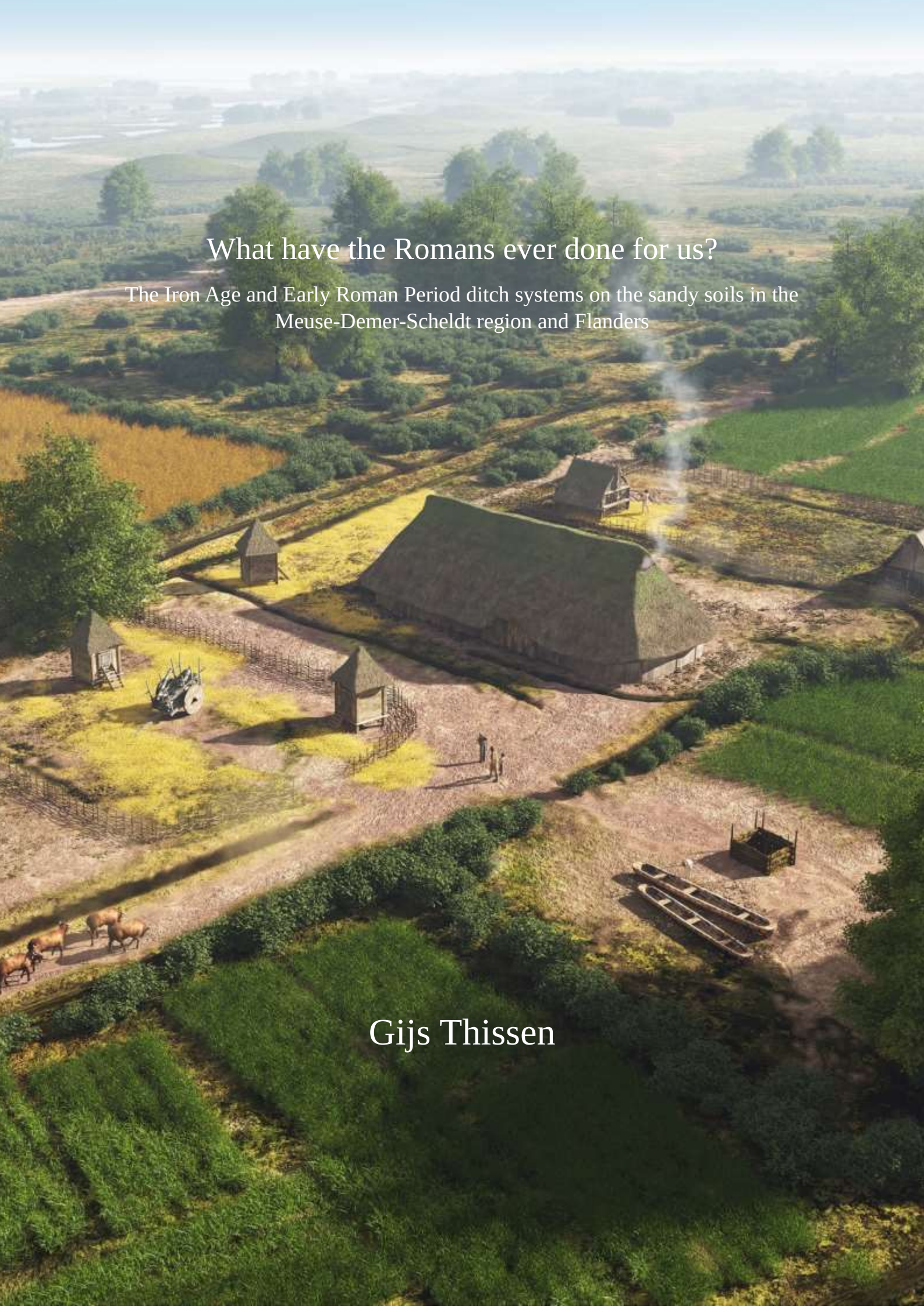
What have the Romans ever done for us? The Iron Age and Early Roman Period ditch systems on the sandy soils in the Meuse-Demer-Scheldt region and Flanders

Thissen, Gijs



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Cover: Kriek, M. (2024). *Impressie van één van de erven uit de Late IJzertijd in Opperdoes-Zuid* [Online image]. BCL Archaeological Support. https://onh.nl/verhaal/opperdoes-in-de-bronstijd-en-ijzertijd

What have the Romans ever done for us?

The Iron Age and Early Roman Period ditch systems on the sandy soils in the Meuse-Demer-Scheldt region and Flanders

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Thesis BA3 - 1083VBTHEY

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Final version

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Foremost, my appreciation goes out to all (field) archaeologists for their accurate reporting of excavated features, even those not always within the scope of their respective projects. These archaeological reports, often made public, were of immense value to the inventarisation and without their rigorous compilation, this research would not have been possible at all.

I would like to especially thank Dr. Alex Brandsen and my supervisor Dr. Richard Jansen, both of whom were always available for project-related questions and readily suggested further avenues of research.

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Gijs Thissen

Leiden, 15th December 2024

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Chapter 1: Introduction

1.1 Background

Northwestern Europe is a quintessentially exclusionary and divided landscape, shaped by the demarcation of land into privately owned parcels through written charters and deeds. This modern practice is the current stage of a process that fundamentally altered the relationship between humans and their surroundings. Previously, for hunter-gatherer societies, a subsistence strategy normative for most of human existence, the landscape was open and fluid. Physical barriers demarcating 'property' were largely absent from their cultural practice (Earle, 2000, p. 45). While humans were closely associated with their local camp and the surrounding supply territory, they lacked a notion of exclusionary landed property (Layton, 1986, p. 30; Sauvet, 2017, p. 191).

Hence, the privatisation of land, a practice that commenced with agricultural intensification, fundamentally changed how humans experienced their surroundings (Earle, 2000, p. 43; Løvschal, 2014, p. 725). This cultural transformation illustrates a profound socio-economic, and more importantly, psychological shift in human experience, as the previously open landscape became partially restricted and accessible to a select few. While in historic times, the division of land is set in writing, prehistoric societies lacked penmanship, and therefore, had to rely on the construction of physical boundaries (e.g. trees, walls, hills, and ditches) to demarcate the land (Earle, 2017, p. 9).

1.2 Division of the landscape

The Bronze Age marked the beginning of a structured, though temporary, demarcation around the farmstead (Fokkens, 2005, p. 413; Løvschal, 2015, p. 261). Structures such as fences and bushes fundamentally transformed the previously open landscape. Their limited workload and impermanent nature, however, failed to anchor the enclosed plot in the landscape (Earle, 2000, p. 39). Subsequently, during the Iron Age and Roman period, permanent demarcations emerged (e.g. hills and ditches). Their monumental qualities firmly anchored properties in the landscape. Through inheritance practices, families became connected to specific plots, where previously fences would have been dismantled with each generation. These enduring boundaries, however, remained in place, symbolically eternalising both the land and its associated people within the landscape (Løvschal, 2014, p. 729).

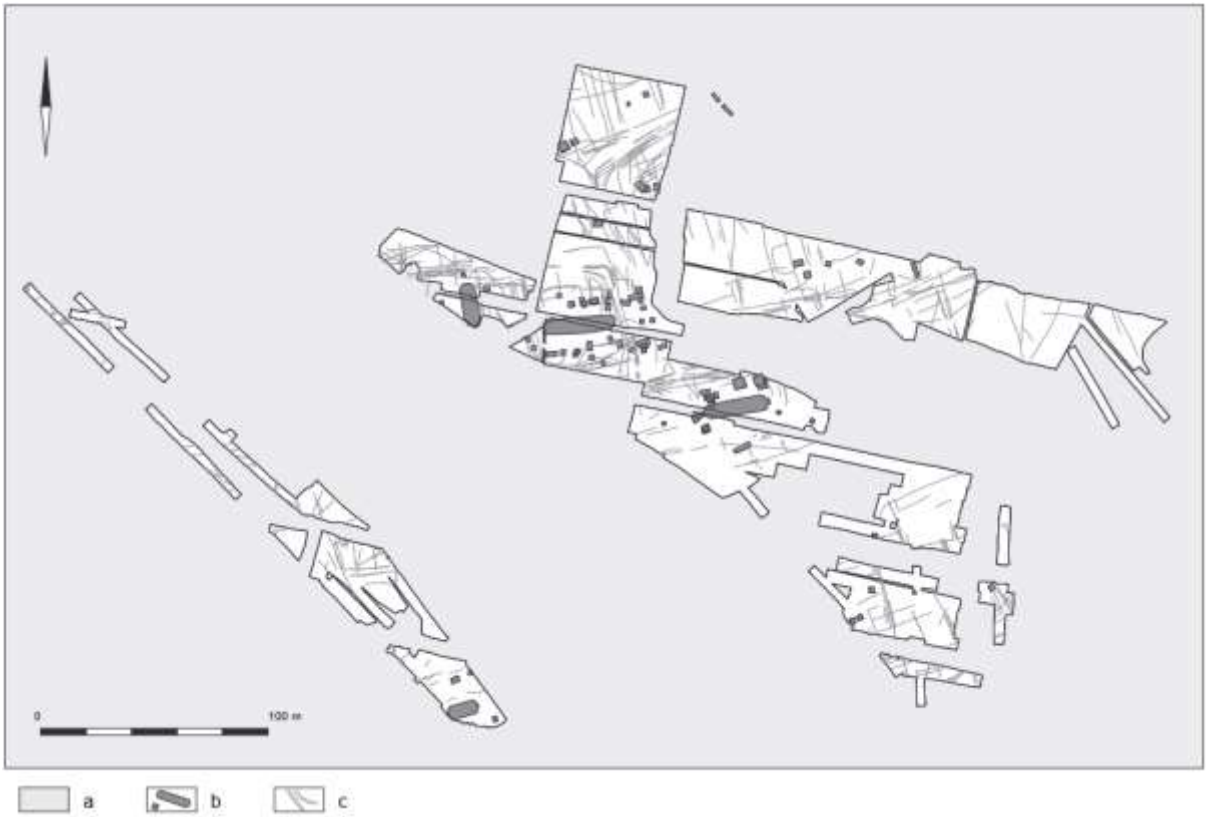

Figure 1.1: The Bronze Age settlement of Zijderveld. The grey lines (c.) denote the (interpreted) fences, around the buildings (b.). These fences, an early form of land demarcation, were temporary, lasting only relatively short periods. Therefore, those illustrated here are non-contemporaneous but represent the total picture of the land demarcation process. (Arnoldussen & Fokkens, 2008, p. 22, Figure 2.6).

1.3 Romanocentrism

The process of permanent division of the landscape is a contentious topic within archaeological research. Historical narratives often hypothesize the introduction of the practice by the Roman provincial administration, in a pristine landscape, while capitalising on its economic potential through (agricultural) initiatives such as villas, colonias, and centuriation (ter Steege et al., 2011, p. 316; Willi, 2014, p. 153; Libecap & Lueck, 2020, p. 212). Notably, however, when the Romans conquered (North)western Europe in the 1st century BCE, they did not encounter an unchanged landscape. Rather, the indigenous population had actively subjugated and altered the landscape ever since Neolithic (Carroll, 2002, p. 62; Kaplan et al., 2009, p. 3016).

This persuasive connection between the structured landscape and Rome originates in late-19th-century Romanisation discourse, coined by German historian Theodor Mommsen. Herein, the Roman empire was framed as a benevolent colonial power spreading the Humanitas – Roman ‘civilisation’ - among the conquered peoples (Webster, 2001, p. 210; Dmitriev, 2009, p. 135). These parallels were drawn to justify Western colonial ambitions,

aligning Roman practices with contemporary empire-building (Dmitriev, 2009, p. 135). In the last 30 years, under the influence of post-processualist narratives, the narrative has shifted. Especially within Dutch Archaeology, more so than other Western European archaeologies, acculturation-based (the transmission and reception of cultural values) romanisation has been discontinued. Rather, notable successes were achieved by incorporating the interrelations between these two distinct cultures into the archaeological discourse, focusing both on the indigenous elements, as well as, their Roman counterparts (Hodder, 1991, p. 198; Slofstra, 1991, pp. 133-135).

In light of this, and to counter the narrative of Romanisation in settlement research, in this thesis I investigate the initiation, character, and effect of permanent boundaries around the settlement, particularly, ditch systems. Due to its well-developed, and consequently intensive (commercially) excavated nature, Northwestern Europe is a prime area for diachronic settlement research (Gerritsen, 2007, p. 2; Løvschal, 2014, p. 727). As large-scale excavations are common, the context of the excavated ditch system can be established. Therefore, settlement-related and farming-related ditches can be adequately distinguished**.** Furthermore, since, during Roman times, the area functioned primarily as a frontier zone, characterised by a strong military presence on the border, while the less-fertile hinterland remained relatively unurbanized (Roymans & Gerritsen, 2002, p. 373; Gerritsen, 2007, p. 156), romanisation of the urban space followed a distinct tradition. Allowing the hinterland to retain much of its pre-Roman indigenous characteristics (Nicolay, 2005, p. 193, Gerritsen, 2007, p. 162). This thesis aims to challenge the notion that the tradition of ditch demarcation of settlements was initiated by the Romans. Therefore, the Meuse-Demer-Scheldt and Flanders regions were selected for the study, given their common geographical characteristics (see section 2.2), retainment of indigenous practices, and their location within the boundaries of the Roman Empire.

1.4 Research questions

The aim of this research is to gain a better (over)view of the function of ditches, as well as ditch systems constructed on the southern Dutch and northern Belgian aeolian cover sand soils during the Iron Age (800 – 12 BCE) and Early Roman Period (12 BCE – 69 CE). Through the inventarisation of ditch systems recovered during (commercial) archaeological excavations, I intend to understand their genesis, physical appearance, character and effect on

the local prehistoric communities. To address these issues the following research questions were formulated:

Main question: What were the extent, physical appearance, character, and origin of the demarcated (settlement-related) ditch systems on the Meuse-Demer-Scheldt and Flemish sand soils during the Iron Age and Early Roman Period?

Sub-question 1**:** What was the extent and physical appearance of ditch systems on the sand soils in the Iron Age and Early Roman Period?

Sub-question 2**:** What differentiated ditch systems on the sandy soils?

Sub-question 3: When during the Iron Age were these ditch systems put into use?

Sub-question 4**:** What were the societal implications and related consequences of introducing demarcated land plots into a traditionally non-monumental fenced landscape?

1.5 Research outline

In this thesis I will categorise the Iron Age and Early Roman Period ditch systems located on the sandy soils of the Meuse-Demer-Scheldt area and Flanders with the aim of understanding their origin, differentiation, character, and consequently, their effect on the landscape and its inhabitants. Chapter 1 provides a comprehensive overview of the research, discussing its relevance in order to demonstrate the validity of the proposed research. Chapter 2 describes the geographical context of the research area, as well as its cultural-historical background, furthermore, it emphasizes the theoretical grounds of the research, Chapter 3 examines the challenges associated with large-scale archaeological report search and their corresponding (methodological) solutions, it further describes the application of the solutions (AGNES, QGIS, and filtering). In chapter 4 and 5, I will present and discuss the results, focusing on the extent, physical appearance, and genesis of the ditches found on the cover sands between 800 BCE and 69 AD. Lastly, in Chapter 6, I will draw a conclusion and formulate recommendations for the future.

Chapter 2: Background

2.1 Introduction

This chapter provides background information on the geographical context of the Meuse-Demer-Scheldt and Flanders regions, emphasizing the characteristics that unite the research areas. Following this, the cultural overview will provide a timeline of human habitation in the MDS and Flanders and examine the anthropogenic processes shaping the (cultural) landscape. Lastly, a theoretical framework based on cognitive archaeology is explained, focussing on the settlement demarcations within prehistoric mind-frames.

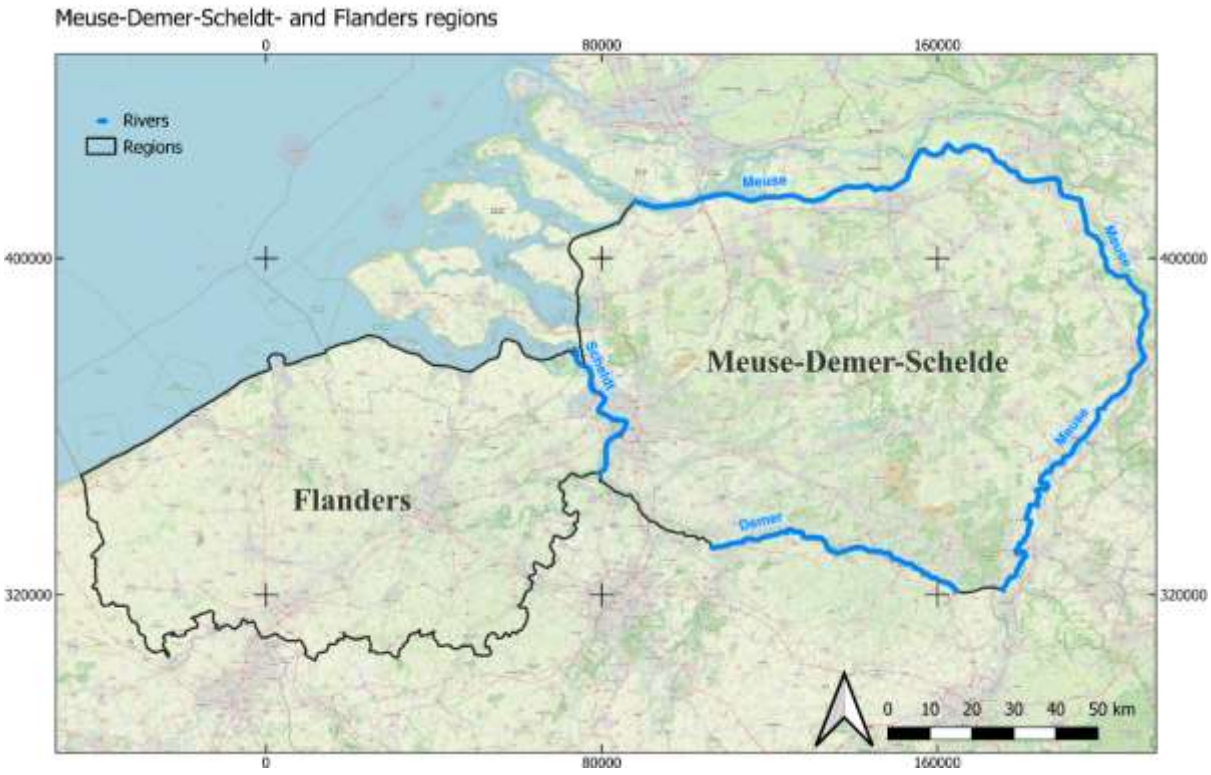

Figure 2.1: The Meuse-Demer-Scheldt and Flanders regions. Flanders follows historic-geological borders, while the Meuse-Demer-Scheldt area is delineated by its respective rivers (marked blue) to the northeast (Meuse), south (Demer) and west (Scheldt). (Figure: Gijs Thissen).

2.2 Geographical context

The regions emphasised in this thesis are the Meuse-Demer-Scheldt and Flanders regions. As can be seen in Figure 2.1, the Meuse-Demer-Scheldt- area is a transnational region in the central Benelux delineated by its respective rivers, namely those in the northeast (the Meuse), the south (the Demer), and the west (the Scheldt). Meanwhile, Flanders, for the purposes of this study, is denoted by its historical extent (roughly the regions of *West-Vlaanderen*, *Oost-Vlaanderen*, and *Zeeuws-Vlaanderen*, in the western portion of Belgium).

Both regions are in large part covered by aeolian deposits accumulated during the Weichselian glacial (115kya – 10.15kya). During the Middle to Late Weichselian phase (ca. 73kya – 10,15kya), the research area, free of land ice, transformed into an arctic desert marked by drift sands (Berendsen, 2005a, p. 185; Berendsen, 2005b, p. 240). The non-consolidated (vegetation-lacking) subsoil was easily grasped by the wind and aeolian deposits formed throughout the region. Consequently, each region is marked by flatness, as the deeper areas were filled in (Berendsen, 2005b, p. 241). As the cover sand deposits are aeolian and fluvio-glacial in nature, the sand is fine-grained (comparable to fluvial deposits; 150-210 μm), largely consisting of quartz and lacking calcium (Roymans & Gerritsen, 2002, p. 373; Berendsen, 2005a, pp. 190-192).

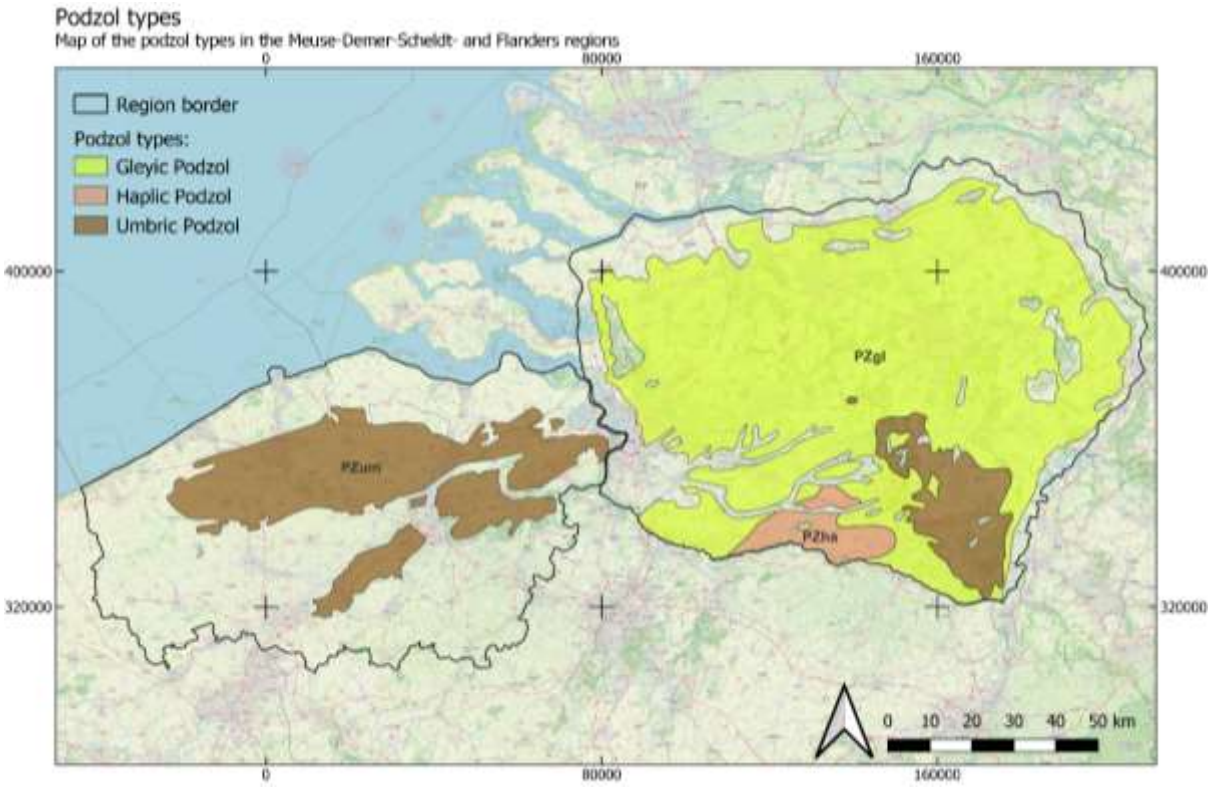

Figure 2.2: Podzol (soil) types in the Meuse-Demer-Schelde- and Flanders regions. The types of podzol soils are denoted by their respective colours and codes. While the MDS region is largely marked by gleyic podzol, Flanders solely contains umbric podzol. The fluvisols (along rivers) and histosols (in the east) are left out, as their origin differs from the cover sands. (Figure: Gijs Thissen).

Much of the soil in research area is composed of podzolic soils, as illustrated in Figure 2.2. Podzols are defined by the presence of a bleached (E) horizon, having been eluviated of minerals and a secondary dark illuviated (B) horizon. The quarzitic sands of Northwestern Europe form the predominant parent soil for podzols, and therefore, these podzols encompass much of the research area (Mokma & Buurman, 1982, p. 4; Nierop & Buurman, 1998, p.

605). Since the Neolithic (5,300-2,000 BCE) human agricultural activity accelerated podzolization, further shaping the soil landscape (Berendsen, 2005a, pp. 287-288). This study focuses specifically on these Pleistocene cover sands, as they form a geological delineated system.

2.3 Cultural overview

Since the Mesolithic era, the Meuse-Demer-Scheldt region (MDS) and Flanders regions have been continuously inhabited, albeit with limited influence on the landscape by the early hunter-gatherer population (Sevink et al., 2023, p. 3). However, from the Middle Neolithic onward, farming populations began clearing forest plots for agriculture through burning. The practice, known as shifting cultivation, involves temporary leaving plots fallow to recover soil fertility (Fokkens, 1986, p. 12; Roymans & Gerritsen, 2002, p. 378). Declining fertility often led to the abandonment of plots, and as farmers relocated closer to their (arable) land, this gave rise to the 'wandering farms' (Fokkens, 1986, pp. 12-13).

By the Late Neolithic (3,000 BCE – 2,000 BCE), the adoption of the (heavy) plough, requiring cattle to provide traction, enabled the cultivation of the mineral-poor cover sands. Additionally, to prevent root growth, fallow periods were reduced, leading to more permanent plots and, as posed by Fokkens (1986, pp. 13-14), fostering a stronger sense of land ownership (Louwe Kooijmans, 1993, p. 137). This development continued from the Middle Bronze Age (~1,750 BCE) onward, as a full mixed farming system emerged, where cattle was integrated into the household by means of a byre. The utilisation of manure, as well as, grazing, significantly transformed the landscape, forests became more open, and heathlands began to form as a result (Roymans & Gerritsen, 2002, p. 378; Fokkens & Arnoldussen, 2008, p. 13).

In the Late Bronze Age (1,100 – 800 BCE), field systems known as 'Celtic' fields emerged, characterised by their earthen ridges and mobile nature (Arnoldussen, 2018, p. 321). The ridges surrounding the plots were formed through deposition of the top soil from the plot, and were thus not necessarily contemporaneous with the initial instance of use. In accordance with the periodic shift of these fields, the settlements gained a 'wandering' element, the location of the settlements would therefore regularly change. The system of the Celtic fields and their accompanying *Wandersiedlungen* (EN: wandering settlements) functioned until the Late Iron Age (250 – 12 BCE), when the ridges were ultimately settled (Slofstra, 1991, pp. 145-147; Spek et al., 2003, p. 167; Arnoldussen, 2018, p. 322).

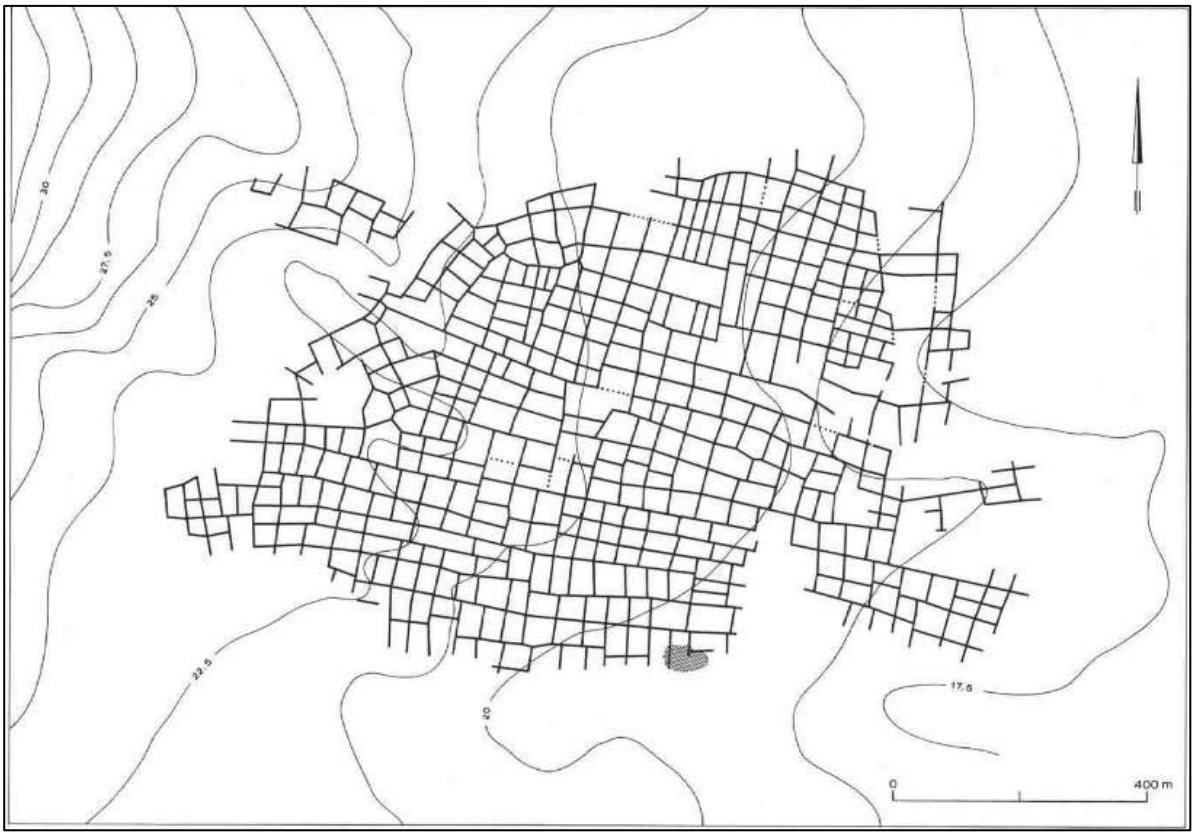

Figure 2.3: A Celtic field complex in Vaassen (NL). The settlement (hatched section, lower-right) is situated in within the system. Importantly, this complex represents final stage of the fields, as, considering the size, contemporaneous use was unlikely. These complexes of land demarcation functioned from the Late Bronze to the Late Iron Age (1,100 – 12 BCE). (Roymans, 1990, p. 100).

During the Late Iron Age settlements in the region became increasingly nucleated and sedentary, transitioning from dispersed wandering farmsteads to clusters of farmhouses (Slofstra, 1991, pp. 150-151; Roymans & Gerritsen, 2002, p. 385). The subsequent Roman expansion (1st century BCE) brought significant transformation, however, with palynological and palaeobotanical evidence showing significant forest regeneration from 50 BCE onward, likely influenced by the settlement disruptions caused by Caesar's campaigns in Northern Gaul (Carroll, 2002, pp. 16-17). The Roman administration later introduced extensive bureaucracy, facilitating systematic forest clearing and the creation of grasslands to support large scale agriculture From the 1st century AD onward, settlements became characterised by sedentary continuity and increased (rural) settlement size (Slofstra, 1991, pp. 150-151; Carroll, 2002, p. 17).

2.4 Theoretical framework

The study of settlement ditches within a Northwest European context requires careful theoretical considerations. Especially since settlement archaeology, owing to its frequent utilisation in Northwestern European archaeology, has been at the forefront of theoretical discourse. The field has, for the greater part of the 20th century, remained rigidly within a processualist frame of reference, basing itself largely on natural-scientific methodology. The 1990s, however, eventually saw the inclusion of various anthropological aspects, causing the field to drift to a more post-processualist approach (Slofstra, 1994, p. 24). Similarly, within this thesis, the data will be investigated under this post-processualist umbrella, in particular, cognitive archaeology (Whitley, 2022, p. 340).

As alluded to in the introduction, this thesis focuses on the emergence of boundaries within societies where previously (permanent) demarcation was largely absent from the landscape (e.g. Bronze-Iron Age Europe). The subsequent introduction of boundaries had a profound impact on the way its inhabitants experienced and conceptualised the landscape from then on (Løvschal & Skewes, 2022, p. 256). Formerly open landscapes were either being closed off by other actors, or were actively being enclosed by people themselves.

Landscapes are understood, as seen through a post-processualist lens, as being both physical entities, as well as social constructs. Additionally, it emphasizes the cultural and symbolic connotations of the landscape, in contrast to a more processualist deterministic stance (Geurds, 2007, p. 184). Within this frame, the cognitive archaeological approach recognises that physical boundaries serve as expressions of mental constructs about space, territory, and hierarchical structures (Renfrew, 1994, p. 3; Trigger, 2006, p. 492). Therefore, boundary introduction did not merely demarcate the landscape, but also reflected evolving ideas about ownership, social organisation, and (private) property.

The cognitive archaeological framework within the scope of materiality permits the analysis of settlement demarcations both as physical phenomena and as expressions of prehistoric peoples' mind frames (world views) (Abramiuk, 2012, p. 15, 17; Whitley, 2022, p. 339). By examining their characteristics and social implications, I aim to get a deeper understanding of how these demarcation ditches worked, both practically and symbolically, as well as how people reimagined their relationship with the landscape (Løvschal, 2014, p. 727).

Chapter 3: Methodology

3.1 Background

The purpose of the study is to categorise the Iron Age (800 – 12 BCE) and Early Roman (12 BCE – 69 CE) ditch systems located on the sandy soils of the Meuse-Demer-Scheldt region and Flanders. Aiming to understand their conception, character and, consequently, their effect on the landscape and its inhabitants. While prior research, although limited in nature, has been conducted on ditch systems (e.g., Løvschal (2014)) it offered mixed results. This is, to a certain degree, is due to the convention, within the Dutch commercial archaeological field, to define ditches and associated landscape features as 'bycatch'. Subsequently, the features are often only briefly mentioned in commercial reports, if at all. Therefore, when commercial reports are utilised in academia, these features are typically omitted (Richards et al., 2015, p. 2). These studies were, furthermore, limited by the search procedures provided by the numerous repositories (DANS, Archis, and KB), all merely facilitating title and metadata search (Brandsen et al., 2022, p. 2).

In response, Brandsen et al. (2019) proposed AGNES, an open-access online tool designed to enable researchers to navigate the extensive corpus of archaeological grey literature in a contextual manner (p. 23). AGNES specialises in semantic full-text search and particularly in finding bycatch. In light of this, as well as its ability to properly handle synonymy, polysemy and context clues (Brandsen et al. , 2022, p. 2), AGNES was chosen as the engine employed during this research. The proposed approach is threefold, first, archaeological data will be collected using AGNES employing a query tailored to the research question. Second, the data will be geographically delineated using QGIS, to ensure that it exclusively contains sites located on the sandy soils of the Meuse-Demer-Scheldt region and Flanders. Lastly, the documents will be manually screened to filter out false positives.

3.2 Grey Literature

The European Convention on the Protection of Archaeological Heritage (1992), known as the Malta Convention, establishes a standard for heritage management among European states, emphasizing in-situ preservation as a source of collective European memory (Council of Europe, 1992, Article 5.3; Willems, 2007, p. 1; Bringmans, 2018, p. 209). In the Netherlands, its implementation through the Heritage Management Act (WAMZ) and the introduction of the *Kwaliteitsnorm Nederlandse Archeologie* (KNA) in 2001 significantly increased archaeological research, requiring developers to fund and conduct prospection or excavation

before disturbing soil (Bringmans, 2018, pp. 210-211; Wansleeben et al., 2023, p. 33). The subsequent excavations, generally undertaken by archaeological companies, result in approximately 4,000 ‘Malta’ reports annually (a 1,120% increase, see Figure 3.1). These reports, classified as grey literature – a category of documents produced by the government, academic, and industry sectors that are preserved in institutional repositories but lack commercial publication– are often unpublished and stored in large repositories such as DANS, Archis, and the KB (Schöpfel, 2011, p. 18).

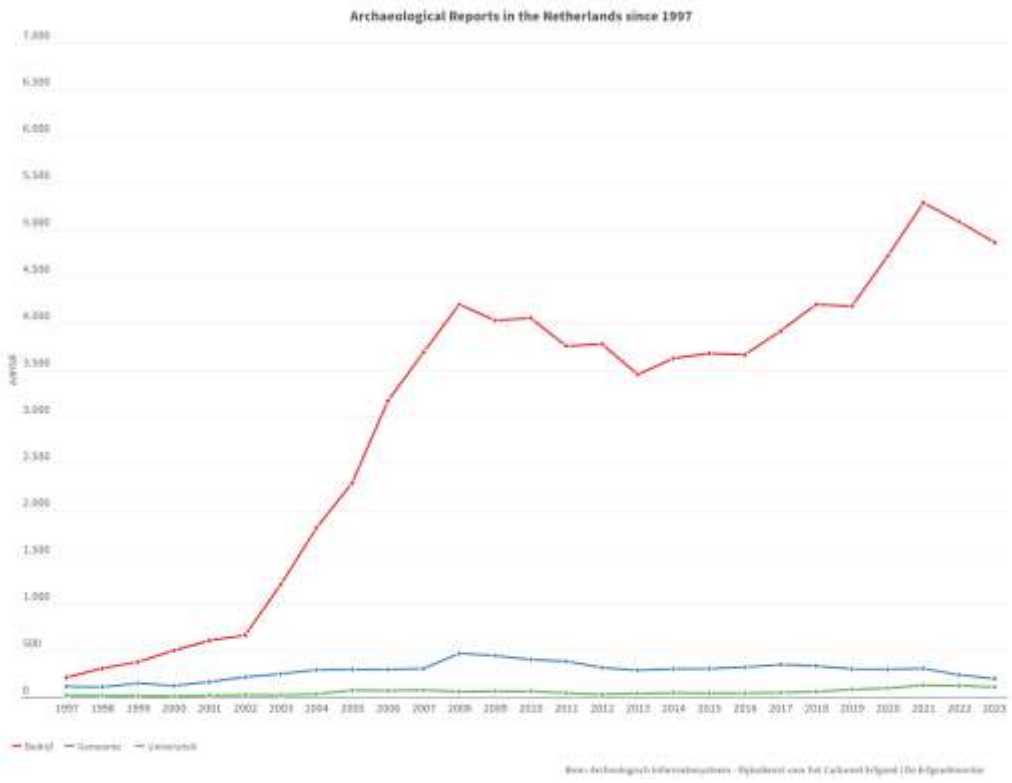

Figure 3.1: Growth of Archaeological (Malta) reports. A graph showing the (1,120%) increase of archaeological reports since 1997. In 2001 a temporary conditional law allowed commercial companies to excavate (Willems, 2007, p. 1). Red indicates companies (2,193% increase), blue municipalities, and green universities. (Rijksdienst voor Cultureel Erfgoed, 2023).

Currently exceeding 90,000 since 2001, these reports are often deemed inferior within academia, likely stemming from their lack of peer-review and limited searchability options. As a result, archaeological information, including bycatch, is frequently overlooked, diminishing the full potential of these resources (Brandsen & Lippok, 2021, p. 2; Brandsen et al., 2019, p. 22).

3.3 AGNES

Archaeological Grey literature Named Entity Search (AGNES) allows for contextual retrieval in these archives, moving beyond traditional metadata-based search engines. Using Machine Learning, AGNES extracts concepts embedded within extensive, unstructured texts, allowing for the recovery of archaeological 'bycatch' (Brandsen et al., 2019, p. 23; Tenzer et al., 2023, p. 5). AGNES is, however, not a database, but rather a referral system, referring to documents within their original repositories rather than storing them itself. The system provides the users with an output containing a DOI URL referring to the specific data entry, as well as, the specific snippet which forms the basis for the result. The complete reference collection encompasses 70,000 post-2001 commercial archaeological reports, spanning a diverse range of different time periods, themes, and locations (Brandsen et al., 2019, p. 23).

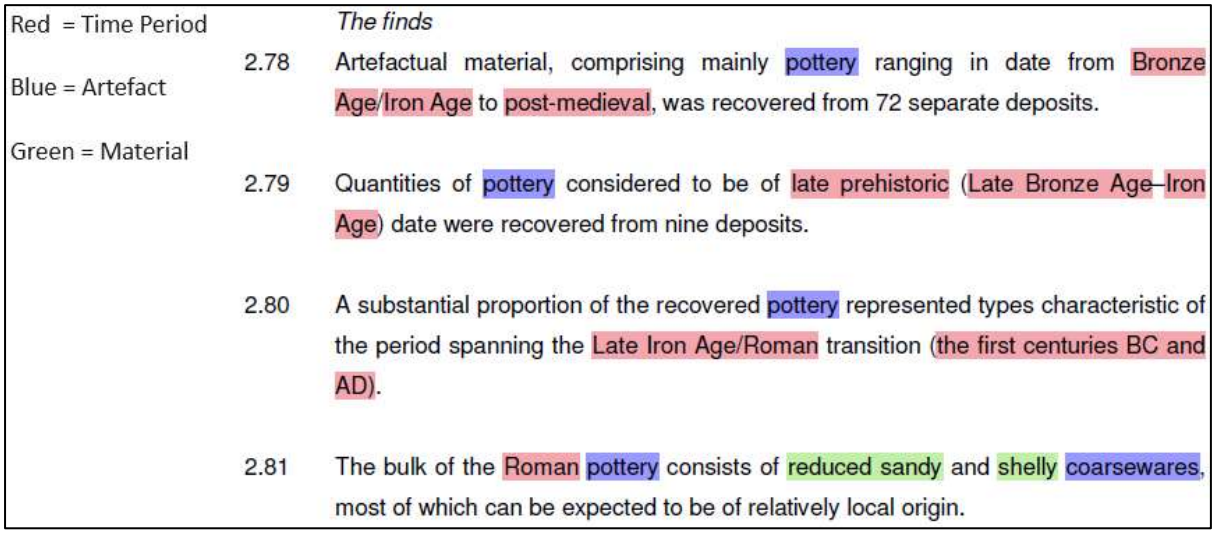

Figure 3.2: Labelled archaeological report. A (British) archaeological report with marked entities. A visual representation of the technique applied by Named Entity Recognition, in this case the entity categories are Time period, Artefact, and Material. Labelled data as shown has been used for fine-tuning ArcheoBERT(je) (Brandsen et al., 2022, p. 7). Adapted from: (Evans, 2013, p. 19).

Central to AGNES is the use of Named Entity Recognition (NER), a text-mining technique that identifies and categorizes entities (e.g., Artefact, Time Period, Context, Species, Material) within unstructured text, see Figure 3.2 (Brandsen et al., 2022, p. 11). Utilising machine learning NER can semantically index entities and link them to specific pages, enabling users to retrieve relevant results for specific concepts (e.g., ditch system) (Brandsen et al., 2019, p. 23; Vlachidis et al., 2021, p. 2). Archaeological jargon may, however, overlap with everyday language (e.g. ditch, stone, etc.). Therefore, Brandsen et al. (2022, p. 1) implemented ArcheoBERTje, a domain specific BERT deep-learning model, able to integrate

bidirectional context within archaeological reports (Devlin et al., 2018, p. 4171; Vlachidis et al., 2021, p. 10; Brandsen, 2022, p. 15). Furthermore, BERT is also able to produce contextual-dependent word embeddings, and is therefore able to discern between a ‘wheel barrow’ and a ‘prehistoric barrow’, as can be seen in Figure 3.3 (Brandsen, 2023, p. 256).

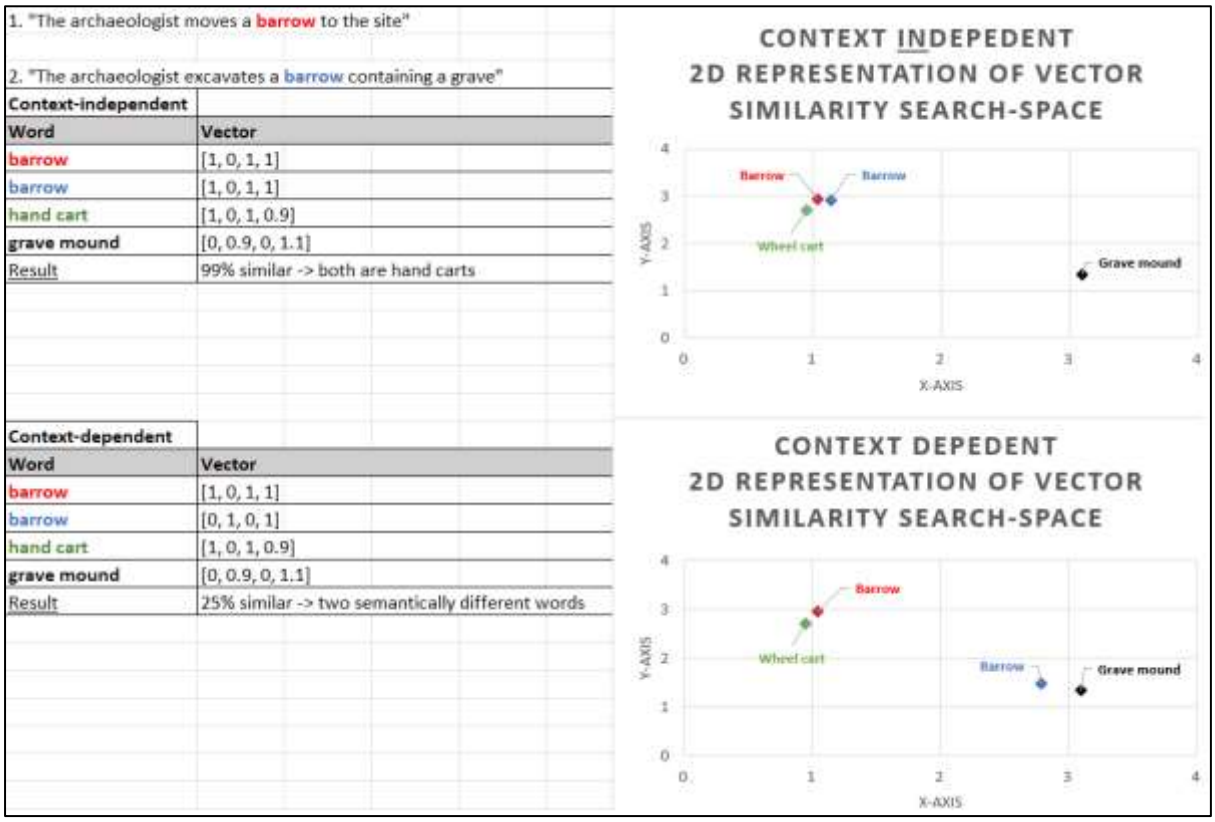

Figure 3.3: Context dependency vs. independency vectors. The difference is shown between context independent and context dependent word embeddings. These are also represented in a 2D representation with colour matching. In the context-independent vector both examples cluster around the concept of ‘hand cart’ while in the context-dependent vector both examples are shown as semantically different. (Figure: Gijs Thissen).

Using these capabilities, AGNES enables structured queries for specific archaeological concepts. Therefore, the query used in this research was: ‘*reppel*syste* ‘, here the ‘*’’s represent wildcards – placeholders – which were placed to account for variations and common misspellings, as well as, prefixes (this query accounts for ‘greppelsystemen’, ‘ringgreppelsysteem’, etc.). Furthermore, the time period was set from ‘-800’ to ‘69’, encompassing the entire Iron Age (800 – 12 BCE), as well as, the early (pre-Flavian) Roman period (12 BCE – 69 CE). The extension into the Roman period was chosen as to take into account residual indigenous process. The archaeological reports were extracted in a .geojson-file as to preserve their geolocation and ability to be imported into a GIS programme.

3.4 GIS

As the sites cover the entire Northern Benelux (see Figure 3.4), the dataset had to be geographically filtered. This was done by using the European Soil Database provided by the European Soil Data Centre (ESDAC) to extract the podzol soils present in the MDS and Flanders areas (Panagos et al., 2022; Working Group WRB, 2022, pp. 152-153). Since podzol layers blanket much of the regions sandy soils affected by human intervention, these soils were used as a proxy (Mokma & Buurman, 1982, p. 28; Roymans & Gerritsen, 2002, p. 377). The Schelde alluvial riverbanks have been excluded, as these soils consist of relatively young fluvisols (down to the fluvio-periglacial alluvium) (Berendsen, 2005c, p. 36; Tóth et al., 2008, p. 28).

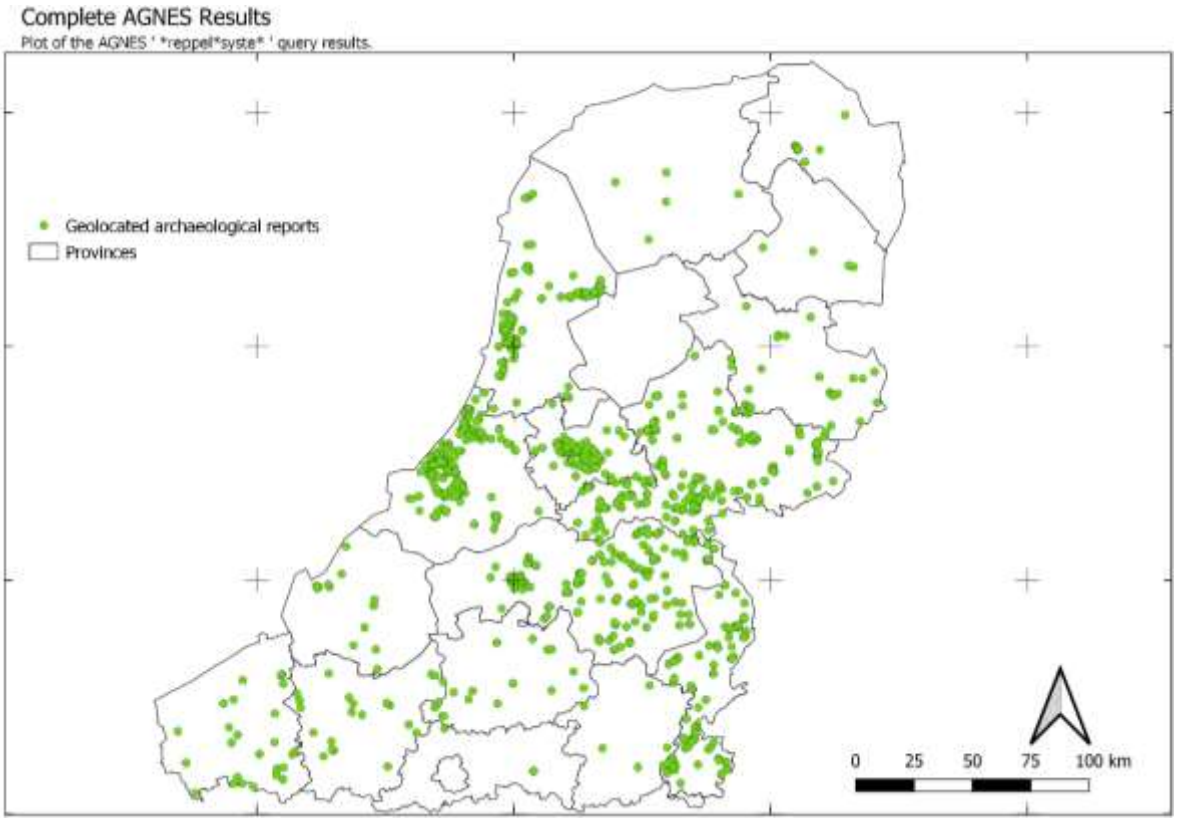

Figure 3.4: A rendering of the AGNES query results. The green data points represent the geolocated archaeological reports extracted using the '*reppel*syste*'-query. The reports were subsequently plotted on a map of the Netherlands and Flanders (ESPG: 28992). A profound clustering of ditch system sites around the western coast can be seen, presumably due to urban density (n= 2,252). (Figure: Gijs Thissen).

This data was plotted into QGIS, an open-source geographical information system software, to be geographically delineated. Using the aforementioned podzol soils extracted from the ESDAC database (Panagos, 2004; Panagos, 2022, p. 3), I clipped the geolocated archaeological reports to keep the ones located on the sandy soils in the MDS & WF regions (see Figure 2.2).

3.5 Archaeological reports

However, when utilising AGNES, two key considerations must be addressed: the prioritisation of recall over precision and the lack of section-specific Named Entity Recognition (NER). AGNES was initially developed following a user requirement study conducted by Brandsen et al. (2019, p. 27), which revealed a preference for recall over precision. This approach prioritises the inclusion of potentially irrelevant documents to avoid overlooking potential documents. Second, is the lack of a section feature. Currently, AGNES 'ties' entities to a page, rather than to a section. It, therefore, may occur that contextually distant entities are 'tied' to the same page, instead to their respective sections. These discrepancies require a human reader to manually check the reports. Therefore, the remaining 307 reports were manually read in order to ascertain whether the 'ditch system' was an Iron Age(/Early Roman) one.

The commercial archaeological reports denote a particular phase within a research project, and therefore, multiple reports may overlap in site location. Consequently, it was decided to, when it comes to ordering the data, deal with individual sites rather than individual reports. Hence, in some instances, multiple reports (e.g. *Oss-Horzak West*) were combined to form a single site, in these instances separate citation was provided. Only when sites were too dissimilar, or did, as was the case in *Udenhout* and *Oss-Horzak*, investigate highly different periods, were they treated as distinct sites. Consequently, *Udenhout* is split up in three and *Oss-Horzak* in two.

The archaeological reports, after being geographically and temporally screened, were read to extract characteristics relating to temporality, geographical context, dating method, ditch system contents, and general description of the ditch systems. This data was ordered and summarised, emphasizing the ditch systems within the greater archaeological context. The results are found in the succeeding chapter (Chapter 4) and Appendix B.2-3.

Chapter 4: Results

4.1 Geographical report distribution

The purpose of this research is to gain a better (over)view of the function of ditches, as well as ditch systems constructed on the southern Dutch and northern Belgian aeolian cover sand soils during the Iron Age (800 – 12 BCE) and Early Roman Period (12 BCE – 69 CE). Using the contextual engine AGNES archaeological reports were extracted from repositories such as DANS, Archis, and the KB. The resulting data was geographically plotted and resulted in 2252 archaeological reports across the continental Netherlands and Belgium, 2057 (91% of total) of which were geolocated (see Figure 3.4). After the reports were geographically delineated, 307 (13.6% of total) reports were located within the research area (see Figure A.1). Additionally, after reading the remaining 195 non-geolocated reports, 10 (0.4% of total) were deemed to be located within the research area, of which a significant part in Flanders.

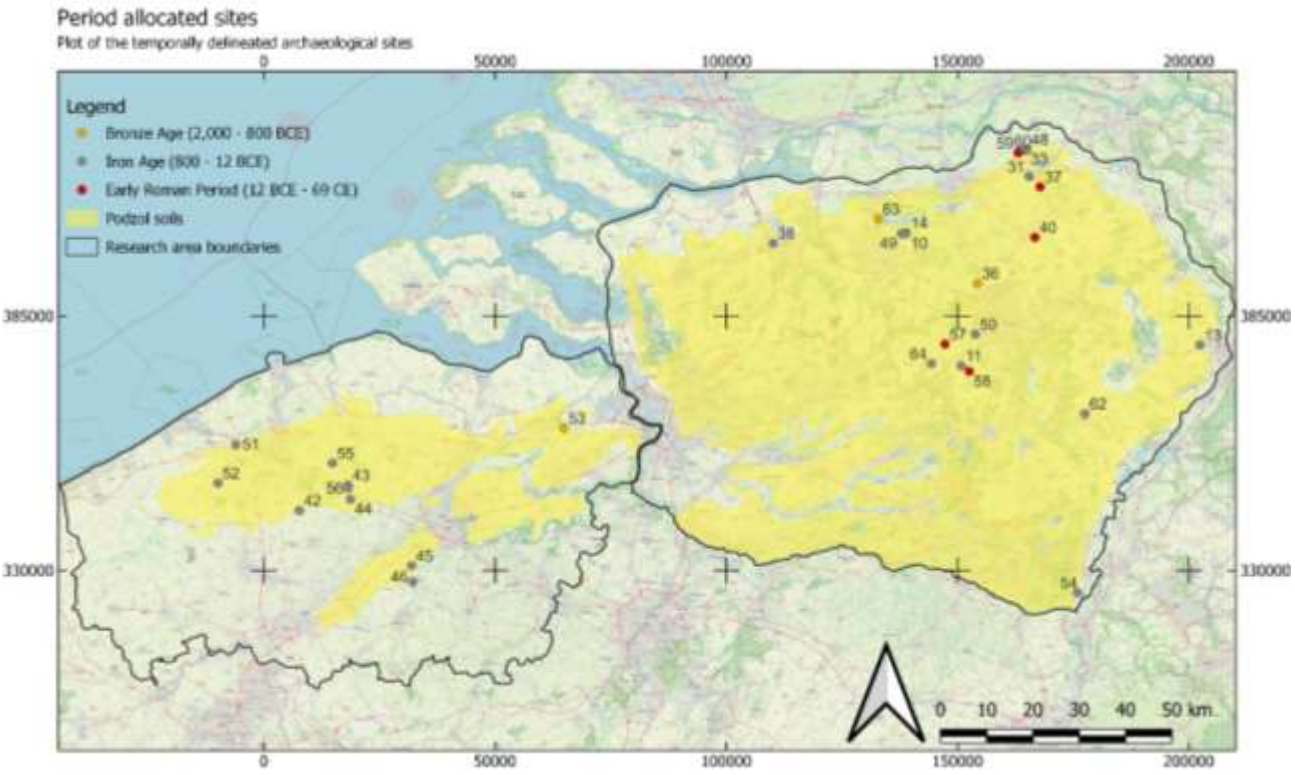

Figure 4.1: Map of the temporally delineated archaeological sites. The archaeological sites are, based on the initiation of their respective ditch systems, grouped into three categories: Bronze Age, Iron Age, and Early Roman Period. The labels correspond with the Site-ID attribute in the short dataset (Appendix B.2) and the accompanying detailed site outlines (Appendix B.3). (EPSG: 28892). (Figure: Gijs Thissen).

Looking at all sites, major clusters were found within the western and southern Netherlands, while hardly any reports were found in the northern Netherlands and the southwest of Belgium. This trend continues when the sites are geographically delineated, showing a significant discrepancy between the sites located in Meuse-Demer-Scheldt area (292 sites (92%)) and Flanders (25, sites (8%)) (see Figure A.2). This distribution aligns, with one exception (*Neerharen-Rekem*, a site located along the Meuse river in Belgium), with the present borders of the Netherlands and Belgium, and clusters therein around major population centres.

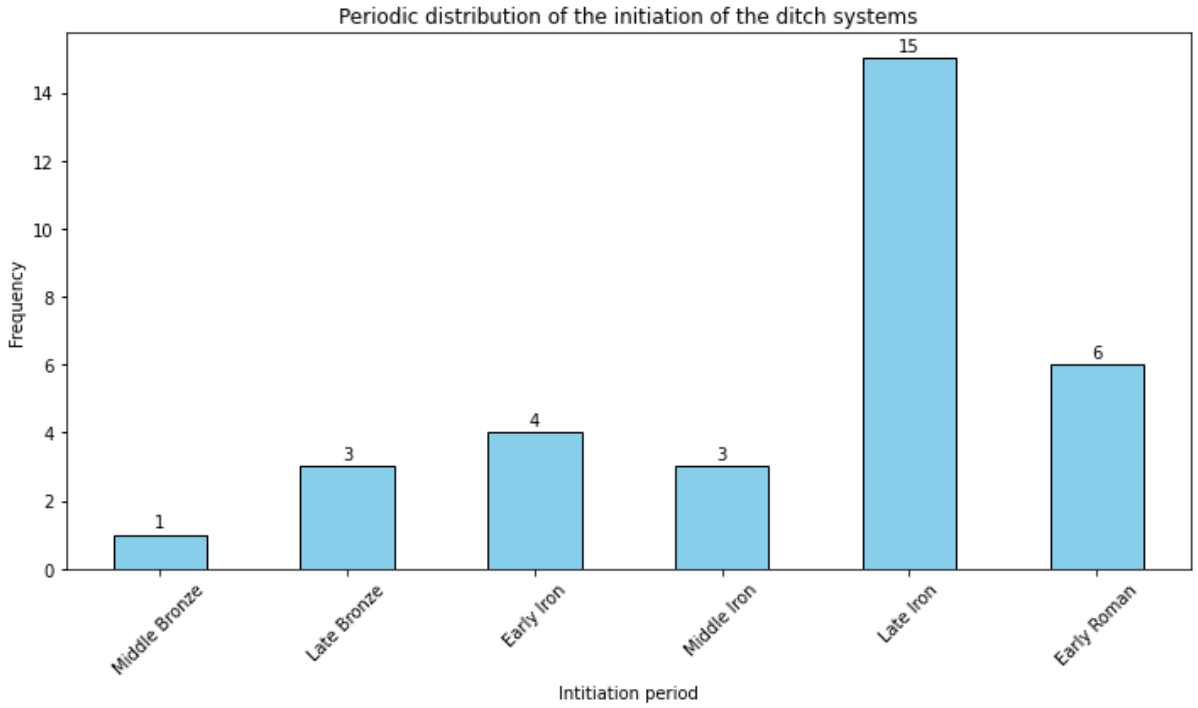

Figure 4.2: Distribution of the period of initial ditch construction in the MDS and Flanders. The y-axis represents the frequency of sites whose initial construction period falls within the periods on the x-axis (for further details see Appendix B.2-3) (n=32). (Figure: Gijs Thissen).

4.2 Temporal distribution

Considering the temporal distribution of the entire dataset, 4 ditch systems were built during the Bronze Age, 22 during the Iron Age, 48 during the Roman Period, 159 during the Medieval Period, and 84 during the Modern Period. Therefore, the total number of sites fitting within the research range (Iron Age – Early Roman Period) was 32 (MDS: 22 (69%) and Flanders: 10 (31%)). Figure 4.2 shows the distribution of ditch initiations, the earliest of which was constructed in the Middle Bronze Age (*Jabbeke-Oude Ketelweg*) and is included due to its continuation into the later Iron Age. Furthermore, a peak in construction can be

seen in the Late Iron Age, representing 15 ditch systems (46%). The geographic distribution of the temporally differentiated sites is illustrated in Figure 4.1.

As introduced in chapter 1, ditch systems were multi-generational, anchored entities in the landscape, often extending their use beyond a single time period. This is evident in Figure 4.3, where the majority (84%) of the sites span multiple periods. The timeline, furthermore, highlights a broad temporal coverage, with the earliest ditch systems, dating to the Middle-Late Bronze Age, still in use during the Iron Age – Early Roman period. Strikingly, certain ditch systems (e.g. *Oerle*, and *Aarle-Hokkelstraat*) last for 1,000-1,500 years. Moreover, a significant pattern is observed in the frequent (86%) continuity between the Late Iron Age and the Early Roman period.

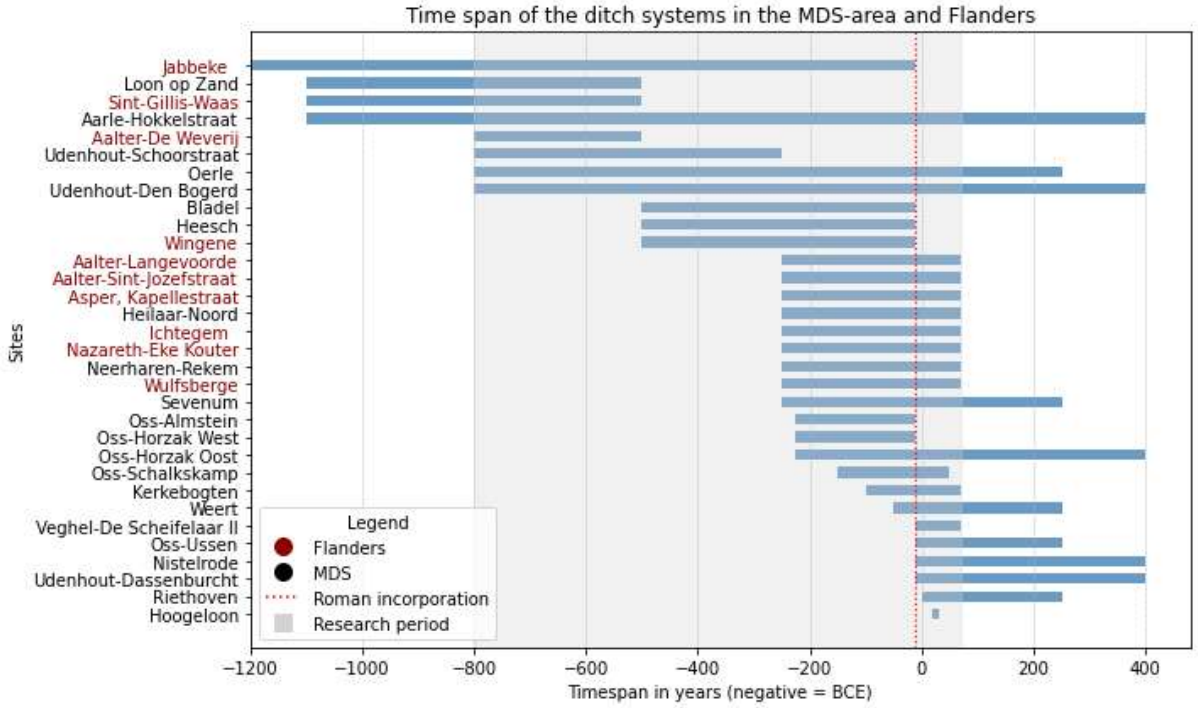

Figure 4.3: Timeline of the sites' ditch systems. A Gantt chart depicting the timeline during which the ditch systems were in use for each specific site. The sites are ordered temporally on the initiation of the systems, starting in the middle Bronze Age (*Jabbeke*) through to the Early Roman period (*Hoogeloon*) (n=32). (Figure: Gijs Thissen).

Finally, as previously mentioned, AGNES' design process prioritised recall over precision, leading to the anticipated retrieval of a substantial number of (temporally) irrelevant documents. The dataset reflected this design choice, with 285 of the 317 reports being temporally irrelevant, resulting in a precision of 10% ($\frac{\Sigma relevant}{\Sigma total\ retrieved}$) (a 7.9% increase compared to the 2.1% precision in Brandsen & Lippok (2021, p. 4)).

4.3 Ditch characteristics

The commercial reports vary both in content and structure, and were thus inconsistent in incorporating characteristics of the 'bycatch', there is no unified approach for taking such measurements. Therefore, for each subsection, a selection of reports was made, as most lacked the measurements (or were unable to be inferred). The non-specific measurements are reported as ranges, in these cases a (weighted) average was taken. Meaning that a single observation may include several ditches, as the true number is unknown if not reported in the literature. Lastly, some sites contain multiple systems and were subsequently denoted multiple times according to their time period (e.g. *Heesch* and *Heilaar*).

4.3.1 Depth

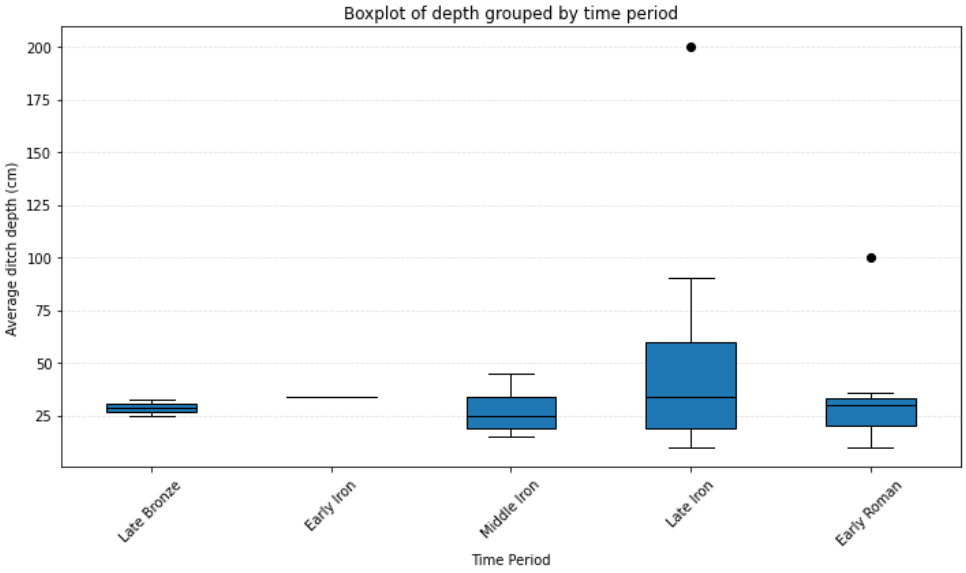

Figure 4.4: A boxplot of the average ditch depth grouped by time period. Due to the uncertainty shown in ter Steege et al. (2011, p. 316) regarding the Early Iron Age construction of the *Oerle-Zuid* ditch, it has been excluded form the boxplot. Consequently, the Early Iron Age consists of one value as the mean ($\bar{x}$) and median (M) are both 34cm (the depth of the ditch at *Aalter-De Weverij*). The median is demarcated by a black stripe and outliers are denoted outside the whiskers in black (n=23). (Figure: Gijs Thissen).

As can be seen in Figure 4.4, the 23 depth measurements, taken from 14 sites, are divided into five time periods: Late Bronze Age (n = 2, $\bar{x}$ & M = 28.75, range = 10 – 50), Early Iron (n = 1, 34cm), Middle Iron Age (n = 4, $\bar{x}$ =27.50, M = 25, range = 10 – 50), Late Iron Age (n = 12, $\bar{x}$ = 53.92, M = 37, range = 10 – 80), and Early Roman (n = 4, $\bar{x}$ = 44, M = 33, range = 10 – 100). The ditch system depth varies little in the Late Bronze through Middle Iron ages. In the Late Iron Age, however, great variety occurs, and while shallow ditch systems do occur (e.g. *Heilaar* or *Nazareth*, see Table A.1) the area sees the introduction of larger, deeper systems (e.g. *Oss-Horzak West*). Notable outliers include *Weert-Molenakker* (MDS) in the Late Iron Age (200cm) and *Hoogeloon-Kerkakkers* (MDS) in Early Roman period (100cm).

4.3.2 Width

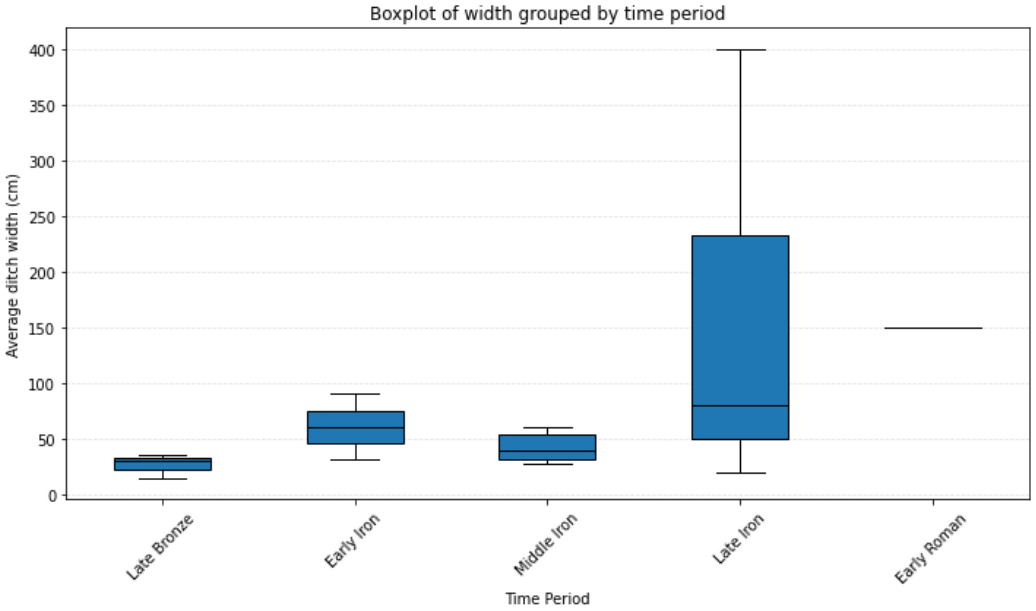

Figure 4.5: A boxplot of the average ditch width grouped by time period. The data from *Sint-Gilis-Waas* (BE) was removed due to a non-continuous measurement ('*below 100cm*', it would have likely been an outlier). Furthermore, the Early Roman Period shows a single stripe, as the mean and median are both 150cm (due to the ditch in *Oss-Horzak West)*. The median is denoted by a black stripe, there are no outliers outside the whiskers (n=23). (Figure: Gijs Thissen).

As can be seen in Figure 4.5, the 23 width measurements, taken from 13 sites, are divided into five time periods: Late Bronze Age (n = 3, $\bar{x}$ = 26.67, M = 30, range = 15 – 35), Early Iron Age (n = 2, $\bar{x}$ & M = 60.75, range = 20 – 114), Middle Iron Age (n = 6, $\bar{x}$ = 42.50, M = 40, range = 20 – 62), Late Iron Age (n = 11, $\bar{x}$ = 145.91, M = 80, range = 20 - 400), and the Early Roman Period (n=1, 150cm). Similarly to the depth measurements, the ditch width variation was limited from the Late Bronze Age through the Middle Iron Age. In the Late Iron Age, a significant amount of ditch systems were constructed, both narrow (e.g., *Heilaar* or *Nazareth*) and larger, wider ones (e.g., *Oss-Horzak West* and *Weert*). No notable outliers were found in the average category.

As a final point, ditch length graphs/tables are excluded, as they are highly dependent on the area excavated. For example, the ditch in *Oss-Horzak West* is quite substantial, measuring 380 metres, whereas the ditch in *Weert* is only partially excavated and therefore the full extent is yet unknown. Such discrepancies are common, with only five sites (15%) having a full length measurement.

4.3.3 Orientation

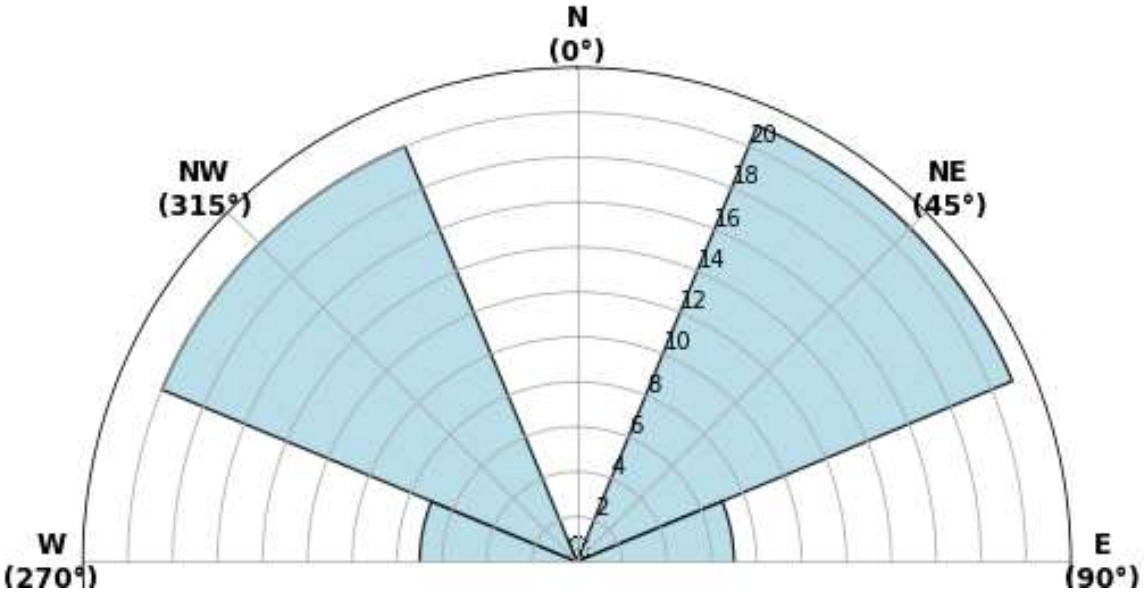

Figure 4.6: A (halved) compass graph showing the orientation of ditch systems across time. Since ditch systems do not 'face' a particular direction, but rather run along an axis, the northern and eastern half of the axis were chosen for clarity. Similarly to a bar graph, the ticks denote the amount of ditches (n=49). (Figure: Gijs Thissen).

Rather than facing a direction, ditches run along an axis (e.g. northwest to southeast), in both directions. Furthermore, as most archaeological reports do not denote a direction in degrees, but rather one in a cardinal direction (e.g. north), it was decided to only include one direction. As can be seen in Figure 4.6, the majority of ditches are orientated along the NE-SW axis (42%) followed by the (perpendicular) NW-SE axis (41%). When broken down across time, as seen in Table 4.1, an increase in popularity of NW-SE and accompanying NE-SW-orientated ditches is apparent. However, this may be an artefact from the similar rise in ditches in the Late Iron Age (see Figure 4.2). Notable, however, are the limited amount of ditches running in the E-W and N-S directions (16%).

	East (E)	Northeast (NE)	North (N)	Northwest (NW)	Total
Middle Bronze Age	1	0	0	0	1
Late Bronze Age	0	3	0	2	5
Early Iron Age	0	3	0	3	6
Middle Iron Age	0	5	0	1	6
Late Iron Age	6	6	1	10	23
Early Roman Period	0	4	0	4	8
Total	7	21	1	20	49

Table 4.1: A frequency table breaking down the distribution of ditch directions. Similar to Figure 4.6, the ditches were divided into the four 'upper half' cardinal directions, as they do not face a direction, but rather run along an axis (N=49). (Table: Gijs Thissen).

4.3.4 Shape

Mentions of ditch shapes in the reports are scarce (16%), however, when mentioned the results are uniform. The ditches within the research area mostly resemble the bowl (or U)-shape (75%) (3 at *Heesch,* 1 at *Aalter-Langevoorde,* and 2 at *Loon op Zand*). Notable exceptions are *Oerle-Zuid* (V-shape) and *Oss-Horzak West* (various, inconsistent uniformity). It is noteworthy is that in the Late Iron Age, the shapes varied the most (*Aalter-Langevoorde, Oerle-Zuid*, and *Oss-Horzak West*). No graphs are provided due to the low sample size (n=8).

4.4 Material finds

The excavated ditches yielded various artefacts, which often aided in dating the ditch (along with associated structures). The majority of the recovered materials consisted of indigenous (Iron Age) ceramic sherds, comprising of 13 non-typological assemblages (61%) and 3 Oss-typology assemblages (phase J-L; 14%). The remaining pottery include two Roman ceramic assemblages and a Bronze Age one. Noteworthy artefacts uncovered outside this category were uncovered in *Oss-Horzak West* where in the corner of a ditch an assemblage of slingshot stones was discovered, *Riethoven* where Roman denarii (coins) dating from 218-231 CE were found (Hiddink, 2013, p. 69), and in *Bladel* where several cattle horns, a small pot in a larger vase, a grinding stone, and a single Celtic coin were discovered (van As, 2008, p. 125).

Chapter 5: Discussion

The purpose of this chapter is to compare and interpret the data presented in Chapter 4 in order to provide an answer to the research questions posed. In this thesis, I examine the extent, physical appearance, character, and origin of the demarcated (settlement-related) ditch systems on the Meuse-Demer-Scheldt and Flemish sand soils during the Iron Age and Early Roman period. In the first section the emergence of ditches during the late Bronze and early Iron Ages will be discussed, as well as their development over time. The second section will outline the physical characteristics of ditch systems as found on the cover sands of the research area. In the third section, I examine the types of enclosures present within the research area, as well as what they enclose. The fourth section briefly discusses the impact of the ditches, especially within the context of shaping the settlement. Finally, the methodological, geographical, and temporal limitations of the study will be discussed.

5.1 Emergence of ditch systems

Ditch systems first appeared in the Meuse-Demer-Scheldt and Flanders region during the Middle to Late Bronze Age (1,500 – 800 BCE). Their emergence aligns with a broader trend of indigenous landscape division, developing around the same time as the Celtic field systems (Arnoldussen, 2018, p. 231). The earliest documented sites, such as *Jabbeke-Oude Ketelweg, Aarle-Hokkelstraat, Sint-Gillis-Waas-Reepstraat,* and *Loon op Zand-Kraanvensche Heide*, mainly feature relatively shallow demarcation ditches surrounding fields (e.g. *Aarle-Hokkelstraat* and *Sint-Gillis-Waas-Reepstraat* (Bourgeois et al., 2003, pp. 271-272; Bink, 2010, p. 45)).

As can be seen in Figure 4.3, indigenous ditch systems continued to be constructed throughout the Iron Age, with ditch systems such as *Heesch* and *Udenhout-Schoorstraat* being erected (van Beek, 2004, pp. 53-57; Pronck, 2012, p. 19). Notable, however, is the considerable increase in ditch construction in the Late Iron Age, with 46% of the ditches found in the dataset being constructed. This significant increase predates the Roman influence (from approximately 50-12 BCE onwards), supporting the argument for the development of an indigenous demarcation tradition.

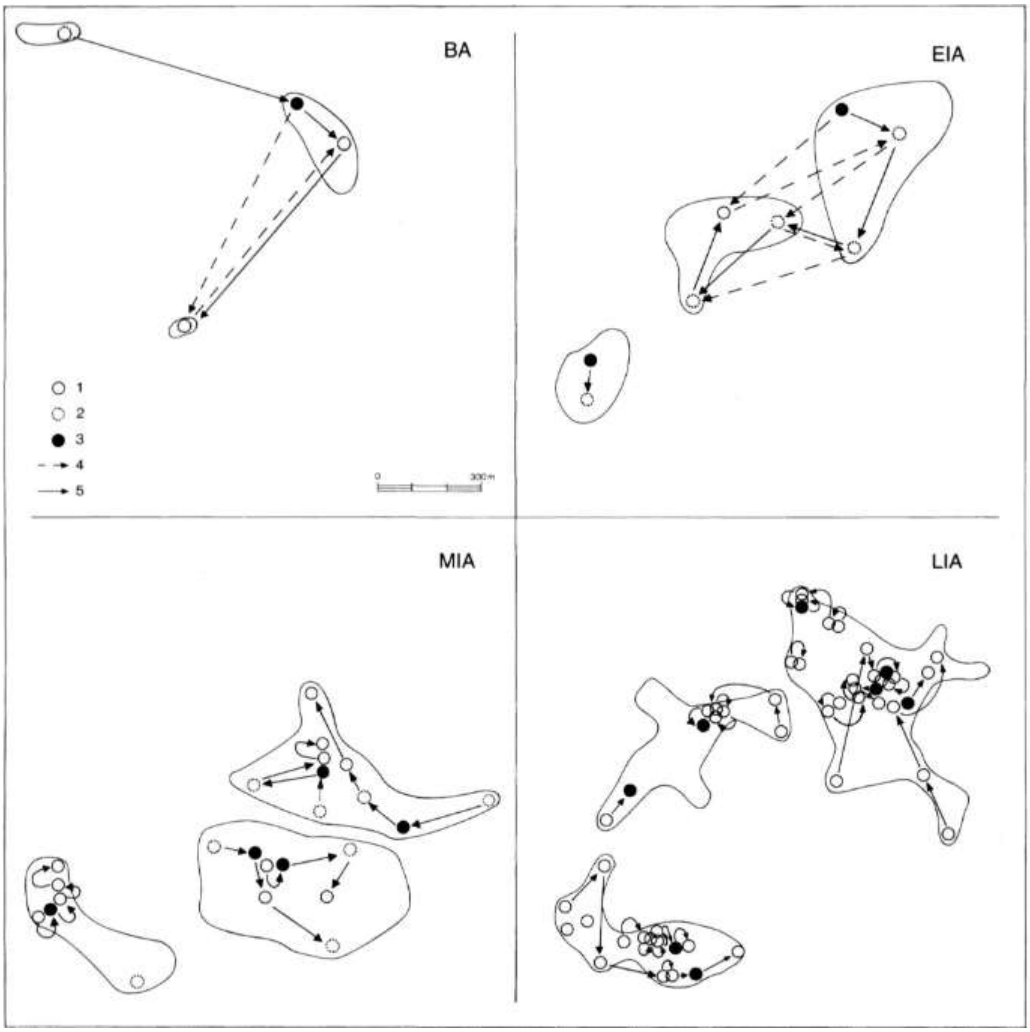

Figure 5.1: The (hypothetical) model of house relocation in *Oss-Ussen* from the Bronze Age (BA) to the Late Iron Age (LIA). The black arrow (№ 5) represents the relocation of the yard (№ 1) to the contemporary yard (№ 3). The other symbols denote the alternative locations for farmsteads, this is irrelevant to the scope of the thesis. The settlement shown predates the Roman one described in Appendix B.3. (Schinkel, 1998, p. 177, Figure 157).

The significant increase in the construction of demarcation ditches throughout the Late Iron Age must be understood in the context of shifting settlement patterns. Characterised by changes in spatial organization, the Late Iron Age saw an increase of sedentarisation, an increase in nucleation, and a decrease in resettlement distances (Schinkel, 1998, p. 179; Jansen & Fokkens, 2002, p. 328). While in the Bronze and Early Iron Ages, farmers tended to resettle across large distances (see Figure 5.1a-b), by the Late Iron Age these distances had decreased significantly (Figure 5.1d). As illustrated in Figure 5.1, several generations would resettle in the same settlement area, as evidenced by the overlap of consecutive house plans in the archaeological record (Gerritsen, 1999, p. 90-91). The presence of demarcation ditches, constructed during the Late Iron Age around these places would have separated the resettlement area from the surrounding landscape. Encapsulating the moving settlements within a bounded, enclosed system. Consequently, shaping the resettlement patterns of the

following generations, and by delineating the appropriate settlement area, their presence ultimately contributed to the process of nucleation.

Figure 5.2: The Iron Age ditch enclosing the Roman settlement at Oerle-Zuid. The yellow feature represents the ditch enclosing the settlement. The Roman houses are illustrated in purple, while the brown-orange structures signify Late Iron Age house plans. In the southern corner of the system, an opening can be seen. (ter Steege et al., 2011, p. 313, Figure 11.1).

Continuity of these ditch systems, however, as can be seen in the majority of these Late Iron Age ditch systems (86% continuing into Roman times, the exceptions being *Oss-Horzak West* and *Oss-Almstein*), does not mean continuity of habitation by the inhabitants who dug the ditch. Throughout their multigenerational existence, ditch systems became semi-permanent forces in the landscape, outlasting the original generation and being present in the landscape for an average of 491 years. In later years, these systems, often diminished through post-depositional processes such as the partial filling of the ditch with colluvial material, would still be recognizable in the landscape. Later settlements would be actively shaped by their presence in the landscape.

This is evidenced by the layout of the Roman sites of *Oss-Schalkskamp* and *Oerle-Zuid*. The former site, which was abandoned in 75 BCE (end of Oss-phase M), saw rehabitation in the Early Roman period (ca. 1 CE). The ditch, as evidenced by the orientation of the Roman settlement, functioned as a guiding structure for the settlement (Wesselingh, 2000, pp. 180-181). In a similar vein, the site of *Oerle-Zuid*, whose ditch is of uncertain dating (although it is most likely to be of Late Iron Age origin), was repurposed by the later inhabitants due to its favoured location. The Roman settlement pattern can be seen in figure 5.2, with the houses not extending beyond the previously abandoned ditch. Therefore, it can be discerned that by Roman times, the ditch, likely too shallow to serve its original purpose due to post-depositional filling, was still visible in the landscape. Continuing to serve as an enclosure ditch (ter Steege et al., 2011, p. 316).

As discussed above, most Early Roman ditch systems saw their genesis in the Iron Age (approximately 70%). Oss-Westerveld (early 1st century CE) and Hoogeloon-Kerkakkers (20 CE) are among the remaining 30%. In both cases, ditch systems of considerable size enclosed Early Roman settlements (Slofstra, 1991, p. 148; Hiddink & Roymans, 2015, p. 67). Settlement-wise, the period marked the culmination of the ongoing nucleation process, permanent settlements acquired permanent yards, and resettlement, if any, took place roughly in the same area (Schinkel, 1998, p. 179; Gerritsen, 1999, p. 91).

5.2 Physical appearance

5.2.1 Measurement discrepancy

The dataset consists of 32 sites extracted from 48 reports, each presenting measurements in varying ways. The measurements extracted from these reports include depth, width, orientation, and shape, and will be discussed in the following paragraphs. This section aims to observe trends, correlate the data with earlier research and place the ditches in the larger landscape.

The ground-level in the Meuse-Demer-Scheldt and Flanders regions has, partly due to the absence of soil deposition processes, remained largely the same since prehistoric times. Therefore, the people hollowing out the ditches would have done so from a ground level roughly equal to that of modern times. The consequences of this are twofold. First, as the top soil layer continued to be used, mainly through ploughing and bioturbation, the layer was disturbed and the features present destroyed. Consequently, when archaeological research is performed, the top soil layer (0.5 – 1 metre) is removed to discern archaeological features

against the larger matrix. The measured depth and width, therefore, do not correlate with the original depth and width, as can be seen in Figure 5.3. Instead, the depth and width reported in archaeological reports (e.g. ter Wal (2010, p. 53) on *Heilaar-Noord*) are measured from the trench level. An uncertainty factor is applied to these measurements (~ 75cm) to properly derive conclusions from the measurements. In addition to this, as evidenced in *Oss-Horzak West*, a (refuse) hill, built up from the sandy waste material extracted during the construction of the ditch, often accompanies the system (van As & Fokkens, 2015, p. 37). While sometimes evidence remains as to the presence of earlier hills (as in *Weert-Molenakker*), most have eroded throughout the years, either partially depositing back into the ditch or dispersing throughout the landscape (Gerritsen, 2001, p. 157; van As, 2008, p. 26; van As & Fokkens, 2015, p. 37). Accordingly, the true extent and physical character of the ditch, and its associated hill structure, is be unknown and must be inferred. Various reports address this issue in different ways, with some leaving out the measurements all together, while others acknowledge them, but only provide ranges.

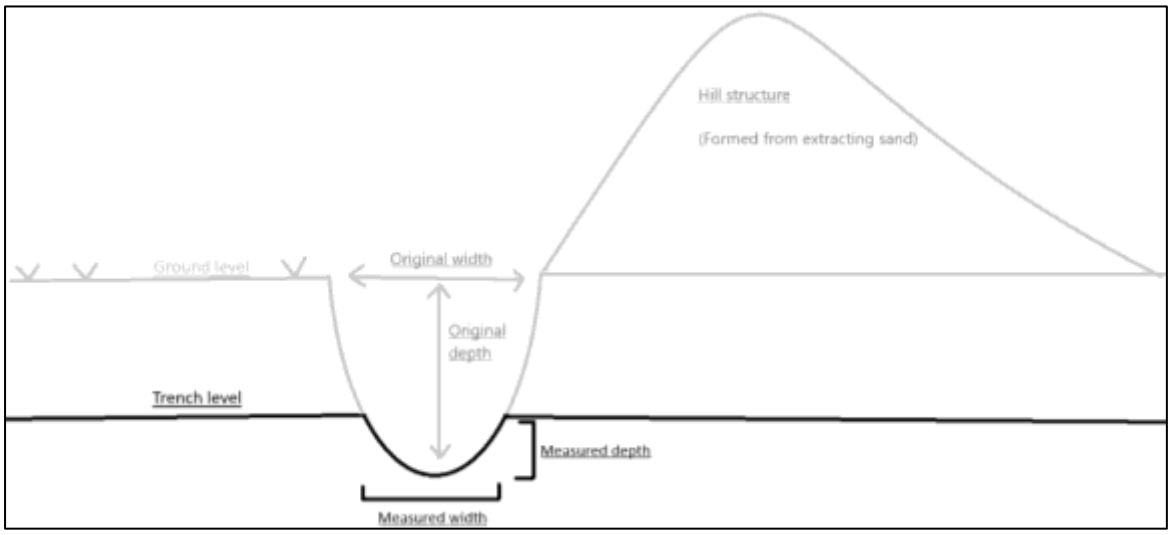

Figure 5.3: Showing the mismatch between measured ditch measurements and original measurements. As trenches are dug out, and thus lower, than the ground level (NL: *maaiveld*), the measurements taken and incorporated in the archaeological reports do not represent the reality. Thus, adjustment is needed to make infer meaning from the measurements. (Figure: Gijs Thissen).

5.2.2 Dimensions

In the Late Bronze to Early Iron Age, the dimensions of the emerging ditches were quite uniform, both in depth and width. These ditches were marked by their narrow and shallow characteristics (approximately 1 metre deep and 1 metre wide). The extracted sandy soil would have formed a small hill structure (on either side) along the length of the ditch, making it noticeable in the landscape. Nevertheless, their characteristics, even when accounting for measurement uncertainty, prevented them in obstructing movement in the landscape. Rather,

as evidenced by the sites of *Loon op Zand* and *Udenhout-Schoorstraat*, their function was mainly to (mentally) divide up the landscape. Thus, mainly serving as boundaries for fields, settlements, and in extension cattle pens (Roymans & Hiddink, 1991, p. 124; Pronck, 2012, p. 9).

This trend continues in the Middle Iron Age, with sites such as *Heesch* showing similar dimensions (van Beek, 2004, p. 53). Despite differentiating further, these systems remained relatively shallow (up to one metre). Most of them, therefore, continue to be interpreted as either enclosure or field ditches.

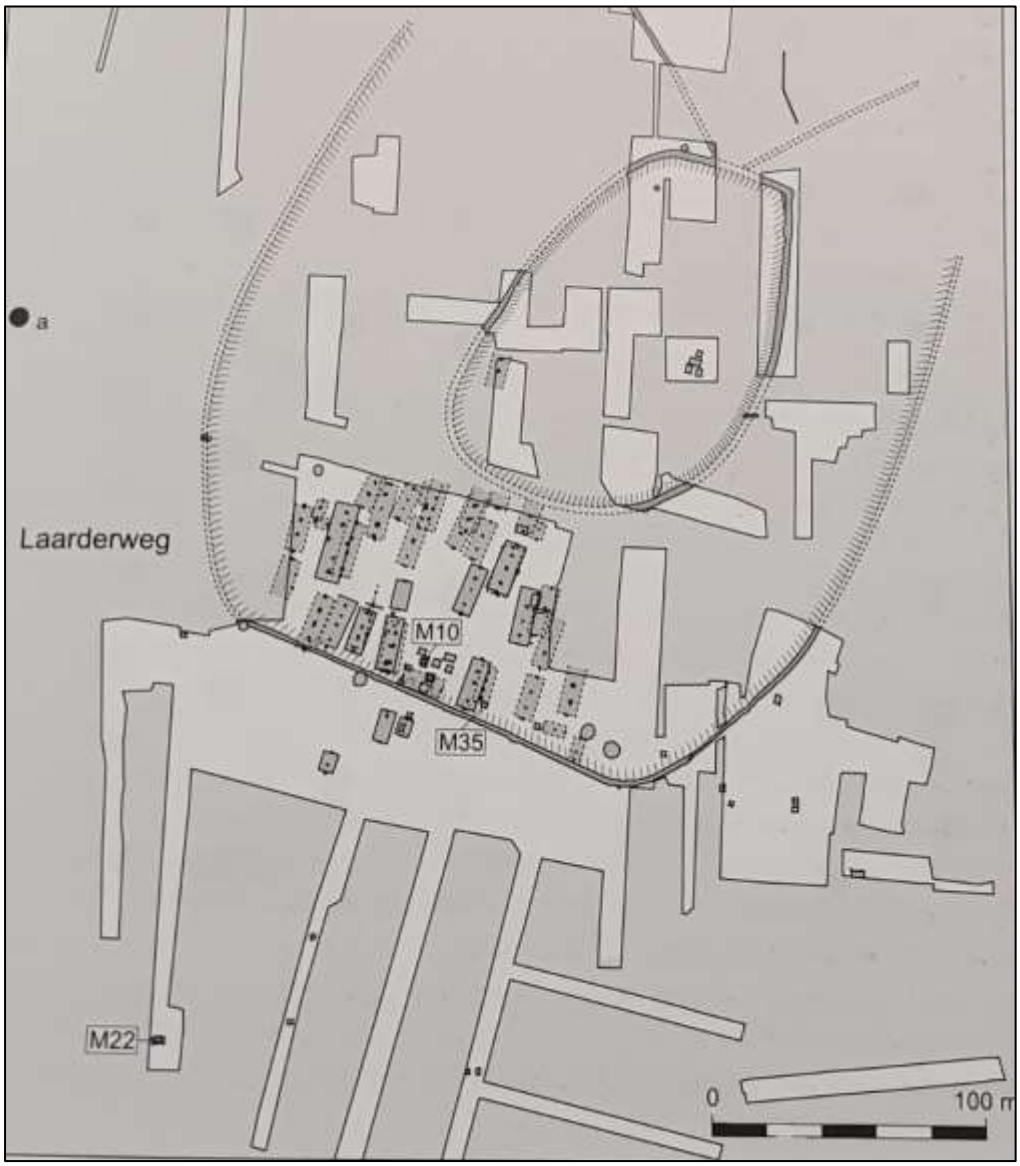

Figure 5.4: The (LBA – ERP) enclosed settlement patterns of Weert-Molenakker. The dimension of the ditch are quite substantial, and alongside a hill (marked by dashed lines) runs in parallel. The radiocarbon dated samples (M10 and M35) within the ditch system date the settlement to around 389 BCE – 125 CE (95.4%, 2σ) (Tol, 1999, p. 1). (Tol, 1999, p. 3, Figure 1.2).

Until this point, palisades had not been placed along or within the ditch. This, combined with a drastic transformation in dimension ranges, changed in the Late Iron Age. While shallow demarcation ditches remain (e.g. *Heilaar-Noord* and *Sevenum*), the area sees the emergence of larger, palisaded systems. A notable example is the double-ditched site of *Weert-Molenakker* (Figure 5.4 & B.23) marked by two 2 to 3 metre deep and 3 to 5 metre wide ditches, as well as a parallel hill structure, and was consequently fully capable of serving defensive purposes. In contrast, subsequent Early Roman ditch systems were characterized by the continuation of the tradition of shallow demarcation ditches (e.g. *Hoogeloon-Kerkakkers* and *Veghel-De Scheifelaar II*). These ditches, mainly surrounding the settlement, averaged 1 meter in depth. The construction of the broader, deeper system tradition as prevalent in the Iron Age would ultimately cease.

In conclusion, two types of ditch tradition may be discerned. One started in the Late Bronze to Early Iron Age and was marked by shallow narrow-to-broad ditches, especially found in demarcated settlements, fields, and cattle pens. A second, defensive one was initiated during the Late Iron Age, with the emergence of strongholds and deep ditch systems such as *Weert-Molenakker* and *Oerle-Zuid* (ter Steege et al., 2011, p. 314; Tichelman, 2016, pp. 152-153).

5.2.3 Orientation

Ditches align along specific axes, rather than facing a specific direction. A general axis is commonly recorded, although it may be non-specific (depending on the report). As illustrated in Figure 4.6, the dominant orientation of these systems is along the NE-SW axis, accounting for 42% of all ditches over time. This is closely followed by the NW-SE direction, which represents 41%. These two orientations are perpendicular (angled at 90 degrees) to each other, and therefore, in association would form a grid-like structure in the landscape. Notably, 32% of the ditches with known orientations were paired in a NE-SW and NW-SE ditch system, and therefore created square plots in the landscape. Prominent examples include *Oss-Westerveld*, *Hoogeloon-Kerkakkers*, and *Sevenum* (Hiddink, 2014, p. 286; Hiddink & Roymans, 2015, p. 67; Bot, 2018, p. 26).

Even when excluding these paired-up sites, the majority of the ditch systems in the MDS and Flanders areas adhere to a NE-SW/NW-SE alignment throughout the Late Bronze to Early Roman period. In total, 83% of all ditches conform to this pattern as opposed to the rarer N-S/E-W pair, accounting for only 16%. An exception to this norm can be seen in the region of *Oss* (*-Almstein*, *-Horzak*, and *-Schalkskamp*). While initially following the dominant NE-

SW/NW-SE alignment in the Iron Age, the site adopted an N-S/E-W tradition during the Early Roman period (Schinkel, 1998, p. 299). Notably, this shift in ditch orientation was matched by a shift in house plan alignment. Early Iron Age houses in the Oss-region mainly followed the NW-SE orientation, however, during Roman times a E-W orientation was adopted (Schinkel, 1998, p. 189).

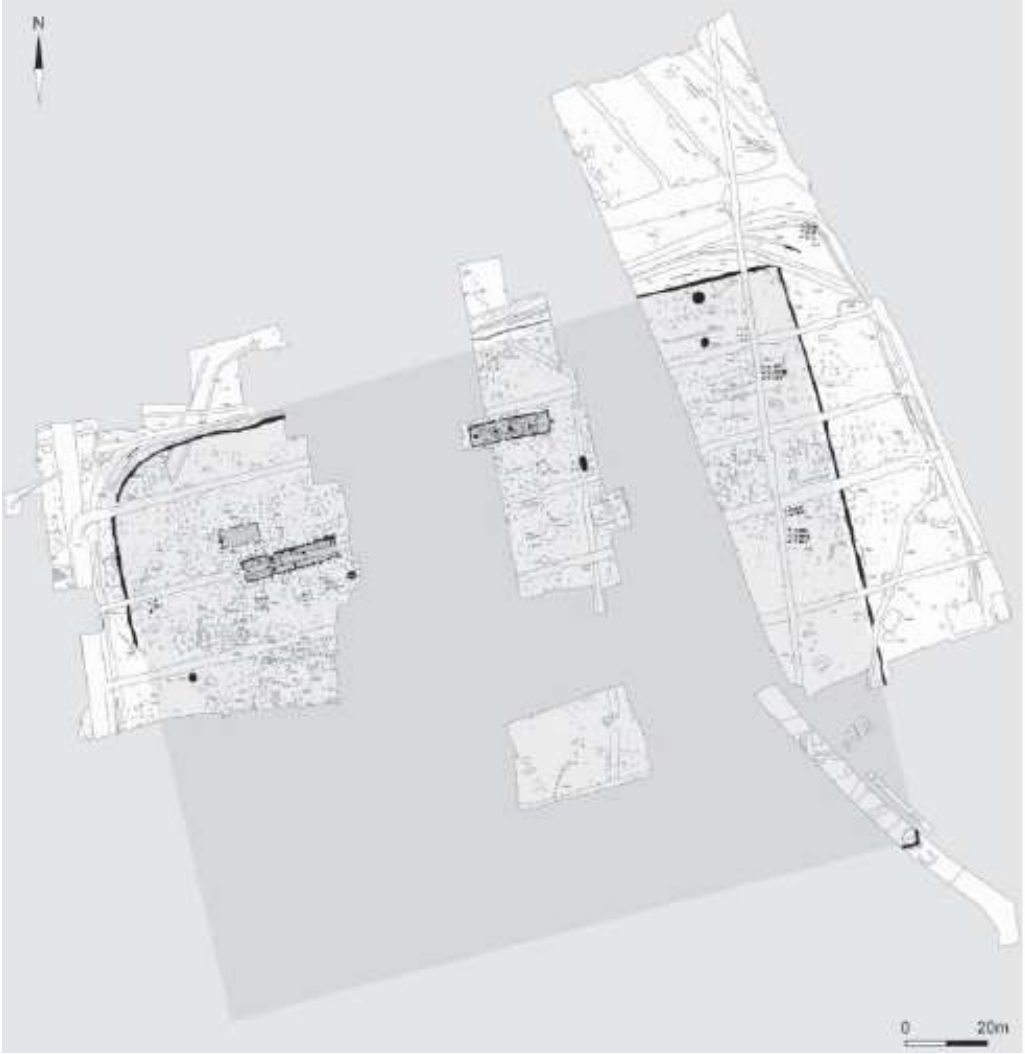

Figure 5.5: The Early Roman enclosed settlement of Oss-Schalkskamp. The site has only been excavated in a limited capacity, however, the excavated (Early Roman) buildings demonstrate parallel alignment with the surrounding (Late Iron Age) ditch system.
(Jansen & Fokkens, 2010, p. 72, Figure 4).

When examining the relationship between ditch systems and house plans in the larger research area, an interesting correlation emerges, as is demonstrated in both the example in Oss, as well as in Figure 5.5. Here, the alignment of houses mirrors the ditch axes, even when the ditch systems predate the construction of the settlement. The continuation of these alignments in the future generations suggests that the ditch systems, by that time, did not merely function as physical boundaries, but also as mental ones. A similar process took place

within the context of Celtic fields, where, as corroborated by van Beek (2011, p. 42), the alignment of structures such as road systems, burial monuments, and farmsteads was significantly determined by the field systems. In a similar vein within the MDS and Flanders, later habitation often mirrored itself on the ditch systems still visible within the landscape, using them as guiding markers for the orientation of their houses, as evidenced in sites such as *Oerle-Zuid* (Figure 5.2), *Oss-Schalkskamp* (Figure 5.5), and *Oss-Westerveld* (Figure B.20). Therefore, cultural ideas about orientation of houses, ditches and other structures were transmitted through time by these long lasting structures.

5.3 Enclosure types

This section describes the different types of enclosures within the research area. The 32 sites of the dataset show a variation of ditch systems. Based on their characteristics, place in the landscape, and chronological context, a subdivision can be made into three major types: field-, settlement-related, and defensive-ditches. These categories will be described below, emphasizing their emergence, common characteristics, associated sites, and function.

5.3.1 Field ditches

Ditches running through or enclosing fields make up 19% of the dataset. First emerging in the Middle through Late Bronze Age, as observed at the site of *Jabbeke-Oude Ketelweg*, they are characterised by their straight but shallow nature (reaching a maximum depth of 1 metre). Their function is twofold, both serving a similar purpose as earthen ridges in the Celtic Field system, namely subdividing the landscape into rectangular plots (as can be seen in Figure B.4 & B.16. As well as, serving a secondary purpose as drainage systems. This latter functionality is supported by the findings of Bink (2010, p. 45) at *Aarle-Hokkelstraat* and Verbeek et al. (2012, pp. 47-48) at *Udenhout-Den Bogerd,* where aside from parcelling up the landscape, ditches drain the land.

5.3.2 Settlement ditches

Ditches enclosing settlements are documented as early as the Late Bronze Age, however, in limited numbers, within the research area only 3 instances are noted: *Wingene*, *Aalter-De Weverij*, and *Sint-Gillis-Waas-Reepstraat*. An exponential increase in settlement demarcation is seen in the Late Iron Age (see section 5.1 for cultural context). Compared to field systems, settlement ditches are characterised by a substantially broader and deeper ditch (up to two meters wide and 130 cm deep). However, even with an accompanying hill structure, these

hardly play an obstructive role in the landscape. This absence of a defensive function is further evidenced by the absence of martial material (e.g. weapons, sling shot stones) in the ditch filling. Rather, the majority of the materials excavated find their origin in a domestic context (e.g. hand made ceramics and waste pits). These should, therefore, be understood in the context of demarcating the (re)settlement area, and the later village, rather than serving a defensive purpose. Furthermore, as posed by De Ketelaere & Sadones (2022, p. 71), Bourgeois et al. (2003, pp. 250-251), and Agache (1976, p. 116), these settlement ditches should be placed in the larger (northern) French phenomenon of *fermes indigènes* (EN: native farms, see Figure 5.6). Emphasizing the similarities between the enclosement styles of the settlement ditches in Flanders and those in France.

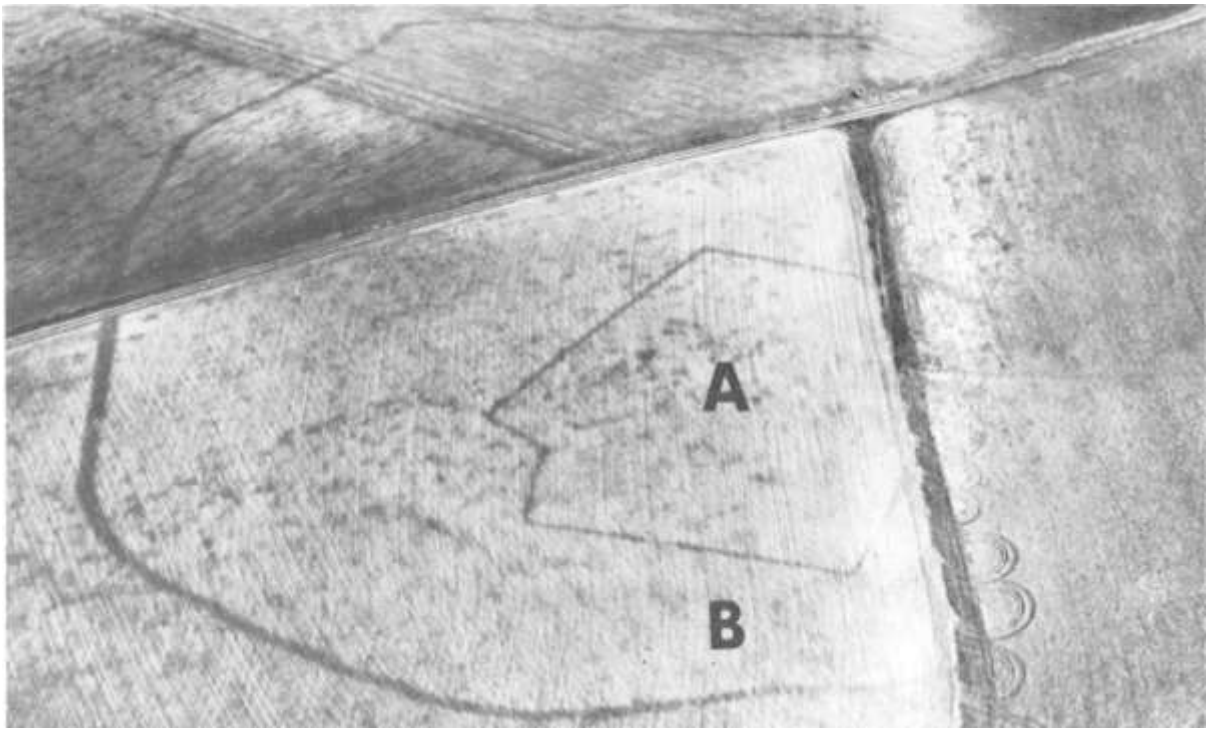

Figure 5.6: A prehistoric *ferme indigène* (EN: *indigenous farm*) in Soues (Somme), northern France. The type I 'Gallic' farmsteads are typically surrounded by two large enclosures (denoted A and B) that are nested inside each other. Photographed during an aerial survey. (Agache, 1976, p. 118, Figure 2).

5.3.3 Defensive ditches

The sites of *Oerle-Zuid, Oss-Horzak West*, and *Weert-Molenakker* are characterised by a deep and wide ditch. This type of ditch saw its genesis, as discussed in a previous section, in the Late Iron Age. The defensive capabilities ascribed to them stem from their substantial dimensions (2 to 3 metres deep and 4 to 5 metres wide), the accompanying hill structure, the presence of palisades, and their V-shape (often associated with defensive structures (ter Steege et al., 2011, p. 314)). Furthermore, martial activities near the site of *Oss-Horzak West*

are supported by an assemblage of sling stones recovered in its ditch fill. Interesting to note, however, is that for all their defensive capabilities, *Weert-Molenakker* and *Oerle-Zuid* lack associated settlement traces. In their report, ter Steege et al. (2011, p. 315), pose a refuge stronghold for cattle. However, the lack of house plans does not indicate their total absence. Post-depositional (anthropogenic) processes have a substantial effect on the topsoil, and may therefore eradicate any traces of postholes and construction ditches, especially when these are shallow. Lastly, it should be noted that for both *Oerle-Zuid* and *Weert-Molenakker*, the total extent of the settlement has not been excavated, and therefore, certain features may have been missed (see section 5.5 Limitations).

5.4 Impact on settlements

During the Iron Age, settlement patterns and societal norms were fundamentally altered by semi-permanent ditch systems introduced into a cultural landscape previously dominated by temporary fences (Løvschal, 2014, p. 732). Unlike their predecessors, ditches, with an average lifespan of 491 years, often outlived their original builders, ultimately becoming physical forces in the landscape and shaping the settlement spaces for the subsequent generations.

This is observed at the site of *Oerle-Zuid* (Figure 5.2), where Early Roman arrivals appropriated the location of an abandoned Iron Age ditch system (ter Steege et al., 2011, p. 316). While it was partially filled in, and thus could not retain its original function, it was repurposed as a boundary marker for the settlement. Thus, the limitations set by the builders were honoured by the later arrivals. Similarly, in *Oss-Schalkskamp* (Figure 5.5), equally abandoned ditches provided orientation rather than a fixed location, guiding the direction of the new settlement. Therefore, these ditch systems transcended their original enclosing function, embedding themselves as permanent guides in the landscape (Wesselingh, 2000, pp. 180–181; Løvschal, 2014, p. 725).

In the end, this process significantly contributed to the increased nucleation of the settlement. This was an essential part of the transition from wandering farms to sedentary settlements. As the ditches were constructed around the resettlement areas, it would not only have fixed them to the landscape, but also encouraged future generations to adhere to these boundaries. In this way, ditches contribute significantly to the creation of a sense of belonging in an area, a particularly revolutionary step within a resettlement culture.

5.5 Limitations

There are several limitations which need to be taken into account when considering the results. These can be classified as methodological, temporal, and geographical. First, as noted by Brandsen et al. (2022, p. 14), the majority of settlement archaeology-related entities are among the most misclassified ones (i.e. ‘house’, ‘settlement’, or ‘mine’). This issue, as corroborated by Vlachidis et al. (2021, p. 62), can be traced to the use of ordinary words in highly specific archaeological terminology. Unlike other highly specialised domains (e.g. physics), archaeological terminology largely overlaps with everyday language. Therefore, determining whether an entity constitutes an archaeological term or a common word heavily relies on context, and while partially solved by the context-dependent embeddings of (Archeo)BERT(je), this issue is still extant within the current v3.0 system (Brandsen et al., 2022, p. 14; A. Brandsen, personal communication, December 12, 2024). This constraint will most certainly limit the number of archaeological reports presented by the system, excluding several. As the true number of false negatives is not able to be discerned, it will likely not become clear how many reports are missing.

Second, the delineation of the research area to the cover-sands in the MDS and Flanders excludes significant sites and cultural connections from the surrounding areas, especially those in Northern Gaul (Slofstra, 1994, p. 25). The exclusion of these sites limits the understanding of broader (supra)regional settlement patterns and ditch initiations, restricting the ability to understand ditch system construction in a broader cultural context. The sites near the research area with similar characteristics, not incorporated in the analysis, include: *Brugelette-Bois d’Attre*, *Orp-Le Tierceau*, *Ladeuze*, *Kontich-Alfsberg*, *Gingelom-Molenveld*, *Denderbelle-Fonteintje* (Bourgeois et al., 2003)*, Kuurne-Ter Perke*, *Izegem-Belkerijstraat* (Verhaevert, 2020), *Itteren-Emmaus* (Meurkens & Tol, 2011), and *Voerendaal-Ten Hove* (Willems, 1988). To expand upon this issue, the disconnection between French archaeology and Dutch archaeology further limits establishing connections between sites on either side of the language border (NL: *Taalgrens*), negating a larger cultural area present in both lingual realms. Similarly, temporal delineation, especially limiting the researched ditch systems to after 800 BCE (the start of the Iron Age), excludes the ditch systems established in earlier times. *Jabbeke-Oude Ketelweg*, *Aarle-Hokkelstraat*, *Sint-Gillis-Waas*, and *Loon op Zand-Kraanvensche Heide* were only included since their time span extended into the research period. However, any older systems discontinued before the Iron Age would have been excluded.

Lastly, as mentioned by Bourgeois et al. (2003, p. 176), commercial archaeological excavations are inherently limited to their assigned areas. Therefore, excavation of archaeological features (including ditch systems) often results in partial features. Moreover, excluding the Oss area, regional ceramic typologies for prehistory are limited, so when scarce ceramic remains are found, dating remains difficult. Combining these factors disallows sites to be narrowly dated, and they are, consequently, often placed within general categories (e.g. Iron Age) (Bourgeois et al., 2003, p. 176).

Chapter 6: Conclusion

6.1 Conclusion

This thesis set out to challenge the narrative of the Romans initiating landscape division in Northwestern Europe, by investigating the indigenous processes of land demarcation. In light of this, I set out to answer the question: *What were the extent, physical appearance, character, and origin of the demarcated (settlement-related) ditch systems on the Meuse-Demer-Scheldt and Flemish sand soils during the Iron Age and Early Roman Period?* The main research question is answered through the sub-questions answered in the paragraphs below.

What was the extent and physical appearance of ditch systems on the sand soils in the Iron Age and Early Roman Period?

Ditch systems are present in both the Meuse-Demer-Scheldt (MDS) and Flanders regions. These systems consist of stretches of hollowed-out ground, the ditches. Since the modern and original ground levels are roughly equal, the topsoil was continuously disturbed and therefore, the original top-part of the ditch was destroyed. Hence, a discrepancy exists between the original depth and width and the measured depth and width.

Most ditches are bowl-shaped (75%) and were thus more shallow than wide. Alongside the ditches, a hill structure of sandy material was present, as evidenced in *Weert-Molenakker* and *Oss-Horzak West*. The dominant alignment of the ditches was along the NE-SW and NW-SE axes, accounting for 83% of the documented systems. These alignments are perpendicular angles, which as evidenced in *Oss-Schalkskamp* and *Hoogeloon-Kerkakkers*, made it so that the ditch systems divided the landscape up into rectangular parcels, or alternatively, enclosed settlements in rectangular shapes.

What differentiated ditch systems on the sandy soils?

Three major categories were discerned among the ditches in the research area.

The first category, bowl-shaped field ditches, are characterised by their straight but shallow nature (having an adjusted maximum depth of 1 metre). They have two functions. First, they delineate and often parcel up the fields, as attested in *Sevenum*. Second, as seen in *Aarle-Hokkelstraat* and *Udenhout-Den Bogerd* these ditches function as drainage systems.

The second category, settlement ditches, as evidenced at *Oss-Westerveld* and *Hoogeloon-Kerkakkers*, are typically bowl-shaped and characterised by a broad and deep ditch (maximum 2 meters wide and 130 cm deep). Their fill contains material related to domestic contexts (e.g. hand made ceramics and waste pit contents), indicating a close association with settlement activities. Their primary function is to demarcate the (re-)settlement areas, playing an essential role in the nucleation process central to the Late Iron Age transition from wandering farms to more sedentary settlements.

The third, defensive ditches, as attested at *Oerle-Zuid*, *Oss-Horzak West* and *Weert-Molenakker*, are characterised by deep and wide ditches (2 to 3 metres deep and 4 to 5 metres wide), an accompanying hill structure, the presence of palisades, and a distinctive V-shape. These serve as defensive structures in the landscape.

When during the Iron Age were these ditch systems put into use?

Ditch systems in the MDS and Flanders regions are first attested during the Late Bronze through Early Iron Age, as evidenced in sites such as *Jabbeke-Oude Ketelweg* and *Aarle-Hokkelstraat*. These systems, while limited in number and mostly enclosing field parcels, represent the earliest instances of a native ditch system practice which would persist until Roman times.

In the Iron Age, this practice continued, as evidenced by sites such as *Udenhout-Den Borgerd* (Early Iron Age), *Heesch* (Middle Iron Age), and *Wingene* (Middle Iron Age). These shallow field systems would remain in use through the Roman period, as seen by the ditches at *Sevenum* (Late Iron Age) and *Veghel-De Scheifelaar II* (Early Roman Period) continuing until the Late Roman Period.

During the Late Iron Age, a substantial increase in ditch construction can be seen, with 46% of all ditch systems recorded in the dataset originating from this period. Furthermore, in this period the majority of settlement ditches and defensive structures would originate, 86% of which continued into the Early Roman times.

What were the societal implications and related consequences of introducing demarcated land plots into a traditionally non-monumental fenced landscape?

The introduction of semi-permanent ditch systems and the consequent demarcation of land plots fundamentally altered settlement patterns and relationships with the landscape. In the Bronze Age, fences were used to (temporarily) demarcate the landscape. However,

(settlement) ditches, in comparison, had average lifespans of 491 years. These multigenerational features, therefore, even outlived their original builders.

This persistence in the landscape influenced the way new arrivals shaped their settlement, as can be seen in *Oerle-Zuid*. New inhabitants were influenced by the abandoned (formerly defensive) ditch systems to shape their settlement, both in the orientation and in the borders of the settlement.

Additionally, these systems influenced resettlement patterns. A permanent ditch system around resettlement areas reduced the distance between subsequent resettlement, or at least within the bounded region. As a result, the introduction of ditch systems played an important role in the nucleation of wandering farmsteads, as eventually the resettlement distance was substantially reduced and eventually houses were rebuilt in roughly the same spot.

In conclusion, the introduction of permanent demarcations not only increased sedentarisation, but also influenced how subsequent generations interacted with and adapted to the existing enclosed settlement layout.

6.2 Future research

Concluding this thesis, several avenues of research are proposed. First, as an expansion on this thesis (topic), future research should investigate the genesis of boundary systems in pre-Iron Age Europe. Since ditch, fence, and Celtic Field systems first emerged during the Middle to Late Bronze Age, further investigation of their development will shed more light on the role which these entities played in prehistoric societies. As well as the role they played in the Iron Age, ultimately placing ditch systems into a wider temporal context.

Furthermore, in order to correlate and compare various ditch system traditions, a focus should be put on the development of these systems in different Western European subregions (e.g. Northern France, Wallonia, or Rhine Valley), thus placing them in a wider supra-regional context. In turn, revealing potential cultural, social, and supra-regional patterns. However, local contexts should also be more thoroughly searched, as the current extent of ditch systems in the southern (Belgian) Meuse-Demer-Scheldt area is limited. At the moment, only one site (*Neerharen-Rekem*) is located in the area. The region, therefore, continues to form a large gap in the archaeological record. More excavations/inventarisation should be done within these boundaries to yield a more complete picture of the archaeological ditch system record in the Meuse-Demer-Scheldt.

In order to address this issue, further development of AGNES is essential, which can be accomplished in two ways. First, in line with what was mentioned before, the inclusion of reports across borders (and therefore languages) is necessary to grasp the entire picture of the Northwestern European cultural context in prehistory. Second, AGNES is currently limited to a page-by-page analysis and may therefore not adequately reflect the query. Implementing a section-by-section feature would yield more accurate results, especially for general queries.

Finally, within the commercial archaeological field, a proper measurement of archaeological bycatch and features would be preferred. The great number of commercial archaeological reports makes them valuable for large-scale academic research. However, the absence of non-invasive measurements (e.g. width and length) within these reports limits research. These inclusions would improve research results, in addition to enhancing interpretations.

Abstract

This thesis sets out to challenge the narrative of the Romans initiating landscape division in Northwestern Europe by examining indigenous ditch systems in the Meuse-Demer-Scheldt (MDS) and Flanders regions during the Iron Age and Early Roman period (800 BCE – 69 CE). Although traditional scholarship credits the Roman administration with the introduction of land division elements, such as parcels. This study demonstrates a complex and diverse tradition of indigenous land subdivision that predates Roman influence by at least 800 years. The research specifically focuses on the extent, physical appearance, character, and origin of ditch systems on Northwestern European cover sand soils. This area was chosen due to its frequent, large scale settlement research, thus allowing for the context of the ditch systems to be adequately established. Prior research into these ditch systems is limited, however, as land division elements are often considered bycatch in archaeological research and are therefore omitted from reports. The AGNES (Archaeological Grey Literature Named Entity Search) engine scanned through 70,000 (commercial) archaeological reports from various European databases, yielding 32 sites within the MDS and Flanders regions. Their analysis reveals a native tradition of ditch construction emerging in the Late Bronze through the Early Iron Age, before expanding exponentially in the Late Iron Age, and eventually continuing into the Early Roman period. These ditch systems can be subdivided into three categories: (shallow) field systems, settlement enclosures, and defensive works. The longevity of ditch systems, averaging 491 years, had a profound effect on the traditionally temporary fenced society, often outlasting their original builders, thereby influencing the settlements they enclosed for successive generations. This research highlights the profound impact indigenous societies had on the landscape, as well as the effect their systems had on them. Further it participates in a broader discussion on the idea of a one-sided romanisation process, where indigenous populations are primarily at the receiving end, advocating instead for a framework of cultural exchange between two distinct cultures, emphasizing both indigenous elements as well as Roman ones.

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Appendix A: Tables and Figures

Appendix A.1: Figures

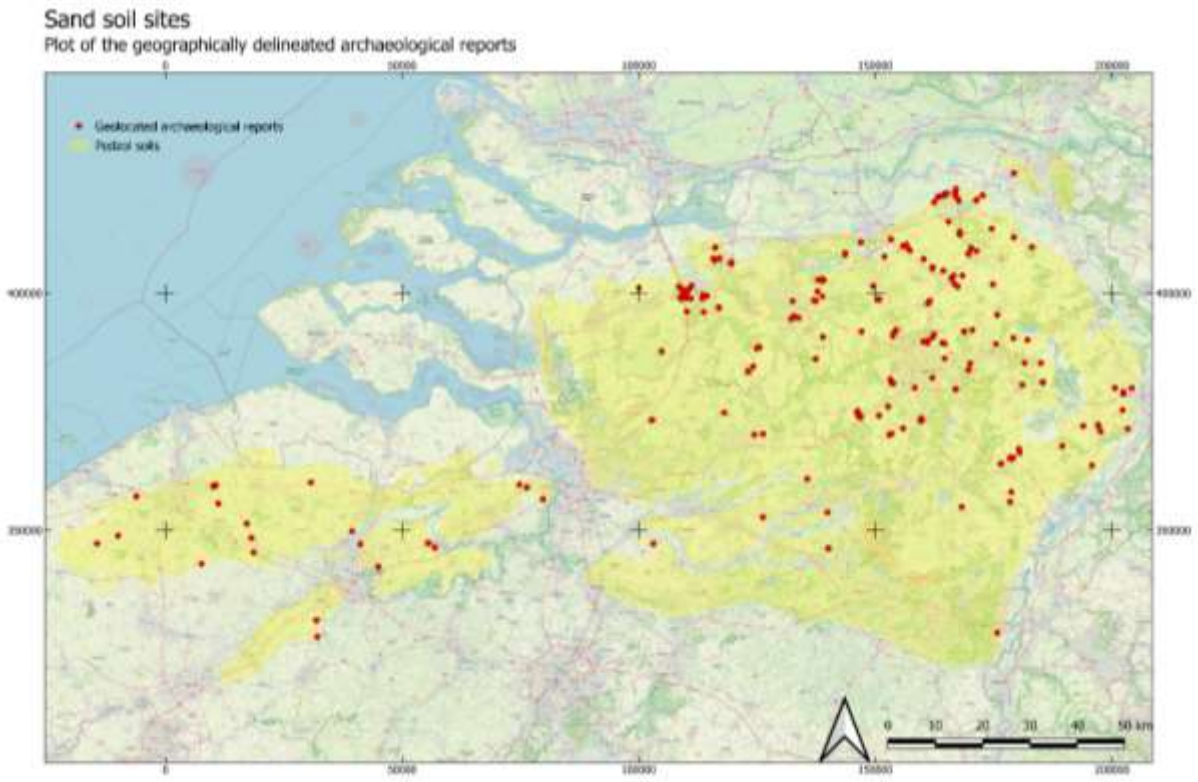


Figure A.1: Map of the archaeological reports located on the southern sand soils. The red data points represent the geolocated archaeological reports extracted using AGNES. The underlaying yellow polygon represents the podzol soils (PZgl, PZum, and PZha) found in the MDS-region and Western Flanders, the transnational data was obtained from the European Soil Data Centre (ESDAC) (Panagos, 2004; Panagos et al., 2022, p. 3). (n = 317, ESPG: 28992). (Figure: Gijs Thissen).

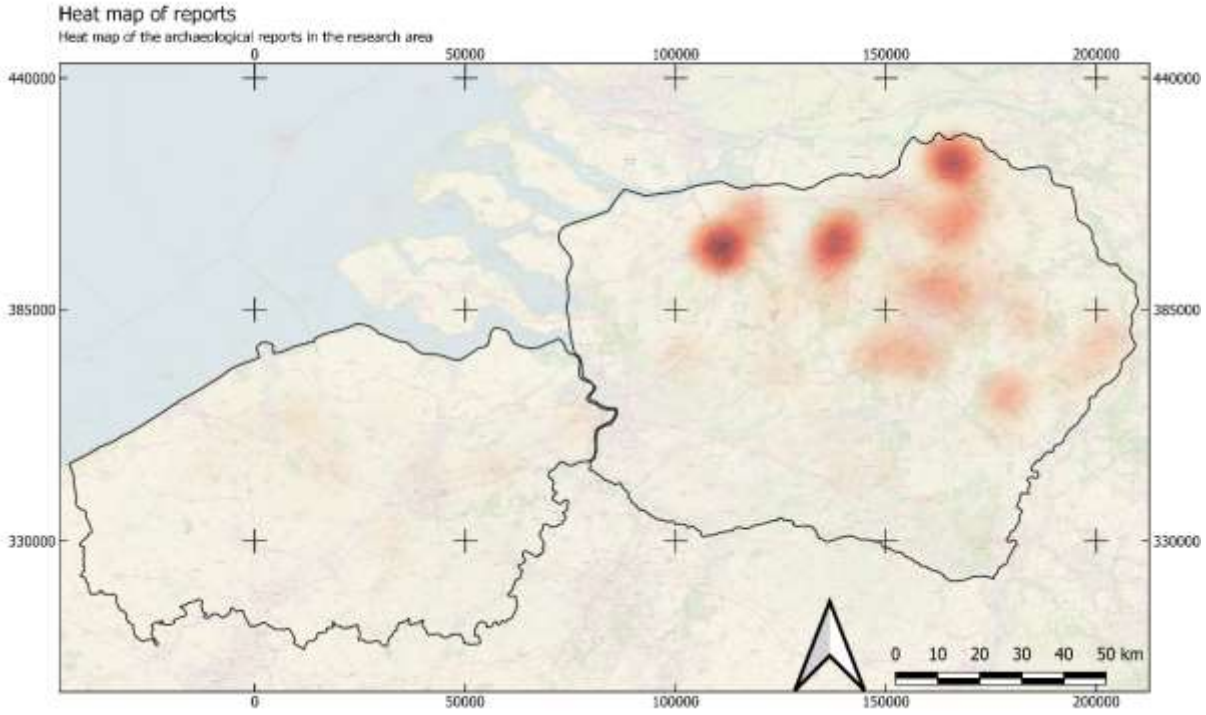


Figure A.2: Heat map of the archaeological reports. Shown is the heatmap of the archaeological reports outputted by AGNES based on the query. Noticeable are the clusters of reports around cities within the Netherlands. This is since Malta reports have a non-normal distribution, but are rather clustered around densely population areas due to urban development (Brandsen, 2022, p. 19). (EPSG: 28992). (Figure: Gijs Thissen).

Appendix A.2: Tables

Site ID	Toponym	Time Period	Depth (Range) (cm)	Average (cm)	Comments
63	Loon op Zand (NL)	Late Bronze – Early Iron	15-50	32.5	Inner Ditch
63	Loon op Zand (NL)	Late Bronze – Early Iron	10-40	25	Outer Ditch
43	Aalter (BE)	Early Iron	34	34	
50	Oerle (NL)	Early Iron – Middle Roman	100	100	Uncertain dating
31	Heesch (NL)	Middle Iron – Late Iron	30	30	Ditch 6.124/222-1
31	Heesch (NL)	Middle Iron – Late Iron	40-50	45	Ditch 6.124/222-2
31	Heesch (NL)	Middle Iron – Late Iron	10-20	15	Ditch 6.125
31	Heesch (NL)	Middle Iron – Late Iron	10-30	20	Ditch 6.126
38	Heilaar (NL)	Late Iron – Early Roman	10	10	Ditch C30-62
38	Heilaar (NL)	Late Iron – Early Roman	10	10	Ditch C30-66
38	Heilaar (NL)	Late Iron – Early Roman	14	14	Feature 53
38	Heilaar (NL)	Late Iron – Early Roman	30	30	Feature 50&51
45	Nazareth (BE)	Late Iron – Early Roman	34	34	Northern Ditch
55	Wulfsberge (BE)	Late Iron – Early Roman	50-70	60	Parallel ditches
55	Wulfsberge (BE)	Late Iron – Early Roman	10-70	40	Perpendicular ditch
13	Sevenum (NL)	Late Iron – Middle Roman	8-40	24	
33	Oss-Horzak West (NL)	Late Iron	55-65	60	Northern Ditch
33	Oss-Horzak West (NL)	Late Iron	70-80	75	Southern Ditch
62	Weert (NL)	Late Iron – Middle Roman	90	90	Outer Ditch
62	Weert (NL)	Late Iron – Middle Roman	200	200	Inner Ditch
33	Oss-Horzak West (NL)	Early Roman	25-35	30	Early Roman Ditch
40	Veghel (NL)	Early Roman	10	10	
14	Udenhout (NL)	Early Roman - Late Roman	24-48	36	
57	Hoogeloon (NL)	Early Roman	100	100	Original depth

Table A.1: Depth of selected ditch systems, ordered temporally. Only ditch systems whose measurements are known from the reports are shown. In addition, it is important to note that except for *Hoogeloon* all ditches were excavated in a trench. Hence, their shown depth requires an approximate 0.5-1m to be added (see Chapter 5: Discussion for further details). (Table: Gijs Thissen).

Site-ID	Toponym	Time period (range)	Width (Range) (cm)	Average (cm)	Other
53	Sint-Gillis-Waas (BE)	Late Bronze - Early Iron	<100	<100	
63	Loon op Zand (NL)	Late Bronze – Early Iron	35	35	inner ditch; 40-75cm
63	Loon op Zand (NL)	Late Bronze – Early Iron	30	30	outer ditch; 40-75cm
36	Aarle (NL)	Late Bronze – Late Roman	15	15	postholes every 30cm
43	Aalter (BE)	Early Iron	20-42	31	northeastern ditch
43	Aalter (BE)	Early Iron	67-114	90.5	southern ditch
50	Oerle (NL)	Early Iron – Middle Roman	250	250	Uncertain dating
31	Heesch (NL)	Middle Iron – Late Iron	40-50	45	Ditch 6.124/222 Phase 1
31	Heesch (NL)	Middle Iron – Late Iron	60	60	Ditch 6.124/222 Phase 2
31	Heesch (NL)	Middle Iron – Late Iron	35	35	Ditch 6.125
31	Heesch (NL)	Middle Iron – Late Iron	20-40	30	Ditch 6.126
42	Wingene (BE)	Middle Iron – Late Iron	52-62	57	Ditch S2
42	Wingene (BE)	Middle Iron – Late Iron	26-30	28	Ditch S22
33	Oss-Horzak West (NL)	Late Iron	215	215	distance 4-5m; the northern ditch
33	Oss-Horzak West (NL)	Late Iron	250	250	distance 4-5m; the southern ditch
38	Heilaar (NL)	Late Iron – Early Roman	60-100	80	Feature 50 & 51
38	Heilaar (NL)	Late Iron – Early Roman	20	20	Ditch C30-62
38	Heilaar (NL)	Late Iron – Early Roman	50	50	Ditch C30-66
38	Heilaar (NL)	Late Iron – Early Roman	20-30	25	Feature 53
45	Nazareth (BE)	Late Iron – Early Roman	50	50	Southern ditch S4/24/11
56	Aalter (BE)	Late Iron – Early Roman	75	75	
62	Weert (NL)	Late Iron – Middle Roman	400	400	inner ditch; original width
62	Weert (NL)	Late Iron – Middle Roman	90	190	outer ditch; possible original width
33	Oss-Horzak West (NL)	Early Roman	150	150	Early Roman ditch system

Table A.2: Width of selected ditch systems, ordered temporally. Only ditch systems whose measurements are known from the reports are shown. In addition, it is important to note that except for *Hoogeloon* all ditches were excavated in a trench. Hence, their shown width requires 0.5-1m to be added, dependent on the form (see Chapter 5: Discussion, for further details). (Table: Gijs Thissen).

Appendix B: Database

Appendix B.1 illustrates the geographical layout of the sites, with each site labeled by a Site-ID that corresponds to the numbering used throughout Appendix B.2-3. Appendix B.2 presents the dataset in tabular form, omitting detailed descriptions to maintain clarity. In Appendix B.3, a more detailed view of the individual dataset entries is provided, with expanded descriptions and figures from the reports that build on the general overview in Appendix B.2.

Appendix B.1 - Map

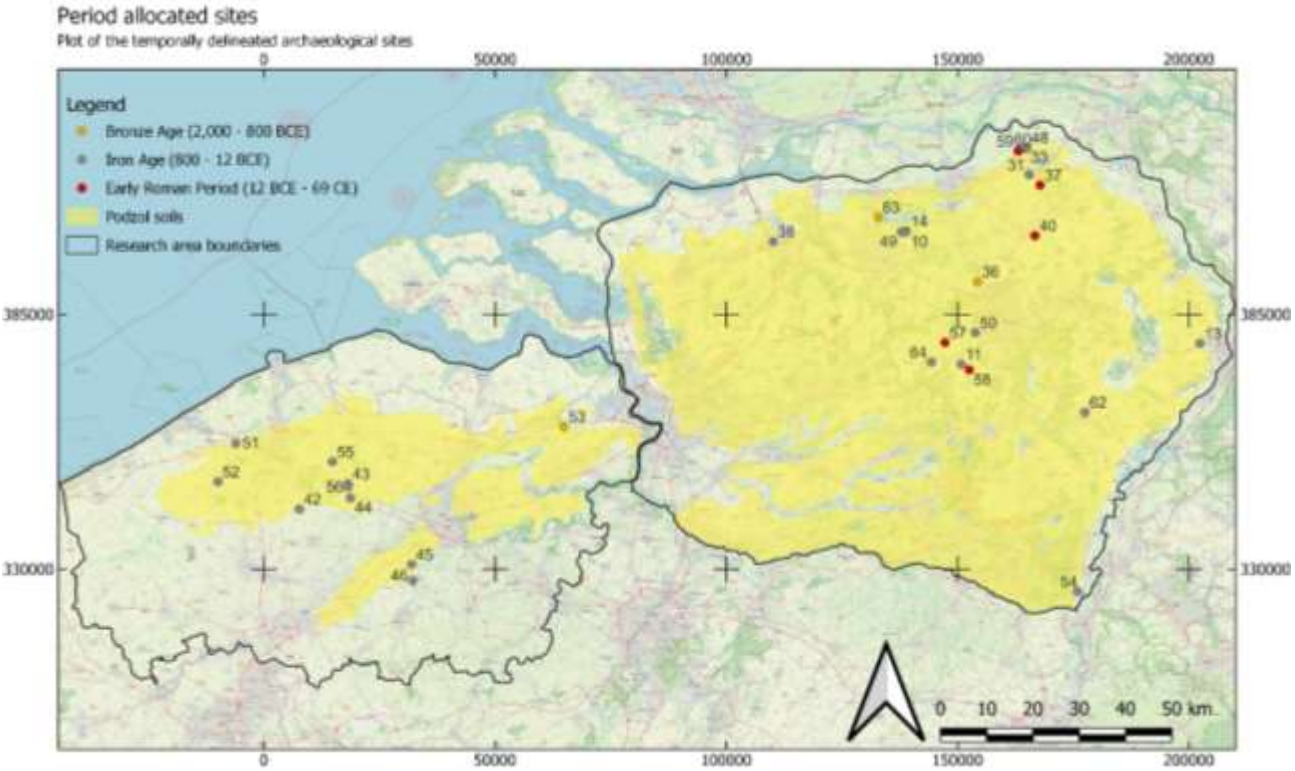
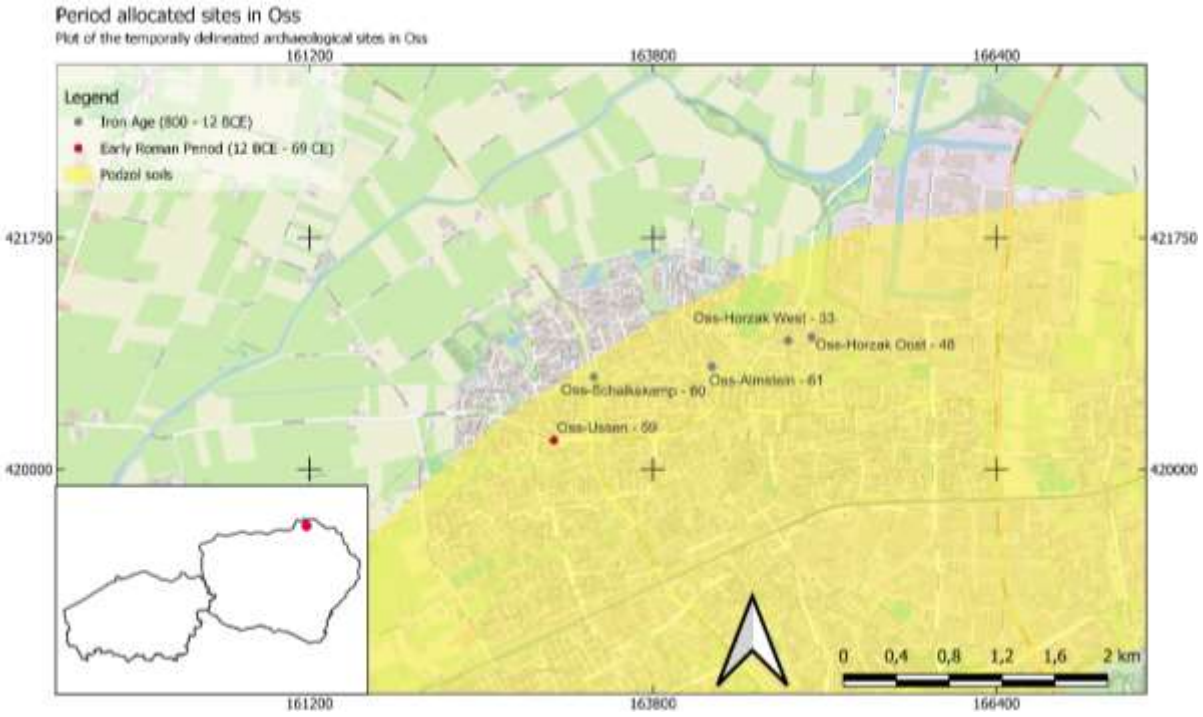


Figure B.1: Map of the temporally delineated archaeological sites. The archaeological sites are, based on the initiation of their respective ditch systems, grouped into three categories: Bronze Age, Iron Age, and Early Roman Period. The labels correspond with the Site-ID attribute in the short dataset (Appendix B.2) and the accompanying detailed site outlines (Appendix B.3). (n = 32, EPSG: 28892). (Figure: Gijs Thissen).



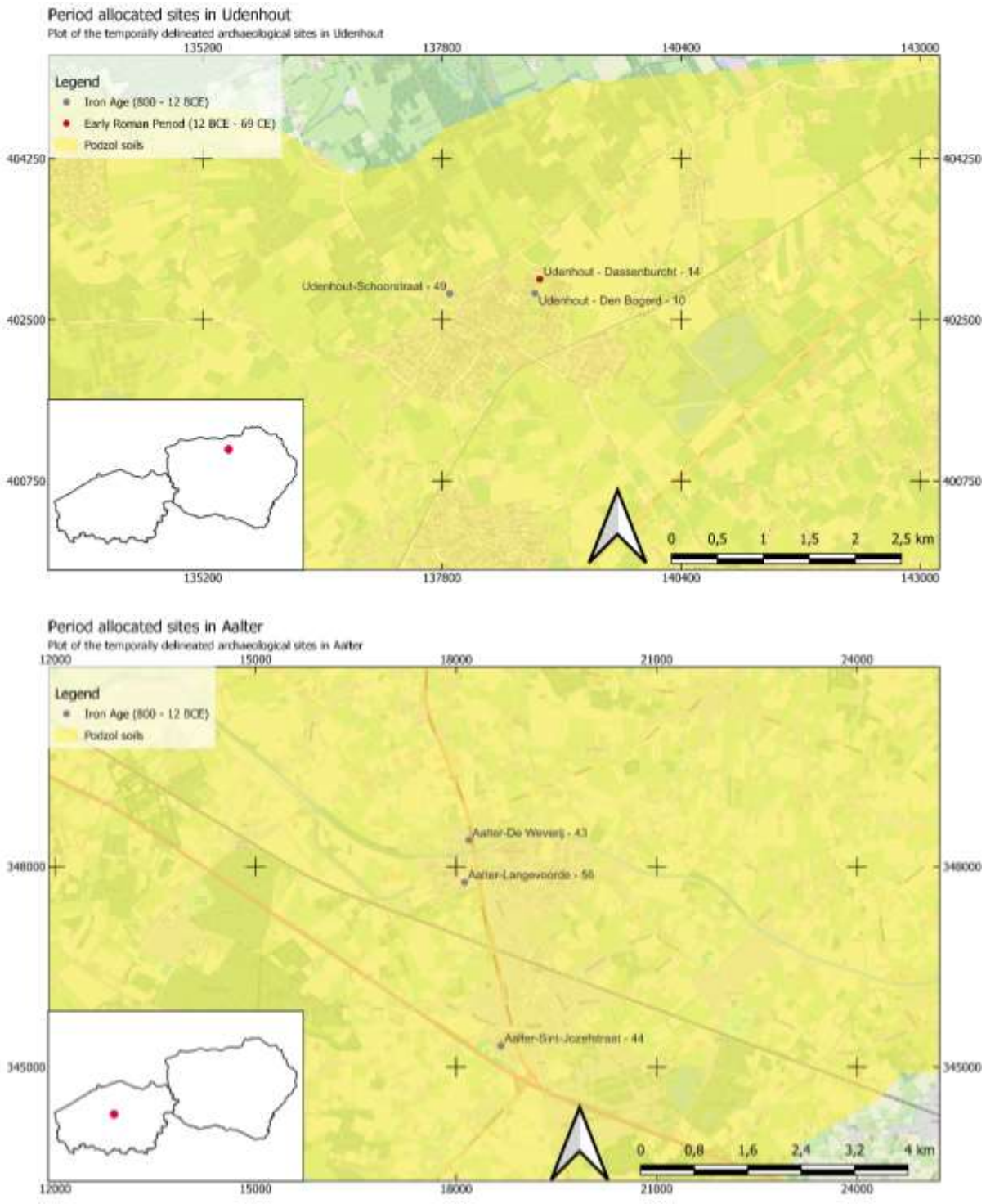


Figure B.2: Maps of the temporally delineated archaeological sites in the clustered areas of Figure B.1. The archaeological sites are, based on the initiation of their respective ditch systems, grouped into two categories: Iron Age and Early Roman Period. The labels correspond with their Toponym and Site-ID attributes in the short dataset (Appendix B.2) and the accompanying detailed site outlines (Appendix B.3). (EPSG: 28892). (Figure: Gijs Thissen).

Appendix B.2 – Dataset

Site-ID	Toponym	Region	Time period (range)	Source
10	Udenhout (NL)	MDS	Early Iron – Late Roman	(Verbeek et al., 2012)
11	Kerkebogten (NL)	MDS	Late Iron – Early Roman	(Lascaris, 2004)
13	Sevenum (NL)	MDS	Late Iron – Middle Roman	(Bot, 2018)
14	Udenhout (NL)	MDS	Early Roman – Late Roman	(van Zon, 2018)
31	Heesch (NL)	MDS	Middle Iron – Late Iron	(van Beek, 2004)
33	Oss-Horzak West (NL)	MDS	Late Iron	(Pruijsen & van As, 2012)
36	Aarle (NL)	MDS	Late Bronze – Late Roman	(Bink, 2010)
37	Nistelrode (NL)	MDS	Early Roman – Late Roman	(Jansen et al., 2007)
38	Heilaar (NL)	MDS	Late Iron – Early Roman	(ter Wal, 2010)
40	Veghel (NL)	MDS	Early Roman	(Van der Beken & Blom, 2012)
42	Wingene (BE)	Flanders	Middle Iron – Late Iron	(Acke et al., 2019a)
43	Aalter (BE)	Flanders	Early Iron	(De Logi et al., 2021)
44	Aalter (BE)	Flanders	Late Iron – Early Roman	(Mostert & Kemme, 2021)
45	Nazareth (BE)	Flanders	Late Iron – Early Roman	(Acke et al., 2019b)
46	Asper (BE)	Flanders	Late Iron – Early Roman	(De Ketelaere & Sadones, 2022)
48	Oss-Horzak Oost (NL)	MDS	Late Iron – Roman	(Jansen & Fokkens, 2002)
49	Udenhout (NL)	MDS	Early Iron – Middle Iron	(Pronck, 2014)
50	Oerle (NL)	MDS	Early Iron – Middle Roman	(ter Steege et al., 2011)
51	Jabbeke (BE)	Flanders	Middle Bronze – Late Iron	(Derweduwen & Vanhoutte, 2021)
52	Ichtegem (BE)	Flanders	Late Iron – Early Roman	(Van De Velde et al., 2021)
53	Sint-Gillis-Waas (BE)	Flanders	Late Bronze – Early Iron	(Bourgeois, 1993)
54	Neerharen-Rekem (BE)	MDS	Late Iron – Early Roman	(De Boe, 1985)
55	Wulfsberge (BE)	Flanders	Late Iron – Early Roman	(Bourgeois, 2003)
56	Aalter (BE)	Flanders	Late Iron – Early Roman	(Bourgeois, 2003)
57	Hoogeloon (NL)	MDS	Early Roman	(Hiddink, 2014)
58	Riethoven (NL)	MDS	Early Roman – Middle Roman	(Hiddink, 2013)
59	Oss-Ussen (NL)	MDS	Early Roman – Middle Roman	(Wesselingh, 2000)
60	Oss-Schalkskamp (NL)	MDS	Late Iron – Early Roman	(Wesselingh, 2000)
61	Oss-Almstein (NL)	MDS	Late Iron	(Wesselingh, 2000)
62	Weert (NL)	MDS	Late Iron – Middle Roman	(Tol, 1999)
63	Loon op Zand (NL)	MDS	Late Bronze – Early Iron	(Roymans & Hiddink, 1991)
64	Bladel (NL)	MDS	Middle Iron – Late Iron	(Roymans, 1982)

Table B.1: Short dataset. The Site-ID's correspond to the numbers on Figure B.1 in Appendix B.1. More detailed descriptions may be found in Appendix B.3 below (sorted by Site-ID). (Table: Gijs Thissen).

Appendix B.3 – Sites

Site-ID	10	**Toponym**	Udenhout-Den Bogerd	**Area**	MDS	**Country**	NL
Period	Early Iron Age – Late Roman Period (800 BCE – 400 CE)			**Coordinates**	(138656, 403235) (139172. 402925) (138472, 403013) (139113. 402531)		
Description	Traces of land division were identified within the research area. In clusters A and B (Figure B.3), parallel ditches oriented along the NE-SW axis and intersecting at right angles suggest the division of farm plots or other land uses (Verbeek et al., 2012, pp. 47-48). Additionally, a ditch delineating the *Roomley* river valley was excavated. Based on the incorporated pottery, soil colour, and absence from the 1830 municipal records, these ditches were dated to the Iron – Roman Age. Furthermore, within cluster B cart tracks also found aligned along a similar axis as the ditches (Verbeek et al., 2012, pp. 47-48).  Figure B.3: Hypothesised course of the ditch systems. The hypothesised course of the ditch systems within development area as presented in the BAAC report. The excavated ditches are shown in dark blue, while the reconstructed ditches are shown in light blue. (Verbeek et al., 2012, p. 55, Figure 3.23).						
Geological context	The research area largely is located on the cover sand ridges. The middle of the area is marked by NE-SW orientated depression through which the river *Roomley* flows (Verbeek et al., 2012, pp. 15-16).						
Contents	Ditch System			**Database URL**	https://doi.org/10.17026/dans-z7k-ewsu		
Dating method	Pottery						
References	Verbeek, C., Mostert, M., Tolboom, M., & van der Weerden, J. (2012). *Tilburg, Udenhout, Den-Bogerd: Proefsleuvenonderzoek.* BAAC rapport A-11.0190. BAAC.						

Site-ID	11	**Toponym**	Kerkebogten	**Area**	MDS	**Country**	NL
Period	Late Iron – Early Roman (100 BCE – 69 CE)			**Coordinates**	(150800, 374200)		
Description	The research area contains intact roads, farmyard, outbuildings and ditch systems associated with a Late Iron Age (100 BCE – 70 CE) settlement cluster in the northern part of the site (Lascaris, 2004, pp. 8-9). Furthermore, prospective (desk) research anticipates the discovery of Roman artefacts, as the broader region shows evidence of Roman habitation (Lascaris, 2004, p. 8). The research area is filled with agricultural remnants indicating extensive agricultural use (Lascaris, 2004, pp. 8-9).						
Geological context	The research area is covered by a thick layer of humus. This layer was accumulated from Mediaeval times onwards, in an attempt to revitalise the poor (cover) sand soils in Brabant (Lascaris, 2004, p. 3).						
Contents	Ditch System			**Database URL**	https://doi.org/10.17026/dans-xch-kcev		
Dating method	Pottery						
References	Lascaris, M. (2004). *Verslag inventariserend veldonderzoek plangebied Kerkebogten, gemeente Eersel.* Zuidnederlandse Archeologische Notities 10. Archeologisch Centrum Vrije Universiteit.						

Site-ID	13	Toponym	Sevenum-Trade Port West	Area	MDS	Country	NL
Period	Late Iron – Middle Roman (250 BCE – 250 CE)			Coordinates	(202296, 378952) (202482, 379419)		
Description	The various ditches heavily varied in height, some ditches (trench 7) even saw the removal of its original top soil prior to construction. Furthermore, the ditches vary between 8-40cm in depth. Habitation has not been found within the confines of the system, as can be seen in Figure B.4. Hence, it is suggested that the associated houses might have been located outside of the research area (Bot, 2018, p. 21).						

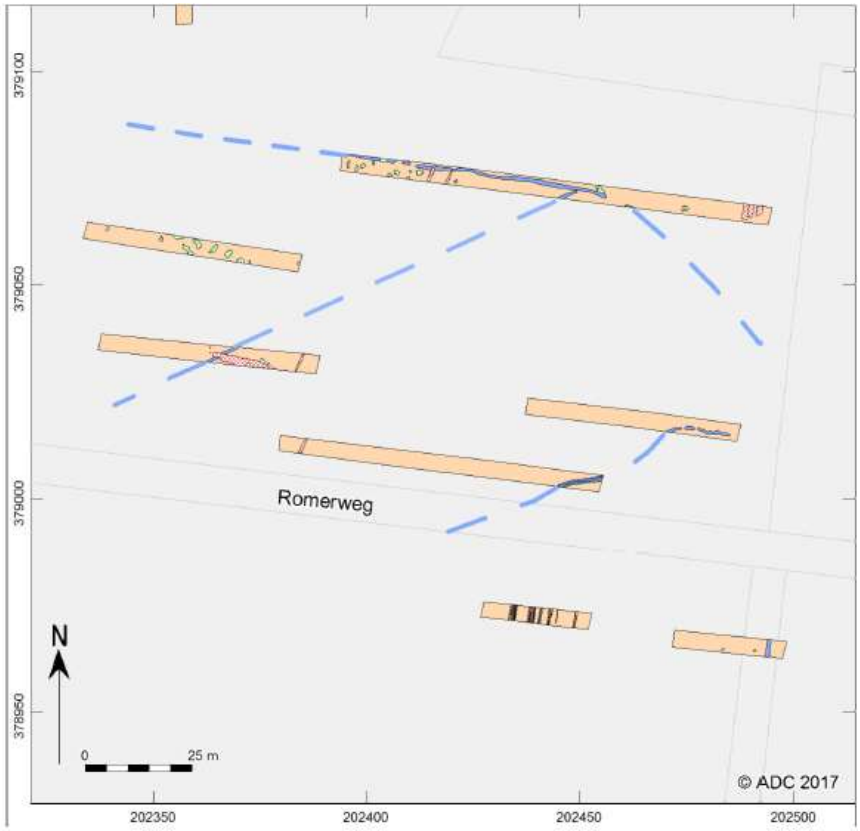
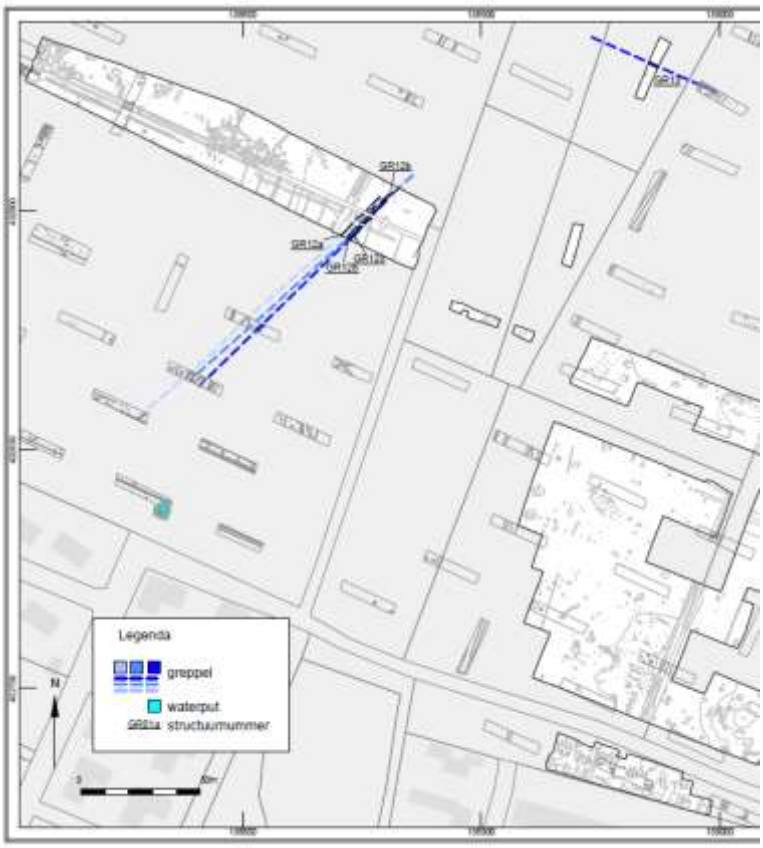


Figure B.4: Hypothesised course of the ditch system in Sevenum. Shown is the hypothesised course of the ditch system, in blue, based on excavated remains. (Bot, 2018, p. 26, Figure 3.20).

The uniform shape and characteristics imply a unified (enclosed) ditch system. The radiocarbon dating of several extracted charcoal fragments (from ditch S14), revealed that the ditches were eventually filled during the Roman period (56 – 217 cal. CE) (Bot, 2018, p. 26). In line with these findings, most of its deposited material dates from the 1st and 3rd century CE. Further palynological analysis reveals the presence of the *Fagus sylvatica* and *Carpinus betulus*. These trees reappeared in a large scale from the Late Iron to Roman period (Bot, 2018, p. 26). It is therefore that the author, reaffirms the possibility of earlier use (since the Late Iron Age (250 – 12 BCE)) of the ditch system (Bot, 2018, p. 30).

Geological context	The ditch system is located higher than the surrounding research area. These cover sand ridges were preferred during prehistory, as they remained dry during wet seasons (Bot, 2018, p. 32).		
Contents	Ditch System	**Database URL**	https://doi.org/10.17026/dans-xud-uc9e
Dating method	Palynology C14-Dating		
References	Bot, M.C.J. (2018). *Trade Port West, Klaver 8, Sevenum.* ADC Rapport 4580. ADC ArcheoProjecten.		

Site-ID	14	**Toponym**	Udenhout-Den Bogerd (Dassenburcht)	**Area**	MDS	**Country**	NL
Period	Roman period (incl. Early Roman) (12 BCE – 400 CE)			**Coordinates**	(138795, 402924)		
Description	[Note: Report 10 concerns the prospective excavation for this one (14)] (Only) four Roman ditches have been (previously and currently) excavated, as can be seen in Figure B.5 (van Zon, 2018a, p. 95). During the excavations of the (former) badgers hole resulted in three shallow ditches: 12a, 12b, and 12c, varying 24-48 cm in depth, as well as being bowl-formed they seem to enclose the settlement. These grey coloured ditches (light grey in lower sections) run parallel and straight along each other (van Zon, 2018a, p. 95; van Zon, 2018b, p. 61). Their straight nature and the lack of habitation marks among them suggests the enclosement. As they run along the depression in which the river *Roomley* flows, the author suggests they delineate it. Lastly, ditches 12a, 12b, and 12c could be considered sequential, with each respective ditch being dug when the other collapsed (van Zon, 2018a, p. 95).  Figure B.5: Hypothesised course of the ditch system in Udenhout-Dassenburcht. Shown in blue is the (hypothesised) ditch system, the lighter the blue the more speculative its course. The figure is cut in half as to accentuate the ditch-related areas, in the text it is referred to as 'Figuur 8.1'. (van Zon, 2018a, p. 96, Figure 8.1).						

Geological context	The research area consists of fluvio-periglacial deposits with a thin aeolian sand cover (van Zon, 2018a, p. 19).		
Contents	Ditch System	**Database URL**	https://doi.org/10.17026/dans-xud-uc9e
Dating method	Excavation Related structures Prospective excavation		
References	van Zon, M. (2018a). *Den Bogerd van neolithicum tot nu – Deel I. Definitieve onderzoeken en een inventariserend onderzoek in plangebied Den Bogerd, Udenhout (gemeente Tilburg).* Archol-rapport 312. Archol. van Zon, M. (2018b). *Den Bogerd van neolithicum tot nu – Deel I. Definitieve onderzoeken en een inventariserend onderzoek in plangebied Den Bogerd, Udenhout (gemeente Tilburg). Bijlage 2: catalogus*. Archol-rapport 312. Archol.		

Site-ID	31	Toponym	Heesch	Area	MDS	Country	NL
Period	Middle - Late Iron Age (500 – 12 BCE)			Coordinates	(165542, 415142)		

Description

Features

Three ditches have been excavated (6.124/222, 6.125, and 6.126), of those only one can be traced along the entire excavated area (6.124/222, along the NNE-SSW axis) (van Beek, 2004, pp. 51-52). Ditch 6.124/222 and 6.125 run parallel, and were thus interpreted as different phases of the same ditch system. The third ditch, 6.126, is non-linear and runs across both 6.124/222 and 6.125, however, due to a recent disturbance the exact nature of the crossing cannot be perceived. As ditch 6.126 does not continue after the disturbance it is suggested that it ends within either ditch 6.124/22 or 6.125 (van Beek, 2004, pp. 51-52).

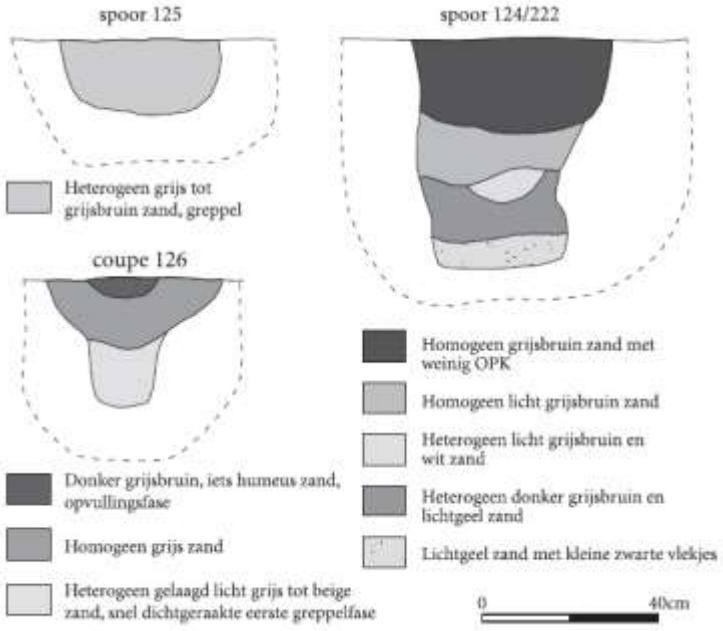


Figure B.6: Profiles of the ditches. Shown are the profile sketches of the 3 ditches found to make up phases within the ditch system. All three are dated to the Iron Age. (van Beek, 2004, p. 52, Afbeelding 5.9).

Characteristics

Ditch	*Width*	*Depth*	*Notes*	*Source*
6.124/222 Phase 1	40-50cm	30cm	Bowl shape	(van Beek, 2004, p. 52)
6.124/222 Phase 2	60cm	40-50cm	6.124/222 has two phases.	(van Beek, 2004, p. 52)
6.125	35cm	10-20cm	Bowl shape	(van Beek, 2004, p. 53)
6.126	20-40cm	10-30cm	Bowl shape	(van Beek, 2004, p. 53)

Table B.2: Characteristics of the ditches. The characteristics (width, depth, and notes) of the Heesch-ditches. (Table: Gijs Thissen).

The different (coloured) layers in the second phase of 6.124/222, ranging from grey-brown to yellow-brown, see Figure B.6, suggest multiple re-excavations and therefore, long term use (van Beek, 2004, p. 52).

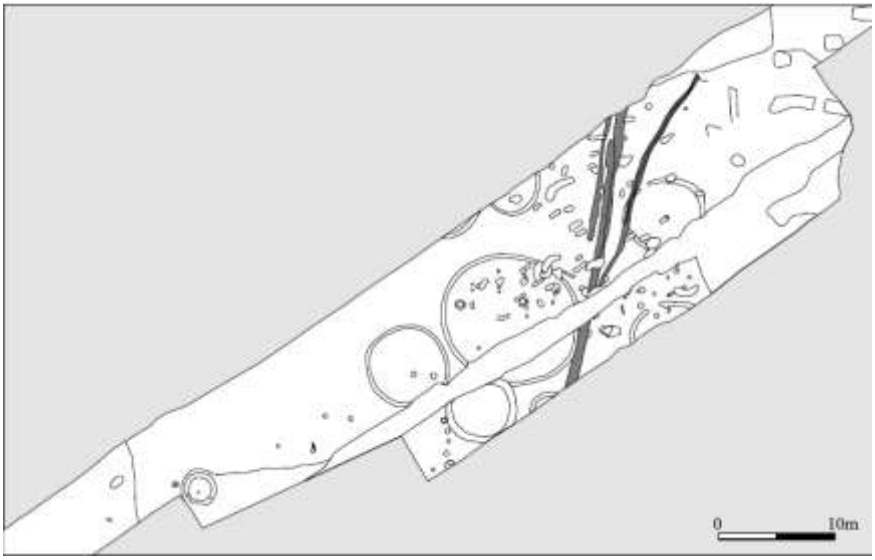


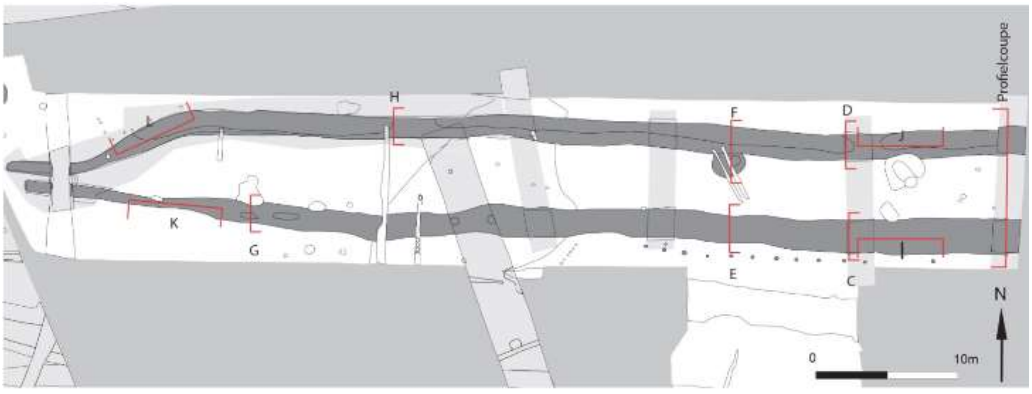
Figure B.7: The (middle to late) Iron Age features. Shown are the features dated to the Iron Age within the trench. Three (NNE-SSW orientated) ditches (6.124/222, 6.125, and 6.126) of which the former two run parallel while latter is divergent. The grave hills (grave 1-8) on either side of the ditch system date to the Late Bronze Age. (van Beek, 2004, p. 34, Afbeelding 5.2).

Interpretation

It is likely that all the ditches are part of a larger ditch system, as they traverse the northern part of the research area. In line with desk-based research, which suggests that during the late Iron to Early Roman period (250 BCE – 69 CE), the increasingly sedentary nature of settlements led to the enclosure of farmyards. The ditch systems, therefore, either functioned as drainage- or enclosement systems, with their development potentially rooted in the Middle Iron Age (van Beek, 2004, p. 53). .

Finds are limited, with pottery predominantly dating to the Middle Bronze Age to Iron Age. Moreover, the ditches closely intersect older (Bronze Age) graveyards. In his report van Beek (2004, p. 53) poses that the symbolic role the urn fields played in the Bronze to Early Iron Age (2000 – 500 BCE) was overtaken by other cultural elements during the Middle Iron Age (500 – 250 BCE). Therefore, since during the early Iron Age, these graveyards were still the norm, their disturbance would be unlikely. These factors suggest that the ditch system likely originates to the Middle – Late Iron Age (500 – 12 BCE) (van Beek, 2004, pp. 53-57).

Geological context	The research area is marked by flatness and is part of the (Limburg-Brabant; MDS) cover sands. In the north the cover sand borders the fluvisols of the *Meuse* (van Beek, 2004, p. 14).		
Contents	Ditch System	**Database URL**	https://doi.org/10.17026/dans-zkg-zf4d
Dating method	Pottery Radiocarbon dating		
References	van Beek, R. (2004). *Wonen en begraven aan de zuidzijde van Heesch*. Archol rapport 24. Archol.		

Site-ID	33	**Toponym**	Oss-Horzak West	**Area**	MDS	**Country**	NL
Period	Late Iron Age (225 – 25 BCE)			**Coordinates**	(164933, 421116) (165279, 421061)		
Description	The research area (*Oss-Horzak West*) contains a double ditch system (G001) dating to the Late Iron Age running across the entire E-W axis of the trench. The specific dating of the system (prehistoric phase J-K) is partly based on material finds (i.e. 22 prehistoric pottery sherds), and partly on the colour and appearance of the ditch (matching the remaining Iron Age features in the northern half of the trench, recognisable due to their grey/grey to grey-brown ditch fill against a general yellow C horizon) (Pruijsen & van As, 2012, pp. 29-30; van As & Fokkens, 2015, p. 35). Both in the east and in the west the ditches eventually merge and end. These points were possibly marked by a pole. Both ends are, however, intersected by a more recent allotment ditch. While in Oss-Horzak Oost (Site-ID: 48), at least two use-phases could be distinguished, Oss-Horzak West sees a partial abandonment of the landscape in later Iron Age and Early Roman times (Pruijsen & van As, 2012, p. 30; van As & Fokkens, 2015, p. 36). *Characteristics* The ditch system consists of two parallel ditches, a northern and southern one. In total, thus incorporating both Oss-Horzak Oost and West, the ditch systems span 380 metres along the E-W axis (Pruijsen & van As, 2012, p. 30). The ditches are spaced out at a distance of 4-5 metres and vary in character. The northern ditch is approximately 2.15 metres wide, while ranging in depth from 55 – 65 cm. The southern ditch is approximately 2.50 metres wide, while ranging in depth from 70 – 80 cm (Pruijsen & van As, 2012, p. 30). The shape varies, both in between and within the ditches, likely the result of multiple people digging the trenches. However, upon reaching either the far west or east, the ditches become shallow (Pruijsen & van As, 2012, p. 30).  Figure B.8: The course of the parallel ditch system in Oss-Horzak West. Shown is the course of the parallel ditch system highlighted in grey. In both the east as in the west of its course it merges and is intersected by an allotment ditch (Pruijsen & van As, 2012, pp 29-30). The red markings indicate the accompanying profile drawings. (van As & Fokkens, 2015, p. 38, Figuur 5.15).							

Construction

In this part of the research area (Oss-Horzak West) evidence has been found of a hill structure, likely built up from the sandy waste material created during the construction of the ditch systems, in between the ditches. On equal sides of the ditches (the north-face for the southern ditch and south-face for the northern ditch) coarser sand has been found (van As & Fokkens, 2015, p. 37). In van As & Fokkens (2015, p. 37) the authors, therefore, pose the presence of a inner hill, as can be seen in Figure B.9. This hypothesis is further supported by the shape of the individual ditches, as well as, the soil composition (high concentrations of Fe_2O_3 on both sides).

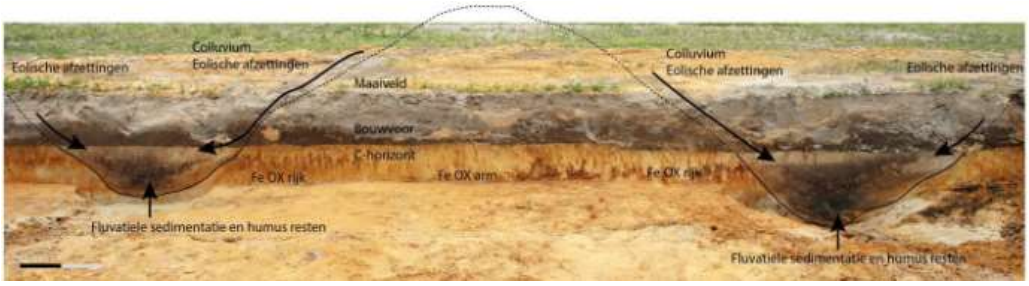


Figure B.9: The sediment formation processes of the ditch-fills of G1. The photograph corresponds to the red marking in the east of Figure B.8. The presence of rust (Fe_2O_3) seen on either side of the hill, the ditch shape, and ground make up suggest the presence of a hill structure. (van As & Fokkens, 2015, p. 38, Figuur 5.17a).

Early Roman Period

An Early Roman Period ditch system (G5; see Figure B.10) encloses an apparent empty plot of land, possibly used as a farm plot or pasture (van As & Fokkens, 2015, p. 42). This dating is partially based on the presence of 1 ceramic sherd (Roman amphora), its light-grey ditch filling (reminiscent of the ditches in Oss-Horzak Oost), as well as, the irregular course (again similar to Oss-Horzak Oost). G5 had multiple use-phases, during which the ditches were 1.5m wide and approximately 25-35cm deep (van As & Fokkens, 2015, p. 41).

<table>
<tr><td></td><td colspan="3"> 

Figure B.10: The (early) Roman ditch systems at Oss-Horzak West. The ditch encloses an apparent empty plot of land, possibly used as a pasture. While appearing rather wide today, during its multiple use stages the ditch was likely max. 1.5m wide. (van As & Fokkens, 2015, p. 40, Figuur 5.20).</td></tr>
<tr><td>Geological context</td><td colspan="3">The research area is located on the Maasland, known for having two distinct landscapes: the clay soils (Maaskant) and the sand soils (Heikant). As the area is prone to flooding the transitional area between the two was in prehistory often chosen for settlements. Therefore, the (higher) Heikant was used for farming and settlement, while the Maaskant was used for cattle grazing (Pruijsen & van As, 2012, p. 17).</td></tr>
<tr><td>Contents</td><td>Ditch System</td><td>Database URL</td><td rowspan="2">https://doi.org/10.17026/dans-zhe-8q6t</td></tr>
<tr><td>Dating method</td><td>Pottery
Settlement Analysis</td><td></td></tr>
<tr><td>References</td><td colspan="3">Pruijsen, M., & van As, S. (2012). Bewoningssporen in de Horzak: Een proefsleuven onderzoek en definitieve opgraving te Oss-Horzak West. Archol rapport 179. Archol.

van As, S. (2014). Bewoningssporen uit de late ijzertijd en de late middeleeuwen. Opgraving Oss-Horzak 2013 [Internal Report]. Rapporten Prehistorie Leiden 1. Faculteit der Archeologie, Universiteit Leiden.

van As, S., & Fokkens, H. (2015). Oss-Horzak West; rapportage over de veldcampagnes 2013 en 2014. Faculteit der Archeologie, Universiteit Leiden.</td></tr>
</table>

Site-ID	36	**Toponym**	Aarle-Hokkelstraat	**Area**	MDS	**Country**	NL
Period	Late Bronze Age – Roman Period (1,100 BCE – 400 CE)			**Coordinates**	NW (153.320, 392.423) NO: (155.280, 392.885) ZO: (154.203, 391.402) ZW: (153.281, 391.181)		
Description	Within the research area (0.57 km^2) 21 ditch systems (8 Iron Age, 7 Roman, and 6 Mediaeval) were found. Some of the ditch systems were deemed extend into later time periods. *Iron Age*. Eight ditch systems (Ditch systems 151-158) were dated to the Late Bronze Age through Late Iron Age (1,100 – 12 BCE) (see Figure B.11). Among these, two types can be distinguished, drainage and construction ditches, the latter of which sporadically contains postholes (Bink, 2010, p. 45). Ditch system 154 is proposed to be the oldest ditch system. Located in (sub-)area 6, trench 601, and trench 616, it consists of one straight ditch running parallel to a granary dated to the late Bronze Age through early Iron Age (1,100 – 500 BCE), and was therefore given a similar dating. Ditch 151, meanwhile, is considered the longest, running for a length of 280m and belongs to the construction ditch category. In the ditch postholes (30 x 15cm) are spaced out every 30cm, consequently the ditch has a similar width (Bink, 2010, p. 45). Lastly, unlike ditch system 156, ditch 151 did not contain any pottery, rather it runs parallel with structures dated to the Late Iron to Early Roman period (Bink, 2010, p. 45). Similarly, ditch system 156 is dated to the Late Iron to Early Roman period, based on ceramics within its matrix (Bink, 2010, p. 48). *Roman Period* Seven ditch systems (Structure 251-257) presumably date to Roman times, as no Roman finds were made. Hence the dating is solely based on colour and soil structure alone. The oldest structure (Structure 255) is located near house 208 (constructed after 175 CE (Bink, 2010, p. 61)) and is orientated along the NW-SE axis, eventually intersecting with the house. The ditch is reminiscent of enclosure ditches found in the Iron Age. These factors, therefore, suggest a pre-Roman (Iron Age) dating (Bink, 2010, p. 60). Similarly, Structure 251 is located within the confines of a Roman graveyard. It does not, however, align nor ignore the graves. This ditch structure was consequently dated before the construction of the Roman graveyard, namely, to the Iron Age. Later structures dated with certainty are Structure 252 and 253, both dating to Roman times due to their relation with nearby Roman settlements (Bink, 2010, p. 58).						

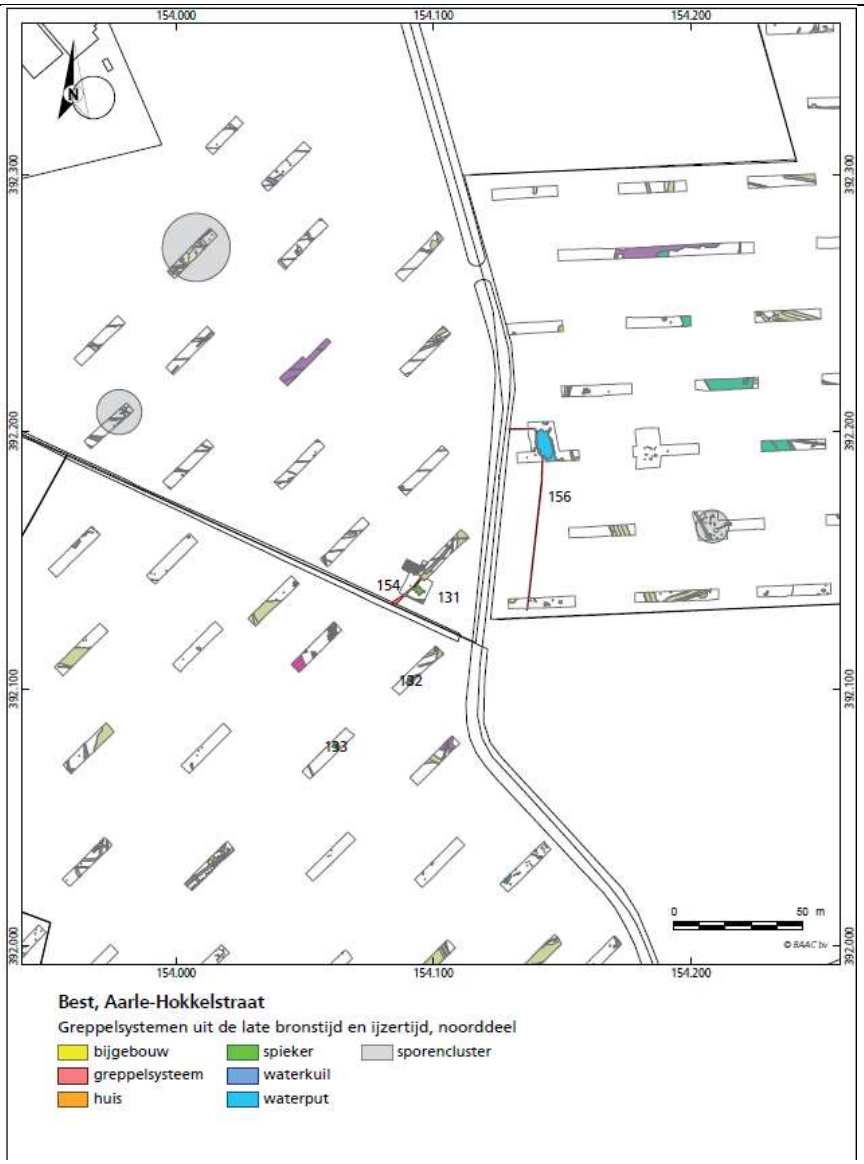
<table>
<tr><td></td><td colspan="3"> 

Figure B.11: Shown are the ditch systems (as well as the other settlement features) dating to the late Bronze and Iron Age. Ditch 154 runs parallel to the Bronze Age dated granary (NL: *spieker*) 131 running for approximately 20 metres southward. (Bink, 2010, p. 47, Afbeelding 5.12).</td></tr>
<tr><td>Geological context</td><td colspan="3">The geomorphological map classifies the area as a cover sand ridge. During the late-Weichselian sand was deposited, forming sand ridges which can be up to a 1.5 meter high (Bink, 2010, p. 11-12)..</td></tr>
<tr><td>Contents</td><td>Ditch System(s)</td><td>Database URL</td><td>https://doi.org/10.17026/dans-z4v-x57g</td></tr>
<tr><td>Dating method</td><td>Associated structures
Soil formation</td><td></td><td></td></tr>
<tr><td>References</td><td colspan="3">Bink, M. (2010). Best, Aarle-Hokkelstraat, Fase 1: Inventariserend veldonderzoek door middel van proefsleuven. BAAC rapport A-09.0297. BAAC..</td></tr>
</table>

Site-ID	37	**Toponym**	Nistelrode	**Area**	MDS	**Country**	NL
Period	Roman (incl. Early Roman period) (12 BCE – 400 CE)			**Coordinates**	(167850, 412865)		
Description	Roman ditch systems, when enclosing settlements, tend to be shallow and thin. Herein (and therefore) they do not serve a defensive function but rather a symbolic one, representing the division between the 'inside' and 'outside' (Jansen, 2007, p. 115). Similarly the ditches at Nistelrode are modest. While the *entire* settlement was not enclosed, it has been suggested that some parts were. The ditch present in the south, while not enclosing the settlement, is such an example, serving as a dividing line between two farmyards. Second, a few shallow ditches south of the porticus (a indigenous Roman period building associated with status) and house 5 facing a similar orientation were suggested as serving the function of ditch system (Jansen, 2007, p. 115). Third, throughout the research area small ditch fragments are scattered. These ditches lie 30 Roman foot apart forming a tight division of the landscape. The precise orientation suggest a purposeful design, as can be seen in the settlement layout (Jansen et al., 2007, p. 116).						
Geological context	The research area *Maashorst* consists in the north of fluvisols deposits by the (ancient) *Meuse*. Furthermore, the landscape is characterised by cover sands deposited during the Weichselian ice age (Jansen, 2007, p. 32).						
Contents	Ditch System			**Database URL**	https://doi.org/10.17026/dans-zrp-uxpw		
Dating method	Associated structures						
References	Jansen, R., van Hoof, L.G.L., Bourgeois, Q., van Enckevort, H., Dijkstra, M., van der Venne, A., van Genabeek, R., Meurkens, L., Koster, A., Knippenberg, S., van den Dries, F., Bakels, C.C., Smits, E., Vermeeren, C., & Heirbaut, E.N.A. (2007). *Bewoningsdynamiek op de Maashorst: De bewoningsgeschiedenis van Nistelrode van laat-neolithicum tot volle middeleeuwen.* Archol rapport 48. Archol.						

Site-ID	38	**Toponym**	Heilaar-Noord	**Area**	MDS	**Country**	NL
Period	Late Iron Age – Early Roman Period (250 BCE – 69 CE)			**Coordinates**	(109.920, 400.750) (110.330, 400.710) (109.890, 400.580) (110.260, 400.625)		
Description	The research area contains three pre-modern ditch systems. The first ditch system consists of features 50, 51, and 52, which forms the largest one. Here Feature 50 and 51 are orientated along the NE-SW and NW-SE axes, and cut through each other in a straight angle. Structure 1, a Roman house plan, is situated near this corner and faces a similar direction. Feature 52 lies approximately 80m east of feature 50 and 51 and has similar characteristics, also running along the NW-SE axis. The ditches run between 65-100m, are 60-100cm wide, and have a maximum depth of 30cm. The edges of the ditch vary from straight to rounded (ter Wal, 2010, pp. 51-52). It is suggested that Feature/Ditch 51 extends into the previously excavated Breda-Huifakker area (Koot & Berkvens, 2004; ter Wal, 2010, p. 52), the ditches would therefore be part of a larger division system, given their extensive reach. Sparse finds in the fill primarily date to the Iron Age and should probably be interpreted as a *terminus post quem*. While the ditch system at Breda-Huifakker is dated to the Roman period, Feature/Ditch 51 closely aligns with the Roman house plan in the research area, maintaining a distance of less than 40cm (ter Wal, 2010 p. 52). Notably, this segment of the ditch contains almost no pottery sherds. As a result, ter Wal (2010, p. 52) argues that the contemporaneous use of the ditch system and the house is improbable, suggesting the ditch was filled by the time the house was constructed. Since the house is roughly dated to the Early to Middle Roman period (69 – 250 CE), and the ditch precedes it, the ditch system can be reasonably dated to the Late Iron Age through Early Roman period (250 BCE – 69 CE) (ter Wal, 2010, p. 52). The second ditch system (feature 54) consists of two parallel ditches (C30-62 and C30-66, orientated along the NE-SW axis), running parallel along ditch 51. C30-62 is max. 20cm wide and 10cm deep, while C30-66 is max. 50cm wide and 10cm deep (ter Wal, 2010, p. 52). The third and smallest ditch system (feature 53) is orientated along the NWN-ESE axis. The two most western ditches are 130 cm apart, 20-30 cm wide, and max. 14 cm deep (ter Wal, 2010, p. 53).						
Geological context	The research area is located in the southern cover sands, the AHN-map defines the area as on a higher ridge between two valleys (ter Wal, 2010, p. 19).						
Contents	Ditch System			**Database URL**	https://doi.org/10.17026/dans-2ck-xywy		
Dating method	Previous Research Pottery						

References	Koot, C.W., & Berkvens, R. (2004). *Bredase akker eeuwenoud, 4000 jaar bewoningsgeschiedenis aan de rand van zand en klei*. Rapportage Archeologische Monumentenzorg 102. Rijksdienst voor Oudheidkundig Bodemonderzoek. ter Wal, A. (2010). *Breda, Heilaar-Noord: Opgraving*. BAAC rapport A-06.0127. BAAC. https://doi.org/10.17026/dans-2ck-xywy

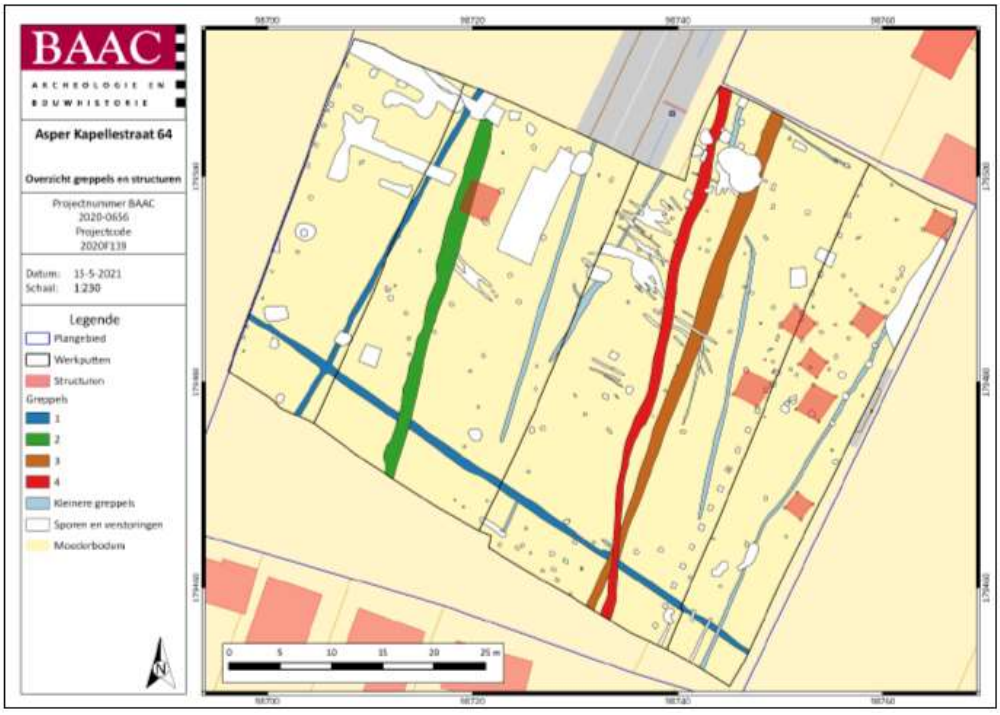
Site-ID	40	**Toponym**	Veghel-De Scheifelaar II	**Area**	MDS	**Country**	NL
Period	Early Roman (12 BCE – 69 CE)			**Coordinates**	(166.478, 402.179) (166.829, 402.309) (166.463, 401.876) (166.992, 401.917)		
Description	Across zone 1A in the research area, several small, shallow, thin ditch fragments are present. They reach a maximum of 10cm depth and are bowl-formed, rarely they contain pole fragments (Van der Veken & Blom, 2012, p. 105). The ditches are thought to be of indigenous origin during the Roman period. Furthermore, down the middle of the area a large ditch runs to a length of 80 metres (GR01) (Van der Veken & Blom, 2012, p. 60).						
Geological context	The research area is situated within the southern cover sand soils located on a NW-SE orientated cover sand ridge, at 10,20m above NAP (Van der Veken, Blom, 2012, p. 29).						
Contents	Ditch System			**Database URL**	https://doi.org/10.17026/dans-z93-7zbe		
Dating method	Associated research						
References	Van der Veken, B., & Blom, E. (2012). *Veghel De Scheifelaar II: Wonen tussen de vennen*. ADC rapport 3350. ADC ArcheoProjecten.						

Site-ID	42	**Toponym**	Wingene	**Area**	Flanders	**Country**	BE
Period	Middle to Late Iron Age (500-12 BCE)			**Coordinates**	(74068, 194694) (74067, 194580)		
Description	A ditch system, dating to phase 2A (Middle to Late Iron Age), consists of a two parallel NE-SW orientated ditches (S2 and S22), likely part of a parcel system dating to the Middle to Late Iron Age (Acke et al., 2019a, p. 63). These ditches vary in width from 52 to 62cm (S2) and 26 to 30cm (S22) and contain a moderate amount of pottery sherds. During this phase the farmyard consists of outbuilding B1 and a granary (Acke et al., 2019a, p. 63). In their report Acke et al (2019a, p. 64) speculate on the sequential nature of ditch S2 and S22, and suggest a contemporaneous dating instead.						
Geological context	The site belongs lies on a loamy sand plateau, in past times the vegetation degraded until heathland was formed (Acke et al., 2019a, p. 37).						
Contents	Ditch System			**Database URL**	https://loket.onroerenderfgoed.be/archeologie/rapporten/eindverslagen/494		
Dating method	C-14 dating Palynology Macrobotany						
References	Acke, B., Bracke, M., Fonteyn, P., Hagen, J., & Wyns, G. (2019a). *Eindverslag Wingene Eikenstraat. Verslag van resultaten*. Project 2018L1333. Acke & Bracke.						

Site-ID	43	**Toponym**	Aalter-De Weverij	**Area**	Flanders	**Country**	BE
Period	Early Iron Age (800 – 500 BCE)			**Coordinates**	(84459,6; 200182,67) (84549,7; 200305,03)		
Description	Three Iron Age ditch systems were recovered during excavations. The first consists of small ditch fragments placed along the southwestern wall of the building A, however, due to their limited size they were presumably not part of the larger ditch systems (De Logi et al., 2021, p. 91). The other two systems are considerably larger. The first delineates the northeastern part of the plot (through a NNW-SSE and a ENE-WSW ditch) and is associated with building B (800-500 BCE) and building O which lie within its enclosed area (De Logi et al., 2021, p. 68). The width of the ditch varies from 20-42cm (De Logi et al., 2021, p. 91). The second ditch system, with a width ranging from 67-114cm and a depth of max. 34cm, cuts through the southern portion of the research area. The ditch system encloses buildings D, G, J, L, and M and is through pottery analysis dated to the Iron Age (De Logi et al., 2021, p. 92).						
Geological context	The research area is marked as a 'developed zone', however, based on its surroundings a moderately dry sand soil with a highly crumbled B-horizon is expected (De Logi et al., 2021, p. 12).						
Contents	Ditch System			**Database URL**	https://loket.onroerenderfgoed.be/archeologie/rapporten/eindverslagen/1469		
Dating method	Pottery						
References	De Logi, A., Van Nuffel, J., Malfliet, L., Billemon, P., Heynssens, N., & Hoorne, J. (2021). *Aalter – Weverij, Eindverslag archeologische opgraving – juni-juli 2019*. DL&H-Rapport 47. De Logi & Hoorne Archeologie. https://loket.onroerenderfgoed.be/archeologie/rapporten/eindverslagen/1469						

Site-ID	44	**Toponym**	Aalter-Sint-Jozefstraat	**Area**	Flanders	**Country**	BE
Period	Late Iron-Early Roman (250 BCE – 69 CE)			**Coordinates**	(84946, 197325) (85177, 197149) (85145, 197351) (84932, 197070)		
Description	The oldest settlement phase (phase 1), is dated to the Iron Age. The hand thrown pottery and Roman pottery found in a similar context suggests a Late Iron to Early Roman occupation phase, while some outbuildings date back to the early Iron Age (Mostert & Kemme, 2021, p. 9). To this phase the oldest stage of the ditch system belongs, consisting of a ditch (structure 601) orientated along a NWW-SOO axis eventually bending north. This ditch is extended by a few ditches, namely structures 604 & 613 which in the west orientate along the E-W axis, as well as, a ditch (structure 619) in the southeast orientating along the NW-SE. This latter structure (619) is interrupted for 3.7m, indicating a opening. In the south a ditch dating to the same phase (structure 615) delineates the area (Mostert & Kemme, 2021, p. 66). The presence of Roman earthenware within the ditch-fill alludes to a *terminus ante quem* in the middle Roman period (70 – 200 CE),						
Geological context	The area is marked by Pleistocene cover sands, formed into podzols, deposited on marine deposits (Mostert & Kemme, 2021, p. 34).						
Contents	Ditch System			**Database URL**	https://loket.onroerenderfgoed.be/archeologie/rapporten/eindverslagen/1714		
Dating method	Pottery						
References	Mostert, M., & Kemme, A.W.A. (2021). *Aalter, Sint-Jozefstraat, Archeologische opgraving*. BAAC-rapport A-19.0209. BAAC. https://loket.onroerenderfgoed.be/archeologie/rapporten/eindverslagen/1714						

Site-ID	45	**Toponym**	Nazareth-Eke Kouter	**Area**	Flanders	**Country**	BE
Period	Late Iron – Early Roman (250 BCE – 69 CE)			**Coordinates**	(984216, 18298829) (985118, 18309465)		
Description	Prospective research showed the presence of a Late Iron to Early Roman site in the south of the research area. The settlement and surrounding landscape is delineated on the southern side by ditch S4/24/41 (width: 50cm & depth: 34cm) orientated along the NW-SE axis. The ditch having been numbered three consecutive times in three different trenches, is U-shaped and homogeneous in colour, contains various pottery sherds, mostly dating to the Late Iron to Early Roman period (Acke et al., 2019b, p. 41). Furthermore, a medieval disturbance in the form of a 6.5m wide moat disturbs the area to the north along a similar axis (Acke et al., 2019b, pp. 41-43).						
Geological context	The soil of the site consists of Weichselian sandy aeolian deposits (code ELPw), with potential occurrences of Weichselian fluvisols (code FLPw) (Acke et al., 2019b, p. 53).						
Contents	Ditch system/Singular Ditch			**Database URL**	https://loket.onroerenderfgoed.be/archeologie/rapporten/eindverslagen/1714		
Dating method	Pottery Radiocarbon dating						
References	Acke, B., Bracke, M., Van Quaethem, K., Fonteyn, P., Hagen, J., & Wyns, G. (2019b). *Eindverslag Eke Kouter. Verslag van resultaten*. Project 2018F333. Acke & Bracke.						

Site-ID	46	**Toponym**	Asper-Kapellestraat	**Area**	Flanders	**Country**	BE
Period	Late Iron – Early Roman Period (250 BCE – 69 CE)			**Coordinates**	(98736,9731; 79557,5713) (98754,8059; 179550,3586) (98745,0632; 179450,4253) (98696,1561; 179481,1049)		
Description	The settlement in the research area was radiocarbon dated to the Late Iron to Roman period, and was organised within a ditch system reminiscent of the *fermes indigènes* of northern France (De Ketelaere & Sadones, 2022, p. 71). Due to the increased sedentary and nucleated nature of Late Iron Age settlements, overlapping features may occur within settlement sites, as can be seen in Figure B.12 (De Ketelaere & Sadones, 2022, p. 69). The system comprises of five primary ditches oriented along the NE-SW axis, of which two intersect (unified in ditch 1, seen Figure B.12). These can, based on their association buildings and pottery finds, be interpreted as demarcation ditches dating to the Early Roman period (12 BCE – 69 CE). The outbuildings are placed are situated within this period. Pottery sherds, primarily dating to the Roman period, were recovered from both ditches, making a precise chronological distinction challenging.  Figure B.12: Map of the ditches within the research area. Shown are the multiple ditches within the research area, of which several overlap to create a ditch system. (De Ketelaere & Sadones, 2022, p. 38, Plan 15).							

Geological context	The area is marked by a (moderately) dry sand soil with rust characteristics in between 60 and 90cm. While the soil retains water during winter it is prone to dry spells in summer (De Ketelaere & Sadones, 2022, p. 14).		
Contents	Ditch System	**Database URL**	https://loket.onroerenderfgoed.be/archeologie/rapporten/eindverslagen/1835
Dating method	Pottery Associated buildings Radiocarbon dating		
References	De Ketelaere, S., & Sadones, S. (2022). *Eindverslag opgraving Asper, Kapellestraat 64*. BAAC Vlaanderen Nr. 2048. BAAC Vlaanderen. https://loket.onroerenderfgoed.be/archeologie/rapporten/eindverslagen/1835		

Site-ID	48	Toponym	Oss-Horzak Oost	Area	MDS	Country	NL
Period	Late Iron Age – Roman Period (225 BCE – 400 CE)			Coordinates	(165000, 421000)		
Description							

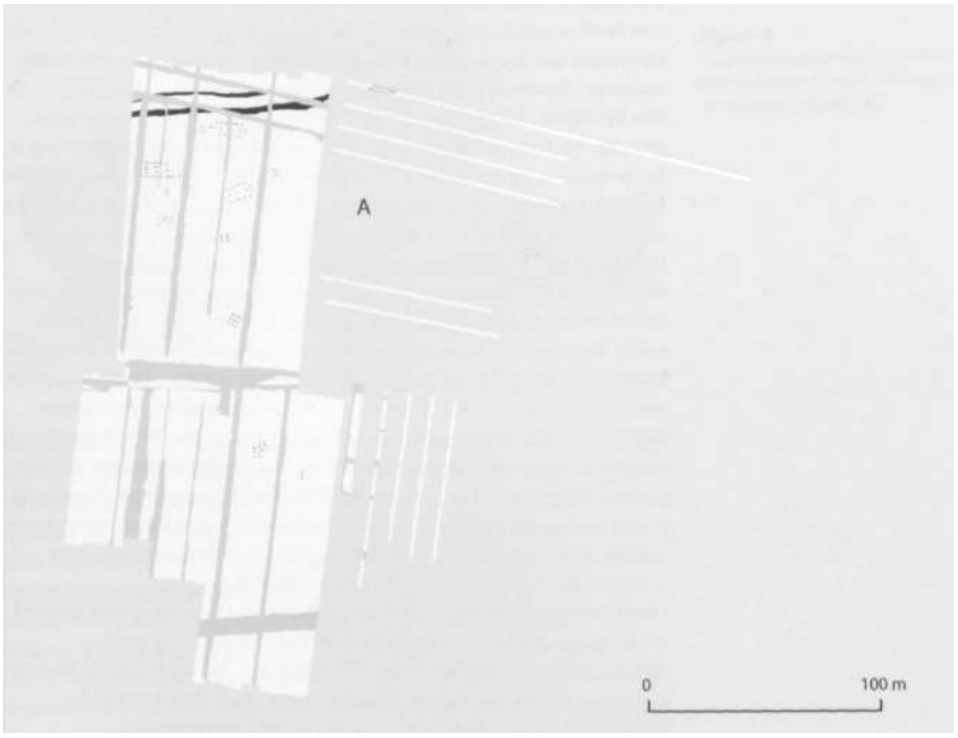


Figure B.13: The distribution of Late Iron Age features in the excavated area of Oss-Horzak Oost. Shown are the double ditches orientated along the E-W axis, these approximately date to phase J-K of the Late Iron Age (225 – 25 BCE). (Jansen & Fokkens, 2002, p. 326, Figuur 8).

The research area (Oss-Horzak Oost) contains a broad double ditch (with almost no material finds in its 1m depth) orientated along the E-W axis dividing the northern house plan H21 and the southern house plans H8, H11, and H16 (see B.13 and B.14) (Jansen & Fokkens, 2002, p. 328). The ditch were dated to phase J-K of the Late Iron Age based on the recovery of large quantities of ceramics. Furthermore, secondary usage of the ditches is shown, either through reparation of the ditch or later deposits (van As & Fokkens, 2015, pp. 29-30).

The ditches are thought to delineate separate yards from the Late Iron Age, in line with research done in the wider Oss area. This phenomenon occurs amidst a process of increased nucleation and increased sedentary nature of settlements (Jansen & Fokkens, 2002, p. 328). Furthermore, it is especially recorded in areas with a dense population pattern. The ditch systems remain open, however, not enclosing the yard on all sides (Jansen & Fokkens, 2002, p. 328). The prehistoric settlement consisted of at least 13 houses and various outbuildings, forming a small hamlet. The oldest house in the hamlet are dated using the dendrochronology to around or before 1 CE (Jansen & Fokkens, 2002, pp. 328-330). The later ditch systems, dating to the Roman period, seem to enclose the entirety of the settlement area. This system is

<table>
<tr><td></td><td colspan="3">straight, constitutes an area of at least 150 metres by 150 metres and contains a palisade in the southwest (Jansen & Fokkens, 2002, p. 331).

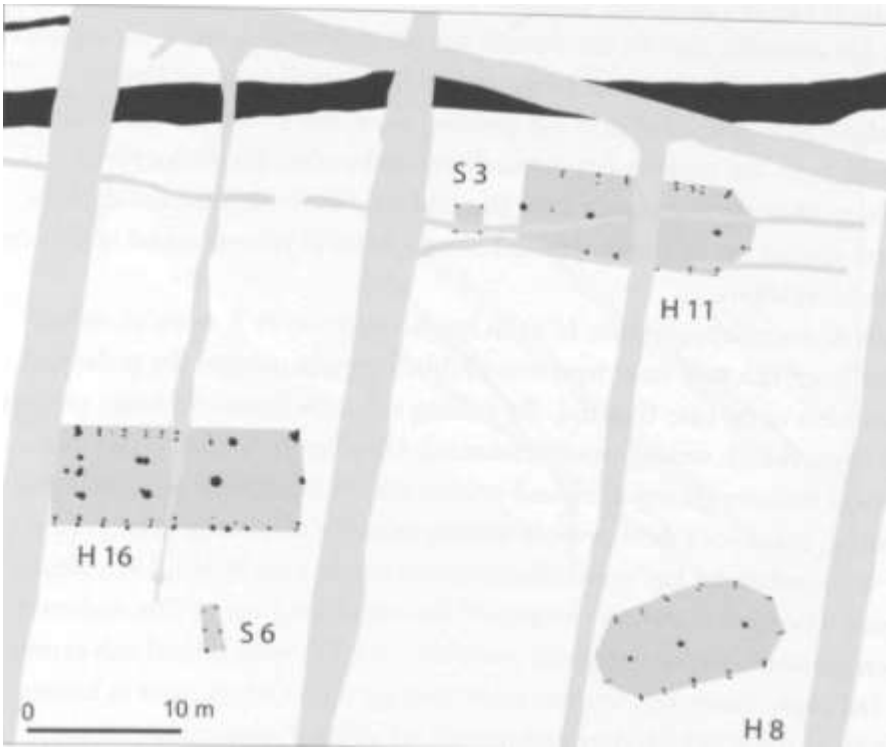
 

Figure B.14: The late Iron Age houses H8, H11, and H16. These houses (and accompanying granaries) are located south of the ditch dividing the settlement. (Jansen & Fokkens, 2002, p. 327, Figuur 9).</td></tr>
<tr><td>Geological context</td><td colspan="3">The research area is located on the edge of the river Meuse on the Pleistocene (Weichselian) cover sand deposits. However, the areas close to the river have been significantly altered in the Holocene, with the Meuse having deposited fluvisols within its limits (Jansen & Fokkens, 2002, p. 316).</td></tr>
<tr><td>Contents</td><td>Ditch System</td><td rowspan="2">Database URL</td><td rowspan="2">https://doi.org/10.17026/dans-zqu-tqqr</td></tr>
<tr><td>Dating method</td><td>Associated structures
Pottery</td></tr>
<tr><td>References</td><td colspan="3">Jansen, R., & Fokkens, H. (2002). Een korte biografie van Oss-Horzak, een lokale gemeenschap tussen Maaskant en Heikant. In H. Fokkens & R. Jansen (Eds.), 2000 jaar bewoningsdynamiek. Brons- en IJzertijdbewoning in het Maas-Demer-Scheldegebied (pp. 315-340). Faculty of Archaeology Leiden University. https://hdl.handle.net/1887/9988

van As, S., & Fokkens, H. (2015). Oss-Horzak West; rapportage over de veldcampagnes 2013 en 2014. Faculteit der Archeologie, Universiteit Leiden.</td></tr>
</table>

Site-ID	49	**Toponym**	Udenhout-Schoorstraat	**Area**	MDS	**Country**	NL
Period	Early and Middle Iron Age (800 – 250 BCE)			**Coordinates**	NW: (137757, 403078) NO: (137977, 402802) ZW: (137555, 402806) ZO: (137922, 402622)		
Description	In the Early and Middle Iron Age, ditches were constructed, serving both as drainage systems and as a means of demarcation (Pronck, 2012, p. 19; Pronck, 2014). Subsequently, during the later Iron Age, the landscape increasingly dried and opened up, leading to significant agricultural activity. The sandy band of the research area was cultivated with barley, bucket wheat, and millet, which were stored in granary houses (Pronck, 2014).						
Geological context	The excavation lies within a transition zone from the higher cover sands to the lower fluvioglacial deposits (see Section 3.4). The top layer generally consists of a *plaggen* soil deposited during the Middle Ages (Pronck, 2014).						
Contents	Ditch System			**Database URL**	https://doi.org/10.17026/dans-zts-zaqk		
Dating method	Pottery						
References	Pronck, E.C. (2012). *Palngebied zorgterrein ASVZ Vicentius. Gemeente Tilburg, Archeologisch vooronderzoek: Inventariserend veldonderzoek (proefsleuven en booronderzoek).* RAAP-Rapport 2478. RAAP. https://archisarchief.cultureelerfgoed.nl/Archis2/Archeorapporten/32/AR30066/ Pronk, E.C. (2014). *Aan de rand van De Brand: Een opgraving van perifere nederzettingssporen uit de IJzertijd, Romeinse tijd en Vroege Middeleeuwen in het plangebied ASVZ-locatie Vincentius te Udenhout, gemeente Tilburg* (Version V2) [Dataset; DANS Data Station Archaeology]. https://doi.org/10.17026/dans-zts-zaqk						

Site-ID	50	**Toponym**	Oerle-Zuid	**Area**	MDS	**Country**	NL
Period	Early Iron Age – Middle Roman Period (800 BCE – 250 CE)			**Coordinates**		(153.467, 380.910) (153.682, 381.262)	
Description	*Background* The research area (20,000 m^2) contains a ditch system orientated along the NE-SW axis, which turns 90 degrees towards the NW on both sides, enclosing the indigenous-Roman settlement (see B.15) (ter Steege et al., 2011, p. 314). The dating of the settlement is supported by the absence of Roman features outside the ditch system, as well as, the parallel alignment of the houses along its edges. (ter Steege et al., 2011, p. 315). Evidence suggests, however, that the ditch system and the houses were not constructed contemporaneously. The original construction of the ditch system is instead dated to the Late Iron Age through Early Roman Period (250 BCE – 69 CE) (ter Steege et al., 2011, p. 316). This is evidenced by Roman material being largely absent from the ditch fill, whereas similar layers in the settlement did yield Roman finds, indicating partial filling of the ditches during Roman times. The sparce material that was found in the ditch, while not allowing a precise dating, suggests an earlier phase, likely the Early Iron Age (800 – 500 BCE). In contrast to the houses which are of type Oss 5A and are dated to the Middle Iron Age to Early Roman period (500 BCE – 69 CE) (ter Steege et al., 2011, p. 316). The filling of the ditch is, therefore, likely dated before the arrival of the population during Early Roman times, although it remained visible in the landscape (ter Steege et al., 2011, p. 316). With settlements becoming increasingly sedentary during this period, the (new) inhabitants likely repurposed a previously present ditch system due to the settlement's favoured location. By that time the ditch system likely was too shallow to be used for defensive purposes, and instead functioned as a boundary marker within the landscape (ter Steege et al., 2011, p. 316). *Characteristics* The ditches greatly vary in size and depth, being up to 2.5m wide and 1m deep, and is largely V-shaped. Furthermore, no traces of any palisades/hills were found around the property (ter Steege et al., 2011, p. 314). In their paper ter Steege et al. (2011, p. 315) suggest that the original function of the ditch system may have been as a refuge stronghold for cattle, as there is a clear absence of (Iron Age) house plans within the area, a distinctive V-shape, and only one opening (see Figure B.15).						

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<tr><td></td><td colspan="3"> 

Figure B.15: Shown are the excavated features in the research area. The yellow feature represents the ditch system enclosing both the Roman (purple) and Late Iron Age (orange) house plans. The ditch system only has one opening, alluding to its original defensive properties (ter Steege, 2011, p. 315). (ter Steege et al., 2011, p. 313, Figure 11.1).</td></tr>
<tr><td>Geological context</td><td colspan="3">The soil in the research area consists mostly of plaggen with cover sand deposits underneath (ter Steege et al., 2011, p. 29).</td></tr>
<tr><td>Contents</td><td>Ditch System</td><td>Database URL</td><td rowspan="2">https://archisarchief.cultureelerfgoed.nl/Archis2/Archeorapporten/24/AR26816/</td></tr>
<tr><td>Dating method</td><td>Pottery
Associated structures</td><td></td></tr>
<tr><td>References</td><td colspan="3">ter Steege, B.C., Hissel, M.E., Verspay, J.P.W., Seijnen, M., Stoffels, E., Hendriks, J., Moesker, T.P., Hoss, S., Fischer, A.D., Slopsma J., & Koolstra, M.J. (2011). Een inheems-Romeinse nederzetting in Oerle-Zuid (gemeente Veldhoven). Definitief archeologisch onderzoek in plangebied ‘Zilverackers’, gemeente Veldhoven, deelgebied Oerle-Zuid. Diachron rapport 50. Amsterdam Archeologisch Centrum.</td></tr>
</table>

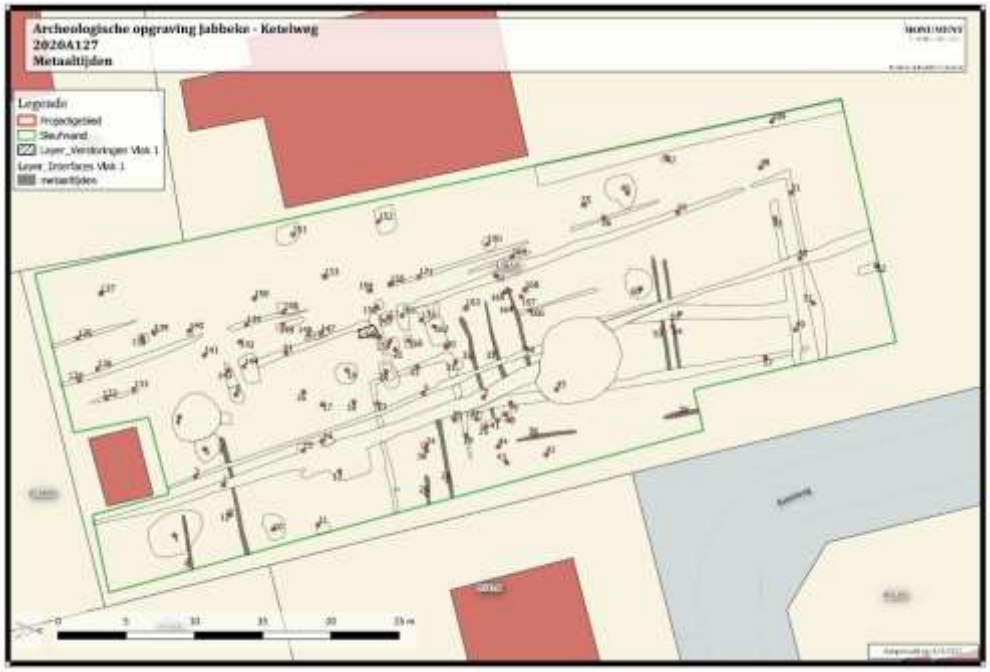
<table>
<tr><td>Site-ID</td><td>51</td><td>Toponym</td><td>Jabbeke-Oude Ketelweg</td><td>Area</td><td>Flanders</td><td>Country</td><td>BE</td></tr>
<tr><td>Period</td><td colspan="3">Middle Bronze – Iron Age (1200 – 12 BCE)</td><td>Coordinates</td><td colspan="3">(59997, 208566)
(60104, 208718)</td></tr>
<tr><td>Description</td><td colspan="7">The settlement site at Jabbeke-Oude Ketelweg contains a Gallo-Roman ditch system, which cuts through older smaller ditches. The older ditches are oriented along a E-W axis and are light grey in colour (Derweduwen & Vanhoutte, 2021, p. 25). These ditches are speculated to belong to the metal ages (Bronze and Iron), as they are superseded by a later system. Furthermore, the older ditch systems have yielded prehistoric pottery sherds (e.g. handmade pottery) (Derweduwen & Vanhoutte, 2021, p. 25).
 

Figure B.16: The excavation map of the Jabbeke-Oude Ketelweg excavation. Shown are the possible metal age ditch systems (in grey). As can be seen, these are overlapped by larger ditch systems. (Derweduwen & Vanhoutte, 2021, p. 25, Figuur 18).</td></tr>
<tr><td>Geological context</td><td colspan="7">Dry gleyic podsolic sand (Derweduwen & Vanhoutte, 2021, p. 16).</td></tr>
<tr><td>Contents</td><td colspan="2">Multiple ditches</td><td>Database URL</td><td colspan="3">https://id.erfgoed.net/archeologie/eindverslagen/1382</td></tr>
<tr><td>Dating method</td><td colspan="2">Pottery
Associated structures</td><td></td><td colspan="3"></td></tr>
<tr><td>References</td><td colspan="7">Derweduwen, N., & Vanhoutte, C. (2021). Archeologische opgraving. Verslag van resultaten: Eindverslag. Jabbeke Oude Ketelweg (prov. West-Vlaanderen). Rapport 2021/02. Monument Vanderkerckhove.</td></tr>
</table>

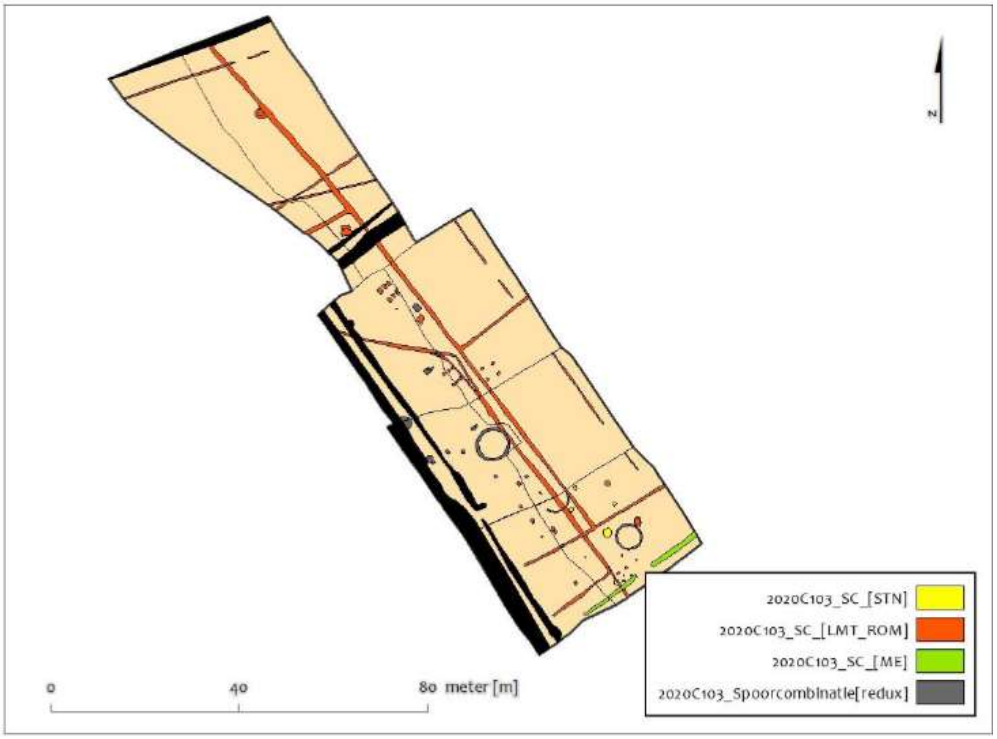
<table>
<tr><td>Site-ID</td><td>52</td><td>Toponym</td><td>Ichtegem-Molenstraat</td><td>Area</td><td>Flanders</td><td>Country</td><td>BE</td></tr>
<tr><td>Period</td><td colspan="3">Late Iron – Early Roman (250 BCE – 69 CE)</td><td>Coordinates</td><td colspan="3">(56286.169, 200384.515)
(56421.106, 200284.238)</td></tr>
<tr><td>Description</td><td colspan="7">The enclosed site of Ichtegem-Molenstraat, primarily dated to the Late Iron Age through the Early Roman period, includes a farmyard (NL: woonerf) with a primary dwelling resembling a Alphen-Ekeren variation (Van De Velde et al., 2021, p. 71). The residence is accompanied by several secondary structures and at least two wells, of which the latter provide evidence for the geographical chronology (see below). The ditch system surrounding the site shows evidence of multiple phases and parcels up the area (Van De Velde et al., 2021, p. 71).
 

Figure B.17: The interpretation of the excavated features at Ichtegem-Molenstraat. The ditch system, marked in orange, stretches across the entire excavation and is seen to parcel up the landscape. (Van De Velde, 2021, p. 70, Figure 53).</td></tr>
<tr><td>Geological context</td><td colspan="7">In prehistoric times the area transformed from a rich wet forest context to a acidic heath landscape (Van De Velde et al., 2021, p. 71). Currently, the research area is marked by a developing podsol within the aeolian sandy deposits. (Van De Velde et al., 2021, p. 23).</td></tr>
<tr><td>Contents</td><td colspan="3">Ditch System</td><td>Database URL</td><td colspan="3">https://id.erfgoed.net/archeologie/eindverslagen/1318</td></tr>
<tr><td>Dating method</td><td colspan="3">Associated structures
Pottery</td><td></td><td colspan="3"></td></tr>
<tr><td>References</td><td colspan="7">Van De Velde, S., Jacops, J., Storme, A.,, Allemeersch, L., & Vergauwe, R. (2021). Opgraving Ichtegem Molenstraat. Opgravingsrapport 2020C103. Ghent Archaeological Team. https://id.erfgoed.net/archeologie/eindverslagen/1318</td></tr>
</table>

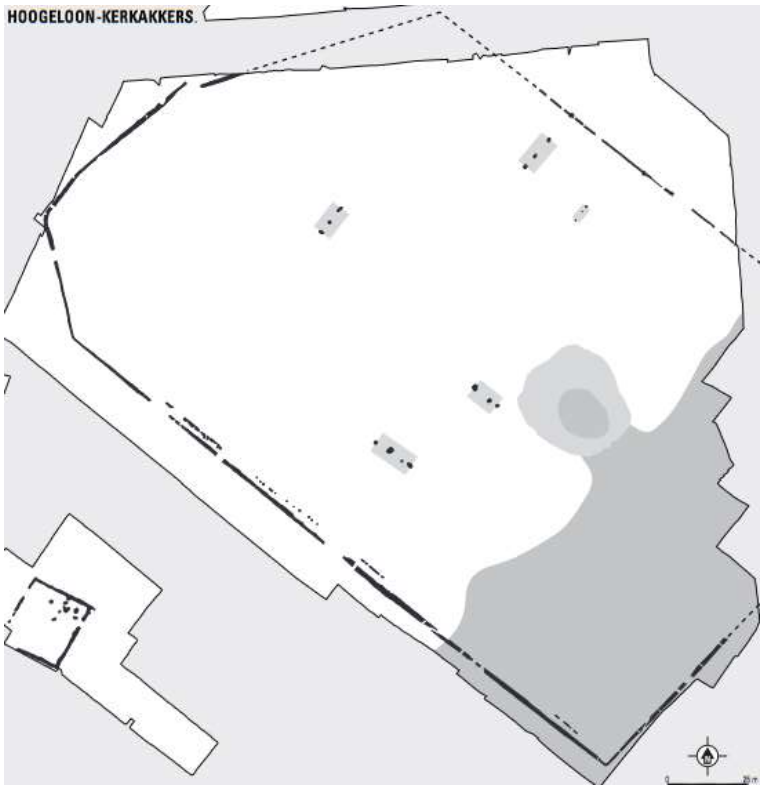
Site-ID	53	**Toponym**	Sint-Gillis-Waas-Reepstraat	**Area**	Flanders	**Country**	BE
Period	Late Bronze – Early Iron (1100 – 500 BCE)			**Coordinates**	51°13'45.0"N 4°05'48.7"E		
Description	The (early) Iron Age settlement at Sint-Gillis-Waas-Reepstraat is subdivided by ditches into square and rectangular parcels, oriented along the NW-SE and NE-SW axis (Bourgeois et al., 2003, pp. 271-272). The earlier phase of the settlement in the late Bronze Age contains a single 1m wide ditch enclosing the settlement. The later Iron Age ditches are organised in an orthogonal pattern and parcel up the settlement. These latter ditches are <1m wide. Both the ditch and the houses during the Iron Age phase are oriented along a similar axis (Bourgeois et al., 2003, p. 273).						
Geological context	Flat sandy soils, apart from two large depressions to the east and west of the site, evidenced to be present during the prehistoric phases of the site (Bourgeois et al., 2003, pp. 270-271).						
Contents	Ditch System			**Original archaeologist**	J. Bourgeois		
Dating method	Associated structures						
References	Bourgeois, J. (1993). De nederzetting uit de Vroege IJzertijd van Sint-Gillis-Waas "Reepstraat" (O.-VI.): 1991-1992. *Lunula: Archaeologia protohistorica*, *I*, 59-61. Bourgeois, J., Bourgeois, I., & Cherretté, B. (2003). Fact Sheets on Settlements. In J. Bourgeois, I. Bourgeois, & B. Cherretté (Eds.), *Bronze Age and Iron Age communities in Northwestern Europe* (pp. 191-299). Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten.						

Site-ID	54	**Toponym**	Neerharen-Rekem	**Area**	MDS	**Country**	BE
Period	Late Iron - Early Roman (250 BCE – 69 CE)			**Coordinates**			
Description	The site of Neerharen-Rekem contains 11 houses dating to the Late Iron Age and Early Roman period. The houses all face the same direction. The settlement likely extends further north, however, has yet to be fully excavated (De Boe, 1985, p. 58; Bourgeois et al., 2003, p. 186). While some buildings are placed in an open space, others overlap each other. The ditch system largely surrounds the settlement and it is hypothesised to also subdivide it (Bourgeois et al., 2003, p. 186). In their reference work, Bourgeois et al. (2003) mark Neerharen-Rekem as the only Iron Age site in Belgium with a clear evidence of stable residency (p. 186).						
Geological context	'Low sand ridge along the old Meuse bank' (De Boe, 1985, p. 58).						
Contents	Ditch System			**URL**	https://doi.org/10.55465/UVVH2212		
Dating method	Radiocarbon dating Pottery						
References	Bourgeois, I., Cherretté, B., & Bourgeois, J. (2003). Bronze Age and Iron Age settlements in Belgium. An overview. In J. Bourgeois, I. Bourgeois, & B. Cherretté (Eds.), *Bronze Age and Iron Age communities in Northwestern Europe* (pp. 175–190). Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten. De Boe, G. (1985). De opgravingscampagne 1984 te Neerharen-Rekem. *Archaeologica Belgica Nieuwe reeks*, *1*(2), 53-62. Nationale Dienst voor Opgravingen. https://doi.org/10.55465/UVVH2212						

Site-ID	55	**Toponym**	Wulfsberge	**Area**	Flanders	**Country**	BE
Period	Late Iron – Early Roman (250 BCE – 69 CE)			**Coordinates**	51°08'57.6"N 3°23'11.9"E		
Description	[Original report was unable to be located, hence I. & J. Bourgeois et al. (2003) were used.] The site of Oedelem-Wulfsberge is classified as a ditched area, containing approximately 10 granaries and 2 outbuildings. The site and its structures have been radiocarbon dated to the transitional Late Iron Age – Early Roman Period (1st century BCE to 1st century CE). Apart from the ditch system the site also contains the remains of fences, as well as, small trenches, none of which overlap (I. Bourgeois et al., 2003, p. 186). The ditch structures consist of parallel and orthogonal ditches which form a parcel system, oriented along a NE-SW axis. While funerary monuments (i.e. barrows) are present the ditch system does not encroach on them, never crossing their structure. The site resembles the '*fermes indigènes*' found in the Late Iron Age and Early Roman period in northern France (J. Bourgeois et al., 2003, pp. 250-251). Physical description: 'Two parallel enclosing ditches (in-between distance 4m/ depth 50-70cm angle of 110 degrees between NNW-SSE axis and SW-NE axis), the border of which are clearly demarcated. Perpendicular on the N-S axis two other ditches (depth 10-70cm). This parcel system seems to be subdivided by (badly preserved) drains and palisades' (J. Bourgeois et al., 2003, p. 250).						
Geological context	'Site situated on the south slope of a tertiary clay outcrop (cuesta Maldegem-Zomergem) features are a long sandy ridge, a shallow depression and tertiary clay deposits (cf. Outcrops)' (J. Bourgeois et al., 2003, p. 250).						
Contents	Ditch System			**Original archaeologists**	B. Cherretté; J. Bourgeois;		
Dating method	Radiocarbon dating						
References	Bourgeois, I., Cherretté, B., & Bourgeois, J. (2003). Bronze Age and Iron Age settlements in Belgium. An overview. In J. Bourgeois, I. Bourgeois, & B. Cherretté (Eds.), *Bronze Age and Iron Age communities in Northwestern Europe* (pp. 175–190). Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten. Bourgeois, J., Bourgeois, I., & Cherretté, B. (2003). Fact Sheets on Settlements. In J. Bourgeois, I. Bourgeois, & B. Cherretté (Eds.), *Bronze Age and Iron Age communities in Northwestern Europe* (pp. 191-299). Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten.						

<table>
<tr><td>Site-ID</td><td>56</td><td>Toponym</td><td>Aalter-Langevoorde</td><td>Area</td><td>Flanders</td><td>Country</td><td>BE</td></tr>
<tr><td>Period</td><td colspan="3">Late Iron – Early Roman (250 BCE – 69 CE)</td><td>Coordinates</td><td colspan="3">51°06'10.7"N 3°25'58.3"E</td></tr>
<tr><td>Description</td><td colspan="7">[Original report was unable to be located, hence Bourgeois et al. (2003) was used.]

In the Late Iron Age (~100 BCE) a large rectangular enclosure was hollowed out, oriented along a NNE-SSW to E-W axis, with its ditches intersecting at right angles (Bourgeois et al., 2003, p. 194). The ditches are approximately 30m in length, U-shaped and ~75cm wide. Furthermore, they contained cremated bone, charcoal, and complete pots (Bourgeois et al., 2003, p. 193). This presence of (funerary-related) depositions suggests an original funerary purpose (Bourgeois et al., 2003, p. 194). Subsequently, however, in the Early Roman period (~1 CE), a settlement was established within its boundaries, marking a shift in the usage patterns of the enclosure. Overall, the enclosure retains a similar orientation during both ‘phases’. The site plan largely resembles the ‘fermes indigènes’ found in the Late Iron Age and Early Roman period in northern France (Bourgeois et al., 2003, pp. 193-194).</td></tr>
<tr><td>Geological context</td><td colspan="7">Most of the features in the site of Aalter-Langevoorde were located on a dry slope of a sandy elevation located in between the Biestebeek and Hoogkale rivers (Bourgeois et al., 2003, p. 193).</td></tr>
<tr><td>Contents</td><td colspan="3">Ditch System</td><td rowspan="2">Original archaeologists</td><td colspan="2" rowspan="2">W. De Clerq;
S. Mortier;</td></tr>
<tr><td>Dating method</td><td colspan="3">Radiocarbon dating
Palynology</td></tr>
<tr><td>References</td><td colspan="7">Bourgeois, J., Bourgeois, I., & Cherretté, B. (2003). Fact Sheets on Settlements. In J. Bourgeois, I. Bourgeois, & B. Cherretté (Eds.), Bronze Age and Iron Age communities in Northwestern Europe (pp. 191-299). Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten.</td></tr>
</table>

Site-ID	57	Toponym	Hoogeloon-Kerkakkers	Area	MDS	Country	NL
Period	Early Roman Period (20 – 30 CE)			**Coordinates**	(147.260, 378.890)		
Description	[Original report was unavailable, hence Slofstra (1991) & Hiddink (2014) were used.] The settlement found in the research area was, based on its Roman imports, most likely founded in the Early Roman period (20 – 30 CE). It consists of 6 to 7 houses around a central open space (Slofstra, 1987; Slofstra, 1991, p. 148). The enclosement ditch had an original depth of 1m, and could therefore, not have been used for defensive purposes (Slofstra, 1991, p. 149). The author debates the idea that the settlement could have been found earlier, as, at the time, no detailed typology for native (pre-historic) pottery existed (Slofstra, 1991, p. 148).  Figure B.18: The enclosed settlement at Hoogeloon-Kerkakkers. Shown is the enclosed settlement found at Hoogeloon-Kerkakkers, the black line around the rectangle structures (houses) is the enclosement ditch. In the southwestern corner an open-air sanctuary was found. (Slofstra, 1991, p. 150, Figure 12; Hiddink, 2014, p. 286, Figure 14.1).						
Geological context	The municipality in which the research area is located is dominated by cover sands deposited during the last ice age. These sands, deposited in ridges, allow for a height difference between 24 and 35 meters above NAP (Provincie Noord-Brabant [PNB], 1992, p. 11).						
Contents	Ditch System			**Original archaeologists**	W.C.M. van Nuenen J. Slofstra		
Dating method	Pottery Associated structures						

References	Hiddink, H. (2014). *De Romeinse villa-nederzetting op de Kerkakkers bij Hoogeloon (Noord-Brabant)*. Zuidnederlandse Archeologische Rapporten 53. Archeologisch Centrum Vrije Universiteit. Provincie Noord-Brabant. (1992). *Cultuurhistorische inventarisatie Noord-Brabant M.I.P.: Gemeente Hoogeloon*. Voorlichting van de Provincie Noord-Brabant. https://020apps.nl/mip/beschrijvingen/Hoogeloon.pdf Slofstra, J. (1987). Een nederzetting uit de Romeinse tijd bij Hoogeloon. In W.C.M. van Nuenen (Ed.), *Drie dorpen een gemeente. Een bijdrage tot de geschiedenis in Hoogeloon, Hapert en Casteren, Hapert*, 51-86. Gemeente Hoogeloon. Slofstra, J. (1991). Changing settlement systems in the Meuse-Demer-Scheldt area during the Early Roman period. In N. Roymans & F. Theuws (Eds.), *Images of the past: Studies on ancient societies in northwestern Europe*, 131-199. Instituut voor Pre- en Protohistorische Archeologie Albert Egges van Giffen.

Site-ID	58	**Toponym**	Riethoven-Heesmortel	**Area**	MDS	**Country**	NL
Period	Early Iron Age/Early Roman - Middle Roman Period (800 BCE/1 – 250 CE)			**Coordinates**	(152500, 373000)		
Description	[Original report was unavailable, hence Hiddink (2013) was used.] *Background* The research area (*Riethoven-Heesmortel*) contains a settlement dating to the first decade CE to the middle of the 3rd century CE (Hiddink & Roymans, 2015, p. 68). In Slofstra (1991, p. 149) the author poses the genesis of the settlement to lie within the late Augustan-Tiberian period (1 – 37 AD). The settlement approximately measures to 200m by 145m and contains 40 houses, 2 large outbuildings and several wells, 40 metres to the east a cemetery was found (Hiddink & Roymans, 2015, p. 68). The settlement is divided by two parallel ditches (301 & 302) which run across the entire research area before make an (almost) right-angled turn. As can be seen in Figure B.19, a similar parallel ditch system was found in the cemetery to the east of the site. Whether they connected is uncertain, as the area in between had not been excavated (Hiddink, 2013, p. 61). *Interpretation* There is some discussion regarding the origin of the ditches. Especially due to the odd orientation in regard to the house plans. Hiddink (2013, p. 62) poses a dating to the early Iron Age, as the ditches seem to follow the pattern in delineating the aforementioned (Iron Age) cemetery. This interpretation, however, would put house 901 and 902 (see B.19) outside of the farming area, a practice uncommon within the Iron Age context. Secondly, were the ditches not to continue in the eastern cemetery later dates are proposed. In Slofstra (1991, p. 149) the author places the settlement within the early-Roman period, akin to the other enclosed settlements of *Neerharen-Rekem*, *Hoogeloon-Kerkakkers*, and *Oss-Westerveld* (Site-ID: 54, 57, and 59 respectively). Furthermore, the settlement is grouped within the *enclosed settlements* typology, alongside the aforementioned. (Slofstra, 1991, p. 149). A third theory proposes the ditches to be either a ritual road or a cattle pen (Hiddink, 2013, p. 63).						

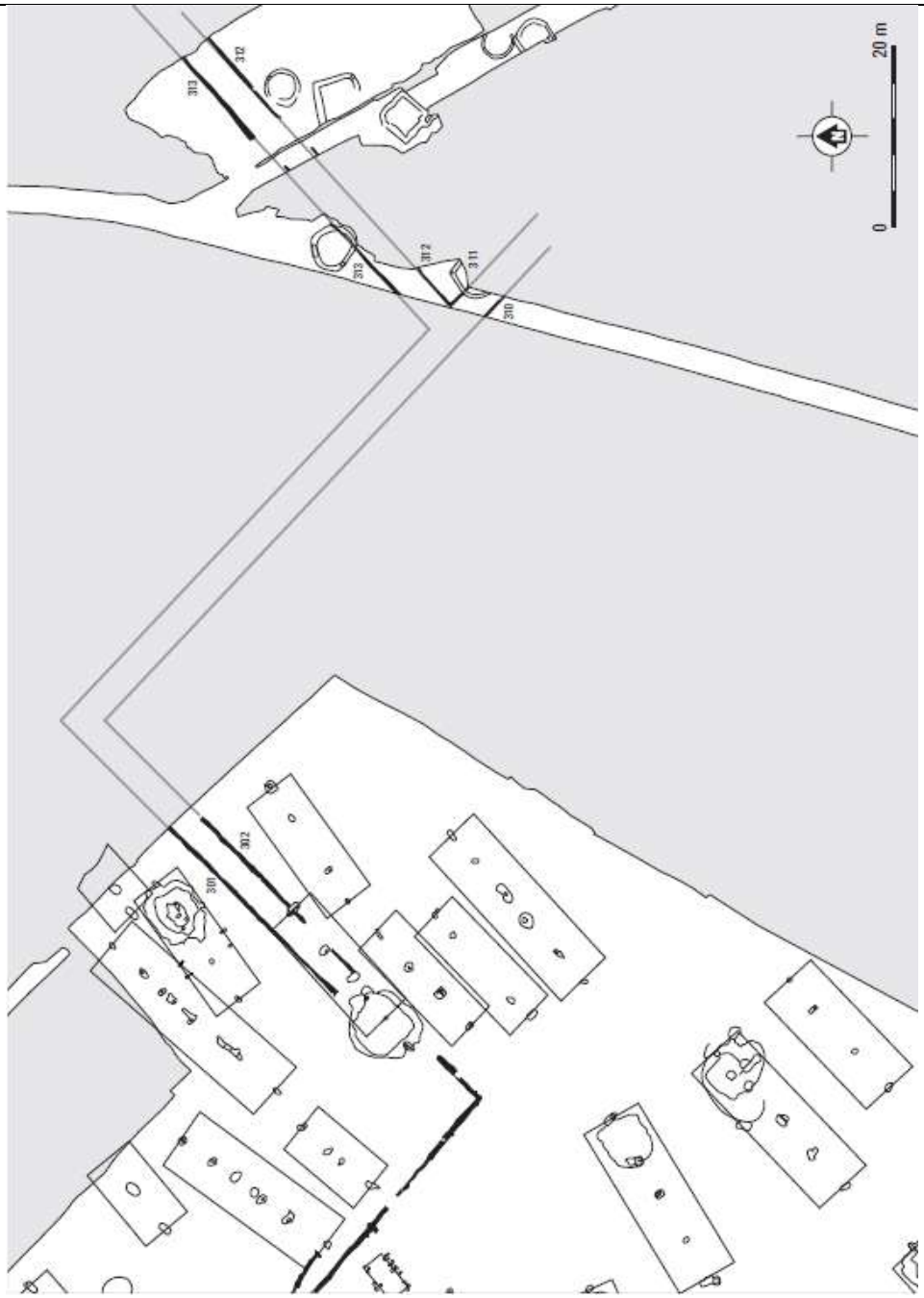
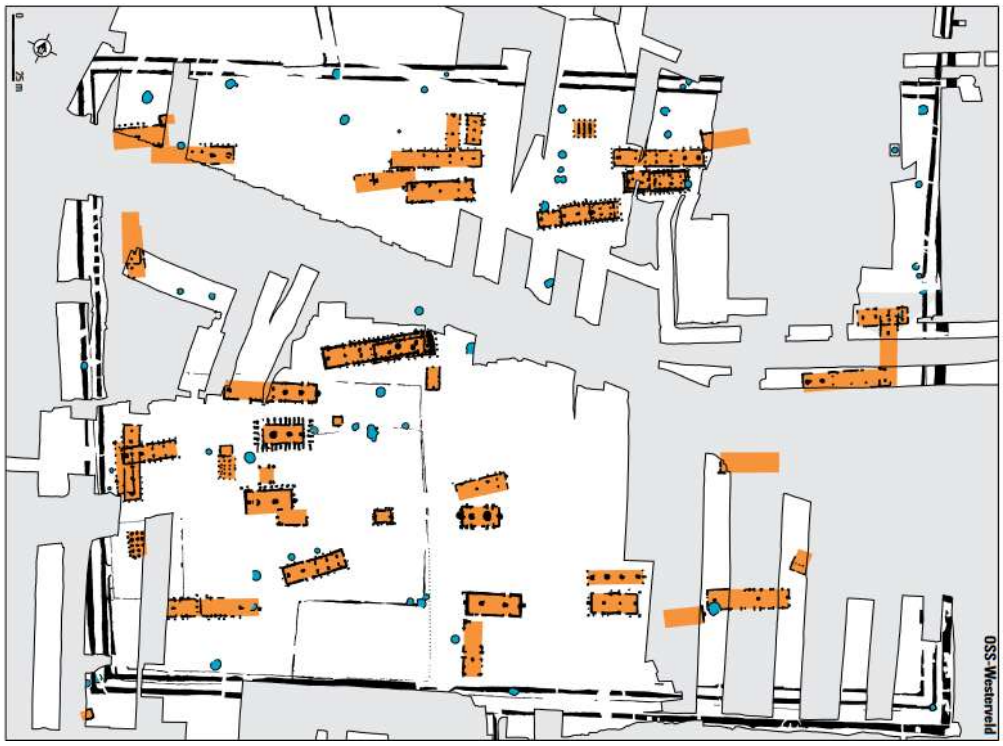


Figure B.19: The early-Roman settlement of *Riethoven-Heesmortel*. The black lines represent the parallel ditches running through the house plans. The lines outside the bounds of the excavation are the proposed path of the ditches. In Hiddink (2013, p. 62) the author suggests a possible older dating (early Iron Age (800 – 500 BCE)), as the house plans misalign with the orientation of the ditches. (Hiddink, 2013, p. 63, Figure 5.10).

Geological context	The research area (*Riethoven-Heesmortel*) contains a shallow cover sand soil, further to the northern lower area the soil transforms into fluvisols. Soil analysis suggests a similar consistency as other areas in the southern cover sands (Hiddink, 2013, pp. 34-35).		
Contents	Ditch System	**Original archaeologists**	J. Slofstra D. Offers
Dating method	Associated structures Pottery Numismatic analysis (Coins)		

References	Hiddink, H. (2013). *Een nederzetting en grafveld uit de Romeinse tijd op de Heesmortel bij Riethoven*. Zuidnederlandse Archaeologische Rapporten 51. Archeologisch Centrum Vrije Universiteit. Hiddink, H., & Roymans, N. (2015). Exploring the rural landscape of a peripheral region. In N. Roymans, T. Derks, & H. Hiddink (Eds.), *The Roman villa of Hoogeloon and the archaeology of the periphery* (pp. 45-86). Amsterdam Archaeological Studies 22. Amsterdam University Press. Slofstra, J. (1991). Changing settlement systems in the Meuse-Demer-Scheldt area during the Early Roman period. In N. Roymans & F. Theuws (Eds.), *Images of the past: Studies on ancient societies in northwestern Europe*, 131-199. Instituut voor Pre- en Protohistorische Archeologie Albert Egges van Giffen.

Site-ID	59	Toponym	Oss-Ussen	Area	MDS	Country	NL
Period	Early Roman - Middle Roman Period (12 BCE – 250 CE)			Coordinates	(163050. 420220)		
Description	The research area (Oss-Ussen) consists of three separated settlements (*Westerveld*, *Vijver*, and *Zomerhof*) and a central cemetery dating to the Roman period. As, *Vijver*, *Zomerhof*, and the cemetery were not intensively occupied during pre-Roman times, therefore, the focus will lie on *Westerveld* (Schinkel, 1998, p. 13). *Oss-Westerveld* Oss-Westerveld was previously inhabited in the Iron Age, as evidenced by a large amount of undatable pre-Roman buildings (Slofstra, 1991, p. 149; Hiddink & Roymans, 2015, p. 66). In the Early Roman period the site saw a radical transition with the construction of an enclosure ditch (Jansen & Fokkens, 2010, p. 316). The (enclosed) Roman settlement, dated to the 1st–2nd century CE, totals 7.5 ha in size, consisting of 30 houses, 12 outbuildings and 70 wells (Hiddink & Roymans, 2015, p. 67). The rectangular shape of the settlement is determined by a double ditched enclosure, which had, due to shallow nature likely no defensive capabilities. Rather in Jansen & Fokkens (2010, p. 70) the authors suggest they were used for settlement delineation. *Enclosing ditches* Ditches F125 and F126 enclose the settlement forming a rectangular ditch system, see Figure B.20. In addition to never intersecting, a northern (15m) and (probable) southern (4m) interruption can be distinguished in both ditches, likely serving as an entrance (Wesselingh, 2000, p. 124). The inner-ditch F125 has been re-dug once, maintaining a consistent depth of 80cm (thus being above the water table) indicating a non-water ditch. Outer-ditch F126 was re-dug at least twice, maintaining a consistent depth of 60cm (Wesselingh, 2000, p. 123). Find material dates the original construction of both ditches to the (early) 1st century CE. In the 2nd century the interruptions were closed through the construction of two, 40cm deep, ditches, north of which a row (2.5m apart) of posts were placed. The south side, however, likely remained open (Wesselingh, 2000, p. 124). *Other ditches* The majority of the ditches which occur in the Westerveld settlement have not survived, the notable exceptions F125, F126, F20, F23, F77, F87, and F124. The ditches vary in width (20–470 cm), length (4.2–330m), and depth (max. 80cm). Within the typology proposed in Schinkel (1998, p. 298) most of these fall within type IIIC (Rectangular and circle-shaped ditches). Various ditches and palisades follow a similar trajectory (Schinkel, 1998, p. 299).						

	Ditch F87 and F117 enclose a smaller plot of 1.4 ha in the southwest corner of the settlement (Hiddink & Roymans, 2015, p. 68). Find material suggests a date a construction date in the latter half of the 1st century CE through the first half of the 2nd century CE. The ditch system, which had been expanded/re-dug several times, eventually fell out of use in the second half of the 2nd century CE (Wesselingh, 2000, p. 120). The ditches F128-F135 continue outside of the enclosed area, expanding into the surrounding fields (Wesselingh, 2000, p. 125; ter Steege et al., 2011, p. 316). Ditch F130 runs north for at least 50m (~45cm deep) and could be connected to the ditches around Oss-Schalkskamp (Site-ID: 60). In these fields no Roman features were found, merely (indigenous) Roman pottery sherds (Wesselingh, 2000, p. 126). As this thesis mainly concerns the settlement-related ditch systems, see Wesselingh (2000, p. 117–128) and Schinkel (1998, p. 298–305) for comprehensive outlines of the field ditches.  Figure B.20: The enclosed settlement of Oss-Westerveld. The settlement (350m by 250m encloses 37 Roman houses, dendrochronological analysis puts the settlement at the 1st to 2nd century CE. (Hiddink & Roymans, 2015, p. 67, Figure 17).
Geological context	The research area is located on the Maasland, known for having two distinct landscapes: the clay soils (*Maaskant*) and the sand soils (*Heikant*). As the area is prone to flooding the transitional area between the two was in prehistory often chosen for settlements. Oss is located on the northern rim of the *Heikant*, the Pleistocene coversands (Wesselingh, 2000, p. 7). The (higher) *Heikant* was used for farming and settlement, while the *Maaskant* was used for cattle grazing (Pruijsen & van As, 2012, p. 17).

Contents	Ditch System	**Original archaeologists**	Institute of Prehistory of Leiden University (IPL)
Dating method	Pottery Associated structures Dendrochronology		
References	Hiddink, H., & Roymans, N. (2015). Exploring the rural landscape of a peripheral region. In N. Roymans, T. Derks, & H. Hiddink (Eds.), *The Roman villa of Hoogeloon and the archaeology of the periphery* (pp. 45-86). Amsterdam Archaeological Studies 22. Amsterdam University Press. Jansen, R., & Fokkens, H. (2010). Central places of the 1st and 2nd century AD in the Maaskant region (southern Netherlands). Reinterpreting the Roman settlement at Oss-Westerveld. *Siedlungs- und Küstenforschung im Südlichen Nordseegebiet*, *33*, 68-81. https://hdl.handle.net/1887/17796 Pruijsen, M., & van As, S. (2012). *Bewoningssporen in de Horzak: Een proefsleuven onderzoek en definitieve opgraving te Oss-Horzak West.* Archol rapport 179. Archol. Schinkel, K. (1998). Unsettled settlement, occupation remains from the Bronze Age and the Iron Age at Oss-Ussen. The 1976-1986 excavations. In H. Fokkens (Ed.), *The Ussen project: The first decade of excavations at Oss* (pp. 5–306). Analecta Praehistorica Leidensia 30. Leiden University. Slofstra, J. (1991). Changing settlement systems in the Meuse-Demer-Scheldt area during the Early Roman period. In N. Roymans & F. Theuws (Eds.), *Images of the past: Studies on ancient societies in northwestern Europe*, 131-199. Instituut voor Pre- en Protohistorische Archeologie Albert Egges van Giffen. ter Steege, B.C., Hissel, M.E., Verspay, J.P.W., Seijnen, M., Stoffels, E., Hendriks, J., Moesker, T.P., Hoss, S., Fischer, A.D., Slopsma J., & Koolstra, M.J. (2011). *Een inheems-Romeinse nederzetting in Oerle-Zuid (gemeente Veldhoven). Definitief archehologisch onderzoek in plangebied 'Zilverackers', gemeente Veldhoven, deelgebied Oerle-Zuid.* Diachron rapport 50. Amsterdam Archeologisch Centrum. Wesselingh, D.A. (2000). *Native neighbours: Local settlement system and social structure in the Roman period at Oss (the Netherlands)*. Analecta Praehistorica Leidensia 32. Faculty of Archaeology University of Leiden. https://hdl.handle.net/1887/33738		

Site-ID	60	Toponym	Oss-Schalkskamp	Area	MDS	Country	NL
Period	Late Iron Age - Early Roman Period (150 BCE – 50 CE)			Coordinates	(163350, 420700)		
Description	The research area (*Oss-Schalkskamp*) is located 400 metres north of *Oss-Westerveld* (Site-ID: 59), and it contains 3 house plans, 29 granaries, 21 pits and wells, and 23 fragments of ditches (Wesselingh, 2000, p. 172; Jansen & Fokkens, 2010, pp. 72-73). Furthermore, a sub-rectangular ditched enclosure encloses these house plans. Using dendrochronological analysis, material remains, and house plan typology, the settlement can be dated to the first half of the 1st century AD (Jansen & Fokkens, 2010, pp. 72-73). However, since Iron Age occupation is known in the area, some of the features may be placed in the Late Iron Age (Wesselingh, 2000, p. 172).						

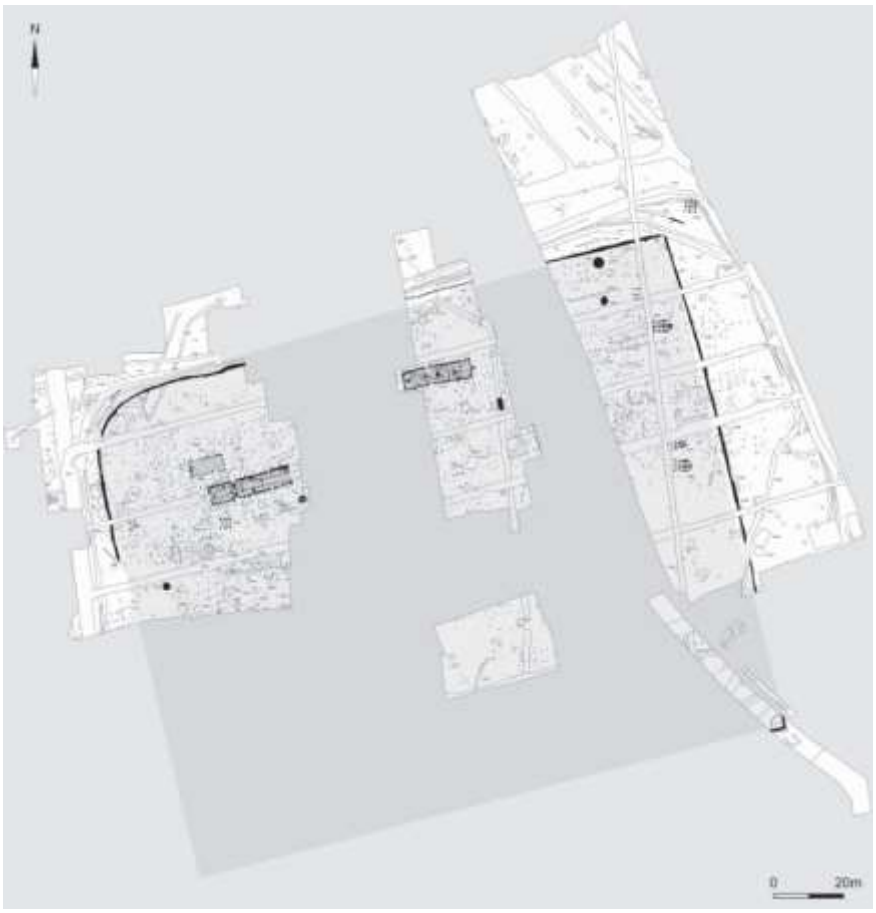


Figure B.21: Shown is the Early Roman enclosed settlement of Oss-Schalkskamp. Within the enclosed system two farmsteads were found, however, the settlement remains largely unexcavated, and hence more farmsteads could be present. (Jansen & Fokkens, 2010, p. 72, Figure 4).

Three ditches (F141, F142, and F144), probably forming part of a ditch system enclosing the settlement, were deemed Schinkel-type IIIA (linear or L-shaped with a flat floor) (Schinkel, 1998, p. 298), and were dated to the Late Iron Age (phase K; Wesselingh, 2000, p. 174). Two fragments of ditches (F156 and F164) resulted in Roman period material. These, together

<table>
<tr><td></td><td colspan="3">with fragmentary ditches, enclose the settlement. This ditch system is, due to scarce finds, dated not later than the 1st century AD (Wesselingh, 2000, p. 175).

Timeline
During the Late Iron Age (phase K-L; 150-1 BCE) the settlement consisted of two small farms enclosed by a ditch (Wesselingh, 2000, p. 180). The settlement period is, however, especially dated to the first decades of the 1st century BCE. Therefore, creating an unaccountable gap of at least 75 years (phase L). Towards the end of the Late Iron Age (approximately 1 CE) a second shallow ditch was dug enclosing the settlement area (Wesselingh, 2000, p. 181). The first ditch, mentioned above, was likely still visible during this time. Within this enclosure at least one farmstead was built. This occupation phase was short in duration, with the settlement being abandoned around 50 AD (Wesselingh, 2000, p. 180). The continuity of the settlement remains up for debate, while the enclosures follow the same orientation, the second ditch was likely still visible and may, therefore, have functioned as a guiding structure (Wesselingh, 2000, pp. 180-181).</td></tr>
<tr><td>Geological context</td><td colspan="3">The research area is located on the Maasland, known for having two distinct landscapes: the clay soils (Maaskant) and the sand soils (Heikant). As the area is prone to flooding the transitional area between the two was in prehistory often chosen for settlements. Oss is located on the northern rim of the Heikant, the Pleistocene coversands (Wesselingh, 2000, p. 7). The (higher) Heikant was used for farming and settlement, while the Maaskant was used for cattle grazing (Pruijsen & van As, 2012, p. 17).</td></tr>
<tr><td>Contents</td><td>Ditch System</td><td rowspan="2">Original archaeologists</td><td rowspan="2">Leiden Institute of Prehistory (IPL)</td></tr>
<tr><td>Dating method</td><td>Dendrochronology
Pottery</td></tr>
<tr><td>References</td><td colspan="3">Jansen, R., & Fokkens, H. (2010). Central places of the 1st and 2nd century AD in the Maaskant region (southern Netherlands). Reinterpreting the Roman settlement at Oss-Westerveld. Siedlungs- und Küstenforschung im Südlichen Nordseegebiet, 33, 68-81. https://hdl.handle.net/1887/17796

Pruijsen, M., & van As, S. (2012). Bewoningssporen in de Horzak: Een proefsleuven onderzoek en definitieve opgraving te Oss-Horzak West. Archol rapport 179. Archol.

Schinkel, K. (1998). Unsettled settlement, occupation remains from the Bronze Age and the Iron Age at Oss-Ussen, The 1976-1986 excavations (S. Mellor, Trans.). In H. Fokkens (Ed.), The Ussen project: The first decade of excavations at Oss. Analecta Praehistorica Leidensia 30. Faculty of Archaeology Universiteit Leiden.</td></tr>
</table>

	Wesselingh, D.A. (2000). *Native neighbours: Local settlement system and social structure in the Roman period at Oss (the Netherlands)*. Analecta Praehistorica Leidensia 32. Faculty of Archaeology University of Leiden. https://hdl.handle.net/1887/33738

Site-ID	61	Toponym	Oss-Almstein	Area	MDS	Country	NL
Period	Late Iron Age (225 – 12 BCE)			Coordinates	(163900; 420900)		
Description	*Settlement* The (Oss-Almstein) research area contains eight house plans, eight granaries, and a enclosement ditch (see Figure B.22).The settlement construction phase lasted from the last part of the Middle Iron Age to the Late Iron Age (350 – 125 BCE; phase H-J) (van den Broeke, 2012, pp. 33-34; Jansen & Fokkens, 1999, pp. 76-78). The oldest buildings H10 and H13 were likely constructed at the same time, namely during the transitionary period from phase H to I (around 225 BCE) (Jansen & Fokkens, 1999, p. 77). Succeeding this, at least three building phases are recorded, with the settlement consisting of at least two farm yards at the same time. An exception can be found in a younger structure which was dated based on pottery sherds to phase K-L (around 150-1 BCE). It is speculated that this structure held a special significance (van den Broeke, 2012, pp. 34 – 35; Jansen & Fokkens, 1999, pp. 76-77).						

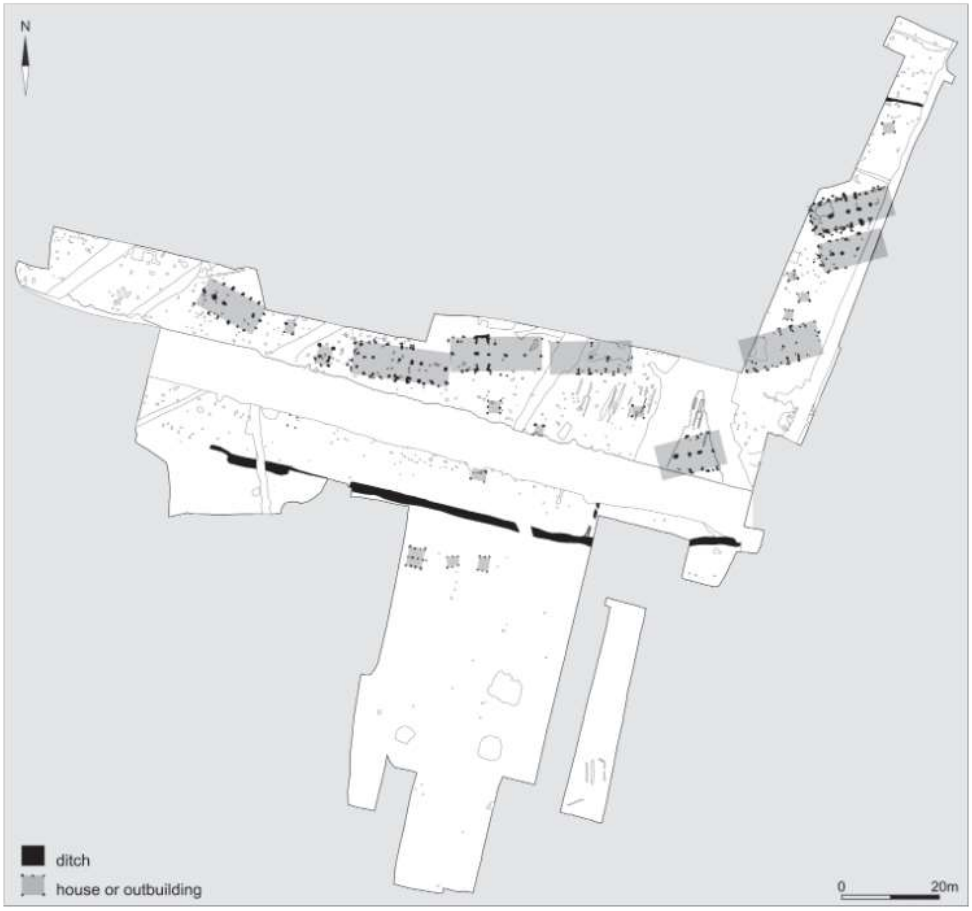


Figure B.22: Shown is the Late (pre-Roman) Iron Age Oss-Almstein settlement. Notable are the clustered farmstead and the ditches enclosing the settlement to the north and the south. (Jansen & Fokkens, 2010, p. 77, Figure 8).

	Ditches Although Roman activity is known in the area, no Roman buildings were excavated in Oss-Almstein (Wesselingh, 2000, p. 200). A few ditch fragments were, however, dated to Roman times, mainly due to material remains, relative dating of intersecting sections and the direction of the ditches in relation to Oss-Schalkskamp (Wesseling, 2000, p. 193). South of the settlement a deep (water) ditch (NL: *sloot*) runs eventually bending north in the east of the research area. Based on settlement material this ditch has been dated to phase K (125 – 50 BCE). Furthermore, in their article Jansen & Fokkens (1999, p. 79) pose the presence of either a wall or bush-line in prehistoric times.		
Geological context	The research area is located on the Maasland, known for having two distinct landscapes: the clay soils (*Maaskant*) and the sand soils (*Heikant*). As the area is prone to flooding the transitional area between the two was in prehistory often chosen for settlements. Oss is located on the northern rim of the *Heikant*, the Pleistocene coversands (Wesselingh, 2000, p. 7). The (higher) *Heikant* was used for farming and settlement, while the *Maaskant* was used for cattle grazing (Pruijsen & van As, 2012, p. 17).		
Contents	Ditch System	**Archaeologists**	Prof. dr. H. Fokkens Dr. R. Jansen
Dating method	House typology Pottery		
References	Pruijsen, M., & van As, S. (2012). *Bewoningssporen in de Horzak: Een proefsleuven onderzoek en definitieve opgraving te Oss-Horzak West.* Archol rapport 179. Archol. Jansen, R., & Fokkens, H. (1999). *Bouwen aan het verleden: 25 jaar archeologisch onderzoek in de gemeente Oss*. Faculteit der Archeologie van de Universiteit Leiden. Jansen, R., & Fokkens, H. (2010). Central places of the 1st and 2nd century AD in the Maaskant region (southern Netherlands). Reinterpreting the Roman settlement at Oss-Westerveld. *Siedlungs- und Küstenforschung im Südlichen Nordseegebiet, 33,* 68-81. https://hdl.handle.net/1887/17796 van den Broeke, P.W. (2012). *Het handgevormde aardewerk uit de IJzertijd en de Romeinse tijd van Oss-Ussen: Studies naar typochronologie, technologie en herkomst*. Sidestone Press. https://hdl.handle.net/1887/20033 Wesselingh, D.A. (2000). *Native neighbours: Local settlement system and social structure in the Roman period at Oss (the Netherlands)*. Analecta Praehistorica Leidensia 32. Faculty of Archaeology University of Leiden. https://hdl.handle.net/1887/33738		

Site-ID	62	Toponym	Weert-Molenakker	Area	MDS	Country	NL
Period	Late Iron Age – Middle Roman Period (50 BCE – 250 CE)			Coordinates			
Description	*Background* The research area consists of an (indigenous) Roman settlement dating to the Late Iron through Middle Roman period (50 BCE – 250 CE). The settlement is located in between two large ditch systems, dating to the Late Iron Age (1st century BCE). These ditches were interpreted, in their original function, to be reinforcement or stronghold ditches (Tol, 1999, p. 3; Tichelman, 2016, pp. 152-153)  Figure B.23: The Late Iron Age ditch system in Weert-Molenakker. Shown is the ditch system surrounding the settlement at Weert-Molenakker, a hill accompanying the ditch was found besides it. The straight edge side, as seen above, is approximately 150 metres long (van As, 2008, p. 26). (Hiddink & Roymans, 2015, p. 71, Figure 21).						

	Settlement The settlement consists of 45 houses plans, 18 granaries and 6 wells (see Figure B.23). The orientation of the buildings suggest that the Iron Age ditch remained visible until, at least, the Early Roman settlement phase. Approximately 200 metres from the settlement an accompanying cemetery was excavated (*Weert-Molenakkerdreef*). Within the Dutch province of Limburg Weert-Molenakker is a unicum, with its close-knit settlement construction and even parallel house constructions (Tichelman, 2016, p. 152). The interior enclosure contains four post structures, the outer ditch has a small hill structure accompanying the ditch. These structures indicate a possible defensive function (Gerritsen, 2001, p. 157; van As, 2008, p. 26). *Characteristics* The doubled ditch enclosure has an oval inner-ditch enclosed by a larger rounded-rectangular outer-ditch. The inner-ditch measures to 160m by 110m, with the ditch itself being ~4m wide and 2m deep. Approximately 80 metres to the south the outer ditch is located. This ditch is 260m by 300m in size, ca. 1.90m wide, and 0.9m deep (Gerritsen, 2001, p. 157; Tichelman, 2016, p. 153). In the eastern side of the outer-ditch an entrance with out-bending ditches, reminiscent of a cattle entrance, was found (akin to other examples in the region, e.g. Blader-Kriekeschoor [Site-ID: 64]) (Tichelman, 2016, p. 152).		
Geological context	The research area (*Weert-Molenakker*) and to a larger extent *Weert* is marked by cover sand soils (Tichelman, 2016, p. 79).		
Contents	Ditch System	**Original Archaeologists**	IPP Universiteit van Amsterdam, Stichting PMK
Dating method	House typology Pottery		
References	Hiddink, H. A., & Roymans, N. G. A. M. (2015). Exploring the rural landscape of a peripheral region. In N. G. A. M. Roymans, T. Derks, & H. A. Hiddink (Eds.), *The Roman villa of Hoogeloon and the archaeology of the periphery* (pp. 45–86). Amsterdam Archaeological Studies 22. Amsterdam University Press. Tichelman, G. (2016). *Romeinse tijd in Limburg: Een actuele kennisstand van de Romeinse tijd in Limburg aan de hand van archeologisch onderzoek tussen 2007 en 2013.* SAM Limburg. https://www.sam-limburg.nl/download-document/442.html Tol, A. (1999). De bewoningsgeschiedenis van Molenakker: Nieuwe gegevens. In N. Roymans & H. Hiddink (Eds.), *Opgravingen in Kampershoek en de Molenakker te Weert: Campagne 1996-1998* (pp. 1–6). Zuidnederlandse Archeologische Rapporten 5. Archeologisch Instituut Vrije Universiteit. van As., S. (2008). *Een fysieke barrière: Een uniek greppelsysteem uit de IJzertijd* [Unpublished bachelor's thesis]. Leiden University.		

Site-ID	63	Toponym	Loon op Zand-Kraanvensche Heide	Area	MDS	Country	NL
Period	Late Bronze Age – Early Iron Age (1,100 – 500 BCE)			Coordinates	(405800, 132200)		

Description

Layout

In the north eastern section of the research area (*Kraanvensche Heide* in Loon op Zand) a double ditch enclosed can be found, both ditches come together in the northern part of the system. Therefore, these are deemed as contemporaneous (Roymans & Hiddink, 1991, p. 122). The inner ditch (oval; 19 m by 12m) and outer ditch (29.5m by 33.5m) form a rounded rectangular shape (Gerritsen, 2001, p. 160). Both ditches have openings on their southern sides, as well as, a suggested palisade inside (Gerritsen, 2001, p. 157). South of the ditched enclosure a settlement, consisting of 3 farmhouses and various outbuildings, was excavated (dating to the same period). Lastly, 50 sherds were found in the ditch-fill dating to the Late Bronze to Early Iron Age (Gerritsen, 2001, p. 45, 157). A later Middle – Late Iron Age dating is unlikely, as the southern settlement is absent in that phase (Roymans & Hiddink, 1991, p. 123).

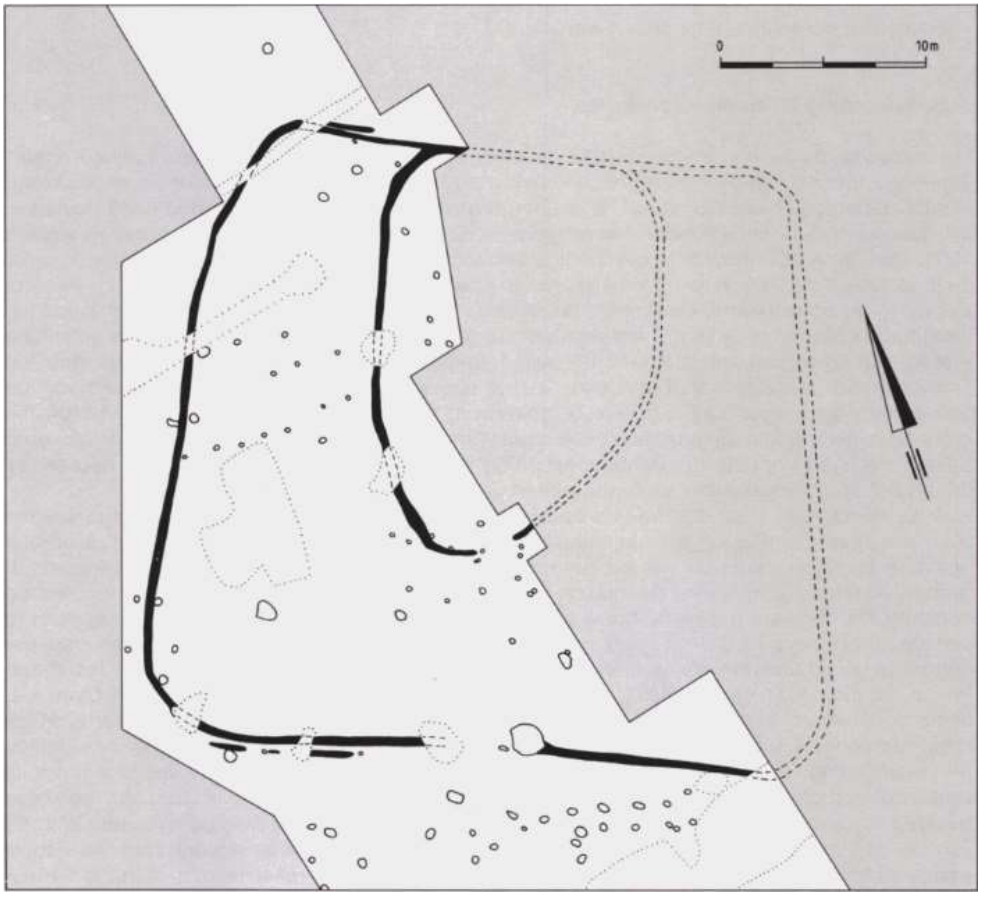


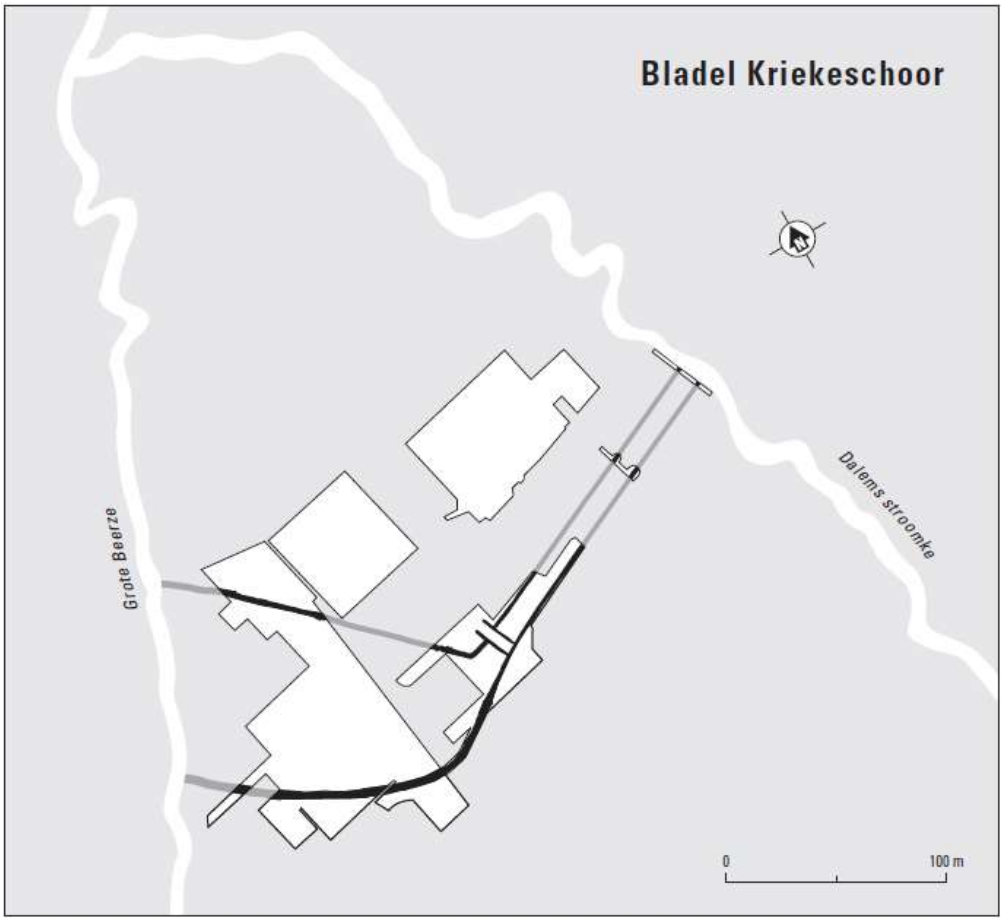
Figure B.24: The (LBA-EIA) double ditched enclosure in the Kraanvensche Heide (29.5m by 33.5m). Uncertainty around its function remains, two entrances in the south lead up to a central space in the middle, however, no house plans were located. Lacking parallels Roymans & Hiddink (1991, p. 124) pose a cattle enclosure. (Roymans & Hiddink, 1991, p. 123, Figure 15).

<table>
<tr><td></td><td colspan="3">Characteristics
The inner ditch is bowl shaped with sharp edges, it averages 35cm wide and varies in depth between 15-50cm. In the southern portion of the ditch an interruption is present (Roymans & Hiddink, 1991, p. 122).
The outer ditch too is bowl shaped and averages 30cm wide and varies in depth between 10-40cm. The southern interruption is approximately 2.5m wide. The width of the entrance, however, is undeterminable as recent disturbances cloud the beginnings of the interruption (Roymans & Hiddink, 1991, p. 122).

Interpretation
In Roymans & Hiddink (1991, pp. 122-124) the authors pose that due to their deep (40-75cm from ground level) but narrow nature, palisade-use is to be expected. However, the homogeneous grey ditch-filling lacks any recognisable postholes. The application of the enclosure, therefore, remains undecided. As parallels in the MDS-region are largely absent, a religious site or cattle pen were also proposed (Roymans & Hiddink, 1991, p. 124).</td></tr>
<tr><td>Geological context</td><td colspan="3">The research area (Kraanvensche Heide) is located, as is the entirety of the town of Loon op Zand, on the southern Dutch cover sands. These soils were deposited during the Pleniglacial stage of the Weichselian ice age with aeolian sand from the riverbeds, as well as, Doggerland (Nales, 2021, p. 12)</td></tr>
<tr><td>Contents</td><td>Ditch System</td><td rowspan="2">Original Archaeologists</td><td rowspan="2">Dr. N. Roymans, ROB, & AWN Midden-Brabant</td></tr>
<tr><td>Dating method</td><td>Pottery
Associated structures</td></tr>
<tr><td>References</td><td colspan="3">Gerritsen, F.A. (2001). Local identities. Landscape and community in the late prehistoric Meuse-Demer-Scheldt region. Amsterdam Archaeological Studies 9. Amsterdam University Press.

Nales, T. (2021). Loon op Zand, De Hoge Mast. Gemeente Loon op Zand. Archeologisch bureauonderzoek (BO) en inventariserend veldonderzoek (IVO), verkennende fase. Transect-rapport 3303. Transect.

Roymans, N., & Hiddink, H. (1991). Nederzettingssporen uit de Bronstijd en de vroege IJzertijd op de Kraanvensche Heide te Loon op Zand. In H. Fokkens & N. Roymans (Eds.), Nederzettingen uit de Bronstijd en de vroege IJzertijd in de Lage Landen (pp. 111-128). Nederlandse Archeologische Rapporten 13. Rijksdienst voor Oudheidkundig Bodemonderzoek. https://doi.org/10.17026/dans-xjm-qs83</td></tr>
</table>

Site-ID	64	Toponym	Bladel-Kriekeschoor	Area	MDS	Country	NL
Period	Middle – Late Iron Age (500 – 12 BCE)			Coordinates			
Description	[The original report was not available, therefore, Gerritsen (2001) was used] The research area (*Bladel-Kriekeschoor*) contains a double ditch system contianing a closed-off entrance (Gerritsen, 2001, p. 157). The enclosed area (4 ha) is enclosed by the ditch and lies at the junction of two river-streams, the *Grote Beerze* and *Dalems Stroomke*. It is therefore, that Gerritsen (2001, p. 161) suggests a possible religious significance, as river-junction often served religious functions. Furthermore, the ditch-fill at the entrance resulted in a grinding stone, a small vase in a larger pott, and several cattle horns. Importantly, however, the function of a cattle pen cannot be excluded (van As, 2008, p. 25). Lastly, within the confines of the system a single (Celtic) gold coin was discovered (Gerritsen, 2001, p. 161).  Figure B.25: The Middle- to Late Iron Age (500 – 12 BCE) enclosure at Bladel-Kriekeschoor. The enclosure is located at the junction of the *Grote Beerze* and *Dalems stroomke*. The entrance of the inner area has been filled in. (Gerritsen, 2001, p. 160, Figure 4.18).						

Geological context	The research area (*Bladel*) is covered by aeolian sand deposited during the last ice age (Weichselian) (Lascaris & Wesdorp, 2007, p. 6)
Contents	Ditch System
Dating method	Associated material finds
References	Gerritsen, F.A. (2001) *Local identities: Landscape and community in the late prehistoric Meuse-Demer-Scheldt region*. Amsterdam Archaeological Studies 9. Amsterdam University Press. Lascaris, M., & Wesdorp, M. (2007). *Verslag van het archeologisch onderzoek aan de Sniederslaan 42-44 te Bladel*. Zuidnederlandse Archeologische Notities 133. Archeologisch Centrum Vrije Universiteit. Roymans, N. (1982). Een veekraal uit de IJzertijd en een inheems-Romeins grafveldje op de Kriekeschoor bij Bladel. In J. Slofstra, H. H. van Regteren Altena, N. Roymans, & F. Theuws (Eds.), *Het Kempenprojekt: Een regionaal-archeologisch onderzoeksprogramma* (pp. 94-101). Bijdragen tot de Studie van het Brabants Heem 22. Stichting Brabants Heem. van As., S. (2008). *Een fysieke barrière: Een uniek greppelsysteem uit de IJzertijd* [Unpublished bachelor's thesis]. Leiden University.