich) and also Coriovallum (Fig. 1.3). Developments at the Thermenterrein during this period can probably therefore be directly linked to the actions of Agrippa and subsequent activities in the last two decades before the start of the common era.

Agrippa was also partly responsible for friendly Germanic tribes moving from the right to the left bank of the Rhine. In the region between the Meuse and the Rhine from the Dutch border they were Cugerni, Baetasi, Ubii en Sunuci (Fig. 10.3).³⁸⁰

The strategic location of Coriovallum guaranteed an influx of people, goods, trade in a general sense, and profits from the flow of Mediterranean and military goods and services into the region. The find material from the first four to five decades clearly reflects this. In fact, Coriovallum quickly became part of a regional network and was able to share the benefits of economic progress in all kinds of areas. This does not necessarily mean that soldiers were stationed in Coriovallum, however. But the settlement was subject to military influences, as can be seen from the material culture. Certain types of fibulae, for example, and the halved coins and early terra sigillata can be linked to the proximity of a military network. This is also the case if we compare the material culture of Coriovallum with that of other Early Roman sites in the region, such as Tongeren and Liberchies. It is significant that several specialists identify similarities between the material from Coriovallum and other urban settlements on the road from Boulogne to Cologne. The early date of the start of activities at the Thermenterrein therefore perfectly fits the pattern of development in the region during this period.

9.3.2 Phase 2: Construction of the bathhouse

A bathhouse of the classic *Reihentyp* (row type) – in which the *apodyterium*, *frigidarium*, *tepidarium* and *caldarium* were all positioned consecutively in a row and the rectangular rooms alternately had circular and square extensions – was built in the later years of the reign of Emperor Nero, or the early years of Emperor Vespasian (Fig. 9.8).

³⁷³ *Beneficarii* were usually legionary soldiers with a specific special task or duty such as military policing. The rank of *beneficiarius* already existed in the time of Caesar.

³⁷⁴ Van der Heijden 2016 with references.

³⁷⁵ Jeneson 2016.

³⁷⁶ Dolmans & Luys 2016.

³⁷⁷ Kunow 1987, 34.

³⁷⁸ Vanderhoeven 1996.

³⁷⁹ It is not known whether the name Traiectum (ad Mosam) is Roman. It first appears in Medieval documents. Communicated verbally by G. Soeters (Maastricht City Council).

³⁸⁰ See *inter alia* Bridger 2008, figure 426, 609.

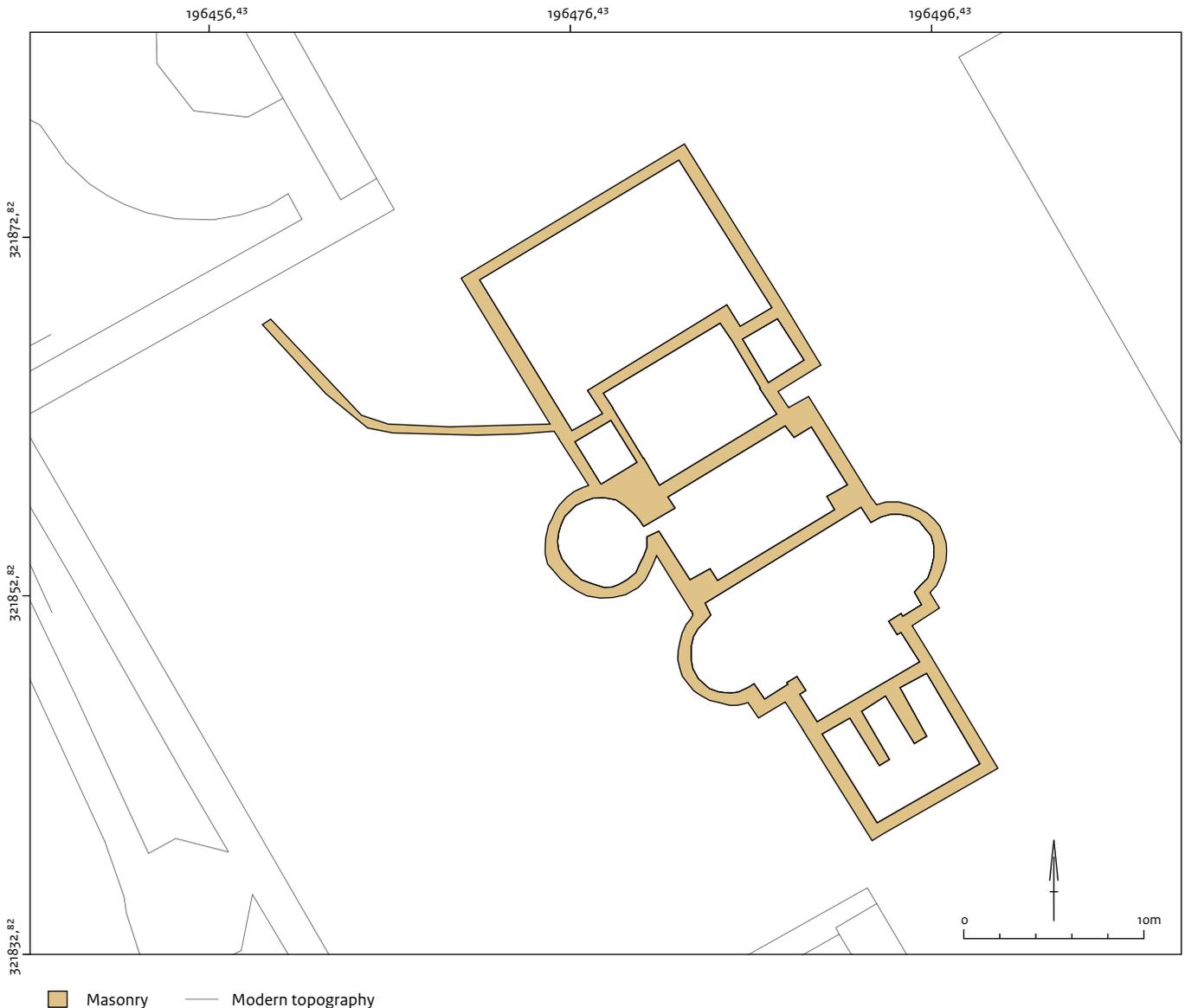


Figure 9.8 The bathhouse in the period AD 65-73 (source: K. Jensen/M. Haars).

The circular *laconicum* was to the west of the bathhouse, and was accessed via the *frigidarium*. There was one *praefurnium* that heated the *caldarium*, the *tepidarium* and the *laconicum*. The *caldarium* had a large hot water bath (*alveus*) and there was a *labrum* in the west apse, indicating that it was used as a *districtarium*.³⁸¹ There were two cold water baths in the *frigidarium*.

Compared with the other rooms, the *apodyterium* was very large. It is quite possible that this room was used not only for changing, but also for exercise. An alternative scenario includes a smaller wooden *apodyterium* in the first phase, which was later replaced by a large stone room with two niches, as suggested

in chapter 4. The geophysical survey did find points of high resistivity in the soil under the *apodyterium*, but this does not constitute evidence of a smaller predecessor, as suggested (Fig. 9.9). Until incontrovertible evidence of such a predecessor is found, we have opted on the basis of the current dataset to assume a first phase of the *apodyterium* at its current size, with two niches.

The bathhouse is built of local stone (Kunrade limestone), which could also be used to make mortar. The marble of which the *labrum* was made came from the Belgian Ardennes. The *frigidarium* had a mosaic floor with black and white *tesserae*. The white pieces were Kunrade

³⁸¹ A place in the baths for rubbing the body down after exercise.

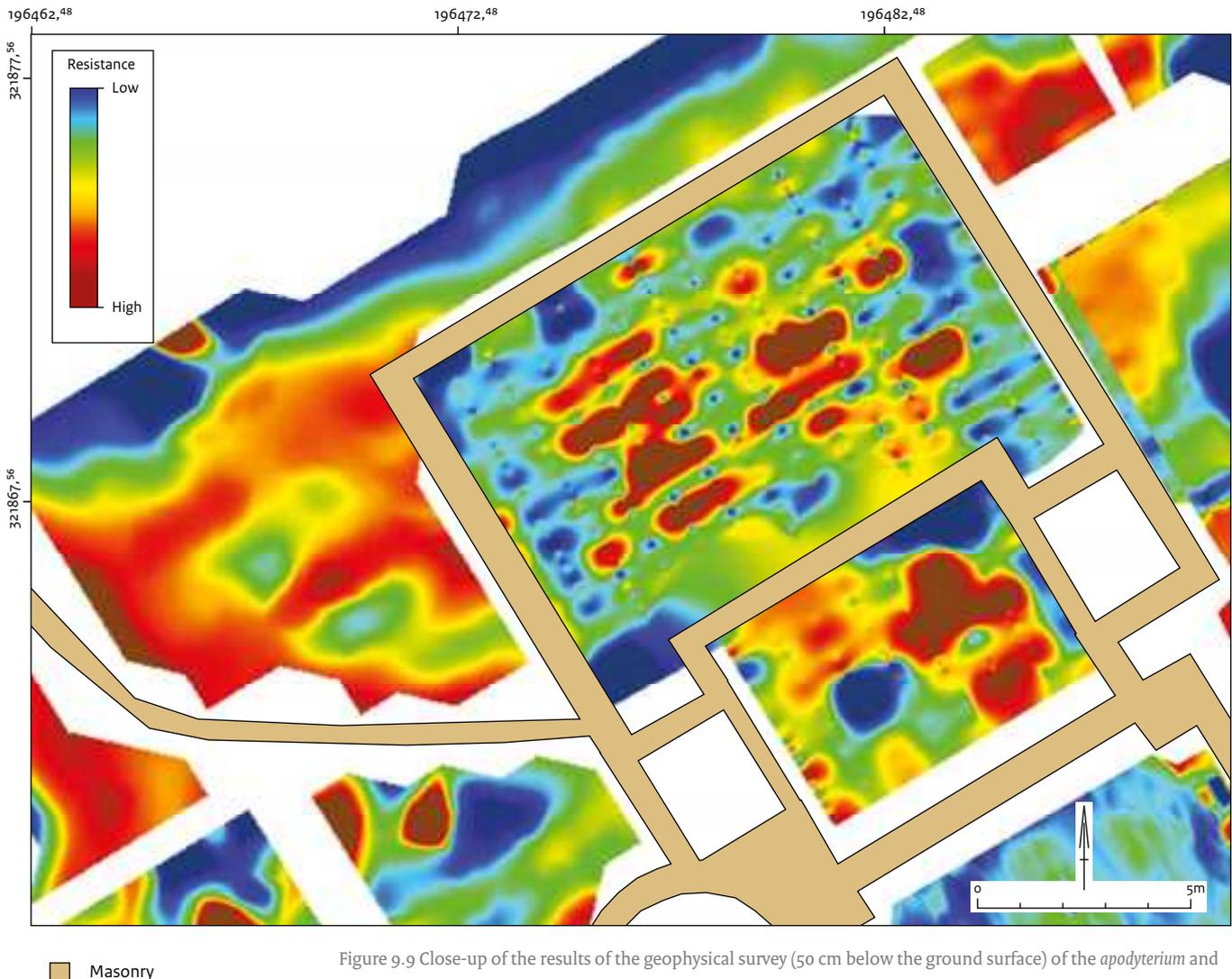


Figure 9.9 Close-up of the results of the geophysical survey (50 cm below the ground surface) of the *apodyterium* and the *frigidarium* (Source: J. Orbons, this volume Section 6.1 and Appendix V/K. Jeneson/M. Haars).

limestone and the black were 'Theux marble', also from the Ardennes.

A large quantity of ceramic building material was also used for the construction of the bathhouse. It was made using clay from several locations within a 30 km radius of Coriovallum (Fig. 8.18). The absence of stamps on roof tiles in this phase is striking. The many different fabrics identified in the material *in situ* suggest that ceramic floor, wall and roof tiles were made in several locations and used in combination for the construction of the bathhouse.

It appears that there were no walled *palaestrae* in the first period of the bathhouse (Fig. 9.10). There are however features on the east and west sides of the building that could be related to some kind of walled outdoor space. On the west, this is the east wall of the later *natatio*. Chapter

4 explains how this wall differs structurally from the other three sides of the *natatio*, and must have been earlier. The wall runs parallel to the central axis of the bathhouse. Its distance from this line is also precisely the same as the distance from the central axis to the middle of the elongated feature under the footings in the east *palaestra*, at 14.8 m.

Is the elongated feature a remnant of the foundation trench of a wall that stood higher? (Fig. 9.10) It is likely that the sloping terrain was levelled off to prepare for construction. Terracing with low walls might have been used for this purpose. But it could also be that the lower terrain to the west of the *laconicum* was raised and that the west side was reinforced by the low wall, to withstand the weight of the structure. The wall does not continue either to

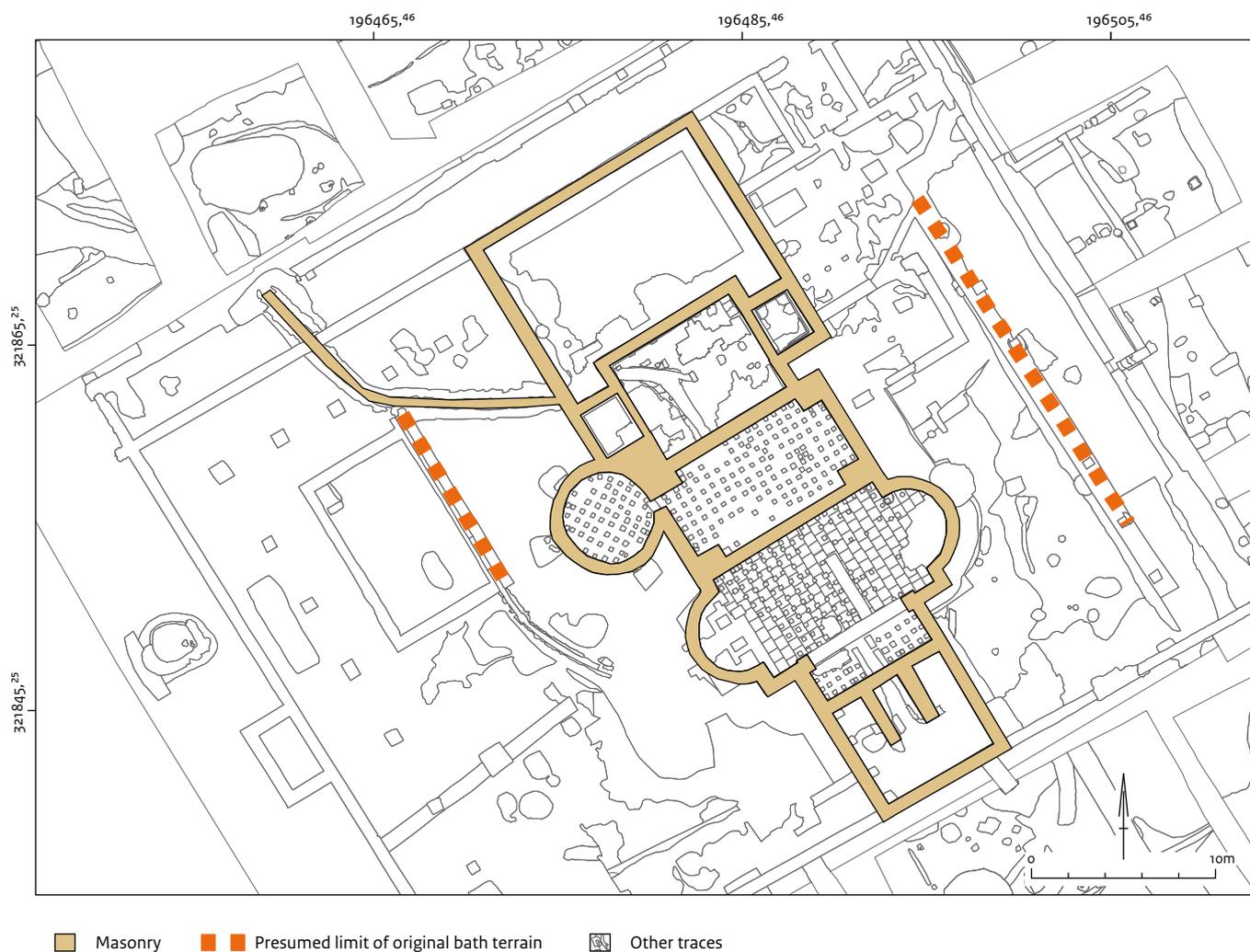


Figure 9.10 The bathhouse in the period AD 65-73, with the two features that possibly indicate the original plot size: 1 = elongated feature in the east *palaestra* (under the footings), 2 = east wall of *natatio* (source: K. Jeneson/M. Haars).

the south or to the north, and there is no robber trench.

It might be good to point out at this juncture that building a public bathhouse is such a complex matter, involving factors like the water supply and drainage, technical requirements and physical requirements of the site, that it will necessarily have been preceded by a planning process, and that nothing was left to chance during the construction work itself.³⁸² This implies that ‘coincidences’ such as that described above were not in fact coincidences, but the result of a predetermined design. It is therefore also interesting that the distance from the east wall of the *natatio* to the elongated feature under the footings is 29.60, which converts to exactly 100 Roman feet.

Whether the plot or construction site was

completely bare when it was decided that a bathhouse should be built there is difficult to say. Excavations have not identified earlier buildings within the walls of the bathhouse, but then again these were never deliberately sought. Furthermore, it is not entirely certain that such remains would still have been present, as the traces of the later bathhouse would undoubtedly have disturbed those of the earliest occupation. Whatever the case, the structures in the immediate vicinity would have been there almost half a century. Was the bathhouse built on a vacant plot, or was it incorporated into an existing collection of structures? This question might never be fully answered, but the geophysical survey did provide information that indirectly has a bearing on the question of whether the plot was inhabited prior to the

³⁸² DeLaine 1988, 17.

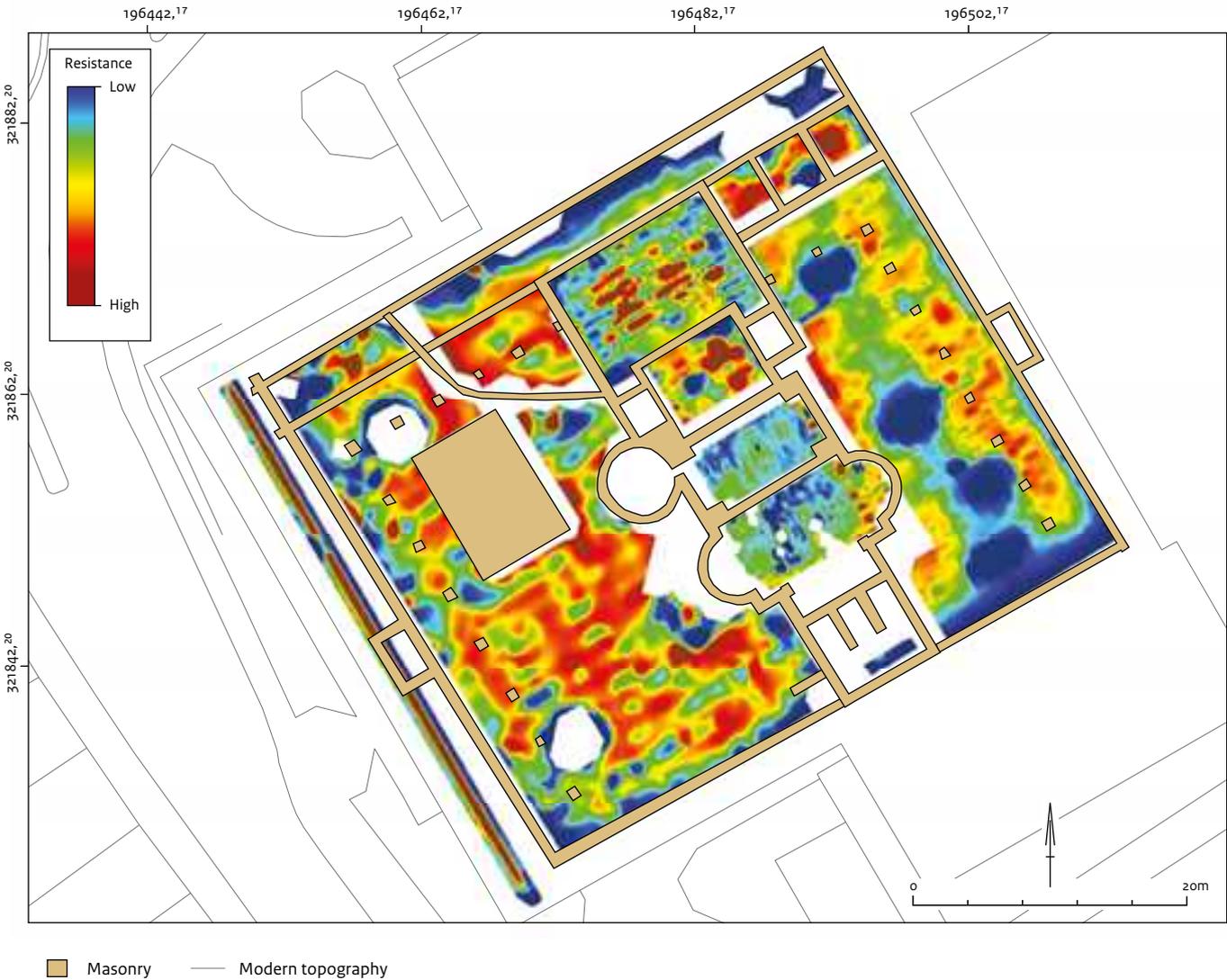


Figure 9.11 Results of the geophysical survey (50 cm below the ground surface) showing the rectangular phenomenon (in orange-red) in the west *palaestra*. (Source: J. Orbons, this volume Section 6.1 and Appendix V/K. Jeneson/M. Haars).

building of the bathhouse. Interestingly, the soil resistivity survey on and around the baths site (Section 6.2) revealed a mass of soil features in the subsoil, outside the actual core building, particularly in what was later the west *palaestra* (Fig. 9.11). Are these the rectangular structures of former buildings? The features are not readily identifiable. It is for example unclear whether they were *vicus* houses. But if these are traces of buildings, they might date from before the bathhouse. They might be buildings that abutted the boundary of the bathhouse or the core building, and may thus be contemporaneous or earlier.

Though we do not know this for certain, if we assume it to be the case the next question to

consider is when these structures disappeared. Though we do not intend to address this question at this juncture, we should recall the posthole cluster of a building immediately to the north of the baths site (Fig 9.12).³⁸³ If it was contemporaneous with the bathhouse, this building would have stood right in front of the entrance to the *apodyterium*. This is unlikely, so this building must have been demolished for a bathhouse to be built on the site. Unfortunately, we are unable to assess and verify these hypotheses yet, and all we can do is present them as such. But it is clear that there is something going on in the subsurface just to the west of the site where the core building of the bathhouse stood.

³⁸³ W.K. Vos, this volume Appendix VII, Fig. 4.24.



Figure 9.12 Map of the Thermenterrein site from AD 65-73 onwards (source: W.K. Vos, this volume Section 7.2 and Appendix VII/M. Haars).

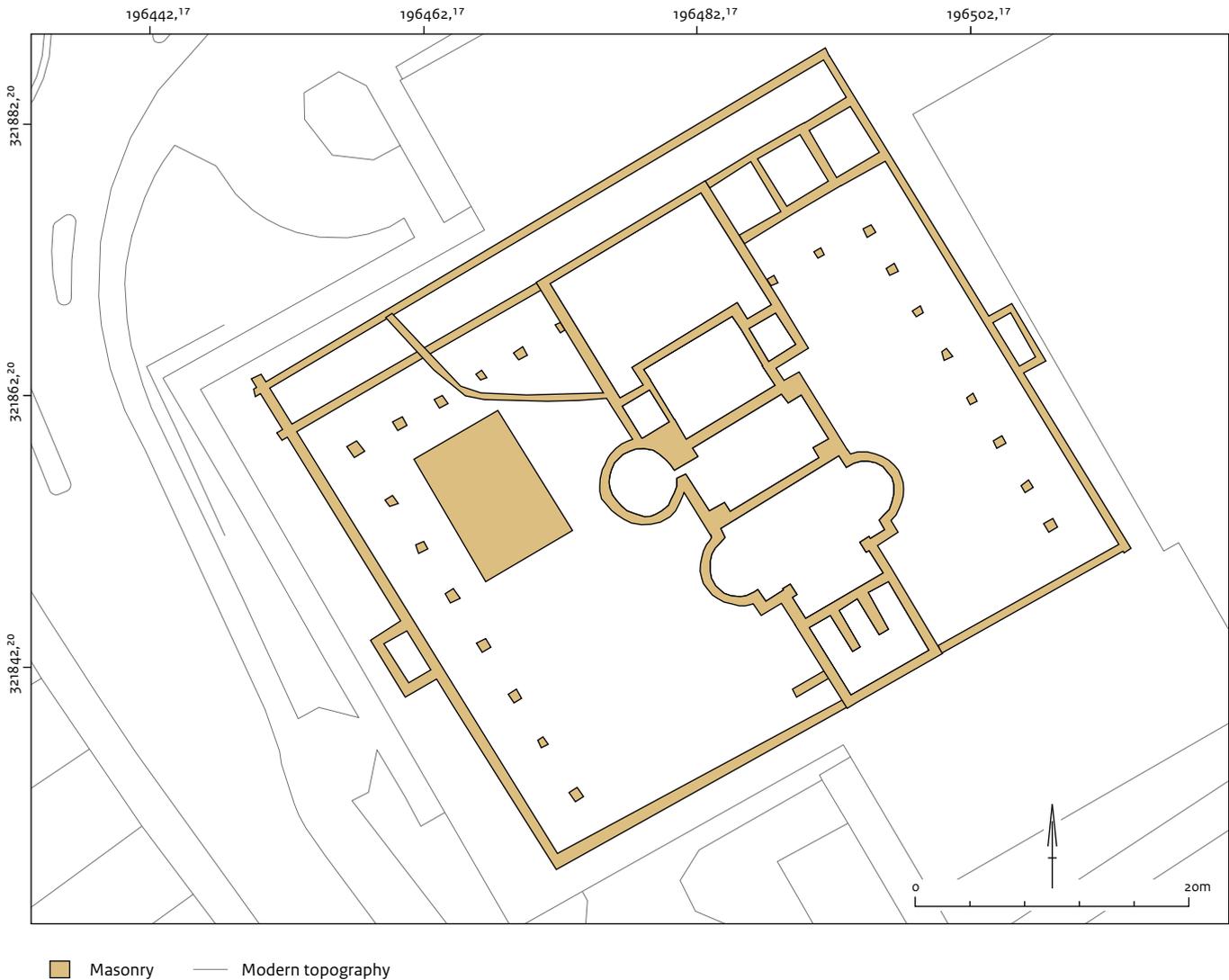


Figure 9.13 The bathhouse from the Late Flavian or Trajanic period onwards (source: K. Jeneson/M. Haars).

Despite the absence of military stamps on the ceramic material, it is likely that the bathhouse was built at the initiative of, and by, the Roman army. In that period there was in fact no other party with the necessary capital and financial and human resources for such a project. The pottery, coins and fibulae from this period support this assumption.

It is difficult to say with certainty whether the bathhouse was built under Nero or Vespasian. Two fragments of what could be a building inscription dated to the first century, with a possible reference to Tiberius Claudius, might constitute evidence that it was built under Nero. The original complete stone was made of Norroy limestone. It was later sawn into pieces that were reused in the building. Two of these

spolia, as they are known, were found near the bathhouse (Fig. 9.12). The reference to Tiberius Claudius could mean that the bathhouse was built in his honour, but was not paid for by him, which might indicate that his successor Nero gave the orders for it to be built.³⁸⁴ However, the name might also refer to an unknown governor or legionary commander. Nor can we rule out the possibility that the inscription originally came from another building in Coriovallum.

9.3.3 Phase 3: Expanding the baths

In the third phase of occupation the bathhouse underwent a significant expansion to include

³⁸⁴ J. Minis & S. Schorn, this volume Section 8.10 and Appendix XIX.

two large walled outdoor areas, each with an L-shaped portico, a *natatio* in the west *palaestra* and a portico on the front (Fig. 9.13). Three extra rooms lay between the portico and the east *palaestra*. This expansion increased the total surface area from 500 m² to 2000 m², thus quadrupling the size of the complex. The 75 m² *natatio* could be used as an alternative to the *piscinae* in the *frigidarium*.

A huge amount of earth was moved to create the two *palaestrae*. A raised layer applied on the north side of the west *palaestra* is 1.20 m above the current ground surface. The original layer will have been much thicker, given the fact that the Roman ground surface would have been much higher, as it was removed in 1935. To the east, on the other hand, earth will have had to be excavated to accommodate the new *palaestra*. It is quite possible that this earth was used to raise the ground level to the west. This major operation demonstrates that, again, there must have been a predetermined plan for the extension.

It is likely that the expansion was intended to make the complex more impressive. The height of the façade of the bathhouse was raised from 13m to nearly 49m, and a grand main entrance with columns of Norroy limestone was created. The *palaestrae* had beautiful gardens where it would have been pleasant to relax between bathing sessions. Visitors could walk, eat and chat in the porticos. There may have been shops in the three rooms on the east-facing front of the bathhouse, though these rooms could also have been used for medical examinations or treatment, or for other body care procedures.

The addition of the *natatio* meant the main drain from the bathing complex had to be modified. The drain with the base made of slabs of Norroy limestone was laid in this phase. It probably replaced an earlier drain of which no trace now remains. It goes without saying, of course, that the bathhouse already had a drain in the previous phase.

Virtually no changes were made to the bathhouse itself. No baths or rooms were added, except for a modification to the *praefurnium* which involved sealing the east entrance. The west entrance thus became the only entrance. The section of wall that was still visible in 1941 probably dates from the second phase, though its purpose remains unclear. It could have been to screen off the entrance to the *praefurnium* so it

was not visible to bathers.

Whether it was a consequence of the formation of the province in AD 84-85, or the founding of Colonia Ulpia Traiana roughly a decade later, the expansion of the complex in the late first century is an established fact. The archaeology shows not only that developments occurred in the bathhouse itself, but also that urban structures outside the complex were radically altered. Roads were rerouted, a public square was created, the entire area was systematically raised – probably after first being levelled – and timber-framed houses (which may have been vulnerable) were replaced by more robust and durable stone buildings (Fig. 9.14).

Another notable fact is that it was in the Flavian period that the pottery industry in Coriovallum flourished.³⁸⁵ This might have been due to the demand from the expanded bathhouse, or a more general commercial boom in Coriovallum.

It is highly likely that this third phase of the Thermenterein continued to the mid-third century, until the Frankish invasions that affected the whole of Germania Inferior – and therefore also the Coriovallum region – between AD 256/7 and 260.³⁸⁶ Up to that time, at any rate, fairly major repairs were carried out on the foundations of the *tepidarium*, the *caldarium* and the *alveus*. This involved digging a trench down to below the ground surface of the *palaestrae*, on both sides of the building, after which the walls of these heated rooms were rendered with white mortar. This procedure is believed to have been performed in order to prevent damp problems in these rooms.³⁸⁷ It could have been carried out at the start of phase 3, but it might equally have been a decade later. It will at any rate have occurred during phase 3, given that the southern *alveus* must still have been in use. This was no longer the case in phase 4. Another procedure possibly carried out in phase 3 was the lowering of the main drain. As concluded in chapter 4, at some point the main drain was lowered from the point at which it collected the water that drained from the *natatio*. The original drain (in the wall separating the north portico and the west *palaestra*) was hewn out and deepened during this operation.³⁸⁸ It is quite possible that, after the *natatio* was installed, it was concluded that the existing drain did not work properly, and that dirty water flowed back into the bathhouse when the *natatio* was emptied. Deepening the

³⁸⁵ J. van Kerckhove, this volume Section 8.1 and Appendix VIII.

³⁸⁶ Kunow 1987, 81.

³⁸⁷ K. Peterse, this volume Chapter 4.

³⁸⁸ K. Peterse, this volume Chapter 4.



Figure 9.14 The bathhouse and its surroundings in phase 3 (Source: W.K. Vos, this volume Section 7.2 and Appendix VII/M. Haars).

drain would have helped resolve this problem. This operation must have occurred in phase 3, since the *natatio* was no longer in use in phase 4.

Although phase 3 appears to have been the heyday of the bathhouse and of activity at the Thermenterrein, both the pottery and the coins show a sudden decline in numbers from AD 170. This might indicate a decline in activity from the late second century. Whether this can be attributed to problems with the bathhouse or problems of a more regional nature is not clear. It is believed that, under Emperor Commodus, there was not only unrest and rebellion in Germania Superior, but also in Germania Inferior.³⁸⁹

9.3.4 Phase 4: Restoring the baths

One significant development in the mid- to late third century was the fortification of towns and important intersections on the main roads in Germania Inferior. Stone city walls were built in places like Cologne, Xanten, Tongeren, Maastricht, Aachen and Jülich.³⁹⁰ Emperor Gallienus (253-268) introduced drastic reforms to the defence of the empire's borders, including the deployment of 'mobile units' on horseback which operated in the hinterland, rather than only at the border.³⁹¹ These measures are regarded as a response to the 'Frankish invasions'. The Alamanni, Bructeri, Chamavi, Chattuarii and Ampsivarii are believed to have crossed the Rhine between Xanten and Cologne in late 256 or early 257, and plundered their way as far as Tarragona, and even Rome.³⁹² After passing the border defences along the Rhine, they were able to move around easily on the main road network. Coriovallum will inevitably have fallen victim to this invasion. The governor at the time, and therefore the commander of all Roman troops in Germania Inferior, Marcus Cassianus Latinius Postumus, seized power locally and founded the 'Gallic Empire' (260-268) with Cologne as its capital. Coriovallum, less than 70 km from Cologne, must have felt the impact. Things remained chaotic in the second half of the third century, and Germania Inferior was invaded repeatedly. It was not until the reign of Constantine (306-337) that peace returned to the region, and the new province of Germania Secunda was created.

Phase 4 occurred against this backdrop. It is clear that a dramatic transformation occurred at the bathhouse in this period. We can only guess as to the reasons for this. It might be that the complex was damaged in the Frankish invasions of 256/7-260, or later, around AD 275. But it might also be that it fell into disrepair, simply because it was not properly maintained during the period of unrest in the third century.

Whatever the case may be, a large amount of rubble dating from the third century was found in pits in the east *palaestra* and elsewhere. It consists of large fragments of wall, floor and roof tiles, stone, wall plaster and black-and-white mosaic floor from the *frigidarium*. One of these pits containing rubble was to the east of the *tepidarium*, and it became apparent during the trial trench survey that room #14 was built on top of this feature. The trial trench survey also showed that six of the eight footings of the east portico had a second phase separated from the first by a layer of rubble.³⁹³

The most radical intervention of phase 4 was the complete redesign of the heated part of the bathhouse (Fig. 9.15). As indicated in Van Giffen's reconstruction, *praefurnium* I and the large *alveus* were decommissioned and separated from the rest of the bathhouse by a wall on the north side of the *alveus*. The west apse of the *caldarium* was transformed into *praefurnium* II, and a new *alveus* was also built there, after the foundations of the *labrum* had been removed right down to the bottom of the underfloor of the hypocaust. The *caldarium* itself was divided in two and a new vaulted structure was built beneath the suspended floor; above this a new wall with an opening was built. The opening between the *tepidarium* and the *laconicum* beneath the suspended floor was sealed, and the foundations of the *laconicum* were dug out on the south side in order to add *praefurnium* III, used exclusively for the *laconicum*. All openings but one were sealed in the vaulted structure under the suspended floor between the original *caldarium* and *tepidarium*. The westernmost opening was left open, so that hot air would still flow into the old *tepidarium* from *praefurnium* II, albeit to a lesser extent. The new structure meant the bathhouse now had two *tepidaria*, which was standard for bathhouses in the north of the Roman Empire from the Flavian period onwards.

Little appears to have changed in the

³⁸⁹ Kunow 1987, 75.

³⁹⁰ Various sources discuss these developments, including Kunow 1987, 84, and also Van Enckevort & Vos 2006, chapter 19, and Van Enckevort, Hendriks & Nicasie 2017, 33-34, 36.

³⁹¹ Kunow 1987, 82.

³⁹² Kunow 1987, 81.

³⁹³ G. Tichelman, this volume Section 6.1 and Appendix IV.

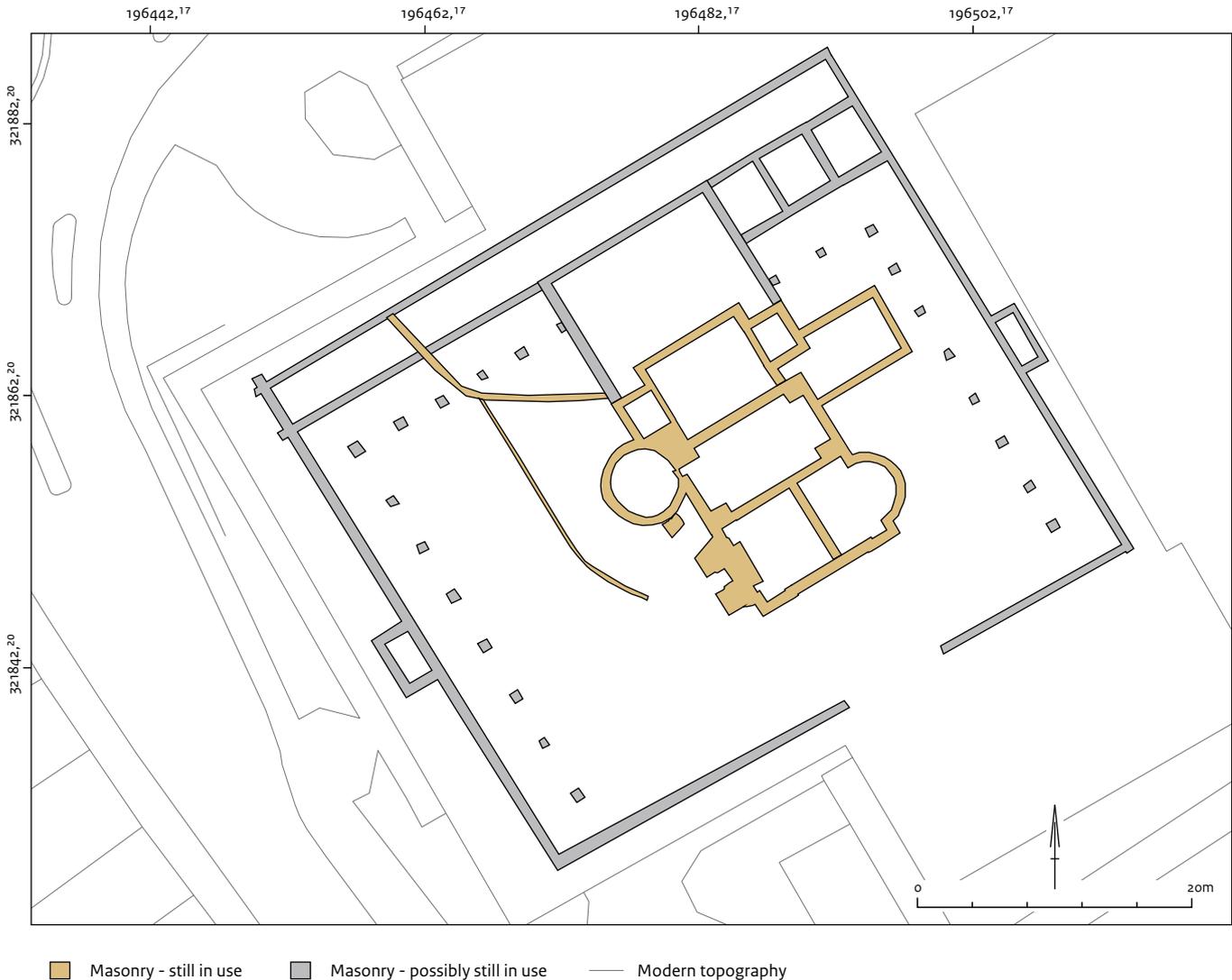


Figure 9.15 The bathhouse in phase 4, after the major alterations in the third century (source: K. Jeneson/M. Haars).

frigidarium, apart from possible repairs to the floor and the *piscinae*. However, Van Giffen believed that a new entrance to the *frigidarium* was created during the alterations, from the extension (#14). Although this scenario is rejected in chapter 4, we believed there is enough evidence that Van Giffen was correct, and that a connection was indeed made between the *frigidarium* and the new extension in a later phase.³⁹⁴ The tiles adjacent to this new entrance are extremely worn – one completely down to the mortar, apart from one small piece (Fig. 9.16). It is perhaps indicative that this opening was exactly opposite the entrance to the *laconicum*, and will thus have been the same width. Two holes in the floor of the *frigidarium* might be associated with the new entrance. A

corner had been cut from two tiles on the south side of the room, creating a slightly rectangular depression in the floor (Fig. 9.16). In the southeast corner, approximately a metre from the two walls, there is a deeper rectangular hole that may have been a posthole.

Van Giffen believed this new extension was used as a latrine.³⁹⁵ The trial trench survey and the study of the water supply rejected this interpretation, however. Given the position of the room and the alterations to the bathhouse as a whole, we believe this was a new entrance and changing room.

Whether the former *apodyterium* (#2) was still in use as such in phase 4 is not certain. Several repairs can be seen in this room, recognisable by the use of pink mortar, which might suggest

³⁹⁴ It is argued in chapter 4 that there was a raised cordon at this point, so Van Giffen could not be correct. However, there is in fact no raised cordon at precisely the position of the new entrance (fig. 9.14).

³⁹⁵ Van Giffen 1948, 213, 225.



Figure 9.16 The possible entrance between the *frigidarium* and room #14. The remains of the removed raised cordon and the wear on the tiles in the *frigidarium* can clearly be seen. the arrows indicate the secondary holes made in the floor, which were presumably related to the new entrance (source: Thermenmuseum, A. Steen).

a purely functional use. For example, part of the mortar edge on the southwest side of the *opus spicatum* floor has been replaced by a row of bricks, and the opening between the *apodyterium* and the *frigidarium* has been repaired with large tiles and pink mortar. On the west side of the *apodyterium* there are postholes that might be associated with this later phase of use. It is quite possible that the room was still used for exercising, particularly if this was no longer possible in the *palaestrae* to the extent it had been previously.

The *natatio* was decommissioned and was filled with rubble, as can be seen in the east section, in the thick layer of rubble on the bottom of the pool. A drain was laid on top of this layer, against the east side of the pool. It is logical to assume that this new drain conveyed the water from the new *alveus*. We cannot say for certain whether the lowering of the drain from the point where the *natatio* water entered it occurred in this phase, or had already happened earlier.

It is also unclear whether the west *palaestra* was still in use. A lot happened at the complex, such as the conversion of the west apse of the *caldarium* to a new *praefurnium*, the decommissioning of the *natatio* and the laying of a new drain for the new *alveus*. We know that the

east *palaestra* was still in use. A later phase can be seen in six of the eight footings in the east portico, consisting of *spolia* from the bathhouse, and possibly also from other buildings in Coriovallum. The connection between these six footings and the new entrance or changing room #14 is interesting. Part of the old portico in the east *palaestra* remained in use and appears to be connected with the assumed entrance to the new *apodyterium* (fig.9.18)

The alterations to the bathhouse not only meant Coriovallum once more had a functioning bathhouse, it had also been transformed from a *Reihentyp* to a *Blocktyp*, as noted by Van Giffen.³⁹⁶ Figure 9.17 makes this clear.

One of the most important pieces in the collection of finds from the baths site is without doubt the intact inscription stone found during the ROB excavations in 1957. It is a dedicatory inscription whereby one Marcus Sattonius lucundus fulfils a promise to Fortuna (Fig. 8.27).³⁹⁷ The inscription makes it clear that this Sattonius '*balneo resstituit*' – that he had the bathhouse restored. It seems logical to link this inscription to the major restoration that took place in phase 4. The script and wording of the inscription suggest a date between AD 150 and 300.³⁹⁸ Another notable feature is the fact that the inscription states that Sattonius

³⁹⁶ Van Giffen 1948, 233.

³⁹⁷ J. Minis & S. Schorn, this volume Section 8.10 and Appendix XIX.

³⁹⁸ J. Minis & S. Schorn, this volume Section 8.10 and Appendix XIX.

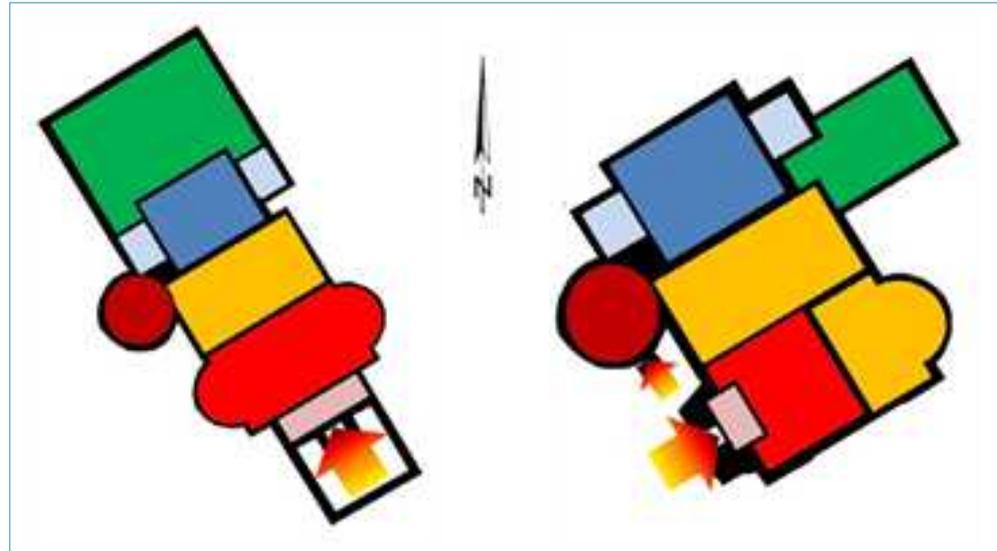


Figure 9.17 On the left, the situation before the major alterations, on the right the situation after the alterations. Red = *caldarium*; orange = *tepidarium*; blue = *frigidarium*; dark red = *laconicum*; green = *apodyterium*; light blue = cold water bath; pink = hot water bath; red and yellow arrow = *praeefurnium*. (source: K. Jeneson).

was a member of the town council of C.V.T. In 1957, when the stone was found, Bogaers linked this Sattonius to a *primipilus* of the third legion named Sattonius Lucundus, who erected a dedicatory stone to Mars in Lambaesis (now Lambèse-Tazoult in Algeria) between 253 and 259.³⁹⁹ It is possible that a Sattonius who originated from Coriovallum, or the surrounding region, served in the third legion, then returned to his birthplace, where he found a derelict and damaged bathhouse and funded its restoration. The new research on the inscriptions at the baths site showed, however, that there are several reasons why Marcus Sattonius Lucundus cannot have been this Sattonius Lucundus of Lambaesis.⁴⁰⁰ Nevertheless, the dedicatory inscription is of inestimable value, not only for the reconstruction of the history of the bathhouse, but also for the insight it affords into society in Coriovallum in the Late Roman period.

In this phase, too, the immediate surroundings of the bathhouse underwent radical change. A deep V-shaped ditch was dug around the bathhouse, a substantial section of which was found during the excavations in the 1950s.⁴⁰¹ The ditch was part of a defensive ditch dug around Coriovallum in phase 4.

This V-shaped ditch presumably also extended to the west and east sides of the baths site, although no evidence could be found to

confirm this. To the west, it probably lay near the crossroads of what is now Coriovallumstraat and Kruisstraat, while to the east it would have continued beyond today's Templesplein, to halfway along Raadhuisstraat.⁴⁰² It covered a hypothetical area of 65 x 250 m.

In archaeological terms, the ditch, which is 6 m wide, consists of two phases, which can be seen only in a small number of sections. It has several layers of backfill, including a distinctive layer containing charcoal, Kunrade stone and roof tile rubble. This is without doubt demolition rubble from the baths site, filled with material that ended up in the open ditch after a period of habitation. The layer might represent 'disaster or destruction', though it seems a little far-fetched to assert this on the basis of this backfill alone. On the other hand, the possibility cannot be ruled out entirely.

The dating of the ditch or ditches is not very specific, unfortunately. Since it cuts through the Augustan occupation layers, it contains both very early material from Arretine sigillata, and material from the Late Roman period.

The fortification of towns mentioned above also took place in Coriovallum, therefore, effectively making the bathhouse part of the fortifications. However, the alterations in the bathhouse itself make it clear that it was still used for bathing in this phase.

The position of the bathhouse relative to the

³⁹⁹ Bogaers 1957a, 52; J. Minis & S. Schorn, this volume Section 8.10 and Appendix XIX.

⁴⁰⁰ Bogaers 1957, 52; J. Minis & S. Schorn, this volume Section 8.10 and Appendix XIX.

⁴⁰¹ W.K. Vos, this volume Section 7.2 and Appendix VII.

⁴⁰² Van Giffen 1948, plate II; see also W.K. Vos, this volume Appendix VII, Fig. 4.11; Tichelman 2019.



Figure 9.18 Reconstruction of the bathhouse in phase 4 showing, to the north and south, the ditch and the space between the wall and the ditch. The possible outdoor area at the bathhouse is reconstructed in red (showing part of the portico with eight footings) (source: K. Jeneson/M. Haars).

new defences in phase 4 makes it clear that the extension to the east of the *frigidarium* was intended as a new entrance and changing room (Fig. 9.18). The ditch along the north side of the

bathhouse made it impossible to use the main entrance from the previous phase. The ditch itself is slightly less than 7 m wide along both sides of the bathhouse. The distance between



Figure 9.19 *Praefurnium* II during the excavation in 1940, with several spolia and on the right the large block of tufa (source: Thermenmuseum archives; original photo by GIA Groningen).

the inside edge of the ditch and the exterior wall of the bathhouse is just under 10 m on both sides. It is not clear whether an earthen rampart or some other kind of defence stood here. Whatever the case may be, it is highly likely that a new entrance to the bathhouse was created on the east side, which would also have necessitated changes to the original walls surrounding the baths site. This would explain why rubble from the bathhouse was also found in pits outside the east *palaestra* wall.

The study of the material culture of the Thermenverein in phase 4 revealed that no more pottery was being produced locally. From the start of the third century, more and more pottery was imported from Trier and Argonne, as well as coarse ware from the Eifel-Urmitz region, whereas in the fourth century only products from Mayen and Trier were used at the baths site. This appears to be a common pattern at many Late Roman forts. The coins show uninterrupted coin loss from AD 260 to 393, which can be explained by the reconstruction of the bathhouse and its use until the fall of the Western Roman Empire. Third-century terra sigillata are almost entirely absent, but there are some from the fourth century onwards bearing the distinctive roller stamps, which also suggests a resumption of activity at the baths site. This can probably be attributed to

the reign of Emperor Constantine (306-337), during which peace was temporarily restored to Germania Inferior. The few fibulae found in phase 4 provide evidence of military activity or a military occupation of the baths site. The fortification thus probably also gave rise to a military presence in Coriovallum. This is not surprising, given the strategic importance of the town, situated on two major roads in the Rhine hinterland.

9.3.5 Phase 5: The final days of the baths

The most recent material from the baths site indicates that it was in use until the Roman period in Germania Inferior came to an end. We cannot however make a compelling case that the bathhouse was still fully operational as it had been in previous phases. We do however know that in the late fourth century a modification was made to *praefurnium* II, when tufa blocks were placed against the mouth of the furnace. The charcoal from a layer under this block dates this activity to after AD 390.⁴⁰³ Excavation photographs from 1940 show that several *spolia* lay around *praefurnium* II, several of which appear to be from grave monuments (Fig. 9.19). It is quite possible that during this

⁴⁰³ G. Tichelman, this volume Section 6.1 and Appendix IV.

chaotic period, when there were again repeated invasions, the people still living in Coriovallum used all the material at their disposal to keep the bathhouse in operation.

All find categories indicate a dramatic decline from the late fourth or early fifth century. The fall of the Western Roman Empire in AD 476 almost certainly meant the end of the bathhouse in Coriovallum.

It is difficult to reconstruct the appearance of the bathhouse in this final. Apart from the modification to *praefurnium* II, there is

no evidence of any further alterations to the complex. We cannot say whether anything was left of the walls of the *palaestra* or the portico at the front, partly because it is likely that, in the post-Roman era, large quantities of stone and ceramic building material were removed and used elsewhere, as happened in many places in the Roman Empire. In this context, it is in fact a wonder that only two sections of wall in the entire complex were removed down to their foundations, and that in fact the entire ground plan has survived to more or less floor level.

10 Synthesis. The public bathhouse of Coriovallum

K. Jeneson and W.K. Vos

10.1 Introduction

At the beginning of this publication we indicated why a research project on the Roman baths at Coriovallum was necessary 75 years after the excavation of the site. The many unanswered questions about the bathhouse and its immediate surroundings related to basic information about the construction, alterations and the date of last use, and also more complex issues such as how the baths functioned in relation to the urban setting of Coriovallum. Although basic information on the bathhouse provides vital building blocks for reconstructing the history of the building, our knowledge is only really enhanced once we know why the bathhouse was founded, who provided the capital and specialist knowledge, and of course who used the bathhouse. The context of a settlement founded *ex nihilo* at the crossroads of two major roads within 70 km of the northern border of the Empire is of course of vital importance in this respect.

This closing chapter evaluates the knowledge acquired from the research project on the Roman baths of Coriovallum. Besides the new insights gained, we will also consider old hypotheses that have been debunked by the new research, as well as new, as yet unanswered research questions raised by the project. It is largely based on the gaps in the knowledge identified in Chapter 3 concerning the dating, the reconstruction and the functioning of the bathhouse, the role and position of the bathhouse in the *vicus* and the finds collected at the bathhouse. The evaluation will focus in particular on insights that have prompted us to readjust our general impression of the baths and of Coriovallum.

The design of the research project itself will also be evaluated. Since Van Giffen's investigation, archaeology has undergone radical development as a discipline. It is therefore important to consider the knowledge gained thanks to the use of new research techniques and methods. Identification of the type of new insights acquired as a result of the specific approach taken in this project can provide important input for similar research projects. If the chosen approach is deemed successful, this might hopefully encourage other

parties to undertake this kind of reassessment of past excavations.

10.2 A new approach

In terms of methodology, we opted for a diachronous approach in order to generate maximum additional knowledge. We began by drawing up a large number of questions at various levels. Some were general, while others specifically referred to rooms in the bathhouse or certain categories of material. This allowed the specialists to study their own research material and later discuss and compare their results with those of fellow researchers.

These results were then compiled and compared with Van Giffen's published findings. Neither the information from the individual specialist studies nor that published by Van Giffen was simply taken at face value. All the data were subjected to critical examination. To facilitate the verification of the results, researchers from the region (Aachen, Cologne and Tongeren) were contacted to provide specialist support from the wider area. This was necessary because expertise in the Netherlands is limited due to the fact that few Roman stone buildings have survived here, and there are virtually no other bathhouses remains in this country. For this reason, the team also visited other specialists in Trier, Xanten, Cologne, Augst, and Carnuntum in Austria. Their knowledge of bathhouses in the northwestern Roman Empire provided a welcome addition to our study.

The cleaning operation, carried out by Restaura, proved to be vital to the new research as it revealed details that had not been seen since the 1940s. After cleaning, all the remains were digitally measured for the first time using a laser scanner. These readings can be regarded as a precise baseline measurement that will allow any future degradation to be identified much more accurately than in the past. It also made it possible to produce a detailed history of the construction of the complex, without the need for actual physical access to the archaeological remains. Furthermore, the data produced by the laser scan could be compared with those from the excavation performed in Van Giffen's day, and the differences visualised to give us an accurate picture of the degradation and



Figure 10.1 The trial trench survey, January 2019, trench 1 (source: Thermenmuseum archives).

deterioration of the Roman baths since then. At the same time, these data were also used to reconstruct lost parts of the complex and how it would have looked in the Roman period.

The trial trench survey was another invaluable element of the project (Fig. 10.1). The decision to conduct such a survey was taken after it was found that some research questions could not be answered by analysis of the cleaned remains of the building or of material finds alone. New excavations on site would be needed to address some pressing questions. Since the complex is a listed monument, this trial trench survey, conducted with a particular focus on certain questions, was only limited in size. The excavation work, performed by the RAAP archaeological consultancy, produced a large amount of information that was essential for our understanding of the chronology of the complex, for example.

The specialist researchers also provided elements of the dating and chronology by jointly examining and publishing data that had never been analysed before. Each of these partial studies was based on the questions in the research framework. Care was taken not only to consider the questions specific to each material, but also to contribute to the identification of diachronous developments and to address the general questions about Coriovallum. The huge

quantity of new information largely referred to the bathhouse itself, though some did concern the spatial context of the building. This also gave rise to some new questions, as in the geophysical survey of the soil surrounding the bathhouse. Thanks to the new information, we have been able to make meaningful connections, including between the bathhouse and the many buildings and streets around it.

All these studies together – the research on the remains of the bathhouse, the material analysis and the trial trench survey – and the diachronous approach yielded a huge amount of knowledge additional to Van Giffen's publication and subsequent analyses, included those performed by Bogaers and Jamar. Of the 224 questions in the research framework, 197 were answered in full (88%). If we include the eight partially answered questions, the proportion rises to 92%. Only 19 of the 224 questions have not been fully answered at this juncture – less than 10% of the total.

Finally, the detailed consideration of the highly interesting research history of the bathhouse in Heerlen also yielded a lot of information. During the Second World War and the first few years of the post-war period Dutch archaeology underwent a radical reorganisation, and the implications of this were felt particularly keenly in the excavation of the Roman baths

in Heerlen. By reconstructing this process in detail, the author managed to shed new light on the 1940-1941 research results and the 1948 publication, elucidating why certain things happened as they did. This is important when it comes to assessing the merits of the various sources of information.

10.3 A new perspective on the public bathhouse of Coriovallum

10.3.1 The bathhouse

The new research allowed us to amend and expand on several essential points in the story of the Roman baths at Coriovallum. It not only shed new light on the bathhouse, but also on Coriovallum itself. Our knowledge of Roman bathhouses has grown considerably over the past few decades. As a result, we have gradually learnt more about the people who used them.

The new account of the history of the bathhouse is based on the building itself. Only a few of the 180 research questions concerning the building remained unanswered, and some of those have in fact been partially answered. All gaps in the knowledge concerning the dating and phasing, functioning and reconstruction have been almost completely filled thanks to the recent study.

The dating and phasing of the bathhouse were discussed in detail in the previous chapter. It is important to emphasise here that Van Giffen and Glasbergen had more or less correctly dated the start and end of the life of the bathhouse, but that more alterations and adaptations occurred in the intervening period than they assumed. Over the course of 400 years, no effort or expense was spared in keeping the complex operational. This says a lot about the importance of the bathhouse to the community, and indicates that bathing had become an essential part of daily life in Coriovallum. This fact is all the more remarkable if we consider the fact that the town was situated very close to the northern border of the Roman Empire. Even in the turbulent period from the third century onwards, featuring many incursions by Germanic tribes, internal power struggles and ultimately the disintegration of the empire,

people in Coriovallum still made the effort to keep the bathhouse functioning until it really was no longer possible. Van Giffen's assumption that the bathhouse was radically altered because it did not function well from the start can at any rate be dismissed as incorrect.

The new study also answered all the questions about the reconstruction of the bathhouse and how it functioned. Something new was discovered about almost every room, compared with the reconstructions by Van Giffen and Peutz. In some cases it was a detail, such as the observation that the opening between the *frigidarium* and the *tepidarium* was not in the centre of the wall that divided them, but was positioned asymmetrically in the west half of the wall; or the fact that there were two doors in the main entrance rather than one. But in other cases completely unexpected discoveries were made, such as the remains of the foundation of the *labrum* in the underfloor of the *caldarium* on the west side of the bathhouse, which allows us to conclude with certainty that this was the original location of the *labrum*. The new research also made the order of construction activity clear in several places. The phasing of alterations to the main drain is now clear, for example, as is the fact that the layer of mortar on the exterior walls of the heated rooms was not applied until a later stage.

One piece of interesting new information concerns how the bathhouse was built. It became clear that the foundation walls of all the heated rooms were built against sections cut through the loess soil. It shows that the builders used the natural properties of the soil in order to avoid unnecessary work, such as the application of an outer layer. It also saved on materials like cut stone and ceramic building material. The location of the baths to the west of the highest point in the town, between two streams – Geleenbeek and Caumerbeek – shows that the builders knew how to exploit the natural landscape to the full. At this spot, water arrived at and drained away from the complex almost by itself, taking care of one essential prerequisite for a properly functioning bathhouse.

The large number of new insights into the water supply to the bathing complex and the distribution of water among the different rooms give us a good picture of how the bathhouse operated, and show that those who built and ran it had a thorough understanding of how

to heat water and air. This again demonstrates how much knowledge was required to build a properly functioning complex. It was not simply a matter of choosing the most suitable location, but also of choosing the right materials. From the very start, as many local materials as possible were used, such as the Kunrade stone and ceramic building material. If necessary, material was obtained further afield, such as Norroy limestone from northern France and black limestone from Theux in the Ardennes. These choices clearly show that the builders, while taking a pragmatic approach to their task, also spared no expense or effort in making sure the bathhouse was sufficiently grand in appearance. The decision to use ceramic material for the interior cladding of the heated rooms is another good example of the builders' practical approach. They apparently knew that Kunrade stone was not sufficiently fire-resistant. The fact that a layer of mortar was later applied to the exterior of the foundations of the heated rooms also testifies to the development of structural knowhow, possibly in response to a structural problem, in terms of damp control, for example.

The new research results allowed several old hypotheses to be debunked. One such hypothesis was the relatively late construction dates proposed by researchers like Christ.⁴⁰⁴ We now know that the bathhouse was built in the Neronian/early Flavian era, as several distinctive elements have been identified that clearly place the beginnings of the bathhouse in this period. They include the presence of a *labrum* in the west *schola* of the *caldarium*, the fact that there was only one *tepidarium* rather than two, and the single *praefurnium* in the core building of the original bathhouse. The presence of stamps of the 30th legion on ceramic material from the bathhouse has often been used in support of a construction date no earlier than the start of the second century. However, the study of this material found that no stamps were ever found on the ceramic finds collected *in situ*, and this in fact suggests an earlier date. Furthermore, the two tiles from the baths site that were found *ex situ* were found to have a stamp of the 30th legion that differs from the normal stamps found at Xanten.⁴⁰⁵

Another significant reassessment of a previous interpretation concerns the phasing of the bathhouse. The study of the construction

history of the complex, combined with the trial trench survey, yielded compelling evidence that both *palaestrae* and the portico at the front were not part of the original plan, but were added to the complex later. The core building, which was built in the late Neronian or early Flavian period, had a fundamentally different character after the major expansion of the bathing complex in the second phase. This is vital information. In recent decades several studies of Roman bathhouses have shown that, over time, the emphasis increasingly came to lie on the social aspect of bathing.⁴⁰⁶ This has been ascertained by analysing how much space in a complex was actually devoted to bathing, the cleansing of the body, and how much to other activities. Social encounters with other guests increasingly took place in spaces not exclusively associated with cleansing the body (dubbed 'non-essential space').⁴⁰⁷ If one compares the amount of 'essential' bathing space and 'non-essential space' a bathhouse had, this gives an important indication of how it was used, and therefore of who used it, as well as the dating of the complex.

From this perspective we can say that the phasing identified in the construction of the core building and the expansion of the complex to include large outdoor areas has a significant bearing on our identification of those who built and used it. The bathhouse at Coriovallum was initially used exclusively for cleansing the body, as all the rooms had a specific role in the bathing process and can therefore all be regarded as essential space. By contrast, the extension in the Flavian period added only non-essential space. It is also highly significant that the surface area of the complex quadrupled thanks to this extension, from 500 m² to 2000 m². Whoever initiated the alterations in the late Flavian or Trajanic period was clearly much more concerned with the social aspect of bathing than with the cleansing process.

Does this make it clear who built the baths and who ordered the alterations? In this respect, a relatively recent study of the differences between military bathhouses of the legionary and auxilia camps in Britannia may be relevant.⁴⁰⁸ It is based on the differences in the cultural background of legionnaires who, as Roman citizens, would certainly have been familiar with bathing, and auxiliaries of non-Roman origin who might not have grown up

⁴⁰⁴ Christ 1959.

⁴⁰⁵ See for example Reuter 2012; Schmitz 2008, 160-161.

⁴⁰⁶ DeLaine 1992, 259-260; DeLaine 1999, 8; Revell 2007, 230.

⁴⁰⁷ DeLaine 1992, 259.

⁴⁰⁸ Revell 2007.

in a bathing culture. Of course it is not entirely certain that the situation in Britain applied equally to *auxilarii* from Gaul, Spain and Illyricum, who undoubtedly had grown up in a bathing culture, and who were stationed in large numbers in the Germania Inferior region.⁴⁰⁹ Whatever the case, the study considered whether this difference was 'visible' in Britannia in the bathhouses belonging to different military settlements, and found this to be the case. Bathhouses at legionary camps offered bathers much more choice and opportunity 'to go beyond the basic maintenance of bodily cleanliness'.⁴¹⁰ Bathhouses in auxiliary camps, on the other hand, consisted largely of essential spaces, with few, if any, facilities for the social side of bathing. Apparently, the study concludes, to an auxiliary a visit to the bathhouse was mainly functional.⁴¹¹ This underlines once more the fact that the presence of a large amount of non-essential space in a bathhouse is an indication of interest in a bathing culture that went beyond the purely functional requirement of bodily cleanliness.

It seems that at the bathhouse in Coriovallum the original structure from the late Neronian/early Flavian period focused on the functional aspect, whereas the expansion in the late Flavian/early Trajanic era was based on wider Roman bathing culture, including its social aspect. This provides an indication of the changing society of Coriovallum, which is examined more closely in the following section.

This shift from a complex with only essential space to a bathhouse with lots of room for non-essential activities appears to have been reversed by the major alterations to the complex in the third century. The outdoor spaces, where lots of social activities would have taken place, were largely lost in this process, and the bathhouse seems to have returned to its core function of bodily cleansing. The interesting thing is that this development appears to have had an external cause. The invasions by Germanic groups in the third century prompted the construction of defences all over Germania Inferior and further inland, particularly in towns, but also in rural areas. In Coriovallum, these invasions resulted in the digging of a defensive ditch around an area that included the baths complex. This meant the entrance to the baths had to be moved, and this operation may have been combined with repairs to parts of the

complex damaged in the invasions. Remarkably, the altered bathhouse subsequently remained in use until the fall of the Roman Empire in the fifth century. Even in the Late Roman period, visiting the bathhouse would have been a matter of high priority for the town's residents.

The specialist studies of the find material from the Thermenterrein yielded so much new information that it was not only possible to answer the questions regarding dates and phasing, and the reconstruction of the complex, but also to give an impression of the kind of activities that occurred in and around the bathhouse. Research on the animal bone found that butchers and tanners processed animal carcasses into meat, leather and bone objects.⁴¹² The study of querns and millstones from the baths site led to the conclusion that there must have been a professional milling facility just outside the bathhouse where grain was ground to produce flour on a large scale. Interestingly, the specialist links this mill to the drain of the bathhouse, where he believes there may have been some kind of watermill.⁴¹³ The findings of the metal specialist provide evidence that the bathhouse was not only a facility for personal care, but that medical treatment was also provided by doctors there. The various metal objects that can be associated with Roman medicine show that surgery was probably performed there.⁴¹⁴

All the material studies indicate that the materials and objects needed at the bathhouse were obtained not only in the immediate vicinity but also quite far afield. This gives a good impression of the huge logistical operation of building a bathhouse. A wide range of materials were needed, including stone, lime for mortar, ceramic building material, wood, glass, iron, and other metals such as lead, bronze and copper. The study of the ceramic building material showed that it came not from several suppliers who used the different clays available in the surrounding area to produce wall, floor and roof tiles.⁴¹⁵

All the building material had to be processed before it could be used. The glass study showed that the bathhouse had lots of windows, an important innovation with implications for the supply of light to and indirect heating of the rooms. A great deal of skill was required to blow and install window glass.⁴¹⁶ Besides craftsmen, the construction of the building would also have

⁴⁰⁹ Bogaers & Rüger 1974; Bechert & Willems 1995.

⁴¹⁰ Revell 2007, 235.

⁴¹¹ Revell 2007, 235.

⁴¹² M. Groot, this volume Section 8.6 and Appendix XIII.

⁴¹³ P. Picavet, this volume Appendix XVII.

⁴¹⁴ S. Hoss, this volume Section 8.5 and Appendix XIII.

⁴¹⁵ T. Vanderhoeven, E.A.K. Kars and B.J.H. van Os, this volume Section 8.7 and Appendix XV.

⁴¹⁶ F. van den Dries, this volume Section 8.9 and Appendix XVIII.

required expertise in terms of design and project implementation. The site had to be prepared before construction could begin, and the water supply from the Caumerbeek source meant that water pipes had to be laid to the bathhouse.

The bathhouse was built before Germania Inferior acquired the status of an official province. Clearly, in that situation, there was only one party capable of executing such a complex construction project: the Roman army. Finds in all categories of material from the period up to the Flavian emperors have an overtly military character, though the quantity of objects is not usually enough to conclude that there was actually a military camp here. The specialists do however underline that there are major similarities with material from other key places that were founded along the Boulogne-Cologne road in the Augustan period, including Tongeren and Liberchies, and with material from military settlements like Velsen and even Nijmegen. It is important to bear in mind that these conclusions were drawn on the basis of material from the Thermenterrein, rather than the whole town. This of course prompts the question of what the outcome of comparison with the different places along the Via Belgica, as it is known, and elsewhere in Germania Inferior would be if all excavation sites in Coriovallum had been interpreted. The significant lack of knowledge of Coriovallum is becoming increasingly problematic. Before we consider this gap in the knowledge and make recommendations for further research, the following section looks at the new insights regarding the town that the study of the bathhouse has yielded.

10.3.2 Coriovallum

The research project on the Roman baths not only encompassed the bathhouse itself, but also its immediate surroundings – the approx. 0.6 ha to the north, east and south of the bathing complex excavated in the past by the State Service for Archaeological Investigations (ROB). One of the main findings of the analysis of these excavations is that activity commenced here in the Augustan period, and that there were at least two phases of wooden building before the stone building was constructed.

This proves incontrovertibly that Coriovallum was founded at the start of the common era. Unfortunately, little extra knowledge was gained from the analysis of the ROB excavations, mainly as a result of the method of excavation, documentation and collection of finds.⁴¹⁷ It was however found that buildings constructed in the northeast corner of the baths site in the earliest phase cannot be regarded as ordinary *vicus* houses. This of course raises the question of what kind of buildings they actually were. No conclusive answer can be given at this juncture, other than the possibility of a *mansio*, *statio* or *mutatio*. This also applies to some structures from the phase of stone building from around the end of the first century, incidentally. Though distinctive, elongated ‘striphouses’ were found, it will take new research to identify the function of the large building in the northeast corner of the baths site. The same applies to the large rectangular building on the east side of the bathhouse, in line with the portico. And although the various material studies have provided some evidence for the reconstruction of several activities and crafts in this part of the *vicus*, we are unfortunately unable to say what building was used for what activity and how the interiors were laid out.

The new information on the development of the bathhouse, on the other hand, provides enough evidence for us to draw conclusions about the urban population in the different phases. It is for example highly likely that in the period up to Domitian Coriovallum a considerable proportion of the population were soldiers, either on active service or veterans. Finds from elsewhere in Coriovallum confirm this. In 1873, for example, a gravestone with a complete inscription was found at one of the four cemeteries in Coriovallum, on what was then Bekkerweg. It mentions Marcus Julius, son of Marcus, a ‘*missus leg V*’, or veteran of the fifth legion, Julius Caesar’s ‘Gallic legion’, which had been stationed at Vetera in Xanten since the time of Tiberius. If the large building in the northeast corner of the baths site was a *mansio* or *statio*, as has been suggested several times in the past, this would at any rate explain the presence of soldiers on active service. On the other hand, it is an established fact that veterans settled in the hinterland of the northern border, given the large quantity of evidence – including inscriptions – in Germania Inferior. More

⁴¹⁷ W.K. Vos, this volume Section 7.2 and Appendix VII.

research is needed to test these hypotheses.

The nature of the various material categories from the Thermenterrein suggests that the Flavian period was a new, more civilian era in Coriovallum. This can be readily explained by the official formation of the province of Germania Inferior under Domitian. As a result of this decision, urban structures in the new province became more permanent and old structures that were originally built for the military purposes were repurposed for civilian use. Such processes were initiated throughout the region from AD 84-85 onwards. It could be that this more civilian era was related to the establishment of a new *colonia*, Colonia Ulpia Traiana (CVT, close to today's Xanten) by Emperor Trajan in AD 98. This puts the expansion of the bathhouse in a somewhat different political and social perspective, closely related to the territory of the new *colonia* and its internal social relations.

Although CVT lay some 90 kilometres to the north of Coriovallum, it is generally assumed on the basis of epigraphical evidence that the territory of the new *colonia*, the Civitas Traianensis, extended as far as the river Geul in southern Limburg, and therefore also included Coriovallum.⁴¹⁸ In Ravensbosch woods, some 10 km west of Heerlen, three bronze tablets bearing a total of four inscriptions were found in the remains of a Roman villa. The people referred to on the tablets all had official functions in the administration of CVT, such as *decurio*, and also *duumvir quinquennalis*.⁴¹⁹ The fifth inscription regarded as evidence is that of Marcus Sattonius Iucundus from the bathhouse in Coriovallum.⁴²⁰ The brick stamps of the 30th legion found on ceramic material in Heerlen also suggest a relationship between CVT and Coriovallum. The Romans would normally make the local elite responsible for the administration of a *civitas*, as the inscriptions from Heerlen and Ravensbosch illustrate. The local elite would want to make their mark not only in the context of the *colonia*, but also in their own region. In this respect it is important to note that the Civitas Traianensis covered not one but two Germanic tribal areas, one belonging to the Cugerni and the other to the Baetasii,⁴²¹ to the south of the Cugerni.⁴²² The investment in the extension and upgrading of the appearance of the bathhouse in the Flavian period would also, in this context, have been an investment in an expansion of the urban stage on which the local elite played their role

as administrators of the *colonia*. It is possible that Trajan granted Roman citizenship to leading families of the new *civitas* – the Cugerni and Baetasii, in other words – just as Claudius had done when he founded Colonia Claudia Ara Agrippinensium (Cologne) in AD 50.⁴²³ These 'new' Romans may have been even more keen to promote the typically Roman custom of bathing, particularly the social aspect.

The Flavian period was also the heyday of the pottery industry in Coriovallum. Although we know that a lot of pottery was produced locally, as suggested by the large number of pottery kilns discovered over the past 100 years, the output of this industry had never been identified before. Fabric analysis combined with form analysis means we now know of 171 types produced in Coriovallum. It is significant that the start of local production is related to the construction and commissioning of the bathhouse, between AD 50 and 70. The fact that the local potters continued to produce at an undiminished rate until the end of the second century indicates the quality of the material, and also tells us something about general circumstances in the town and the surrounding area at the time. It is to be hoped that all the different types of Heerlen pottery will eventually be identified and will become better known among pottery experts, so we can gain some insight into its distribution pattern.

Besides potters, various other artisans can be identified on the basis of their material. They include tanners, butchers, smiths, stone masons and millers. Many of them were located close to the bathhouse. This suggests a picture of a lively town where trade was booming. The weighing scales found raise the possibility that Coriovallum might even have had a market. This has important implications for the status of the town, as regular markets were not permitted everywhere. Of course the discovery of a single set of scales is not sufficient evidence to conclude there was a market, but weights and parts of weighing scales have been found at other places in Heerlen, too. More research would be desirable in this area.

The specialists' analyses showed that the bathhouse was a grand, impressive building with Tuscan pillars in the portico on the front, a black-and-white mosaic floor in the *frigidarium*, decorated Norroy limestone wash basins and *palaestrae* with gardens surrounded by

⁴¹⁸ Derks 2011, 116, fig. 3; Bridger 2008, 608, fig. 426.

⁴¹⁹ Derks 2011, 120-123.

⁴²⁰ J. Minis & S. Schorn, this volume Section 8.10 and Appendix XVIII.

⁴²¹ Eck 2008, 250-251.

⁴²² Byvanck 1944, 201-202, based on Tacitus, *Annales* XII.39; Suetonius *Tiberius* 9.

⁴²³ Eck 2008, 250.



Figure 10.2 Two pillar fragments of Norroy limestone; above, the fragment found during the 1940 excavation; below, the one found in an excavation on Tempsplein in 2016 (source: Thermenmuseum, Ph. Debeerst).

a portico with *exedra*. The study also found, however, that this was not the only grand building in Coriovallum. In this respect, the fragment of a Norroy limestone pillar with alternating round and rectangular cannelures is interesting. It was the first 'find' ploughed up in June 1930 and since then it has always appeared in photographs on top of one of the Norroy limestone foundations on the front of the bathhouse. We have now discovered, however, that this pillar was never part of the bathhouse. The architectural study notes that this type of pillar is in fact too elegant for a functional building like a bathhouse, and would be more appropriate for a building of a religious nature. While the research on the bathhouse was in full swing, an archaeological watching brief connected with a project to

replace sewage pipes found an identical pillar fragment on Tempsplein (Fig. 10.2). The stone specialist working at the museum at that moment compared the recently uncovered fragment with the 'old' fragment from 1940, and it became clear that both were part of the same building. The fragment found at the baths site was probably brought there as a *spolium*. In this context, it is significant that the pillar was discovered during ploughing in 1940, indicating it must have been quite close to the ground surface. On the basis of our current knowledge, we cannot say which building the pillar fragments belonged to, but it is clear that meticulous analysis of the old investigation at Tempsplein is now required. There is now no doubt that the bathhouse was not the only large, impressive building in Coriovallum.

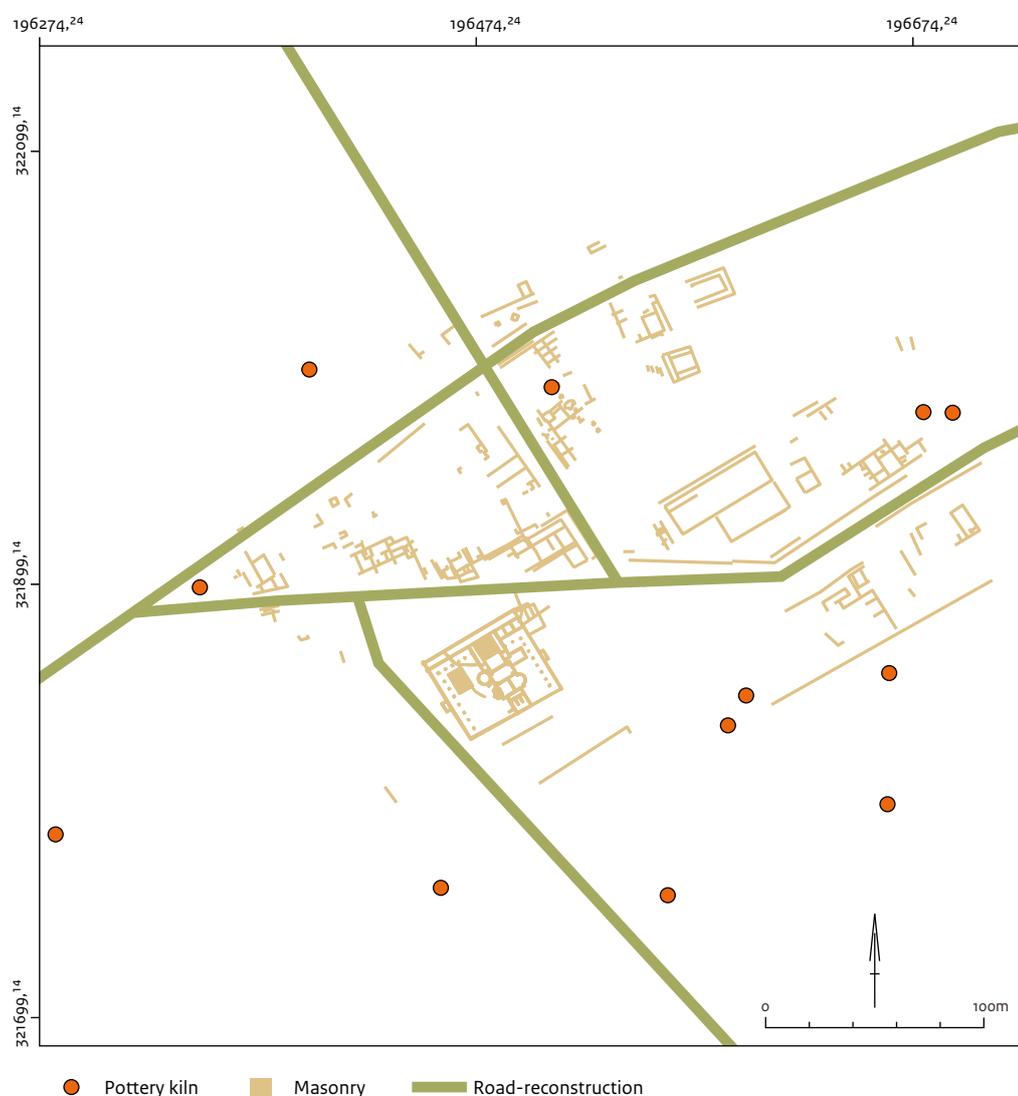


Figure 10.3 Map of the heart of Coriovallum based on the work of B. Eggen and J. Jamar (source: K. Jeneson/M. Haars).

In this connection, the metal specialist's conclusion that there must have been a life-size statue of a god or emperor in gilt bronze in the town is important. The metal finds at the baths site including four pieces of bronze plate with pleating, which must have been from a life-size or even larger statue, plus a round bronze gilt staff. We cannot say who or what the statue represented or where it originally stood, but it seems to confirm that Coriovallum was grander than was hitherto believed. The fragments of Norroy limestone inscription stones on the Thermenterein and the pieces of funerary monuments with images and inscriptions brought to the bathhouse from the cemeteries in the Late Roman period are also consistent with this image.

All this raises questions concerning the status of Coriovallum. Until now, the town has always been interpreted as an ordinary Roman roadside settlement. But the presence of at least two public buildings, their grand appearance and the flourishing pottery industry are difficult to reconcile with the idea of an ordinary street village with elongated *vicus* houses on either side of the road. There has been no synthesis of all locations in Heerlen excavated to date, though in the 1980s amateur-archaeologist B. Eggen together with the curator of the museum J. Jamar made an attempt to map all the Roman structures discovered in the centre of Heerlen (Fig. 10.3). The result is remarkable. Besides the bathhouse there are at least seven other buildings that are a good deal larger than an

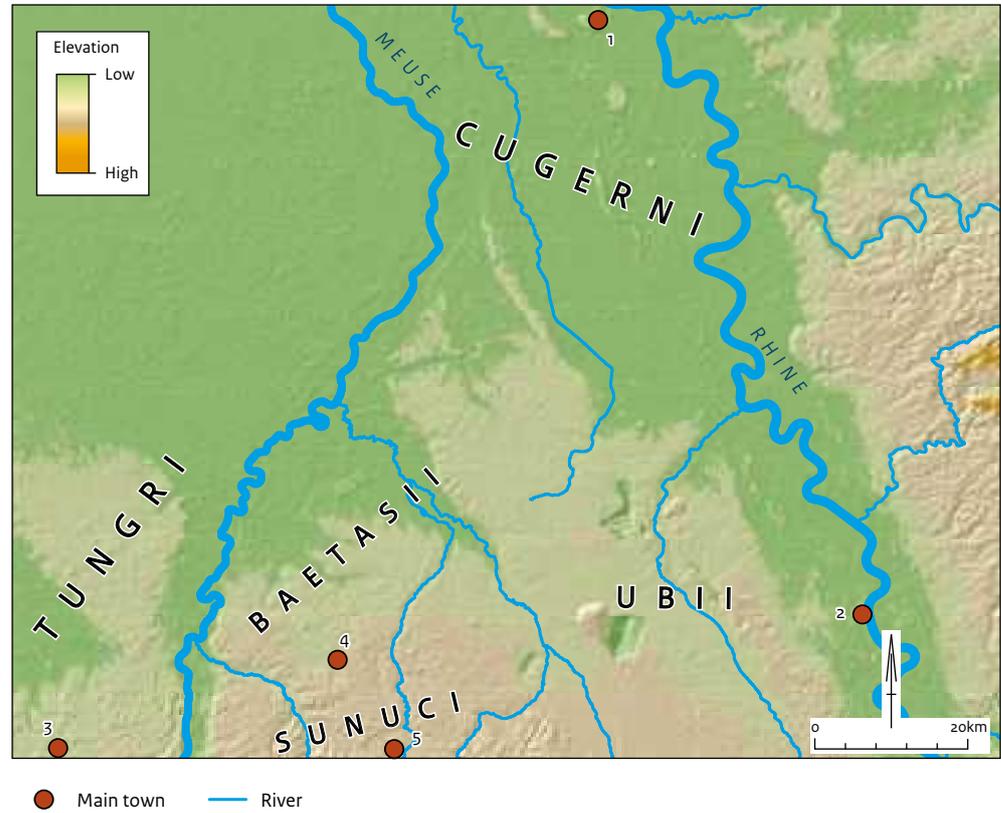


Figure 10.4 Map of the region between the Meuse and the Rhine, showing the assumed location of the Germanic tribes who were settled in the area under Augustus. 1 = Colonia Ulpia Trajana, 2 = Colonia Claudia Ara Agrippinensium, 3 = Atuatuca Tungrorum, 4 = Coriovallum, 5 = Aquae Grannis (source: K. Jeneson/M. Haars, after: Bridger 2008, 609, Figure 426).

ordinary *vicus* house. Furthermore, we must bear in mind that this is only part of the Roman town. We estimate that the built-up area of Coriovallum covered some 40 to 50 ha, with four large cemeteries outside that area, at least two of which were a minimum of half a kilometre long.⁴²⁴ All four cemeteries included extraordinary graves, featuring stone urns, gravestones with inscriptions and valuable grave gifts. To obtain more idea of Coriovallum's possible role in the region, we would point out again that the territory of CVT extended as far as the river Geul, and that it included two previous *civitates*, those of the Cugerni and the Baetasii.⁴²⁵ Each tribe Augustus moved to the left bank of the Rhine was given its own designated tribal area, in which a 'central place' was established. For the Ubii, for example, that place was Ad apud Ubiorum, which from AD 50 became Colonia Claudia Ara Agrippinensium, and for the Tungri it was Atuatuca Tungrorum (Tongeren).⁴²⁶ Colonia Ulpia Traiana became the

Cugerni capital in AD 98. When it comes to the Baetasii, however, the exact location of neither their *civitas* nor their capital is known. Based on the current reconstruction of the *civitas* Traianensis, it is not unlikely that the former *civitas* of the Baetasii was the lower half. Could Coriovallum then have been the capital of the Baetasii?⁴²⁷ (Fig. 10.4) One interesting detail is that the Baetasii are known to have had a cavalry guard in Rome who accompanied the emperors of the Julio-Claudian dynasty. Could this have been the reason for the construction of a bathhouse at Coriovallum in the time of Nero? Clearly, we can only speculate on this matter given our current knowledge. Further research on these aspects of Coriovallum is therefore also needed.

⁴²⁴ Jeneson 2016, 96-97.

⁴²⁵ Bridger 2008, 609, Fig. 426.

⁴²⁶ See Eck 2008.

⁴²⁷ See also Bridger 2008, 607.

10.4 Recommendations

The research project on the bathhouse of Coriovallum and its immediate surroundings produced a huge amount of new knowledge. Almost all the research questions relating to the bathhouse itself were answered, so further research would not appear to be necessary.

Nevertheless, there are some points on which clarification would be welcome. This concerns, first of all, the *apodyterium*. As indicated earlier, the architectural study suggested that the current *apodyterium* might have had a small (possibly wooden) predecessor with two niches, although the geophysical survey and the archaeological features provide no direct evidence of this. It might be that future non-destructive research methods will be able to shed more light on this matter. The same applies to the points of high resistivity in the west *palaestra* revealed in the geophysical survey. To ascertain whether this really does represent archaeological structures, or some other phenomenon, further non-destructive investigation would need to be conducted in the future. Another issue lies in the fact that

no latrine has ever been found, though one would expect to find one at a bathhouse. Further investigation of find spots around the Thermenterrein is therefore needed in order to locate the latrine.

The analysis of the ROB excavations around the bathhouse has made clear which structures were there and when they were built. Nevertheless, we still do not know the function of the various buildings. A search for and analysis of parallels in other provincial Roman centres could help clarify this.

The lack of knowledge about Coriovallum as a whole is associated with the fact that none of the research conducted in the town up to 2000 has been analysed and published. There are of course publications from that period, but in most cases they are interim reports, material studies concerning unusual finds or reports of finds. Since the appointment of a regional archaeologist for Heerlen and the Parkstad region in 2013, all archaeological activity has been analysed and published according to current standards. It is therefore highly desirable that a comprehensive research plan be launched covering all sites that have not yet been analysed, starting with Zwarte Veldje and Tempsplein in the immediate vicinity of the bathhouse.

- Ambrogi, A.**, 2005: *Labra di età romana in marmi bianchi e colorati*, Rome (Studia archaeologica 136).
- Amkreutz, L., & I. van Wijk** 2014: Stein-Haven (1925-1927), in: I. van Wijk, L. Amkreutz & P. van de Velde, 'Vergeten' bandkeramiek: een odyssee naar de oudste neolithische bewoning in Nederland, Leiden, 281-294.
- Baatz, D.**, 1978: Das Badegebäude des Limeskastells Walldürn (Odenwaldkreis), *Saalburg Jahrbuch* 35, 61-107.
- Bechert, T., & W.J.H. Willems (eds.)** 1995: *De Romeinse Rijksgrens tussen Moezel en Noordzeekust*, Utrecht.
- Beckers, H.J.**, 1928: Beschrijving der vondsten uit Stein, *Oudheidkundige Mededeelingen uit het Rijksmuseum van Oudheden te Leiden* 9, 20-47.
- Beckers, H.J., & G.A.J. Beckers** 1940: *Voorgeschiedenis van Zuid-Limburg: twintig jaar archeologisch onderzoek*, Maastricht.
- Berkel, K. van**, 2017: *Universiteit van het noorden: vier eeuwen academisch leven in Groningen, deel 2: de klassieke universiteit 1876-1945*, Hilversum.
- Bidwell, P.T.**, 1979: *The legionary bath-house and basilica and forum at Exeter*, Exeter (Exeter Archaeological Reports 1).
- Bogaers, J.E.**, 1957: Archeologische onderzoekingen te Heerlen, *Bulletin van de Historische Kring het Land van Herle* 7, 49-52.
- Bogaers, J.E., & C.B. Rüger** 1974: *Der niedergermanische Limes*, Köln (Kunst und Altertum am Rhein 50).
- Bouet, A.**, 2003: *Les thermes privés et publics en Gaule Narbonnaise*, Rome (Collection de l'École Française de Rome 320).
- Bouet, A.**, 2009: *Les latrines dans les provinces gauloises, germaniques et alpines*, Paris (Gallia, Supplément 59).
- Braat, W.C.**, 1941: Souburg en Middelburg, *Oudheidkundige Mededeelingen uit het Rijksmuseum van Oudheden te Leiden* 22, 52-69.
- Braat, W.C.**, 1942: Nieuwe vondsten te Middelburg, *Oudheidkundige Mededeelingen uit het Rijksmuseum van Oudheden te Leiden* 23, 15-29.
- Braat, W.C.**, 1953: De grote Romeinse villa van Voerendaal, *Oudheidkundige Mededeelingen van het Rijksmuseum van Oudheden* 34, 48-76.
- Bridger, C.**, 2008: Die civitas Traianensis: das römische Umland von Xanten, in: M. Müller, H.J. Schalles & N. Zieling (Hrsg.), *Colonia Ulpia Traiana: Xanten und sein Umland in römischer Zeit*, Mainz (Xantener Berichte, Geschichte der Stadt Xanten Band 1), 607-626.
- Broise, H., & J. Scheid** 1987: *Recherches archeologique à la Magliana: le balneum des Frères aevals*, Rome (Roma Antica 1).
- Burgers, A.**, 2001: *The water supplies and related structures of Roman Britain*, Oxford (British Archaeological Reports British Series 324).
- Bürgi, J.**, 1989: Bauphasen, in: J. Bürgi, H. Lieb, R. Hoppe & M. Bossert (Hrsg.): *IVLIOMAGVS: römisch Schleithem: die öffentlichen Thermen*, Schleithem (Archäologische Führer der Schweiz 11), 12-13.
- Byvanck, A.W.**, 1944: *Nederland in den Romeinchen tijd, II*, Leiden.
- Christ, H.**, 1959: Het dateringsvraagstuk van de Romeinse thermenbouw te Heerlen, *Bulletin van de Historische Kring het Land van Herle* 9, 109-114.
- DeLaine, J.**, 1988: Recent research on Roman baths, *Journal of Roman Archaeology* 1, 11-32.
- DeLaine, J.**, 1990: *The baths of Caracalla: a study in the design, construction, and economics of large-scale building projects in imperial Rome*, Portsmouth (Journal of Roman Archaeology Supplementary Series 25).
- DeLaine, J.**, 1992: New models, old modes: continuity and change in the design of public baths, in: H.J. Schalles, H. von Hesberg & P. Zanker, *Die römische Stadt im 2. Jahrhundert n.Chr.: der Funktionswandel des öffentlichen Raumes*, Köln.
- DeLaine, J.**, 1999: Introduction: bathing and society, in: J. DeLaine & D.E. Johnston, *Roman baths and bathing: proceedings of the First International Conference on Roman Baths, held at Bath, England, 30 March-4 April 1992*, Portsmouth (Journal of Roman Archaeology Supplementary Series 37), 7-16.

- DeLaine, J.**, 2018: Gardens in baths and palaestras, in: W. Jashemski, K. Glaeson, K. Hartswick & A. Malek (eds.), *Gardens in the Roman Empire*, Cambridge, 165-184.
- Deriks, M.H.**, 2000: *Dokter H.J. Beckers, 23 augustus 1862-12 januari 1950: zijn leven en zijn werk*, Stein.
- Derks, T.**, 2011: Town-country dynamics in Roman Gaul: the epigraphy of the ruling elite, in: N. Roymans & T. Derks (eds.), *Villa landscapes in the Roman North: economy, culture and lifestyles*, Amsterdam, 107-138.
- Dickey, E.**, 2017: *In een Romeins klaslokaal: een schoolboek uit de eerste eeuw*, Amsterdam.
- Dodt, M.**, 2003: *Die Thermen von Zülpich und die römischen Badeanlagen der Provinz Germania inferior*, Bonn.
- Dolmans, M., & W. Luys** 2016: Al 2000 jaar in gebruik: het traject Heerlen-Xanten, in: P. van der Heijden (red.), *Romeinse wegen in Nederland*, Utrecht, 103-111.
- Driessen, M.**, 2017: The metalwork, in: W.K. Vos, C.C. Bakels & T.A. Goosens (eds.), *The Roman villa at Maasbracht: the archaeology and history of a Roman settlement on the banks of the river Meuse (Province of Limburg, The Netherlands)*, Leiden (Analecta Praehistorica Leidensia 46), 157-179.
- Duparc, F.J.**, 1975: *Een eeuw strijd voor Nederlands cultureel erfgoed*, Den Haag.
- Eck, W.**, 2008: Die Gründung der Colonia Ulpia Traiana in ihrem politischen Kontext, in: M. Müller, H.J. Schalles & N. Zieling (Hgg.), *Colonia Ulpia Traiana: Xanten und sein Umland in römischer Zeit*, Mainz (Xantener Berichte, Geschichte der Stadt Xanten Band 1), 243-256.
- Eckerle, A.**, 1970: *Römische Badruine in Hüfingen (Ldkrs. Donaueschingen), Baden* (Archäologischen Nachrichten aus Baden 4), 18-22.
- Eickhoff, M.**, 2003: *De oorsprong van het 'eigene': Nederlands vroegste verleden, archeologie en nationaal-socialisme*, Amsterdam.
- Eickhoff, M.**, 2018: Museumdirecteur in oorlogstijd: de morele worsteling van Willem van Wijngaarden met het nationaalsocialisme, in: P. ter Keurs & W. Wirtz (red.), *Rijksmuseum van Oudheden Leiden: een geschiedenis van 200 jaar*, Leiden/Zwolle, 357-366.
- Enckevort, H. van, & W.K. Vos** 2006: De limes: een natte grens dwars door Nederland, *Nationale Onderzoeksagenda Archeologie (NOaA) hoofdstuk 19* (versie 1.0) (www.noaa.nl), 1-45.
- Enckevort, H. van, J. Hendriks & M. Nicasie** 2017: *Nieuw licht op donkere eeuwen: de overgang van de laat-Romeinse tijd naar de vroege middeleeuwen in Zuid-Nederland*, Amersfoort (Nederlandse Archeologische Rapporten 58).
- Es, W.A. van**, 1972a: The origins and development of the State Service for Archaeological Investigations in the Netherlands: research, *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek* 22, 17-71.
- Es, W.A. van**, 1972b: *De Romeinen in Nederland*, Bussum.
- Evelein, M.A.**, 1909: Verslag van het onderzoek der vernielde resten, *Oudheidkundige Mededeelingen uit het Rijksmuseum van Oudheden te Leiden* 3, 73-74.
- Fagan, G.G.**, 1999: *Bathing in public in the Roman world*, Michigan.
- Fehr, H.**, 1993: *Roemervilla: Führer durch die Ausgrabungen am Silberberg Bad Neuenahr-Ahrweiler*, Koblenz.
- Garbrecht, G., & H. Manderscheid** 1994: *Die Wasserbewirtschaftung römische Thermen: archäologische und hydrotechnische Untersuchungen*, Braunschweig (Mitteilungen des Leichtweiß-Instituts für Wasserbau der Technischen Universität Braunschweig, Heft 118 A, B und C).
- Giffen, A.E. van**, 1925: De Zuid-Limburgsche voorhistorische vuursteenindustrie tusschen Rijckholt en St. Geertruid, *Tijdschrift Koninklijk Nederlands Aardrijkskundig Genootschap* 42, 481-503.

- Giffen, A.E. van**, 1926: De ligging en aard van de overblijfselen der vóórhistorische vuursteenindustrie bij Rijckholt in Limburg, *Verslag Geologische Sectie Geologisch en Mijnbouwkundig Genootschap*, derde deel, 101-108.
- Giffen, A.E. van**, 1948: Thermen en castella te Heerlen (L.): een rapport en een werkhypothese, *L'Antiquité Classique* 17 (Miscellanae philologica historica et archaeologica in honorem H. van de Weerd), 199-236.
- Giffen, A.E. van, & W. Glasbergen** 1948: Thermen en castella te Heerlen-Coriovallum, *L'Antiquité Classique* 17 (Miscellanae philologica historica et archaeologica in honorem H. van de Weerd), 199-262.
- Glasbergen, W.G.**, 1948: Terra sigillata uit de thermenopgraving te Heerlen-Coriovallum, *L'Antiquité Classique* 17 (Miscellanae philologica historica et archaeologica in honorem H. van de Weerd), 237-262.
- Goossens, W.**, 1909: Eene Romeinsche pottebakkerij te Heerlen (L), *Oudheidkundige Mededeelingen uit het Rijksmuseum van Oudheden te Leiden* 3, 71-80.
- Grewe, K.**, 1986: *Atlas der römischen Wasserleitungen nach Köln*, Bonn.
- Grimal, P.**, 1943: *Les jardins romains à la fin de la République et aux deux premiers siècles de l'Empire: essai sur le naturalisme romain*, Paris.
- Haalebos, J.K.**, 1995: *Castra und Canabae: Ausgrabungen auf dem Hunerberg in Nijmegen*, Nijmegen (Libelli Noviomagenses 3).
- Haan, N. de**, 2010: *Römische Privatbäder: Entwicklung, Verbreitung, Struktur und sozialer Status*, Frankfurt am Main.
- Hartswick K. & A. Malek (eds.)**, *Gardens in the Roman Empire*, Cambridge, 165-184.
- Heeringen, R.M. van, P.A. Hendriks & A. Mars (red.)** 1995: *Vroeg-middeleeuwse ringwalburgen in Zeeland*, Goes/Amersfoort.
- Hedinger, B., & U. Leuzinger** 2002: *Tabula rasa: Holzgegenstände aus den römischen Siedlungen Vediturum und Tasgetium*, Frauenfeld/Stuttgart/Vienna.
- Heijden, P. van der, (red.)** 2016: *Romeinse wegen in Nederland*, Utrecht.
- Hingh, A. de, & W.K. Vos** 2005: *Romeinen in Valkenburg (ZH): de opgravingsgeschiedenis en het archeologische onderzoek van Praetorium Agrippinae*, Leiden.
- Hoekstra, T.J., & S.L. Wynia** 1997: 'Dan zullen velen juichen': geschiedenis van twintig jaar conflicten over het archeologisch onderzoek op het Domplein te Utrecht (1929-1949), *Jaarboek Oud-Utrecht*, 125-168.
- Holwerda, J.H.**, 1920: Romeinsch castellum te Heerlen (L.), *Oudheidkundige Mededeelingen van het Rijksmuseum van Oudheden te Leiden* 1, 38-39.
- Holwerda, J.H.**, 1928a: Nederzettingen bij Stein aan de Maas, *Oudheidkundige Mededeelingen uit het Rijksmuseum van Oudheden te Leiden* 9, 3-14.
- Holwerda, J.H.**, 1928b: Een Germaansch oppidum bij Stein, *Oudheidkundige Mededeelingen uit het Rijksmuseum van Oudheden te Leiden* 9, 15-19.
- Holwerda, J.H.**, 1931: Romeinsche sarcophaag uit Simpelveld, *Oudheidkundige Mededeelingen van het Rijksmuseum van Oudheden te Leiden* 12, 27-48.
- Hommerich, L.E.M.A. van**, 1975: Terugblik op de opgraving van de Romeinse thermen 1941-1942, *Land van Herle* 25, 94-101.
- Horn, H.G.**, 2008: *So badeten die Römer: rund um die Thermen von Zülpich*, Zülpich.
- Huizinga, J.**, 1920: Het historisch museum, *De Gids* 84, 251-262.
- Jamar, J.T.J.**, 1975: De thermen te Heerlen, *Spiegel Historiae* 10, 450-457.
- Jamar, J.T.J.**, 1981: *Heerlen, de Romeinse thermen*, Amersfoort (Archeologische Monumenten in Nederland 9).
- Jamar, J.T.J.**, 1989: Archeologie in Limburg 1863-1988, *Publications de la Société Historique et Archéologique dans le Limburg* 125, 188-191.
- Jamar, J.T.J.**, 1993: Jos Habets als archeoloog, *Publications de la Société Historique et Archéologique dans le Limburg* 129, 257-263.

- Jansen, G.**, 2002: *Water in de Romeinse stad: Pompeji – Herculaneum – Ostia*, Leuven.
- Jansen, G.**, 2011a: Toilets in urban and domestic water infrastructure, in: G. Jansen, A. Koloski-Ostrow & E. Moormann (eds.), *Roman toilets, their archaeology and cultural history*, Leiden (BABESCH supplement 19), 71-77.
- Jansen, G.**, 2011b: Toilets and health, in: G. Jansen, A. Koloski-Ostrow & E. Moormann (eds.), *Roman toilets, their archaeology and cultural history*, Leiden (BABESCH supplement 19), 157-162.
- Jeneson, C.F.**, 2015: De thermen in Heerlen opnieuw bekeken, *Jaarboek historische en heemkundige studies in en rond het Geuldal*, 32-51.
- Jeneson, K.**, 2016: Oudste snelweg van Nederland: de Via Belgica in Zuid-Limburg, in: P. van der Heijden (red.), *Romeinse wegen in Nederland*, Utrecht, 91-101.
- Jeneson, K.**, 2017: Lood om oud ijzer, in: *Top or topic: archaeological highlights and mysteries from the Maastricht area*, Maastricht, 111.
- Krencker, D.**, 1929: *Die Trierer Kaiserthermen: Ausgrabungsbericht und grundsätzliche Untersuchungen römischer Thermen*, Augsburg.
- Kunow, J.**, 1987: Die Militärgeschichte Niedergermaniens, in: H.G. Horn (Hrsg.), *Die Römer in Nordrhein-Westfalen*, Stuttgart, 27-109.
- Lancaster, L.**, 2005: *Concrete vaulted construction in imperial Rome: innovations in context*, Cambridge.
- Laur-Belart, R.**, 1930: Grabungen der Gesellschaft Pro Vindonissa im Jahre 1929, *Anzeiger für schweizerische Altertumskunde*, Neue Folge 32/2, 65-102.
- Manderscheid, H.**, 1983: Katalog der öffentlichen Thermenanlagen des römischen Reiches: Projekt und Durchführung am Beispiel der Schweizer Thermen, *Jahresberichte aus Augst und Kaiseraugst* 3, 59-76.
- Manderscheid, H.**, 1988: *Bibliographie zur römischen Badewesen: unter besonderer Berücksichtigung der öffentlichen Thermen*, München/Berlin.
- Manderscheid, H.**, 2009: *Dulcissima aequora: Wasserbewirtschaftung und Hydrotechnik der Terme Suburbane in Pompeii*, Leiden (BABESCH supplement 13).
- Maréchal, S.**, 2017: A note on the drainage of pools in Roman baths, *BABESCH* 92, 179- 186.
- Mayer-Reppert, P.**, 1995: *Brigobannis: das römische Hüfingen*, Stuttgart.
- Minis, J., & S. Schorn** 2018: Lateinische Inschriften aus dem Thermenmuseum in Heerlen (Niederlande), *Ancient Society* 48, 221-261.
- Muscettola, S.**, 1982: Le ciste di piombe decorate, in: *La regione sotterrata dal Vesuvio: studi e prospettive*, Napoli, 701- 752.
- Nielsen, I.**, 1990: *Thermae et balnea: the architecture and cultural history of Roman public baths*, Aarhus.
- Nielsen, I.**, 1993: *Thermae et balnea: the architecture and cultural history of Roman public baths*, Aarhus.
- Overbeck, J., & A. Mau** 1884: *Pompeji in seinen Gebäuden, Alterthümern und Kunstwerken*, Leipzig.
- Panhuysen, T.**, 1996: *Romeins Maastricht en zijn beelden*, Assen.
- Pasqui, A.**, 1897: La villa pompeiana della Pisanella presso Boscoreale, *Monumenti Antichi* 7, fragmenta selecta, 440-452.
- Pasqui, A.**, 'La villa pompeiana della Pisanella presso Boscoreale', *Monumenti Antichi* 7, 397-554.
- Perse, M.**, 2013: Die Römer und das Wasser: Spuren entlang der Via Belgica in und rund Jülich, *Jahrbuch des Kreises Düren*, 53-61.
- Peters, P.**, 1936: Romeinsche vondsten in Heerlen, *De Maasgouw* 56, 13-18.
- Peterse, K.**, 2005: Die Rekonstruktion des gallorömischen Umgangstempels von Elst-Westeraam (NL), in: *Otium: Festschrift für Volker Michael Strocka*, Remshalden, 285- 294.
- Ponzetta, L., N. de Winter & E. Wesenmael** 2002: *Opmeting van het Romeins aquaduct te Tongeren*, Tongeren (ARON rapport 2).

- Ponzetta, L., N. de Winter & E. Wesenmael** 2003: Opmeting van het Romeins aquaduct te Tongeren, *Archeologie in Limburg* 93, 3-7.
- Rebuffat, R.**, 1991: *Vocabulaire thermal: documents sur le bain romain, dans les thermens romains*, Rome/Paris (Actes de la table ronde organisée par l'École Française de Rome (Rome, 11-12 novembre 1988)), 1-32.
- Restaura** 2016: *Behandelingsvoorstel en begroting voor het reinigen en consolideren van het Romeinse thermencomplex te Heerlen*, Heerlen (Thermen Museum Heerlen 2016-1).
- Reuter, M.**, 2012: *Legio XXX Ulpia Victrix: ihre Geschichte, ihre Soldaten, ihre Denkmäler*, Darmstadt/Mainz (Xantener Berichte 23).
- Revell, L.**, 2007: Military bath-houses in Britain: a comment, *Britannia* 38, 230-237.
- Revellio, P.**, 1937: *Das Kastell Hüfingen*, Berlin/Leipzig (Der obergermanische-raetische Limes des Römerreiches Bd. 5, nr. 62a).
- Sarfatij, H.**, 1972: Conservations about the pre- and protohistory of the State Service for Archaeological Investigations (ROB), Amersfoort, *Berichten Rijksdienst voor het Oudheidkundig Bodemonderzoek* 22, 73-79.
- Schmitz, D.**, 2008: Das Lager Vetera II und seine Legionen, in: M. Müller, H.J. Schalles & N. Zieling (Hrsg.), *Colonia Ulpia Traiana: Xanten und sein Umland in römischer Zeit*, Mainz (Xantener Berichte, Geschichte der Stadt Xanten Band 1), 141-170.
- Schut, P.**, 2009: Romeinse waterkranen uit het Rijn-Maasgebied, *Xantener Berichte* 15, 51-84.
- Schut, P.**, 2012: Hot, cold or mixed? A Roman mixer tap from Hoogeloon (The Netherlands), in: B. Migotti, Ph. Mason, B. Nadbath & T. Mulh (eds.), *Scripta in honorem Bojan Djurić Ljubljana* (Monografije CPA 1), 319-327.
- Schut, P.**, in prep.: De watervoorziening van de villa van Voerendaal (L).
- Tichelman, G.**, 2005: *Het villacomplex Kerkrade-Holzkuil*, Amersfoort (ADC rapport 155).
- Tichelman, G.**, 2019: *Proefsleuven, opgraving en archeologische begeleiding op het Templesplein te Heerlen*, Weesp (RAAP-rapport 4111).
- Trumm, J.**, 2010: Vindonissa: Stand der Erforschung I: Vorgeschichte, keltische Zeit und der militärische Komplex, *Jahresbericht Gesellschaft Pro Vindonissa* 49, 37-54.
- Vaerenbergh, J. Van**, 2000-2001: *De latrines in of nabij de Romeinse badcomplexen van Italië: het discrete secreet* (niet gepubliceerde licentiaatsverhandeling).
- Vaerenbergh, J. Van**, 2011: Flush water for toilet in and near the baths; Disposal from baths and malfunctioning of the system; Location of toilet within baths, in: G. Jansen, A. Koloski-Ostrow & E. Moormann (eds.), *Roman toilets, their archaeology and cultural history*, Leiden (BABESCH supplement 19), 78-86, 115-119.
- Vanderhoeven, A.**, 1996: The earliest urbanisation in Northern Gaul: some implications of recent research in Tongres, in: N. Roymans (ed.), *From the sword to the plough: three studies on the earliest romanisation of Northern Gaul*, Amsterdam (Amsterdam Archaeological Studies 1), 189-260.
- Verhart, Leo**, 2005: Botsende noorderlingen: de Leidse jaren van A.E. van Giffen, in: E. Knol, A.C. Bardet & W. Prummel (red.), *Professor Van Giffen en het geheim van de wierden*, Groningen, 64-77.
- Verhart, Leo**, 2012a: Een kleine voorgeschiedenis van de opgraving van de thermen in Heerlen, *Westerheem* 61, nr. 2, 131-136.
- Verhart, Leo**, 2012b: De archeologische rijksmusea van Nijmegen en Leiden in de oorlogsjaren: de correspondentie tussen de directeuren J.H. Holwerda en W.D. van Wijngaarden, *Numaga* 59, 80-103.
- Verhart, Leo**, 2013: Een kleine verborgen geschiedenis: intriges in Valkenburg rond een delicate kwestie, *Westerheem* 62/2, 59-70.

- Verhart, L.B.M.**, 2016: Een monument voor de archeologie, een monument voor zichzelf: het hunebeddenboek van A.E. van Giffen, *Nieuwe Drentse Volksalmanak* 133, 187-220.
- Verhart, Leo**, 2017: Groningse archeologen in Limburg, *Publications de la Société Royale Historique et Archéologique dans le Limbourg* 153, 257-295.
- Verhart, Leo**, 2018a: Het belang van Limburg voor Leiden: hoe de waardevolle collectie van notaris Charles Guillon voor een groot deel in het RMO terecht kwam, in: P. ter Keurs & W. Wirtz (red.), *Rijksmuseum van Oudheden Leiden: een geschiedenis van 200 jaar*, Leiden/Zwolle, 195-213.
- Verhart, Leo**, 2018b: Vader en zoon openen nieuwe wegen: Antonie en Jan Hendrik Holwerda kozen meer en meer voor Nederland en het grote publiek, in: P. ter Keurs & W. Wirtz (red.), *Rijksmuseum van Oudheden Leiden: een geschiedenis van 200 jaar*, Leiden/Zwolle, 284-293.
- Verhart, Leo**, 2018c: Irritaties, ruzie en strijd: conservatoren Jan Hendrik Holwerda en Albert Egges van Giffen konden niet samen door één deur, in: P. ter Keurs & W. Wirtz (red.), *Rijksmuseum van Oudheden Leiden: een geschiedenis van 200 jaar*, Leiden/Zwolle, 303-311.
- Verhart, Leo**, 2018d: Een collaborerende conservator: Frans Bursch ontpopte zich gaandeweg de oorlog als een overtuigd nazi-propagandist, in: P. ter Keurs & W. Wirtz (red.), *Rijksmuseum van Oudheden Leiden: een geschiedenis van 200 jaar*, Leiden/Zwolle, 347-356.
- Verhart, Leo, & Luc Amkreutz** 2018: Graven is er steeds minder bij, in: P. ter Keurs & W. Wirtz (red.), *Rijksmuseum van Oudheden Leiden: een geschiedenis van 200 jaar*, Leiden/Zwolle, 312-320.
- Vos, W.K., E. Blom & T. Hazenberg**, 2010: *Romeinen in Woerden: het archeologische onderzoek naar de militaire bezetting en de scheepvaart van Laurium*, Leiden.
- Vos, W.K., & J.J. Lanzing** 2016: *Programma van Eisen IVO-p Heerlen (Limburg) Thermenmuseum, versie 5.0, juni 2016*, Oosterbeek/Ter Aar.
- Waterbolk, H.T.**, 1976: Albert Egges van Giffen, Noordhorn 14 maart 1884-Zwolle 31 mei 1973, *Jaarboek van de Maatschappij der Nederlandse letterkunde te Leiden* 1975-1976, 122-153.
- Weber, G.**, (ed.) 2000, *Cambodunum-Kempten: Erste Hauptstadt der römischen Provinz Raetien?*, Mainz.
- White, G.**, 1999: Das römische Badegebäude auf dem Nikolausfeld in Rottweil am Neckar: Studien zur Baugeschichte und historischen Bedeutung, *Fundberichte aus Baden-Württemberg* 23, 193-242.
- White, G.**, 2012: Das Badegebäude im Bonner Vicus, in: R. Kreiner & W. Letzner (eds.), *SPA: Sanitas Per Aquam: proceedings of the International Frontinus-Symposium on the Technical and Cultural History of Ancient Baths*, Aachen, March 18-22, 2009, Leuven/Paris/Walpole (Babesch supplement 21) 109-116.
- White, K.D.**, 2010: *Farm equipment of the Roman world*, Cambridge.
- Willems, W.J.H., & L.I. Kooistra** 1987: De Romeinse villa te Voerendaal, opgraving 1986, *Archeologie in Limburg* 32, 29-38.
- Willems, W.J.H., & L.I. Kooistra** 1988: De Romeinse villa te Voerendaal, opgraving 1987, *Archeologie in Limburg* 37, 137-147.
- Zienkiewicz, J.D.**, 1986: *The legionary fortress baths at Caerleon: volume 1: the buildings*, Cardiff.

| | |
|----------------|--|
| Appendix I | Onderzoekskader - W.K. Vos |
| Appendix II | Bouwhistorisch onderzoek - K. Peterse |
| Appendix III | Waterhuishouding - G. Jansen |
| Appendix IV | Proefsleuvenonderzoek in het Thermenmuseum - G. Tichelman |
| Appendix V | Geofysisch onderzoek - J. Orbons |
| Appendix VI | Fysisch-geografisch onderzoek Thermenmuseum Heerlen - J.J.W. de Moor |
| Appendix VII | Sporen en structuren ROB-opgravingen - W.K. Vos |
| Appendix VIII | Het Romeinse aardewerk van het Heerlense thermenterrein - J. Van Kerckhove |
| Appendix IX | Terra sigillata van het thermenterrein in Heerlen - R.A.J. Niemeijer en M. Polak |
| Appendix X | De munten uit de Romeinse tijd gevonden op het thermenterrein van Heerlen - P.A.M. Beliën |
| Appendix XI | Die römischen Fiblen aus Coriovallum Heerlen - M. Rappe |
| Appendix XII | De fibulae van Heerlen - L.M.B. Van der Feijst en S. Heeren |
| Appendix XIII | De metaalvondsten uit het thermencomplex van Heerlen - S. Hoss |
| Appendix XIV | Zoöarcheologisch onderzoek Heerlen thermenterrein - M. de Groot |
| Appendix XV | Keramisch bouwmetaal thermen Heerlen - T. Vanderhoeven, E.A.K. Kars en B.J.H. van Os |
| Appendix XVI | Aard en herkomst van de bouw- en decoratieve steensoorten uit de Romeinse thermen van Heerlen - R. Dreesen |
| Appendix XVII | Rotary querns and millstones from the Roman baths at Heerlen - P. Picavet |
| Appendix XVIII | Romeins glas van het thermenterrein te Heerlen - F. van den Dries |
| Appendix XIX | Lateinische Inschriften vom Thermengelände in Heerlen - S. Schorn en J. Minis |

The digital versions of the full reports can be downloaded from:
www.romanbathingincoriovallum.com



This report presents the results of a major research project conducted at the Thermenmuseum in Heerlen between 2016 and 2019. The object of the study was the Roman public bathhouse in Coriovallum – now known as Heerlen – and its role and position in the Roman town. More than twenty archaeological specialists collaborated on the project.

The project has produced a wealth of new information, not only about the chronology, construction and use of the bathhouse over the centuries, but also about Coriovallum, a small provincial town in the province of Germania Inferior, just a stone's throw from the border of the Roman Empire. It is now clear that the Roman bathhouse played a key role in the life of Coriovallum for almost 400 years.

This scientific report is intended for archaeologists, as well as for other professionals and amateur enthusiasts involved in archaeology.

The Cultural Heritage Agency provides knowledge and advice to give the future a past.