Notae Praehistoricae, 44/2024 : 109-117

Developing an optimal excavation strategy for the extensive and well preserved Final Palaeolithic Lommel Molse Nete sitecomplex (Prov. Limburg, BE)

Dave Geerts, Marjolein van der Waa,
Ferdi Geerts & Bart Vanmontfort

1. Introduction

The development of a 240 ha industrial zone in Lommel, located in the Sandy Campine region of Belgium (**Fig. 1**), prompted a large-scale preventive archaeology campaign beginning in 2009. An extensive survey examined landscape development and presence of Late Glacial to Early Holocene hunter-gatherer sites north of the Molse Nete rivulet (Vanmontfort *et al*., 2022). The present-day article focuses on the Final Palaeolithic remains that are found in a well-preserved palaeolandscape of nearly 1 ha, dating from the Allerød interstadial.

The unique character of the site lies in the magnitude of the preserved palaeolandscape and its pristine preservation conditions. This offers potential for gaining insight into how humans interacted with their landscape at a microregional level. In order to exploit the archaeological data to its full potential, an excavation strategy was developed that optimally combines detailed documentation of individual artefacts with an extensive evaluation of presumed empty zones.

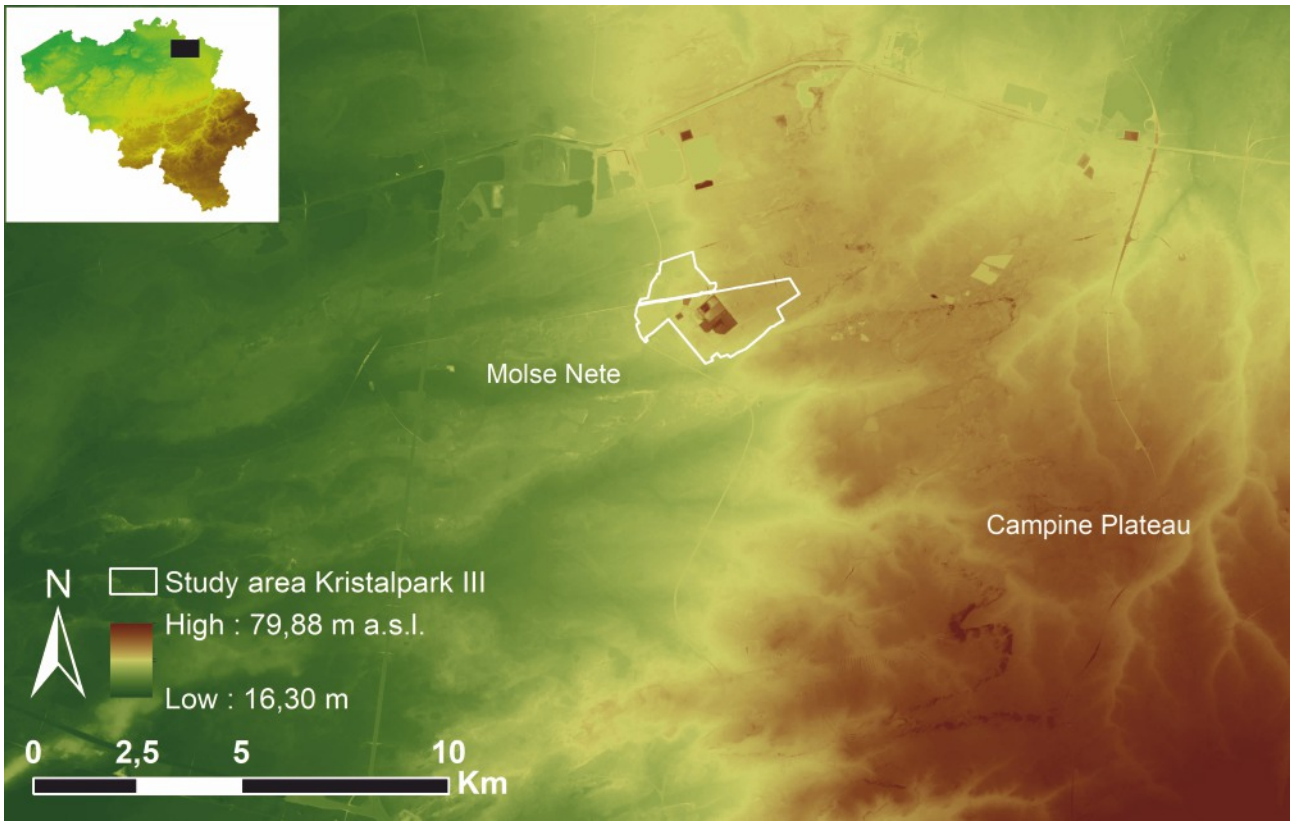

Fig. 1 – Location of the study area on the north-western edge of the Campine Plateau. Background: 1 m raster digital terrain model, constructed on the basis of LiDAR data. Source : Informatie Vlaanderen.

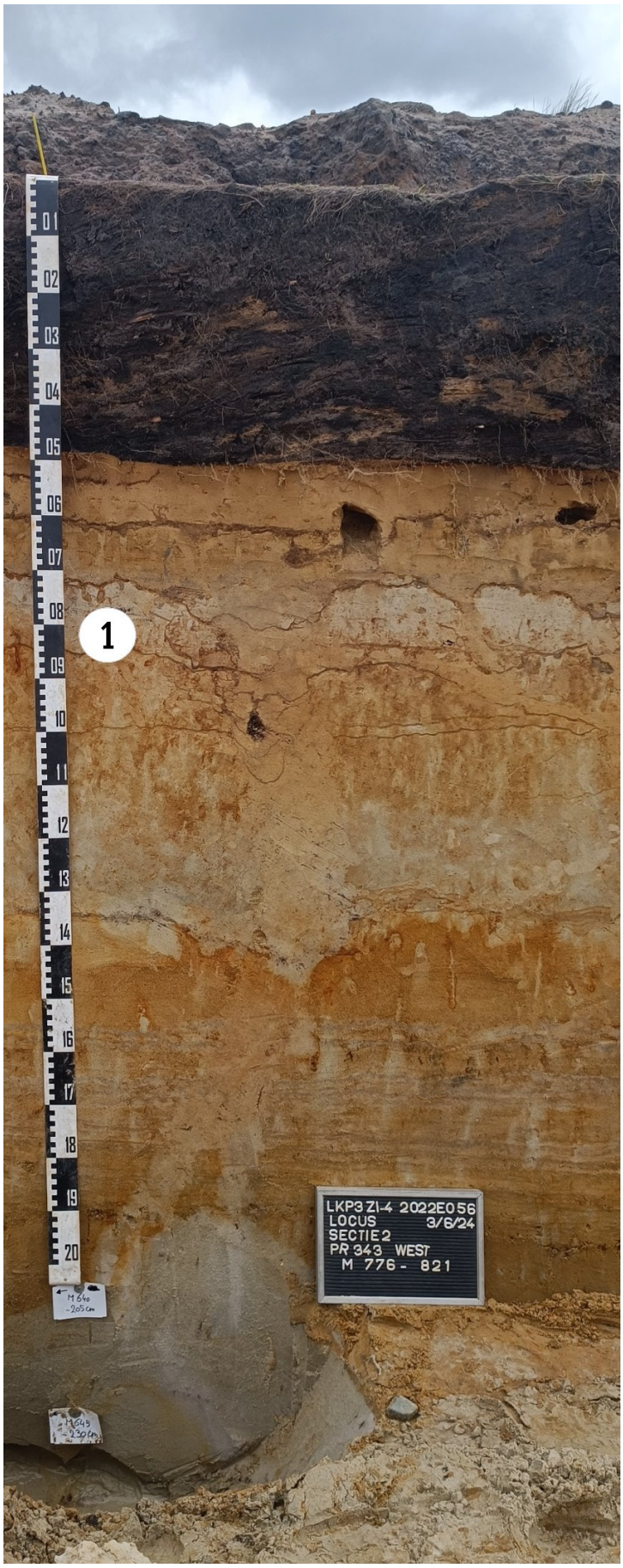

Fig. 2 – Landscape profile 343 with the litho- and pedogenetic sequence from the Early to Middle Pleistocene up to present day. Legend: 1. Late Glacial palaeosol (equivalent Usselo soil).

2. Context

The Molse Nete site complex is located at the northern edge of the Molse Nete valley within the Einderheide dune complex, stretching over several kilometers (Vanmontfort *et al.,* 2022; Van Gils & De Bie 2001; 2003; Van Neste *et al.,* 2009; Maes *et al.,* 2011). This rivulet cuts into the northwestern edge of the Campine Plateau and is part of the Scheldt basin. The Campine Plateau is a classic example of relief inversion resulting from tectonic uplift and erosion. The site is situated at the plateau's rim, above the Beringen-Diepenbeek glacis (Beerten *et al.,* 2018).

The general litho- and pedogenetic stratigraphy at the site (**Fig. 2**) consists of Pliocene estuarine deposits at the base, followed by (reworked) Early to Middle Pleistocene fluvial deposits from the Rhine and Meuse rivers. Over this substrate, (fluvio-)aeolian sands were deposited during the Late Pleniglacial and Late Glacial periods. In some areas, at least one Late Glacial palaeosol is present within the coversand sequence. Based on its stratigraphic position and the characteristics of its bleached horizon, this soil can be considered an equivalent to the Usselo soil, dated to the Allerød interstadial (**Fig. 2:1**). A Holocene Podzol soil has developed at the top of the lithostratigraphic sequence (Vanmontfort *et al.,* 2022).

The first evidence of prehistoric activity in the Molse Nete area was recorded by archaeologists in the early 20th century (Geerts, 1981). The development of a munitions factory (Poudreries Réunies de Belgique) and surrounding industrial activities led to the discovery of more lithic artefacts. In the 1980s, the first systematic excavations were conducted, revealing a Mesolithic occupation phase (Geerts, 1984). Between 2001 and 2003, augering campaigns and excavations demonstrated that Mesolithic occupation extended over several kilometres along the Molse Nete valley (Van Gils & De Bie, 2001; Van Gils & De Bie, 2003).

The current CRM (Cultural Research Management) survey and excavation project started in 2009, following the plans for developing and expanding an industrial site. In a first phase, archaeological augering, field surveys and smaller excavations revealed a dense Mesolithic record associated with a Holocene Podzol, and a Final Palaeolithic record linked to a palaeosol below (Maes *et al.,* 2011; 2012; Yperman *et al.,* 2010; Vanmontfort *et al.,* 2010; Van Neste

et al., 2009). The second phase of the project started in 2019 with a comprehensive palaeolandscape and archaeological survey. Several zones containing Final Palaeolithic artefacts associated with the buried palaeosol were selected for further excavation. Currently, excavations are taking place in a continuous area of approximately 0.9 ha (van der Waa *et al.,* 2021; van der Waa & Robberechts, 2022; Vanmontfort *et al.,* 2022).

3. Methodology

The unique character of the Final Palaeolithic site of Lommel Molse Nete lies in the pristine preservation conditions of an extensive site. This site is protected by over half a meter of Younger Dryas coversands and has been minimally affected by later, Holocene disturbances. Based on the survey results, a dense concentration of archaeological remains seems to cover a continuous area of nearly 1 ha of this well-preserved palaeolandscape. As such, the site has an exceptional potential for gaining insight in the functioning of Final Palaeolithic communities, including techno-functional, chronological and spatial analyses. This urges the development of a tailored methodology, that balances the necessity for detail in line with the research potential of the site and the common constraints associated with CRM archaeology, such as budget and time limitations.

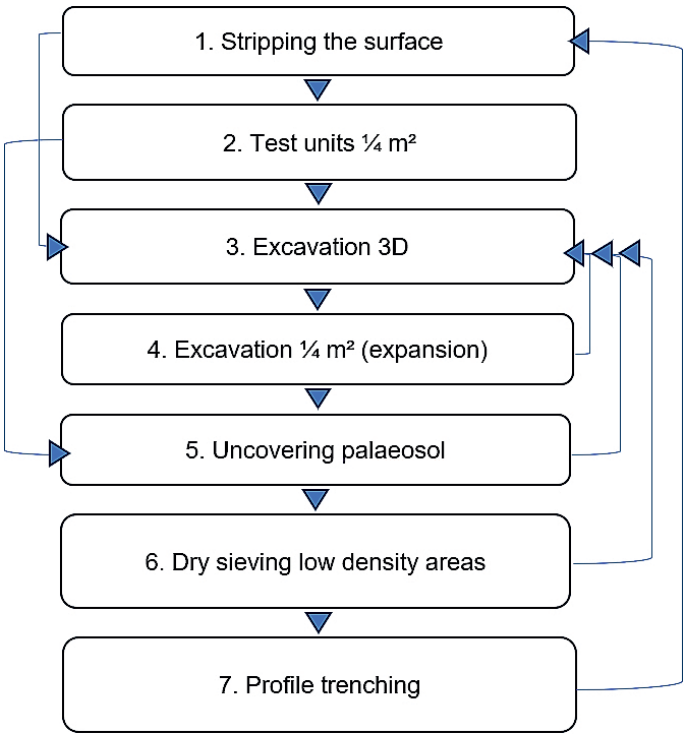

Fig. 3 – Flowchart of the field methodology.

The decision was made to excavate the entire site at varying levels of precision and with the flexibility to adapt strategies to new observations. The system follows a sequence of seven phases. Additionally, based on field results, decisions can be made to revisit earlier phases or skip steps (**Fig. 3**). This flexible approach enhances the excavation process, allowing context-specific questions while maintaining a systematic method to ensure comparable data.

In the **First Phase**, the upper Younger Dryas sands are mechanically removed layer by layer. A gouge auger is used to estimate the depth of the palaeosol and to ensure a buffer of 10 cm above it. Finds that appear in this phase are individually measured. If finds are observed above the envisioned level, an evaluation of their stratigraphic position and the relation with other artefacts is made. When this leads to the identification of additional and hitherto unidentified strata or levels with archaeological remains, this can lead to an excavation on this particular level, following the rationale of phases 3 and 4.

In the **Second Phase**, 50x50 cm test units are excavated in a triangular 4x2 m grid and wet-sieved on a sieve with a 2 mm plastic mesh. This phase serves multiple purposes: (1) the registration of the horizontal and vertical distribution of artefacts in order to identify locations of artefact concentrations, (2) the initial evaluation of the archaeological record and (3) the documentation of the topographic layout of the palaeolandscape. Decisions regarding the detail of excavation in subsequent phases are made based on the results of this phase. Quarter m² test units in a fixed staggered grid have been introduced with the excavations of an extensive Mesolithic site in Verrebroek (Crombé *et al.,* 1997; Crombé, 2005: 21) and have become somewhat the standard methodology for the first excavation phase of hunter-gatherer artefact clusters in Flanders (see Perdaen *et al.,* 2018). Where in Verrebroek the grid was a staggered 2x2 m grid, this was reduced to an even tighter 2x1 m

Fig. 4 – Photograph of a detailed 3D excavation uncovering Late Glacial artefacts (phase 3).

grid in more recent excavations[1]. The latter results in the screening of 12.5 % of the surface, a similar percentage as obtained in standard trial trenching (*ibid.*). Our choice for a wider 4x2 m, reducing the number of test units by a factor 4, is motivated by the specific aim of this phase. Rather than the basis for a final selection of areas to be excavated, it is aimed at guiding the subsequent phases.

During the **Third Phase**, selected concentrations undergo detailed excavation with measurement of the precise coordinates of all artefacts larger than one centimeter (**Fig. 4**). This not only allows for a detailed determination of the vertical and horizontal distribution of artefacts, but the simultaneous documentation of their position and attributes also provides valuable insights into the formation processes of the site. The sediment from these excavations is collected per unit of 50x50x5 cm and wet-sieved through a sieve with a 2 mm plastic mesh.

In the **Fourth Phase**, the areas excavated in phase 3 are manually deepened and/or laterally extended when there are few or no artifacts larger than one centimeter found in the bordering and/or overlying units. Sediment is collected in units measuring 50x50x5 cm and wet-sieved through a sieve with a 2 mm plastic mesh. This process is carried out for at least two 5 cm units below the end of the phase 3 excavation and for at least 1 meter surrounding the phase 3 excavations. Further decisions on expansion depend on the yield from these units.

The **Fifth Phase** involves manually uncovering the top of the palaeosol in the areas that were not selected for a detailed excavation, using careful shoveling. The sediment is dry-sieved through a sieve with a wider mesh of 0.5 or 1 cm. The goals of this phase are to identify additional features or disturbances within the palaeosol, locate concentrations missed in a previous phase, and pinpoint individual isolated artefacts between the excavated concentrations. During this phase and the previous ones, photographs are made with the goal of creating a photogrammetric dataset for the reconstruction of the palaeosurface. Throughout this phase, decisions are made to revisit earlier phases for more detailed excavation.

1. A 2 x 1 m grid involves one ¼ m^2 pit every 2 m on a single row – thus leaving 1.5 m in between two test pits – and an intermediate distance of 1 m between the rows.

During the **Sixth Phase**, the upper part of the palaeosol is dry-sieved through a sieve with a wider (0.5 or 1 cm) mesh. This is done for the entire area that was not selected for excavation during one of the previous phases. This phase aims at identifying concentrations missed in previous phases and to locate individual, isolated artefacts in between the concentrations. It is possible to return to one of the earlier phases if deemed necessary. The ambition to excavate the entire site, including low density zones, follows the unique character of the site and its potential for generating detailed insights in the spatial layout of human activity. It recalls the same ambition that was upheld during the investigations of a similarly well preserved and extensive Mesolithic site and palaeolandscape in Verrebroek. In three of the large excavation trenches of the Verrebroek *Dok 1* site, the complete surface of the Mesolithic site was excavated in 50x50x10 cm squares that were sieved over a mesh of 2 mm (Crombé, 2005: 21). It has, however, not been implemented since.

The final, **Seventh Phase** involves digging long profile trenches at the edges of fully excavated zones. These trenches, dug every 20 m perpendicular to the valley of the Molse Nete, were approximately 80 m long and one to three m deep, exposing the complete Late Glacial and Holocene pedo- and lithological sequences. These profiles provide ideal locations for studying the genesis of the landscape and are amply sampled for dating and pedostratigraphic characterisation. After this phase, it may be possible to return to earlier phases if unknown palaeosols are detected.

4. Preliminary results

The current excavations and data processing are ongoing and the results presented here are preliminary. However, several conclusions can already be made.

During the excavations the surface was screened several times in different phases (phases 1, 2, 5 & 6) to accurately localise zones for further excavation (phases 3 & 4). The results of phase 1 led to the selection of three excavation areas, including a very low-density artefact zone with ochre-coloured features (**Fig. 5**, blue zones). Shifting between the phases had the advantage that more concentrations were discovered than purely relying on the results of the test squares of phase 2. In phases 5 and 6, previously undiscovered clusters were actually identified and selections of zones to be excavated were extended. Phase 5 led to the extension of a previously selected excavation zone (**Fig. 5**, green zone). But it was mostly during the dry-sieving phase (phase 6) that previously unidentified concentrations were discovered. In total seven new excavation zones were selected after this phase (**Fig. 5**, red zones). It became evident that the 4x2 m grid could leave not only smaller concentrations unidentified, which could have been missed even by a 2x1 m grid, but also four larger concentrations over three meters in diameter. This unnoticing of larger concentrations occurred at the edges of excavation pits, potentially due to a 'border effect' where a row of sample locations falls just outside the border of the research zone (see also Van Gils & Meylemans, 2019).

The excavation phases 3 and 4 provided detailed geospatial insights into the locations of artefact clusters and generated datasets to address specific questions regarding individual activity and habitation zones. To date, 30 concentrations have been differentiated (**Fig. 5**) and around 40 000 flint artefacts were excavated. The high resolution field data gathered during the 3D excavation (phase 3) ensured that contextual details were observed, which could have gone under the radar with the excavation technique of phase 4, *i.e.* the minimal and standard approach for the excavation of hunter-gatherer sites in Flanders. This is true for the three dimensional registration of bigger fragments of stone that could have been used in habitation contexts, but also for fragile finds that were noticed and carefully excavated. Apart from brittle burnt bone fragments, one example is a flint backed point with remnants of glue at its basal part. This is a unique piece that will serve for an accurate and unquestionably associated radiocarbon date.

The manual uncovering of the palaeosol during phase 5 revealed Holocene and Pleistocene treefall pits, Late Glacial ochre-colored dug features, and large systems of frost wedges

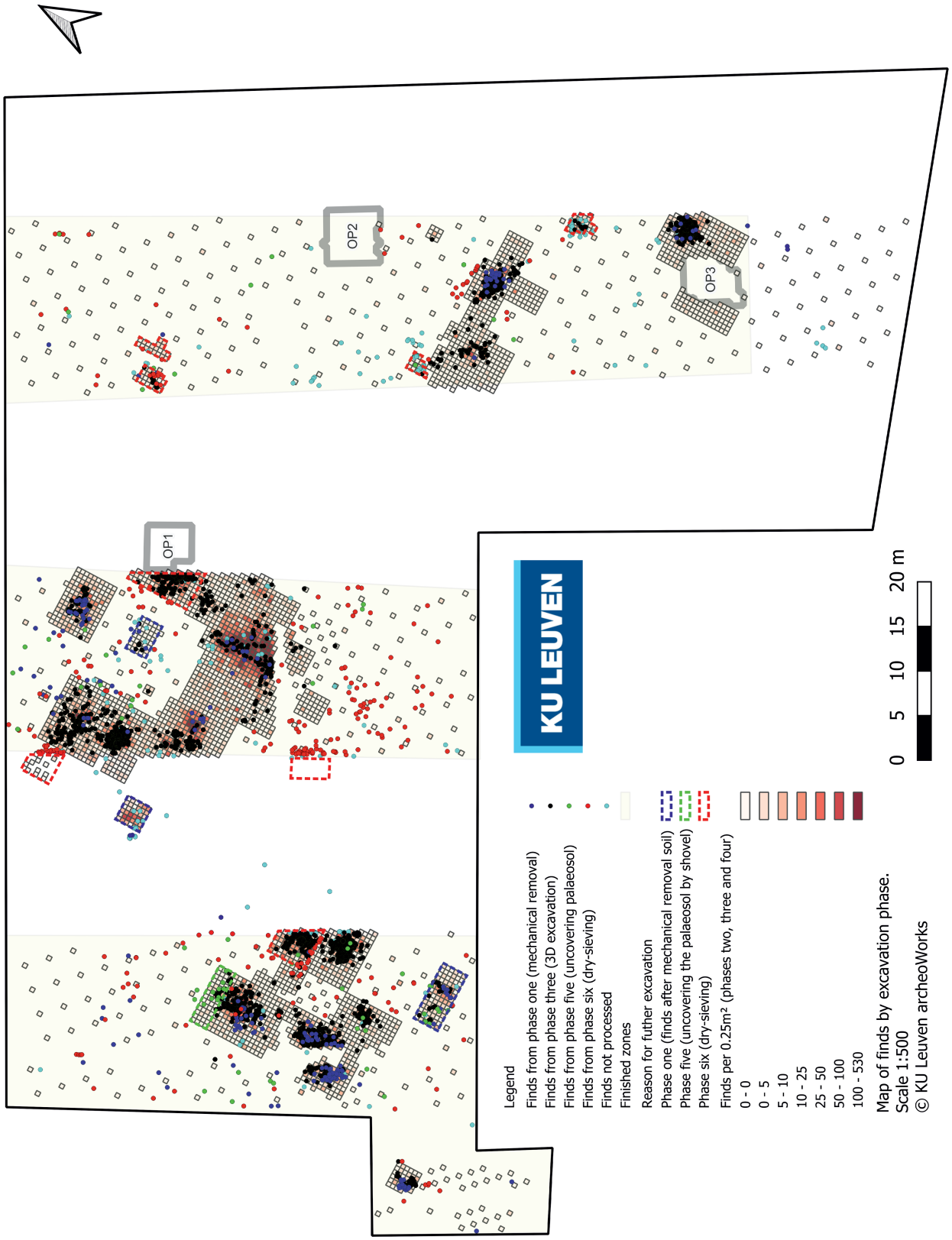

Fig. 5 – Map of the recorded Late Glacial archaeological findings by excavation phase.

and cracks. These observations offer insights into the past landscape and, combined with the threedimensional registration of artefact locations, assist in identifying site formation processes and reconstructing human behaviour.

The use of several field techniques during phases 1, 5 and 6 not only led to the discovery of new artefact clusters but also revealed what occurred in presumably empty areas between and beyond the concentrations. In the southern part of the central excavation zone, a large number of dispersed, isolated cores was found (**Fig. 5**, orange points). This contrasts with the relative rarity of cores in the concentrations themselves. This particular phenomenon of a specific core disposal zone would have passed unnoticed had further research ended after the test square or excavation phases. The test squares in this southern area were mostly empty or yielded very few archaeological indicators and the area was presumed to be void of lithic concentrations. Another pattern of landscape use that emerged from this phase was the scattered presence of individual artefacts or very small clusters of lithic tools throughout the area, suggesting specific uses of the local landscape. Elsewhere, no artefacts have been recovered during any of the phases. It is only because of the inclusion of phases 5 and 6 that we can truly confirm these areas to be void of traces of human activity. Thanks to the complete excavation of this palaeolandscape, we will obtain a particular and unprecedented detail on Late Glacial human activity.

5. Conclusion and prospects for future research

The Lommel Molse Nete Final Palaeolithic site is unique because of the large surface in which a palaeolandscape is preserved in pristine preservation conditions. Because of an industrial development on this location, the site is currently excavated in a CRM context. In order to allow the exploitation of the site to its maximal potential, a specific methodology was developed, balancing the need for detail with the typical constraints of CRM archaeology, *i.e.* budget and time. This methodology involves a flexible, phased and tiered approach, with the excavation of the entire palaeolandscape on different levels of detail, varying from the most detailed threedimensional excavation, to the rough screening of presumably empty areas. The preliminary results already demonstrate the advantages of this method as opposed to the minimal standards or fixed strategies that are sometimes promoted in salvage archaeology. It will result in an exceptional dataset, with perhaps unprecedented possibilities for future research. Even with the often strict conditions in which CRM archaeology needs to operate, we believe that formal procedures and regulations should not only make similar choices possible, as was the case in Lommel, but mandatory at least for the most valuable sites.

Acknowledgments

The Lommel project is a KU Leuven archeoworks project financed by Kristalpark NV in the context of CRM archaeology. Its success is the result of the constructive collaboration with Kristalpark NV and the effort of the entire archeoWorks team.

We are indebted to numerous colleagues for continuous feedback and lively discussions, including Philip Van Peer, Pierre Vermeersch, Etienne Paulissen, Cornelis Kasse, Eckhart Heunks and Marijn Van Gils.

In memory of Martine Delvaux (1969-2024), whose efforts will forever contribute to the advancement of the story of the Lommel Molse Nete site complex.

Bibliography

Beerten K., Vandersmissen N., Deforce K. & Vandenberghe N., 2014. Late quaternary (15 ka to present) development of a sandy landscape in the Mol area, Campine region, NE Belgium. *Journal of Quaternary Science*, 29: 433-444.

Crombé P., 2005. Research history and method. In: Crombé P. (ed.), *The last Hunter-Gatherer-Fishermen in Sandy Flanders (NW Belgium). Volume 1: Palaeo-environment, chronology and features*, Archaelogical Reports Ghent University, 3, Academia press, Gent: 18-25.

Crombé P., Perdaen Y. & Sergant J., 1994. Le gisement mésolithique ancien de Verrebroek (Flandre Orientale) : résultats de la campagne 1994. *Notae Praehistoricae*, 14/1994: 95-102.

Geerts F., 1981. *Enkele Epipaleolithische en Mesolithische sites te Lommel en omgeving*. Licentiaatsverhandeling, KULeuven, Leuven.

Geerts F., 1984. Lommel-Vosvijvers 3, A Late Mesolithic settlement. *Notae Praehistoricae*, 4/1984: 61-64.

Maes B., Willems M., Lambrechts B., Van Baelen A. & Vanmontfort B., 2011. Vervolgonderzoek op het sitecomplex langs de Molse Nete te Lommel (B). Opgravingscampagne 2011. *Notae Praehistoricae*, 31/2011: 61-68.

Maes B., Cnuts D., Willems M., Van Baelen A. & Vanmontfort B., 2012. Vervolgonderzoek op het sitecomplex langs de Molse Nete te Lommel. Opgravingscampagne 2012. *Notae Praehistoricae*, 32/2012: 37-42.

Perdaen Y., Pawelczak P., Depaepe I. & Woltinge I., 2018. Steentijdonderzoek in het archeologietraject. De '*BAAC Vlaanderen*'-aanpak. *Notae Praehistoricae*, 38/2018: 247-265.

van der Waa M. & Robberechts B., 2022. *Nota Lommel Ciner Sector A Fase 2. Verslag van resultaten*. KULeuven archeoworks, Leuven.

van der Waa M., De Boeck S., Van Baelen A., van Kerkhoven I. & Weekers-Hendrikx B., 2021. *Archeologienota Lommel Kristalpark III – Sector A. Verslag van resultaten*. KULeuven archeoWorks, Leuven.

Van Gils M. & De Bie M., 2001. Prospectie en kartering van laat-glaciale en vroegholocene sites in de Kempen: resultaten van de boorcampagne 2001. *Notae Praehistoricae*, 21/2001: 77-78.

Van Gils M. & De Bie M., 2003. Een uitgestrekt Laat-Mesolithisch site-complex langs de *Molse Nete* in Lommel. *Notae Praehistoricae*, 23/2003: 67-69.

Van Gils M. & Meylemans E., 2019. *Prospecties naar steentijd artefactensites – versie 1*. Agentschap Onroerend Erfgoed, Brussel.

Van Neste T., Yperman W., Vanmontfort B., Van Gils M. & Geerts F., 2009. Nieuw onderzoek op het sitecomplex langs de Molse Nete te Lommel. *Notae Praehistoricae*, 29/2009: 87-91

Vanmontfort B., Yperman W., Lambrechts B., Van Gils M. & Geerts F., 2010. Een finaalpaleolithisch en mesolithisch sitecomplex te Lommel, Molse Nete. Opgravingscampagne 2010. *Notae Praehistoricae*, 30/2010: 29-34.

Vanmontfort B., van der Waa M., Verbeeck K., De Boeck S., Van Baelen A., Willems M. & Geerts F., 2022 (2023). Landscape development and hunter-gatherer activity in Lommel Molse Nete (BE) during the Late Glacial and early Holocene. First results of an extensive survey. *Notae Praehistoricae*, 42/2022: 133-144.

Yperman W., Van Neste T. & Vanmontfort B., 2010. *Lommel Kristalpark Fase 3B. Archeologische prospectie. Eindverslag*. KULeuven Eenheid Prehistorische Archeologie, Leuven.

Abstract

The 'Molse Nete' Final Palaeolithic site (Lommel, Belgium), situated in the Sandy Campine-region, is unique because of the large surface on which a palaeolandscape is preserved in pristine preservation conditions. Because of an industrial development on this location, the site is currently excavated in a CRM context. In order to allow the exploitation of the site to its maximal potential, a specific methodology was developed, balancing the need for detail with the typical constraints of developer-funded archaeology, i.e. budget and time. This methodology involves a flexible, phased and tiered approach, with the excavation of the entire palaeolandscape on different levels of detail, varying from the most detailed threedimensional excavation, to the rough screening of presumably empty areas. The preliminary results demonstrate the advantages of this method as opposed to application of fixed fieldstrategies.

Keywords: Lommel 'Molse Nete' (Limburg, BE), Late Glacial, Usselo palaeosol, Final Palaeolithic, hunter-gatherers, CRM archaeology, excavation methodology.

Samenvatting

Het Finaalpaleolithische 'Molse Nete' sitecomplex (Lommel, België), gesitueerd in de zandige Kempen, bevat een uniek onaangetast en op grote schaal bewaard gebleven paleolandschap, dat momenteel wordt opgegraven in de context van de reguliere Vlaamse preventieve archeologie. Om het kennispotentieel van dit grote oppervlak ten volle te kunnen benutten, is een sitespecifieke opgravingsmethodologie ontwikkeld die een evenwicht biedt tussen de beperkingen van commercieel gefinancierde projecten (o.a. budget en tijd) en het gewenste onderzoeksdetail. Via een flexibele, gefaseerde en trapsgewijze veldstrategie wordt het volledige paleolandschap vlakdekkend opgegraven, waarbij registratie- en veldtechnieken van verschillende resolutie worden afgewisseld. De voorlopige onderzoeksresultaten hebben de voordelen van deze flexibele en sitespecifieke methode ten opzichte van rigide en uniforme veldstrategieën.

Trefwoorden: Lommel 'Molse Nete' (Limburg, België), laatglaciaal, Usselo paleobodem, finaalpaleolithicum, jager-verzamelaars, preventieve archeologie, opgravingsmethodologie.

Dave Geerts
Marjolein van der Waa
Bart Vanmontfort
KULeuven, Department of Archaeology
Centre for Archaeological Research of Landscapes
& LRD division archeoWorks
200E, Celestijnenlaan, pb 2409
BE–3001 Heverlee
dave.geerts@kuleuven.be
marjolein.vanderwaa@kuleuven.be
bart.vanmontfort@kuleuven.be

Ferdi Geerts
Archeohuis De Kolonie
Kolonie, 77
BE–3920 Lommel
ferdi.geerts@erfgoedlommel.be