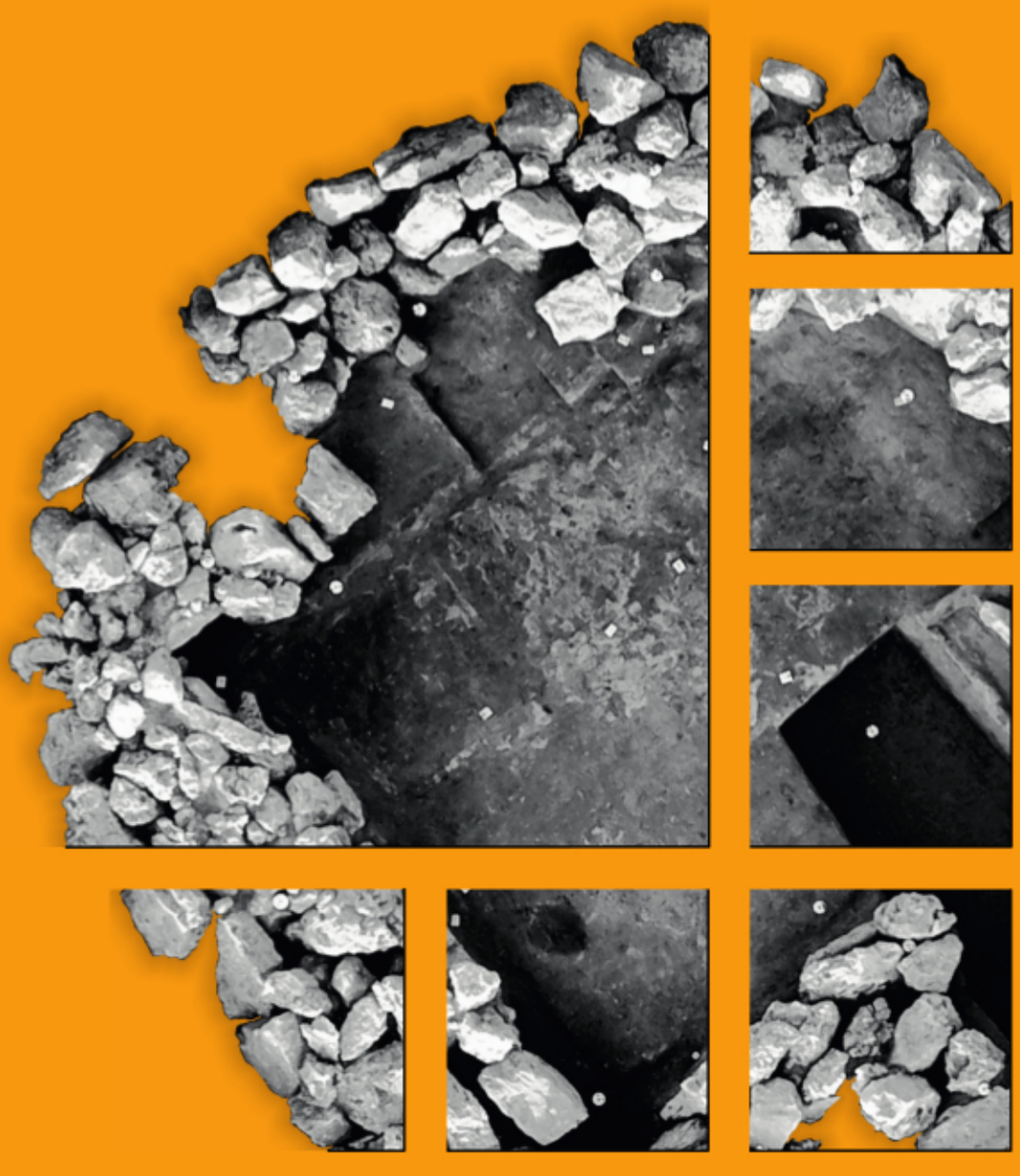
DISSERTATIONES ARCHAEOLOGICAE

ex Instituto Archaeologico Universitatis de Rolando Eötvös nominatae



Ser. 3. No. 4. | 2016

Dissertationes Archaeologicae

ex Instituto Archaeologico

Universitatis de Rolando Eötvös nominatae

Ser. 3. No. 4.

Budapest 2016

Dissertationes Archaeologicae ex Instituto Archaeologico
Universitatis de Rolando Eötvös nominatae
Ser. 3. No. 4.

Available online at http://dissarch.elte.hu
Contact: dissarch@btk.elte.hu

Budapest 2016

Contents

Articles

Method

Field Reports

Thesis abstracts

Book reviews

Implication of non-invasive archaeological methods in Brigetio in 2016

Dávid Bartus
Institute of Archaeological Sciences
Eötvös Loránd University
bartus.david@btk.elte.hu

Zoltán Czajlik
Institute of Archaeological Sciences
Eötvös Loránd University
czajlik.zoltan@btk.elte.hu

László Rupnik
Institute of Archaeological Sciences
Eötvös Loránd University
rupnik.laci@gmail.com

Abstract
The non-invasive archaeological research in the territory of the Roman settlement of Brigetio has been continued in 2016. Our previously applied methods have been supplemented with RPAS aerial prospection and documentation. The aim of the present paper is to provide a presentation of the results and experiences of conventional and RPAS aerial photography, field walking and complex GIS-analysis, as well as the relationship of aerial photography and field data.

Aerial archaeology

Due to the work of O. Braasch and I. Kuzma the aerial archaeological research of the region has more than 25 years of history.[1] The archive imagery related to the Ripa Pannonica, studied by Zs. Visy, has provided valuable information regarding the topography of Brigetio.[2] The area in question was systematically photographed by Z. Czajlik during the past nearly ten years. Meanwhile a scientific programme supported by the Hungarian Scientific Research Fund has been launched in order to claim more detailed knowledge about the structure of Brigetio and its surroundings (NRDIO 108667). According to the above mentioned research our knowledge about the topography of the Roman settlement has significantly increased.[3] Thus it was reasonable to continue the aerial archaeological survey in 2016.

The only flight which concerned the area this year was carried out on 22th June. A C150 airplane flown by pilot Dániel Horváth was used during the operation. The images were captured by a Nikon D300 camera mounted with a Nikkor ED 24-70 mm objective. The flight took place in the afternoon by clear, windy weather. The visibility has proved to be outstanding in vertical and horizontal directions alike.

1 Kuzma 1995, 64; Rajtár 1997, 122; Braasch 2003, 44, Abb. 1–2.
2 Visy 1985, 53–57; Visy 2003, figs. 32 and 35.
3 The latest results were published in several papers, see Borhy et al. 2011; Rupnik – Czajlik 2013; Borhy et al. 2017.

Accordingly to the early summer period we have focused our attention to the plots which were sown with winter wheat. The crops tend to provide light yellow or light green background colour during this period which generally does not last longer than a couple of days. The negative structures like pits and ditches appear in dark green while the positive ones of stone walls and paved surfaces can be observed in dark yellow. In spite of the generally promising date the number of definable archaeological features were limited. The outlines of the crop-marks were obscure which made it hard to conclude whether they have an archaeological origin. The main reason of this unfortunate circumstance was the high level of moisture in the soil caused by the rainy late spring and early summer weather. However a smooth difference was to be observed: the higher grounds like terraces and combs proved to be more sensible than the lower alluvial plains. Moreover the crop rotation has also turned into unfavourable state. Among other things most of the plots covering the *canabae* were sown with maize. According to our expectations the conditions of aerial archaeology proved to be far from preferential in 2016.

Although the Roman settlement and its surroundings were completely observed *(Fig. 1)*, limited result have been obtained. As a positive exception, part of a rural settlement marked by pits and perhaps sunken featured houses can be mentioned, which was detected close to the estuary of a stream (Szila-völgyi-patak) into Szőny-Füzitői Channel *(Fig. 2)*. Based on the archive data and the result of the field walk performed later the site can be dated to the Roman Period. It is presumably an element belonging to the settlements which occupied the hinterland of Brigetio.

From May 2016 a new DJI Phantom 4 quadcopter has been involved to the aerial archaeological survey of the research area and to the documentation of the ongoing excavations. The new platform gave us greater flexibility than the traditional high-wing airplane. We were able to take images at different times of the day, making it possible to choose the best visibility. Thus the particular plots could be observed even day by day in order to find the best condition of the vegetation. In spite of the unfavourable weather described above the flights using the drone were more effective than the one carried out with an airplane on 22th June.

The northern section of the legionary fortress which was covered by wheat appeared to be the most suitable and coherent area from the aerial archaeological point of view after the first flights. We have taken images from different altitudes and circumstances more than a dozen times. One of the most important results was the detailed documentation of an apsidal stone building found close to the eastern gate of the fortress (*porta principalis dextra*) *(Fig. 9.1)*. It was first documented in 2009,[4] but due to the new images we were able to create a more elaborated ground plan. The negative crop marks of the stone foundations could be observed in various quality from the end of May until harvest *(Fig. 3)*. The advantages of the series of images taken under different conditions can be exceedingly seen in the hybrid view made of the images from 10th and 28th of June *(Fig. 4)*. According to the results some questions have arisen. The orientation of the building was adjusted to the main axis of the *castrum*, but the negative crop marks which draw out the ground plan were more visible than in the case of any other buildings inside the fortress. It seems the foundations are closer to the surface than anywhere else in the questionable plot. What could the explanation be for that? Two possible answers come into play. Either the building was built later than the other parts of the legionary

4 Borhy et al. 2011, 47–48, Fig. 45; Lóki – Szabó – Visy 2011, 63, Fig. 47; Rupnik – Czajlik 2013, 75, Fig. 4, C.

fortress, or the erosion of the surface must have been more intensive here. Theoretically an apsidal building can be identified as a medieval church but in this particular case the apse is situated on the western side, moreover, we have no information of any medieval buildings or finds nearby. According to the field walk *(Fig. 5)* which was performed in narrow, three meters wide transects, the decisive majority of the collected artefacts were to be dated to the Roman period, but none of them to the Medieval Age. We have also recorded the density of the stone and Roman tile fragments lying on the surface. Their concentration around the apsidal building is very expressive *(Fig. 6)*. Based on these facts we may suggest that the building was originally erected during the Late Roman Period, however, a future excavation is destined to reveal the function and age of the building.

According to the early excavations taken place around the legionary fortress the Late Antique cemeteries were situated directly in front of the *fossa* by the southern and eastern sides.[5] Moreover, Late Roman burials came to light in the former territory of the *canabae* in the northern area of the Pannonia-dűlő[6] and also in the site Komárom/Szőny-Dunapart.[7] The aerial imagery has given evidence that a similar arrangement existed by the western side. Positive crop-marks of previously unknown rectangular graves were observed in the vicinity of the *fossa* not far from the *porta principalis sinistra (Fig. 9.2)*. It can be studied how the nature of the crop-marks changed during a short period between 15th and 21th of June *(Fig. 7)*.

The exact location of the western gate (*porta principalis sinistra)* is unknown, it must be somewhere under the present-day railway and main road crossing the fortification.[8] The area in question cannot be easily surveyed because it is covered by the railway, the road and detached houses. Due to the recent aerial archaeological evidences the street net of the *canabae* can be reconstructed quite well.[9] Negative crop-mark of a short street section was identified in the northern section of the so-called Pannónia-dűlő during the 2009 summer campaign. The continuation of this street heading in north-eastern direction through the present-day long and narrow plots was captured by drone footage in 2016 *(Fig. 8)*. We have every reason to believe that this street has connected to the limes road in front of the gate *(Fig. 9.3)*, which supports our earlier reconstruction.[10]

Field walks

Due to the recent year's research program mentioned above, the structure and topography of the Roman Brigetio have been discovered in more detail. However, a Roman city cannot be fully interpreted without knowing the geography and the settlement pattern of the surrounding area. In a cooperation with our colleagues from the Institute of Geography and Earth Sciences in Eötvös Loránd University we have theoretically reconstructed the geomorphological appearance the questionable area based on archive maps, digital terrain models and soil drillings.[11]

5 Paulovics 1941, 152–153; Barkóczi 1949, 69; Barkóczi 1951, 9–10, 1. kép; Barkóczi 1965.
6 Borhy et al. 2012, 263–264.
7 Bartus et al. 2014, 439, Fig. 1.
8 Barkóczi 1951, 9, 2. kép.
9 Borhy et al. 2011, 47–48, Fig. 45; Szabó 2011, 157–158, Fig. 144; Rupnik – Czajlik 2013, 77; Pl. 11.
10 Rupnik – Czajlik 2013, 77; Pl. 11.
11 Viczián et al. 2013.

According to our research we strongly believe that the Romans had built a dam in order to regulate the water system south from Brigetio, which was destroyed later. The existence of this system must be confirmed as many ways as possible. One of the objectives of our field walks is to reconstruct the – not only the Roman – topography of the research area, which will hopefully provide useful data to refine the environmental reconstruction. On the other hand we would like to verify the sites captured by aerial photography. Last but not least the field survey was included in the curriculum of the Instute of Archaeological Sciences of the Eötvös Loránd University thus giving students an opportunity to practice.

The method of the survey has been predefined by the fact that the staff mostly consisted by unexperienced persons. We formed small groups of three or four students mentored by an archaeologist, each of them equipped with a hand-held GPS device. The territory was surveyed in transects according to the plot system. The distance held between each transect varied between 10 and 25 meters in order to maintain the range of audibility between the teacher and the students. The artefacts were recorded as waypoints with the help of the GPS devices and they were normally packed per transect and per GPS separately. Some type of the findings such as stones, tiles, pottery dating to the 18–20th centuries were not collected, but marked and noted in the field report. The advantage of the applied method was that it has provided structured data with a comparatively high resolution which has allowed us not only to define the extension of the archaeological site but to obtain information about its inner relations and density, even about distribution by archaeological periods. Its disadvantage is that the process is time-consuming thus not suitable to investigate larger regions. We spent ten days on the field during 2016, and surveyed more than 270 acres *(Fig. 10)*. The evaluation of the material is in progress, but some results can be presented henceforth.

The plot found in the eastern foreground of the legionary fortress was an important part of our field survey. According to L. Barkóczi the area was sparsely occupied by stone buildings which were interpreted as parts of Roman villa estates.[12] One of these structures was excavated by A. Radnóti in 1940[13] and another stone building was discovered by E. Számadó during the construction works of a pipeline in 1992.[14] The archaeological features have been disturbed by World War 2 bomb craters and several construction works related to the neighbouring oil refinery and storage facility. Traces of these interventions can be easily identified in both archive and modern aerial imagery *(Fig. 11)*. According to the georeferenced photographs we were able to create a map of this area.[15] It seems that a huge proportion of it was covered by stone buildings or at least their foundation was made of stones. Although no clue of the street system was identifiable, we suppose that these remains are better to be interpreted as part of the *canabae* instead of individual villas. By the time of the field walk the plot in question was divided into two parcels with different types of cultivation, which led to uneven surface visibility. Growing wheat covered the eastern part, while the western part was ploughed and flatted. The dispersion of the artefacts on the surface was compared with the map drawn on the basis of the aerial images. The sparse structure of the buildings is reflected by both sources *(Fig. 12)*.

12 Barkóczi 1949, 68, Fig. 1; Barkóczi 1951, 9, Fig. 1.
13 MNM RA 439.Sz.VII; B. Thomas 1964, 265-267, Abb. 142.
14 Számadó 2010, 151-152, Fig. 38.
15 It was partially published: Rupnik – Czajlik 2013, 75, Fig. 5.

The so-called Vasállás is located on the southern bank of the Szőny-Füzitői-Channel, and it is divided into several parts by an artificial channel and roads. It is known from an earlier field walk performed by E. Számadó and L. Borhy (KÖH ID No.: 59494).[16] L. Barkóczi supposed that the Roman road heading from Brigetio towards Aquincum was running through this area.[17] Between 2008 and 2015, multiple series of aerial images were taken on the site by Z. Czajlik.

We have created a rectified photomap of the area based on these images *(Fig. 13, above)*. Beside the traces of a rural settlement characterized by pits, sunken featured houses and trenches and other structures. We were not able to fully elaborate the plan as certain areas remained hidden due to the wind damage and disadvantageous geological conditions. According to the high density of sherds collected on the surface these areas must have been occupied by similar settlement structures *(Fig. 13, below)*.

No unambiguous negative crop-marks of the road leading to Aquincum can be identified, but parallel trenches are visible based on which two possible paths can be supposed *(Fig. 14, above)*. A light dispersion of gravel on the surface was recorded by the northern section close to the modern road to Bélapuszta *(Fig. 14, below)*. Another evidence proving the existence of the road was provided by a soil drill which was performed on the bank of the Szőny-Füzitői-Channel. A thick layer of gravel presumably belonging to the road in question has been documented in the face of the drill *(Fig. 14, above)*. According to these data the line of the road mentioned by L. Barkóczi can be reconstructed, fitting fairly to the street system of the *canabae (Fig. 15)*.

In the southern part of the Vasállás plot, at least fifteen circular trenches can be seen in the aerial images *(Fig. 16.1)*. The origin of these features is uncertain. The traces of World War II bomb craters are often visible due to similar crop-marks, but we did not find any proof that the area in question had been affected by bombing during the war. The other possible explanation is that the circular features belong to burial mounds, which are frequently indicated by circular trenches without any trace of inside structure. The field walk was not successful in this area, because the surface was mostly covered by high-grown weed. Thus further investigation is needed in order to identify and date these circular objects.

The list of objects in question captured by aerial imagery continues with a polygonal trench system found in the south-eastern part of the plot *(Fig. 16.2)*. Although the circumstances were quite favourable by the time of our field survey, no surface finds have been recorded here. This structure might have been built during the 19th century as an outpost of the fortification system surrounding Komárom.[18] North of this earthwork several rectangular crop-marks of graves (approximately 50) are visible, which are mostly adjusted in lines. The field survey did not provide artefacts neither in the case of the fortification nor the cemetery.

Conclusion

Due to the combined elaboration of the aerial photographs and the systematic field survey in front of a GIS background we were able to collect and organise detailed information about the

16 Magyar Nemzeti Múzeum Régészeti Adatbázis (Hungarian National Museum Archaeology Database), http://archeodatabase.hnm.hu/hu/node/68068, accessed 07.03.2017.

17 Barkóczi 1949, 69; Barkóczi 1951, 8, 1. kép.

18 Szamódy – Csikány – Horváth 1998, 116.

extension and structure of the sites. Some features, like graves, enclosures and trenches cannot be detected by field walks, but they become visible using aerial imagery. The methodological and GIS implicated field survey can refill and correct either the archive data of a known site or the information based on aerial photography. Obviously these methods are comprehensive to each other. Hopefully we will be able to expand the boundaries of our research to a wider area around Komárom involving geophysical measurements in order to gain a more elaborated view of the historical landscape.

Acknowledgment

The field walks were supported by the Hungarian Scientific Research Fund and the Klapka György Museum of Komárom. We are very grateful for the help of István Koós from the Office of Building Affairs and Cultural Heritage, Tatabánya. We owe thanks to our colleagues András Bödőcs and Bence Simon from the Eötvös Loránd University. Last but not least, the following students have taken part of the field works: Ferenc Barna, Luca Búr, Róbert Eppel, Rebeka Gergácz, Fruzsina Hege, Dóra Hományi, Bianka Horváth, Bence Jőrös, Zsófia Kelemen, Zoltán Kiss, Dalma Kollerits, Adrienn Leibinger, Dániel Polyák, Dorottya Rakó, Katalin Szarvas, Zsóka Varga.

References

Barkóczi, L. 1949: A brigetiói tábor és canabae topográfiája (Nouvelles données pour la topographie de Brigetio). *Antiquitas Hungarica* 3, 67–72.

Barkóczi, L. 1951: *Brigetio.* Dissertationes Pannonicae Ser. 2, No. 22. Budapest.

Barkóczi, L. 1965: New Data on the History of Late Roman Brigetio. *Acta Antiqua Academiae Scientiarum Hungaricae* 13, 215–257.

Bartus, D. – Borhy, L. – Delbó, G. – Számadó, E. 2014: A new Roman bath in the canabae of Brigetio Short report on the excavations at the site Szőny-Dunapart in 2014. *Dissertationes Archaeologicae* Ser. 3, No. 2, 437–450.

Borhy, L. – Bartus, D. – Czajlik, Z. – Rupnik, L. – Számadó, E. 2011: Brigetio (Komárom/Szőny): Tábor – város a Duna mellett. Brigetio (Komárom/Szőny) – Fortress/City next to the Danube. In: Visy, Zs. (ed.): Rómaiak a Dunánál. A Ripa Pannonica Magyarországon mint világörökségi helyszín. – Romans on the Danube. The Ripa Pannonica in Hungary as a World Heritage Site. Pécs, 42–51.

Borhy, L. – Számadó, E. – Dévai, K. – Sey, N. 2012: Komárom-Szőny, MOL-bázistelep. In: Kisfaludy, J. (ed.): Régészeti kutatások Magyarországon 2010 – Archaeological Investigations in Hungary 2010. Budapest, 263–264.

Borhy, L. – Czajlik, Z. – Rupnik, L. – Nagy, B. – Puszta, S. – Bödőcs, A. – Bartus, D. 2017: Nondestruktív lelőhelykutatási módszerek integrált alkalmazása Brigetioban és környékén 2014–2015-ben. In: Magyarország régészeti topográfiája – Múlt-jelen-jövő. (In press).

Braasch, O. 2003: Die Donau hinab – archäologische Flüge in Ungarn. In: Visy, Zs. (ed.): Régészeti műemlékek kutatása és gondozása a 3. évezred küszöbén. Pécs, 41–65.

Lóki, R. – Szabó, M. – Visy, Zs. 2011: A PTE kutatócsoportja által felmért lelőhelyek katalógusa. In: Visy, Zs. – Szabó, M. – Priskin, A. – Lóki, R. (eds.) A Danube limes program régészeti kutatásai

2008–2011 között. Jelentés a Danube Limes Unesco World Heritage Site pályázat keretében a PTE BTK Régészet Tanszékének kutatócsoportja által végzett kutatásokról – The Danube Limes project archaeological research between 2008–2011. Report on the research carried out by the research team of the Department of Archaeology, University of Pécs within the framework of the Danube Limes Unesco World Heritage Site project. Pécs, 53–100.

Kuzma, I. 1995: Luftbildarchäologie in der Slowakei. In: Kunow, J. (ed.): Luftbildarchäologie in Ost- und Mitteleuropa. Forschungen zur Archäologie im Land Brandenburg 3. Berlin, 251–258.

Paulovics, I. 1941: Funde und Forschungen in Brigetio (Szőny). In: Alföldi, A. (ed.): *Laureae Aquincenses Memoriae valentine Kuzsinszky dicatae II.* Dissertationes Pannonicae Ser. 2, No. 11. Budapest, 118–164.

Rajtár, J. 1997: Die Legionen Mark Aurels im Vormarsch. In: Oexle, J. (ed.): Aus der Luft – Bilder unserer Geschichte: Luftbildarchäologie in Zentraleuropa. Dresden, 58–67.

Rupnik, L. – Czajlik, Z. 2013: Aerial archaeological survey of the legionary camp and military town at Brigetio. In: Czajlik, Z. –Bödőcs, A. (eds.): Aerial Archaeology and Remote Sensing from the Baltic to the Adriatic. Selected Papers of the Annual Conference of the Aerial Archaeology Research Group, 13th–15th September 2012, Budapest, Hungary. Budapest, 71–78, Pl. 11–12.

B. Thomas, E. 1964: *Römische Villen in Pannonien. Beiträge zur pannonischen Siedlungsgeschichte.* Budapest.

Szamódy, Zs. – Csikány, T. – Horváth, Cs. 1998: *Komárom erődváros.* Komárom.

Számadó, E. 2010: Régészeti kutatások Komárom/Szőny területén a római kori Brigetióban, 1990–2010 között (The Archaeological Research at Komárom (Szőny Neighbourhood) on the Territory of the Roman Brigetio, 1990–2010); (Cercetarea archeologica de la Komárom (cartierul Szony), pe teritoriul Brigetio-ului roman, 1990–2010). *Terra Sebus*, 141–176.

Viczián, I. – Nagy, B. – Deák, M. – Szeberényi, J. – Rupnik, L. 2013: Environmental Reconstruction of the Area of Roman Brigetio (Komárom, Hungary). *Studia Geomorphologica Carpatho-Balcanica* 47, 95–105.

Visy, Zs. 1985: *Der pannonische Limes in Ungarn.* Budapest.

Visy, Zs. 2003: *The ripa Pannonica in Hungary.* Budapest.

Fig. 1. The track of the flight carried out on 22th June 2016.

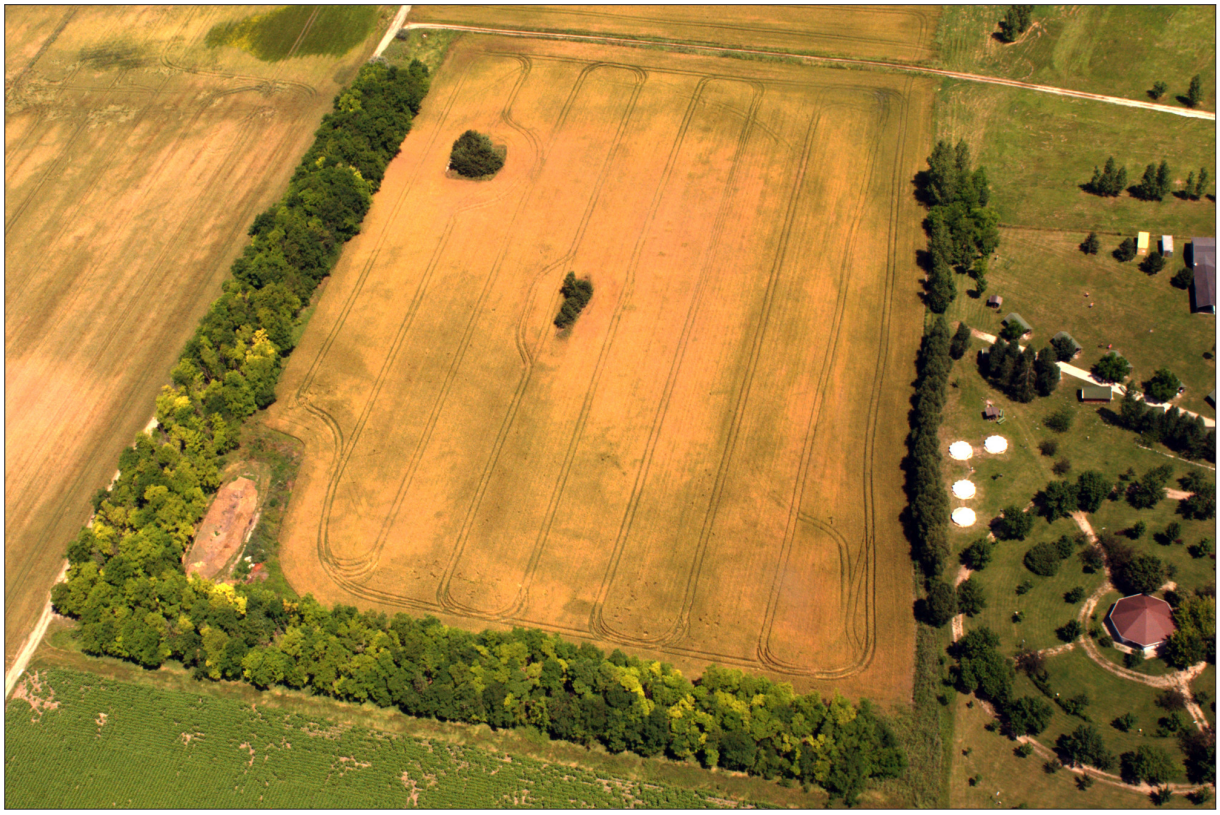


Fig. 2. Traces of a Roman age rural settlement in the territory of Brigetio (Photo: Z. Czaljik, 22.06.2016).

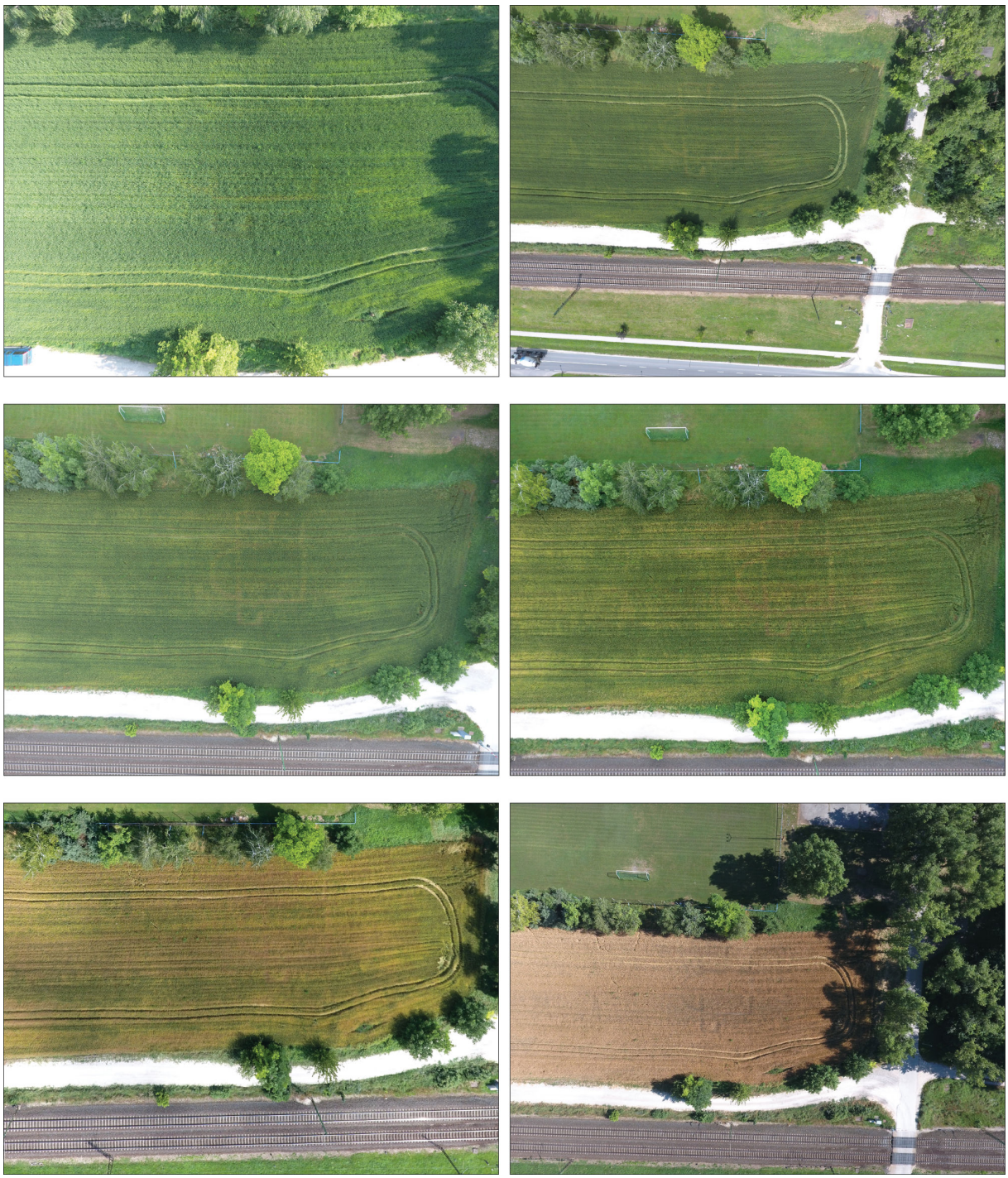


Fig. 3. Development of the crop-marks showing the apsidal stone building in the castra. Above left: 03.06.2016; Above right: 06.06.2016; Middle left: 10.06.2016; Middle right: 14.06.2016; Below left: 23.06.2016; Below right: 28.06.2016 (Photos: D. Bartus – L. Rupnik).

Fig. 4. Apsidal building. Hybrid view of images taken on the 10th and 28th of June (Photo: D. Bartus and L. Rupnik).

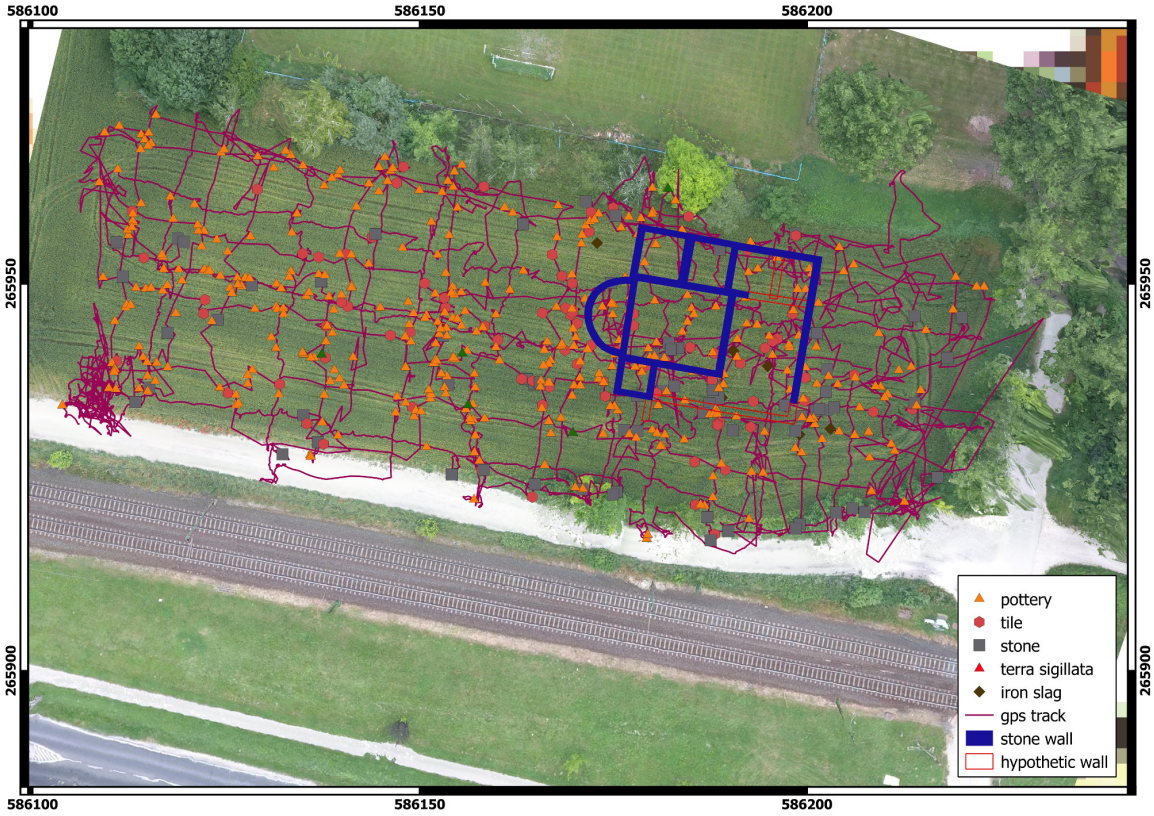


Fig. 5. The ground plan of the apsidal building and the result of the field walks.

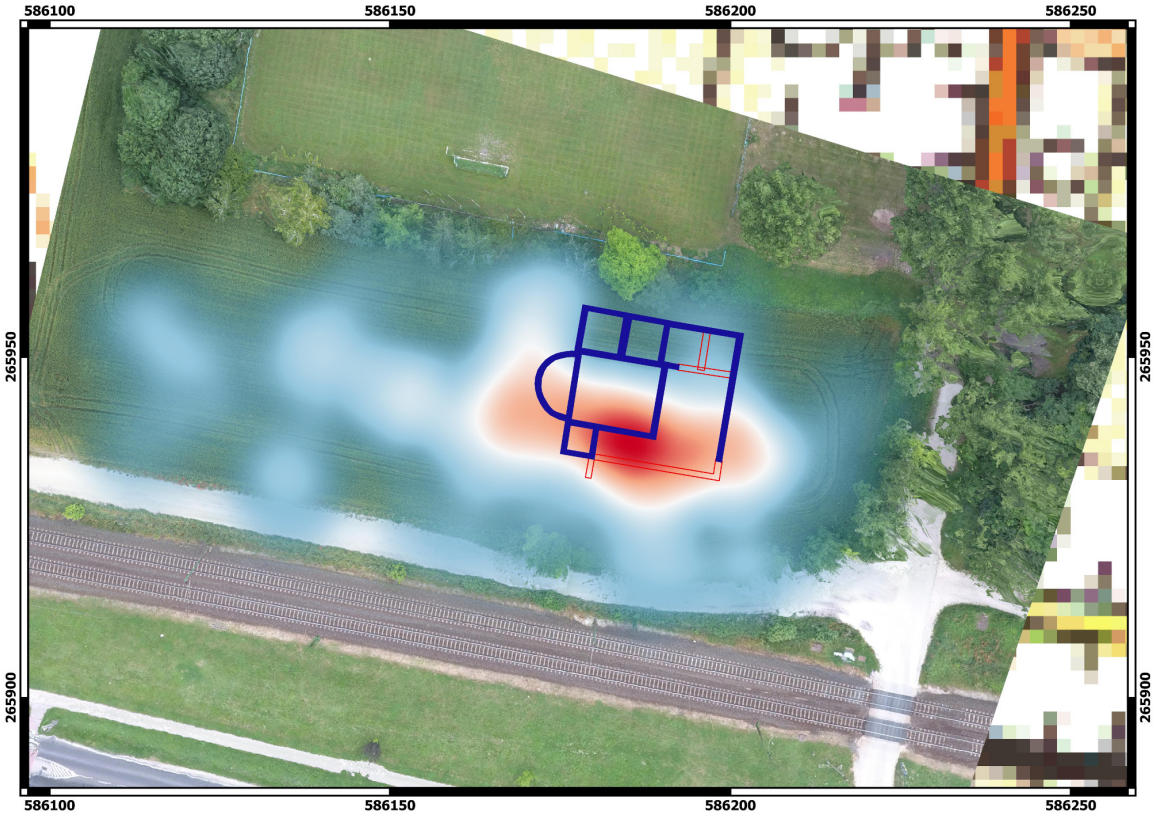


Fig. 6. The heat map showing the density of stone and tile fragments around the apsidal building.

Fig. 7. Positive crop-marks of the graves in front of the *fossa* near the *porta principalis sinistra*, by different visibility.

Fig. 8. Traces of a street connecting the *porta principalis sinistra* with the *canabae*.

Fig. 9. The position of the archaeological features documented using the quadcopter around the *castra legionis*.

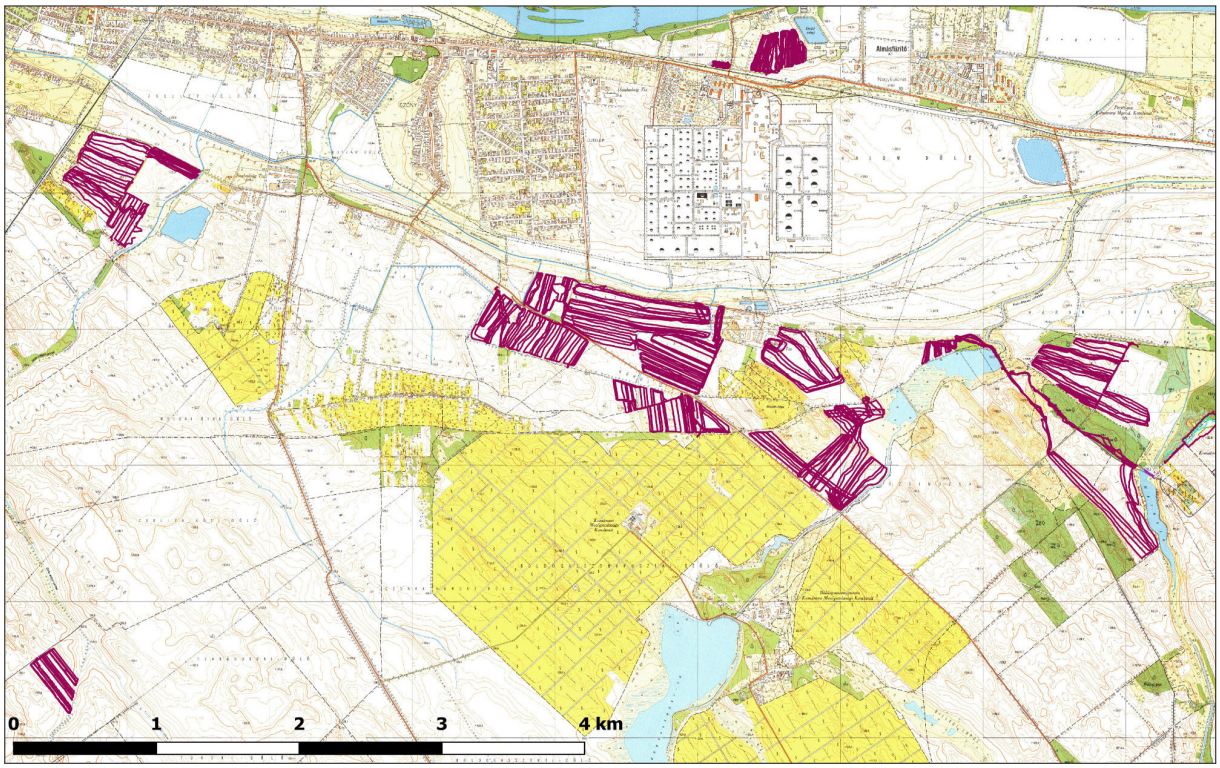


Fig. 10. The areas around Komárom affected by field surveys.

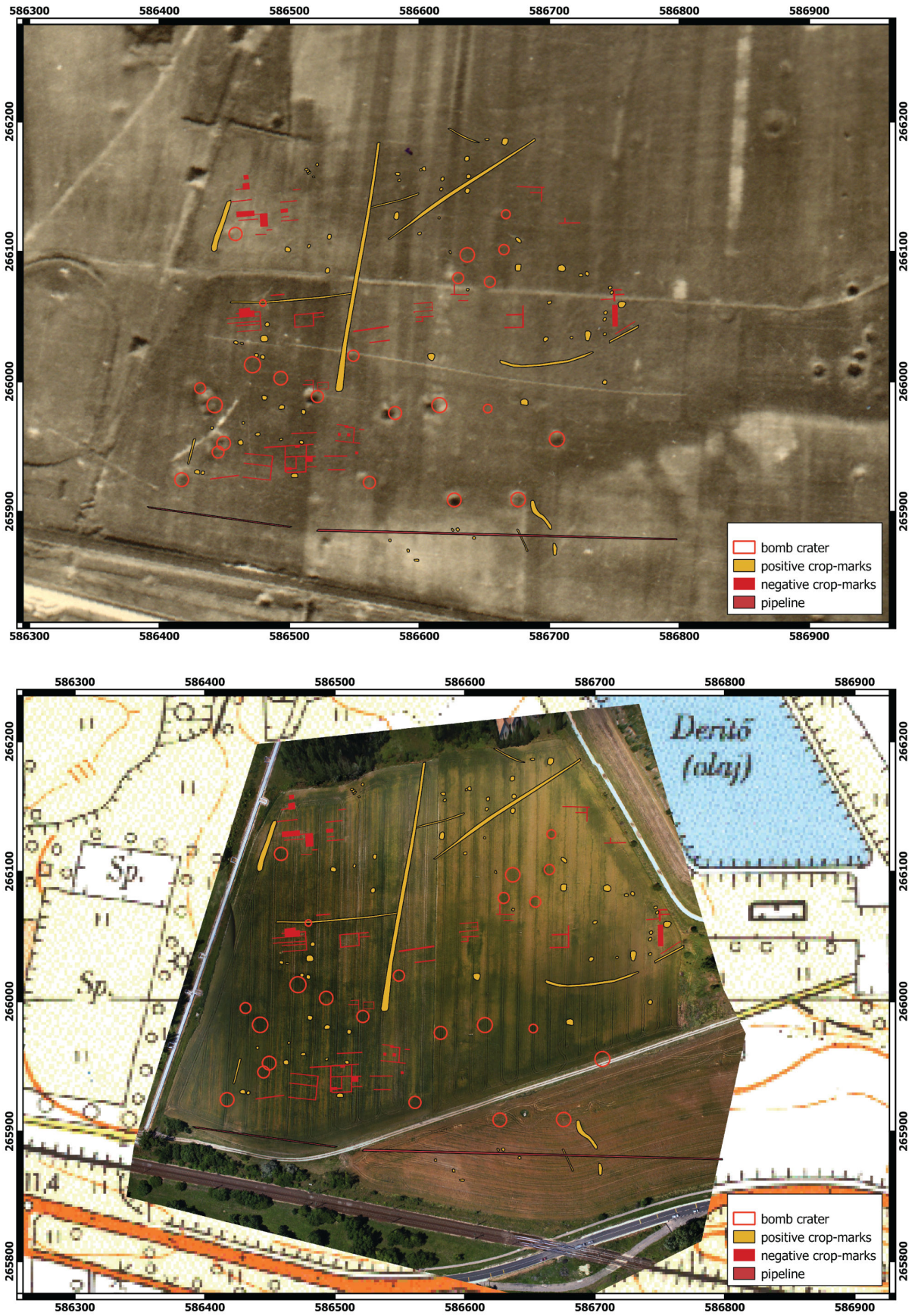


Fig. 11. The interpreted ground plan of the area east of the fortress, displayed in archive (above) and modern oblique images (below).

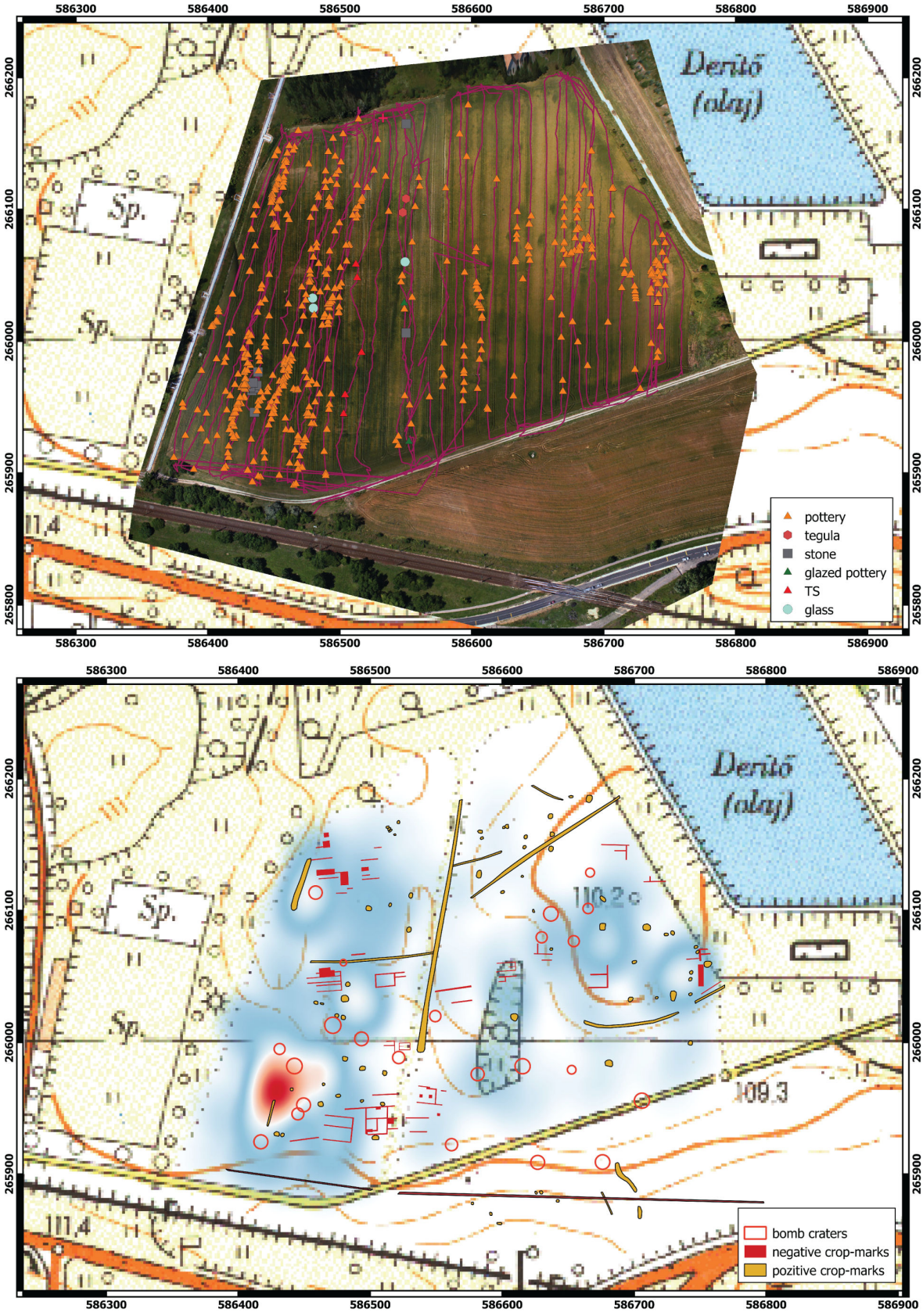


Fig. 12. The results of the field survey concerning the area east of the fortress. The GPS-tracks and the location of the collected artefacts (above), and the heat map weighted by the surface finds (below).

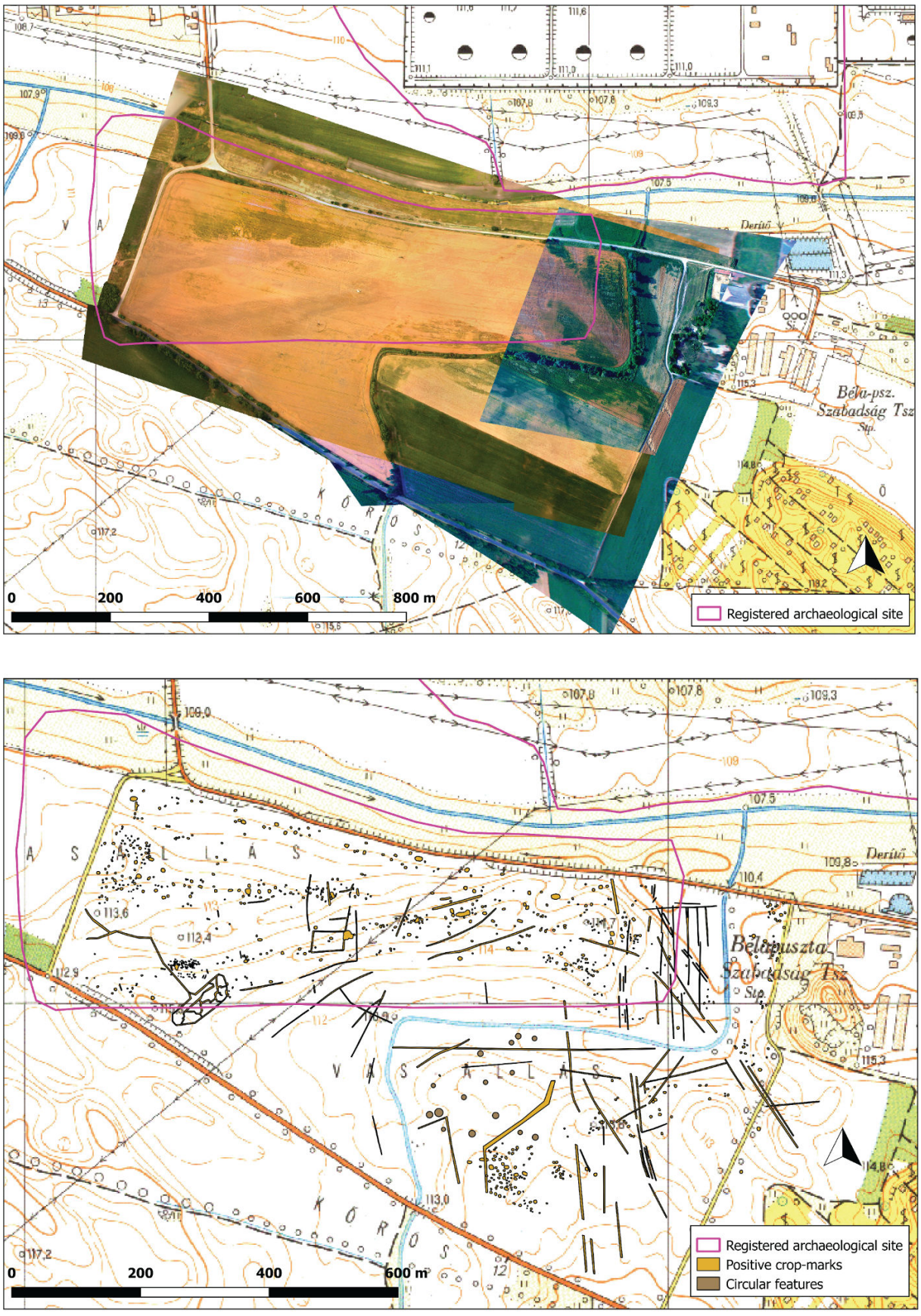


Fig. 13. The photomap of the Vasállás site (above), and the interpreted crop-marks (below).

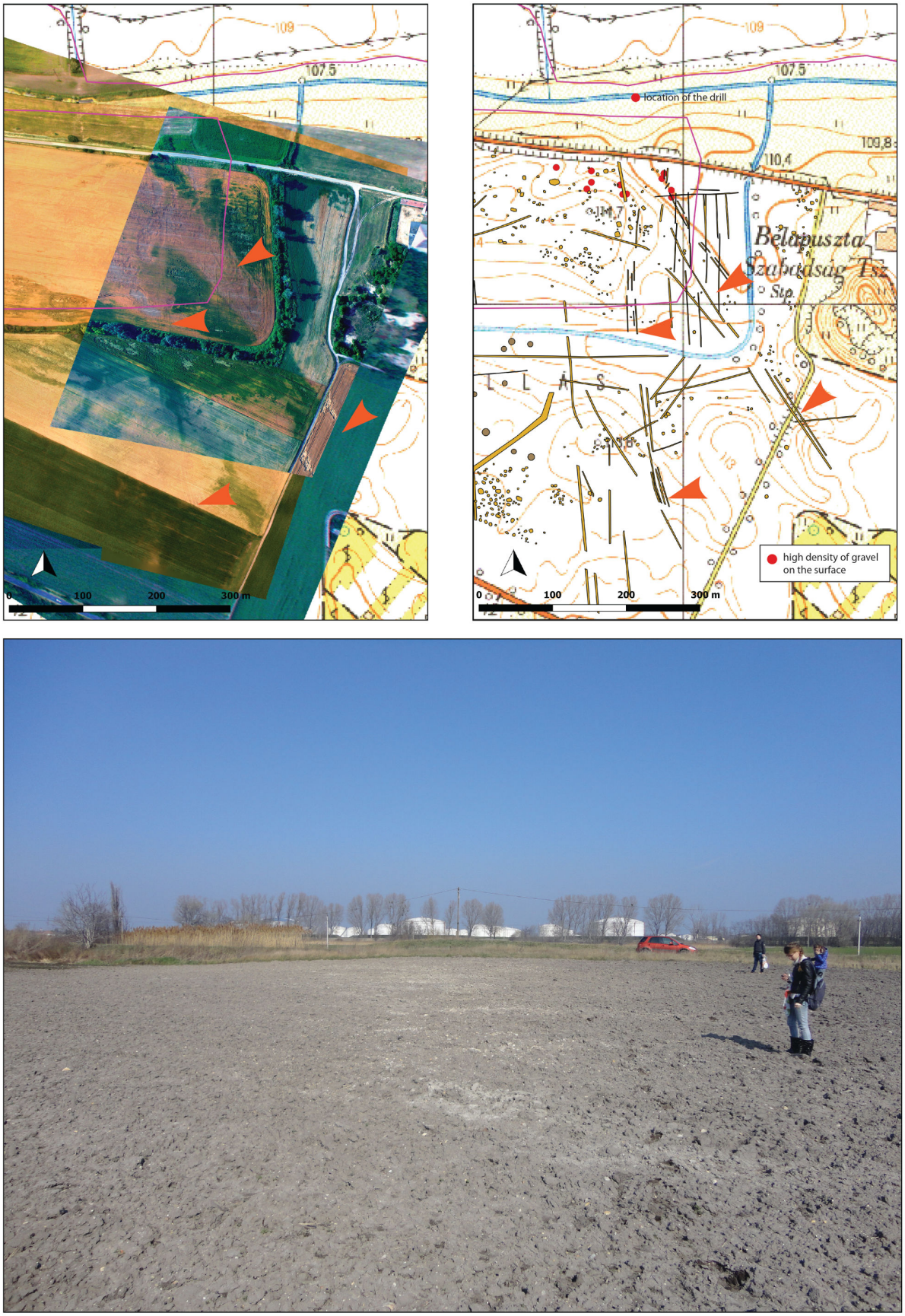


Fig. 14. Section of the Vasállás site with the possible paths of the Roman road heading from Brigetio to Aquincum (above) and the spread of gravel on the surface in the line of the road (below).

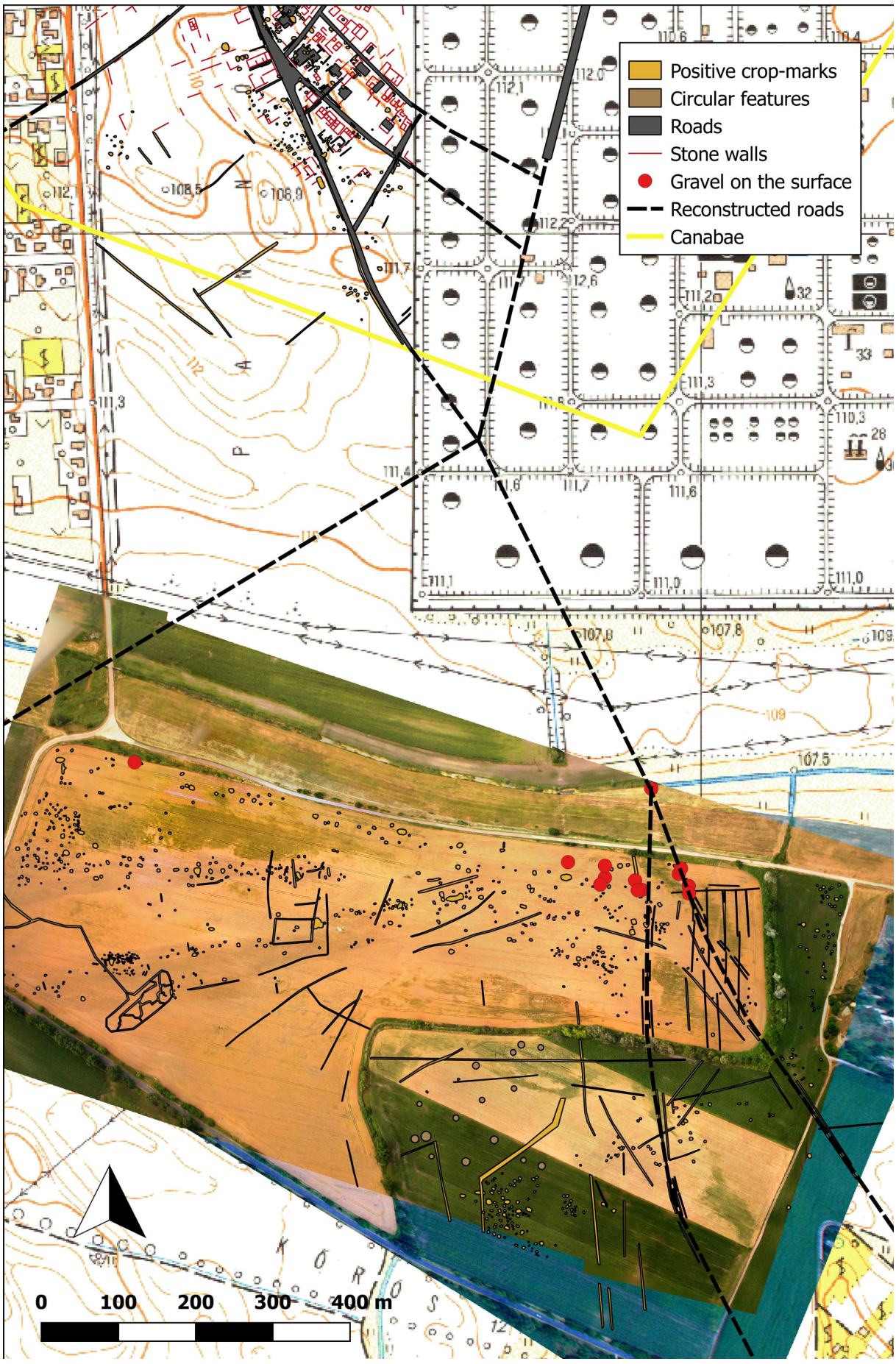


Fig. 15. The possible reconstruction of the road net which might have occupied the southern part of the *canabae* and the Vasállás.

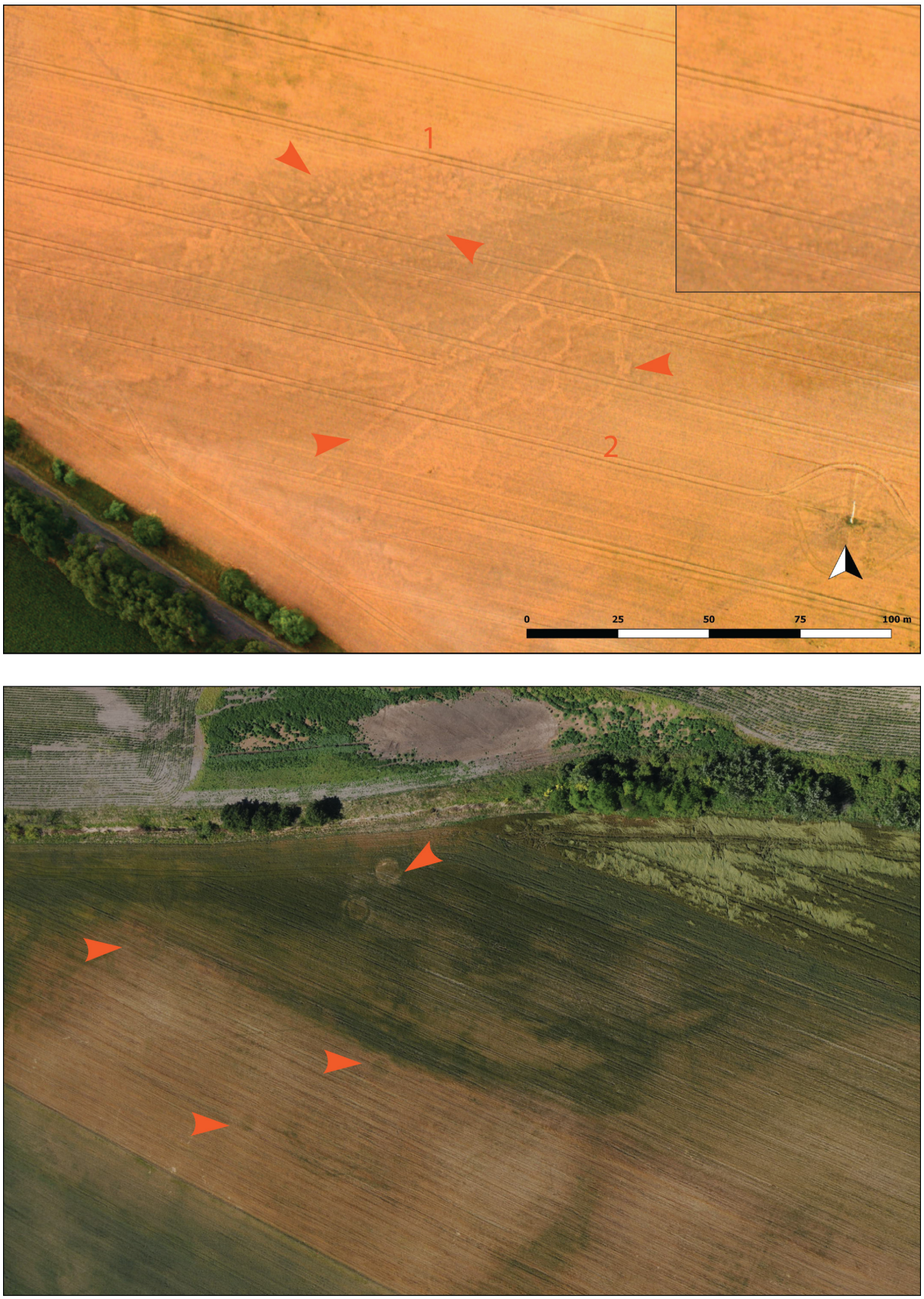


Fig. 16. Traces of circular structures (1), 19th century fortification (2) and a cemetery (3) in the Vasállás site.