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The Linear Pottery Settlement Kleinhadersdorf-Marchleiten

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Abstract
The Linear Pottery cemetery of Kleinhadersdorf (Lower Austria) is one of the oldest and best researched in Austria. Already during the excavations in the late 1980s, it was assumed that it was the burial site of a local population, although a connection to a specific settlement could not be clarified. In order to investigate this hypothesis, the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology carried out large-scale magnetic surveys in the surrounding area. The results revealed an extensive multi-phase settlement with at least 40 buildings. Most of the houses are classic medium- to large-sized Linear Pottery buildings with distinct post positions and a northeast-southwest orientation. Further anomalies in the survey area suggest that the cemetery was larger than previously thought. In 2020 and 2021, two of the buildings were investigated in more detail through targeted excavations. The excavations confirmed the accuracy of the geophysical data interpretation and provided evidence of a later occupation of the site in the Lengyel period. Here we present the results of the extensive archaeological investigations and their comprehensive integrative interpretation, discussing the unusual position of the settlement in the landscape, its internal structure and economic foundations.

Keywords
Neolithic, Linear Pottery Culture, settlement archaeology, magnetic prospection, airborne laser scanning, landscape archaeology

Zusammenfassung – *Die linearbandkeramische Siedlung Kleinhadersdorf-Marchleiten*

Das linearbandkeramische Gräberfeld von Kleinhadersdorf-Marchleiten (Niederösterreich) zählt zu den ältesten und am besten erforschten in Österreich. Bereits bei den Ausgrabungen in den späten 1980er Jahren wurde angenommen, dass es sich dabei um den Bestattungsplatz einer lokalen Bevölkerung handelt, wenngleich eine Zugehörigkeit zu einer bestimmten Siedlung nicht geklärt werden konnte. Um eine mögliche weitere Ausdehnung des Gräberfelds und damit direkt verbundene Siedlungsstrukturen zu überprüfen, führte das Ludwig Boltzmann Institut für Archäologische Prospektion und Virtuelle Archäologie großflächige magnetische Prospektionen im Umfeld des Gräberfelds durch. Neben dem Nachweis weiterer Grabgruppen konnte bei den Prospektionsmessungen ein weitläufiges mehrphasiges Siedlungsareal mit rund 40 Hausgrundrissen festgestellt werden. Bei den meisten Häusern handelt es sich um klassische mittelgroße bis große linearbandkeramische Gebäude mit ausgeprägten Pfostenstellungen und begleitenden Längsgräben in einer Nordost-Südwest-Ausrichtung. In den Jahren 2020 und 2021 wurden zwei der Häuser durch gezielte Ausgrabungen näher untersucht. Die Grabungen bestätigten die Ergebnisse der magnetischen Prospektionsmessungen und lieferten Hinweise auf eine spätere Nutzung des Areals durch Träger der Lengyel-Kultur. Im vorliegenden Beitrag werden die Ergebnisse der umfangreichen archäologischen Untersuchungen vorgestellt und die ungewöhnliche Lage der Siedlung in der Landschaft, ihre innere Struktur und wirtschaftlichen Grundlagen diskutiert.

Schlüsselbegriffe
Neolithikum, Linearbandkeramik, Siedlungsarchäologie, magnetische Prospektion, airborne laser scanning, Landschaftsarchäologie

1. Introduction

1.1. The Linear Pottery Site Kleinhadersdorf-Marchleiten

The site is located on the southwestern edge of the Poysdorf Basin in the municipality of Poysdorf in the Lower Austrian Weinviertel in the northeasternmost corner of Austria (Fig. 1). The Poysdorf Basin is characterised by fertile loess soils and a special microclimate, which has provided an excellent basis for wine- and orchard growing since the Middle Ages. Previous research has shown that the Poysdorf Basin has been a settlement area with intensive colonisation since the Early Neolithic. This settlement chamber developed on the upper reaches of the Poybach stream and, according to the current state of research, was densely populated from around 5250 to 4400 BC. There is evidence of several large-scale settlements of the Linear Pottery Culture, a Linear Pottery cemetery and several Middle Neolithic *Kreisgrabenanlagen* (circular enclosures, Fig. 1/6–8)[1] with associated settlement areas, and a fortified settlement of the

1 Melichar, Neubauer 2010. – Neubauer 2012. – Neubauer 2017.

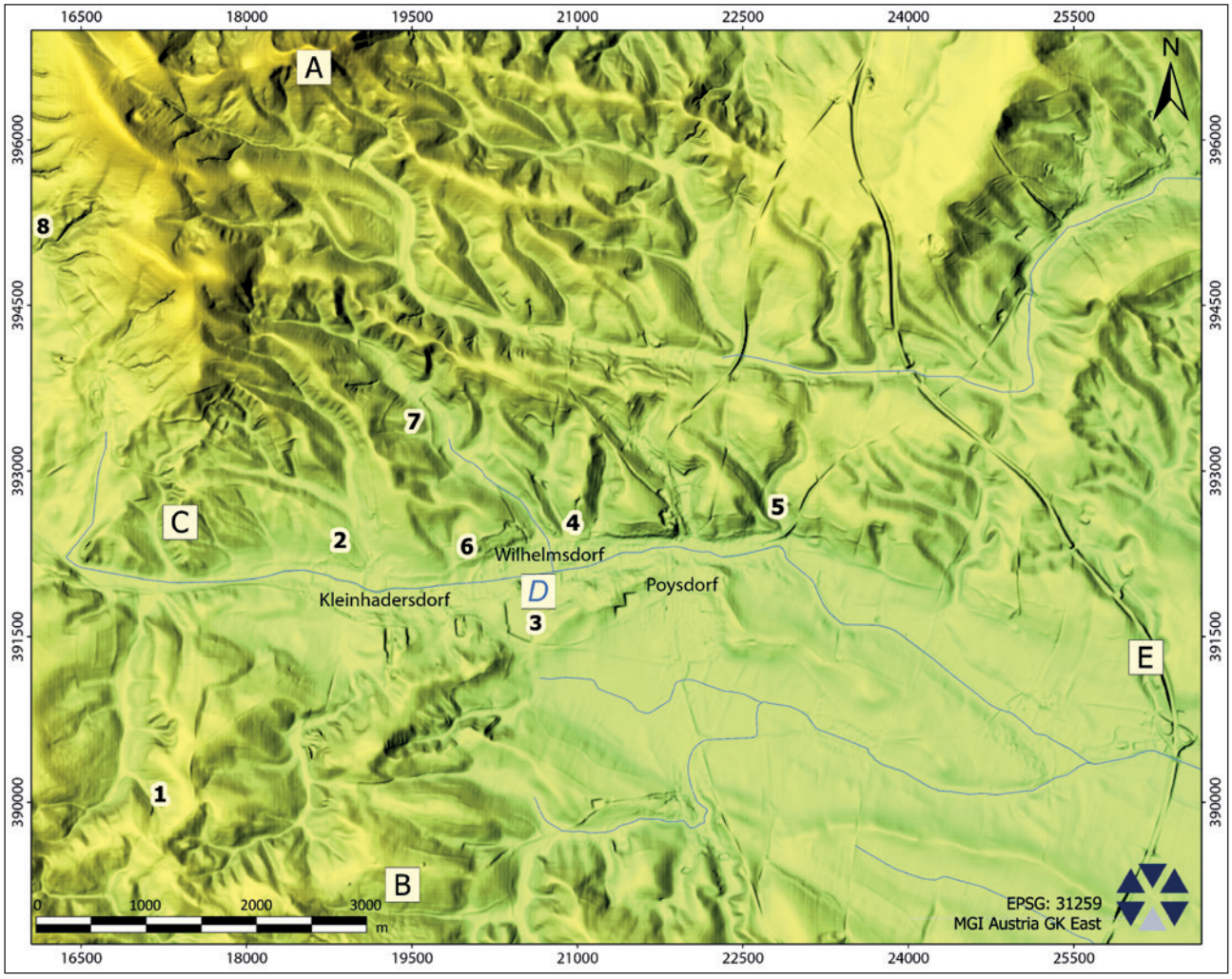


Fig. 1. The topography and known archaeological sites in the area of the Poysdorf Basin. – A. Galgenberg. – B. Mistelbacher Wald. – C. Guglerwald. – D. Poybach. – E. Brünnerstraße. – 1. Kleinhadersdorf-Marchleiten. – 2. Kleinhadersdorf-Bockfeld. – 3. Poysdorf-Obern Lüß. – 4. Poysdorf-Blanken Grund. – 5. Poysdorf-Bürsting. – 6. *Kreisgrabenanlage* Wilhelmsdorf 1. – 7. *Kreisgrabenanlage* Wilhelmsdorf 2. – 8. *Kreisgrabenanlage* Altruppersdorf (GIS and graphics: L. Aldrian; basis: DEM basemap.at).

subsequent Moravian–Eastern Austrian (MOG) group of the Lengyel Culture on the Galgenberg (Fig. 1/A).

Located to the southwest of the cadastral municipality of Kleinhadersdorf and the municipality of Poysdorf, the Kleinhadersdorf-Marchleiten site (Fig. 1/1) belongs to the administrative district of Mistelbach. The site is situated on the road linking Kleinhadersdorf and Mistelbach at the northern end of the present-day Mistelbacher Wald, an extensive woodland area covering approx. 19 km² in the Weinviertel. Mistelbach itself lies 9 km south of the site. The Mistelbacher Wald has not yet been archaeologically investigated, so that so far more detailed information about the prehistoric settlement is only available for the areas north of the site.

The area north of the site is characterised by the villages of Kleinhadersdorf and Poysdorf as well as the Poybach, which flows from west to east through both villages. The Poybach rises approx. 3 km west of Kleinhadersdorf and opens up the narrow Poysdorf Basin to the east, turns south after a wide plain near Althöflein and flows into the Zaya approx. 10 km beyond Poysdorf. The Poysdorf Basin is bordered to the south and northwest by wooded hills and slopes down to the east.

The fertile loess soils in the Poysdorf Basin were seen as an essential prerequisite for intensive settlement in the Linear Pottery Culture (LBK). Along the Poybach, a regionally closed, small settlement chamber of the Linear Pottery Culture was postulated.[2] Due to the extensive woodland, there

2 Neugebauer-Maresch, Lenneis 2015, 15.

is no information on the prehistoric settlement in the area south of the Poysdorf Basin, which covers almost 40 km², so that the extent of the Linear Pottery settlement chamber in this form is not yet assessable. In the Poysdorf Basin, the sites Kleinhadersdorf-Bockfeld, Poysdorf-Obern Lüß, Poysdorf-Blanken Grund and Poysdorf-Bürsting have so far been localised (Fig. 1/2–5), whereby they have been confirmed or investigated by surface finds on the one hand, and large-scale excavations on the other.[3] The location of these four sites directly along the Poybach was considered to be consistent with the settlement pattern of the Linear Pottery Culture observed throughout the region. In addition to being located close to watercourses, it is assumed that individual settlement sites were repeatedly relocated during the course of the Linear Pottery era. The chronological classification of these sites into phases LBK I–III would correspond with this.[4]

However, the situation is completely different at the Kleinhadersdorf-Marchleiten site (Fig. 1/1). Not only is the site located more than 2 km from the Poybach, but it is also close to the highest hill ranges that border the Poysdorf Basin to the south. There is an altitude difference of 100 m from the valley settlements, which are over 3 km away. The larger contemporary settlements known to date at Asparn an der Zaya/Schletz[5] in the southwest and Wilfersdorf[6] in the southeast were located less than 10 km from the Kleinhadersdorf-Marchleiten site. In prehistoric times, these settlements could also be reached on foot within a few hours.

Based on previous findings at the site, it was assumed that the large-scale settlements were located along the Poybach and that the associated cemetery could be localised in the Kleinhadersdorf-Marchleiten area. Excavations carried out by the Federal Monuments Office (BDA) in five campaigns between 1987 and 1991 revealed the remains of an extensive cemetery with around 100 burials, dating to the period 5250–4980 BC.[7]

The assumption made during the excavation was that the burial ground in question had been thoroughly documented in its entirety. The excavators estimated that, due to the significant erosion of the slope and the shallow preservation of some of the graves, only half of the former graves could be traced. This therefore led to the estimation that up to 200 burials may have originally been present.[8] In the course of the excavation, individual postholes were observed; however, these could not be linked to any house features. Nevertheless, a neighbouring settlement, albeit on a smaller scale, was not ruled out.

The comprehensive publication of previous research on the Kleinhadersdorf-Marchleiten site has confirmed the original assumption that this site is the oldest known Linear Pottery burial ground in Austria. Since the excavations in the 1980s, the prospection methodology has developed rapidly, so that today large-scale investigations can be carried out using both remote sensing methods and geophysical prospection at low cost.[9] The Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology (LBI ArchPro), founded in 2010, began to investigate the site further in 2017.[10] The aim was to examine a possible further expansion of the burial ground or directly associated settlement structures. In addition to the analysis of aerial photographs and airborne laser scans, inspections, geomorphological investigations and large-scale magnetic surveys were carried out.[11]

The large-scale magnetic survey yielded evidence of a Linear Pottery settlement with an area of around 4 ha and at least 39 houses (see Figs. 8, 11). In contrast to numerous previously investigated sites in Austria, it was possible to visualise not only the typical linear ditches flanking the houses, but also in several cases the main post positions of the longhouses by means of magnetics. The clear visibility of individual house plans, especially downhill towards the north, indicated that the features were covered by colluvium and thus better preserved. With regard to the extent of the burial ground, the observed magnetic anomalies also allowed further grave groups to be postulated. The magnetic survey also revealed ground plans of houses that can be assigned to the Lengyel Culture and can be directly linked to the settlement of the Poysdorf area after the end of the Linear Pottery Culture. These structures are to be seen in conjunction with the *Kreisgrabenanlage* of Altruppersdorf, north of Kleinhadersdorf, as well as the two *Kreisgrabenanlagen* of Wilhelmsdorf between Kleinhadersdorf and Poysdorf.[12] The site was therefore located within an area that was densely populated during the Lengyel Culture and that was dominated by the large fortified settlement of the late Lengyel Culture in Falkenstein-Schanzboden following the

3 Neugebauer-Maresch, Lenneis 2015, 15–16 and Fig. 2.
4 Neugebauer-Maresch, Lenneis 2015, 110—111.
5 Fehlmann 2011, 15–17. – Lenneis 2017a, 57.
6 Krenn, Artner, Baumgart 2010, 378–379. – Lenneis 2017a, 68.
7 Neugebauer-Maresch, Lenneis 2015, Fig. 53.
8 Neugebauer-Maresch, Lenneis 2015, 383.
9 Doneus et al. 2011a. – Neubauer, Doneus, Trinks 2012. – Neubauer 2016.
10 The LBI ArchPro successfully completed its planned 14-year term in 2024.
11 Löcker et al. 2009.
12 Hinterleitner, Löcker, Neubauer 2010, 171–175, 367–370.

abandonment of the *Kreisgrabenanlagen*. The results of the archaeological prospection have shown that the Kleinhadersdorf-Marchleiten site is not an isolated Linear Pottery cemetery but an extensive settlement site with an associated burial ground. The southern part of the site is now in woodland and could therefore not be magnetically prospected. However, it can be assumed that the settlement was at least twice as large as the area so far recorded by the prospection measurements.

The location of the settlement, which is rather atypical for the Linear Pottery Culture, in addition to the direct connection with an early and well-studied cemetery, resulted in the decision to investigate selected houses by means of stratigraphic excavations in 2020 and 2021. The aim of this publication is to summarise the new results based on the archaeological prospection and the targeted archaeological excavations in the form of an initial preliminary report.

1.2. Discovery of the Site and Excavations 1931–1991

The Linear Pottery site in Kleinhadersdorf-Marchleiten has been known since 1911, when local historian Viktor Kudernatsch reported a destroyed grave. In the years 1924–1926, skeletons and finds from a further three graves were excavated, which Kudernatsch also reported on.[13] In 1931, while digging for a vineyard on the same plot, seven more graves were excavated, which were carefully uncovered and recovered for the first time. This first excavation was carried out under the supervision of Josef Bayer, head of the Prehistoric and Anthropological Collection of the Natural History Museum in Vienna. Subsequently, in 1931, Bayer excavated a further group of graves, graves 6–11, and documented them with site sketches. After Bayer's unexpected death, the excavations were continued in 1931 by the anthropologist Viktor Lebzelter, who uncovered graves 12–19, but did not document their location. In 1935, four more graves were destroyed by deep ploughing.

In 1987, a new vineyard was to be planted in the area of the plot where the graves had been found. The area was once again to be prepared by deep ploughing. Timely notification of this by the Poysdorf museum director, Josef Preyer, enabled the Federal Monuments Office (BDA) to conduct an initial investigation led by Johannes-Wolfgang Neugebauer. As the cemetery in this area would have been completely destroyed by the renewed trenching, the Federal Monuments Office decided to carry out comprehensive excavations. These were subsequently conducted between 1987 and 1991 under the direction of Johannes-Wolfgang Neugebauer and Christine Neugebauer-Maresch.[14]

These scientific investigations enabled the systematic uncovering and documentation of approximately 100 burials within an excavation area spanning 5000 m². Following a thorough examination, it has been postulated that the Linear Pottery cemetery underwent four distinct occupational phases. Radiocarbon dating of human remains from a total of 18 samples yielded a date range of between 5250 and 4980 BC for the Kleinhadersdorf cemetery,[15] thereby confirming its status as the largest and oldest cemetery in Austria.

1.3. Evaluation of the Cemetery Excavations

The archaeological interpretation, anthropological analysis of the burials and scientific analysis of the find material from all the excavations carried out so far were published by Christine Neugebauer-Maresch and Eva Lenneis in 2015.[16] The results of the excavations and further analyses were most recently summarised by Lenneis.[17] The analysis revealed that merely 67 % of the examined burial pits contained inhumations. Anthropological examination of the preserved skeletons identified 16 men, 10 women and 18 children, and 12 adults who could not be further identified. With two exceptions, these were single burials. In the exceptions, one burial pit contained two infants, and another contained a young woman and a newborn. The remains of burnt bones were also found in seven burial pits, but only four of these are thought to be the remains of cremation graves. Among the pits investigated from 1987 to 1991, 26 were similar in shape and size to the burial pits with inhumations but contained no skeletons or only meagre remains of skeletons. This large number of empty burial pits was regarded as a special feature of Kleinhadersdorf-Marchleiten.[18]

The dead from Kleinhadersdorf-Marchleiten were mainly buried in a crouched position turned to the left with a less frequent occurrence of a crouched position turned to the right and with some degree of variation in the flexing of the legs. The upper body was mostly found in a lateral

13 Neugebauer-Maresch, Lenneis 2015, 21.

14 Neugebauer-Maresch, Neugebauer 1988, 194. – Neugebauer-Maresch, Neugebauer 1989, 265. – Neugebauer-Maresch, Neugebauer 1990, 167. – Neugebauer-Maresch, Neugebauer 1991, 182. – Neugebauer-Maresch, Neugebauer 1992, 237. – Neugebauer-Maresch 1992. – Neugebauer-Maresch, Lenneis 2015.

15 Neugebauer-Maresch, Lenneis 2015, 152 and Fig. 53, sum calibration at 1-sigma level.

16 Neugebauer-Maresch, Lenneis 2015.

17 Lenneis 2017b, 90—107.

18 Lenneis 2017b, 90–91.



Fig. 2. Grave finds and artefacts from the Late Neolithic cemetery of Kleinhadersdorf (Neugebauer-Maresch, Lenneis 2015, Pls. 61–62, 59).

position with the hands in front of the face, and less frequently, in a supine position with different hand positions. In nine of the burials, red ochre was strewn in the head area, which was also visible on grinding plates and quernstones.

The type of grave goods and the number of artefacts included varies considerably between the individual burials. The typical equipment of the male graves consists of adzes, flint arrowheads and a large number of different types of pottery. In comparison, the women's graves show a smaller variety and number of grave goods. A local speciality of the Kleinhadersdorf-Marchleiten site identified by the researchers was the high number of grinding stones and quernstones, which were mostly found in male graves. The twenty grinding stones are made of fine sandstone or medium-grained high-quality quartz sandstone. While it was hypothesised that some of those of a higher quality might have originated from central Bohemia, it was not possible to determine their exact origin.[19]

The ceramic finds from the graves of Kleinhadersdorf-Marchleiten were analysed typologically. The oldest pottery belongs to the transitional phase from LBK I to LBK II (5250–5110 BC).[20] The majority of the vessels show music-note decoration, which can be assigned to the LBK II phase. The final phase of the cemetery is formed by vessels with decorative motifs of the LBK III level (5050–4930 BC),[21] which indicates contacts to the north and northeast. These connections to northwest Moravia and Bohemia and to Slovakia and southern Poland are also evident from the raw materials of the stone tools found. Items of jewellery and costume components include perforated boar tusks, dentalium beads, perforated snail shells and pieces of jewellery made from spondylus shells. Three men wore bone or antler toggles on their garments (Fig. 2).[22]

Thirty-nine skeletons from Kleinhadersdorf-Marchleiten were sampled for isotope analyses, 36 of which yielded usable results. An astonishing homogeneity was found, according to which the majority of the people grew up in loess areas and thus potentially spent their lives in the immediate vicinity of the site. No differences were found in the diet of men and women. Compared to other Linear Pottery cemeteries investigated, the Kleinhadersdorf-Marchleiten site shows a low mobility of the population. Migration could only be assumed for two women and one adult whose gender could not be identified.[23]

1.4. Cemetery and Settlement: A Central Issue

The edge of the cemetery could already be observed in a southeasterly direction during the 1987–1991 excavations. However, further archaeological stratification, including postholes, was discovered here, indicating potential

19 Lenneis 2015a, 128–134 and Tabs. 27–28, Figs. 43–45.
20 Lenneis 2015b, 103–107. – Lenneis, Stadler 2015, 107–109 and Tab. 17. – Stadler 2015, Tab. 37.
21 Stadler 2015, Tab. 37.
22 Neugebauer-Maresch, Lenneis 2015, 142–148.
23 Bickle et al. 2015, 173–178 and Fig. 75.

settlement structures. In their analysis of the Kleinhadersdorf-Marchleiten cemetery, Neugebauer-Maresch and Lenneis also address the fundamental research questions for future studies: 'Unfortunately, this area south of the cemetery is the least well-researched. On the basis of some finds by G. Erger from the Museum Poysdorf and a very short inspection together with G. Erger and M. Götzinger in March 2010, this not too large settlement area of the LBK could be approximately recognised. The relationship of this presumed settlement to the cemetery could probably only be clarified by means of a large-scale excavation, whereby massive erosion damage to the features would be expected due to the loose sediment and the slope of the terrain – similar to the cemetery.[...] In the case of the Kleinhadersdorf cemetery, whose somewhat remote, elevated location corresponds to some customs within the LBK, the question of which neighbouring settlements the burials came from will certainly remain unanswered for a long time to come.'[24]

This quote poses one of the key questions for further research on the Kleinhadersdorf-Marchleiten site. The question of whether the cemetery is connected to an independent settlement or is an excellent burial site shared by several settlements at some distance from the settlements to which it belongs is essential for the interpretation of the cemetery and the population buried in it.

2. Integrated Archaeological Prospection

2.1. Research Approach

Based on the results of previous research and the following new questions about the Kleinhadersdorf-Marchleiten site, an archaeological prospection project was launched in 2017 as part of a large-scale case study by the LBI ArchPro. The aim of this project was to explore and evaluate the archaeological landscape in which the unusual site is located in detail. The evaluation of the high-resolution topographical data available today from airborne laser scanning in conjunction with the existing aerial photographs and the analysis of satellite images was of particular importance for the evaluation of the site in relation to the landscape. In the field, the large-scale prospection approach was extended by a high-resolution magnetic survey with motorised magnetometer systems. The aim of the large-scale magnetic survey was to verify the extent of the previously known burial ground and to explore the settlement structures presumed to be in the immediate vicinity. As part of the project, a total area of 26.7 ha was magnetically prospected. The prospection data was combined with geographical, geological, pedological and hydrological data in a GIS project and interpreted archaeologically.

2.2. The Archaeological Landscape around Poysdorf

The area around Poysdorf is formed by an approx. 8 × 8 km basin, which is bordered to the north by the Galgenberg (Fig. 2/A) and to the south by the elevations of the Mistelbacher Wald (Fig. 2/B). To the west, it is enclosed by the Guglerwald (Fig. 2/C), another elevation before the village of Ameis. To the east, the basin opens up into a plain, at the northern edge of which the Poybach stream runs eastwards. The Poybach joins here with the local stream to the south, which crosses the plain from west to east. The central area of the basin is occupied by the villages of Kleinhadersdorf, Wilhelmsdorf and Poysdorf, with the latter two villages forming a contiguous settlement area. All three villages are located along the Poybach (Fig. 2/D), which is the main watercourse in the Poysdorf Basin. The natural north-south connection, which has determined traffic at least since the Middle Ages, runs along the eastern edge of the basin, following the course of the so-called Brünnerstraße (Fig. 2/E).

The Poybach rises in the village of Föllim, from where it first flows in a southwesterly direction before turning directly southwards and taking its course eastwards through the Poysdorf Basin between Ameis and Kleinhadersdorf (Fig. 2/D). The area between Föllim and Ameis is a watershed and separates two hydrological systems. The western system drains into the Laaer bay and at the town of Laa into the Thaya, which flows via the Morava into the Danube. The eastern system drains via the Poybach into the Zaya, which flows into the Morava at Drösing. This hydrological situation also indicates that the transition from the Laaer bay via the Poysdorf Basin leads to the eastern Weinviertel and the Morava. This is an important west-east connection in the northern Weinviertel, which can still be seen today in the modern road network. This was already one of the easiest routes in the Palaeolithic period and was probably used by fauna, especially mammoths. The corresponding mammoth finds from Poysdorf support this thesis.

The Poysdorf Basin has a favourable microclimate, which to this day is the basis of the small region's wine and fruit production. The basin is characterised by fertile black soils on loess or on tertiary fine sediments, as well as brown soils on loess or tertiary fine sediments in the more southerly elevations.[25] In the Neolithic period, the microclimate and the easily worked black earth soils in the Poysdorf Basin

24 Neugebauer-Maresch, Lenneis 2015, 17–19 [translated by I. Kowatschek].

25 Digitale Bodenkarte 2025.

are likely to have been the main incentives for the early colonisation of this area.[26] It can be assumed that the various loess terraces were not densely forested during this period and therefore offered good conditions for colonisation by the first arable farmers and cattle breeders.[27] The mountain slopes around the Galgenberg and the area of the Mistelbacher Wald, which is still forested today, probably provided sufficient wood for the settlers' needs.

Neugebauer-Maresch and Lenneis have already emphasised that the Poysdorf Basin, and in particular the areas along the Poybach, represent a settlement chamber of the Linear Pottery Culture.[28] As already mentioned in the introduction, there are several Linear Pottery sites at intervals of 2–5 km along the Poybach from Kleinhadersdorf via Wilhelmsdorf and Poysdorf to the adjoining plain to the east.

Based on previous data, it can be assumed that settlement in the Poysdorf Basin began around 5250 BC. The end of the Linear Pottery settlement in the Poysdorf area can currently be dated to the period 5000–4850 BC based on the most recent graves in the Kleinhadersdorf cemetery. In general, the end of the Linear Pottery Culture in the Weinviertel can be assumed to be around 4950/4900 BC. Of particular importance are the finds relating to the inhabitants of the fortified Linear Pottery settlement of Asparn an der Zaya/Schletz, who died violently during this period. The position of the human skeletons in one of the massive settlement ditches and their injuries indicate a brutal death in a violent event at the end of the settlement.[29] The settlement site was abandoned, and a new settlement with a *Kreisgrabenanlage* was built at a distance of approx. 3 km in the upper reaches of the Schletzerbach stream.[30]

Based on previous findings, the Weinviertel was colonised by bearers of the painted pottery Lengyel Culture in around 4850/4800 BC at the latest. Large-scale investigations show that most of the newly established settlements also have a *Kreisgrabenanlage*. The attractiveness of the Poysdorf Basin as a settlement area is demonstrated in the Lengyel Culture by the construction of one of the largest Middle Neolithic *Kreisgrabenanlagen* in Wilhelmsdorf.[31] The two monuments at Wilhelmsdorf are both located within vineyards, which is why they have been partially excavated, but it has not yet been possible to carry out magnetic prospection. It is therefore not clear whether there was also an associated settlement area in the vicinity, as has been established for most of the monuments investigated by magnetic prospection. During the construction of the *Nordautobahn* (A5) motorway, numerous settlement pits of the Lengyel Culture were excavated north of Poysdorf, in the municipal area of Poysbrunn, on the northern edge of the Poysdorf Basin, but no house plans could be found.[32] Based on the distribution of these pits, the excavators assume that the empty areas in between are the former homestead areas, no traces of which have been preserved in the subsoil. Remains of a Lengyel building have been found on the southern edge of the Poysdorf Basin in Wetzelsdorf near a wind turbine construction site.[33] Directly to the southwest of the Galgenberg, another *Kreisgrabenanlage* in Altruppersdorf has been documented in great detail through magnetic prospection.[34] One of the most important Lengyel period sites on the edge of the Poysdorf Basin is the fortified hilltop settlement Falkenstein-Schanzboden, which has been the subject of several years of excavation.[35] This oval complex in the area of the Galgenberg (Fig. 2/A) has an outer rampart and an inner ditch measuring 120 × 165 m and overlaps a much larger and older fortification with up to three ditches. The ditches were constructed as pointed ditches with a typical V-shaped cross-section, similar to those of the Middle Neolithic *Kreisgrabenanlagen*. The use of the two enclosures at Falkenstein-Schanzboden has been dated to the Moravian-Eastern Austrian group Ib and IIa of the painted pottery Lengyel Culture.[36] Towards the end of the Lengyel Culture, the settlement density in the Poysdorf Basin decreased and the region only regained its importance at the beginning of the Bronze Age.

2.3. Topography

The Linear Pottery site of Kleinhadersdorf-Marchleiten is located on a ridge that runs from south to north and reaches an altitude of 300 masl. The ridge slopes gently northwards towards the Poybach stream and is continued on the northern side by the ridge in the Guglerwald forest (Fig. 2). This ridge forms the western boundary of the Poysdorf Basin. Towards the southeast, the ridge drops rapidly in the area of the so-called Statlerkreuz and ends at a west-east-running drainage ditch in the area of the Mistelbacher Wald. The settlement and cemetery are located on this ridge,

26 The origin of black earth has been discussed for some time; see for example Gerlach, Eckmeier 2012, 105–124 and Fig. 2.
27 Kohler–Schneider 2017, 166–170.
28 Neugebauer-Maresch, Lenneis 2015, 15.
29 Teschler–Nicola et al. 1996. – Wild et al. 2004.
30 Hinterleitner, Löcker, Neubauer 2010, 320–325.
31 Hinterleitner, Löcker, Neubauer 2010, 367–368.
32 Preinfalk et al. 2015, 75–79. – Lenneis 2017c, 265.
33 Geigenberger 2014, 259. – Lenneis 2017c, 267.
34 Hinterleitner, Löcker, Neubauer 2010, 169–174.
35 Neugebauer 1995, 67–74. – Lenneis 2017d, 309–310.
36 Neugebauer-Maresch 1981.

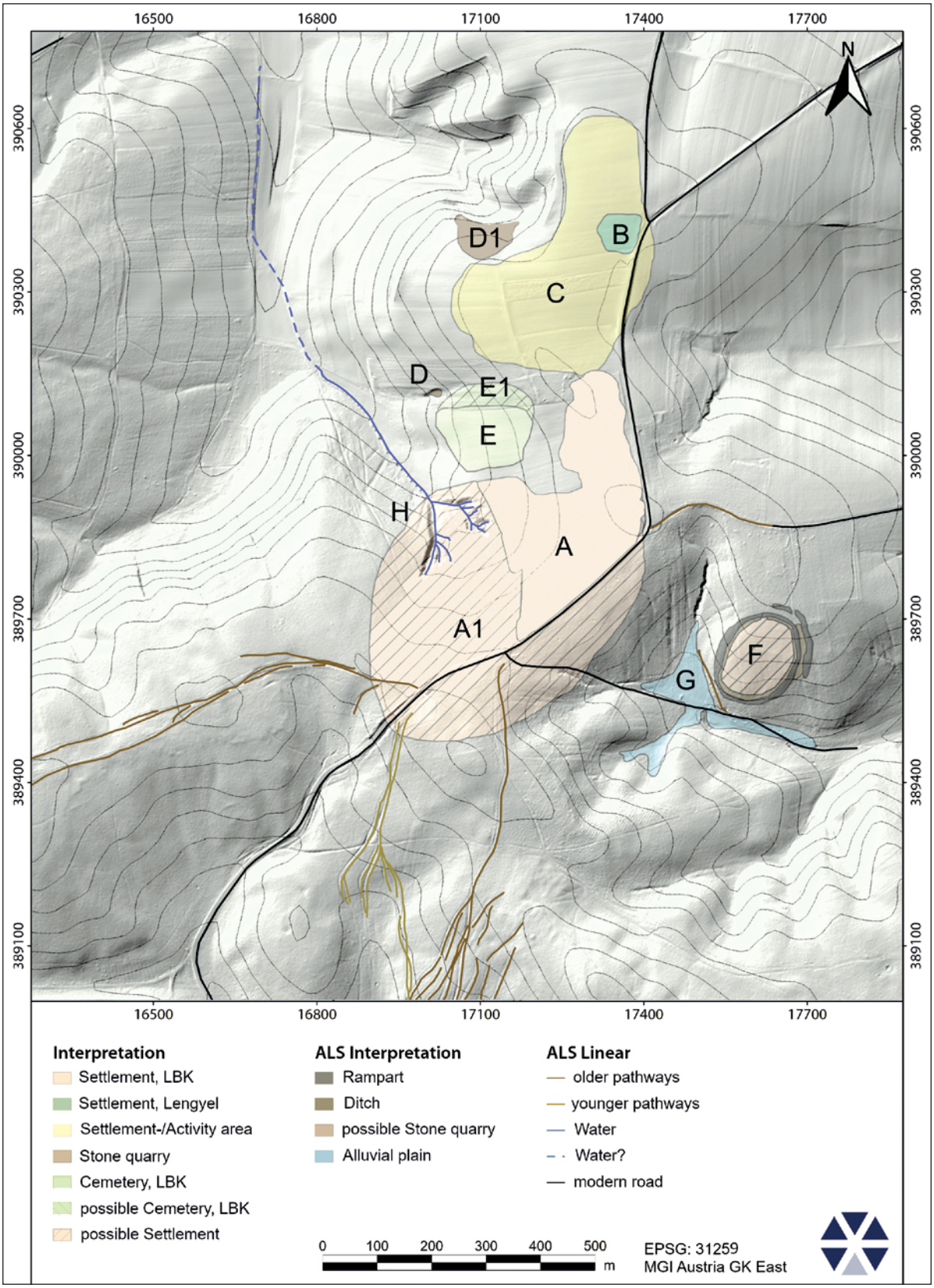


Fig. 3. Topography around the Kleinhadersdorf-Marchleiten site. — A. (Presumed) Linear Pottery settlement area. — B. Lengyel settlement area. — C. Further settlement/activity area. – D. (Possible) quarry. — E. (Presumed) Linear Pottery cemetery. — F. Prehistoric fortification. – G. Alluvial fan. — H. Erosion gullies (GIS and graphics: L. Aldrian, I. Kowatschek; basis: DEM basemap.at, 5 m contour lines).

which is positioned on a slope that is inclined slightly to the southwest. Following the transition into the forest, the ridge is formed by a plain in the area known as Rauscherkreuz. The terrain to the south is characterised by a winding valley, through which the L3062 road still runs today, passing through the Mistelbacher Wald. The elevation of 300 m represents the highest point within the Mistelbacher Wald region. The settlement's position on the southwest-facing slope provides a degree of protection from cold easterly winds; however, it is located slightly outside the microclimatic benefits offered by the Poysdorf Basin.

The settlement area detected by magnetic survey is located directly at the transition to the Mistelbacher Wald (Fig. 3/A), where so far, no magnetic measurements have been carried out. Immediately adjacent to the settlement area is a larger plateau, which was most likely settled as well (Fig. 3/A1). So far, traces of the settlement have been found on an area of 4 ha. If this plateau is included as a further possible settlement area, the total area of the former Linear Pottery settlement is more than twice as large. The plateau is characterised in the north by a Y-shaped structure that widens like a fan (Fig. 3/H). These are deeply incised erosion gullies, which continue northwards in a ditch that is now filled in. The erosion gullies are located more or less on level ground and therefore cannot be explained by surface water run-off. Consequently, it is reasonable to conclude that they are springs, most likely artesian springs given the altitude. These springs drained into the ditch, which is a small tributary to the Poybach.

According to the excavators, the cemetery in the north of the settlement area (Fig. 3/E) was excavated in its entirety. Given that no magnetic measurements or excavations have been carried out in the neighbouring small wooded area, it is, however, possible that the cemetery extends slightly further north into the forested area (Fig. 3/E1). A massive depression can be seen in this strip of woodland, which cannot be explained by natural processes (Fig. 3/D). This is probably a large pit for the extraction of raw materials. A clay pit seems unlikely, as the topographical situation and the specific soil situation mean that a corresponding clay deposit cannot be assumed.

This area is followed to the north by a terraced depression, which is also not of natural origin (Fig. 3/D1). This is probably a mining site for other raw materials, which may have been utilised until modern times. A semicircular depression adjoins the terraced depression to the south, as is clearly evident in the topographical data. The magnetic survey has revealed massive anomalies in this area, which can be attributed to an infilling with magnetic material such as brick fragments or pieces of iron. It can therefore be assumed that a large quarry with an area of around 6000 m² also existed here. This quarry was later filled with various materials in order to increase the arable land.

To the east of the main road, in the already sloping terrain, a further erosion gully can be identified, which, however, due to its specific shape and topographical situation, can certainly be explained by surface water run-off. As already mentioned, the terrain slopes sharply to the southeast and runs into a more or less flat area and the aforementioned drainage ditch (Fig. 3/G). The formation of this plain is the result of the accumulation of material that has been removed by several erosion gullies from the slope above. Above and to the east of this alluvial fan, an oval fortification can be recognised in the topographical data (Fig. 3/F). It is around 180 m long and 150 m wide. The complex has an inner ditch and an outer rampart. A small section in the east shows evidence of a double-ditch system. Towards the south, parts of the fortifications have probably already been destroyed by surface erosion. The newly discovered fortification has an internal area of 1.3 ha and could previously only be dated as prehistoric on the basis of surface finds. The peculiarity of the fortification's construction with external ramparts and internal ditches cannot be observed in Bronze Age and later fortifications. The closest comparable monument to this fortification is located at Falkenstein-Schanzboden. This is also an oval complex with an outer rampart and an inner ditch measuring 120 × 165 m. The site was investigated by excavations and can be dated to the late phase of the Lengyel Culture.[37]

2.4. Pedology and Geology

An initial brief summary of the geological situation around the Kleinhadersdorf-Marchleiten site was recently provided by Michael Götzinger.[38] His geological analysis focuses mainly on the origin of the raw materials used for the stone tools found in the burials. Of particular importance are numerous quartz sandstones, which were used as raw material for the large quantities of grinding stones and quernstones found in the cemetery. Unfortunately, these raw materials have not yet been analysed in detail. However, this study assumes that the raw material for the high-quality products must have come from a greater distance, as it differs from the locally occurring stone.

From southwest to northeast, the Poysdorf Basin is characterised by the Flysch/Waschberg overthrust zone, so that the deeper geological structure in the west and east is different

37 Neugebauer-Maresch 1981.

38 Götzinger 2015.

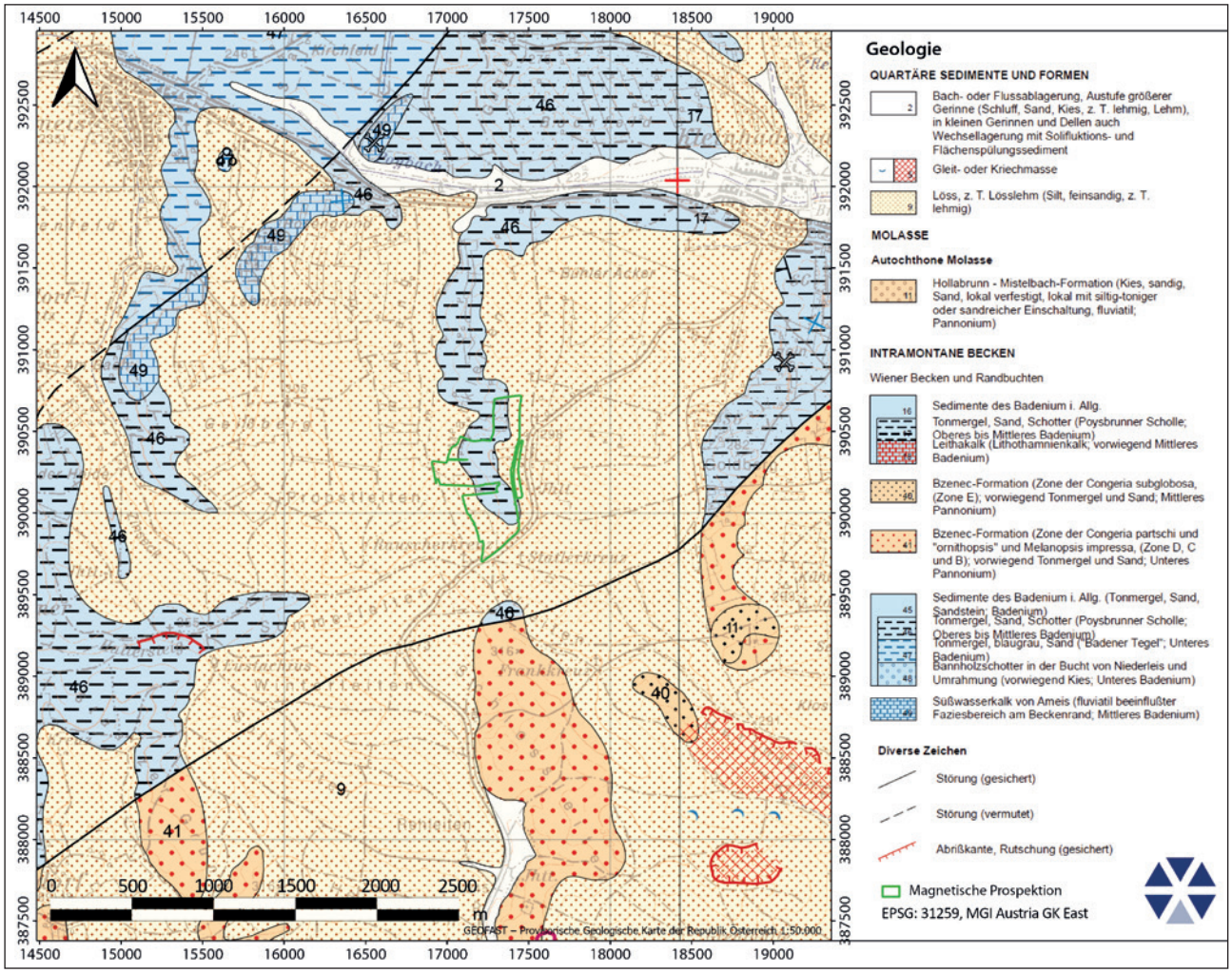


Fig. 4. Overview of the geological conditions around the Kleinhadersdorf-Marchleiten site (GIS and graphics: L. Aldrian; basis: Geologische Bundesanstalt 2018).

(Fig. 4).[39] In the west, the Waschberg Zone is mainly formed from Jurassic limestones, which are found on the surface between Kleinhadersdorf and Ameis in the immediate vicinity of Poysdorf, as well as the so-called Klippen (cliffs) of Staatz. Flysch, which predominantly consists of marls and sandstones, is found in the Waschberg Zone. The soil types at the excavation site are brown loam from relict soil material and decalcified loose sediment brown earth from loess.[40]

As a mineral topsoil, the A horizon of the brown loam is characterised by regular agricultural cultivation and shows a coarse fraction between loamy silt and silty clay. The B horizon shows the processes of brunification and loamification,[41] which give the soil a reddish colour and high concentrations of clay lenses. Characteristic here is a dense layer with a small proportion of coarse gravel down to a depth of 1 m. The soil horizons of the loose sediment brown earth are divided into A_p, B_v and C horizons, whereby the weathering horizon B_v is lime-free, and the subsequent C horizon is highly calcareous.[42] The C horizon at the excavation site is mainly formed by loess, which was introduced as an aeolian deposit. An extension of the Poysdorfer Scholle with the main components of clay marl, sand and gravel runs north-south.[43] At its southern tip, this extends into the area of the excavation site. In the deeper layers, clays, sands, gravels and clay marl of the Badenian are found.[44]

39 Grill 1968, Fig. 1.
40 Digitale Bodenkarte 2025.
41 Pehamberger, Gerzabek 2009.
42 Digitale Bodenkarte 2025.
43 Geologische Bundesanstalt 2018.
44 Neugebauer-Maresch, Lenneis 2015.

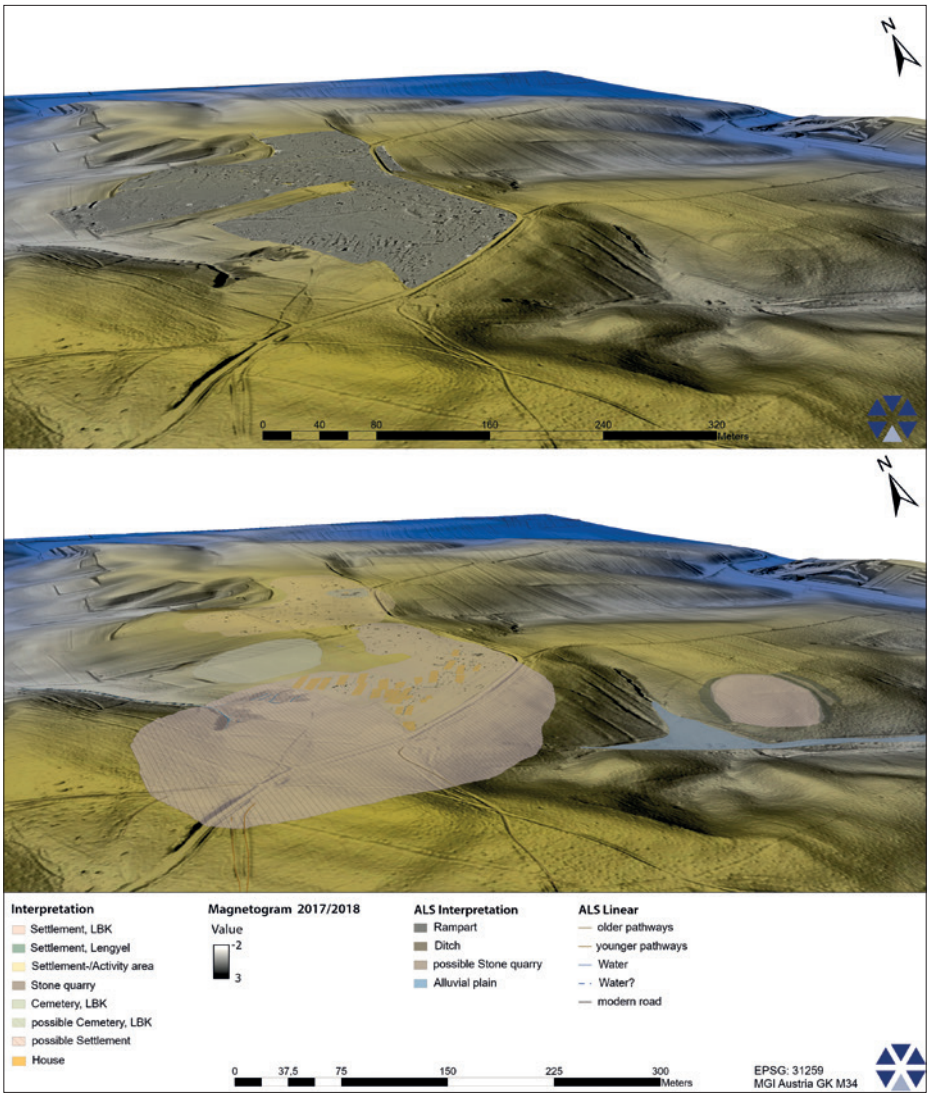


Fig. 5. Location of the settlement investigated by magnetic prospection in the terrain model from the south-west (GIS and graphics: L. Aldrian; basis: DEM basemap.at).



Fig. 6. In 2017 and 2018, a total area of 26.7 ha was investigated in Kleinhadersdorf-Marchleiten using a motorised magnetometer system (Photo: LBI ArchPro).

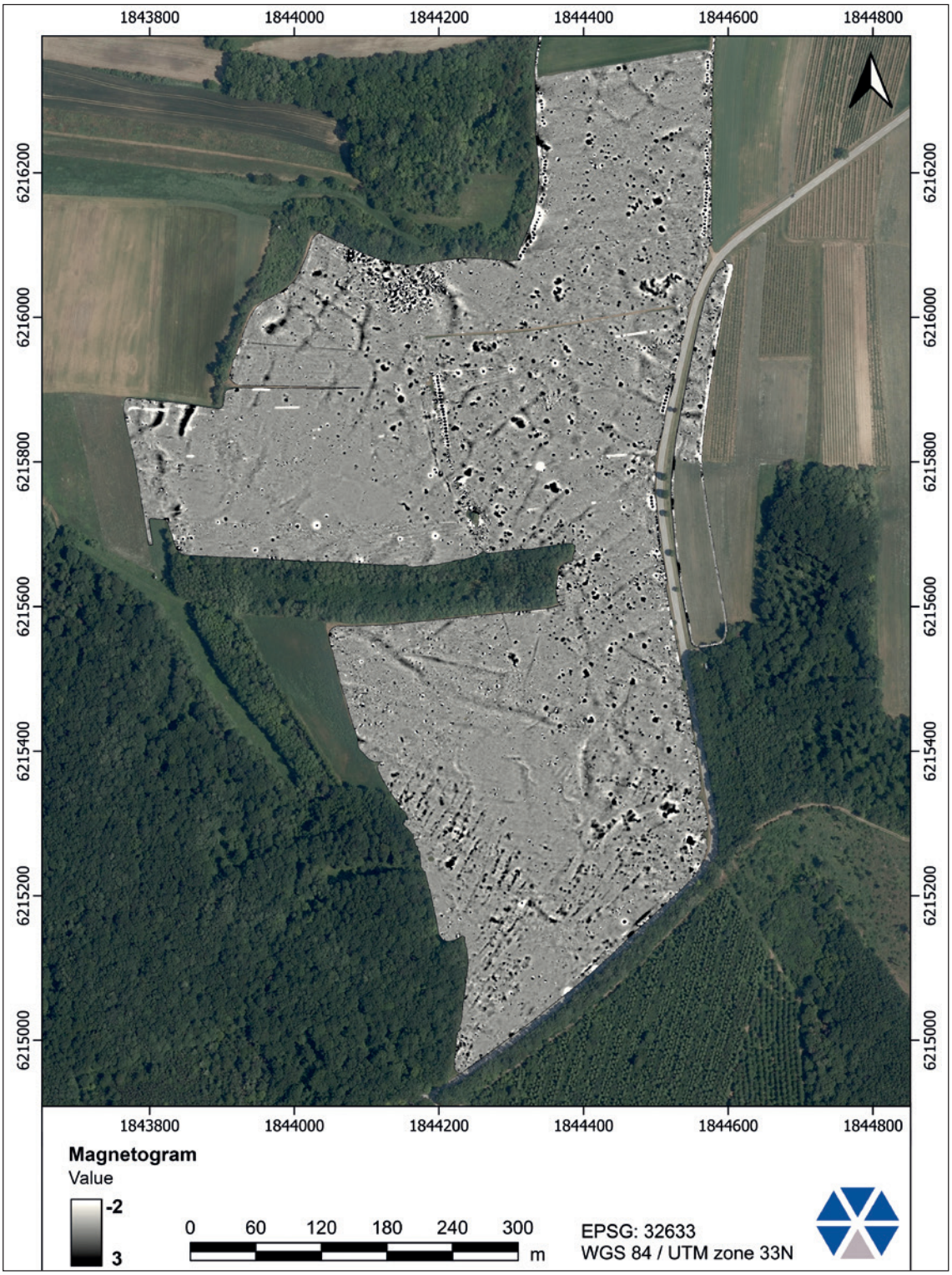


Fig. 7. Visualisation of the motorised fluxgate gradiometer survey conducted at Kleinhadersdorf-Marchleiten 2017–2018 (GIS and graphics: I. Kowatschek, LBI ArchPro; basis: basemap.at).

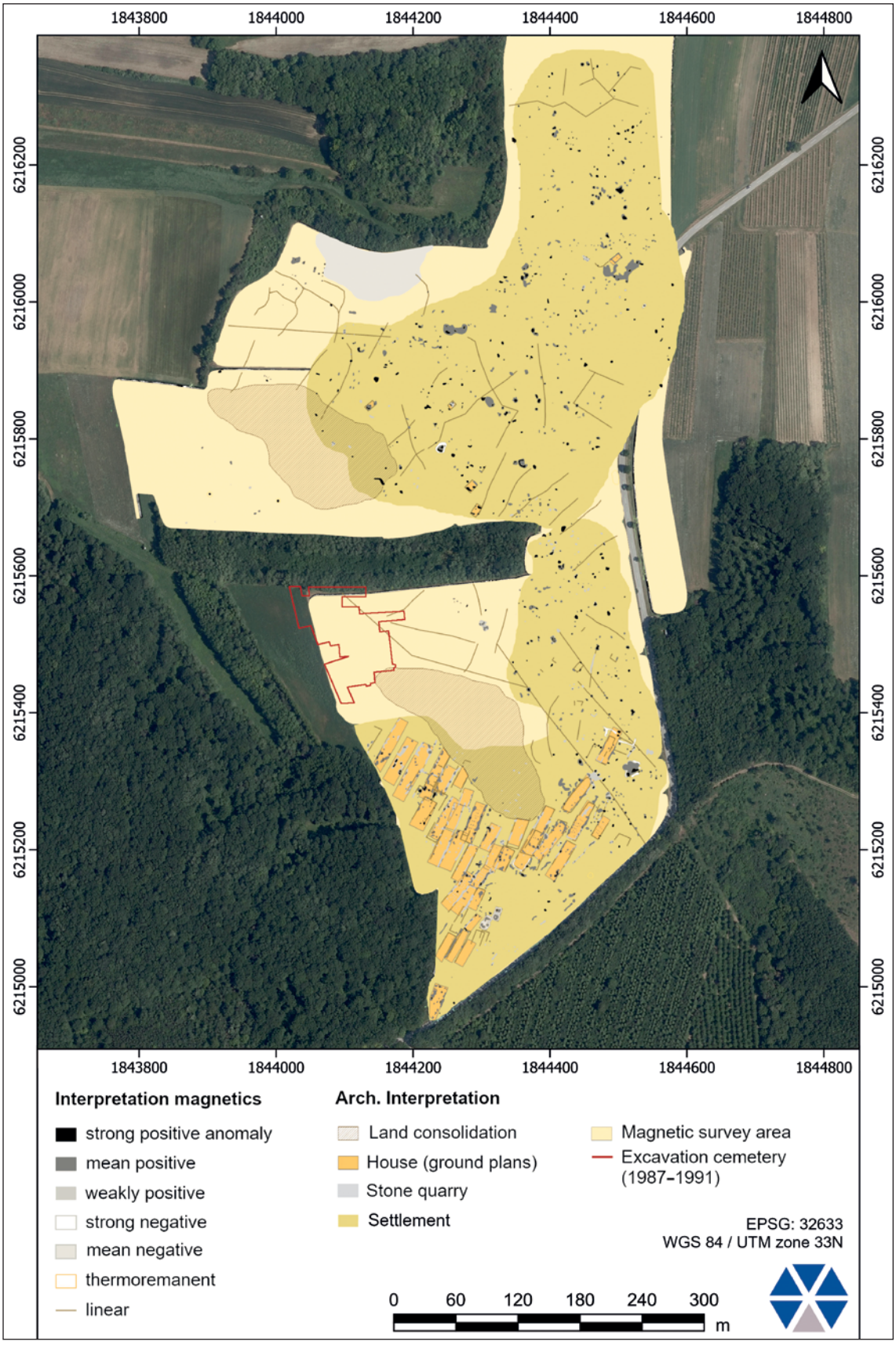


Fig. 8. Archaeological interpretation of the magnetic prospection (GIS and graphics: I. Kowatschek, LBI ArchPro; basis: basemap.at).

2.5. Hydrology

The selection of settlement sites during the time of the Linear Pottery Culture can be repeatedly linked to watercourses, whereas the later settlements with *Kreisgrabenanlagen* of the Middle Neolithic were located near springs.[45] The original assumption that the Linear Pottery cemetery of Kleinhadersdorf-Marchleiten was connected to the settlements along the Poybach is directly related to the availability of water there. The settlement identified by magnetic prospection directly adjacent to the cemetery is of a size that once again raises the question of water supply at this altitude. An obvious explanation can be found in the massive erosion gullies that can be seen in the terrain model in the wooded area to the west of the settlement (Fig. 3/H). There is no topographical situation that could explain such erosion gullies caused by surface water run-off. They can therefore only be springs that have dried up today but formerly emerged as artesian springs on the hilltop. The springs must be related to the already discussed Jurassic limestones of the Waschberg Zone and the location of the site directly on the overthrust area between the Waschberg and the Flysch Zone. This would mean that this overthrust area lies directly in the area of the prehistoric settlement. These artesian springs would have supplied the settlement with the necessary drinking and industrial water despite the unusual altitude for a Linear Pottery settlement.

2.6. Magnetic Prospection

As part of a case study by the LBI ArchPro, large-scale and high-resolution magnetometer measurements[46] were carried out in the area of the Kleinhadersdorf-Marchleiten site in 2017–2018 (Fig. 5). Over the course of two field campaigns, a total area of 26.7 ha was magnetically surveyed. The motorised magnetometer system used for the measurements consists of eight Förster FEREX probes mounted with a spacing of 25 cm on a custom-built non-magnetic cart and pulled by a quad. The resolution is 0.1 nT at 60 measurements per second (Fig. 6). The measurement system was positioned using a differential GNSS system with a measurement resolution of 1–2 cm, depending on the measurement speed. The data was interpolated to a grid of 0.125 × 0.125 m after the necessary data corrections. The measurement data was visualised as a digital image with a grey scale of 256 grey levels, whereby strong magnetic anomalies were displayed in dark and weak magnetic anomalies in light shades (Fig. 7).[47]

Strong dipole anomalies can be recognised in varying densities throughout the survey area, which can be attributed to iron in the soil layer, brick fragments or similar modern magnetic objects. Parts of the prospection area were used as vineyards, resulting in a further ingress of magnetic metal parts in the topsoil layer. These are mainly characterised by linear arrangements of dipole anomalies whose minima are randomly oriented and do not occur to the north of the anomaly, as is the case with anomalies from pits or posts. Other recent anomalies are clustered along the field boundaries or in the area of the field paths. This can be explained by the introduction of brick or magnetic rock material to reinforce the paths or by fences.

Extensive linear structures of varying width can be seen in the north of the survey area, which may represent former field boundaries dating from the time before the land consolidation. In particular, in the northwest corner of the survey area, there are a number of very small plots indicating flattened former terracing. Towards the south, the recorded anomalies thin out and in some cases are only very faintly recognisable. This situation is limited to one plot of land on which no other archaeologically relevant structures can be identified. This indicates massive soil intervention by deep ploughing or in the course of land consolidation. If the cemetery in this area extended further north beyond the strip of woodland, it is no longer detectable in this area due to the destructive intervention.

The area of the cemetery that had already been excavated was also recorded during the magnetic survey (Fig. 8). This reference area makes it possible to gain an impression of the recent magnetic objects in the topsoil. It is hardly possible to locate the backfilled burial pits from the 1987–1991 excavations in the magnetogram (Fig. 9). The smaller groups of anomalies in the hillside area directly to the east of the excavated cemetery can be explained by pits. Their dimensions and layout are reminiscent of the burial pits found during the excavations. It is not possible to distinguish between burial pits and other pits within the survey area, but it can be assumed that some of these observed groups of pits indicate a further extension of the burial ground up the slope to the east. These groups of anomalies are particularly prominent east of the forest edge. This area has not been used for agricultural purposes for many years and therefore generally offers better preservation conditions for archaeological structures. Based on the hypothesis that these anomalies are further burials, at least 50 burials can be expected in this area.

Most of the magnetic anomalies are concentrated in the area south of the burial ground (Fig. 8). These are the typical linear ditches flanking the Linear Pottery houses on either side. The anomalies are of different shapes and have varying

45 Melichar, Neubauer 2010, 78.

46 Neubauer 2001.

47 Neubauer, Doneus, Hinterleitner 2010.

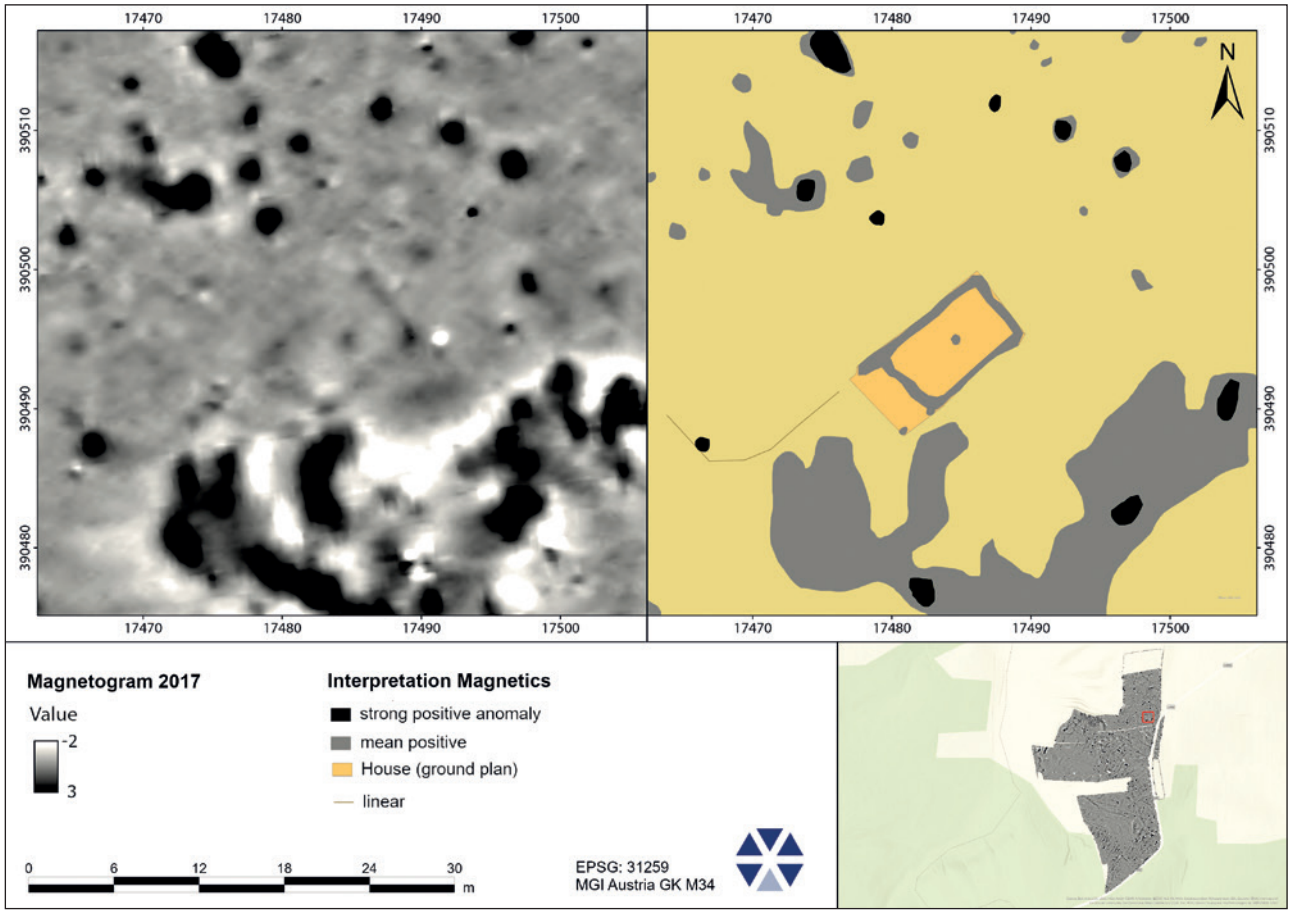


Fig. 9. Near the main road, the magnetic prospection data show a house floor plan of the Lengyel Culture (GIS and graphics: L. Aldrian, LBI ArchPro).

characteristics, indicating differences in the backfilling of the trenches. The ground plans of the houses are defined by the flanking ditches, with many houses showing up to three rows of posts inside. Based on the ditches and posts, the presumed dimensions of the houses have been marked in the interpretation with rectangular polygons (Figs. 8, 11). It could be seen repeatedly that the individual houses overlap stratigraphically. This fact can be interpreted as evidence for the multiphase nature of the settlement. In total, at least 39 houses can be distinguished based on the magnetic survey, although in some areas they are in varying states of preservation due to increased soil erosion from agricultural use.

Both the density of the anomalies and the state of preservation of the postulated buildings decreases significantly towards the top of the slope. On the one hand, this may be related to the extensive soil erosion; on the other hand, it also seems plausible that the buildings were not erected on the ridge, but rather downhill in a location that was protected from the wind. Particularly striking is a zone with a relatively homogeneous magnetic signal, which is directly adjacent to the settlement uphill and appears to represent a boundary. This area is limited to one plot and is probably the result of deep ploughing or massive mechanical soil removal during the land consolidation.

The verifiable house sites and the associated longhouses are orientated northeast to southwest, with variations in orientation of a few degrees. In addition to the postholes clearly arranged in rows, further pits or strongly magnetic anomalies can be recognised in the area of the house sites, which on the one hand can be seen as part of the house sites, but could just as well originate from a later settlement phase.

Very large pits are found repeatedly along the ridge, some of which are arranged in rows. It should be emphasised that this type of anomaly does not occur in the area of the settlement site with the Linear Pottery houses. They are regularly combined with groups of smaller anomalies, some of which are also arranged linearly (Fig. 10). The extent to which these structures are archaeologically relevant or can be traced back to more recent structures cannot be clearly determined.

On the ridge to the north of the forest strip, larger complexes of pits can also be seen again and again, some of them

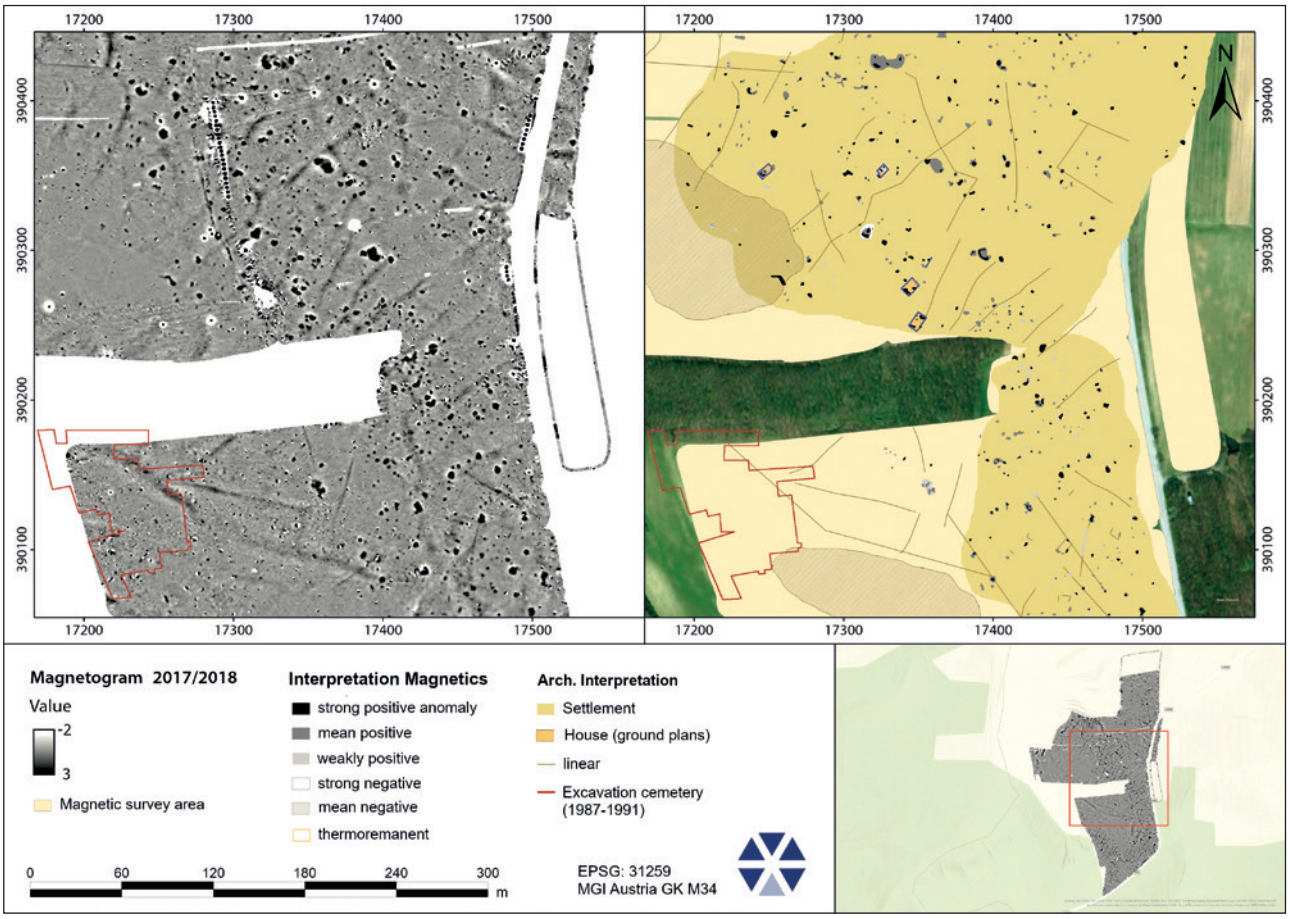


Fig. 10. Along the ridge, the magnetic prospection data show various linearly arranged pits (GIS and graphics: L. Aldrian, I. Kowatschek, LBI ArchPro).

arranged in a rectangular pattern (Fig. 10). These could be the remains of sunken buildings, like those found in the prospection results of the *Kreisgrabenanlage* in Schletz. Subsequent targeted excavations were able to identify these as sunken areas within a slightly sunken building of the Lengyel Culture.

The magnetic prospection revealed a house plan in the northern part of the survey area near the road, which can also be dated to the Lengyel Culture due to its characteristic shape (Fig. 9). This building is located in an exposed position on the ridge. The typical foundational wall ditches form an 11.5 × 6 m-large house plan, whose northwest-facing ditches protrude like antennae, forming an open roofed annex. This type of house plan is common in the Lengyel Culture area and has also been documented in excavations in eastern Austria in recent decades.[48] This house is in close proximity to other large pit complexes, as can be seen in the settlement areas around the *Kreisgrabenanlagen*. However, comparable large pit complexes have not yet been investigated by excavations, so a corresponding explanation must remain open.

This Middle Neolithic house suggests that at least in the northern part of the survey area, i.e. north of the forest strip, more recent settlement features of the Lengyel Culture are to be expected. Comparable features could also be observed in the wider area, for example during excavations in the course of the construction of wind turbines. These are pits of varying dimensions that are notable for their arrangement in groups; however, they do not conform to any identifiable settlement structure. This discovery in the magnetogram bears a resemblance to a finding in an excavation north of Poysdorf in Poysbrunn, where the presence of house sites in connection with the pits was suspected, but could not be proven.[49] It is possible that only shallowly deepened sill

48 Lenneis 2017c, 270–275. – Wallner et al. 2022.

49 Lenneis 2017c, 265.

beam structures are to be expected here, which are no longer preserved today due to soil erosion. In the southeastern corner of the survey area, a further feature is worthy of note, namely a linear arrangement of small ditches. The structural design of this building diverges considerably from that of the Linear Pottery houses of a similar type. The ground plan is comparable to the house found in Wetzleinsdorf[50] and should most probably also be dated to the Lengyel period.

2.7. Integrated Interpretation of the Prospection Data

The magnetic survey provided the first clear evidence that the presumed Linear Pottery settlement was in fact located in close proximity to the well-known cemetery at Kleinhadersdorf-Marchleiten and was of considerable size. The large number of graves uncovered during the excavation, along with the 200-year timespan suggested by radiocarbon dating, indicates a direct connection between the cemetery and the nearby settlement. This discovery consequently calls into question the assumption that the settlements along the Poybach are to be considered as the origin of the burials.

The elevated location of the settlement on the edge of the Poysdorf Basin, as well as the satisfactory state of preservation of the settlement area as indicated by magnetic prospection, are both exceptional features. In addition to the prominent flanking ditches of Linear Pottery houses, which are typically detected through magnetic prospection, the individual postholes of the longhouses are also clearly visible in the data. Based on the visualisations of the magnetic prospection data, a GIS-based archaeological interpretation was carried out in which the various magnetic anomalies were redrawn by experts and classified according to archaeological criteria.[51] This provides a detailed settlement plan which, when combined with the cemetery plan, for the first time depicts a Linear Pottery settlement complex without the need for large-scale excavations.

The analysis of the prospection data revealed a total of 39 houses, some of which overlap and probably date from at least two settlement phases. As the analysis of the burial ground revealed a continuous occupation, it can be assumed that the settlement was also continuously inhabited and that individual houses were repeatedly replaced. The model of changing or abandoned settlement sites (*Hofplätze*), which has been repeatedly assumed for the Linear Pottery Culture,[52] could be applied to the sites along the Poybach. However, this model appears to be less applicable to the Kleinhadersdorf-Marchleiten site, given the regular arrangement of the buildings detected so far. The prospection data only allow the reconstruction of the settlement areas revealed by the prospection with individual groups of houses and different phases of overlapping house plans. In comparison with other contemporaneous settlements that have been investigated by magnetic prospection to date, the site in question shows an exceptional state of preservation, which is particularly evident in the northwestern, downslope investigation area. Due to the shape and arrangement of the postholes and accompanying linear ditches, it is possible to speak of typical Linear Pottery houses in a settlement group with a general orientation of the buildings from northeast to southwest (Fig. 11).

It is highly probable that the identified houses are merely a component of the original settlement. Given the topographical situation, which includes forested areas, it can be assumed that only a proportion of the potential settlement area could be recorded by the magnetic surveys. Furthermore, the substantial soil erosion that has occurred in the eastern slope area may have resulted in the demolition or minimal preservation of some houses. The superior preservation conditions postulated at the foot of the slope can be attributed to the soil that was removed from the upper slope area and subsequently deposited over the house remains in the lower settlement area, thereby preventing further destruction resulting from intensive agricultural use.

The presence of house structures in the direction of the cemetery, located in the north, is highly improbable, a consequence of the substantial mechanical soil extraction undertaken during land consolidation. The settlement area is likely to extend to the west and south. A continuation of the settlement area in the direction of the Mistelbacher Wald is very likely. Taking into consideration the topographical situation, it can be postulated that the settlement initially expanded to a maximum total area of approx. 10 ha. The Linear Pottery settlement at Kleinhadersdorf-Marchleiten would thus be approximately half the size of the multi-phase settlement at Asparn an der Zaya/Schletz, which is located less than 10 km to the southwest and was contemporaneous at least in the later phases. According to the latest classification of Linear Pottery settlements by Lenneis,[53] the Kleinhadersdorf-Marchleiten site thus belongs to the central sites or large settlements, which include the sites of Breiteneich, Großrussbach and Asparn an der Zaya/Schletz north of the Danube.[54]

50 Urban 1980.
51 Neubauer 2004, 160–176. – Hinterleitner et al. 2015.
52 Lüning 2005. – Lüning 2012. – Zimmermann 2012.
53 Lenneis 2017a, 54–70.
54 Doneus, Neubauer, Trnka 2001. – Löcker et al. 2009. – Pieler 2010.

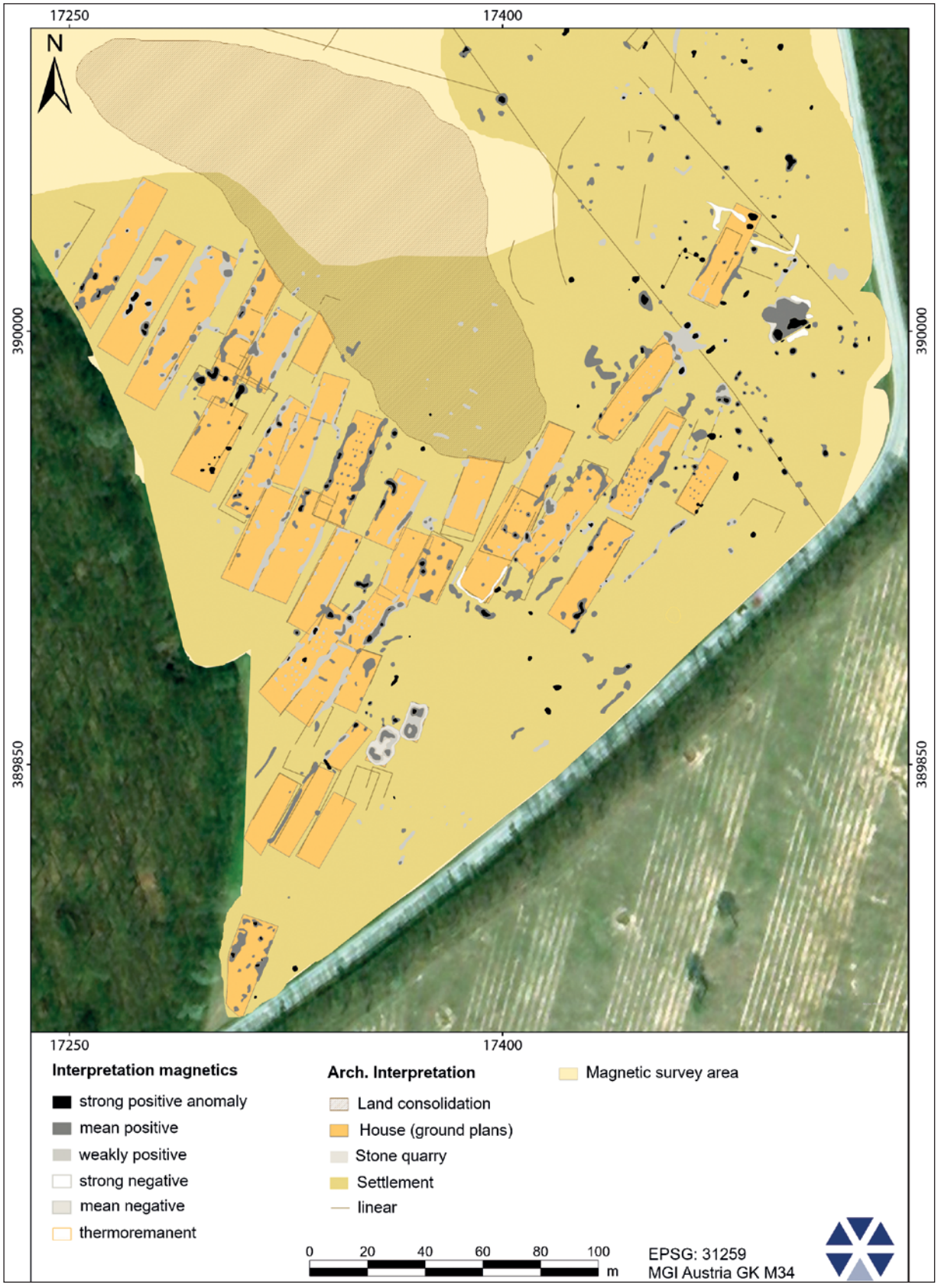


Fig. 11. The large-scale magnetic prospection yielded evidence of a Linear Pottery settlement with at least 39 house foundations and an area of around 4 ha (GIS and graphics: L. Aldrian, I. Kowatschek, LBI ArchPro).

According to current research by the LBI ArchPro, the site at Eggendorf am Walde can now also be included in this ranking.[55] A suitable comparison to the settlement of Kleinhadersdorf-Marchleiten with regard to its classification as a large settlement and the early dating on the basis of the cemetery would be the extensive settlement of Brunn am Gebirge, which is located to the south of the Danube.

3. Excavations Kleinhadersdorf-Marchleiten 2020–2021

Previous research and, above all, the large-scale magnetic survey have shown that the Kleinhadersdorf-Marchleiten site is one of the larger settlements in the region. Both the location of the site and the preservation of the settlement area seemed to be outstanding. On the basis of the ceramic artefacts found in the burial ground, it was possible for the first time to compile a chronology of the Linear Pottery in eastern Austria, a desideratum that had existed for many years.[56] As the comprehensive evaluation of the associated cemetery offers excellent basic conditions for a detailed chronological investigation, targeted excavations in the settlement area appeared to promise further essential information of supra-regional significance. The already good database can be significantly expanded by including settlement finds from individual houses.

With the support of the Department of Culture of the Province of Lower Austria, a three-year follow-up project was therefore defined and implemented in the period from 2020–2023. The research project, which was initiated with the aim of conducting a more in-depth investigation of the Kleinhadersdorf-Marchleiten site, was led by the LBI ArchPro in cooperation with the Institute for Prehistory and Historical Archaeology and the Vienna Institute for Archaeological Science (VIAS) at the University of Vienna. The scientific director of the project was Wolfgang Neubauer.

The aim of the research project was to verify the results of the magnetic survey through targeted archaeological excavations and to be able to make more detailed statements about the dating and possible basis of the settlement. The excavation in the initial year was conducted in a specific area of the settlement where magnetic prospection had previously indicated the potential for significant soil erosion. In the subsequent year, one of the houses that had been particularly visible in the magnetic data was to be investigated. Based on the observations made during the excavations in the cemetery and the analysis of the prospection data, it was assumed that the state of preservation varied greatly depending on the slope. Of particular importance was the hypothesis that parts of the settlement area were covered by colluvium and that this could provide previously unobserved preservation conditions for Linear Pottery settlement features. Down the slope, a loamier and heavily soaked surface situation was also observed, which raised hopes for the possible preservation of organic finds.

With over 100 graves, the cemetery at Kleinhadersdorf is by far the largest and, based on the radiocarbon dating available, also the oldest known cemetery in Austria.[57] The Kleinhadersdorf-Marchleiten site also occupies a special position with regard to the Linear Pottery Culture, which is widespread throughout Europe. In view of the wide distribution of the Early Neolithic Linear Pottery (western Hungary to eastern France) and the varying burial customs (burials in cemeteries, within the settlement, in earthworks or ditches), the connection between the cemetery and the neighbouring settlement is of overriding relevance.[58] This opens up the possibility of gaining unique insights into the social structure of the first farming culture in central Europe. The various phases and groups of houses identified through magnetic measurements may potentially be associated with the different grave groups located in the cemetery, which have been identified through ceramic finds.[59] This would open up new hypotheses regarding the social structure of the population at the time.

Further research into the natural components of the site, as well as the analysis of local resources, is expected to provide a more comprehensive understanding of the specific economic basis of the settlement. One of the key questions in relation to the size of the settlement found at the exposed altitude is the supply of fresh water. Most of the Linear Pottery settlements analysed are located at the headwaters of streams and rivers, and there is also evidence of several wells. At the settlement of Asparn an der Zaya/Schletz, which has already been used as a comparison, artesian springs were identified on the ridge between the Schletz stream and the Zaya by combining the prospection data with the data from the excavations. These must be interpreted as an essential basis for the fortifications in the late phase of the Linear Pottery Culture. Assuming a basic self-sufficiency with food, suitable arable and pasture land is, of course, also important, in addition to the water supply, for the settlement. However, the Linear Pottery settlements along the Poybach should

55 Russ et al. 2023.

56 Lenneis, Pieler 2016.

57 Stadler 2015.

58 Bickle, Whittle 2013, 17–20.

59 Classen 2004.

also be taken into consideration for this purpose, as they are located at a distance of one to a maximum of two hours from each other and have areas that are ideally suited for arable farming.

In the course of this project, further essential foundations for the settlement and economic archaeological analysis of the Kleinhadersdorf-Marchleiten site were developed by means of state-of-the-art stratigraphic excavations with fully digital, three-dimensional documentation and interdisciplinary investigations.

3.1. Excavation Methodology

The two four-week excavations were carried out as stratigraphic excavations according to the principles of archaeological stratigraphy published by Edward C. Harris[60] using digital three-dimensional documentation.[61] The most important prerequisite for the stratigraphic excavation method is the knowledge that every site has an archaeological stratification which is essentially formed by anthropogenic influences.[62] An archaeological stratification consists of stratification units (SU), which can be divided into deposits and special surfaces.[63] A deposit is defined by a surface, a self-contained three-dimensional volume and the material it contains. Non-material stratification units, which for example, illustrate an important point in time or process in the development of the archaeological stratification, are expressed in so-called special surfaces and are also documented during the excavation process. During the stratigraphic excavation, the deposits and surfaces are removed and documented in reverse order of their deposition, starting with the present-day surface and ending with the geologically developed, anthropogenically undisturbed subsoil. Each stratification unit is given a consecutive number for clear identification. The individual deposits are differentiated according to the colour, consistency, grain size of the fine and coarse soil, moisture content and proportion of humic and anthropogenic material. Spatial properties such as the extent and topography as well as material properties such as the colour, texture and composition are documented in detail for each deposit. During the excavation, initial considerations on the stratigraphic relationships of the individual deposits and on archaeological interpretation are also recorded. Archaeological finds are examined as part of the deposit, which, in the case of special artefacts, are documented, measured and inventoried in situ.

The spatial relationships between the individual deposits and surfaces are visualised in the form of a so-called Harris matrix.[64] The SUs are either in superposition to each other or have no direct relationship.[65] The Harris matrix is the essential basis for analysing the excavation results, as it depicts the entire stratigraphic sequence of the excavation and the chronological sequence of the stratification units.[66] The graphical visualisation of the stratigraphic relationships of the individual deposits was carried out using the Harris Matrix Composer+ (HMC+) developed at the LBI ArchPro.[67]

3.2. Digital Documentation

The stratigraphic excavation was documented completely digitally using a total station, a digital camera and a terrestrial laser scanner. The basis for the survey was a total station (Leica TCR 1203), which was used to measure the spatial extent of the individual deposits (boundary polygons), the location of significant finds and the position of control points and reflectors for photographic documentation and laser scanning.

Image Based Modelling (IBM) was chosen as the method for the photographic documentation of the excavation. After uncovering, identifying and describing the individual deposits, a series of overlapping photographs were taken around the archaeological structures or artefacts using a digital camera (Nikon D7200).[68] In the course of post-processing on-site or after the end of the excavation, a textured 3D surface model, an orthophoto and a digital terrain model (DTM) were created for each documented stratification unit using AgiSoft Metashape. In addition to the photographic documentation of individual deposits, aerial photographs were taken by drone after the completion of large-scale work steps, which provided an overview of the relationships between the individual features with just a few photographs. Three-dimensional models of the excavation area were also produced on the basis of these photographs. The georeferencing of the results was carried out using control points, the position of which was measured with the total station after the photographs had been taken. In collaboration with the company ArcTron 3D GmbH, the excavation area was surveyed over a large area in 2020 using aerial photographs taken from a paraglider trike (Fig. 12). These aerial images

60 Harris 1989.
61 Neubauer, Aldrian 2024, 56–63.
62 Harris 1989, 155.
63 Neubauer 2007. – Neubauer 2008. – Traxler, Neubauer, Icga 2008. – Neubauer et al. 2018. – Neubauer et al. 2022.
64 Harris 1989.
65 Traxler, Neubauer, Icga 2008.
66 Harris 1989, 119–122.
67 Neubauer et al. 2018.
68 Doneus et al. 2011b. – Verhoeven 2017.



Fig. 12. Aerial three-dimensional documentation of the excavation trench and the surrounding landscape using a paraglider trike (ArcTron3D GmbH) and the RiCOPTER (Photos: I. Kowatschek, LBI ArchPro).



Fig. 13. The surfaces were documented in high resolution using a terrestrial laser scanner (Riegl LMS GmbH) (Photo: I. Kowatschek).

were used to create a further three-dimensional model that not only includes the excavation trench itself, but also the entire surrounding landscape.

A terrestrial laser scanner from Riegl LMS GmbH (Riegl VZ400i, Fig. 13) was also used during the excavations in Kleinhadersdorf-Marchleiten.[69] This allows large-scale, high-resolution topographical recording of relevant surfaces or the entire excavation trench from just a few positions. In just a few minutes, the laser scanner delivers a high-resolution 3D point cloud of all surfaces within a radius of around 500 m with an accuracy in the millimetre range. The orientation of the individual scan positions in relation to each other is determined by geodetically calibrated reflectors, which are systematically placed in the scanner's wide field of view and automatically recognised during the scanning process. The main advantages of surface documentation using a laser scanner are the much higher spatial resolution and the speed of the measurement process compared to manual geodetic surveying or recording using a camera. In the third week of excavation in 2020, the excavation progress was also digitally surveyed using the LBI ArchPro's RiCOPTER. This is a Riegl drone equipped with a LiDAR sensor and a digital camera (Fig. 12).

69 https://www.riegl.com (last access 7.3.2025).



Fig. 14. The measurements of magnetic susceptibility after topsoil removal with a grid of 0.5 × 0.5 m (Photo: I. Kowatschek).

3.3. Magnetic Susceptibility Measurements

Magnetic susceptibility measurements can be carried out in the form of individual profiles or in an individually selected grid over a larger area. Such measurements can be used to delineate an archaeological site or individual features, as these usually stand out from their surroundings due to their higher magnetic susceptibility. The use of susceptibility measurements is also particularly worthwhile for investigating the state of preservation of sites that are already known from geophysical prospection. As the uppermost soil horizons generally have a higher magnetic susceptibility, evidence of destruction can be provided directly via the magnetic susceptibility. Even the smallest thickness of preserved soil remains (A and B horizons) on the already very heavily eroded sites in the loess soils of the Weinviertel are characterised by a significant increase in magnetic susceptibility. This is particularly relevant for Neolithic sites, where high erosion rates can cause significant changes to the topography. The susceptibility measurements provide a valuable indication of whether specific areas within the measurement or excavation area with a low frequency of magnetic anomalies that have been cleared of topsoil were originally free of structures, or whether this phenomenon is due to erosion. For this reason, it was decided to carry out in situ measurements during the excavations in Kleinhadersdorf-Marchleiten after the large-scale removal of the ploughed topsoil.

The in situ susceptibility measurements were carried out on the entire excavation area after the topsoil had been removed by the excavator and the humus residues had been removed by hand. The measurements in 2020–2021 were carried out with a Bartington MS2D sensor and data logger in a grid of 0.5 × 0.5 m (Fig. 14). The magnetic susceptibility measurements were able to detect even the smallest deviations in magnetic properties that were not visible to the naked eye in the colour differences of the sediments. The measurements are an essential tool for the localisation and delineation of deposits, especially when optical separation based on sediment colours is difficult.

The result of the magnetic susceptibility measurement of the excavation area in 2020 shows a good correspondence between the magnetic anomalies and the areas of increased magnetic susceptibility (Fig. 15). From this it can be deduced that the anomalies detected by the magnetic measurements are mainly due to induced magnetism, based on pronounced contrasts in the magnetic susceptibility of the pit and trench fillings compared to the geological background. The proportion of the total magnetisation of the archaeological structures accounted for by thermoremanently magnetised objects (pottery sherds, kiln remains, hearths) or other forms of remanent magnetisation is therefore low. The comparison of the magnetic susceptibility measurement with the excavation results (Fig. 15) shows that the coarse grid of the susceptibility measurement does not allow smaller postholes to be recognised. In the magnetic field measurements, significantly more postholes are visible in the data due to the higher measurement resolution. More importantly, however, the house plan does not appear in the 2020 susceptibility measurement, apart from the demarcation by the flanking linear trenches. The increased magnetisation to be assumed for the interior is not discernible, from which it can be deduced that the former surfaces and associated deposits in the interior of the house have already been completely

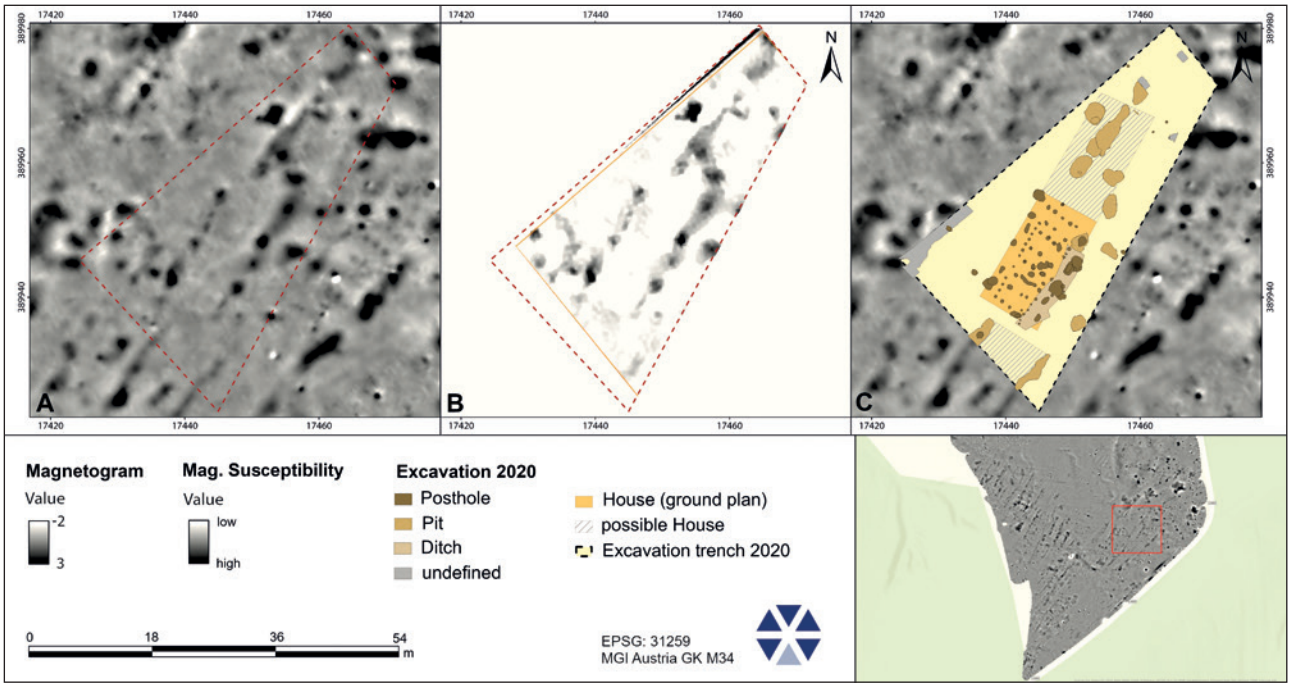


Fig. 15. The results of the magnetic susceptibility measurement in Excavation Trench 1 (B) compared with the data from the magnetic prospection carried out in advance (A) and the excavation 2020 (C) (GIS and graphics: L. Aldrian, I. Kowatschek, LBI ArchPro).

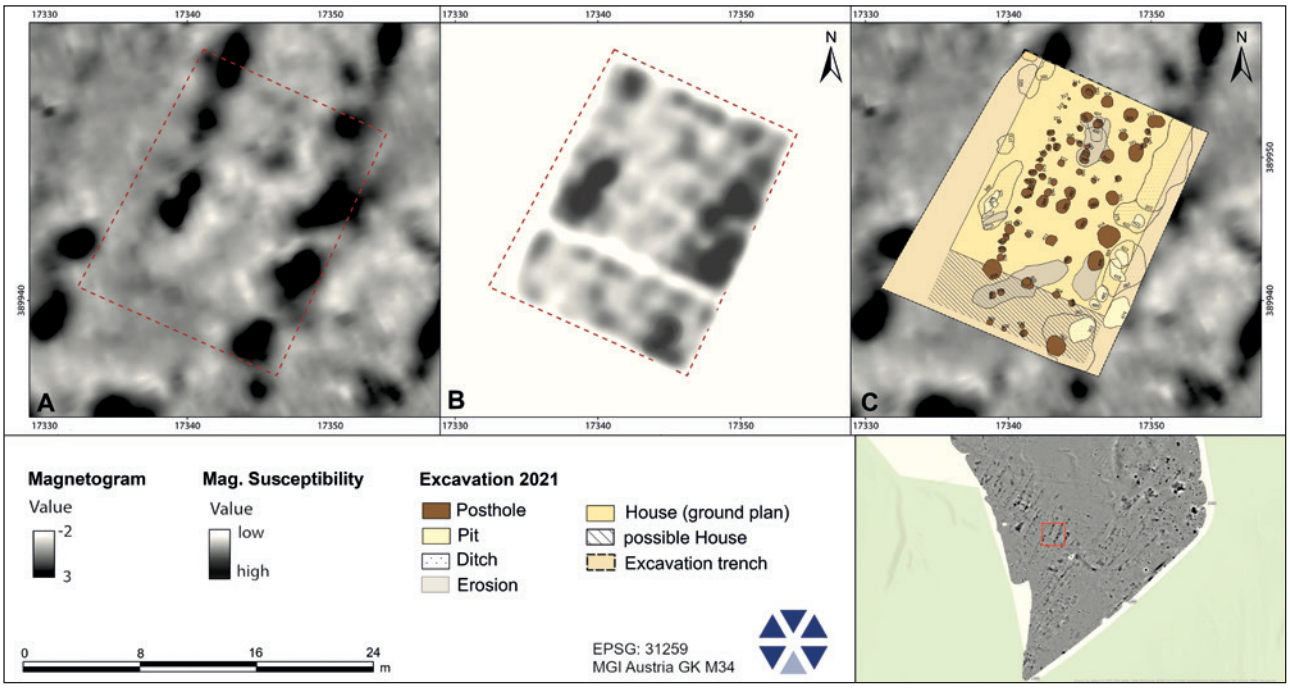


Fig. 16. The results of the magnetic susceptibility measurement in the area of House 3 (B) compared with the data from the magnetic prospection carried out in advance (A) and the 2021 excavation (C) (GIS and graphics: L. Aldrian, I. Kowatschek, LBI ArchPro).

destroyed by natural soil erosion and increased soil erosion due to intensive agricultural use. There is also no evidence of the repeatedly observed relocation of magnetic iron compounds to deeper soil horizons.

If this is compared with the result of the magnetic susceptibility measurements in the excavation trench from 2021, it can be seen that the better preservation already postulated by the magnetic measurements is also reflected by a generally



Fig. 17. Drone image of Excavation Trench 1, 2020 (Photo: G. Verhoeven, LBI ArchPro).

increased magnetisation of the house area in the magnetic susceptibility measurements. Several postholes of the longhouse are also recognisable in the susceptibility measurements, which must also be due to the better preservation. The strong magnetic anomalies in the northeastern and southeastern corners of the excavation trench (Fig. 16) are only vaguely recognisable in the susceptibility measurements. It can therefore be deduced that the proportion of remanent magnetisation makes a significant contribution to these structures. This was confirmed by the specific find content.

4. Excavation Trench 1, 2020

In the initial year of the project, the excavation trench was located in the southern and topographically highest area of the settlement, covering a total area of 1101 m² (Fig. 17). Based on the results of the magnetic prospection, at least two longhouses with an orientation from northeast to southwest could be assumed in this area. The archaeological structures preserved in the soil in this part of the settlement area appear to have been more severely affected by increased soil erosion, a consequence of intensive agricultural use. The excavation was carried out between 17 August and 12 September 2020 as a four-week research and teaching excavation by the LBI ArchPro and the Institute of Prehistory and Historical Archaeology (University of Vienna).

In the centre of Excavation Trench 1, dark oval to round deposits were visible after the topsoil had been removed. These were interpreted as the posts of the Linear Pottery House 1 and House 2. In the interior of House 1, 53 approximately round postholes were examined, most of which were less than 20 cm deep. The features were divided into different investigation areas according to their position within the ground plan: a northwestern and southeastern outer area with the postholes of the external walls (L1, L5) and the remains of the flanking ditches, as well as an inner area with two central rows of postholes (L2, L4) and the row of posts that carried the ridgepole in the longitudinal axis in the centre of the house (L3). In the following, the (post) pits of the house plan are described according to this division from south to north (L1/R1–L5/R8) as well as other features in the immediate vicinity. The verbal description of the house plan with illustrations of particularly important or interesting features is followed by a table describing the individual pits (Figs. 18–19 and Tab. 1).

4.1. House 1

House type: Medium-sized LBK house comprising two sections[70]
Orientation: NNE–SSW
Total length: 15.4 m (W) – 16.2 m (E)
Total width: 5.2 m (S) – 6 m (N)
Postholes: 53
Inner area: 85 m²
Cross-row spacing: 2.25 m

70 Terminology according to Modderman 1972. – Lenneis 2017a, 75.

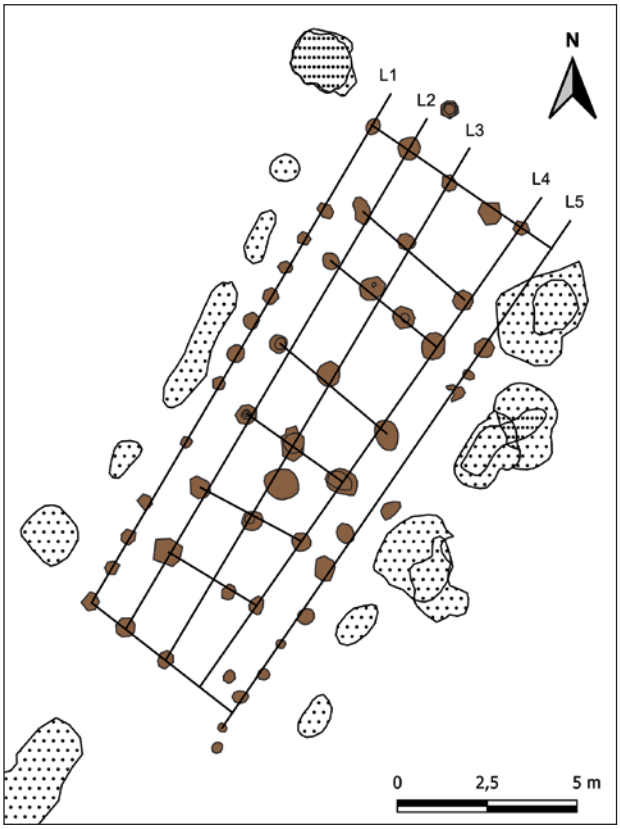


Fig. 18. Reconstruction of House 1 (GIS and graphics: I. Kowatschek).

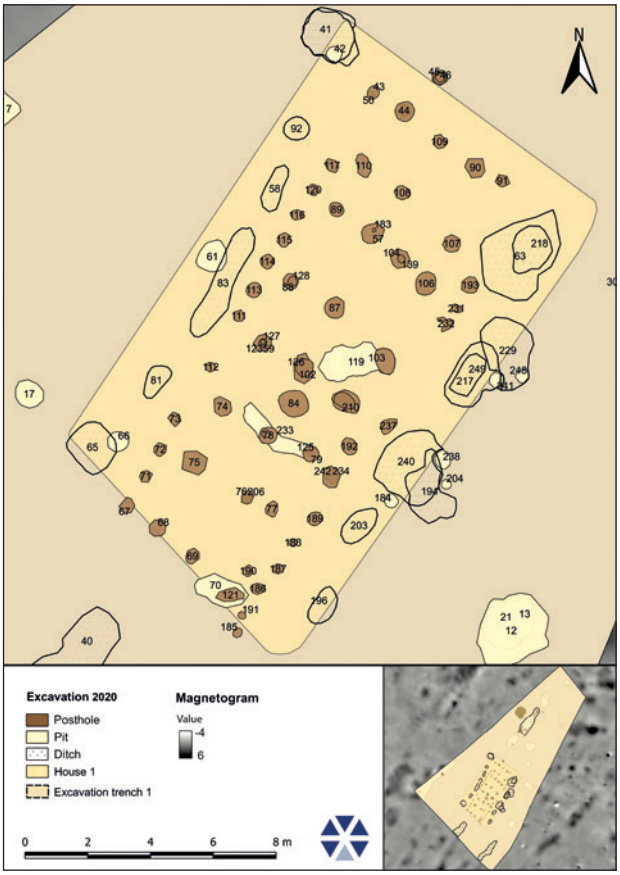


Fig. 19. Overview of the stratigraphic units of the Linear Pottery house in Excavation Trench 1, 2020 (GIS and graphics: I. Kowatschek).

4.1.1. Northwestern Wall

The northwestern wall of House 1 is made up of 13 postholes, which were significantly smaller in diameter than the postholes to the east. The approximately circular pits had a diameter of 30–53 cm and lay in a northeast-southwest-aligned line at a distance of 0.87–2.64 m from each other. The fillings of the individual postholes differed only very slightly in colour from the surrounding geological material. The pits have a cauldron-shaped profile with almost vertical walls and a rounded transition to a flat or sloping base. The postholes of the outer wall were only preserved to a depth of 5–31 cm. No artefacts were found within the pits; only a few small pieces of charcoal have been noticed.

4.1.2. Northwestern Central Posts

At a distance of approximately 1.2 metres from the northwestern wall, there is an additional line of nine parallel postholes. These were part of the northwestern central post row. With diameters of 41–66 cm, the pits are already significantly larger. The pits lie in a northeast-southwest-aligned line with a distance of 1.58–2.68 m between them. The backfill of the individual almost circular postholes was of darker colour and therefore more distinct from the surrounding geological material than was observed in the postholes in the outer wall. During the excavation, two separate fillings were recorded in five of the nine postholes, which differed significantly in the composition and colour of the fine soil (SU 59/SU 127, SU 88/SU 128, SU 89/SU 132, SU 211/SU 44, SU 49/SU 45; cf. Fig. 20). The pits were oval shaped and partly filled with black earth and charcoal. The darker deposits documented within the postholes were interpreted by the excavators as traces of the original posts. The preserved depths of the individual postholes varied considerably in the northwestern centre post row. With a depth of 5–46 cm, they were generally better preserved than the postholes of the northwestern outer wall. The profiles of the pits were again cauldron shaped with an almost vertical wall and a flat to sloping base, most of which had a rounded transition. Small pieces of charcoal and burnt daub were repeatedly found in the backfill, but generally no artefacts were discovered.

4.1.3. Central Posts

The row of posts that carried the ridgepole in the centre of the house runs parallel to the aforementioned rows of posts at a

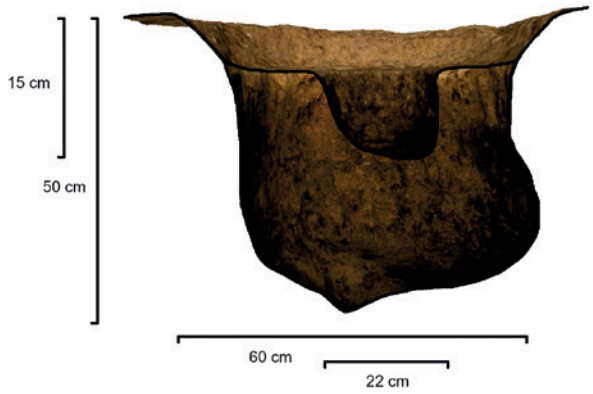


Fig. 20. Cross-section of the SU 59 and SU 127 postholes (3D model and graphic: I. Kowatschek, LBI ArchPro).

distance of around 1.5 m and consists of eight postholes. The pits, which are more or less circular in shape, have a diameter of 42 to 74 cm and are located at a distance of 1.54–2.68 m from each other. The greater variation is explained by the distance between the two southeastern posts, between which no post was identifiable or preserved at the time of the excavation. The postholes showed a depth range of 9–60 cm, thus exceeding the average depth of the surrounding pits. This could be attributed to the load-bearing function of the ridge posts. Once more, an analysis of the material properties revealed that five postholes contained several stratigraphically consecutive backfills (SU 206/SU 76, SU 78/SU 124, SU 102/SU 126, SU 57/SU 134/SU 183, SU 104/SU 139). In this context, the long oval posthole in the central area of the house (L3/R6) was particularly striking. The posthole exhibited three distinct plastic fillings, characterised by their notably dark grey to black colours and high charcoal content (SU 57/SU 134/SU 183, Fig. 21). The profile of the postholes can again be described as cauldron-shaped with almost vertical walls and a flat base. Between the transverse rows R3 and R4 there was an oval pit, which differed from the surrounding postholes due to its larger dimensions (93 × 86 × 37 cm) and the numerous finds of thin-walled pottery fragments, burnt daub and charcoal. The function of the pit remains unclear; it could be another posthole for the replacement of the central post, or alternatively, it may have been used as a working or rubbish pit within the house.

4.1.4. Southeastern Central Posts

The subsequent row of nine postholes is located at a distance of approx. 1.5 metres from the central posts. The diameter of the postholes ranged from 38 to 82 centimetres, with a preserved depth between 3 and 30 centimetres. There were two postholes in which two or three different fills could be identified (L4/R3, L4/R4). The stratigraphically younger deposits were characterised by very dark material mixed with charcoal and an elongated, cauldron-shaped form. The largest posthole contained three fragments of flint implements (SU 106); in the other pits, only isolated charcoal and burnt daub could be found.

4.1.5. Southeastern Wall

The southern wall, with 12 recorded postholes, not only had a greater number of preserved posts than the inner walls of the house, but the pits were also placed more closely together. The number of posts corresponds to the northwestern wall, but the distribution of the pits shows differences. During the excavation, a gap was found in the centre of the row in which no visible remains of further posts were found. Assuming the regular spacing of the pits in this area, at least two to three postholes are missing here. The two pits adjacent to the gap to the north (SU 231, SU 232) have been interpreted as postholes on the basis of their location and dimensions, but the very shallow preservation and indistinct shape make it difficult to be certain. In this area, the results

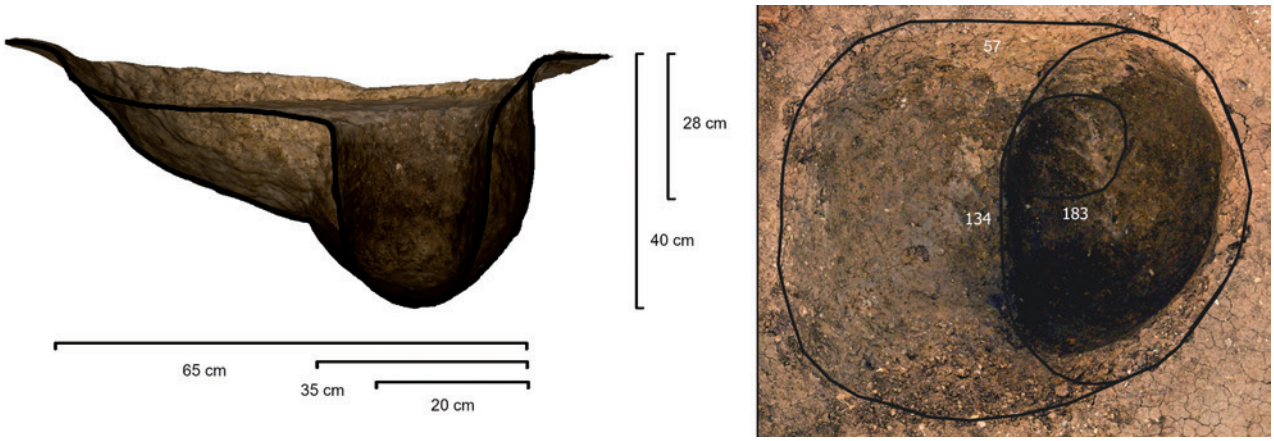


Fig. 21. Orthophoto and cross-section of posthole L3/R6 with SU 57, SU 134 and SU 183 (3D model and graphic: I. Kowatschek).



Fig. 22. The pit complex SU 194, SU 240 and the surrounding postholes SU 184, SU 204 and SU 238 during and after the completion of the excavation (Photo: I. Kowatschek).

of the two preliminary magnetic investigations do not provide any further information, so it must be assumed that many postholes from the southeastern wall have already been destroyed by recent agriculture.

With a diameter of 25–55 cm, the other postholes had roughly the same dimensions as the pits of the opposite outer wall. The round to slightly oval pits had cauldron- or trough-shaped profiles with steeply sloping walls and angular transitions to flat to slightly convex bases. With a depth of 5–25 cm, however, they were somewhat better preserved, at least in the southern area. The southernmost five postholes were distinguished from the other pits by their loamy consistency and faint reddish colour, which is likely to have originated from ceramic remains or burnt daub. The backfill of the postholes did not contain any significant finds.

4.1.6. Eastern Flanking Ditch

Due to their location, the eight pits directly adjacent to the southeastern wall can be interpreted as the partly secondarily utilised southeastern linear ditch flanking House 1. In terms of their shape, characteristics and the backfilling observed, they are comparable with the linear ditches accompanying the Linear Pottery houses in the settlement of Mold near Horn, for example.[71] The pits that are now separated and lined up next to each other are probably only the lower-lying remains of the former ditch that originally flanked the walls of the house along its entire length. The longitudinal pits accompanying the outer wall at a distance of approx. 2 m were better preserved and preserved to a greater depth on the southeastern wall than those on the northwestern side due to the B horizon that had not yet been removed by the plough. With an average depth of 35.8 cm, the pits running along both sides of the building were significantly deeper overall and also contained considerably more finds than the postholes. The ditch had evidently stood open for a long time and slowly filled in with the settlement rubbish from the house and its surrounding material. The pits are described below according to their geographical location from south to north.

The northernmost pit (SU 196) had a maximum length of 125 cm and a width of 70 cm. The approximately 25 cm-deep pit had an almost oval shape and a steep wall with a smooth transition to the convex base. The backfill was black to dark brown in colour and very compact. In the upper part of the backfill were several fragments of pottery, reddish-brown pieces of burnt daub approx. 5 cm in size and charcoal remains. With increasing depth, the material became somewhat lighter in colour and turned brown. There were few or no finds in the lower deposits of the pit.

The adjacent longitudinal pit to the south (SU 203) measured 130 cm in length and 70 cm in width. The outline of the oval pit was relatively distinct from the surrounding material due to the black and compact backfill. Similar to the

71 Lenneis, Schwarzäugl 2019, 180–187.

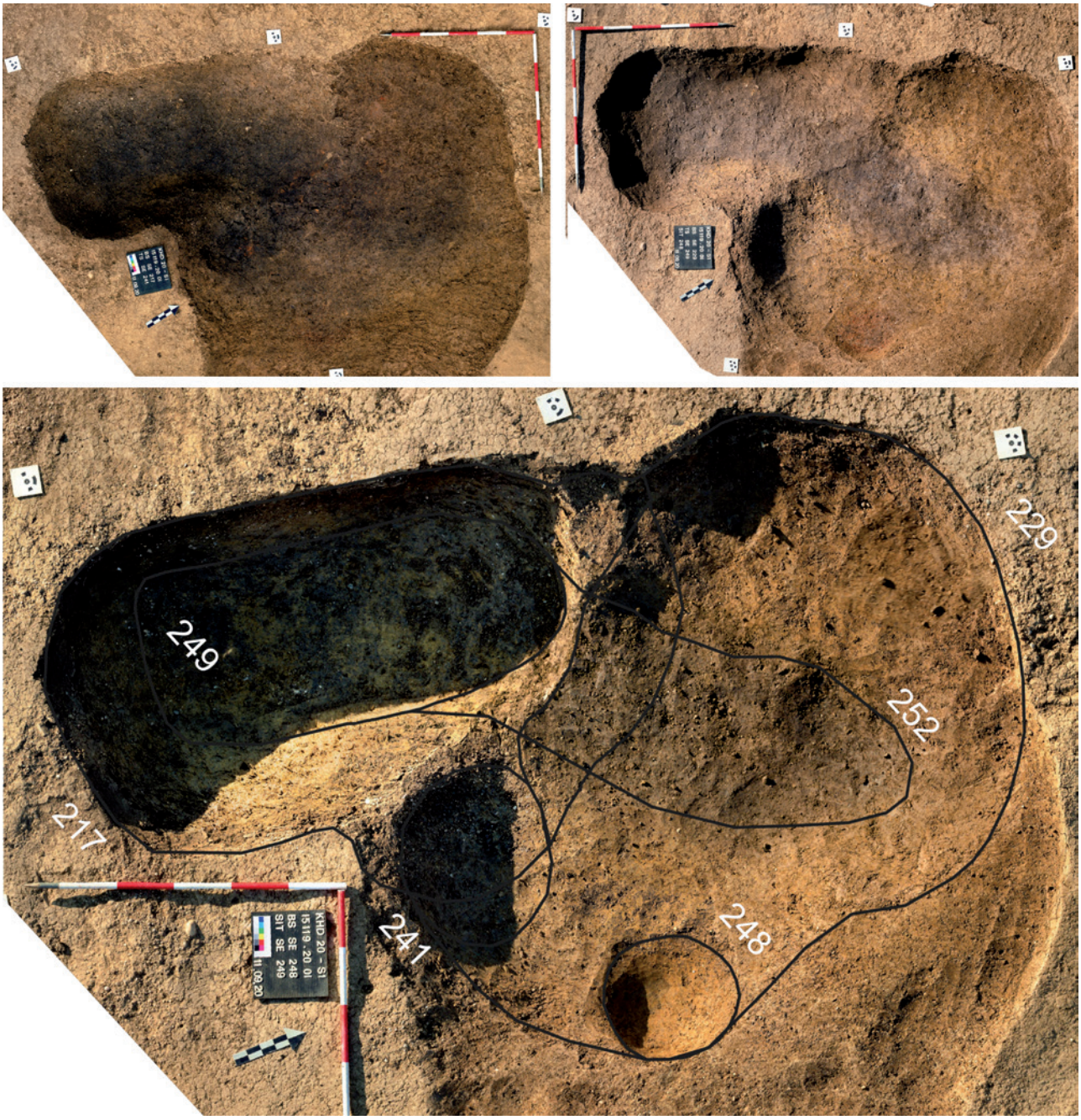


Fig. 23. Overview of the stratigraphic units in the pit complex SU 217, 229, SU 241, SU 248, SU 249 and SU 252 during and after the completion of the excavation (Photo and graphics: I. Kowatschek).

neighbouring pit, the upper half was also filled with numerous pieces of burnt daub and charcoal as well as scattered fragments of pottery. The lower half gradually lightened towards the bottom and was empty of finds. The pit was 60 cm deep and had a trough-shaped profile with steep walls and a convex base.

Further north were two large pits surrounded by three postholes, interpreted as a single structure measuring 2.9 m in length and 2.5 m in width. The contour of the pit was clearly visible down to a depth of around 80 cm due to the very compact, black and clayey backfill (SU 240, Fig. 22). The rich find material from the pit consisted of several grinding plates and a flint blade, two fragments of ceramic spoons (see Fig. 50) and pottery fragments, which suggest a Lengyel period date. The surrounding postholes (SU 204, SU 238) had a diameter of 30 to 50 cm and contained dark



Fig. 24. The most southerly pit, running alongside the house, contained a large number of pottery fragments that can be dated to the Lengyel period due to their characteristic decoration (Photo: I. Kowatschek).

brown to black clay, a large number of burnt daub pieces and pieces of charcoal. The finds included small fragments of pottery and a stone artefact interpreted as a runner stone. Posthole SU 184, north of the pit complex, was approximately the same size, but no artefacts were found in the fill. The numerous fragments of grinding stones found in the pit suggest that the longitudinal pit was used or reused as a working pit. Due to the construction, it could also be a pithouse with a post structure.

Similar to the previous observations in the other flanking pits, the deposits of the following pit to the north could also be divided into six stratigraphic units (SU 217, SU 229, SU 241, SU 248, SU 249, SU 252) (Fig. 23). Natural environmental influences, such as soil washed in by rain, appear to have filled in the lower part of what are probably related pits. The upper areas were filled with carbonised material and burnt daub fragments at a later date, possibly when the adjacent building burnt down. In addition to the pieces of burnt daub with rod impressions, the finds in this pit also included grinding stone fragments and some poorly preserved pottery fragments. The pit was a maximum of 3.3 m long and between 1.2 and 1.7 metres wide, and was around 50 cm deep at its deepest point. Below these deposits were the remains of two stratigraphically older and smaller pits. These were presumably a dark-filled posthole (SU 241) and a pit measuring around 45 × 50 × 35 cm with a high concentration of burnt daub and charcoal (SU 248), the function of which remains unclear due to the lack of artefacts.

The northernmost of the flanking pits (SU 63, SU 218) corresponds to the surrounding pits in terms of its shape and the dark calcareous backfill with burnt daub inclusions. The stratigraphically youngest backfill of the pit contained burnt daub inclusions up to 10 cm in size, while the backfill in the area of the base remained empty. The shape of the approx. 60 cm-deep pit is an elongated oval with a north-south orientation and dimensions of 210 to 300 cm. The boundaries of the features were slightly blurred but could be easily defined by the sandy geology interspersed with gravel surrounding it. The deposit contained small fragments of pottery and a flint. The profile shape is trough shaped and shows a flat sloping wall with a slight step at about half the radius, which merges into a rounded, flat to convex base.

4.1.7. Northwestern Flanking Ditch

From the original flanking ditch in the area of the northwestern wall of the Linear Pottery house nine pits were preserved, each in line with the cross-rows of the centre posts. The southernmost pit (SU 65, SU 66) measured 1.3 × 1.5 m and contained a large quantity of pottery (Fig. 24). The fragments came from several large pots, some of which can be dated to the Lengyel period on the basis of their profile shape and the small round knobs. Based on the finds, a secondary use of the southern end of the original ditch as a rubbish pit can be assumed, even if a later disturbance in this area could no longer be determined stratigraphically.

The following long oval pit to the north (SU 61, SU 83) ran parallel to the northwestern wall of the house and was already clearly visible after the topsoil had been removed. The pit had a length of 3.5 m and a width of 50–80 cm. It was on average 30 cm deep and filled with dark grey to dark brown material. A stratigraphically younger pit with dimensions of 115 × 85 cm adjoins it to the west. The dark grey to black backfilled pit contained a large lump of burnt daub, a fragment of pottery with a knob and three fragments of grinding stones.

The elongated pit SU 58 measured 1.93 m in length and 1 m in width and, like the neighbouring postholes, was only preserved to a depth of around 25 cm. North of the pit was the almost circular pit SU 92 with a diameter of around 65 cm and a clearly distinguishable very dark backfill.

4.2. Pits in the Vicinity of House 1

In the northwestern part of the excavation trench, around 14 m north of the Linear Pottery house, a pit with a diameter of approx. 3 m was investigated. This pit was characterised by a high concentration of pottery finds. In the magnetic survey data, this pit was already clearly visible as an almost rectangular, strongly magnetic anomaly. After the topsoil had been removed, the pit was clearly distinguishable from

Linear Pottery House 1 – Postholes					
Northwestern Wall					
Position	SU	IF	Length (cm)	Width (cm)	Depth (cm)
L1/R1	SE 67	IF 144	47	42	20
L1/R1–R2	SE 71	IF 145	40	36	15
L1/R2	SE 72	IF 146	45	40	8
L1/R2–3	SE 73	IF 181	40	40	23
L1/R3–4	SE 112	IF 147	15	15	10
L1/R4	SE 111	IF 148	36	37	13
L1/R4–5	SE 113	IF 149	50	50	15
L1/R5	SE 114	IF 150	40	40	5
L1/R5–6	SE 115	IF 151	45	45	15
L1/R5–6	SE 116	IF 152	35	35	5
L1/R6	SE 120	IF 153	40	40	15
L1/R7	SE 117	IF 154	43	33	18
L1/R8	SE 43		63	50	13
L1/R8	SE 50	IF 213	30	30	31
Northwestern Central Posts					
Position	SU	IF	Length (cm)	Width (cm)	Depth (cm)
L2/R1	SE 68	IF 155	55	51	20
L2/R2	SE 75	IF 156	22	20	8
L2/R3	SE 74	IF 157	67	60	18
L2/R4	SE 59	IF 158	60	60	50
L2/R4	SE 127		22	22	15
L2/R5	SE 88	IF 159	45	45	18
L2/R5	SE 128		23	28	10
L2/R6	SE 89	IF 160	52	42	23
L2/R6	SE 132		20	17	14.5
L2/R7	SE 110	IF 161	71	39	14
L2/R8	SE 211	IF 212	62	61	46
L2/R8	SE 44		35	38	40
L2/R9	SE 49	IF 214	48	45	5
L2/R9	SE 045		54	50	5
Central Posts					
Position	SU	IF	Length (cm)	Width (cm)	Depth (cm)
L3/R1	SE 69	IF 162	55	55	25
L3/R2	SE 206	IF 165	45	34	27
L3/R2	SE 76		45	35	13
L3/R3	SE 78	IF 167	55	50	27
L3/R3	SE 124		25	20	9
L3–4/R3–4	SE 84	IF 168	93	86	37
L3/R4	SE 102	IF 169	80	55	60
L3/R4	SE 126		57	54	30
L3/R5	SE 87	IF 170	70	67	25
L3/R6	SE 57		65	50	28
L3/R6	SE 134		20	27	40
L3/R6	SE 183	IF 171	40	35	40
L3–4/R6	SE 104	IF 175	63	58	18
L3–4/R6	SE 139		25	25	10
L3/R7	SE 108	IF 172	49	45	28
L3/R8	SE 109	IF 180	47	43	16
Southeastern Central Posts					
Position	SU	IF	Length (cm)	Width (cm)	Depth (cm)
L4/R1	SE 121	IF 163	29	25	15
L4/R1–2	SE 190		40	40	20
L4/R2	SE 77	IF 164	50	20	20
L4/R3	SE 125	IF 166	31	28	20
L4/R3	SE 79		60	51	16
L4/R4	SE 86	IF 173	20	20	20
L4/R4	SE 210		45	20	5

L4/R4	SE 222		25	42	3
L4/R5	SE 103	IF 174	80	43	30
L4/R6	SE106	IF 176	82	56	17
L4/R7	SE 107	IF 177	55	55	15
L4/R8	SE 90	IF 179	90	67	21
Southeastern Wall					
Position	**SU**	**IF**	**Length (cm)**	**Width (cm)**	**Depth (cm)**
L5/R0	SE 185	IF 197	30	25	12
L5/R1	SE 191	IF 198	24	22	7
L5/R1–2	SE 186	IF 199	36	33	16
L5/R1–2	SE 187	IF 200	30	30	9
L5/R1–2	SE 188	IF 201	26	25	9
L5/R2	SE 189	IF 202	47	40	12
L5/R3	SE 242	IF 235	61	58	26
L5/R3	SE 234		40	40	25
L5/R3–4	SE 192		43	52	20
L5/R4	SE 237	IF 266	60	38	11
L5/R5–6	SE 232	IF 239	40	30	10
L5/R6	SE 231	IF 267	30	20	11
L5/R6–7	SE 193	IF 228	56	55	22
L5/R8	SE 91	IF 178	35	40	0

Tab. 1. Dimensions of the postholes from Linear Pottery House 1, organised according to their position in the lines of posts L1–L5. The table presents the name of the stratigraphic unit (SU), special surfaces (IF), and the measurements of each post (length, width, and depth in cm).

its surroundings due to its dark grey to black colour and loamy texture (Figs. 25–27).

The homogeneous material of the backfill contained numerous inclusions of charcoal, burnt clay and heavily weathered pottery. In the southern part of the pit, the remains of an already heavily destroyed kiln were found (SU 96, SU 221, SU 225). The pit was interpreted as a working area for the kiln, which originally had a dome-shaped cover and was constructed against the pit's wall. The pit was later used as a rubbish pit (SU 6, SU 19, SU 28, SU 38). The stratigraphically youngest deposits were found over the entire surface of the pit and showed a high concentration of sherds. The artefacts in the various backfills were relatively homogeneous and for the most part heavily weathered. Due to the very

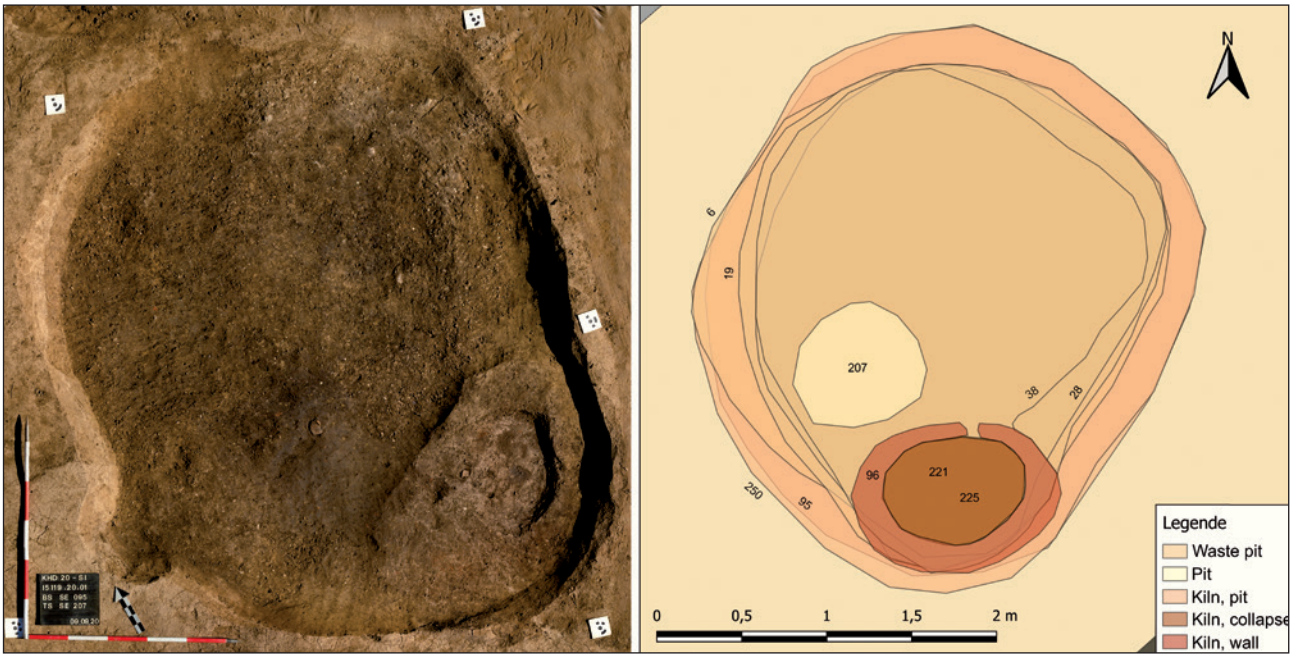


Fig. 25. Overview of the stratigraphic units in the area of the furnace pit (Photo and graphics: I. Kowatschek).



Fig. 26. The feature after removal of the collapsed remains in the interior of the kiln (SU 221, SU 225). The ring-shaped compact kiln wall (SU 96) was erected on the south wall of the pit (Photos: I. Kowatschek).

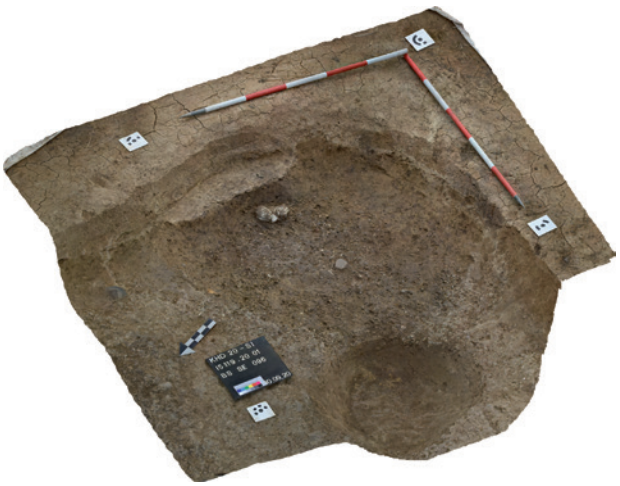


Fig. 27. Overview of the kiln pit after the removal of the features SU 96, SU 207 belonging to the kiln (3D model and graphics: I. Kowatschek)

homogeneous deposits interspersed with numerous finds, it can be assumed that there were different phases of utilisation in quick succession.

The majority of the sherds date to the Middle Neolithic Lengyel period, including some pieces with knobs, a miniature vessel decorated with incised lines and the foot and base of a low footed bowl (see Fig. 50). There were also some flint implements, two grinding plates and heavily weathered pieces of calcined bone. The oval-shaped kiln showed a high concentration of reddish material and burnt clay inclusions along the original kiln wall (SU 96). The ring-shaped outer wall enclosed a much looser backfilled area containing the collapsed remains of the kiln, which were too fragile to be recovered. The dark brown to reddish-black earthen material of the backfill (SU 221, SU 225) contained a large quantity of oxidising fired ceramic inclusions, as well as a fragment of Lengyel period pottery and a flint flake. The kiln measured 90 × 70 cm and was preserved with a height of approx. 15 cm. Directly in front of the kiln and partly below it, a deposit with a diameter of 80 cm and a depth of 20 cm was documented. This pit (SU 207) was much more interspersed with pieces of charcoal and the weathered remains of pottery sherds. Due to its location, the pit was probably associated with the kiln, possibly serving to fire the kiln or to facilitate the disposal of charcoal and ash after the firing process.

To the southeast of the Lengyel period pit and kiln, further large deposits were investigated during the excavation. These were already recognised in the magnetic prospection data as a series of oval anomalies in a coherent ditch structure (Fig. 28). During the excavation, this area could be divided into two larger pits with dimensions of 3.4 × 2.5 m (SU 14) and 2.7 × 2.1 m (SU 64) and a 7.5 m-long ditch (SU 9, SU 54) with further smaller pits (SU 15, SU 24, SU 26, SU 52, SU 223, SU 224, SU 236, SU 245, SU 251).

The southernmost pit (SU 14) was extremely rich in finds and contained numerous flint and pottery sherds, most of which can be dated to the Lengyel period. Within the pit, the shallow remains of a stratigraphically older pit, possibly a posthole, measuring 60 × 30 cm were identified (SU 122). In contrast to the more recent backfilling of the larger pit, no finds were uncovered here. The pit can probably be seen in connection with the similarly dimensioned Lengyel period oven pit to the north, which is also rich in

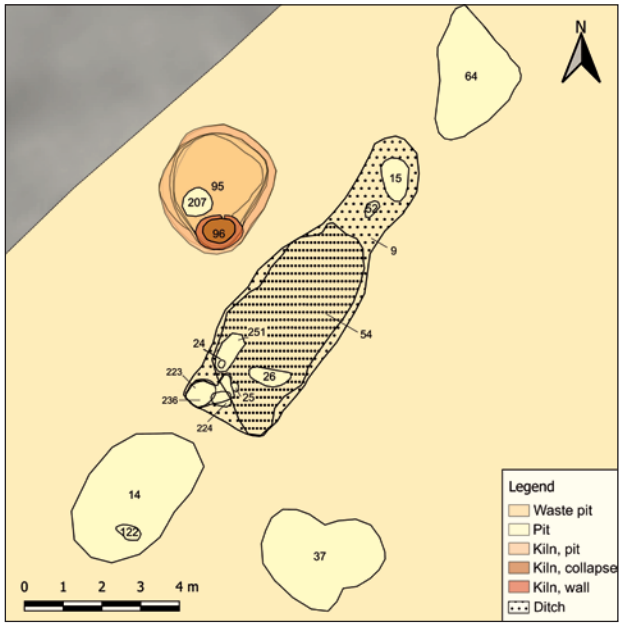


Fig. 28. Overview of the archaeological structures north of House 1 (Graphics: I. Kowatschek).

finds, while the posthole within it could also date from an earlier settlement phase.

Within the 7.5 m-long and 2 m-wide ditch (SU 9), a number of other stratigraphically younger deposits were identified, that were dug into the bottom of the ditch. These almost circular pits measure 30 cm, 40 cm and 3 m in diameter and are preserved to a maximum depth of 15 cm. Two other pits had dimensions of around 50 × 30 cm, but only contained small, heavily weathered pottery sherds that could not be identified more precisely. In the southern part of the ditch there were repeated areas of very reddish soil and a high proportion of burnt clay. The deposit measured 120 × 70 × 10 cm. Based on the material found during the excavation, it was interpreted as another collapsed kiln. From the ditch, which appeared as a light greyish-yellow area below these structures, several layers of sherds were recovered. Whether this ditch and the surrounding pits were originally part of a flanking linear ditch of another Linear Pottery house cannot be determined due to the lack of other distinct features in the immediate vicinity. As the ditch is aligned with the centre post of Linear Pottery House 1, the possibility that the ditch itself is connected to this house can be ruled out. No further assumptions can be made about the dating or construction process due to the lack of significant finds from the ditch.

4.3. House 2

Orientation: NNE–SSW
Excavated length: 4.3 m (NW) and 7.2 m (SE)
Excavated width: 11.5 m

At the southeastern end of Trench 1, parts of another Linear Pottery house were examined (Fig. 29). The ground plan of House 2 had already been recognised in the magnetic prospection data and shows the remains of the linear flanking ditch, which had already been severely damaged by soil erosion at the northern end. The excavated part

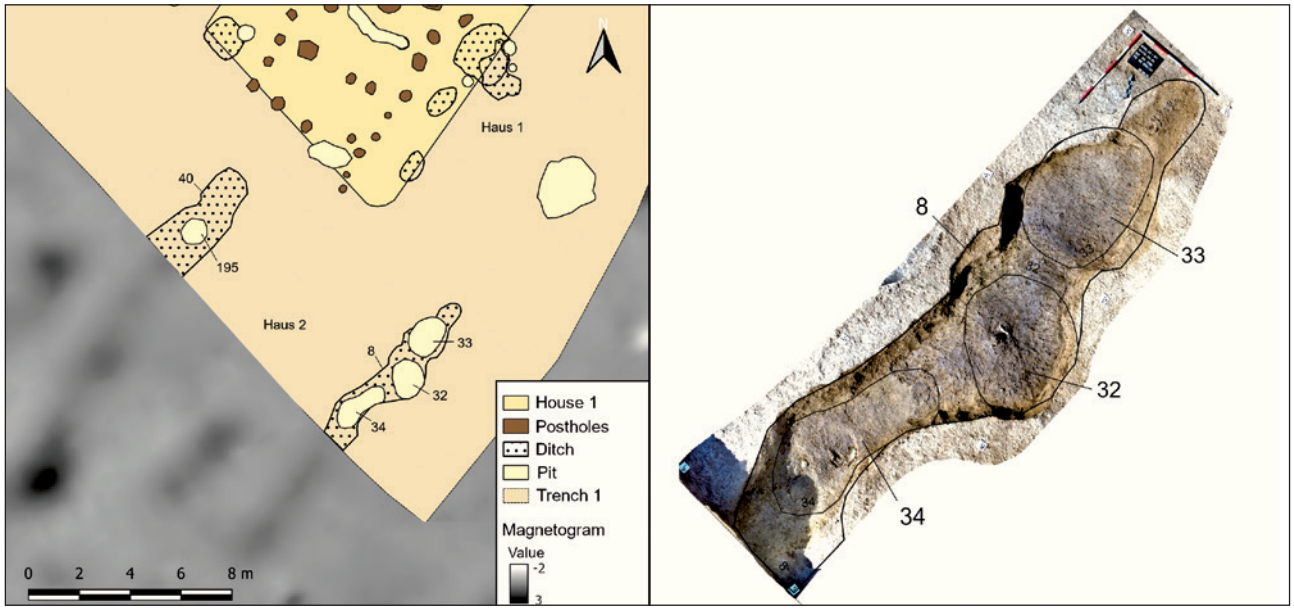


Fig. 29. Left: Overview of the stratigraphic units of House 2 in the southeast of the 2020 excavation trench. – Right: Orthophoto of linear trench SU 8 flanking the house (Photo and graphics: I. Kowatschek).



Fig. 30. Drone images of Excavation Trench 2 after removal of the topsoil and in the last week of excavation in 2021 (Photos: I. Kowatschek).

of the house was located at a distance of only three metres from House 1 and consisted of two approximately 5 m-long ditches running parallel to each other in a northeast-southwest direction beyond the southern edge of the trench. The stratigraphically youngest deposit within the ditches contained a similar loamy brownish fill material, which may have formed part of the browning horizon. Below the ditches were smaller, stratigraphically older pits.

4.3.1. Southeastern Flanking Ditch

The southeastern flanking ditch had an elongated shape with dimensions of 7.2 m in length and max. 1.5 m in width and shows a northeast-southwest orientation comparable to House 1. The magnetic prospection data indicate that the ditch extends a further 6 m to the southwest. The deposits within the ditch had a dark brown mottled colour and a silty-clay consistency. On the surface were some pottery sherds in nests, a grinding stone fragment and what we suppose to be polishing stones. The consistency became harder and denser towards the bottom, and the material was very blocky until the stratigraphically older deposits within the ditch came to light at a depth of around 30 cm (SU 8). The variation in colour and consistency combined with the similar composition of the material indicates that in contrast to those of the stratigraphically older pits, the different properties of SU 8 were caused by natural soil formation processes (brunification).

The three pits stood out very well due to their dark brown to black and very compact backfill material. The northernmost pit (SU 33) measured 1.8 metres in length, 1 metre in width and a considerable depth of 1.1 metres. A nest of black, very porous pottery with a reddish surface and small charcoal fragments was found in the backfill. To the south was another pit (SU 32), 1.4 m long and 1.2 m wide, which also contained several poorly preserved pottery sherds in the centre and southern part of the backfill. The third pit (SU 34) had an elongated oval shape measuring 2.2 m long, 0.7 m wide and 0.6 m deep. The very hard, compact backfill of the pit was intermixed with firing debris and relatively poorly preserved coarse sherds, which also showed secondary traces of firing.

4.3.2. Northwestern Flanking Ditch

The northwestern ditch of House 2, which was only shallowly preserved, contained a dark brown, clayey-silty deposit with numerous pieces of burnt daub, some pottery sherds and a grinding stone. The trench was 4.3 m long, 2 m

wide and about 30 cm deep. After the topsoil had been removed, the feature was mainly delimited by an increased number of finds on the surface. Within the ditch, near the southwest profile, was a very dark 1.2 × 1 m deposit, which contained no finds.

5. Excavation Trench 2, 2021

The trench excavated in the second year of the project was located in the northern part of the settlement near the Mistelbacher Wald and covered an area of approximately 250 m² (Fig. 30). For the new excavation, the ground plan of a house was chosen which was clearly visible on the magnetogram. At the beginning of the project, it was assumed that this house was covered by colluvium and that it would be much better preserved than the features investigated in the previous year. The initially postulated colluvium in the area further down the slope could not be confirmed by the excavation. The posts visible in the magnetic survey had also already been affected by ploughing, as evidenced by plough marks in the postholes during excavation in 2021. It can therefore be assumed that the prospected houses for which no clear postholes are visible in the magnetograms are in an even worse state of preservation. On the basis of the results of the magnetic prospection, the excavation trench could be laid out precisely in the southeastern half of the preserved house. The excavation was again carried out as a four-week research and teaching excavation by the LBI ArchPro and the Institute of Prehistory and Historical Archaeology (University of Vienna) in the period from 16 August to 10 September 2021.

After the topsoil had been removed, some dark, oval to round deposits were already visible in the centre of the excavation trench. These were attributed to the Linear Pottery postholes and pits of House 3. In the interior of House 3, a total of 69 postholes were examined, which were preserved to an average depth of 22 cm. The features were divided into different investigation areas according to their position within the house floor plan: a northwestern and southeastern outer area with the postholes of the walls (L1, L5) and the remains of the flanking ditches, as well as an inner area with three central post rows (L2–L4). In the following description, the deposits are described according to this division from south to north (L1/R0–L5/R8), followed by a description of the surrounding pits. The description of the ground plan with orthophotos of particularly important or interesting features is followed by a table showing the dimensions of the individual pits (Figs. 31–32 and Tab. 2).

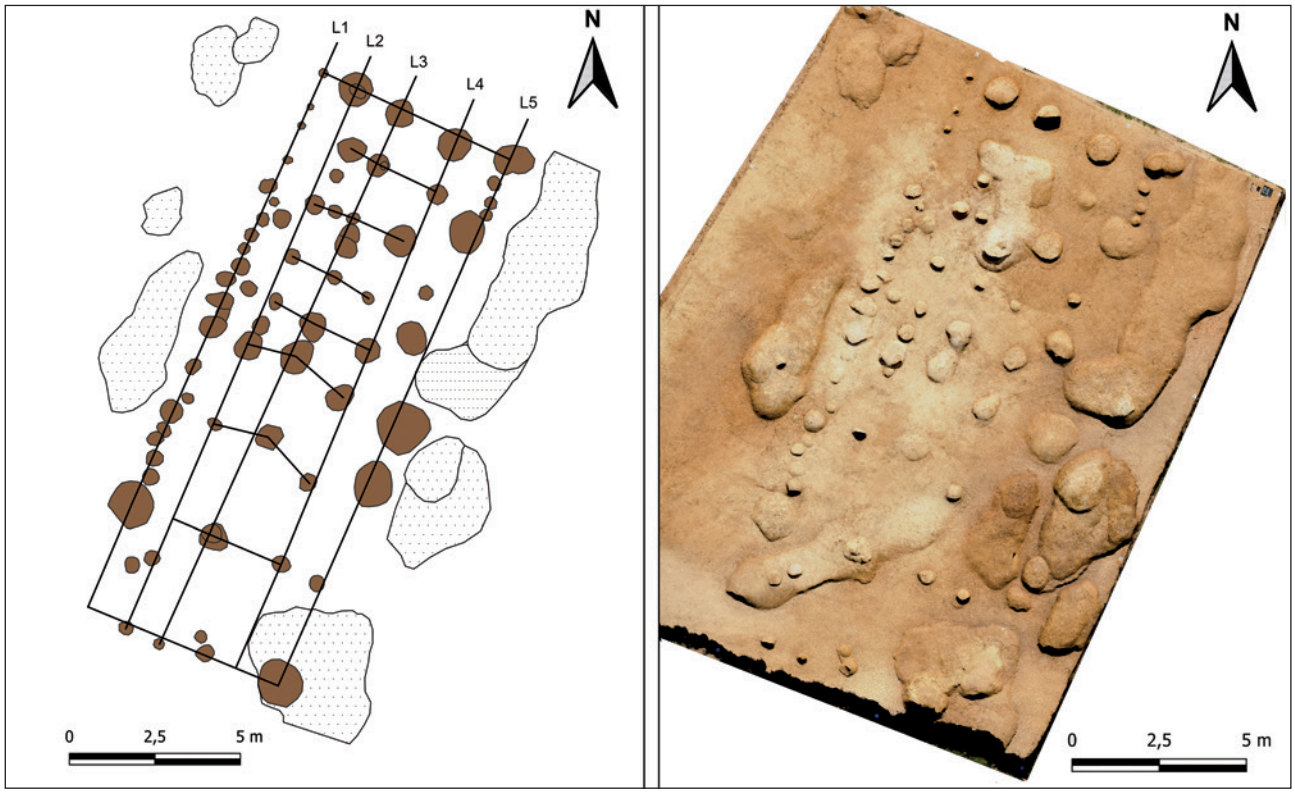


Fig. 31. Reconstruction and orthophoto of House 3 (Graphic and photo: I. Kowatschek).

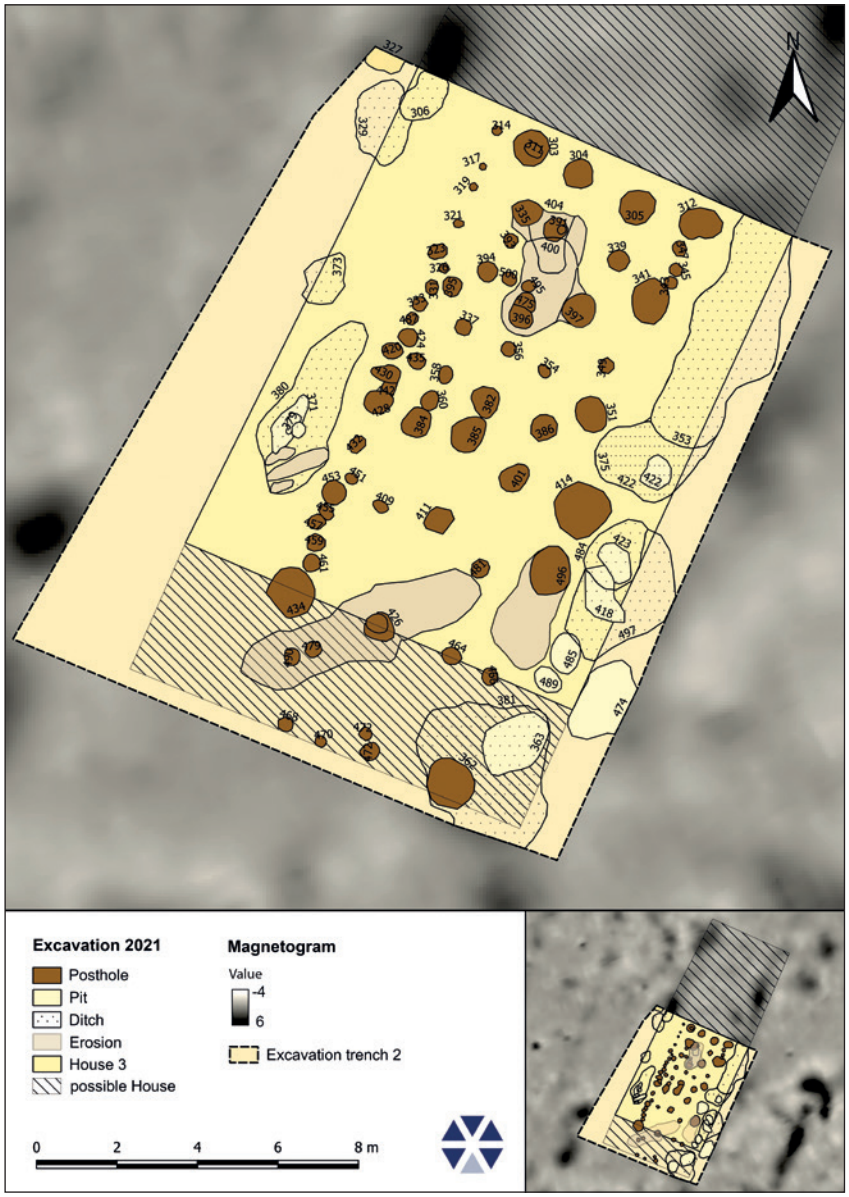


Fig. 32. Overview of the stratigraphic units of the Linear Pottery House 3 in Trench 2, 2021 (Graphics: I. Kowatschek).

5.1. House 3

House type: Large LBK house of Type 1c[72]
Orientation: NNE–SSW
Total length (excavation): 13.7 m – max. 17 m (L2–L4)
Total length (prospection): 25 m – max. 29 m (L2–L4)
Overall width: 5.7 m (S) – 6 m (N)
Postholes: 69
Inner area (excavation): 81 to max. 100 m²
Cross-row spacing: 2.15 m

5.1.1. Northwestern Wall

From the northwest wall (Fig. 33), 23 approximately circular postholes (L1/R1–L1/R8) were investigated, running in a northeast-southwest direction. They were located at a distance of 0.4–1.3 m from each other and were set much closer together than observed in House 1. The postholes, with an average depth of 18.2 cm, were found to be relatively shallow, and their homogeneous fills differed only marginally in colour from the surrounding geological material. No artefacts were recovered within the postholes; only small pieces of charcoal and burnt daub were found. The majority of the postholes exhibited a diameter measurement ranging from 15 to 55 cm; however, those located within the central

72 Terminology according to Modderman 1972. – Lenneis 2017a, 75.



Fig. 33. The shallow postholes SU 451, SU 453, SU 455, SU 459, SU 461 on the southwestern wall (Photo: I. Kowatschek).



Fig. 34. Cross-section of posthole L2/R8 with SU 311, SU 303 (3D model and graphics: I. Kowatschek, LBI ArchPro).

post rows demonstrated significantly larger diameters, ranging from 49 to 123 cm. Furthermore, these postholes were found to contain dark brown to black fills and were found to be deeper than the wall posts.

5.1.2. Northwestern Central Posts

The second row of eleven postholes was identified at a distance of approximately 1.4 m from the posts of the northwestern wall. The orientation of these posts is aligned in a northeast-southwest direction, spaced at a distance ranging from 0.9 to 2.5 m. The pits were found to have larger dimensions with diameters of 40–98 cm. The most massive posts were observed along the cross-rows R3, R7 and R8. The deposits appeared almost circular and differed more clearly in colour from the surrounding geological material. Within the northernmost posthole (L2/R8, Fig. 34), two deposits (SU 303, SU 311) were identified, exhibiting distinct variations in the composition and colour of the sediment. The darker deposits observed within some postholes were identified as the remains of the original posts. With a depth of 15 to 41 cm, the individual postholes were generally better preserved than those of the northwestern wall. The profiles of the pits showed a steeply sloping to vertical wall and a flat base, in most cases with a rounded transition. Small pieces of charcoal and burnt daub were repeatedly found in the backfills, but again, no artefacts were recovered.

5.1.3. Central Posts

The central posts run parallel to the above-mentioned row at a distance of around 1.3 m, and this row also consists of eleven postholes (Fig. 35). The pits, which are roughly circular in shape, have a diameter of 25–100 cm and are spaced 0.8–3.4 m apart. The postholes exhibited an average depth of 27 cm, which was significantly deeper than the surrounding pits. This can be attributed to the load-bearing function of the central posts. In two postholes (L3/R1 and L3/R7) two deposits were identified (SU 476/SU 426 and SU 391/SU 494). The profile of the postholes can again be described as cauldron shaped with almost vertical walls and a flat base. The posts L3/R3 and L3/R4 (SU 385 and SU 382) were set close together in an elongated pit, with the southern of the two posts having a larger diameter and possibly representing the main load-bearing post. In the southern part of the house (L2/R0 to L4/R3) and between the central posts SU 356 and SU 304, massive erosion damage can be seen. Consequently, it was challenging to determine the dimensions of the

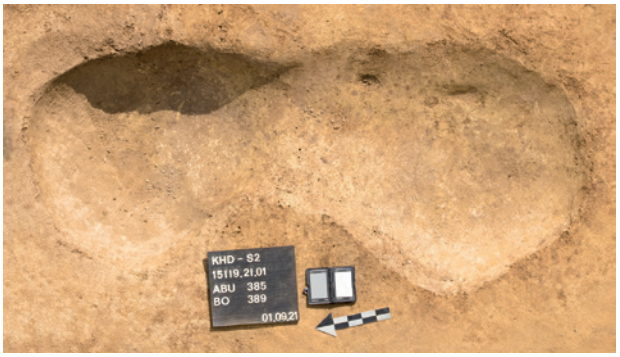


Fig. 35. The multiple postholes SU 382 and SU 385 in the row of posts that supported the ridgepole (Photo: I. Kowatschek).



Fig. 36. Horizontal double handle from the younger LBK from SU 401 (Photo: H. Adelwöhrer).

individual ridge-bearing posts in the northern sector, and the precise course of the southern end of the house could only be vaguely reconstructed.

5.1.4. Southeastern Central Posts

The southeastern central row with eight excavated postholes traces its course at a distance of around 1.6 m from the central posts. In this row, only four of the postholes are orientated along the reconstructed line of the central posts; the remaining postholes deviate from it. In the second, third, fifth and sixth cross-rows, the pits are slightly offset, while the final posthole in the south is missing. The diameter of the postholes was between 20 and 96 cm, whereby the three larger pits were located in the area of cross-rows R3, R6 and R8. With an average depth of 18.8 cm, the postholes of the southeastern central row were comparably poorly preserved and showed no traces of the original post position.

A horizontal double handle of the younger Linear Pottery period was found within the approx. 22 cm-deep posthole SU 401 (Figs. 36, 55). SU 481 contained small fragments of pottery and calcined bone fragments, while only isolated charcoal and burnt daub were found in the other pits.

5.1.5. Southeastern Wall

The southeastern wall of House 3 was located at a distance of around 1.6 m from the almost parallel central posts. The small and closely spaced posts typical of Linear Pottery houses were only preserved at the northern end of the trench. However, the wall showed an unusually large number of massive postholes, with a diameter exceeding one metre at the location of the cross-rows. It was observed on multiple occasions during the excavation that there may have been several smaller postholes in the area of these large but shallow deposits. However, these could no longer be separated stratigraphically due to the poor preservation and the mixed, homogeneous character of the individual backfills. This applies in particular to the posts between the cross-rows R1 and R3, which were just visible as three to five



Fig. 37. Remains of the small pot FNo. 1121 in situ and as a 3D model (Photo and 3D model: I. Kowatschek).

deposits, yet could not be accurately distinguished due to the considerable brunification. The observed interruption of the outer wall in this area can therefore be explained by the poor preservation of the posts in this area. This should not be interpreted as evidence of a possible entrance (erosion south of SU 496).

After the topsoil had been removed, a concentration of pottery sherds was found in the area of the southeastern corner of the house, near pit SU 362. The find situation was documented, but most of the fragments were already in too poor a state of preservation to be recovered. The small bowl with a partially intact handle had a diameter of approximately 15 cm; however the rim and base of the vessel were not preserved (Fig. 37).

5.1.6. Southeastern Flanking Ditch

The flanking ditch on the southeastern side of House 3 was discovered as a series of pits of varying dimensions

Linear Pottery House 3 – Postholes					
Northwestern Wall					
Position	SU	IF	Length (cm)	Width (cm)	Depth (cm)
L1/R1	SE 434	IF 444	123	120	27
L1/R1–2	SE 461	IF 462	47	43	35
L1/R1–2	SE 459	IF 460	53	46	8
L1/R1–2	SE 457	IF 458	38	38	8
L1/R1–2	SE 455	IF 456	44	30	7
L1/R2	SE 453	IF 454	65	63	19
L1/R2–3	SE 451	IF 452	26	21	9
L1/R2–3	SE 432	IF 433	53	40	11
L1/R3	SE 428	IF 429	74	66	30
L1/R3	SE 442	IF 443	32	27	15
L1/R3–4	SE 430	IF 431	79	53	45
L1/R4	SE 420	IF 421	60	45	46
L1/R4–5	SE 424	IF 425	45	30	6
L1/R4–5	SE 487	IF 488	20	20	15
L1/R5	SE 333	IF 334	25	25	20
L1/R5–6	SE 331	IF 332	20	20	14
L1–L2/R5–6	SE 395	IF 398	55	55	11
L1/R5–6	SE 325	IF 326	15	15	14
L1/R6	SE 323	IF 324	49	45	14
L1/R6–7	SE 321	IF 322	15	15	11
L1/R7	SE 319	IF 320	20	20	16
L1/R7–8	SE 317	IF 318	15	15	17
L1/R8	SE 314	IF 315	24	24	20
Northwestern Central Posts					
Position	SU	IF	Length (cm)	Width (cm)	Depth (cm)
L2/R0	SE 468	IF 469	44	38	25
L2/R0–1	SE 479	IF 480	44	42	17
L2/R2	SE 409	IF 410	48	36	41
L2/R3	SE 384	IF 388	83	70	30
L2/R3–4	SE 360	IF 361	57	40	15
L2/R4	SE 358	IF 359	50	39	15
L2/R5	SE 337	IF 338	40	40	15
L2/R6	SE 394	IF 403	55	54	27
L2/R6–7	SE 393	IF 483	40	40	20
L2/R7	SE 335	IF 336	82	71	15
L2/R8	SE 303	IF 307	98	93	24
L2/R8	SE 311		56	34	11
Central Posts					
Position	SU	IF	Length (cm)	Width (cm)	Depth (cm)
L3/R0	SE 470	IF 471	30	29	25
L3/R1	SE 476	IF 477	61	52	40
L3/R1	SE 426		85	77	28
L3/R2	SE 411	IF 412	80	75	10
L3/R3	SE 385	IF 389	100	87	23
L3/R4	SE 382	IF 383	75	70	29

L3/R5	SE 356	IF 357	55	50	21
L3/R5–6	SE 396	IF 439	68	58	40
L3/R5–6	SE 475	IF 478	56	42	37
L3/R6	SE 495	IF 399	43	34	17
L3/R7	SE 391	IF 399	67	64	15
L3/R7	SE 494	IF 399	25	24	21
L3/R8	SE 304	IF 308	82	80	48
Southeastern Central Posts					
Position	**SU**	**IF**	**Length (cm)**	**Width (cm)**	**Depth (cm)**
L4/R1	SE 464	IF 465	64	50	12
L4/R2	SE 481	If 482	48	52	20
L4/R3	SE 401	IF 402	87	68	22
L4/R4	SE 386	IF 390	75	70	20
L4/R5	SE 354	IF 355	20	20	15
L4/R6	SE 397	IF 438	94	86	27
L4/R7	SE 339	IF 340	55	56	12
L4/R8	SE 305	IF 309	96	94	22
Southeastern Wall					
Position	**SU**	**IF**	**Length (cm)**	**Width (cm)**	**Depth (cm)**
L5/R0	SE 362	IF 377	130	125	40
L5/R1	SE 466	IF 467	46	42	21
L5/R2	SE 496	IF 502	138	115	30
L5/R3	SE 414	IF 419	140	138	27
L5/R5	SE 351	IF 352	95	85	31
L5/R5–6	SE 349	IF 350	40	40	20
L5/R7	SE 341	IF 342	122	100	20
L5/R7–8	SE 343	IF 344	35	31	15
L5/R7–8	SE 345	IF 346	36	32	12
L5/R7–8	SE 347	IF 348	39	37	13
L5/R8	SE 312	IF 313	100	80	30

Tab. 2. Dimensions of the postholes from Linear Pottery House 3, organised according to their position in the lines of posts L1–L5. The table presents the name of the stratigraphic unit (SU), special surfaces (IF), and the measurements of each post (length, width, and depth in cm).

(Fig. 38). These pits were found to be arranged in a close row, with only minor spacing of approximately 30–50 cm between them and the surrounding (post) pits. The most massive pit (SU 353, SU 375) was located in the northeast and accompanied the outer wall over a length of 8.2 m. The magnetogram shows that this longitudinal pit extends beyond the northern edge of the trench and is probably twice as long. In the excavated area the pit was 2.5 m wide and had a maximum depth of 50 cm. The homogeneous deposit was dark brown to black in colour and contained heavily decomposed pottery sherds and two fragments of grinding plates.

To the south of this, a further longitudinal pit was discovered, measuring 4.3 m in length and 2.5 m in width. This pit contained multiple deposits and extended beyond the eastern border of the trench (SU 497, Fig. 39). In the northern area of the pit, in an elongated oval area of around 2 × 0.9 m, a high concentration of artefacts was already evident after the removal of the topsoil (SU 418, SU 484).

The black material of the deposit was discovered beneath a layer of river pebbles, some of which showed clear signs of severe heat damage and fragmentation. The deposit contained pottery sherds, flint, charcoal and burnt daub, as well as a grinding stone, calcined bones and fragments of animal teeth. The magnetogram revealed a large, strong magnetic anomaly in this area, originating from these high temperature-influenced deposits. The deposit could be distinguished from a dark brown-reddish material (SU 423) with numerous burnt daub inclusions, which contained isolated ceramic fragments, bone splinters and charcoal. The pit had a maximum depth of 60 cm in the northwestern area. Fragments of Music Note ceramics with the typical decorative elements were found in the northern deposits of the pit. The small wall fragments probably originate from bowls and show remnants of the music-note design and knobs. In addition to numerous wall fragments, nine different handles and handle fragments were also found (see Fig. 55). At the southern edge of the longitudinal pit another pit comparable to the neighbouring postholes (SU 485) was

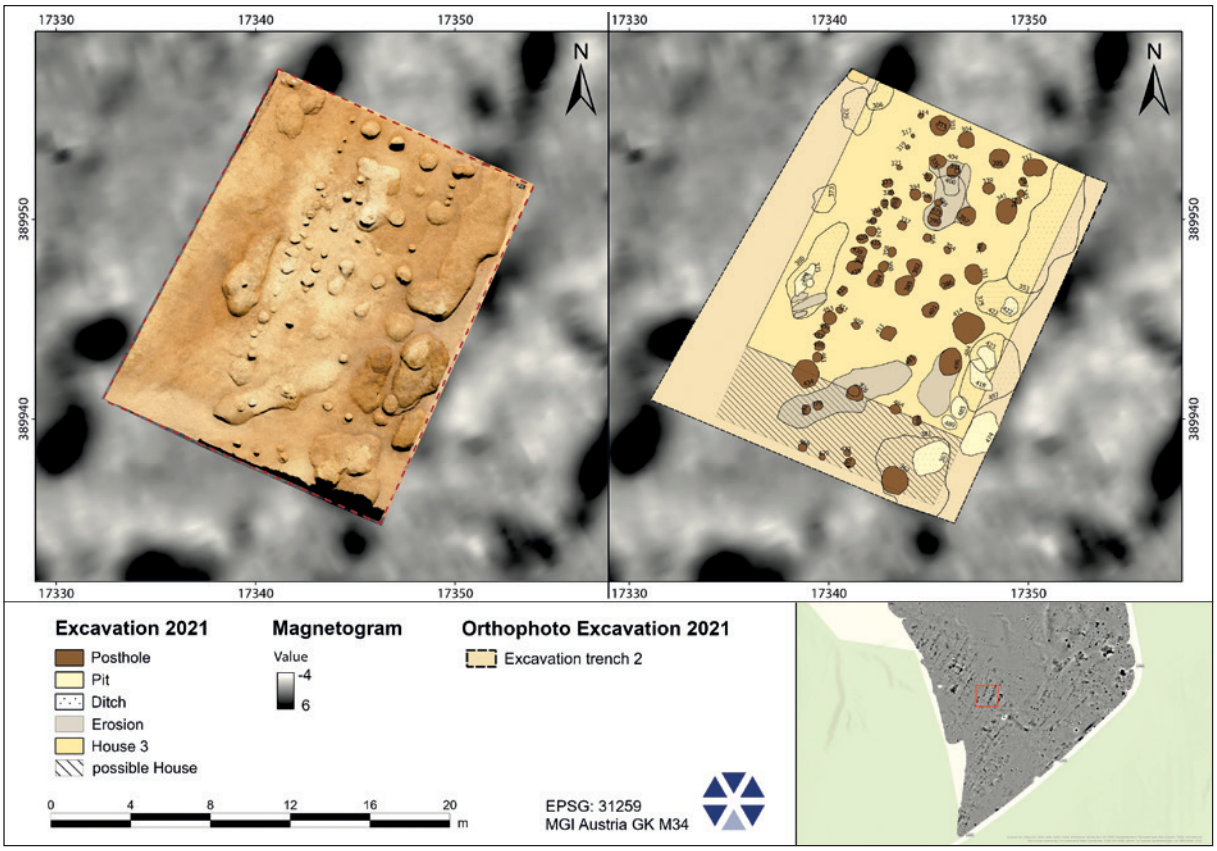


Fig. 38. Orthophoto and results of the 2021 excavation (Photo and graphics: I. Kowatschek).



excavated, but it did not contain any artefacts. Two neighbouring pits (SU 474, SU 489), which were distinguished from the surrounding material by a dark backfill and some pottery sherds and bone finds, also probably belonged to the longitudinal pit. A grinding stone was also found in the elongated SU 474.

The end of the linear ditch and two (post) pits are located approximately half a metre further south (SU 381, SU 362, SU 363, Fig. 40). This area was already visible in the magnetogram due to its increased magnetisation. It was particularly clear after the removal of the topsoil, both in the magnetic susceptibility measurements and with the naked eye. The two smaller pits had a diameter of around 1.2 m and were filled with dark brown to black material, burnt clay and numerous poorly preserved pottery fragments. While the deposits were very clearly distinguishable from the surrounding material during the excavation, the dimensions of the original flanking ditch, and thus the

Fig. 39. Excavation situation of SU 423, SU 484, SU 485 and SU 497 in one of the southeastern flanking pits of House 3 (Photos: I. Kowatschek).



Fig. 40. Pit complex SU 381, SU 362 and SU 363 at the southern edge of Trench 2 (Photos: I. Kowatschek).

stratigraphic relationships of the deposits, could not be precisely recorded.

5.1.7. Western Flanking Ditch

The oval pits of the western flanking ditch follow the outer wall at a distance of 0.6–1.4 m and are thus also orientated northeast-southwest. Due to the dark colour of the deposits, the individual pits were already clearly recognisable after the topsoil was removed. The northwesternmost pits (SU 306, SU 327 and SU 329) extended beyond the northern edge of the trench and were probably an approximately 3 m-long section of the ditch. The magnetogram shows a 5.5 m-long anomaly here, which indicates high magnetic deposits. The pits are preserved to a depth of about 40 cm in the deepest areas and show dark, compact fills with occasional inclusions of burnt daub and charcoal. A further oval pit (SU 373), whose deposit was also dark and clayey, was located around 2.6 m away. None of the four pits contained any artefacts. An anomaly measuring 2.4 × 1 m that was clearly visible in the magnetogram should be located between these pits, but was not detected during the excavation. This suggests that these were structures located entirely within the agricultural layer.



Fig. 41. Excavation situation of the northwestern flanking ditch SU 380 (Photos: I. Kowatschek).

The following longitudinal pit (SU 372, SU 380, Fig. 41) was disturbed in the upper 10 cm by recent plough marks, which could be observed at this height in the entire excavation trench. The pit had a length of around 5 m and a maximum width of 2.1 m. Particularly in the north and south of the pit, alternating very dark and reddish-orange deposits interspersed with charcoal and large pieces of burnt daub were found. The burnt components of the clayey backfill of the pit appear as strong magnetic anomalies in the magnetogram and possibly originate from a burnt, collapsed wall. In the centre, a small pit with a diameter of approx. 40 cm was found (SU 406), the surface of which contained a lump of clay of roughly the same dimensions and a large quantity of charcoal. The very compact deposit of the longitudinal pit contained pottery sherds with music-note decoration and knobs, as well as an unusually large number of poorly preserved bone fragments.

6. The Linear Pottery Houses of Kleinhadersdorf-Marchleiten

The results of the magnetic survey allowed a detailed investigation of selected settlement areas through archaeological excavation. For this purpose, two Linear Pottery houses at different locations in the settlement were selected for further investigation. The magnetogram showed

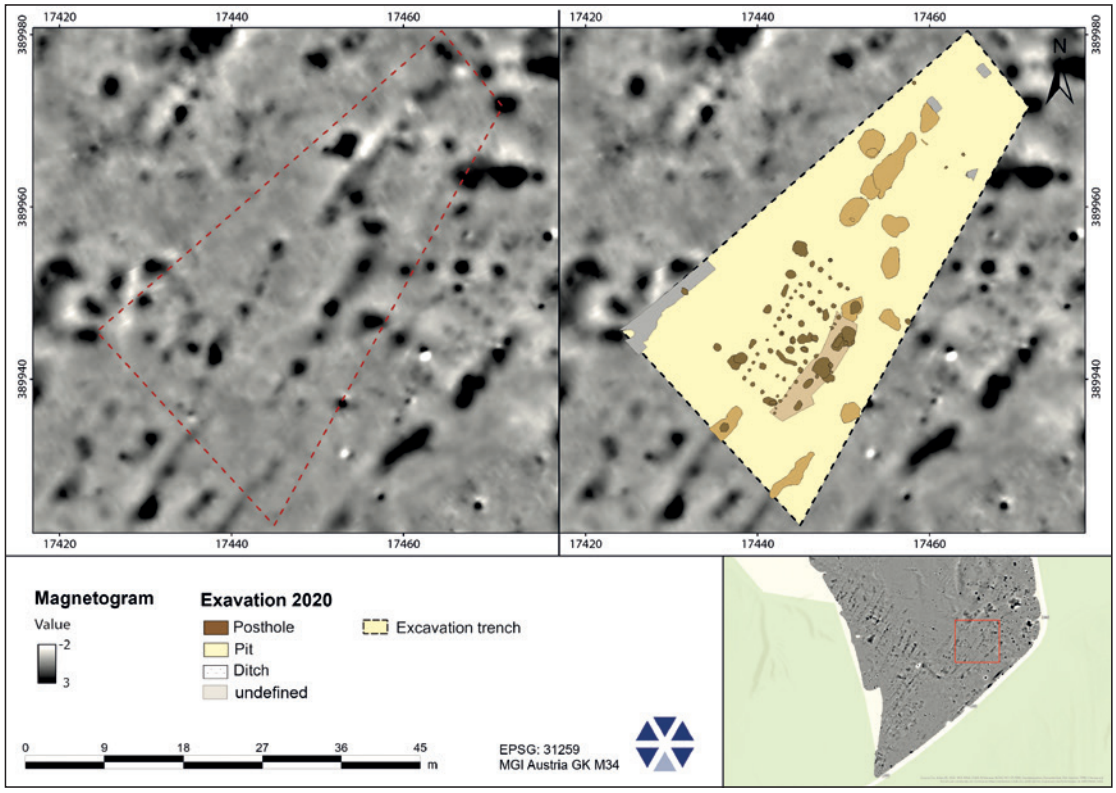


Fig. 42. Comparison of the magnetogram and the excavated deposits of House 1, 2020 (GIS and graphics: L. Aldrian, I. Kowatschek, LBI ArchPro).

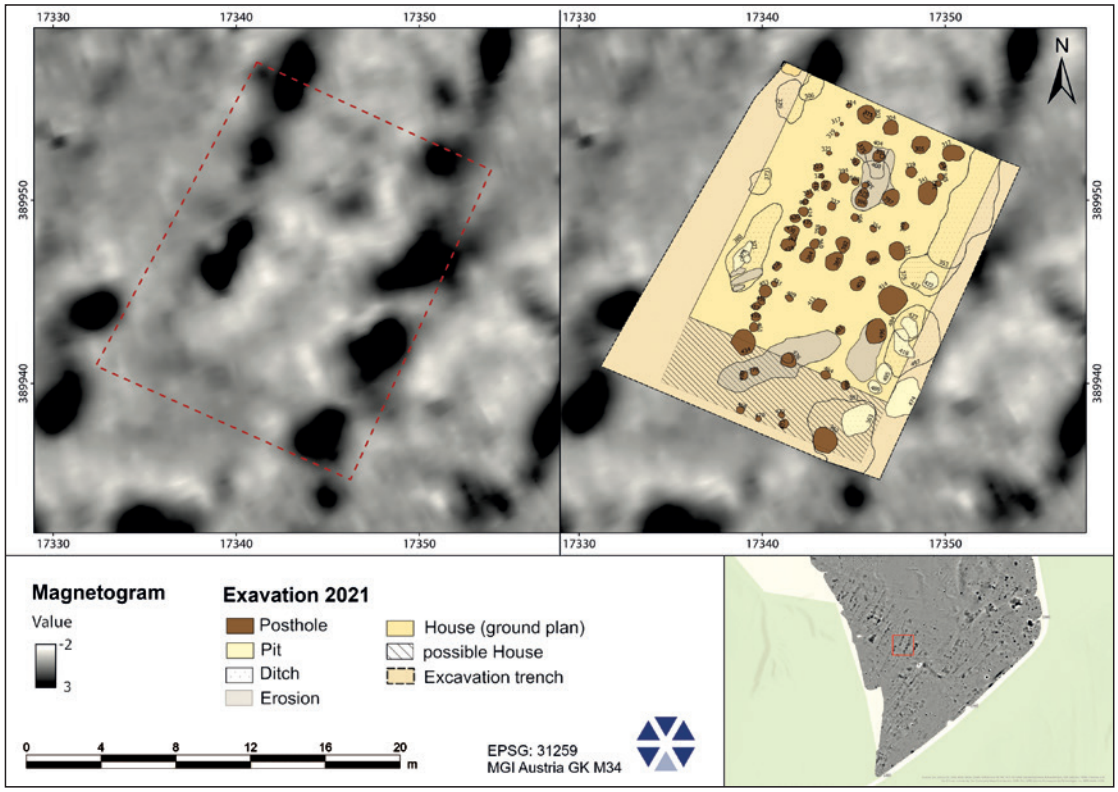


Fig. 43. Comparison of the results of the magnetic prospection and excavation in the area of House 3 (GIS and graphics: L. Aldrian, I. Kowatschek, LBI ArchPro).

in particular the strong magnetic anomalies of the linear ditches flanking the individual houses, making it relatively easy to determine the location and extent of the buildings. In the case of Trench 1 (2020), the magnetogram also showed some of the postholes between the ditches, and thus the main features of a typical Linear Pottery house construction (Fig. 42). In contrast to these clear results, the postholes inside Trench 2 (2021) were only weakly or barely reflected in the data (Fig. 43). The magnetic survey had already suggested the poor state of preservation of the settlement, especially in the topographically highest area of the site. Unfortunately, this was confirmed by the excavations.

During the two four-week research and teaching excavations, a total settlement area of approx. 1351 m² was archaeologically investigated, and numerous Neolithic structures were uncovered. In Trench 1, the Linear Pottery House 1 could be excavated in its entirety, while in Trench 2 only the southeastern half of House 3 was investigated. In addition to numerous settlement pits around these buildings, parts of two further linear ditches were excavated in Trench 1. According to the interpretation of the magnetic survey, these belong to another Linear Pottery house (House 2). Surprisingly, features from the Lengyel Culture were also investigated within Trench 1. These include a large pit to the north of House 1, in which the 1.2 × 0.8 m remains of a collapsed domed kiln were documented.

During the course of the archaeological excavations, it was repeatedly observed that the interpretation of the magnetic survey corresponded very well with the archaeological structures uncovered. The results of the magnetic susceptibility survey after the removal of the plough horizon in both trenches provided more detailed information and were able to provide additional clues, especially in the case of the shallowly preserved pits. The measurements were generally very rewarding for refining the results of the preliminary geophysical investigation.

6.1. Early Neolithic House Constructions

Typical of Linear Pottery buildings is the long rectangular plan, which in the case of the largest longhouses can be up to 50 m long. The most frequently observed houses in Lower Austria correspond to medium-sized buildings with a length of 10–30 m.[73] The characteristic house construction consists of three parallel rows of thick posts supporting the roof in the centre and two more parallel rows of thinner and more closely spaced posts for the outer walls. The walls were made of closely spaced posts interlaced with wattle and daub. Evidence of this construction type was also found during the excavation in Kleinhadersdorf-Marchleiten in the form of burnt daub, some of it with the imprints of the timbers. The largest quantities were found in the long pits running along either side of the excavated houses. These deposits may have been the result of a fire that caused part of the wattle and daub wall to collapse into, or be disposed of in, the adjacent ditches.

The Linear Pottery House 1 showed a total length of 15.4 m (W) to 16.2 m (E) and a width of 5.2 m (S) to 6 m (N). With an internal area of approx. 85 m², this medium-sized building type corresponds to the classic Linear Pottery buildings investigated in Lower Austria. A total of 53 postholes were examined during the excavation, which can be divided into three rows of centre posts with a massive diameter and two rows of smaller, more narrowly set wall post rows. The average depth of the deposits found during the excavation in Trench 1 was 18.8 cm in the case of the postholes and 35.8 cm for the linear ditches. The posts of the walls and the central rows of posts of House 1 are comparably poorly preserved, although the central posts were almost twice as large in diameter and set slightly deeper. The average depth of the postholes is 14.1 cm at the outer walls and 21.9 cm in the case of the central posts.

Furthermore, the presence of multiple deposits in 15 of the postholes suggests the potential for surviving post remains or indications of repairs. Due to the large number of excavated central postholes, it was possible to calculate a total of 21 cross-row spacings (Tab. 3). The mean distance between the posts within the central row is between 2.23 and 2.29 m. This suggests that the construction method of the house is comparable to that of the Linear Pottery houses in the Mold settlement near Horn. Here, the most common cross-row spacing is also 2.2 m, although 1.6 m or 2 m spacing was often chosen depending on the type of house.[74] The distances between the walls and the centre posts of House 1 were calculated on the basis of all 53 postholes. The mean distance between the walls (L1, L5) and the centre posts (L2–L4) was an average of 1.14 m, and the mean distance between the centre post rows was an average of 1.56 m.

The ground plan of the partially excavated House 3 revealed the typical post positions and associated pits of Linear Pottery longhouses, as evidenced by archaeological

73 Lenneis 2017a, 74–75.

74 Lenneis, Schwarzäugl 2019, 178.

Cross-Row Spacing House 1					
L2/R1–L2/R2	2.247	L3/R1–L3/R2	2.669	L4/R1–L4/R2	3.045
L2/R2–L2/R3	1.651	L3/R2–L3/R3	2.135	L4/R2–L4/R3	2.253
L2/R3–L2/R4	2.685	L3/R3–L3/R4	2.324	L4/R3–L4/R4	1.926
L2/R4–L2/R5	2.203	L3/R4–L3/R5	2.126	L4/R4–L4/R5	1.905
L2/R5–L2/R6	2.393	L3/R5–L3/R6	2.647	L4/R5–L4/R6	2.755
L2/R6–L2/R7	2.03	L3/R6–L3/R7	1.665	L4/R6–L4/R7	1.564
L2/R7–L2/R8	2.407	L3/R7–L3/R8	2.085	L4/R7–L4/R8	2.561
Median					
L2	2.231	L3	2.236	L4	2.287

Tab. 3. Cross-row spacing of House 1 (in m) based on a total of 21 postholes. These values correspond to the distributions shown in Boxplot Figure 44, left.

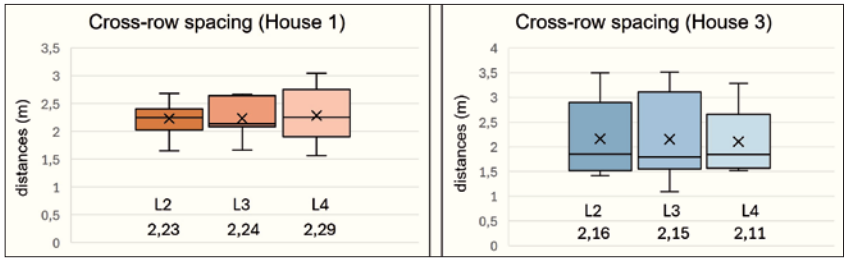


Fig. 44. Boxplots of cross-row spacing (in m) for House 1 (left) and House 3 (right). The plots show the distribution of distances for L2, L3, and L4 of the two Linear Pottery houses (Graphics: I. Kowatschek).

analogies of previously excavated buildings.[75] The excavated house comprised three rows of central posts and two rows of wall posts, with longitudinal pits originating from the linear ditch. The somewhat uncertain position of the southern gable wall means that the maximum length of House 3 can only be estimated. The length of the house within the excavation trench is 13.7 m, resulting in a total length of the house of 25 m, including the interpretation of the magnetogram. If the possible further cross-row R0 in the south is added, the excavated length is 17 m, and the maximum total length of the house 29 m. The original width of the house can be reconstructed at around 6–6.5 m. Comparable ground plans can be found in Mold near Horn, where the large buildings examined had preserved or reconstructed lengths of between 22 and 37.5 m and widths of 6–6.7 m. The internal cross-row spacing of the large buildings is 3.2–4.5 m, while the distances vary between 1.2 and 5.6 m. For House 3, a total of 24 cross-row spacings could be calculated, also including the southernmost cross-row, whose posts along the excavation trench possibly represent the end of the house. The distances vary greatly, as shown in Table 4. The mean value is between 2.11 m and 2.16 m, with the greatest distances being found in the southern part of the building. Based on all the postholes, the average distance between the outer walls and the centre posts was 1.48 m, and the average distance between the rows of centre posts was 1.57 m.

Another construction detail that is already known from the large buildings from Mold near Horn (House 1 and House 13) and the large building from Jetzelsdorf[76] is multiple posts in the southern part. This detail is described as an essential element of the large buildings up to the earliest phase of the Late Linear Pottery Culture.[77] The multiple post settings in House 3 in the area of L1/R3 (SU 428, SU 430, SU 442), L2/R3 (SU 360, SU 384) and L3/R3 (SU 382, SU 385) consist of two to three posts set close together or in an elongated pit (Fig. 46). In each case, the main load-bearing post can be assumed to be at the southern end due to the larger diameter.

75 Compilation by Lenneis 2017a, 74–81. – Lenneis, Schwarzäugl 2019.

76 Russ 2005, 753. – Lenneis, Schwarzäugl 2019, 162.

77 Modderman 1972.

Cross-Row Spacing House 3					
L2/R0–L2/R1	3.494	L3/R0–L3/R1	3.513	L4/R0–L4/R1	3.288
L2/R1–L2/R2	3.018	L3/R1–L3/R2	3.31	L4/R1–L4/R2	2.513
L2/R2–L2/R3	2.533	L3/R2–L3/R3	2.498	L4/R2–L4/R3	2.703
L2/R3–L2/R4	1.477	L3/R3–L3/R4	1.094	L4/R3–L4/R4	1.587
L2/R4–L2/R5	1.419	L3/R4–L3/R5	1.494	L4/R4–L4/R5	1.516
L2/R5–L2/R6	1.655	L3/R5–L3/R6	1.803	L4/R5–L4/R6	1.958
L2/R6–L2/R7	1.951	L3/R6–L3/R7	1.734	L4/R6–L4/R7	1.732
L2/R7–L2/R8	1.758	L3/R7–L3/R8	1.782	L4/R7–L4/R8	1.563
Median					
L2	2.163125	L3	2.1535	L4	2.1075

Tab. 4. Cross-row spacing of House 3 (in m) based on a total of 24 postholes. These values correspond to the distributions shown in Boxplot Figure 44, right.

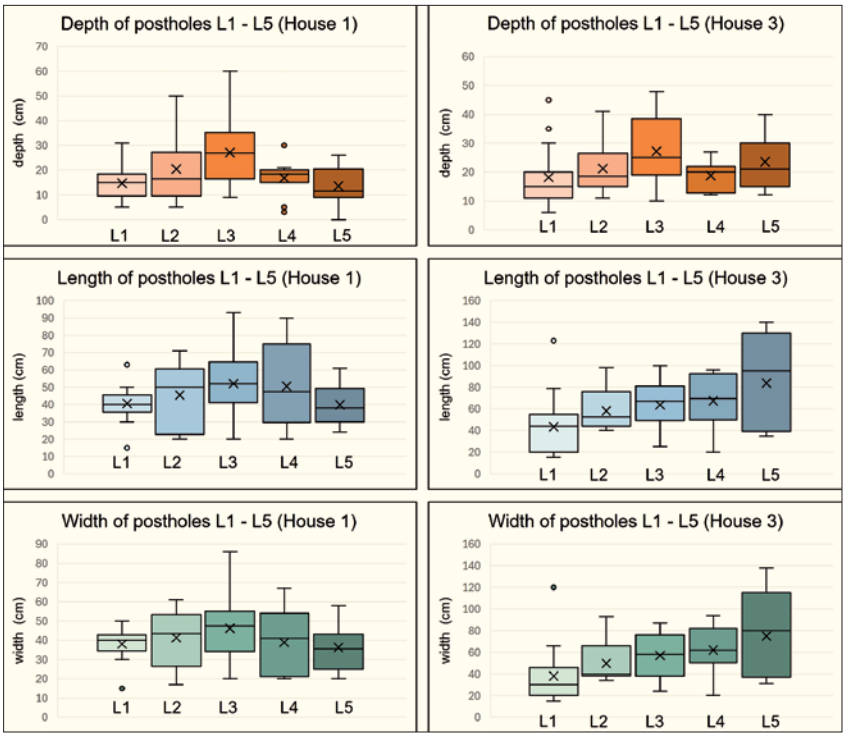


Fig. 45. Boxplots of post dimensions (depth, length, and width in cm) for House 1 (left column) and House 3 (right column) across post rows L1 to L5 (Graphics: I. Kowatschek).

Although only half of House 3 was excavated in 2021, combined with the interpretation of the prospection data, it can be assumed that this building is a large Linear Pottery structure. However, it is difficult to classify the layout as one of the house types defined by Pieter J. Modderman[78] due to the lack of information on the design of the northern part of the house. Based on the results of the magnetic survey, it can be assumed that the approximately 25–29 m-long house is a large building. Houses of this type consist of three sections and can reach lengths of 20 metres to over 50 metres. Maria Cladders and Harald Stäuble also defined the subtypes of large buildings, Type 1c[79] of which could apply to House 3 at Kleinhadersdorf-Marchleiten. This type of construction consists of three building parts with no ditches around the northern part. The magnetic survey did not locate any of these anomalies in the northern part of the house; only the strong positive anomalies of the longitudinal pits along some weakly positive postholes were visible.

78 Modderman 1972.

79 Cladders, Stäuble 2003, 494.



Fig. 46. The multiphase posthole with supporting main posts at the southern end of the elongated pits (Graphics: I. Kowatschek).



Fig. 47. The plough is already causing damage to the preserved pits, as evidenced by plough marks running across Excavation Trench 2, cutting about 20 cm deep into the archaeological features in the southern part of House 3 (Photo: I. Kowatschek).

The postulated dating and cultural attribution of the prospected houses was supported by the type of construction as well as the numerous pottery finds from the excavation, which resemble those from the nearby Linear Pottery cemetery in style and typical decoration. Unfortunately, the highly fragmented, porous and sometimes secondarily fired pottery sherds were unable to provide any further clues as to the fine dating or chronological position of the two houses.

The archaeological investigations were able to confirm the hoped-for better state of preservation of the Neolithic site in the lower-lying area of the slope, but the postulated colluvium is not present. Although the numerous posts typical of Linear Pottery houses were clearly visible after the removal of the topsoil, they were generally quite shallowly preserved (Trench 1: 18.8 cm, Trench 2: 21.4 cm). With an average depth of 24 cm, the longitudinal pits associated with House 2 were not dug much deeper than the surrounding postholes. In contrast to Trench 1, there was no evidence of later use of the longitudinal pits, which suggests that we may have been able to examine them in their original dimensions. Both houses show additional, irregularly placed smaller posts between the central post rows. These could be subsequent repairs or reinforcements of the load-bearing posts, but possibly also the remains of a floor construction.

In the southern part of Trench 1, some elongated structures were found after the topsoil had been removed, which can be attributed to recent agricultural interventions (plough marks). Due to the erosion damage to the features in this area, the exact course of the southern end of the house can only be vaguely reconstructed (Fig. 47). This observation is of particular importance with regard to the measures that are to be implemented for the protection of the remaining houses.

7. Early and Middle Neolithic Finds

The finds from the two excavations in Kleinhadersdorf-Marchleiten include a wide range of Early and Middle Neolithic pottery and stone artefacts. Unfortunately, no meaningful or datable artefacts were found in the backfill of the postholes in either excavation trench. The finds mainly came from the longitudinal pits alongside the houses and other settlement pits, in which the accumulated domestic rubbish was discarded.

In addition to the Linear Pottery fragments, fragments of Early Lengyel vessels were also found in Excavation Trench 1. The fragments comprise small to medium-sized sherds and are heavily rounded due to frequent repositioning. In comparison to the first excavation campaign, no artefacts from the Lengyel Culture or later periods were recovered in the second campaign. However, ceramic fragments with the typical shapes and decoration of the Linear Pottery Culture were found.

The artefacts include numerous fragments of grinding and polishing stones as well as polished stone tools made of serpentinite, amphibolite and greenschist, some of which can be identified with certainty as stone axes or adzes. As is frequently observed with Linear Pottery bones, the quantity of material from the excavations in Kleinhadersdorf-Marchleiten is comparatively limited and poorly preserved. The isolated bone fragments are in a porous and highly fragmented state, predominantly unidentifiable bone splinters, thus preventing further archaeozoological statements. Numerous remains of burnt daub were found in the vicinity of the three excavated houses, particularly within the backfill of the accompanying pits, some of which also showed impressions of timber.

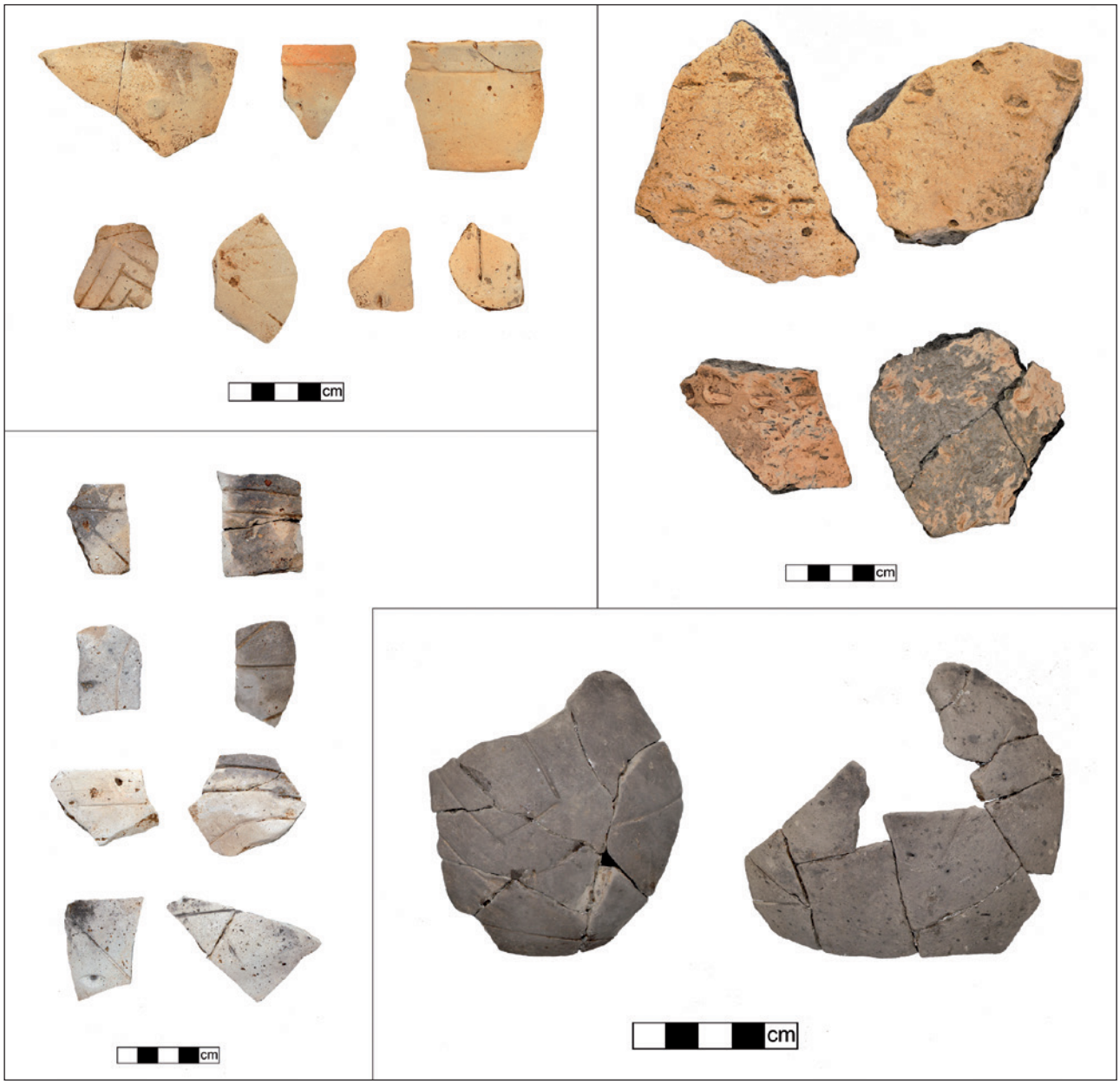


Fig. 48. Thin-walled rim and wall fragments of the Music Note pottery with typical decorative elements and coarse, vegetable-tempered pottery with decorations (Photos: H. Adelwöhrer; graphics: I. Kowatschek).

7.1. Finds from the Linear Pottery Culture

The pottery fragments from the two excavations can be categorised into two distinct pottery ware types, one vegetable-tempered, the other of finer quality and often decorated. The sherds, which can be clearly assigned to the older Linear Pottery Culture, were of coarse, vegetable-tempered pottery in a poor state of preservation. The clay of these thick-walled fragments is mixed with sand and tiny pebbles and moderately hot-fired (Fig. 48). It is rarely possible to assign the sherds to specific vessel forms due to the high degree of fragmentation. The forms include pots, bowls, and bomb-shaped bowls (*Kümpfe*) and show knobs, handles and also occasional finger impressions. Fragments of pottery from the pre-Music Note and Music Note periods with typical decorative elements are particularly noteworthy (Fig. 48). Some of the highly fragmented wall fragments show remnants of the music-note motif, but can't be assigned to a specific vessel type, let alone correctly oriented. In accordance with the findings from the nearby cemetery of Kleinhadersdorf, it is probable that



Fig. 49. The different handles from the 2020 and 2021 excavations reflect the diverse range of shapes from Linear Pottery to Lengyel (Photo: H. Adelwöhrer).

they originate from bowls.[80] The clay of the fine pottery is homogeneous and fired at a higher temperature.[81] The fragments are thin-walled, without visible (organic) admixture and of a grey, grey-yellow or light yellow colour. The decorated fragments have approx. 2 mm-thick thin straight or curved lines, some ornamented in the music-note style. The material also comprises thin-walled eggshell pottery made of fine-ground light grey to beige-brown clay with fine fingernail impressions on the rim. The ceramic material also contained a large number of various types of knobs (oval, round or flattened) and handles in various sizes and shapes, reflecting the diverse range of forms found in the excavation from Linear Pottery to Lengyel (Fig. 49).

7.2. Finds from the Lengyel Culture

The finds from the Lengyel Culture also show a high degree of fragmentation. The larger assignable fragments include wall and base fragments of larger pots with lobed handles and butts with the typical horn-shaped and vertically perforated handles (Fig. 50). The wall fragments with knobs probably also come from pots; however, they cannot be clearly assigned to any particular vessel form (Fig. 50). The coarse pottery shows vegetable-tempered clay mixed with small pebbles and chamotte. In Excavation Trench 1, three fragments of footed bowls were found (Fig. 51).

Particularly noteworthy are the fragments of a miniature vessel from the Lengyel period pit in Excavation Trench 1. The small, almost cubic vessel has a height of around 5.5 cm, is decorated with incised lines and has small holes in the upper corners which were probably used for hanging (Fig. 51).

In addition to the various vessels, two fragments of Lengyel ceramic spoons with relatively short, straight shaft holes were also found (Fig. 51). The two fragments were found in Excavation Trench 1, in a charcoal-rich pit to the east of House 1.

7.3. Stone Artefacts

The stone artefacts include a wide variety of river boulders, which were used as polishing stones on the one hand, and as chipping stones and hammerstones on the other, and are characterised by impact marks. Particularly noteworthy are the 38 fragments of grinding stones that were found throughout the excavation trenches. The grinding plates and runners, possibly made from local limestone and (quartz) sandstone (Fig. 52),[82] could represent the economic basis of the settlement and thus also explain the special position on the slope. The flint artefacts contain cores, a few broken blades and numerous flakes (Fig. 52). The range of primary raw materials corresponds to that already determined during the analysis of the flint finds from the cemetery.[83] The majority of the artefacts were made from distant Jurassic Kraków silicites and southwest Moravian Krumlovský les cherts, while a few fragments came from

80 Neugebauer-Maresch, Lenneis 2015.
81 Lenneis 1995, 39.
82 Götzinger et al. 2010.
83 Mateiciucová 2015, 112.



Fig. 50. Fragments of Lengyel period pottery with different handles, pots and butts with small round and flattened knobs, lug handles and the typical horn-shaped handles of butts (Photos: H. Adelwöhrer; graphics: I. Kowatschek).

Transdanubian Szentgál radiolarites from Hungary.[84] The stone tools found are made of amphibolite/amphibole slate or serpentinite and include axe fragments, adzes and scrapers (Fig. 52). Parallels can also be drawn with the finds from the cemetery with regard to the raw materials of the stone tools, among which axes and adzes made of amphibolite are also predominant.

84 Mateiciucová 2015.



Fig. 51. A (restored) miniature vessel decorated with an incised line, foot and base of a low footed bowl and two fragments of ceramic spoons (Photos: H. Adelwöhrer; graphics: I. Kowatschek).

Limonite chunks, which could come from the surrounding area[85] and were probably used to make red paint, were also found.

8. Conclusions

The significance of the Early Neolithic site of Kleinhadersdorf-Marchleiten in the Poysdorf Basin became known to both experts and the general public at the latest with the large-scale excavations carried out by the Federal Monuments Office in the 1980s and the subsequent analyses.[86] The largest and oldest cemetery of the Early Neolithic Linear Pottery Culture to date stands out in an international comparison, particularly due to the large number of grinding stones used as grave goods. It was hypothesised that this site was a burial place for the population from the other contemporaneous settlements known in the Poysdorf Basin, although the possibility of a neighbouring settlement was not excluded. However, due to the unusual topographical location for an Early Neolithic settlement and the problem of water supply on the ridge, a larger settlement was not expected.

The large-scale magnetic survey carried out by the LBI ArchPro aimed to clarify a possible larger extent of the burial ground and the localisation of an adjacent settlement area. The large-scale prospecting approach, which

85 Götzinger 2015, 171.

86 Neugebauer-Maresch, Lenneis 2015.



Fig. 52. Blades, flakes and retouched tools made of flint, polished stone tools and fragments of sandstone grinding plates (Photos: H. Adelwöhrer; graphics: I. Kowatschek).

is accompanied by a significant financial investment from the international research programme, has proven to be successful. This approach is based on a key site in Austria, which is clearly limited and isolated. The corresponding archaeological analysis and interpretation of the survey data combined with a landscape archaeological examination have yielded unexpected results for the Kleinhadersdorf-Marchleiten site. It is now evident that the burial ground may have been significantly larger than previously thought and that there was an extensive settlement area in its immediate vicinity, with clearly visible individual houses. The question of the water supply was solved by the discovery of artesian wells that are now dry, and the production of grinding stones from local sandstone could be made plausible as the economic basis for the settlement in this atypical and exposed location.

The results of the magnetic survey were then further investigated by means of targeted excavation campaigns. As

part of two teaching excavations by the University of Vienna which spanned a period of eight weeks, the objective was to verify the conclusions derived from the prospection data with regard to the state of preservation. As it turned out, the exceptional clarity of individual ground plans, indicating a unique preservation scenario, was a consequence of technological development and the high resolution of the magnetic measurements. The remains of one of the earliest settlements in Austria are under significant threat, as is the case at numerous other Linear Pottery sites in the extensively cultivated Weinviertel. The state of preservation of the houses is a cause for concern, as the plough is already causing damage to the preserved pits, even in areas where the ground plans are still clearly visible in the magnetic data. Large-scale magnetic measurements are urgently required in order to document these sites for posterity and to provide the relevant basis for settlement and landscape archaeological issues in international discussions.

During the excavations, it was possible to stratigraphically excavate and three-dimensionally document two of the Linear Pottery houses in all details. The excavations also revealed the remains of a later settlement by carriers of the Lengyel Culture, the existence of which had been postulated on the basis of typical ground plans in the magnetic prospection data. This settlement phase is directly related to the Middle Neolithic *Kreisgrabenanlagen* known in the Poysdorf Basin.[87]

The further evaluation of excavation data, the scientific analysis of samples and finds, and the archaeological evaluation with regard to typology and chronology of the Early and Middle Neolithic, will be the subject of master's theses and dissertations. These studies promise further insight into a nationally important site and its economic and social foundations. It is nevertheless important to note that the results and find material presented in this preliminary report are available for research. Given that teaching excavations are poorly financed, short-term projects lacking the infrastructure and financial resources of internationally operating archaeological institutions, further research is necessary to ensure the preservation of our cultural heritage. Before they can be subjected to further analysis, conservation measures on the artefacts are required; however, the necessary resources in terms of both personnel and time are not currently available at the Institute of Prehistory and Historical Archaeology. While the preceding overview of the Linear Pottery finds shows that the settlement corresponds to the occupation period of the cemetery, it is evident that the detailed chronological investigations (stratigraphy and ^{14}C) would have to be carried out as part of a comprehensive international project.

This preliminary report presents the key data and results of the research projects to date. It is essential that these projects are followed by large-scale excavations, as the site is an endangered and internationally significant archaeological monument. We hope that with this preliminary report, have aroused the interest of researchers and fulfilled our role as an incubator of future research.

87 Melichar, Neubauer 2010.

Acknowledgements

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