Frontiers of the Roman Empire – The Lower German Limes

Nominated for Inscription on the UNESCO World Heritage List

Additional information provided to ICOMOS, 26 February 2021

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In response to the ICOMOS missive GB/AA/1631/IR:

World Heritage List 2021 – Interim report and additional information request
Frontiers of the Roman Empire – The Lower German Limes (Germany, Netherlands)

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1 Selection of components

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The exploitation of the very distinctive trachyte stone from the Drachenfels, a mountain of the Rhenish Massif near Königswinter, is well attested by the occurrence of this type of stone in Roman buildings along the Rhine. An inscription set by the Rhine fleet on a block of trachyte found in Bonn mentions the transport of building stone for the forum of Xanten-Colonia Ulpia Traiana ▶27. In contrast to the unquestionable use of trachyte stone in Roman times, the evidence for Roman stone extraction activities on the Drachenfels itself remains unclear. Until modern times, the Drachenfels was used as a stone quarry, especially by the workshop of the Köln cathedral. At a number of places, traces of quarrying have survived. Wedge holes occur on several rocks and have been dated to Roman times (Röder 1974). A recent documentation and re-evaluation of the wedge holes, however, has raised doubts concerning their Roman origin. Demonstrably, the use of wedge holes in quarrying continued until at least the 17th, probably to the middle of the 19th centuries (Grabowski 2016, 117). The occurrence of an engraved phallus was interpreted by Röder as a typical phenomenon of Roman activities, yet such signs can also be found at the Köln cathedral dating to Medieval times. Therefore, no traces of historical stone quarrying at the Drachenfels can be dated with certainty to Roman times, at the moment.

It is planned to improve knowledge about the exact dating of historical stone quarrying at the Drachenfels as part of heritage management. Due to its status as a natural reserve, access to most parts of the Drachenfels is very limited and research therefore needs a more long-term vision.

References

- J. Röder, Römische Steinbruchtätigkeit am Drachenfels. Bonner Jahrbücher 174, 1974, 509-544.
- S. Grabowski, Die Trachyt-Steinbrüche vom Drachenfels im Siebengebirge. In: J. Bemmann / M. Mirschenz (Hrsg.), Der Rhein als europäische Verkehrsachse II. Bonner Beiträge zur Vor- und Frühgeschichtlichen Archäologie 19 (Bonn 2016) 69-135.

2 Landscape and cultural contexts

2.a Development of the Lower Rhine river through time

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On leaving the Mittelgebirge downstream from Remagen ▶44, the river Rhine has changed its course during several thousands of years, until it became controlled by dikes and other embankments in the Middle Ages. On the whole, the development of the Rhine through time can only be sketched in broad lines, since the main dating instrument consists of radiocarbon dating, which is relatively imprecise in archaeological perspective. A more detailed history can only be established in the context of an excavation, where man-made constructions and waste deposits in the river bed offer an additional, finer chronological framework.
In line with this contextual difference, the development of the Rhine over time will be presented here in two sections. In the first section, the general development will be explained. In the second, two examples will provide a more detailed view and illustrate the dynamics which are characteristic for many components of the Lower German Limes.

General development of the river Rhine

Downstream from Bonn ▶41 the Rhine has created a gradually widening complex of channel belts (fig. 1), the width of which increased to approximately 3 km at Dormagen ▶36, 6 km before Xanten ▶27-28 and 12 km in the area of Till ▶22. Further downstream the river built up a wide delta, merging with that of the river Meuse and eventually reaching a width of more than 40 km.

Pre-Roman

The pattern outlined above goes back to the pre-Roman period. In the area upstream from the delta, two parallel complexes of channel belts developed between Neuss ▶33 and Alpen ▶29, while the river meandered in an increasingly wider zone beyond that point. In the delta, the development of the river was initially mainly confined to the northern part, where it gradually and continually created secondary and parallel channels. From 2500 BC onwards the southern part of the area became more involved in the development, and at some point the branches known as the Waal and Vecht were created. Several millennia of river development left a jumble of stream ridges and fossil river channels, some of which were still carrying water after their abandonment.

Roman

During the Roman period, the river for the most part meandered within the area of the earlier channel belts, upstream from the delta. The meandering system of the Rhine north of Bonn and south of the Rhine-Waal bifurcation consisted of an approximately 300 m wide river bed with several islands, as recent palaeogeographical research at different sites of the Lower German Limes has demonstrated.[1] It largely confirms the description of the geological situation of the river Rhine by the Roman historian Tacitus.
The wide river bed and a much lower discharge caused a much lower water level in Roman times, especially in dry summer times. The new investigations revealed that the Romans were in need and favour of

[1] L.-C. Dempwolff et al., Hydrodynamic cross-scale archaeology at a Roman river harbour (Basel, 2020). https://publikationsserver.tu-braunschweig.de/receive/dbbs_mods_00069167.

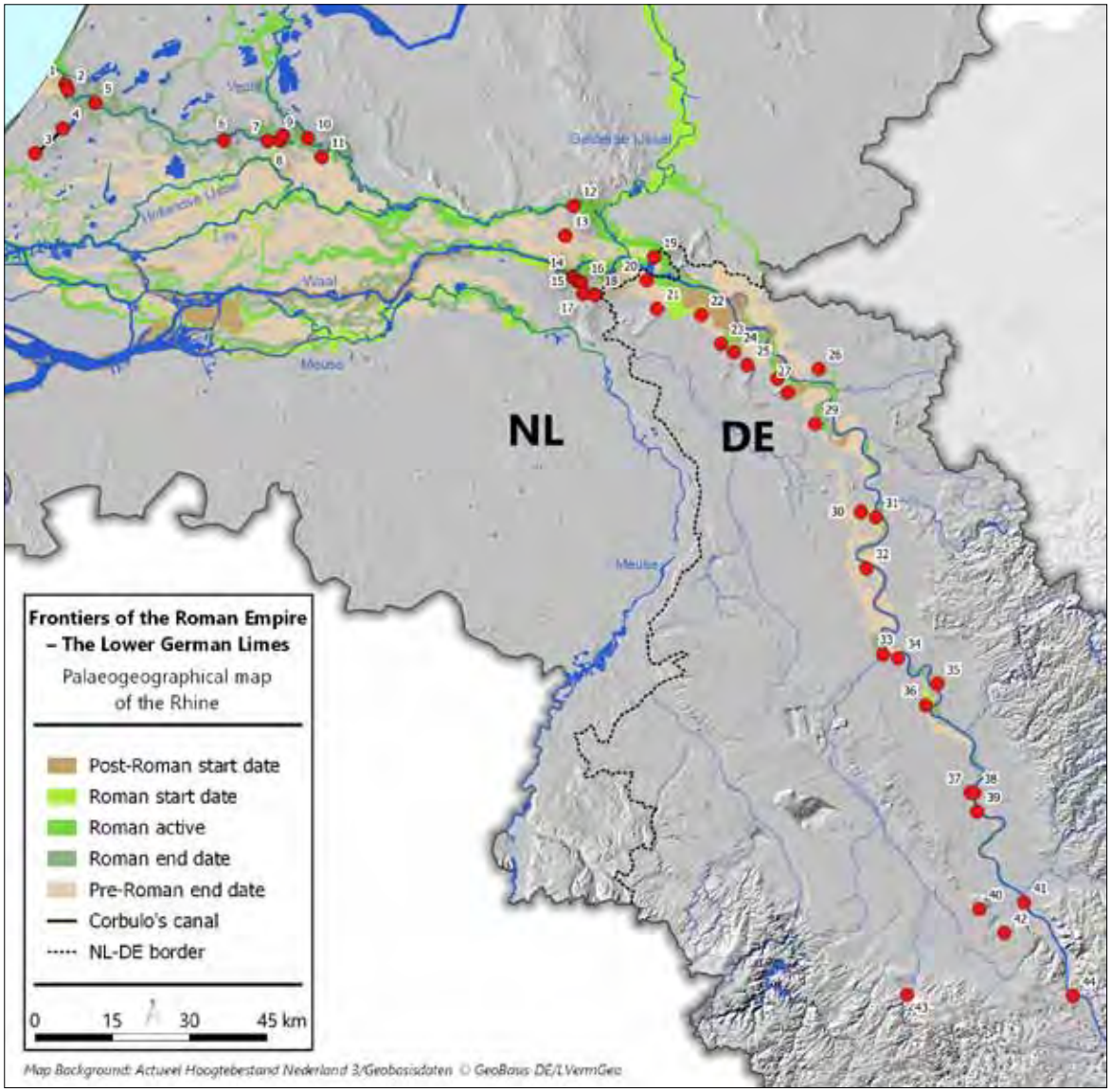

Fig. 1 Holocene channel belts of the river Rhine, in the delta supplemented with those of the rivers Waal and Meuse. All green channel belts were active at some point during the Roman period. Modern river courses are indicated in blue. Background: modern digital elevation map.

placing their settlements at the convex river bends, with deeper water levels for harbours and mooring points. The downside of this was the risk of much stronger erosion. More and more structures formerly interpreted as quays are now better understood as embankment protections to prevent river erosion. A good example is Xanten-CUT ▶27, where the proven harbour quay alongside river embankments is part of the property area. The widespread use of embankment protections lead to a very stable river course from the 1st to the 3rd centuries AD.

In the delta, there were several new developments during the Roman period. The earliest changes were man-made. Shortly before the beginning of the Common Era, Drusus – stepson and general of the first emperor Augustus – built a groyne (dam) at the Rhine-Waal bifurcation situated between Kleve-Keeken ▶20 and Herwen-De Bijland ▶19. This construction aimed at improving the navigability of the northern branch (Rhine) at the cost of the southern one (Waal). Drusus also dug one or more canals, probably connecting two brook systems which later developed into the Gelderse IJssel river. This provided him with a second navigable access into the Germanic territories across the Rhine, in addition to the river Vecht. In AD 47, the army commander Corbulo dug a canal between the estuaries of the Rhine and Waal/Meuse rivers, to create an inland connection which was safer than the sea passage. At some point in the 1st century AD the later river Lek started develop, perhaps as a consequence of the increased water flow through the northern Rhine branch. Initially it adopted most of the course of the Hollandse IJssel, discharging into the Waal/Meuse estuary, but later it created a whole new channel. Over the entire length of its course in the delta, the meanders of the Rhine constantly shifted within the channel belt, causing erosion in the outer bends and accretion in the inner ones. These more local changes can be observed at many of the military sites.

Recent palaeogeographical research has shown that the situation of the stable Rhine course in the first three centuries AD dramatically changed in the Late

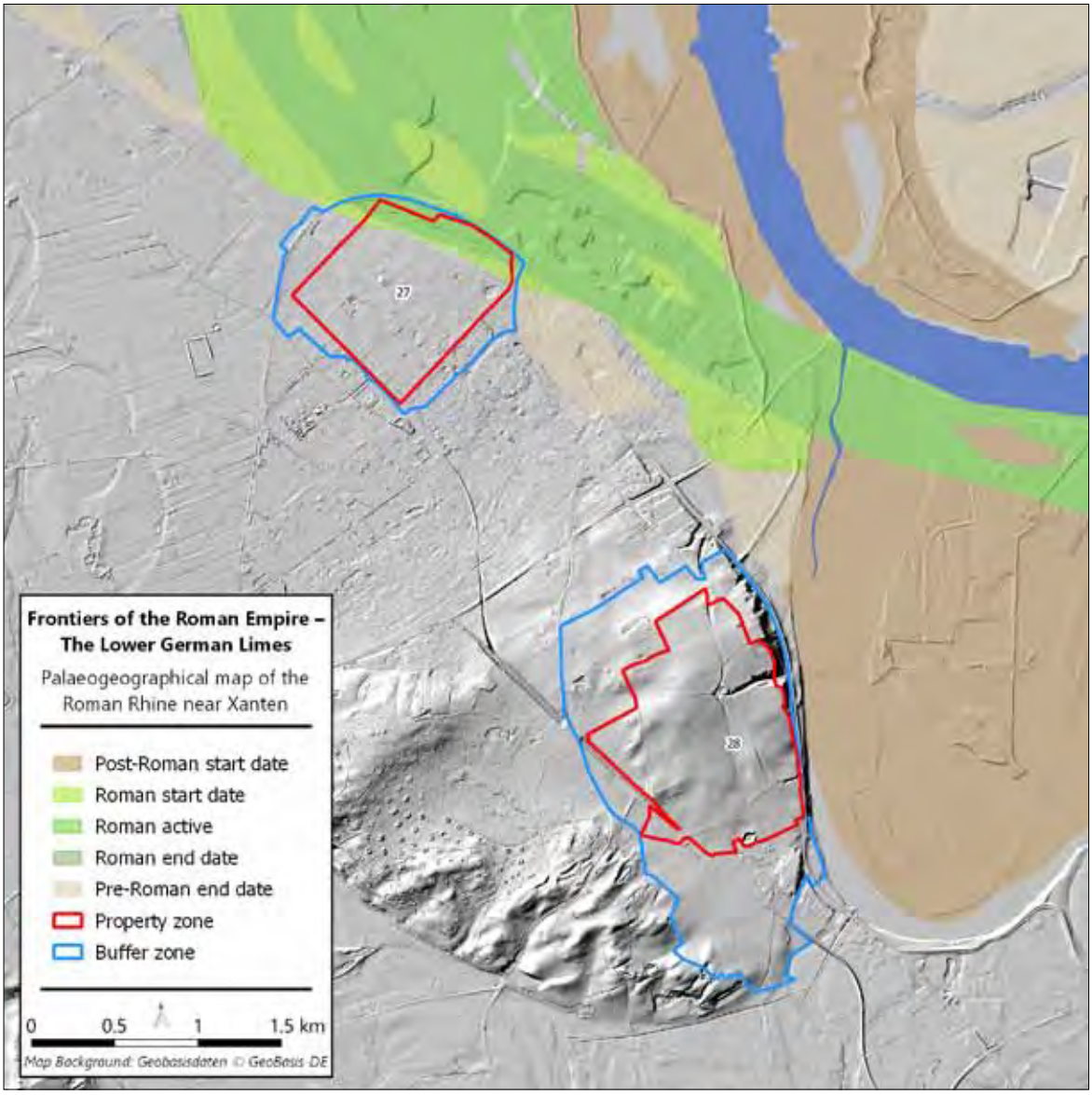

Fig. 2 Development of the river Rhine in the area of Xanten-CUT ▶27 and Xanten-Fürstenberg ▶28. The modern course of the Rhine is indicated in blue. Background: modern digital elevation map.

Roman period, from the beginning of the 4th century onwards. Now, much higher river dynamics are attested by the creation of new branches after breakthroughs of river bottlenecks.

This led to damage to the front of the fort of Kalkar-Bornsches Feld ▶24, where the northeast corner eroded and collapsed. A new wall, probably erected in the 4th century, closed the open gap. The repair of the eroded part of the fort in Late Antiquity provides an exceptional testimony of the interaction between river erosion and the Roman army. This situation occurred interestingly long before the dramatic climate change of the Late Antique Little Ice Age after 560 AD. The reason might be a decreased maintenance of river embankments along the Rhine frontier in times of crisis in the 4th and 5th centuries.

Post-Roman

After the Roman period, the Rhine followed its earlier course in some areas, but remained very active in others. Between Köln and Nijmegen, the river shifted in the post-Roman period in a much wider area. At Alpen-Drüpt ▶29 the front part of the fort was eroded by river activities which cannot be dated closer than in the Late-Roman or Early Medieval period. Monheim-Haus Bürgel ▶35 is since a major Rhine shift in the 14th century situated on the right bank of the modern Rhine course, demonstrating the large area where the river dynamics took place. West of the legionary fortress Xanten-Fürstenberg ▶28 its successor from the late 1st century was eroded by an undercut bend that developed in the 16th and 17th centuries, one of the latest major erosion events on the Lower Rhine. Considerable erosion might have occurred at other sites, since some forts mentioned in Roman written sources have not been identified yet. Later erosion might be one explanation, but the amount and extent cannot be estimated.

In the delta, the Waal and Lek became the most important Rhine branches, and the Gelderse IJssel developed into a proper river. Between the Rhine-Waal

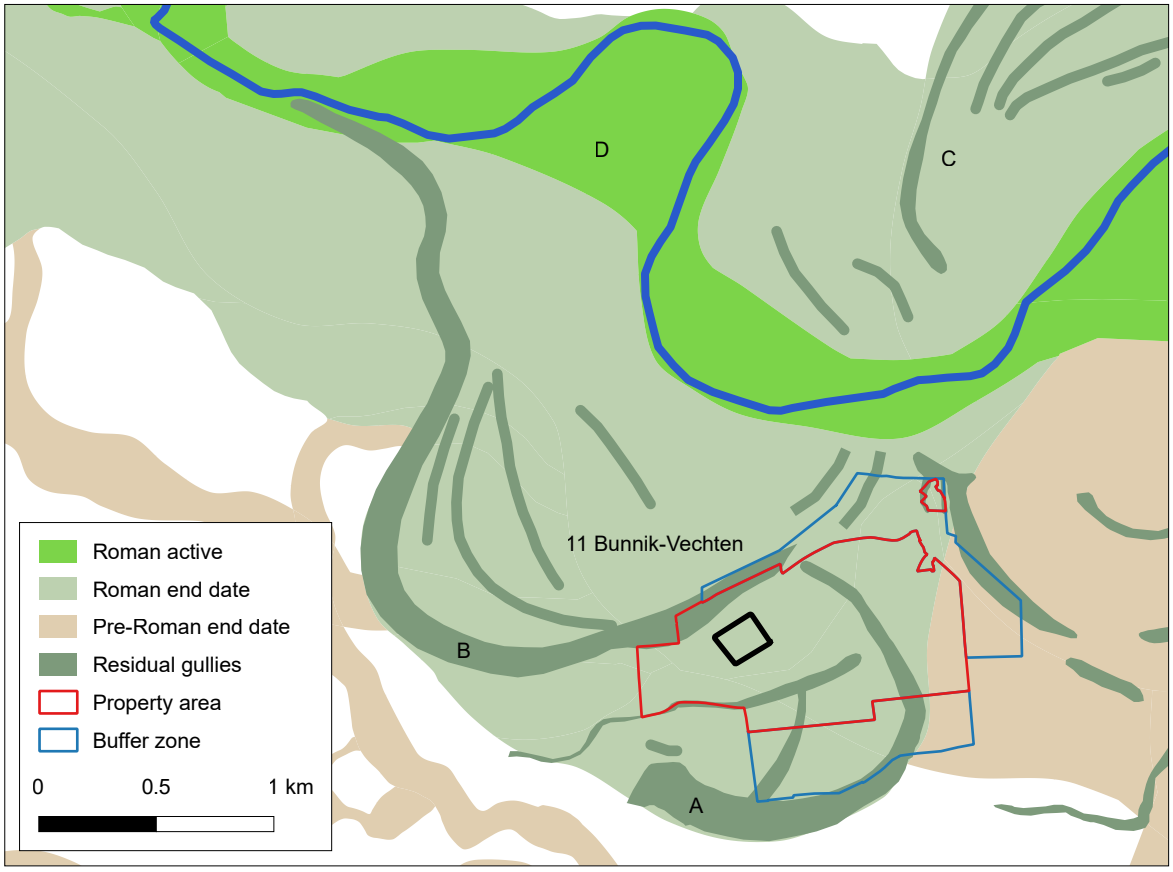

Fig. 3 Development of the river Rhine in the area of Bunnik-Vechten ▶11. The modern course of the Rhine is indicated in blue. A-D: cf. text.

and the Rhine-Lek bifurcations the river was quite active during much of the Medieval period, causing considerable erosion to the Roman military settlements near the river. At the same time, the northern branch lost most of its importance beyond the Rhine-Lek bifurcation, its fate being eventually sealed by the construction of a dam in AD 1122. Finally, in 1707 a newly excavated canal made the Rhine branch to the east of Herwen-De Bijland ▶19 redundant.
As a consequence of the changes in the post-Roman period, many military sites lost their connection with the Rhine, because it shifted away or silted up entirely. This topic is further discussed in section 2.b.

Examples of the development of the river Rhine in detail

The area around Xanten

Recent research of the historical Rhine courses between the Roman *colonia* Xanten-CUT ▶27 and the legionary fortress of Xanten-Fürstenberg ▶28 has led to a totally new reconstruction of the Roman Rhine course (fig. 2). For long it was believed that the Romans used a cut-off meander of the Rhine for the positioning of the city, to make use of the calm waters. Core drillings, geophysical measurements and archaeobotanical analysis have now revealed that it was the active river course that was used. The reconstruction of the water level of the Rhine in Roman times showed that it was much lower than today. The low water level constituted a danger to navigation, which was avoided by building the city and its harbour on the edge of the river bank, where the channel was at its deepest and most dynamic. The risk of erosion of structures was obviously considered to be acceptable. The results gained at Xanten provide an exceptional testimony of human-nature interaction and is exemplary for other Roman sites along the river Rhine.

The area around Bunnik-Vechten

Decades of geological research in the river area around Bunnik-Vechten ▶11 have provided a detailed image of the river dynamics in the delta during the Roman period (fig. 3). Here, the river Rhine has meandered in a 2-3 km wide band, leaving smaller and larger silting-up gullies as its course shifted and new channels developed. Although the broad lines of the development of the Rhine are clear, it is difficult to date individual stages with precision.
On current evidence, the first military post at Vechten was established within an abandoned meander (fig. 3, A), on the edge of a younger, already existing meander (B). This meander had been shifting to the south-west for some time, leaving several residual gullies, and was probably the continuation of a wide bend from the northeast (C). At some point during the Roman period (cf. below) both meanders (B and C) were cut off by a new channel (D), which is the predecessor

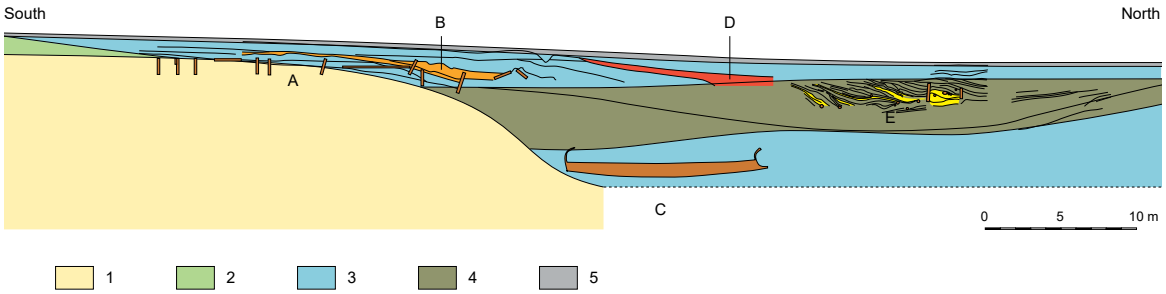

Fig. 4 Idealised section through the Rhine meander in front of the fort of Bunnik-Vechten ▶11. 1: pre-Roman river deposits (coarse sand). 2: overbank river deposits (sandy clay and loam). 3: channel deposits (layered clay). 4: channel deposits (peat). 5: disturbed topsoil. A-E: cf. text.

of the modern Rhine in this area.

The behaviour of the meander immediately north of the successive forts (B) can be reconstructed in more detail by combining the results of various excavations and coring surveys. The available evidence has been merged into an idealised section (fig. 4) located to the northeast of the stone fort, at a right angle to its front, which is situated immediately to the left (south) of the illustrated section.

The fort was built on pre-Roman river deposits (fig. 4, 1), on the edge of an active river channel. Initially, this channel deposited sediment on its bank during high water (2). However, the meander must have been cut off early in the Roman period. A radiocarbon date obtained from a peaty layer (4) in the river channel indicates that it was already silting up in the 1st century AD. This is in line with the radiocarbon date of the patrol vessel that was found in front of the fort (C), which indicates that it was built before the middle of that century.

Although the river bend must have remained navigable for some time after it was cut off, the edge of the water was shifting away from the fort. This can be read from timber constructions built out into the river before the middle of the 1st century (A) and from the stratigraphical position of a thick layer of burnt material (B) which may be linked with the Batavian revolt of AD 69-70. The river bank was steadily built out with timber constructions, backfilled with settlement waste. By the middle of the 2nd century these timber frames were extending as far as 40-50 m from the early-Roman bank (E). The rubbish layers in this area were rich in waste of leather working and in animal dung at least partly produced by horses (yellow layers at E). It is tempting to connect this horse dung with the cavalry unit known to have constituted the garrison by this time.

Although the well-known cargo ships of the Lower Rhine needed less than 1 m of water depth, it is questionable whether the cut-off river bend was navigable for long after the mid-2nd century. A layer which is particularly rich in building debris (D) may be linked to the abandonment of the fort in the 3rd century, and seems to cover the layers rich in leather and dung.

2.b Recognition and protection of the Rhine in the context of the components

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Of the 44 component parts/clusters included in the nomination 28 were connected to the Rhine (table 1). In 7 cases the connection to the river is relatively indirect. These sites were located at some distance from the Rhine, up to 1 km, and there are no quays or protective structures in front of the military installation. At Kleve-Keeken ▶20, both the buried Roman Rhine and the modern river are included in the large buffer zone shared with Herwen-De Bijland ▶19. At Alpen-Drüpt ▶29 the buffer zone extends to the residual gulley of a river channel which silted up in the Late Roman or Medieval period. At Dormagen ▶36 a small section of the buried Roman Rhine is included in the buffer zone.

In the remaining 21 cases the connection with the Rhine is much more direct. Especially in the delta, military installations were situated on the very edge of the river bank, and provided with protective revetments or mooring facilities. In most instances, the Roman river is now buried. In eight cases, sections of the buried river are included in the property area, as at Valkenburg-De Woerd ▶2, and in five of these additional parts in the buffer zone, as at Moers-Asberg ▶30. In another eight cases it is included in the buffer zone alone, as at Arnhem-Meinerswijk ▶12, four of these being located in urban areas where only the military installation could be included in the property area, as at Utrecht-Domplein ▶10. At four sites, the Rhine still follows the same course as in the Roman period. Here, the buffer zone extends to the river, as at Remagen ▶44, or includes a section of it, as at Köln-Deutz ▶38.

In all, there are only seven sites where the connection

id	site	established on bank of Rhine	Roman Rhine buried	Roman Rhine still present	modern Rhine present
1	Valkenburg-Centrum	●	B		B
2	Valkenburg-De Woerd	●	C		
3	Voorburg-Arentsburg				
4	Corbulo's canal				
5	Leiden-Roomburg	●	C		
6	Woerden-Centrum	●	B		
7	Utrecht-Limes road	●	C		
8	Utrecht-Hoge Woerd	●	C + B		
9	Utrecht-Groot Zandveld	●	C + B		
10	Utrecht-Domplein	●	B		
11	Bunnik-Vechten	●	C + B		
12	Arnhem-Meinerswijk	●	B		
13	Elst-Grote Kerk				
14	Nijmegen-Valkhof area				
15	Nijmegen-Hunerberg				
16	Nijmegen-Kops Plateau				
17	Berg en Dal-aqueduct				
18	Berg en Dal-De Holdeurn				
19	Herwen-De Bijland	●	B		
20	Kleve-Keeken	○	B		B
21	Kleve-Reichswald				
22	Till	○			
23	Kalkar-Kalkarberg				
24	Kalkar-Bornsches Feld	●	B		
25	Uedem-Hochwald				
26	Wesel-Flüren	●			
27	Xanten-CUT	●	C + B		
28	Xanten-Fürstenberg				
29	Alpen-Drüpt	○		B	
30	Moers-Asberg	●	C + B		
31	Duisburg-Werthausen	○			
32	Krefeld-Gellep	●			
33	Neuss-Koenenlager	○			
34	Neuss-Reckberg				
35	Monheim-Haus Bürgel	○			
36	Dormagen	○	B		
37	Köln-Praetorium	●			
38	Köln-Deutz	●		B	
39	Köln-Alteburg	●		B	
40	Kottenforst-Nord				
41	Bonn	●		B	
42	Kottenforst-Süd				
43	Iversheim				
44	Remagen	●		B	

Table 1 Representation of the river Rhine in the property area (C) and buffer zone (B). Component parts/clusters which were not located on the bank of the Rhine are shaded. Legend: ● direct connection to the river. ○ indirect connection to the river.

to the Rhine is not included in the property area or buffer zone, and in most of these cases the distance to the (modern) river is too large to consider that.

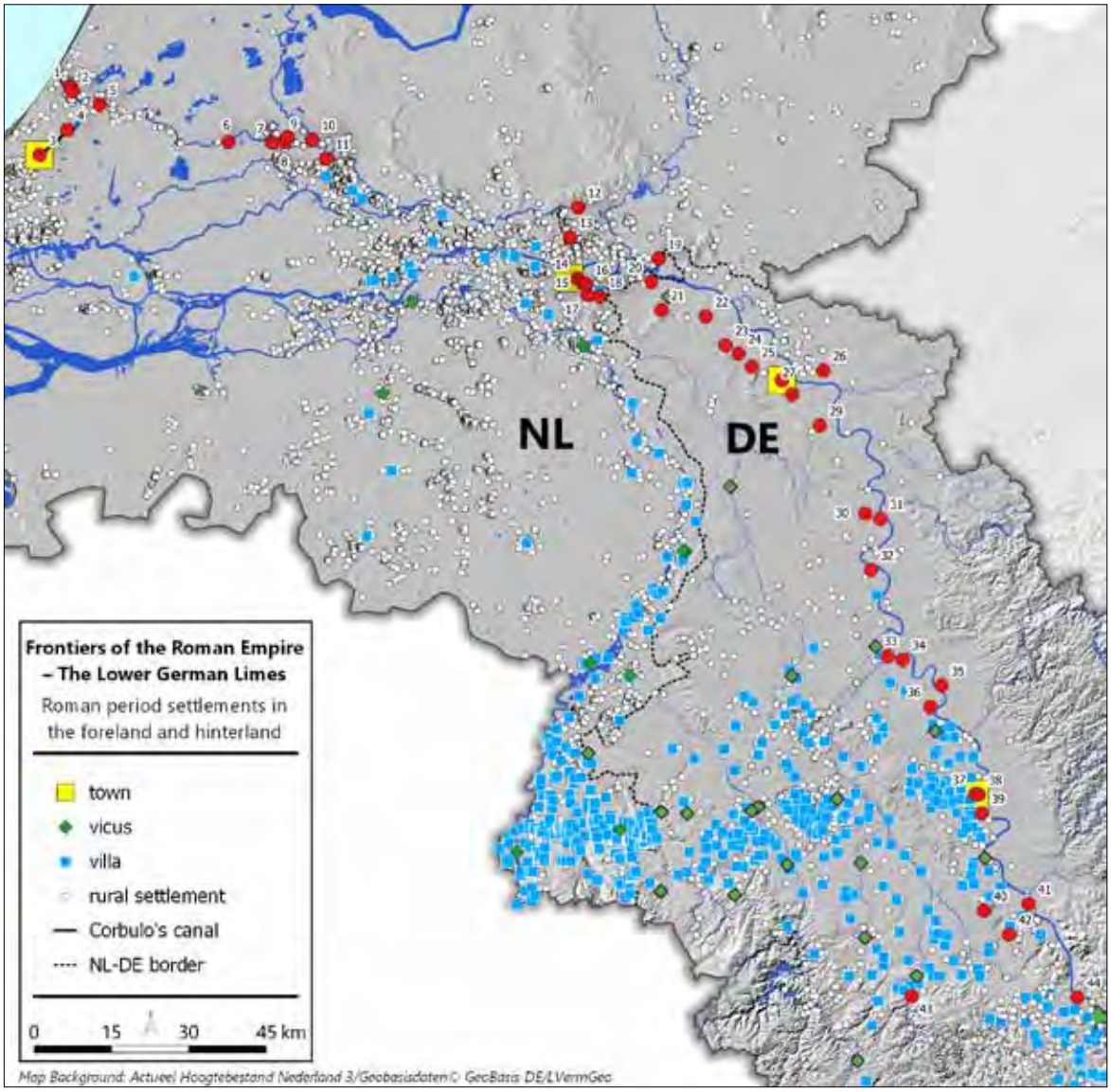

Fig. 5 Settlements from the Roman period in the foreland and hinterland of the Lower German Limes. Background: modern digital elevation map.

2.c Civil settlements and non-Roman populations

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Civil settlements in the wider setting of the frontier

Civil settlements were as much part of the riverine landscape of the Rhine as military installations. They were not presented and discussed in the Nomination dossier, which followed the so-called Koblenz declaration of 2004, stating that nominations of sections of the Frontiers of the Roman Empire should encompass "fortresses, forts, towers, the Limes road, artificial barriers and immediately associated civil structures".[2] The civil structures referred to in this definition are the extra-mural settlements of military installations, not the rural settlements, small towns (*vici*) and villas in the frontier zone and hinterland or the rural settlements of non-Roman groups across the frontiers.

The distribution of non-military settlements along the river Rhine is visualised in a map (fig. 5). This map is an imperfect and incomplete rendering of the historical situation, reflecting the character of the underlying data and the state of research. Strictly speaking, the map does not show the distribution of *settlements*, but that of *finds* which have been interpreted as *belonging to settlements*. Sites with a starting date in the Late Iron Age have been included, as it is impossible to distinguish those from sites starting in the Early Roman period, due to the continuation of regional pottery traditions.

[2] Cf. Nomination dossier, Part I, p. 76.

In areas with a tradition of systematic field surveys – as much of the Dutch river area – the distribution map may well be too dense, whereas in areas with less or no systematic field surveys – as much of the northern German Rhineland – it is surely too thin. Nevertheless, some general patterns are clear.

Upstream from the delta

In the south-eastern hinterland of the Lower German Limes a dense distribution of vici and Roman villas, mainly built of stone, is attested. This so-called 'villa landscape' stretches between the rivers Rhine and Meuse and along the Rhine to the north, mainly until Neuss ▶33, in a fertile loess area (cf. fig. 6). It is more or less identical with the *civitas Ubiorum* (administrative district of the Ubii) around Köln and the region around Aachen, areas of more 'Romanised' societies. The south-eastern part of the Netherlands belongs to this same 'villa landscape'; to the north this extended through the valley of the river Meuse until Nijmegen, gradually thinning out.
North of Krefeld-Gellep ▶32 no typical Roman villa is known yet. Roman settlements north of Neuss ▶33 seem to have mainly consisted of timber buildings and were probably simple rural settlements, as a handful recently excavated sites suggest. The sparse distribution of Roman period settlements between Neuss and Nijmegen reflects more the difficulties of identifying timber-built settlements than the historical situation. The actual settlement distribution in Roman times may have been much denser than the map suggests.
The foreland of the Lower German Limes in its southern half was long believed to have been a strip of land with a strong restriction on Germanic settlements, but recent research reveals more and more native settlements from the early 1st century onwards. The map covers the immediate strip of the foreland (c. 30 km east of the Rhine) in the modern administrative district of the Rhineland.

In the delta

To the west of the Rhine-Waal bifurcation there is a tight relationship between the presence or absence of civil settlements and the natural conditions of the landscape. When a reconstruction of the landscape c. AD 100 is added to the distribution map it is immediately clear that habitation was nearly entirely confined to areas with fertile river deposits, while inaccessible peat areas and sandy soils were avoided (fig. 6).
Comparison with the settlements from the Iron Age (not shown) reveals no indication of a systematic evacuation of native sites during the Roman period which might signal that settlements in the surroundings of military posts were not tolerated. Although some sites are known to have been abandoned at about the time of the arrival of Roman troops nearby, synchronicity is difficult to prove, and other causes than removal by the army may apply, such as exhaustion of marginal agricultural areas.
In the foreland of the Dutch part of the frontier human settlement was thin, and largely confined to brook valleys and the fringes of the outwash plains of ice-pushed ridges. Settlements on the river deposits on the right bank of the Rhine are rare. Once again, the settlement pattern of the Roman period does not significantly differ from that of the Late Iron Age.
The settlement density in the river area south of the Rhine increased greatly during the Roman period. The villas indicated in these parts are no typical stone-built Roman villas as they are known further south, but timber farmhouses with added porticoes and occasionally heated stone-built rooms.

Extra-mural settlements

Recent research on extra-mural settlements along the frontiers of the Roman Empire emphasize more and more their role as a link between the military world in a narrow sense and the wider civilian context of the hinterland.[3] Lying next to and connected with the military garrisons they are not seen any more as purely civilian settlements of communities separated from the army. The extra-mural settlements along the Lower German Limes can contribute to a better understanding of this close connection.
A recent study on the basis of the material culture of garrisons and extra-mural settlements revealed the close connection and interchange between soldiers and civilians along the Lower German Limes and the role of the extra-mural settlements in cultural transformation.[4] Graffiti, mainly marking goods with the names of their owners, often provide evidence for the origin, sex and sometimes the profession of people that were part of the mixed community inside and outside the forts and fortresses. This may be illustrated by a graffito found in the extra-mural settlement of the fort of Utrecht-Domplein ▶10 of a man called *Alexander*, clearly pointing to an origin from the Greek East. He put his name on a dish of regional production by a pottery still producing in a Late Iron Age tradition in the 1st century AD. Its distinctive production stamp makes a production at or near Xanten very likely. In

[3] A.R. Birley, The nature and significance of extramural settlement at Vindolanda and other selected sites on the northern frontier of Roman Britain (unpub. PhD thesis, University of Leicester, 2010).

[4] M.J.M. Zandstra, Miles away from home. Material culture as a guide to the composition and deployment of the Roman army in the Lower Rhine area during the 1st century AD, (Nijmegen, 2019). https://repository.ubn.ru.nl/handle/2066/212417.

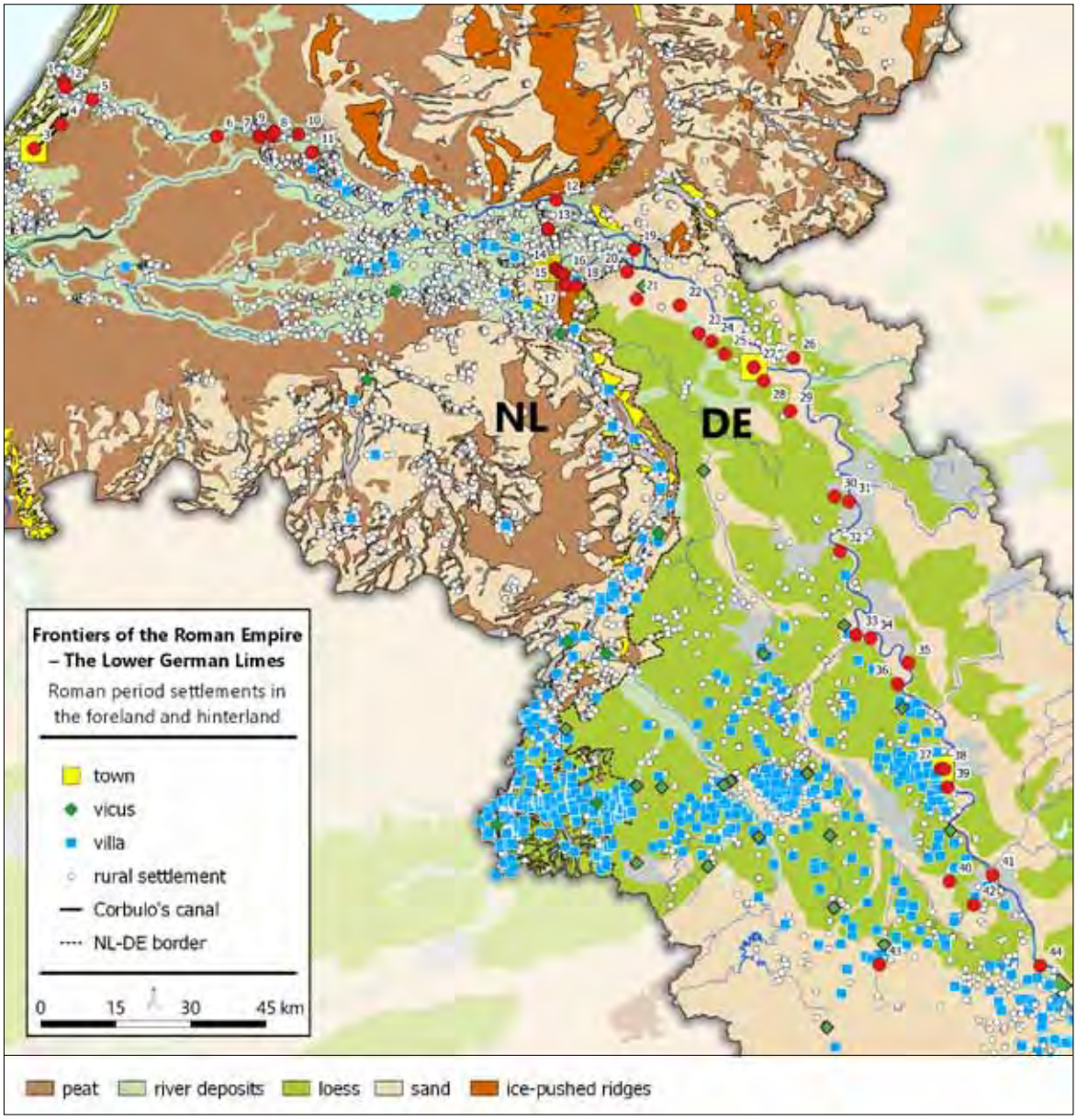

Fig. 6 Settlements from the Roman period in the foreland and hinterland of the Lower German Limes. Background: palaeogeographical reconstruction c. AD 100 (Netherlands); generalised modern soil map (Germany).

this one piece, the complex process of mobility of people and goods comes to light. The mentioned study also focused on brooches and other dress accessories that provide splendid evidence for the importance of the extra-mural settlements for the understanding of the complex frontier society along the Lower German Limes. The study also demonstrated the high value of the rich find collections held by the museums along the Lower German Limes for further studies on the role of the extra-mural settlements. It will also serve as an example for the development of future research questions and the creation of a research strategy for the Lower German Limes.

Recent research on the structures of extra-mural settlements such as Valkenburg-De Woerd ▶2 and Kalkar-Bornsches Feld ▶24 provided new insights into the extent and internal organisation of the extra-mural settlements, which led to their inclusion as component parts in the nomination. Long rows of strip houses alongside the main roads leading to the forts are a distinctive feature and can be seen as the main living and production area of the people connected with the garrisons. At both sites further buildings of civil, public and military use underline the complex appearance, function and spatial development of the extra-mural settlements. In contrast to the relatively standardised layout of the forts and fortresses, the internal structure and extent of the extra-mural settlements follows more individual principles. Topography is surely one, but not the only condition. Further research and comparative analysis of the archaeological structures of extra-mural settlements along the Lower German Limes will be an important aim of the research strategy for the Lower German Limes.

Inter-cultural exchange

The Roman army played a major role in the interchange of cultural traditions between the Mediterranean world and the northern provinces. The Lower German Limes and its hinterland allow important insights into the processes of inter-cultural exchange in architecture and technology, monumental arts, townplanning, landscape design and material culture. Many studies have focused on aspects of the inter-cultural exchange in this region, based on the rich archaeological evidence. In this short summery, only a selective approach is possible.

The administrative incorporation of the tribal groups in the Lower Rhine area had a major impact on the inter-cultural exchange between Rome and the communities in its frontier province. The tribal communities of the Batavians and the Ubii, occupying most of the left bank of the Rhine, are known from written sources to have been of great importance for the military support and security of the frontier. The grant of Roman citizenship to veterans of auxiliary forces levied here led to an increasing incorporation of these communities in the Roman society. This can be traced, for example, by the abundant occurrence of writing implements found in rural settlements in the Rhine delta. Batavian soldiers became familiar with administrative processes in the Roman army and, after their service, brought the writing culture and Latin literacy back into the hinterland of the Lower German Limes.[5] The preservation of organic materials along the Rhine has led to the discovery of many writing implements of organic materials, such as wooden writing tablets and styluses. This process was not limited to the Roman province itself; even in the Germanic foreland, writing implements can be found as grave goods, as attested for a native settlement on the right bank of the Rhine opposite Köln.

In the area of the Ubii, the southern part of Lower Germany, another phenomenon of the inter-cultural exchange connected with the Roman administration can be recognised: in the late 2nd and 3rd centuries the ethnic composition of the legionary forces changed significantly: more and more recruits were now taken from the local communities, especially from Köln and its hinterland. While recruitment from almost all other parts of the Roman Empire remained common, more and more legionaries and legionary veterans with an ethnic origin in the Rhine area can now be traced by the rich epigraphical evidence, mainly stone altars and funeral monuments. Their Roman-style family names, modified in a specific regional way, often reveal their local origin,[6] linking the inter-cultural exchange to the very personal biography of the people.

With the Roman army arriving on the Rhine and establishing forts and fortresses, the regional landscape underwent considerable changes. But the military infrastructure encompassed much more than military fortifications, such as a road connecting the military posts and brickworks, quarries and limestone kilns. In some cases the landscape was drastically adapted to the military needs, as by the building of a dam on the Rhine-Waal bifurcation, the construction of aqueducts and the excavation of a canal connecting the rivers Rhine and Meuse. That Roman architecture and design influenced regional communities, is revealed by the appearance of elements of Roman architecture in rural buildings, and of the so-called Gallo-Roman temple in a wider area north of the Alps.

Strict rectangular street patterns are another manifestation of Mediterranean design traditions on the left bank of the Rhine. The typical internal organisation of Roman towns and military bases consisted of a cross of two main roads, from which secondary roads spread out in a strict rectangular order. This tradition had a major impact on the development of the main civil settlements in the Lower Rhine area.

At Xanten, preceding the later Roman town of Colonia Ulpia Traiana ▶27 founded in AD 100, a major civil settlement with a rectangular street pattern developed from the early beginning in the 1st century onwards, when Roman forces were stationed 2 km to the south at Xanten-Fürstenberg ▶28. This predecessor of the Roman colony is supposed to be the central place of the *civitas* of the Cugerni, one of the tribal groups organised by and settled under Roman control. Hints at the existence of rectangular street grids from the first decades of the 1st century on can also be found at the central place of *Ubii*, the later *colonia Claudia Ara Agrippinensium* at Köln. Recent research at Aachen reveals that the concept of regular street patterns was also adopted by *civitates* in the wider hinterland of the Lower German Limes. The organisation of the tribal societies under the control of the Roman administration makes it highly probable that military surveyors played a major role in the establishment of central places, as indigenous societies were not capable of land surveying. The adoption (and preservation) of rectangular street grids at central places of local communities along the Lower German Limes demonstrates the important role of the Lower German Limes for the development of urban planning along the Rhine.

The adoption of the rectangular street pattern as a distinctive feature of urbanisation was certainly not

5 T. Derks / N. Roymans, Seal-boxes and the spread of Latin literacy in the Rhine delta, in A.E. Cooley (ed.), Becoming Roman, writing Latin? Literacy and epigraphy in the Roman West. Journal of Roman Archaeology, Suppl. Ser. 48 (Portsmouth, 2002), 87-134.

6 R. Haensch, Inschriften und Bevölkerungsgeschichte Niedergermaniens. Zu den Soldaten der legiones I Minervia und XXX Ulpia Victrix, Kölner Jahrbuch 33, 2001, 89-134.

limited to spatial aspects. The need of organisation of private and public property was accompanied by regulations for maintaining the urban infrastructure by the town inhabitants. This process led to the development of urban societies with self-governance along the Lower Rhine, which did not stop with the end of the Western Roman Empire. The inter-cultural exchange in the domain of town planning developed further into the Early Middle Ages, when Frankish kings established their seats of power in cities and forts of the former Roman province of Lower Germany.

As religion formed a major part of the Roman self-conception, the religious domain is also present in the nomination. The sanctuary of Hercules Magusanus at Elst-Grote Kerk ▶13 and the sanctuary of Vagdavercustis at Kalkar-Kalkarberg ▶23 are well-preserved and well-researched examples of the worship of indigenous deities by members of the Roman army. The indigenous god Magusanus was interpreted by the Romans as a local form of Hercules. The joint name of Roman and Celtic or Germanic origin is the typical sign of a phenomenon known as *interpretatio Romana*. But the worship of indigenous gods and goddess was not limited to provincials, as an altar for Vagdavercustis from Köln demonstrates: it was erected by the prefect of the imperial guard, one of the highest commands below the emperor. His worship of a regional goddess demonstrates that cultural exchange really worked in two directions. This can also be traced by the abundant richness of inscriptions along the Lower German Limes of Roman and indigenous deities venerated by the different members of the 'frontier society', even if the original context of the altars is not as well preserved as at Elst and Kalkar.

On a river frontier, shipping of troops and supplies, horses, fodder and building materials was vital to the army. This led to a massive need of transport ships, not only for the Lower German army, but also for the growing needs of the civilian society. Many Roman transport ships have been found in excellent preservation conditions along the Rhine. In most cases, for example at Köln, Xanten, Woerden and Zwammerdam, it is not surprising that the findspots of ships are identical with places of military function or at least with a very close connection to the army. The perfect preservation conditions for organic materials allowed in some cases the recognition of regional building techniques and of the use of regional oak.[7] This proved the existence of regional shipyards along the northern part of the river Rhine and the adaptation of local building techniques by the indigenous population in Roman times. These local traditions in the building of large river barks continued and developed even after the fall of the Roman Empire, as finds of Early Medieval barks along the Rhine demonstrate. The transfer of shipbuilding technology and the further development in local traditions on the Lower German Limes presents therefore an important testimony of inter-cultural exchange.

The material culture of the Lower German Limes provides important insights into the process of inter-cultural exchange in everyday life, between Roman and local traditions. This can be traced for example by the presence and absence of Roman wheel-turned pottery on the one hand and of handmade regional ceramic products on the other. This applies to military sites as well as to settlements in the rural hinterland north of Neuss.

In the 1st century AD, handmade pottery of regional production is a significant part of the finds assemblage at Roman military sites, as has been demonstrated for Nijmegen-Hunerberg ▶15 and Nijmegen-Kops Plateau ▶16. The occurrence of handmade pottery at Roman military sites indicates points to the presence of significant groups of people from regional communities at Roman military bases. In contrast to that, Roman wheel-turned pottery is very sparse in contemporaneous rural settlements in the initial stages of Roman occupation. In the course of the 1st century, the occurrence of handmade pottery at Roman military sites ends, while handmade pottery is still present in the extra-mural and rural settlements. The import of Roman pottery in the rural settlements starts in the course of the 1st century, when auxiliary veterans levied from regional communities returned to their homes in vast numbers. They seem to have had a major impact on the process of 'Romanising' the hinterland. But still, imported Roman pottery remains sparse in the settlements in the northern frontier zone, as compared to the villa landscape in the south of the province. The regional identity of veterans of the indigenous societies in the north seems to have been played a larger role here than in many other frontier societies and may have been influenced by aspects of resilience. This shows a very differentiated process of inter-cultural exchange along the Lower German Limes.

Other elements of the material culture also demonstrate these aspects, such as the presence or absence of funeral monuments with military scenes. The material culture of the Lower German Limes therefore offers a great testimony of inter-cultural exchange and provides valuable opportunities for comparative studies along the Frontiers of the Roman Empire.

[7] W.K. Vos / T. Hazenberg / J. Morel, The Woerden 7: an oar-powered Roman barge built in the Netherlands – details on the excavation at the Nieuwe Markt in Woerden (Hoochwoert). Archäologisches Korrespondenzblatt 2011/1, 101-118.

3 Legal protection

3.a Transition to the Environmental and Planning Law (NL)

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The Dutch State Party confirms that the postponed establishment of the Environment and Planning Act (Omgevingswet) will not affect the protection of the nominated components and their buffer zones.
The protection under the current Spatial Planning Act (Wet op de ruimtelijke ordening) will be transferred smoothly and without interruption to the new Environment and Planning Act, regardless of when this will take place. In the Nomination dossier we assumed that the date of transition would be 1-1-2021, but this has been postponed until 2022.

3.b Progress report on legal protection

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Germany

Since the handing over of the Nomination dossier, the following component parts in North Rhine-Westphalia have been enlisted in the list of monuments or extensions have been ratified: Kleve-Keeken ▶20, Kleve-Reichswald ▶21a-b, Wesel-Flüren ▶26a-d; Kottenforst-Süd ▶42a-j and Iversheim ▶43. For the other component parts to be enlisted the registration process has already started in 2020 and in most cases the hearing is completed. It is expected that all component parts will be enlisted in the first half of 2021.
However, as the provisions of §§ 1 (3), 11, 13 to 17, 19, 28 and 29 of the Monument Protection Act of North Rhine-Westphalia [DSchG NRW] apply regardless of whether the monuments are enlisted in the list of monuments (DSchG NRW §3 (1)), all component parts are already treated as so-called "Vermutete Bodendenkmäler" (suspected archaeological monuments).

Netherlands

The procedure for the legal protection of the component parts which need to be legally protected, started January 21st, 2021. From this date onwards a pre-protection applies, which is identical to the final protection once that will be in place. The procedure takes ten months at most, so the State Party expects to have finished the procedures by November 2021, although we strive to complete them earlier. With these procedures we carry out the protection programme which has been adopted by the minister of Culture, Education and Science on June 2nd, 2020. The late start of the procedure was due to an extra information round with the owners of the properties involved.
Legal protection of extensions of component parts which follow from the adoption of suggestions in the Interim Report of ICOMOS will take ten months at most from the start of the procedures.

3.c Protection of the buffer zones

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Before going into the protective regimes in the buffer zones and their practical application it is pointed out that excavated areas included in buffer zones usually no longer contain archaeological remains. This general rule and the few exceptions to it are further explained in section 8.b.
The buffer zones have an important function in safeguarding information that is of importance in understanding the OUV.[8] There is however no OUV in the buffer zones itself.

Germany

In North Rhine-Westphalia the buffer zones containing archaeological features are protected archaeological monuments or suspected archaeological monuments (cf. section 3.b). In public planning the interests of the preservation of monuments must be taken into account (§§ 1(3) and 11 DSchG NRW). Every desired change of a monument or its surroundings (§ 9 DSchG NRW) will only be granted if the conservation is not jeopardised. Also, any excavation (§13 DSchG NRW) will only be granted if the conservation of sources of research is not jeopardised.
This means that measures affecting the archaeological remains in buffer zones have to take into consideration the aims for protection.
In Rhineland-Palatinate the buffer zones are protected by §§ 2 (3), 6, 7, 17, 18, 20, 21 and 22 DSchG RLP. According to § 21 DSchG RLP the same regulations in the planning system apply as for inscribed monuments. The protection of the archaeological remains is not dependent on whether the monuments are registered in the monument list of Rhineland-Palatinate (§ 10 (1) DSchG RLP) or not. The buffer zones will be registered as so-called "Verdachtsflächen" (suspected areas). This ensures that they are taken into account early on in the planning process.

Netherlands

Most of the buffer zones are protected through spatial planning, by a research obligation: research has to be undertaken before a permit is granted by the municipality. This is one of the outcomes of the Valetta convention, that archaeological research is taken into consideration in building activities. The decision whether or not to grant a permit is taken after targeted desktop and/or field research.
In most municipalities there is an exemption for small-scale building activities. The general rule is that activities of less than 100 m^2 / less than 30 cm deep do not require a permit. However, municipalities can change these rules based on archaeological research. For instance at Valkenburg the dispensation surface area around the site of the Valkenburg-Centrum fort is 0 m^2 (zero).
Additionally, municipalities can require a permit for groundwork ('aanlegvergunning'). With regards to such a groundwork permit the exemptions for smaller building activities where no permit is needed do not apply. Thus, an initiator of a building activity that does not need a building permit can still be obliged to apply for a groundwork permit if it involves disturbing the soil in a way that could harm archaeological values.
If a building activity takes place without prior research (or the desk research has indicated that there no remains were expected) and archaeological values are discovered during the work, the Minister must be informed immediately (par. 5.4, art. 5.11 of the Heritage Act). The Minister has to decide how to proceed.

Intervention from higher governments

Finally, the Living Environment Quality Decree (Besluit kwaliteit leefomgeving (Bkl)) contains an extra safety measure. Article 5.131 Bkl instructs the municipalities to take the Outstanding Universal Value of World Heritage into account when deciding on a spatial plan. This not only applies to the World Heritage site itself; but can also cover activities carried out in its surroundings that affect the OUV. Article 14.9 Living Environment Activities Decree (Besluit activiteiten leefomgeving (Bal)) is a catch-all clause, directed at anyone carrying out an activity which is known to or can be expected to harm World Heritage, instructing them to take all necessary precautions, within reason, to prevent damage to or destruction of the Outstanding Universal Value. This regulation is not bound to a specific area, but is a general rule applying everywhere in the Netherlands.

For 'the inclusion of areas that have been excavated, in buffer zones rather than inside the component boundaries' we refer to section 8.b, which explains that excavation in the past normally implies that nothing is left.

8 Nomination dossier, section 5.b.2.

4 Delineation of boundaries and buffer zones

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In the Interim Report a division was made between requests concerning component parts and those concerning buffer zones, but in the Clarifications provided by ICOMOS the requests were listed site by site. Here we will follow the order of the Clarifications.
Maps referring to the sites discussed in this section can be found at the back of this documentation, arranged by the number of the component part/cluster.

4.a Netherlands

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Several of the suggestions made by ICOMOS find their explanation in observations that in the maps presented in the Nomination dossier parts of civil settlements or cemeteries extend beyond the proposed boundaries of component parts and buffer zones, or that excavated areas with potential valuable remains were excluded from these proposed areas.
Concerning the former, it must be underlined that maps of archaeological features are often no more than approximations of the past reality, based on incomplete and imperfect information. This is particularly true of civil settlements and cemeteries. Unlike military fortifications, civil settlements have no standardised layout, which makes their extent much more 'unpredictable'. Cemeteries often consist of spatially separated clusters of graves located in a wide area, and it is usually impossible to attest their extent without large-scale (destructive) excavation.
In some cases, excavated areas may still include valuable remains, as is further explained in section 8.b. The Nomination dossier reports some examples, and others were mentioned during the technical evaluation mission. However, well-attested cases are rather exceptional, and limited to areas excavated before the 1970s. The actual presence, the precise location and the quality of such remains are often uncertain. Consequently, it is only rarely possible to protect such areas under the Heritage Act.

The feasibility of extensions of component parts and buffer zones as proposed below depends on the outcomes of legal procedures and support by municipalities and owners. The proposed adaptations have been principally agreed upon by the aldermen responsible for archaeological heritage and/or spatial planning, but their realisation depends on formal decisions which need more time than now available. Especially when protection under the Heritage Act is required, legal procedures may lead to different outcomes.

1 Valkenburg-Centrum

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Within the area delineated by the outmost ditch of the fort, there is only one area, of just under 500 m², where protection under the Heritage Act may be feasible. It is our intention to designate this area as an archaeological monument as soon as the required procedures allow.
The remainder of the fort area, outside the nominated component parts, cannot be protected under the Heritage Act, either because the relevant areas are largely or entirely built over (fig. 7), or because potential surviving remains cannot be adequately attested. However, the regulations of the planning system in the area of the fort are very strict, not allowing any intervention deeper than 30-80 cm (depending on the known disturbance of the top soil) without a permit. In our view, this would provide an effective instrument to protect the remains in the areas which cannot be protected under the Heritage Act. Extension of the property area under the protection of the planning system would not include the north-eastern corner of the fort (from the Hoofdstraat to the east), which is known to have been entirely destroyed by post-Roman river erosion.
To the east of the fort, the buffer zone will be extended to the edge of the modern Rhine, to include the connection of the fort to the (modern) river. This is an outcome of the review of sites with a connection to the Rhine (cf. section 2.b).

5 Leiden-Roomburg

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To the south of component 5b, trial trenches have not produced any Roman structures, but only a scatter of Roman finds. To the east of 5b, the boundary of the civil settlement is no more than an educated guess, in the absence of excavations and other sources of information. Therefore, there is insufficient evidence for the presence of Roman structures, and thus to extend the property area in these directions. The delineation of a buffer zone on these sides would provide an adequate protection to any remains present here.
Although the excavations to the west of components 5a-b cover most of the areas where prior trial trenches had indicated the presence of Roman remains, some may still be present outside the excavated parts. A buffer zone will be defined to protect such remains.
The extension of the buffer zone of component parts 5a-b will also include the filling of some gaps in and between the two components, which were excluded from the archaeological monument when it was designated in 1978.

8 Utrecht-Hoge Woerd

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Fig. 7 Valkenburg-Centrum. Dense overbuilding of unexcavated parts of the defensive ditches to the west (A) and south (B).

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In line with the advice by ICOMOS, the property area at Hoge Woerd will be extended as indicated in the map. In this way nearly all unexcavated parts of the extra-mural area will be included in the property area. Extending the property area in this way implies the inclusion of several housing plots. Some of these plots were designated as parts of the archaeological monument in 1969. On these legally protected plots housing development will take place in the near future, in line with a long-standing administrative commitment. This development is submitted to strict conditions, protecting the buried archaeology (cf. section 10).
Because of the current interpretation of the Heritage Act, the remaining plots will be protected by the planning system. These plots have been developed and built upon in the past. New developments are not expected here. Within the framework of an individual management plan for the site the current protective regime for these plots will be evaluated. The municipality will adapt its policy per January 2022, demanding a permit for interventions exceeding a surface area of 0 m^2 (zero) and a depth of 30 cm.

14 Nijmegen-Valkhof area

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The boundary of the Valkhofpark component ▶14a encompasses a plateau shaped by the river Waal on the north side and by human activities on all other sides (fig. 8, A). The construction of the Voerweg on the south and east, and of the pedestrian access to the Waal on the west has caused large-scale destruction. The Lindenberg arts centre, built c. 1970, has caused further destruction on the latter side (fig. 8, B). For these reasons it is not feasible to extend the archaeological monument, to improve the relationship between the component and the Late Roman fort.
The delineation of the buffer zone has been reviewed. The extent of the core of the town of *Oppidum Batavorum* as projected in the map in the Nomination dossier is an approximation of the past reality. Excavations to the west of the buffer zone (Grotestraat and beyond) have not produced evidence of the continuation of the settlement in this direction. Evidence for the presence of Roman remains south of the buffer zone is thin, but

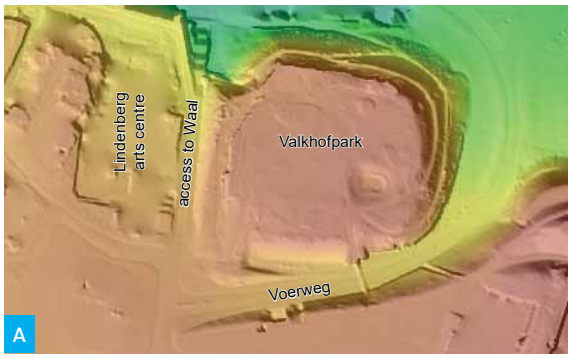

Fig. 8 Nijmegen, Valkhofpark.
A: Digital elevation model showing the loss of archaeological substance around the park.
B: pedestrian access to the Waal, with the Valkhofpark to the right and the Lindenberg arts centre to the left.

the buffer zone will be extended here.
To the southeast of the buffer zone there is more substantial evidence for remains of the early town, extending in the direction of Nijmegen-Hunerberg ▶15. Since there is reason to extend the buffer zone of the latter component to the west (cf. below), it is proposed to connect these buffer zones, thus effectively creating a very large buffer zone surrounding the component parts/clusters Nijmegen-Valkhof area ▶14, Nijmegen-Hunerberg ▶15 and Nijmegen-Kops Plateau ▶16, connected to that of Berg en Dal-aqueduct ▶17.
The area immediately east of the Hunnerpark component ▶14b has been excluded from this buffer zone. This is the area of the Keizer Trajanusplein, a major road crossing dug into the former plateau to create accesses to a bridge over the river Waal and to the river plain at the foot of the Hunerberg. The depth of the disturbance (3-4 m) is such that no Roman features have survived here.

15 Nijmegen-Hunerberg

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In line with the advice by ICOMOS, the component part will be extended to include the full extent of the early operational base. As most of the earlier proposed property area, the added area will be protected by the spatial planning system.
The suggestions concerning the buffer zone have been carefully considered. The buffer zone will be extended in three directions: to the west, to cover the western part and periphery of the extra-mural settlement, connecting with the buffer zone of Nijmegen-Valkhof area ▶14; to the south, to cover the southern part of the extra-mural settlement and (clusters of) burials in this area; to the east, to protect any surviving remains between and outside excavated areas. The eastern boundary of the latter part is constituted by a deep sand quarry which has destroyed any Roman features that may have been situated here. To the east of that

quarry, another extension of the buffer zone has been defined, but that has for practical reasons been assigned to the Kops Plateau cluster ▶16.

16 Nijmegen-Kops Plateau

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Additional information by ICOMOS has made clear to which areas the above remarks refer. Following these suggestions the buffer zone will be slightly extended to the northwest and to the east, to include a small part with potential remains of the extra-mural settlement of Nijmegen-Hunerberg ▶15 (northwest) and to include the whole topographic unit in the east. In both cases the natural elevation of the site has been used to define the boundary.
Additionally, the buffer zone will be somewhat extended to the southwest, to include further potential remains of the extra-mural settlement of Nijmegen-Hunerberg▶15. The western boundary of this extension is constituted by a deep sand quarry (cf. above).

18 Berg en Dal-De Holdeurn

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Following the suggestion by ICOMOS, the buffer zone will be extended to the west, to include the whole of the natural valley that constituted the setting of the kilns and buildings.

4.b Germany

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24 Kalkar-Bornsches Feld

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The buffer zone of Kalkar-Bornsches Feld will be extended c. 600 m to the north and encompass the silted-up Roman Rhine course and parts of its former right bank to protect the topographic setting and views from the north over the site.

39 Köln-Alteburg

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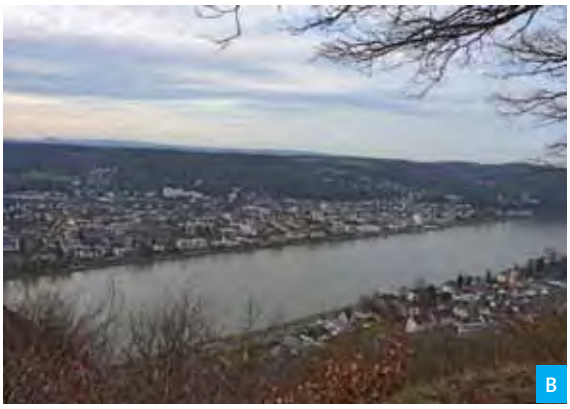

Fig. 9 View to the city of Remagen.
A: Visual relationship between the Erpeler Ley and the city of Remagen.
B: View from the Erpeler Ley to Remagen.

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It is planned by the Römisch-Germanische Museum of the city of Köln as the responsible heritage agency to create a damage register for the interior of the fleet base to get a better understanding of potentially preserved remains not yet included in the component part. This register will serve as a basis for a future extension of the property area inside the fleet base to include as much of the area of the fleet base as possible. It is intended to realise the evaluation and designation in the first management period (2021-2027). The extension will be proposed as a minor boundary modification.

44 Remagen

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In accordance with the principles specified in the Nomination dossier and taking into account the proposals of ICOMOS, the component part will be extended by about 900 m to the east and southeast. It then includes, in addition to the auxiliary fort, the civilian settlement, the extent of which – bounded by the Rhine and cemeteries – is largely known, as well as a section of the Roman road between Bonn and Koblenz. The entire extended component part is a designated excavation protection area under § 22 DSchG RLP.

The buffer zone includes the cemeteries, the extent and preservation of which are still unknown, as well as the remains of possible quay structures. In order to even better protect the view and setting of the unique geographic location on the Lower German Limes, the buffer zone will be extended on the north to the edge of the Rhine and by a small area at the Apollinaris Church.

On the right bank of the Rhine and 136 m above the Rhine lies the Erpeler Ley. From here, there is an extensive and unobstructed view to the city of Remagen and the Middle Rhine Valley (fig. 9). It is a designated excavation protection area according to § 22 DSchG RLP as well as a designated nature reserve according to § 23 para. 1 BNatSchG (Federal Nature Conservation Act). It also includes a viewing plateau, which is a component of the well-known Rheinsteig hiking trail and will certainly play a role in the presentation of the site in the future.

4.c Legal protection of 'cut-out' areas

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14a Nijmegen-Valkhof

1. The nominated area has been designated in 1991 as a national archaeological monument. Under the current Heritage Act the Minister is responsible for the permission procedure (permits) concerning national archaeological monuments. Under the new Environment and Planning Act the permit process is placed under the authority of the municipalities, but the Minister holds an advisory role with the right of consent when granting a permit; a municipality cannot deviate from this advice.
2. The nominated area has also been designated as national built monument, in 1973. The main focus of this protection is on the park and the built elements. This built monument does include the cut-out parts of the nominated component. Changes to the monument are not allowed without a permit. The municipality is responsible for the permission procedure (permits) of built monuments, but the Minister has the right to advice. When the national interest is hampered, the Crown can overrule a decision by the municipality.
3. The entire Valkhof area component part ▶14a-b is part of the much larger legally protected 'Town and village scenery' site "Nijmegen" (designated 1980). The protection is focused on the scenery and layout, and encompasses the lower historic city, including the Valkhofpark ▶14a, the Hunnerpark ▶14b, the riverside and part of the river Waal (fig. 10). The protective regulations are part of the planning system of the municipality. The municipality is responsible for the permission procedure by their planning system. The Crown can overrule a decision by the municipality if the national interest is hampered.

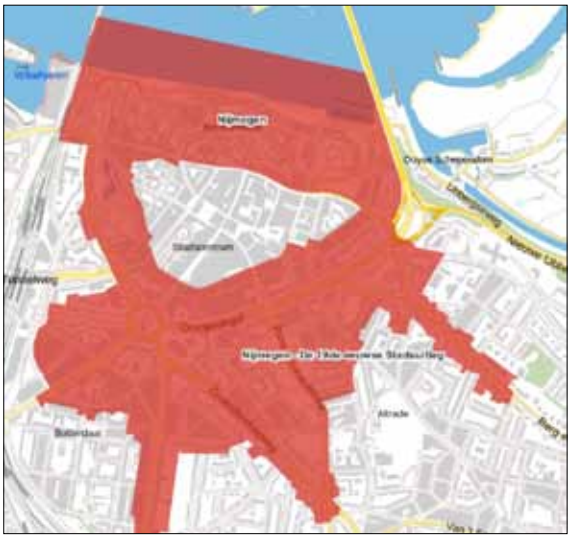

Fig. 10 The legally protected 'Town and village scenery' sites "Nijmegen" and "Nijmegen-De 19de-eeuwse Stadsuitleg" in the centre of Nijmegen, incorporating the Valkhof area component parts.

To the south of the component part, and connecting with the above mentioned 'Town- and village scenery' on two sides, is another large protected 'Town- and village scenery' site, "Nijmegen-De 19de-eeuwse Stadsuitleg" (designated 1991). The protection is focused on the 19th-century layout and scenery.
Please note that protections 2 and 3 where not mentioned in the Nomination dossier, since they are not focused on the archaeology.

17 Berg en Dal-aqueduct

The 'cut-out' area will be added to the buffer zone. This part of the buffer zone aims to protect (potential) views over the earthworks of the aqueduct. The use of the area as a cemetery will not affect such views.

18b Berg en Dal-De Holdeurn | South

The cut-out part in this component represents a farmhouse designated as a municipal built monument (designated 1991). As in case of national built monuments, a permit is needed for changes to the monument. In case of a municipal built monument, the regulations, licensing etc. are the responsibility of the municipality. Both designation and permits of municipal monuments are regulated under the Heritage Act. Changes to the monument are not allowed without a permit. The municipality is responsible for the permission procedure (permits).

5 Vertical buffer zones

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In the Nomination dossier it was proposed that later developments overlying the remains of the Lower German Limes as well as reconstructions and visualisations should be excluded from the nominated property and treated as vertical buffer zones.[9] This proposal was based on the advice of ICOMOS regarding the nomination of the Upper German Raetian Limes (Ref: 430bis), which stated: "ICOMOS considers that those parts of the Limes that have been reconstructed since 1965, together with development over and above Roman remains, should be excluded from the nomination and treated as a buffer zone".[10] The term '*vertical* buffer zone' was introduced in the nomination of the Antonine Wall (Ref: 430ter), in the same context.[11]

Reconstructions and visualisations are nearly always physically separated from the underground remains, by protective layers or construction materials applied prior to their erection. Both the modern constructions themselves and the applied layers of soil or construction materials thus provide extra physical protection to the buried remains. This character of additional protection agrees very well with the purpose of a buffer zone: "to give an added layer of protection to the property" (OG par. 104).

Being modern constructions, post-Roman buildings, reconstructions and visualisations do not meet the requirements of authenticity. This provides an additional argument to separate these constructions from the property area and to treat them as parts of the buffer zone. An overview of the component parts/clusters with post-Roman buildings, reconstructions and visualisations is presented in table 2. Modern buildings occur in nearly all component parts/clusters, but substantial aboveground reconstructions and visualisations only occur at seven sites.

Considering post-Roman buildings, reconstructions and visualisations as parts of the buffer zone does not affect the protection of the underground remains. Since these non-Roman constructions are located within the (horizontal) boundaries of the component parts, any intended intervention requires a permit, and will thus be signalled to the monument authorities, warranting the timely identification of potential threats to the monument.

To sum up, it may be stated that treating post-Roman buildings, reconstructions and visualisations as parts of the buffer zone is in line with their non-authentic character. They provide extra physical protection to underground remains, while not affecting the protection of the latter in any way.

The vertical buffer zones do not require a separate protective regime, since any planned intervention will be assessed in the context of the heritage laws, as explained above. For those sites with substantial aboveground visualisations the individual site management plans will outline what can and cannot be done within the protective framework.

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9 Nomination dossier, Part I, pp. 93, 118, 132, 144 and 172.

10 Quoted from the nomination dossier for the Upper German-Raetian Limes p. 454 (http://whc.unesco.org/uploads/nominations/430ter.pdf). Cf. p. 455, Recommendation 3, which was adopted by the World Heritage Committee (WHC Decision 29 COM 8B.46).

11 "The archaeological remains themselves also are protected by the vertical buffer zone provided by the overlying medieval and modern buildings and their associated features" (p. 714 of the nomination dossier [http://whc.unesco.org/uploads/nominations/430ter.pdf]; cf. p. 701). In this sense it was also used in the nomination dossier for Frontiers of the Roman Empire – The Danube Limes (Western Segment) (Ref: 1608, Volume I, pp. 16, 237 and 390-391).

id	site	post-Roman buildings	reconstruction / visualisation	explanation
1	Valkenburg-Centrum	●	○	The components are partly built over. Visualisation is limited to markings in the pavement.
2	Valkenburg-De Woerd	●		The components are partly built over. There are no visualisations.
3	Voorburg-Arentsburg	○	○	Minor parts of the component are built over. Visualisations are limited to markings in the pavement.
4	Corbulo's canal	○		Minimal parts of the components are built over. In the Vlietvoorde component (4d) overbuilding will be limited to the buffer zone. There are no visualisations.
5	Leiden-Roomburg	○	●	Minor parts of the components are built over. There is a substantial aboveground visualisation, representing the defences of the Roman fort.
6	Woerden-Centrum	●	○	The componentis largely built over. Visualisation is limited to markings in the pavement.
7	Utrecht-Limes road	○	○	A minimal part of component 7c is built over. Visualisation is limited to markings in the pavement and a steel platform on the surface.
8	Utrecht-Hoge Woerd	○	●	A minor part of component 8b is built over. There is a substantial aboveground visualisation, representing the defences of the Roman fort, including a multi-purpose building extending into the fort interior.
9	Utrecht-Groot Zandveld		○	There are no buildings within the component. Visualisation is limited to a steel platform on the surface.
10	Utrecht-Domplein	●	○	The component is largely built over. Visualisation is limited to markings in the pavement.
11	Bunnik-Vechten	●	●	The components are partly built over. There is a substantial aboveground visualisation, representing the defences of the Roman fort.
12	Arnhem-Meinerswijk		●	There are no buildings within the component. There is a substantial aboveground visualisation, representing the headquarters building and parts of the defences of the Roman fort.
13	Elst-Grote Kerk	●	○	The component is partly built over. Visualisation is limited to low walls on the surface.
14	Nijmegen-Valkhof area	●	○	Minimal parts of component 14a and part of component 14b are built over. Visualisation is limited to markings in the pavement.
15	Nijmegen-Hunerberg	●	○	The component is partly built over. Visualisation is limited to markings in the pavement and low walls on the surface.
16	Nijmegen-Kops Plateau			
17	Berg en Dal-aqueduct			
18	Berg en Dal-De Holdeurn	○		Minor parts of component 18b are built over. There are no visualisations.
19	Herwen-De Bijland			
20	Kleve-Keeken			
21	Kleve-Reichswald			
22	Till	○		A minimal part of component 22 is built over. There are no visualisations.
23	Kalkar-Kalkarberg			
24	Kalkar-Bornsches Feld	○		A minimal part of component 24 is built over. There are no visualisations.
25	Uedem-Hochwald			
26	Wesel-Flüren			
27	Xanten-CUT	●	●	The component is partly built over. There is a substantial aboveground visualisation, representing interior buildings (amphitheatre, mansio) and the defences of the Roman city. The aboveground visualisations of the harbor temple, bath house, and workshop houses are constructed as protective buildings.
28	Xanten-Fürstenberg	○		A minimal part of the component is built over. There are no visualisations.
29	Alpen-Drüpt	○		A minimal part of the component is built over. There are no visualisations.

Table 2 Overview of post-Roman buildings, reconstructions and visualisations.
Legend:
● large-scale overbuilding / substantial reconstructions and visualisations.
○ minor overbuilding / reconstructions and visualisations at the surface.

id	site	post-Roman buildings	reconstruction / visualisation	explanation
30	Moers-Asberg	●		The component is largely built over. There are no visualisations.
31	Duisburg-Werthausen	●	○	The component is partly built over. Visualisation is limited to markings in the road surface.
32	Krefeld-Gellep	○		A minimal part of the component is built over. There are no visualisations.
33	Neuss-Koenenlager	●		The component is largely built over. There are no visualisations.
34	Neuss-Reckberg	○	●	A minimal part of the component is built over. An architectural representation of the Roman watchtower was erected ex situ.
35	Monheim-Haus Bürgel	●	○	The component is largely built over by a medieval castle and a 19th century country estate, both following and marking the Late Roman defensive wall. Visualisation is limited to the marking in the pavement of the eroded SW tower.
36	Dormagen	●	○	The component is largely built over. Visualisation is limited to markings in the pavement.
37	Köln-Praetorium	●		The component is largely built over. There are no visualisations at the surface.
38	Köln-Deutz	●	○	The component is largely built over. Visualisation is limited to markings in the pavement and a low wall on the surface.
39	Köln-Alteburg	●		The component is largely built over. There are no visualisations.
40	Kottenforst-Nord			
41	Bonn	●	○	The component is largely built over. Visualisation is limited to markings in the pavement.
42	Kottenforst-Süd			
43	Iversheim	○	●	The component is covered by a protective building. Outside the protective building there is a visualisation of a lime kiln on top of the remains in situ.
44	Remagen	●		The component is largely built over. There are no visualisations.

6 Threats

6.a Revised information on threats

this text was obliterated since provisional advices by ICOMOS are not public

Apologies are due for the confusion created by errors in the captions of tables 4.2 and 4.3 in the Nomination dossier. The correct captions of these tables are:

Table 4.2 Overview of the integrity of *Frontiers of the Roman Empire – The Lower German Limes*, for individual component parts (upper part) and clustered component parts (lower part).
Legend: ●●● very good (wholeness, intactness) | moderate (threats). ●●○ good/very good (intactness only). ●● good (wholeness, intactness) | minor (threats). ● fair (wholeness, intactness) | minimal (threats).

Table 4.3 Overview of the integrity of the individual component parts/ clusters of *Frontiers of the Roman Empire – The Lower German Limes*, for individual component parts (upper part) and clustered component parts (lower part).
Legend: ●●● very good (wholeness, intactness) | moderate (threats). ●●○ good/very good (intactness only). ●● good (wholeness, intactness) | minor (threats). ● fair (wholeness, intactness) | minimal (threats).

These corrected ratings of the threats are in line with their definitions in table 4.1. The ratings in the columns 'exposure to threats' of tables 4.2 and 4.3 are correct.
The descriptive text concerning the exposure to threats[12] should be changed to read as follows:

"The current exposure to threats is minimal for 59% of the 44 component parts/clusters (79% of the 106 individual component parts), and minor for another 39% of the 44 component parts/clusters (19% of the 106 individual component parts)."
This also applies to the (identical) text in section 3.1.c (statement of integrity).[13]

6.b Waterlogged conditions

this text was obliterated since provisional advices by ICOMOS are not public

Although the waterlogged conditions have not been mentioned explicitly in the site catalogue, the recorded preservation of timber, seeds, leather etc. points implicitly to the importance of the waterlogged conditions. In the Netherlands, these conditions are controlled by the regional water boards, as part of their general responsibility for the quality and levels of groundwater and surface water. Additionally, the waterlogged conditions are monitored by the Cultural Heritage Agency, as part of a national monitoring programme to collect, in a consistent and repeatable way, basic information of all listed archaeological monuments. Part of this monitoring scheme is a coring programme with – amongst other things – the aim to document the preservation conditions of the soil. One of the elements is the monitoring of the groundwater table. The first cycle of this programme is underway and will be finished by the end of 2021. From then on monitoring of the same indicators in a 6-year cycle is planned.
In Germany a monitoring of groundwater levels in the area of the relevant component parts and buffer

[12] Nomination dossier, Part I, p. 135.

[13] Nomination dossier, Part I, p. 116.

zones will be ensured by the archaeological heritage agencies. At the moment, only at Xanten-CUT ▶27 a timber structure (harbour quay) is known to be preserved *in situ* and under a regular monitoring by the heritage department of the LVR-Archaeological Park Xanten.

Both in the Netherlands and in Germany the maintenance of waterlogged conditions will be included in the individual management plans of the sites where such conditions occur. The individual site management plans will include strategies to cope with incidents. Management responses to a threat involving the waterlogged conditions depend on the character and scale of the problem. Many problems can be solved by local water management measures, and can be handled at the local level (component part). Problems where more component parts are involved, may need involvement of the water boards (Netherlands), to discuss solutions.

The Dutch government has a grant scheme for preservation of listed monuments. In Germany the governments of North Rhine-Westphalia and Rhineland-Palatinate provide grant schemes for preservation of listed monuments.

7 Management system

7.a Individual site management plans

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For the preparation of the individual site management plans (IMPs) it is important to work in close collaboration with local stakeholders and at the same time within a joint international framework. The schedule in table 3 aims at working towards locally supported IMPs.
By first developing a common approach for an overall structure and overall themes (that should correspond with the factors affecting the property identified in the Nomination dossier) a strong link with the overall Management plan (MP) can be made. However, it is essential not only to develop IMPs, but also to monitor these together with the local stakeholders. By sharing these annual monitoring reports in the international management group, all partners will have insight into the overall state of conservation of the Lower German Limes. Partners have expressed the wish to do a mid-term review of the MP in 2023 (section 1.3 of the MP). Through this review, an assessment can be made if the chosen approach is effective.
At this moment the management of the sites is arranged through a a large variety of plans. A draft outline for an IMP has been included in Appendix 1.

7.b Development of the management system

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Research

Partly as a result of the preparation of the nomination, various research initiatives have been funded during the last years. For instance in the Netherlands a large research programme 'Constructing the Limes' of Utrecht University and Radboud University Nijmegen received a national funding of over 4 mln Euros. The Nederlandse Limes Samenwerking (the Dutch management organisation) is a partner in this programme. To be effective, it is necessary to integrate these existing initiatives in the national strategy.

September 2021	October 2021	October 2021 – March 2022	March 2022	September / October each year
Overview of all relevant indicators for each of the properties and stakeholder assessment.	Presentation of the outlines of the IMP at annual Limes meeting.	Drafting the IMPs together with local stakeholders.	Agreement on IMPs with local stakeholders.	Annual meetings with local stakeholders to monitor the indicators and present outcomes of these meetings in an annual report.

Table 3 Development of individual management plans.

June-December 2021	December 2021	January – March 2022	March 2022 – December 2023	December 2023
Identify research themes/questions at the level of the Lower German Limes. Make an inventory of existing research programmes and how they can contribute to these questions.	Presentation and discussion with relevant stakeholders to identify research gaps.	Identify which additional projects should be started, using which resources.	Implementation and annual meeting on progress.	Evaluation.

Table 4 Development of an international research strategy.

Although national research strategies are important instruments, it is essential that these are linked by an international research strategy for the Lower German Limes as a whole. This overarching strategy will provide a framework for the national strategies, and at the same time receive input from these. The overarching strategy will be developed in the course of 2021-2023 (table 4).

Interpretation Framework

An interpretation framework was developed in the Netherlands in 2016/17, in coordination with the partners from North Rhine-Westphalia, Rhineland-Palatinate and the Upper German-Raetian Limes, and with involvement of the former director of the management organisation of Hadrian's Wall. Pilots took place in 2018 and 2019 to see how the interpretation framework can be implemented and what works and what does not.
In Germany an interpretation framework is yet to be developed, in close coordination with the Dutch partners and the Deutsche Limeskommission. Possible outlines for such a framework have been laid down in the "Fundplatzkatalog NRW" (Site Gazetteer North Rhine-Westphalia) for each of the proposed properties and in the "Masterplan Bonn" for the proposed site of Bonn ▶41 in particular.
It is the aim of all partners to develop a joint interpretation framework for the Lower German Limes, that not only pays attention to the storylines, but also to the on-site and off-site presentations. Because it is essential that this document is supported by all heritage institutions and local stakeholders, it is decided to take the time for this process. A rough timeline is sketched in table 5.

Sustainable tourism

Until now, tourism pressure is not a concern for the Lower German Limes. At multiple sites there are opportunities to work more closely with local tourism associations and businesses nearby and help to increase the quality of the visitor experience and gain from tourism opportunities. To identify these opportunities, two desk studies have been carried out to get a better view on possible national and international target groups with an interest in heritage, and how they can be reached.
In order to get a better grip on this an analysis will be made for each site, within the framework of the IMPs, of the practical aspects related to tourism (such as on-line and off-line accessibility, on-site communication in multiple languages, etc.) and of opportunities for developing new products for the site and for cooperation with other partners, using the outcomes of the desk studies. Furthermore, multiple pilot projects on supporting sustainable tourism are funded.
Based on the outcomes of the pilots and the individual management plans we will organise an expert meeting in 2023 on tourism along the Lower German Limes. The outcomes will be integrated in a strategy for promoting sustainable tourism.
In the Rhineland, sustainable tourism is primarily understood as inclusive tourism. As regards this, the LVR-Archaeological Park Xanten serves as a benchmark for future developments, here. It has been evaluated and certified by the German Seminar for Tourism in view of its accessibility for those with special requirements.

7.c Heritage Impact Assessment (DE)

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According to the Spatial Planning Law of the Federal State of Germany and the Monuments Protection Acts of the individual federal states, matters pertaining to World Heritage must be considered in planning

	2021				2022				2023				2024	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Define project team and subgroups			■											
Agreement of structure and scope				■										
Identify main IF themes				■										
Discuss the themes with the local/ regional partners					■									
Writing and editing						■								
Presenting the new IF (International Limes congress)							■							
Implementation of the new IF							■		■	■	■	■	■	■

Table 5 Development of an international interpretation framework.

governed by public law. Furthermore, the spatial development plans of the federal states and the regions assign a special level of protection to World Heritage sites.
If any cultural monument, including World Heritage sites, is affected by measures, a permit by the competent monuments protection authority in coordination with the State Conservation Office is required. In this context, a comprehensive review of the measures with regards to monuments preservation is conducted.
Beyond that, in Germany, potential impacts and consequences of development projects on cultural heritage sites in general and on World Heritage sites in particular are examined, documented and carefully assessed in the course of the public law planning or approval procedures, which must be executed for each project.
The ICOMOS Guidance on Heritage Impact Assessments for Cultural World Heritage Properties provides an important approach for such assessments. In order to avoid conflicts, the Standing Conference of the Ministers of Education and Cultural Affairs has also recommended the implementation of HIAs for planning processes. Currently, considerations regarding impacts on World Heritage sites are part of environmental impact assessments, environmental reports or case-by-case assessments, depending on the procedure.
These examinations are reviewed by the authority responsible for the World Heritage site, in coordination with the other specialist authorities involved.
If the submitted examinations are insufficient for an assessment or if the evaluation does not seem to be conclusive with regards to the World Heritage site, rectifications are demanded and/or additional expert opinions will be commissioned.
However, in any case, the authority responsible for the site will perform its own impact assessment for the World Heritage site based on the available documentation.
A comprehensive HIA is usually commissioned if the extent of a measure or the potential negative consequences originating from a measure require it or if the documents submitted in the course of the examinations do not allow for a sound evaluation. For example, HIAs have been conducted with regards to a railway crossing without intersecting traffic in the World Heritage site Upper Middle Rhine Valley, with regards to planned wind turbines in the vicinity of the Abbey of Corvey, as well as a traffic project in the vicinity of the Castles of Augustusburg and Falkenlust at Brühl. Another HIA is intended to be commissioned for a bypass road in the Middle Rhine Valley.

7.d Further aspects of management

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Site manager

In the Netherlands, the Province of Utrecht is appointed as site manager.
In North Rhine-Westphalia the municipalities asked – in consultation with the Ministry of Regional Identity, Communities and Local Government, Building and Gender Equality of the Land of North Rhine-Westphalia – the LVR to continue its work as the site manager.
In Rhineland-Palatinate the Limes coordinator for the Upper German-Raetian Limes will be responsible for Remagen as component part of the Lower German Limes as well and will take over the function of the site manager.

Specific roles in the management organisation

The international LGL Management Group is responsible for the implementation of the Management plan.

Netherlands

The LGL-NL Management Group, the LGL-NL Programme team and Programme team + are all administrative consultation bodies composed of representatives of the relevant administrative organisations. They are platforms for discussions, responsible for preparing official decision-making, and also important for implementing the work of the different working groups in their organisations and communities.
The LGL-NL Steering Group is composed of the three provincial executives responsible for Cultural Heritage and of the Cultural Heritage Agency (as a representative of the Minister of Education, Culture and Science). The Steering Group decides on strategic matters and agrees on the annual working budget. The Steering Group will be starting as of March 2021, supplemented by administrative officials of three municipalities.
The LGL-NL Coordination point is a small project team responsible for preparing the overall implementation of the Management plan and ensuring that the programme teams and working groups can be effective in implementing the Management plan.

Germany

For the cooperation and coordination at the municipal level the LGL-DE Steering Group is currently being established. The municipalities and districts within the nominated World Heritage site, the LVR, the regional government and the Ministry of Regional Identity, Communities and Local Government, Building and Gender Equality of the federal state of North Rhine-Westphalia are part of this. In addition, representatives from Rhineland-Palatinate take part in the meetings. The LGL-DE Steering Group will support the site manager and offer a platform to discuss all relevant issues and projects, such as the implementation of the Management plan or the further development of the individual sites and the German part of the Lower German Limes in its entirety.
North Rhine-Westphalia and Rhineland-Palatinate provide responsible representatives of the German part of the LGL to the "Deutsche Limes Kommission" (DLK), the steering group of the Upper German-Raetian Limes and of future extensions to the transnational World Heritage framework 'Frontiers of the Roman Empire' in Germany.

Working groups

The working groups on protection and public awareness are formed on a national basis. For the working group **protection** the reason is that a lot of the discussions concern local stakeholders that prefer to discuss matters in their mother tongue, and that a lot of the discussions relate to specific national protection instruments. The outcomes and progress of these discussions will be discussed in the LGL Management Group and if needed in the LGL-IGC.
Also the working group **public awareness** acts primarily on a national basis, with the aim to support and facilitate local communities and to develop communication and education materials at a national level. This does not mean, however, that there is no international cooperation or knowledge exchange. In the field of logos and signage a joint framework is under development. Additionally we aim to develop common projects such as joint publications and interlinked websites that have a similar look and feel. Finally, we support knowledge exchange between both countries by actively facilitating international knowledge exchange on presentations and community involvement.
In the field of **presentation** and **knowledge**, a more international approach is chosen. Already during the development of the interpretation framework meetings were held with experts from the United Kingdom and the Upper German-Raetian Limes. For the coming years international standards will be developed for presentations (a.o. the upgrade and integration of the existing interpretation frameworks). However, the way of implementation of these standards can differ in both countries, due to cultural differences. While much research will be carried out at the national level, the working group knowledge will act on the international level as well, particularly for the development of a joint research strategy, for research into preservation and monitoring, and to enhance the exchange and synthesis of research results generated at the national level.
The working group on **museums** along the German part of the Lower German Limes is formed on a national basis. The aim of the working group is to support, coordinate and promote the cooperation of the numerous local stakeholders. With the help of an overarching interpretation framework, which is being developed by the LGL Management Group, visitors will be offered a varied museum landscape.
The working group will be in close contact with the already existing working group of the museums at the Upper German-Raetian Limes. Although this is a working group at national level, the existing international cooperation will be continued. Coordination between the parties involved will be taken over by the LGL Management Group. The common goal of the German and international working groups is to achieve the highest possible quality standard for the interpretation of the Lower German Limes in the museums.

8 Archaeological excavations and excavated materials

8.a Future excavations within component boundaries

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The state parties confirm that archaeological excavations within the property area will be limited to a minimum, to ensure the best preservation and conservation.
Some small-scale excavation will be required for research purposes, to control the interpretation of non-invasive methods like geomagnetic surveys. Small-scale excavation may also be needed for the management of the component parts, to assess the state of conservation and to understand degradation processes. Finally, field investigations in the form of archaeological field evaluation (for example trial trenches) are usually required as a condition for, or prior to the determination of, a planning application or as part of an Environmental Impact Assessment.

8.b Areas excavated in the past

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The consideration by ICOMOS that excluding excavated areas from components leads to a vulnerability reveals that the usual impact of an excavation in the area of the Lower German Limes was not adequately explained in the Nomination dossier. As a matter of fact, excavated areas generally no longer encompass (significant) archaeological remains.

Whereas remains of stone buildings can often be excavated without disturbing them, excavation of other sorts of remains nearly always leads to their complete loss: they cannot be investigated without destroying them. In the context of the Lower German Limes, where most remains are not of stone, excavation thus normally involves a complete destruction of the uncovered features.
There are three exceptions to this rule (cf. table 6):

1. If stone remains were preserved after being excavated, e.g. at Elst-Grote Kerk ▶13 and Köln-Praetorium ▶37.
2. If remains other than stone were purposely preserved during excavation, e.g. in recent excavation trenches in Woerden-Centrum ▶6, Utrecht-Groot Zandveld ▶9 and Dormagen ▶36.
3. If remains other than stone remained intact because the lowest excavation level was not completely investigated, as has been attested for some excavations up to the early 1970s, e.g. at Valkenburg-De Woerd ▶2, in some parts of Nijmegen-Hunerberg ▶15 and at Xanten-Fürstenberg ▶28 and Neuss-Koenenlager ▶33.

Excavated areas with known surviving remains have been included in the property area, as well as some with potential surviving remains. Excavated areas without preserved remains, and some with potential remains, have preferably been included in the buffer zone, to clarify the coherence of the complex (buffer zone principle B). Some large excavated areas in an urban setting have been excluded from the buffer zone. This applies to areas south of the fort of Valkenburg-Centrum ▶1 and in the northern part of the fleet base Köln-Alteburg ▶39.
All in all, it may be evident that there are no excavated areas outside the components which encompass significant remains of the Lower German Limes and might thus be impacted by proposals for reconstructions or other future developments. All excavated areas with known surviving remains are included in the components, and excavated areas with potential surviving remains are included in the components or in the buffer zone.

id	site	stone remains	other remains	other remains?	large areas excluded	explanation
1	Valkenburg-Centrum			C + B	•	Potential surviving remains from excavations in the 1940s and 1950s, some included in the components, some in immediately adjacent parts of the buffer zone. A large area destructively excavated in the 1980s has been excluded.
2	Valkenburg-De Woerd			C + B		Potential surviving remains from excavations in the 1970s, some included in the components, some in immediately adjacent parts of the buffer zone.
3	Voorburg-Arentsburg	C		B		Some stone remains from excavations c. 1830, mostly in the component. Potential surviving remains from excavations c. 1910, mostly in the buffer zone.
4	Corbulo's canal		C			Some recent trial trenches in the Vlietvoorde component (4d) were only superficially excavated, to attest the presence of the canal.
5	Leiden-Roomburg					Part of a large area destructively excavated in the 1990s and 2000s has been excluded.
6	Woerden-Centrum		C			In several trenches remains of the fort defences and internal structures were only superficially excavated.
7	Utrecht-Limes road					
8	Utrecht-Hoge Woerd	C				Excavated remains of the stone bathhouse are included in component 8a. Several areas destructively excavated in the 1990s and 2000s have been excluded.
9	Utrecht-Groot Zandveld		C			Timber uprights of the watchtower and some additional features were purposely preserved.
10	Utrecht-Domplein	C				Some excavated remains of the stone defenses of the fort were left intact.
11	Bunnik-Vechten		C	C		Known and potential surviving remains from excavations in the 1920s-1930s are included in component 11a. A recent trial trench in component 11b was only superficially excavated, to verify the preservation of expected features.
12	Arnhem-Meinerswijk	C				Stone remains of the headquarters building were only superficially excavated.
13	Elst-Grote Kerk	C				Substantial stone remains of the temple were left intact.
14	Nijmegen-Valkhof area					
15	Nijmegen-Hunerberg			C		Potential surviving remains from excavations in 1950s and 1960s. A large area destructively excavated in the 2000s has been excluded.
16	Nijmegen-Kops Plateau		C			Some parts of the components 16c and 16d were only superficially excavated.
17	Berg en Dal-aqueduct					
18	Berg en Dal-De Holdeurn			C		Potential surviving remains from excavations c. 1940.
19	Herwen-De Bijland					
20	Kleve-Keeken					
21	Kleve-Reichswald					
22	Till		C			Several trenches for ground-truthing in the 2010s with only partly or superficially excavated features.
23	Kalkar-Kalkarberg	C	C			Potential surviving remains from excavations in the 2000s. Stone remains of the foundation of the temple preserved *in situ* after excavation.
24	Kalkar-Bornsches Feld		C	C		Two trenches in the 1960s and in 2000 accompanying supply channels along the modern road (B57) leading trough vicus and fort. Potential surviving remains below the supply channels.

Table 6 Overview of the component parts/clusters, with indication of the presence in excavated areas of stone remains, known other remains and potential other remains, and of the exclusion of large excavated areas from the property area and buffer zone. B: in the buffer zone. C: in the component.

id	site	stone remains	other remains	other remains?	large areas excluded	explanation
25	Uedem-Hochwald					
26	Wesel-Flüren					
27	Xanten-CUT	C	C	C		Known and potential surviving remains from excavations since the 1860s onwards are included and mainly covered by protective buildings of the archaeological park.
28	Xanten-Fürstenberg	C	C	C		Known and potential surviving remains from trenches in the early 20th century which touched c. 5 ha (5%) of the two main periods of the legionary fortresses. Stone foundations were left intact and many earlier features, mainly pits for earlier periods, only superficially excavated.
29	Alpen-Drüpt		C			Two trenches for ground-truthing of defensive ditches of the two marching camps and a storage building in 2015. Many other features (postholes, pits) only superficially excavated.
30	Moers-Asberg			C + B		Potential surviving remains from excavations from the 1950s until 1980s in component 30 and in parts of the extra-mural settlement.
31	Duisburg-Werthausen	C		C		Surviving remains of stone foundations of the defensive wall and a cistern inside the fortlet from excavation trenches in 1891 and 1924.
32	Krefeld-Gellep	C		C + B		Stone remains of an interval tower of the fort and parts of the foundations of the bathhouse left *in situ* after excavations in the 1960s and 1970s.
33	Neuss-Koenenlager	C	C	C		Known and potential surviving remains from trenches in the late 1880s. Stone foundations were left intact, as well as many earlier features.
34	Neuss-Reckberg	C		C		Potential surviving remains of the stone foundations of the watchtower and the fortlet from excavations from 1885.
35	Monheim-Haus Bürgel	C	C			Known and potential surviving remains from small-scale excavations. Stone foundations of a gate and from internal structures left *in situ*.
36	Dormagen	C		C		Known surviving remains of the stone foundation of the headquarter building from a small-scale excavation in 2017. Potential surviving remains from excavations in the 1960s and 1970s.
37	Köln-Praetorium	C	C	C		Known and potential surviving remains from the large-scale excavations in the 1950s. The stone walls are preserved in situ, and many layers are still untouched.
38	Köln-Deutz	C		C		Excavated remains of the stone defenses of the fort were left intact. Potential remains of other structures
39	Köln-Alteburg	C			•	A large area destructively excavated in the 19th and early 20th century has been excluded.
40	Kottenforst-Nord					
41	Bonn	C	C	C		Known surviving and potenial stone and other remains from excavations since the early 19th century.
42	Kottenforst-Süd					
43	Iversheim	C		C + B		Excavated lime kilns of component part 43 preserved in situ under the protective building. Potential remains of other lime kilns fragmentary known from excavations in the 19th century in the buffer zone.
44	Remagen	C	C + B	C + B		Surviving remains of the stone walls and the stone foundations of the commander's residence and the headquarters building of the fort. Known and potential surviving remains known from excavations in the 20th and 21st centuries in the component and the buffer zone.

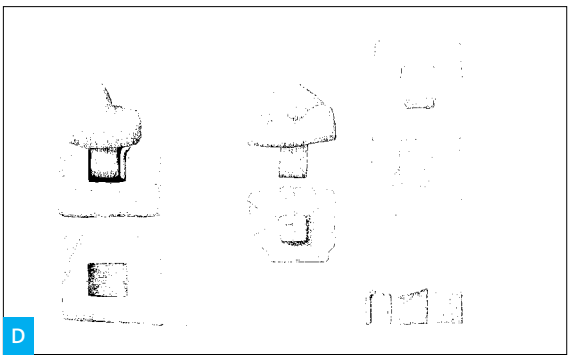

Fig. 11 Construction in timber.
A: woodworking tool with preserved wooden shaft (Utrecht-Balije).
B: registration of traces of a woodworking tool (Utrecht-Limes road).
C: wood sample prepared for tree-ring dating (Alphen a/d Rijn).
D: drawings of a preserved mortise-and-tenon construction (Alphen a/d Rijn).

8.c Documentation and curation of excavated materials

this text was obliterated since provisional advices by ICOMOS are not public

In the Nomination dossier the range and quality of archaeological materials, particularly in relation to organic remains, are frequently highlighted as contributing considerably to the OUV. In waterlogged conditions, organic remains and objects made of iron and copper alloy are usually very well preserved, thanks to the anaerobic environment created by the groundwater; otherwise, such remains are set out to decay under the influence of oxygen. The wet conditions typical of large parts of the riverine landscape of the Lower German Limes explain why this frontier section has information to offer which is much rarer or even absent elsewhere.
The organic remains and metal objects highlighted in the Nomination dossier have often been excavated without preservation *in situ*, and were thus separated from their original context. Most are now exhibited in museums or stored in depots (*ex situ*) and, as movable objects, cannot be part of the nomination. In the Nomination dossier, these excavated materials and objects are used to demonstrate the value of the unexcavated remains still present within the components (*in situ*). These components surely include many more objects of similar quality and value, contributing significantly to the OUV.
Although excavated objects cannot be part of the nomination they constitute our main *sources of knowledge* for key values such as 'Roman military construction in timber' and 'treasure-chest of frontier life'. Therefore, we will briefly explain their documentation during and curation after excavation. In doing so, we will distinguish between construction timber, ships and smaller wooden objects, plant remains, animal and human bone, leather and metal objects.

When **timber constructions** are uncovered during excavation, a wood specialist is called in to study the constructions, identify traces of woodworking tools, determine wood species, and advise on sampling for age determination (tree-ring analysis, radiocarbon dating) and preservation. Several details (esp. dimensions, wood species, traces of processing) are systematically recorded. A sample of the represented timbers is reproduced in detail by drawing or photography. Due to the dimensions of construction wood and the costs of preservation, normally only a limited sample is preserved, by a long process of impregnation and freeze-drying.

Ships are a special case, and iconic for the Lower German Limes. Their remains are normally extensively documented, by specialists. Preservation may vary from a few elements to the whole of a ship. Currently, two complete ships are permanently exhibited, in the

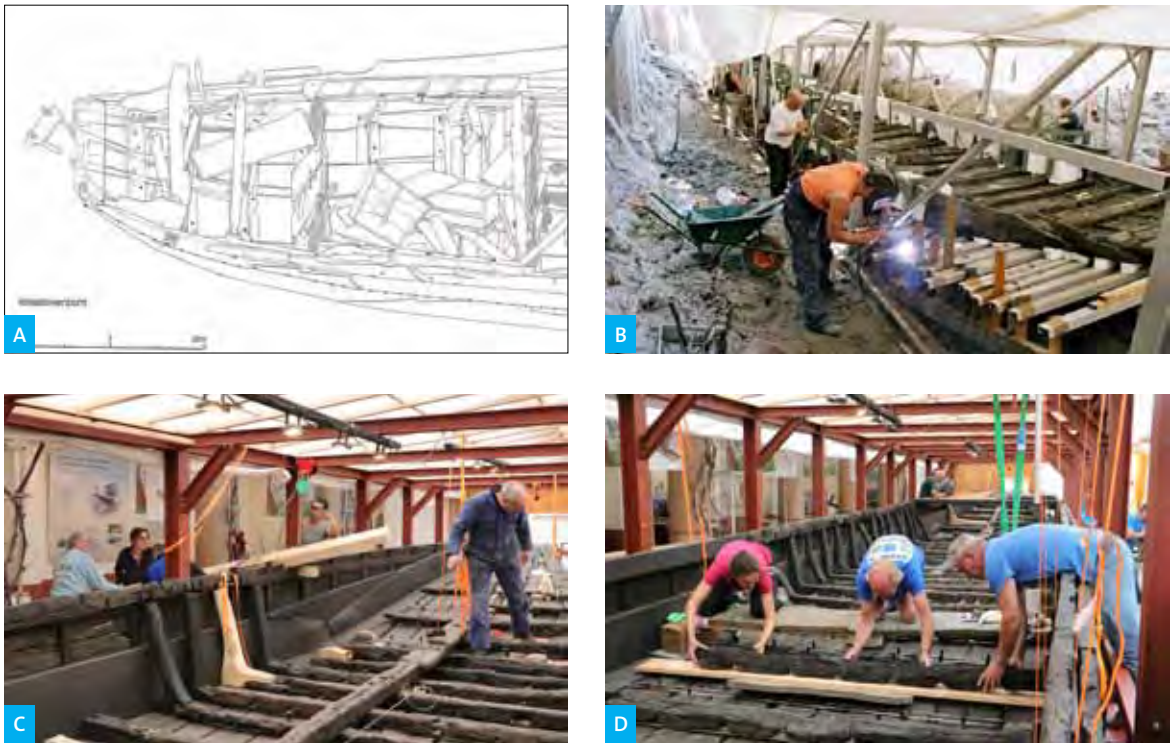

Fig. 12 Ships.
A: technical drawing of part of a ship (Utrecht-Balije).
B: preparation of the same ship for integral preservation *ex situ*.
C-D: reconstitution of a ship from Zwammerdam which was preserved as loose elements.

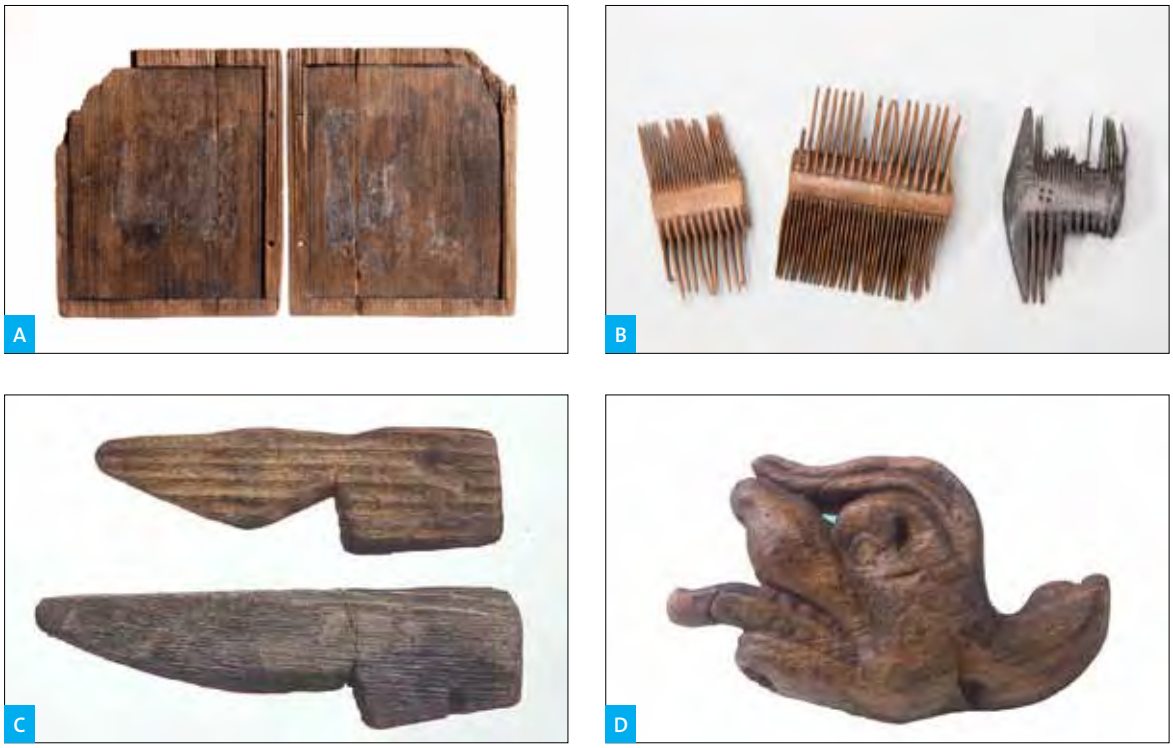

Fig. 13 Wooden objects.
A: writing tablet (Bunnik-Vechten).
B: wooden combs (Bunnik-Vechten).
C: tent pegs (Velsen).
D: decorative animal head (Voorburg-Arentsburg).

site museum at Utrecht-Hoge Woerd and the Römermuseum at Xanten.[14] Further, several complete ships excavated at Zwammerdam[15] c. 1970 are now being reconstituted for a planned museum for Roman shipping, to be attached to the open air museum Archeon at Alphen aan den Rijn (NL).

Smaller wooden objects (boxes, writing tablets, tableware and sundry other objects) are normally completely recovered during excavation. Since their numbers are generally limited, all or most objects tend to be selected for full documentation and preservation by impregnation and freeze-drying.

14 Nomination dossier, Part I, fig. 2.10.

15 Despite being the findspot of several iconic ships, Zwammerdam (mun. Alphen aan den Rijn, NL) was not included in the nomination, as the fort located here was practically entirely excavated (without preservation of remains) (cf. Nomination dossier, Part I, p. 62).

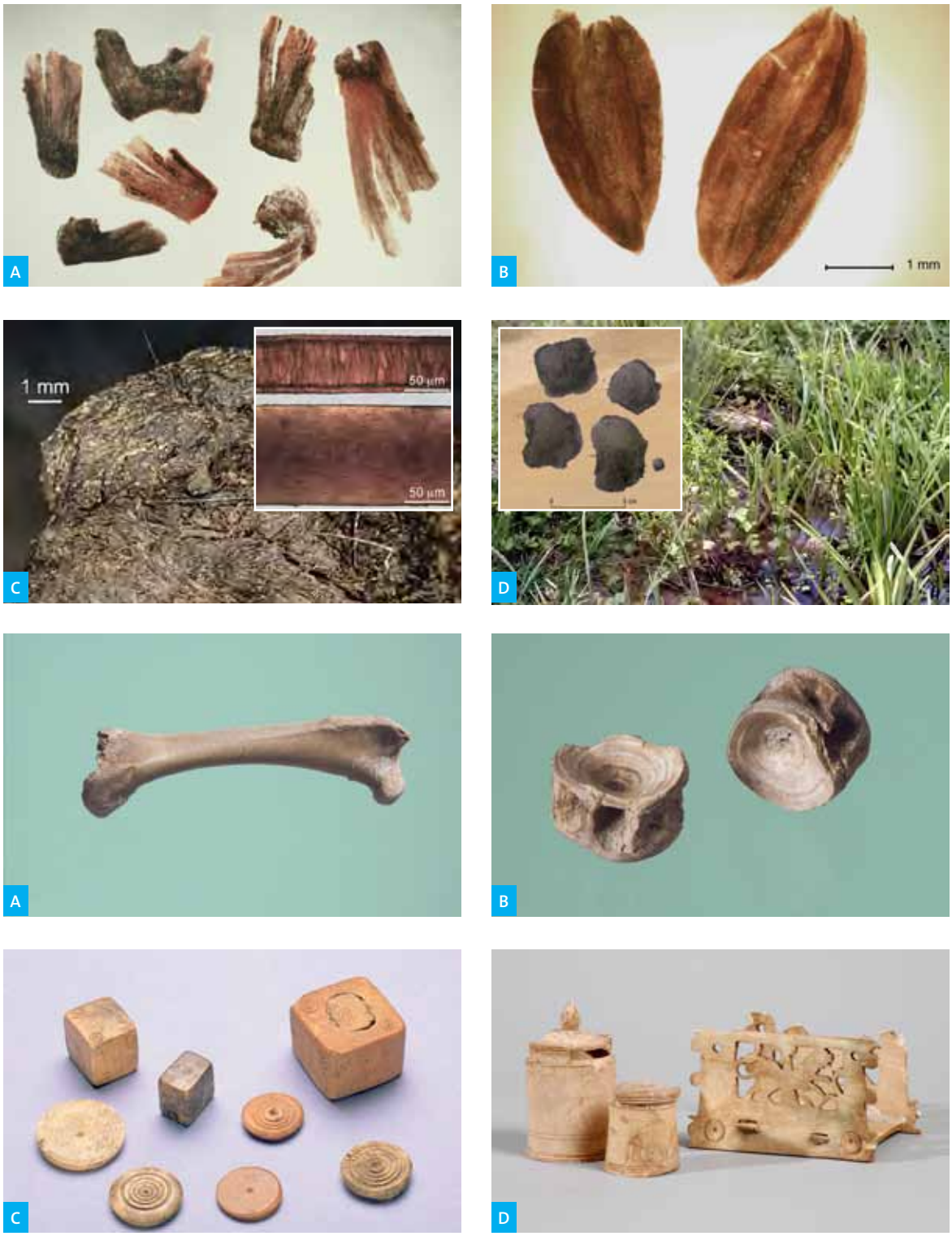

Fig. 14 Plant remains.
A: waterlogged chaff remains of spelt wheat (Leiden-Roomburg).
B: waterlogged fennel seeds (Voorburg-Arentsburg).
C: crust of calcium phosphate with plant remains and human and horse hairs (inset) (Bunnik-Vechten).
D: horse-droppings (inset) from a residual gulley of the Roman Rhine (Kalkar-Bornsches Feld).

Fig. 15 Animal bone.
A: thighbone of a white-fronted goose (Utrecht-Balije).
B: vertebrae of a sturgeon (Utrecht-Balije).
C: dice and counters (Nijmegen).
D: *pyxides* (cilindrical boxes) and a standard probably used as a loom for weaving (Nijmegen).

In waterlogged conditions, **plant remains** are normally preserved in perfect condition, but during excavation they are often invisible to the eye. They are only revealed by sieving and preparing soil samples collected from significant features with favourable preservation conditions (e.g. humid ditches, pits, wells and latrines). Pollen, seeds, fruits and other plant elements and products (e.g. chaff, bread) are identified and quantified by botanical experts, using large reference collections. Plant remains provide insight into the natural landscape, land use (deforestation, wood management, agriculture, stock breeding, horticulture) and the transport, processing and consumption of food. Carbonised (burnt) organic remains can be preserved without difficulty, but other remains are rarely preserved after documentation and analysis. Plant remains can also be used for dating purposes (radiocarbon dating), for instance to establish the chronology of sedimentation and rubbish deposits in river channels.

Fig. 16 Human burials.
A-B: cremated human bones in cooking pots used as containers (Valkenburg).
C: careless inhumation burial (Valkenburg).
D: Late Roman inhumation with multiple burial gifts (Nijmegen).

Animal bone is found in most excavations, with the exception of those in dry, sandy soils. In waterlogged conditions the preservation is excellent, also of bones of small animals and fish. Since it often occurs in large quantities, animal bone may provide a clear and varied image of the presence, use (e.g. riding, traction) and consumption of animals. Remains unfit for human consumption were converted into a wide variety of products, including leather, marrow, glue, and objects like combs and handles. During excavation, larger bone fragments are usually systematically recovered, while series of soil samples are collected for the identification of smaller species. Bones and bone objects are studied by zoological experts, and compared to reference collections. Of many animals sex and age can be determined on account of their bones, giving insight into aspects as the viability of herds (age distribution) and horse breeding for the Roman cavalry. The bones recovered during excavation are normally all preserved, without further treatment.

During the Early and Middle Roman periods (up to the later 3rd century AD) the bodies of the deceased were usually cremated. Inhumations were rare and careless, probably pointing to a marginal social position of the deceased. In the Late Roman period, inhumation was the standard.
Cremated **human bone** is very resistant to degradation, so its preservation is not limited to waterlogged conditions. Analysis of cremation remains is the domain of physical anthropologists. Often the age of the deceased can be estimated, and the sex of adult individuals determined with a varying degree of certainty. Inhumated human bone is normally well preserved in all soil types except dry, sandy soils. The recovery of inhumations is preferably left to specialists, who further assess age and sex. Scientific methods as isotope analysis may provide insight into the region of origin of the deceased, and the date of inhumation may be established by radiocarbon analysis. All human remains are preserved, normally without further treatment.

In the context of the Roman army, **leather** is a last important category of organic remains, and one that is only preserved in waterlogged conditions. In temporary camps, whether for campaigns or exercising, the troops stayed overnight in leather tents. Shield covers are further examples of typical military leather accessories. Leather was also used for the *caliga*, the iconic military shoe with nailed soles, and for belts, straps and linings. Excavations have not only yielded remains of finished products, but also a wide range of cuttings and other residuary products testifying of local production and repair, which took place in workshops within the forts as well as in the extra-mural settlements. Leather remains are studied by specialists, who determine the type of leather (animal species), identify the type of object – often incomplete, deformed, worn – and study details of the processing of the leather and of the manufacture of the object. A selection of recognisable or otherwise significant objects is drawn or photographed. ‘Archaeological leather’ is very delicate and its preservation by impregnation and freeze-drying is labour-intensive; as a consequence, usually only a selection can be preserved.

Fig. 17 Leather.
A: various shoes (Bonn).
B: waste from leather manufacture (Kalkar-Bornsches Feld).
C-D: *caliga* or military shoe (Bonn).

Waterlogged conditions are not only favourable for the preservation of organic remains, but also for that of **metal objects**, particularly when made of iron and copper alloys. Other than gold, silver and lead, iron and copper alloys are normally set out to considerable corrosion, affecting their structure and aspect. In the anaerobic conditions created by the groundwater, corrosion is prevented or much reduced. Consequently, iron and copper-alloy objects are preserved in a state close to the original. When recovered, chemical treatment is needed to maintain this state of preservation. Once affected by corrosion iron objects often loose most of their original structure and aspect, requiring extensive mechanical cleaning and chemical treatment to attain a stable condition. To a lesser degree, this also applies to copper-alloy objects. Consequently, only a selection of such corroded objects is normally preserved. Near-pristine metal objects as recovered from waterlogged contexts require less treatment and convey a much better image of the original objects and are more often preserved. Metal objects are studied by specialists, generally focusing on the type and date of the objects. Analysis of the chemical composition of metal objects is not a standard procedure and requires expensive equipment and specialised researchers. Many metal objects were used by soldiers and civilians alike, but for instance weapons, armour and some tools are exclusive to the army. As with leather, not only the finished products are of interest, but also the scrapped metal that testifies of the production and repair of all the objects vital to the functioning of the army.

Whereas most of the materials mentioned above contribute strongly to the OUV of the Lower German Limes, by their excellent preservation in the wet conditions of the riverine landscape, they represent only a minority, in numbers and volume, of the finds made during excavations on Roman military sites. The bulk of the finds consists of stone buildings materials and pottery fragments.

Building materials occur often in such volumes that it is impossible to process and preserve all: tuff from the Eiffel region, Grauwacke from the Schiefergebirge, limestone from the Moselle region, bricks and tiles from the kilns of Berg en Dal-De Holdeurn or from those spread out along the Rhine.

In the case of pottery it is not so much the volume which is difficult to manage as the sheer number of fragments, not rarely adding up to tens or hundreds of thousands. A considerable percentage of the pottery vessels has travelled over hundreds of kilometres, either because they were valued pieces of tableware from specialised kiln sites in Italy or Gaul, or because they carried essential or estimated products as olive oil, fish sauce or wine, mainly from the Mediterranean. Whereas building materials and pottery fragments thus have many stories to tell, these stories are not exclusive to the Lower German frontier section.

With the exceptions mentioned above, most finds collected during excavation are stored in depots, to allow further or new research in the future. The documentation compiled during their collection and processing is also archived, along with the meticulous documentation of the excavation itself, in analogue or,

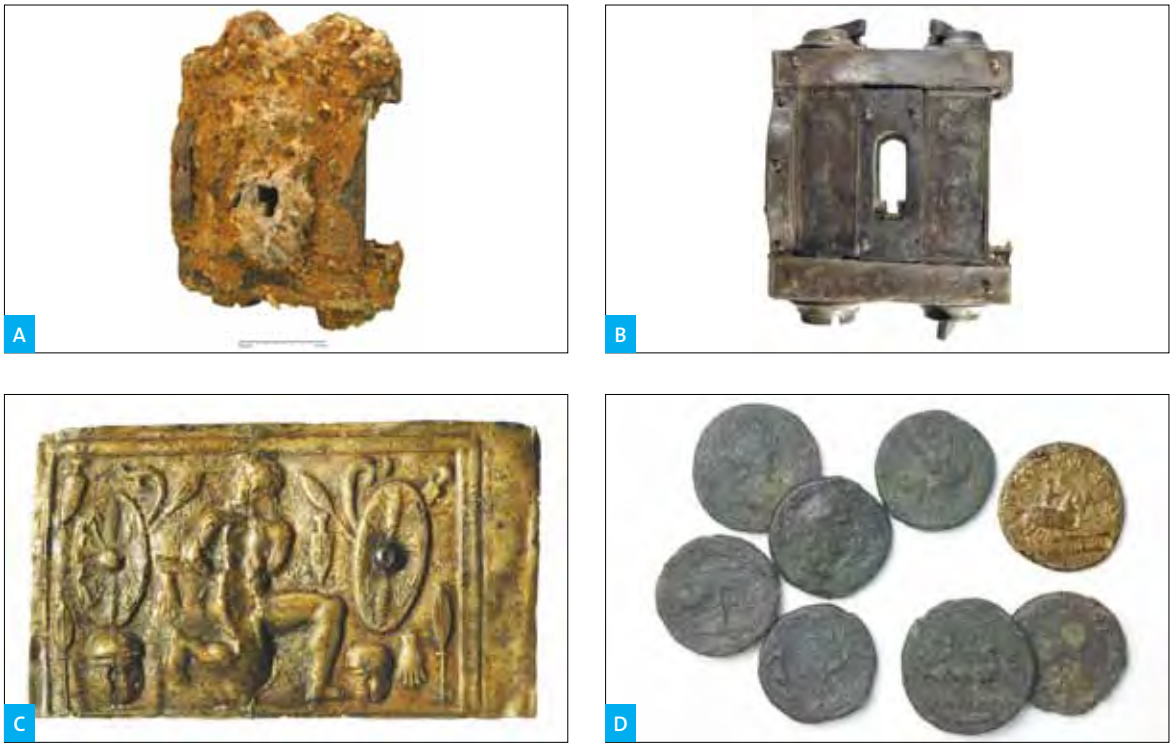

Fig. 18 Metal objects.
A-B: iron and copper-alloy frame of a *manuballista*, a torsion catapult, before and after mechanical and chemical treatment (Xanten).
C: fragment of a copper-alloy sheath preserved in waterlogged conditions (Valkenburg).
D: copper-alloy coins, seven in corroded state and one preserved in waterlogged conditions (Alphen a/d Rijn).

increasingly, digital form. An increasing awareness of the importance of sustained and accessible digital archiving is leading more and more to shared standards for the storage of digital data.

9 Reconstructions and visualisations

9.a Approach to reconstructions and visualisations

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In Germany, the principles for future reconstructions and visualisations are laid down in the guidelines presented in Part B of the Management plan, which closely follow the guidelines for the Upper German-Raetian Limes. They follow international regulations.
In the Netherlands a pilot project has been carried out (2017-2019) with an independent quality board giving guidelines for projects aiming to make the Lower German Limes more visible and supporting local communities. The outcomes of this pilot have been evaluated and reported to the LGL-NL Steering Group.
Both documents provide the basis for the development of a common international approach for the Lower German Limes. This common approach will be part of the Interpretation Framework. In the Netherlands the working group Presentation (which is the successor of the mentioned quality board) will be involved in preparing this approach.
Since presentation is also an element of the individual management plans, implementation of these common guidelines will be done mainly through these individual management plans and also by supporting local communities in the development of initiatives with knowledge and funding.

9.b Known proposals for reconstructions and visualisations

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In the Dutch part, no reconstructions are planned. For one of the component parts, a concept for visualisation exists. This concerns Corbulo's canal | Vlietvoorde ▶4d. This area is being developed into a residential area, in which the remains of the canal are spared. At the location of the canal it is now planned to create a constructed wetland as an extra layer of protection for the canal and as a reference to the former Roman canal. Elsewhere, at multiple places artworks and references are in preparation in order to support the visibility and understanding of the site.
In the German part, no reconstructions are planned. For some component parts, concepts for visualisations exist. For the component part of Bonn ▶41 the aboveground marking out of the course of the defensive wall at the southwest corner is part of a development project (cf. section 10). For Neuss-Koenenlager ▶33 a first draft of an aboveground visualisation of the course of the defensive wall at the southern front of the legionary fortress has been commissioned.
In Xanten-CUT ▶27, the visualisation of two already excavated Gallo-Roman temples is planned as part of the long-term development concept (Entwicklungskonzeption des LVR-Archäologischen Parks Xanten II). The ancient construction form, which is characteristic for the north-western provinces, is to be made experienceable for visitors by means of a (partial) reconstruction above the sanctuary on insula 20. In addition, the original remains of the temple on insula 13 will be preserved under a protective building that picks up on the cubature of the building, using modern building materials.

10 Existing development proposals

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2 Valkenburg-De Woerd

The nominated property is part of a larger development area for a.o. housing and business. There is an overarching masterplan that designates this specific area for development as a business park. The plan on how this can be done is now part of a planning approach that takes all relevant aspects, including heritage, into account. The province and municipality are working together on these plans. Part of this process is investigating how the archaeological values can be safeguarded and better presented to a wider audience. The aim is to better protect these values by giving this area a more public function. The regulations of the Heritage Act are applicable: all plans need to comply with these regulations. Based on these regulations, the national government can ask for a Heritage Impact Assessment, when needed.

4d Corbulo's canal | Vlietvoorde

The Vlietvoorde location is being developed as a residential area. In the new plans the location of Corbulo's canal (the property area) is designated as a constructed wetland. By giving the location of Corbulo's canal a public function (park), public support for protection of this constructed wetland will increase. This approach is similar to that on other sites in residential areas such as Utrecht-Hoge Woerd ▶8 (park and cultural centre) and Leiden-Roomburg ▶5 (park).
In the buffer zone, housing development will take place. In the framework of the development of the plans extensive desk research has taken place. During the development further research will be carried out to safeguard all relevant archaeological information.

36 Dormagen

At Dormagen the municipality is developing an interpretation centre for the Roman cavalry fort in the historical town hall. A subsidy has been granted in 2020 for the further development of the interpretation rooms. The development will take place inside the town hall and not touch any archaeological features.

41 Bonn

At Bonn the existing housing complex Didinkirica will be developed with three additional housing buildings. These will be erected inside the component part, in the southwest corner of the legionary fortress. In close cooperation between the investor and the heritage agency of the Rhineland (LVR-ABR) the foundations of the three buildings have been reduced to the bare minimum. New cellars are not planned. At the most northern building, pile foundations will be needed, but these will be placed after and according to the results of an archaeological field evaluation to minimize the impact on archaeological remains. The planning for the most southern building has been adjusted to take respect and to preserve the remains of the defensive wall at this location. The central building will be erected at the place of an existing building.

Other approved developments

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8 Utrecht-Hoge Woerd

A part of the archaeological monument which will be added to the property area, is to be developed in the near future. The development is in line with a long-standing administrative commitment. A house, a shed and a greenhouse will make way for an assisted-living centre and three or four houses. The development will

be subject to strict conditions concerning the impact of their construction on the underground remains (requiring 'archaeology-friendly building').
The foreseen development was not the reason why this area was previously assigned to the buffer zone. Prior to the building of the greenhouse in 1984, the area had been illegally levelled, destroying the top layers of the archaeological complex. Therefore, the integrity of the surviving remains was considered insufficient for inclusion in the property area. Since ICOMOS is of a different opinion, the decision to include it in the buffer zone has been reconsidered.

44 Remagen

In the area of the former Ludendorff Bridge ('Bridge at Remagen'), the construction of a hotel complex and several residential buildings is planned. The area of about 6000 m² is located at the north-eastern edge of the buffer zone. Planning for both projects has not yet been finalised.

The state conservation office of Rhineland-Palatinate was and is involved in all processes, and is in close contact with the building authority of the city of Remagen and the investors.
The hotel project has already been in planning since 2017. At that time, the area was not yet a designated excavation protection area. As it was nevertheless treated as a suspected archaeological site, the investor and the state conservation office reached an agreement to carry out an excavation of the area prior to the new construction in order to document possible structures and to recover and secure finds.
There are considerations for building a bridge for cyclists and pedestrians between the two towers of the former Ludendorff Bridge, linking Erpel and Remagen and thus increasing the touristic appeal of the region. The bridge would also facilitate direct access to the Erpeler Ley with the view to the World Heritage property at Remagen (fig. 9). Concrete plans are still pending. The state conservation office was also informed about this project at an early stage.

Appendix 1: Outline Individual Management Plans

Outline Individual Management Plans FRE-LGL World Heritage Site (Ref: 1631)

The IMPs must be independently readable and understandable for local stakeholders and residents. It is aimed to make the IMPs freely available through the internet. This may be limited (for parts of the IMPs) by privacy legislation. On the longer term an online log will be considered.

Table of contents Individual Management Plans

No	Name	Contents
1.0	Data	Site number, site name, location, map.
2.0	Site description	General description. This should correspond with the applicable theme(s) from the Interpretation Framework.
		Contribution to Outstanding Universal Value.
3.0	Stakeholders	Stakeholder Assessment.
4.0	Visibility	Identification of all projects on public awareness within property area and buffer zone.
5.0	Ownership	Contact data of owners.
6.0	Management themes	Identification of relevant themes for the site, based on the 6 management themes from the Management plan (Appendix 1: FRE-LGL MP). Each theme will be made specific for an individual component part/cluster. Through annual reports we will identify: • condition: the current status and development. Whether the condition is unchanged, has improved or has deteriorated • the aim • specific actions for the next year • through what kind of instrument(s) the subtheme is managed This can be through legal instruments, but also through participation • who is responsible - all these partners should be involved in the drafting and annual evaluation of the IMP • the monitoring Management themes will be reported SMART and in the form of a table. A preview is given on the next page, with in grey examples of how the management themes will be reported.
7.0	Partners	Contact data of relevant partners.
	Appendix	Annual reports on management themes. Maps.
	Literature	Publications/presentations for an academic as well as a wider audience.

Preview annual report on management themes (nr & name of component)

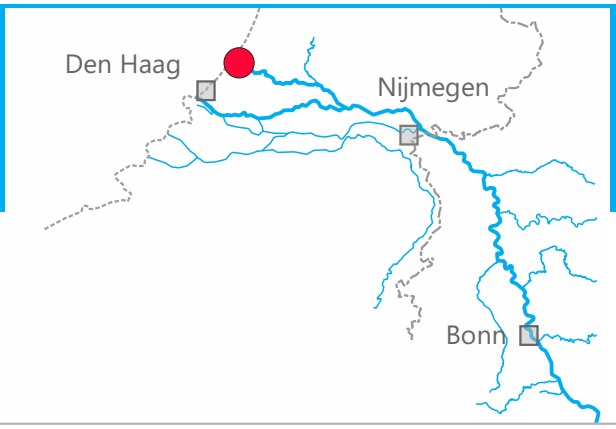
Theme	Subtheme*	Aim	Status and condition	Management actions (SMART)	Instruments / tools	Monitoring
Protection	Factor (s) affecting the property **					
	Tree root growth	*Prevent possible damage of tree root growth to the archaeological monument.*	*There are four large oak trees located in the property area. It is unclear what the influence of these trees is on the monument*	*Research on the influence of the tree root growth on the monument before 1-1-2023. Based on the outcomes, possible strategies will be discussed. (municipality)*	*Research. Budget through national research fund. Municipal Landscape plan.*	*Through annual management meetings and reports*
Knowledge	Knowledge development					
Comprehension	Interpretation on site					
	Communication					
Cooperation	Strategic alliances					
Education	Awareness programmes	*There is a local heritage education programme explaining the importance and history of the site and of heritage management*	*The local museum recently developed an education programme together with the regional heritage agency.*	*Enrol and monitor use of the education programme through counting the users and questionnaires (local museum).*	*Monitoring*	*Questionnaires*
Presentation	On site presentations - existing					
	Visitor management -accessibility					
	Signage	*At all entrances an info panel corresponding with the interpretation framework.*	*On site there is one info panel (see map). The panel is damaged and outdated.*	*Place two new info panels before 1-1-2023 (municipality)*	*Guideline signage FRE – LGL Visibility fund LGL Local funding*	*Through annual management meetings and reports*
Communities	Community involvement					

* The subthemes given are a first selection. If relevant for the theme and site, more sub-themes can be given.
** E.g. groundwater level, tree management, flooding, metal detecting, tourism, other monuments, piping. Each factor will be reported individually.

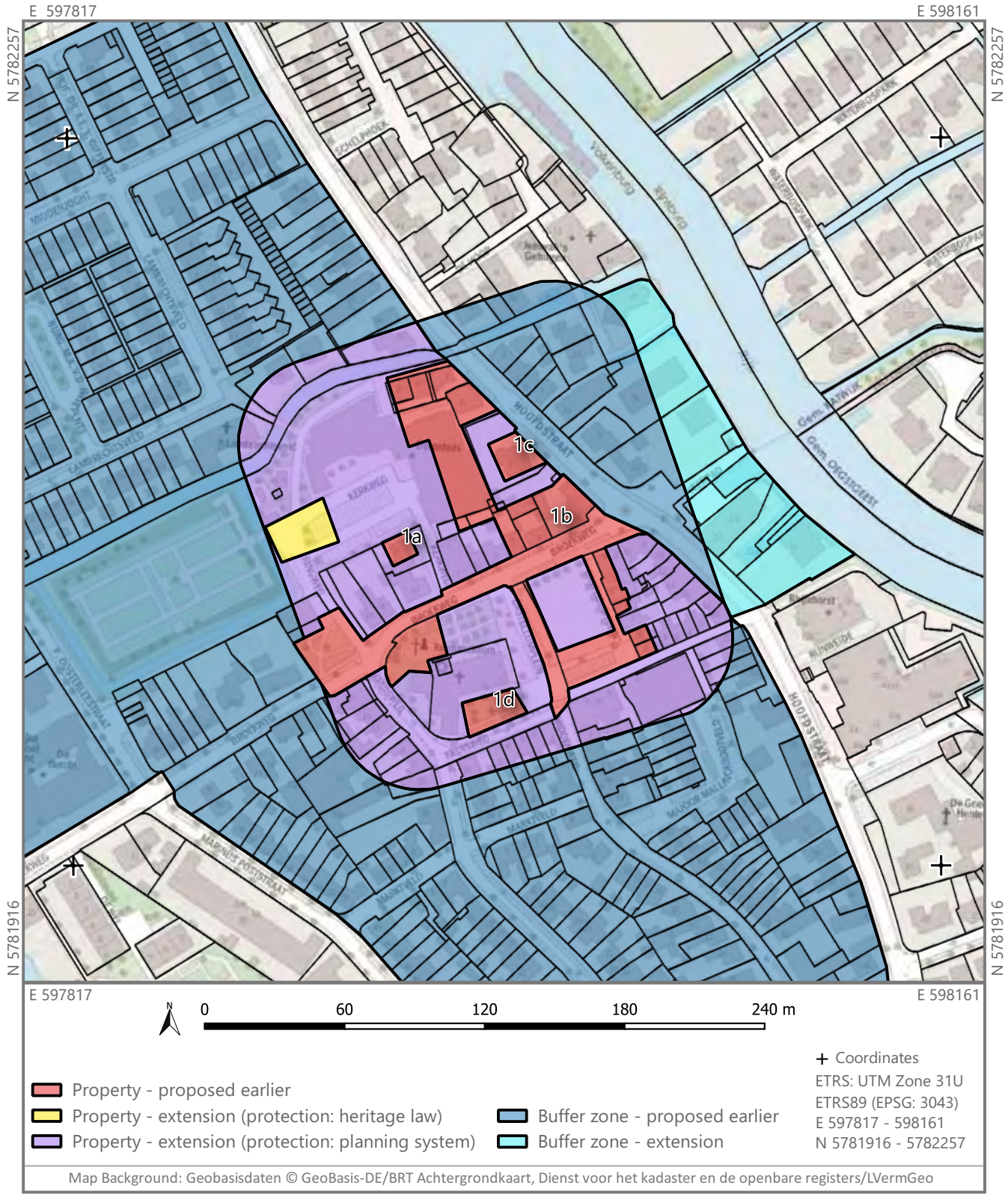
Grey texts are examples illustrating how the report on management themes can be filled.

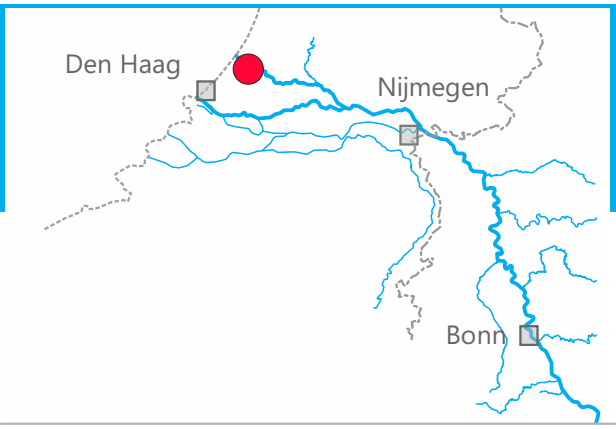
– Maps –

Maps

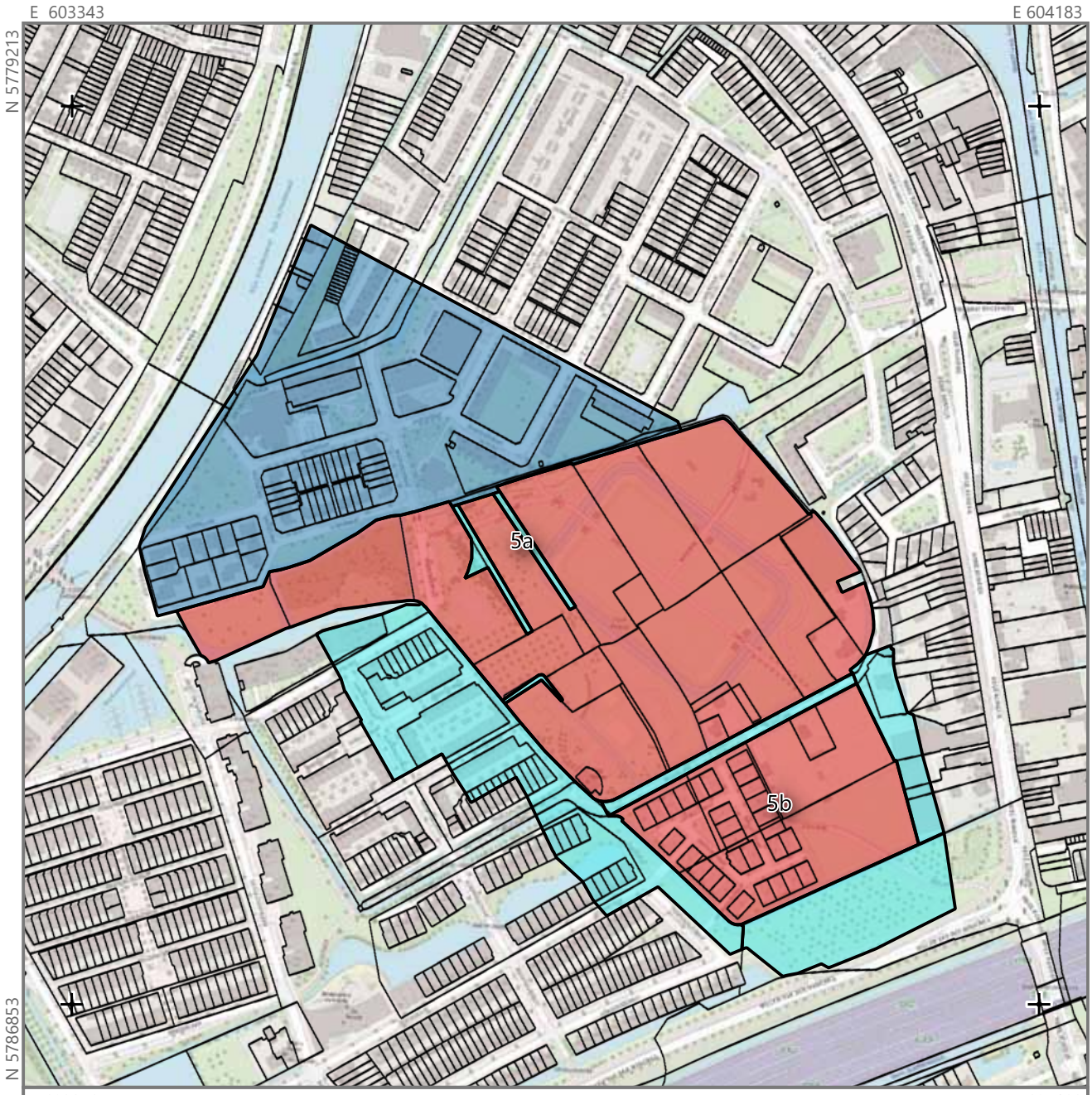


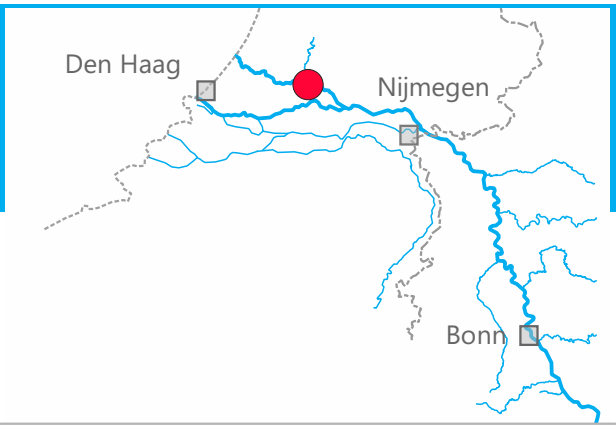
1 - Valkenburg-Centrum



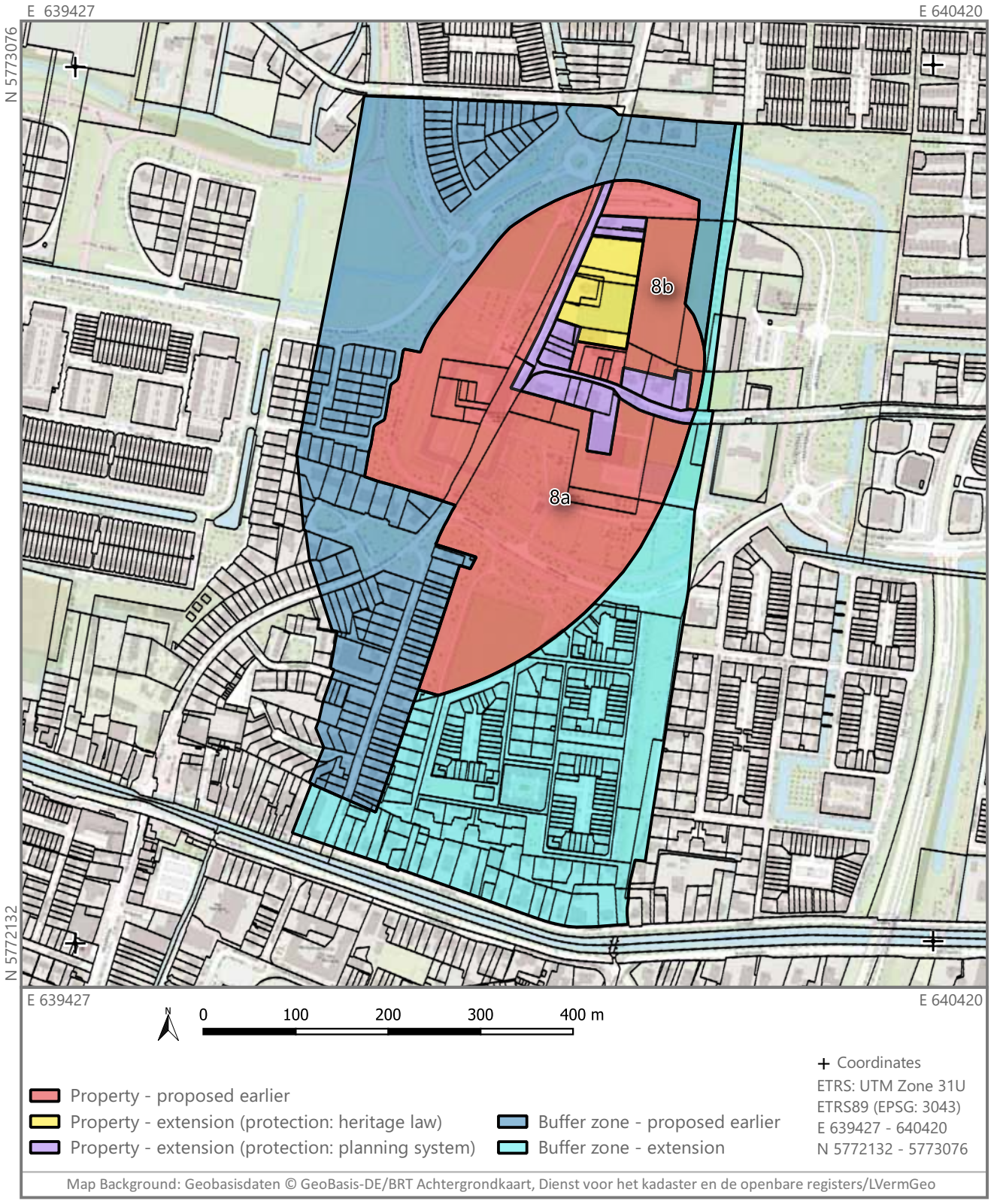


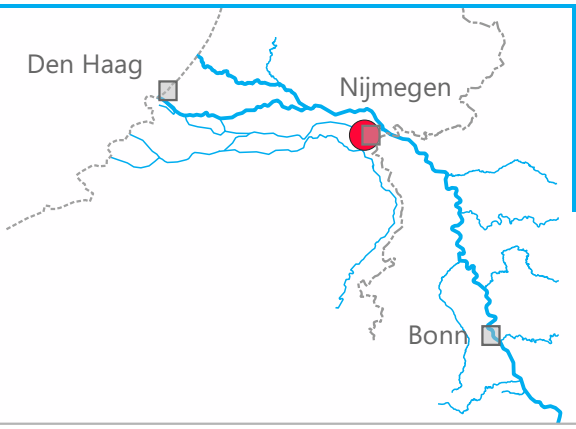
5 - Leiden-Roomburg



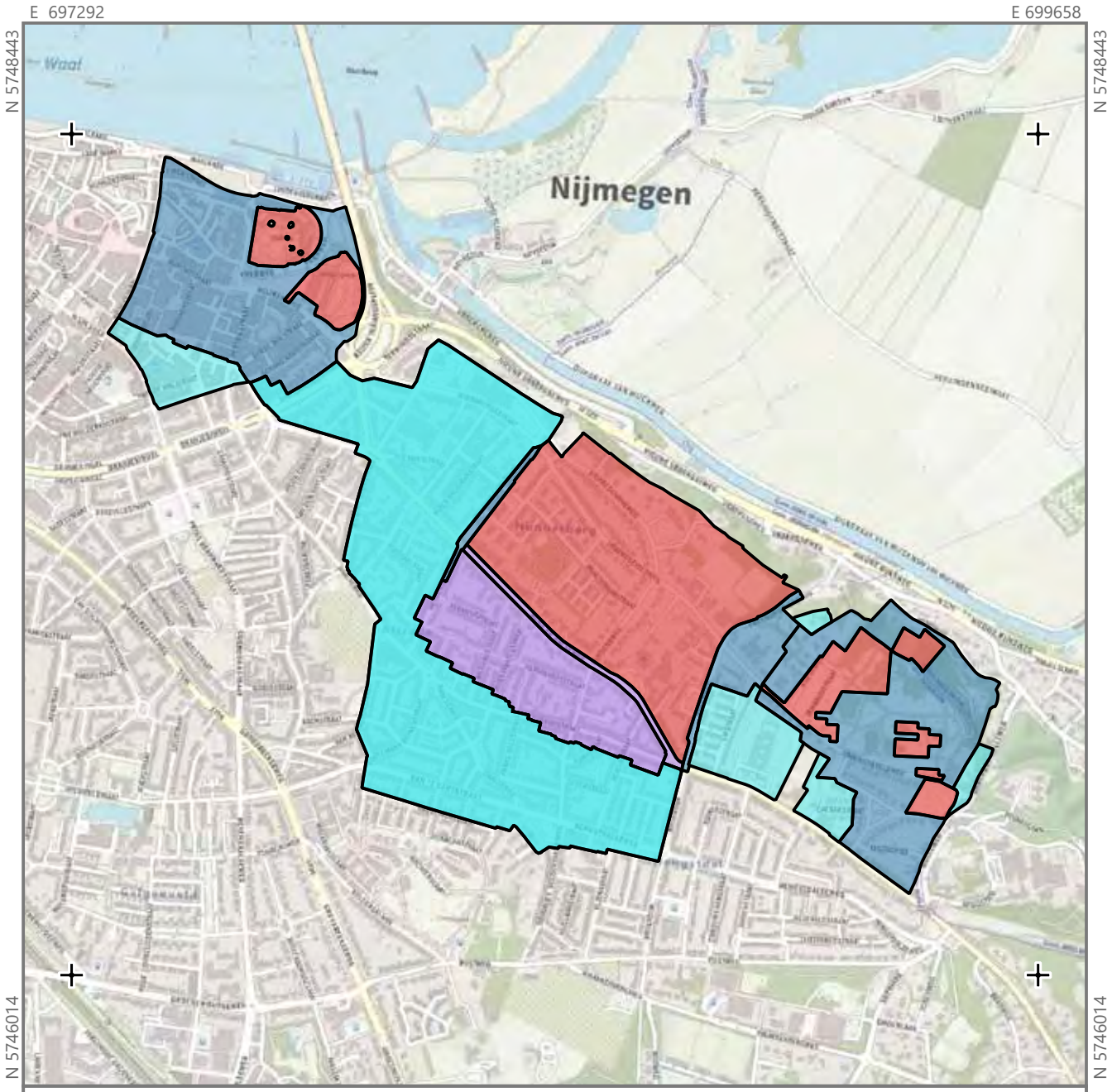


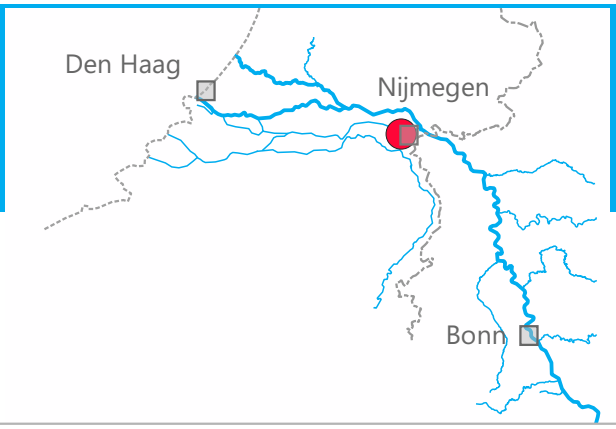
8 - Utrecht-Hoge Woerd





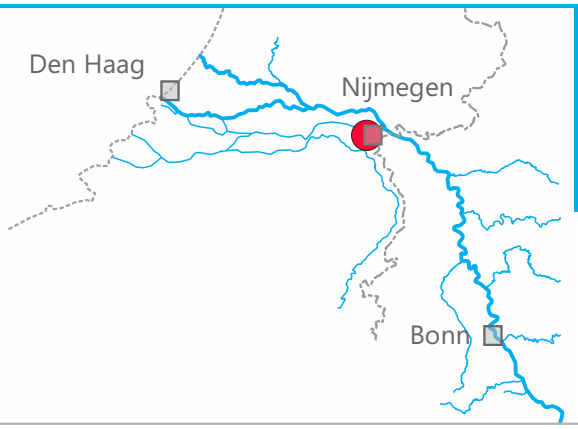
14-16 - Nijmegen-Overview



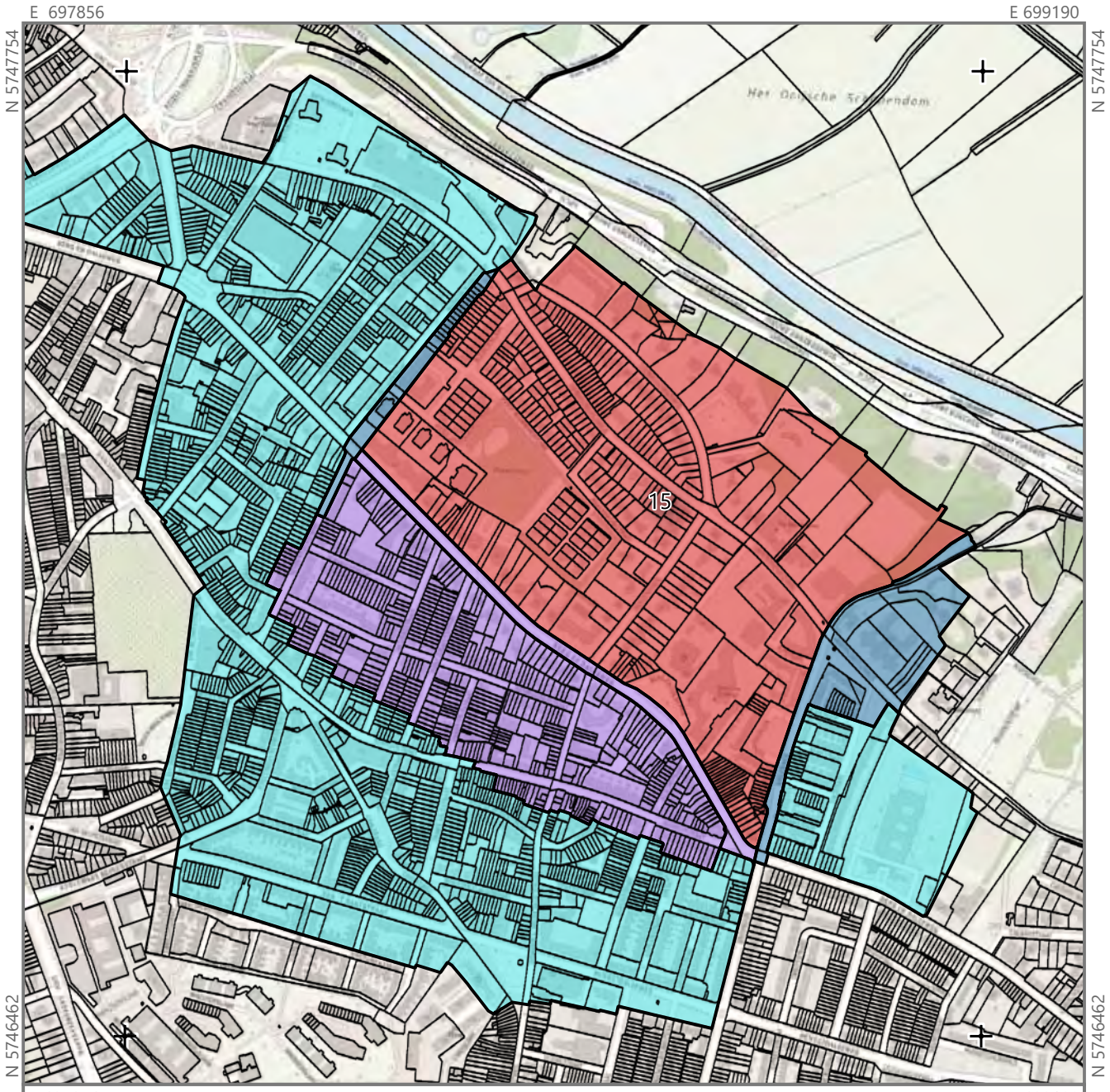


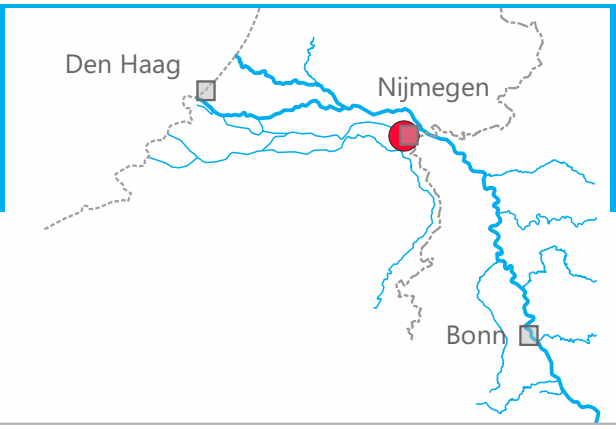
14 - Nijmegen-Valkhof area

E 697204 E 697958
N 5748270 N 5748270
N 5747451 N 5747451
E 697204 E 697958
0 100 200 300 400 m
14a
14b
Property - proposed earlier
Property - extension (protection: heritage law)
Property - extension (protection: planning system)
Buffer zone - proposed earlier
Buffer zone - extension
+ Coordinates
ETRS: UTM Zone 31U
ETRS89 (EPSG: 3043)
E 697204 - 697958
N 5747451 - 5748270
Map Background: Geobasisdaten © GeoBasis-DE/BRT Achtergrondkaart, Dienst voor het kadaster en de openbare registers/LVermGeo



15 - Nijmegen-Hunerberg





16 - Nijmegen-Kops Plateau

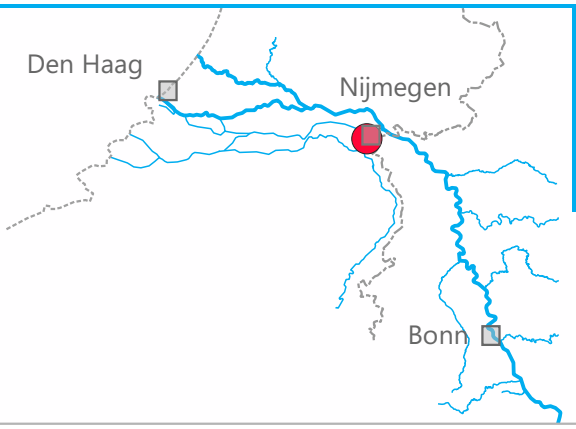
E 698904 E 699823
N 5747255 N 5747255
N 5746349 N 5746349
E 698904 E 699823

16a
16b
16c
16d
16e

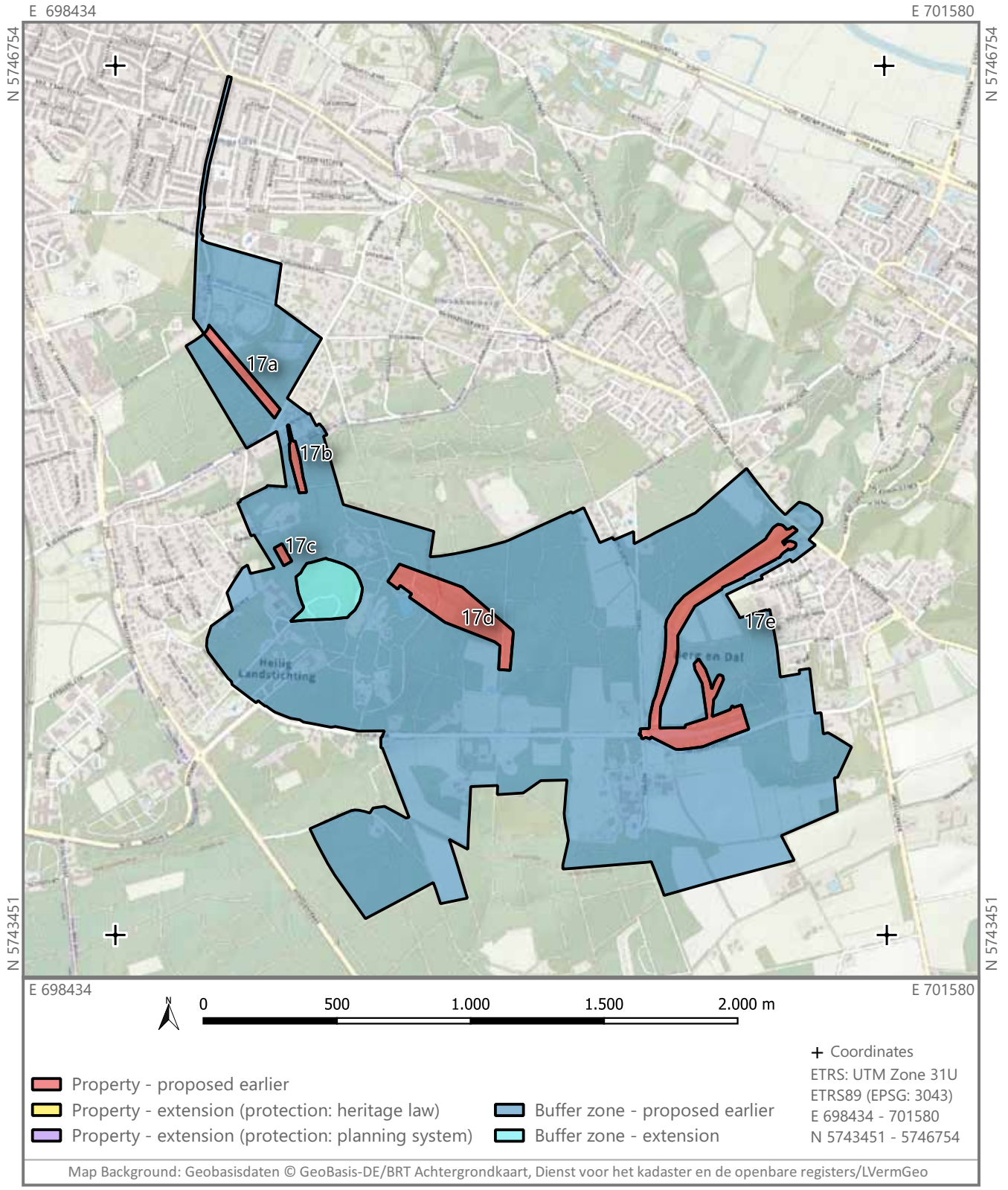
N
0 100 200 300 400 m

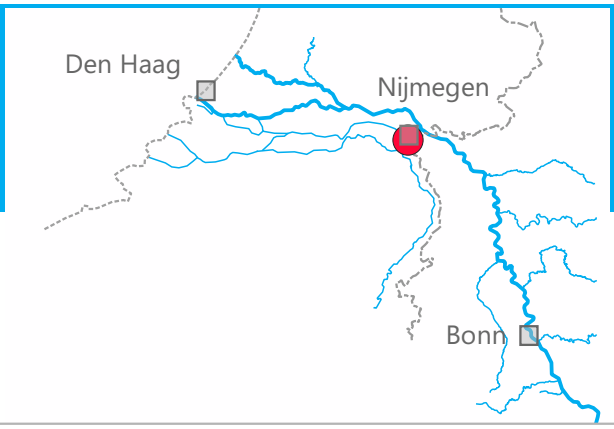
Property - proposed earlier
Property - extension (protection: heritage law)
Property - extension (protection: planning system)
Buffer zone - proposed earlier
Buffer zone - extension

+ Coordinates
ETRS: UTM Zone 31U
ETRS89 (EPSG: 3043)
E 698904 - 699823
N 5746349 - 5747255



17 - Berg en Dal-aqueduct

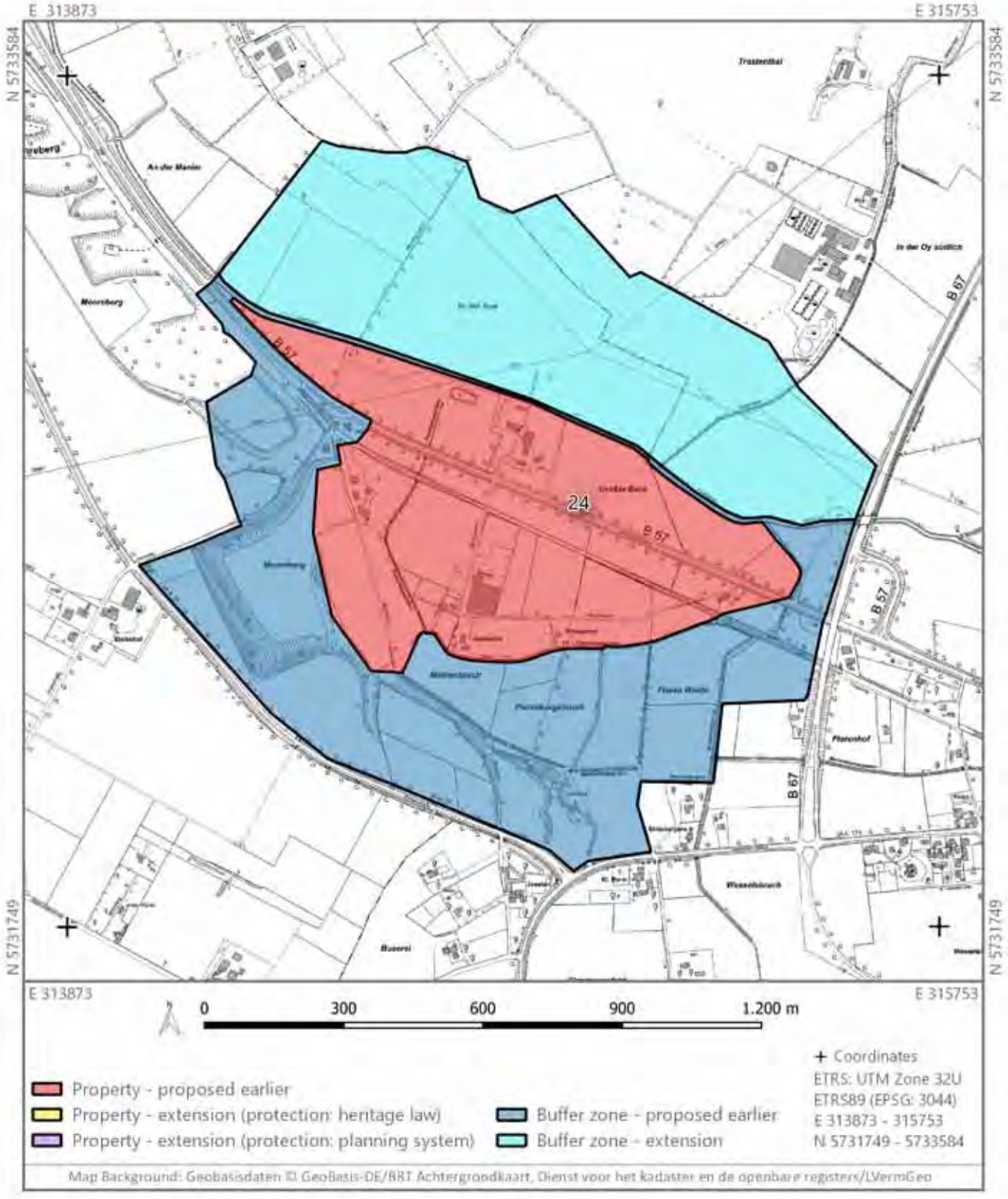




18 - Berg en Dal-De Holdeurn

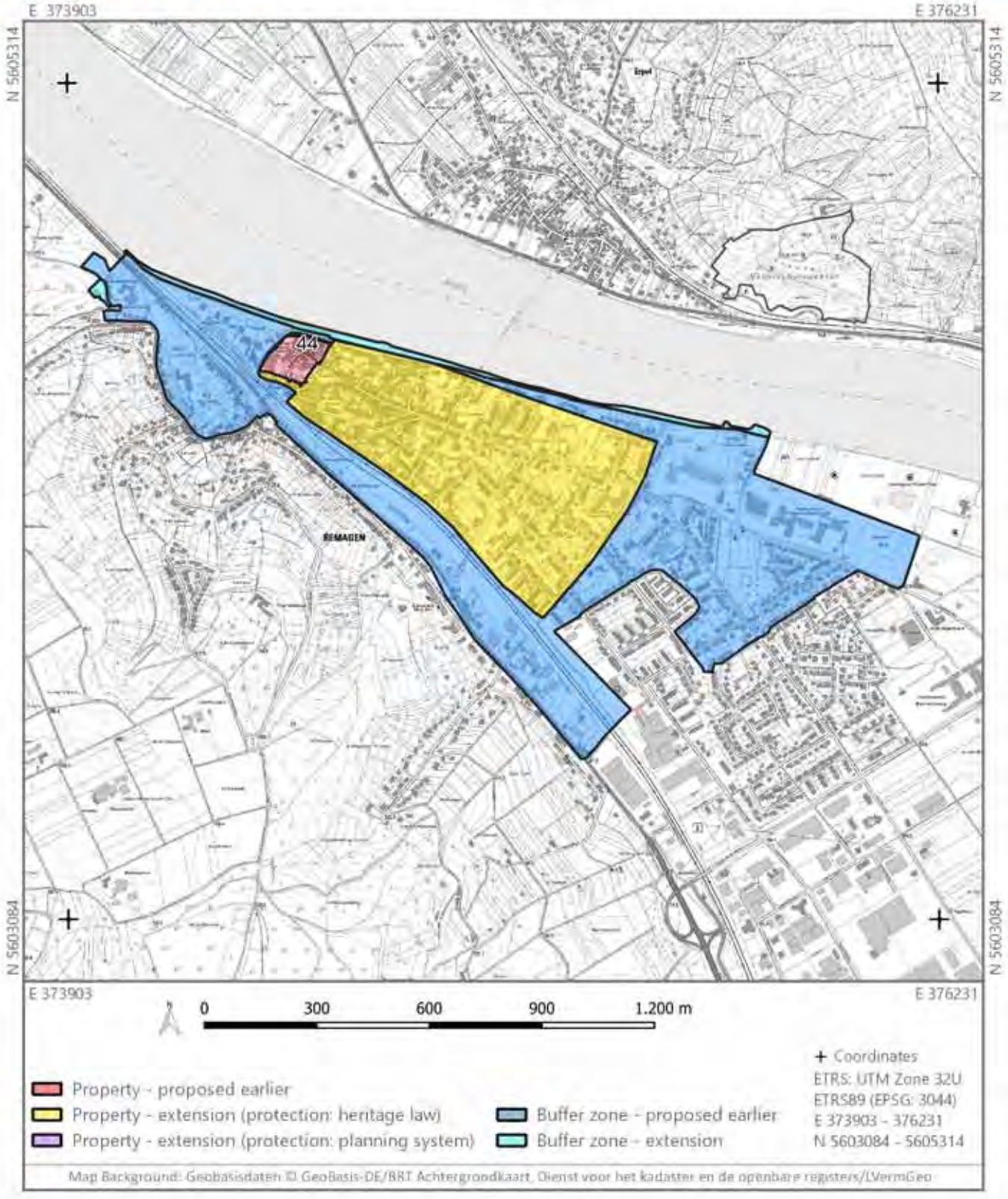
E 701490 E 702435
N 5745286 N 5745286
N 5744260 N 5744260
E 701490 E 702435
18a
18b
0 100 200 300 400 m
Property - proposed earlier
Property - extension (protection: heritage law)
Property - extension (protection: planning system)
Buffer zone - proposed earlier
Buffer zone - extension
+ Coordinates
ETRS: UTM Zone 31U
ETRS89 (EPSG: 3043)
E 701490 - 702435
N 5744260 - 5745286
Map Background: Geobasisdaten © GeoBasis-DE/BRT Achtergrondkaart, Dienst voor het kadaster en de openbare registers/LVermGeo

24 - Kalkar-Bornsches Feld




Den Haag
Nijmegen
Bonn

44 - Remagen


E 373903
E 376231
N 5605314
N 5603084
44
REMAGEN
0
300
600
900
1.200 m
Property - proposed earlier
Property - extension (protection: heritage law)
Property - extension (protection: planning system)
Buffer zone - proposed earlier
Buffer zone - extension
+ Coordinates
ETRS: UTM Zone 32U
ETRS89 (EPSG: 3044)
E 373903 - 376231
N 5603084 - 5605314
Map Background: Geobasisdaten © GeoBasis-DE/BKG Achtergrondkaart, Dienst voor het kadaster en de openbare registers/LVermGeo