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## Airborne Laser Scanning and 20<sup>th</sup> Century Military Heritage in the Woodlands

### ABSTRACT

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This paper discusses recent advancements in the context of modern conflict archaeology in the woodlands. One aspect of this development of archaeological research is a broad use and application of airborne laser scanning (ALS). Material remains of a forced labour camp and munitions depot in the forests around Gutowiec (Poland) known as Guttowitz 35 are used as a case study. After approaching prisoners' memories concerning the site, the results of ALS combined with the outcomes of fieldwalking at the site are presented. This article tries to back up the following thesis: due to applications of non-invasive methods (e.g. ALS, fieldwalking), archaeology is able to offer a deeper understanding and contextualization of such sites as Guttowitz 35: a fresh insight into the materiality of conflict landscapes from the recent past in the woodlands.

**Key words:** airborne laser scanning, modern conflict archaeology, archaeology of the recent past, military heritage, woodlands, landscape, materiality

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### Introduction: modern conflict archaeology and woodlands as *terra incognita*

Modern conflict archaeology is a growing field of archaeological interest (e.g. Schofield 2005; Zalewska *et al.* 2017). One of the branches of it is so-called archaeology of the Second World War which focuses on material heritage of this conflict (Sturdy Colls 2012; Moshenska 2013). Archaeologists have been carrying out both invasive and non-invasive field research on such sites as death camps (e.g. Kola 2000; Majorek, Grupa 2015), prisoner of war and forced labour camps (e.g. Carr, Mytum 2012; Mytum, Carr 2013), mass graves (Kola 2005), to mention but a few examples.

However, heritage of Second World War in the forests was out of closer attention for a long period of time (Passmore *et al.* 2014). In this regard archaeology of the Second World War met the same difficulties

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as other kinds of archaeologies. For decades, from an archaeological point of view, forests were a blind spot (e.g. Czebreszuk *et al.* 2013), so to speak. In a nutshell, a density of trees and bushes, among others, did not give opportunities for detailed surveys and research of woodland landscapes. Aerial photography was not efficient in this context too (e.g. Rączkowski 2002; Opitz, Cowley 2013).

The situation has begun to change in the recent years though. The broad applications of non-invasive research, especially ALS (e.g. Hesse 2010) but not only, brought new possibilities. This concerns different categories of landscapes up to and including the conflict landscapes from the recent past (Stichelbaut, Cowley 2016). In short, forest as *archaeological terra incognita* becomes slowly a *terra cognita*. A whole series of books and articles have recently been published where LiDAR derivatives are used in the context of heritage in the woodlands (e.g. Hesse 2010; Kokalj *et al.* 2013; Mlekuž 2013a, 2013b; Štular *et al.* 2012; Irlinger, Suhr 2017). Along these lines, the same is valid about recent research tendencies in Polish archaeology (e.g. Banaszek 2015; Pawleta, Zapłata 2015; Zapłata *et al.* 2014; Kobińska *et al.* 2016; Kobyliński 2016). It can be even said that ALS is changing our understanding of prehistory. That is to say, archaeologists have recently started writing a *new* prehistory due to a broad use of ALS data.

The body of new articles, books, and projects dealing with heritage of the modern armed conflicts in the woodlands is constantly growing too. Once again, this trend includes both archaeological research in different parts of Europe (e.g. Seitsonen, Herva 2011; Herva 2014; Passmore *et al.* 2014; Capps Tunwell *et al.* 2015) as well as within the context of conflict archaeology in Poland (e.g. Ławrynowicz 2013; Karczewski, Karczewska 2014; Kobińska *et al.* 2015, 2016, 2017; Konczewski *et al.* 2016). All this research clearly indicates the potential of various archaeological methods in regards to documentation of conflict landscapes of the recent past. From an archaeological point of view, material heritage of the conflict as well the whole landscapes in which conflicts took place are as much valuable data as historical, written documents from the period.

In the same vein, most of the studies highlight the fact that the modern conflict heritage in the woodlands has preserved in a very good condition till present (Passmore, Harrison 2008; Passmore *et al.* 2014; Seitsonen, Kunnas 2009; Seitsonen, Herva 2011). This situation gives unique possibilities to show the strength and advantage of archaeological

research in *practice*. For example, as pointed out by David G. Passmore and Steven Harrison (2008, 106) apropos of their research on field fortifications in the Ardennes forests of Belgium dated on the Second World War:

[archaeological research in the forests – D.K.] provides an illustration of the potential for such studies to explore the hurried deployment of field fortifications in the face of unexpected and imminent threat, while also serving to inform a comparison of battlefield remains with military unit histories, contemporary military doctrine and published accounts of the local conduct of battle. It is to be hoped that the work will stimulate a wider awareness of the value of recording and managing the region's WW2 battlefield heritage in the face of future development pressures, and especially the immediate threat posed by mechanised forestry operations.

Without any doubt, it would be – to put it simply – misunderstanding that archaeological research on material heritage of modern armed conflicts offers to write e.g. a *new history* of Second World War.

Indeed, archaeology is able to document, contextualise and – sometimes – change the dominant understanding of what happened in the recent past. Nonetheless, archaeology does not only offer microhistories: local aspects of the conflict. There are relevant examples where archeological research changes even the *grand narrative* and perception of the conflict. The most obvious example concerns the famous Battle of Little Bighorn in the US where archaeological research could change – as one could put it – the dominant understanding of the battle and its progress (Scott Douglas *et al.* 1989). As a more recent example of such archaeological research can be mentioned a work of Alfredo González-Ruibal (2017) in the context of the Spanish Civil War.

Above all, archaeological research on the conflict landscapes from the recent past especially in the woodlands makes visible the huge amount and diversity of the First and Second Word Wars' heritage. As noted by Passmore *et al.* (2014, 1289) in their influential paper on the topic:

Writing in 1994 – the year of the fiftieth anniversary of D-Day – Chippindale's *Antiquity* editorial observes that “it is the number and mass of objects that make one aware of the material differences of twentieth-century warfare” (1994, 478). Chippindale would no doubt recognise the vast majority of objects specific to WW2 that have been documented since. But nearly 20 years on, it would appear that we have significantly underestimated the

“quantity of stuff” (Chippindale 1994, 478) that remains to be documented in the conflict landscapes of WW2 Europe. In hosting such a well-preserved earthwork legacy of constructional features and explosive impacts, forest and woodland environments stand as a unique resource in the context of WW2 battlefields in north-west Europe. This is true not only in terms of the quantity of material, but also in complementing the concrete and brick of widely recognised conflict landscapes with more ephemeral battlefield and bombscape archaeology.

Paradoxically, from a certain point of view, Passmore *et al.* (2014) also underestimated the quantity and variety of *conflict stuff* in the woodlands. Forests of north-western Europe are not a unique resource in this regard. Without any doubt, Polish woodlands are, as recent research indicates, an archaeological *terra repromissionis* as well (e.g. Kobialka *et al.* 2015; 2017).

Nonetheless, no one is questioning the possibilities offered by a new, non-invasive archaeological research. The results of a broad application of LiDAR derivatives in Poland (Banaszek 2015; Wroniecki *et al.* 2015; Zapłata *et al.* 2014), Germany (e.g. Hesse 2013), Slovenia (Mlekuž 2013a, 2013b), and so on are – to put it simply – outstanding (see also Štular *et al.* 2012; Opitz, Cowley 2013). However, one has to be also aware of the limitations of method. Like every method, it has its strong and weak aspects (Rączkowski 2012). In other words, ALS is not – to use a concept coined by the American philosopher Richard Rorty (1979) – a mirror of nature; a tool that opens up the *black box* of the past. Accordingly, ALS is not the way to reconstruct the past as it really was. During gathering, working, and interpreting of ALS data, a long chain of data reduction takes place (Kiarszys, Szalast 2014; Banaszek 2015; Wroniecki *et al.* 2015; Rączkowski 2017). This is the reason why even ALS data offer only the possibility to study the multitemporality of material aspects of landscapes of the past in the present.

This paper is a case study of one site related to the Second World War in the woodlands around Chojnice, Pomorskie province (Poland). In what follows, I present historical data concerning the site known as *Guttowitz 35*. I discuss some of the testimonies written down by the prisoners of the camp. The next part contextualises the results of an analysis of ALS data of the site combined with outcomes of fieldwalking at the *Guttowitz 35*. All in all, I try to back up the following thesis: due to various applications of non-invasive methods (e.g. ALS), archeology

is able to deliver new data, a fresh insight into the conflict landscapes from the recent past in the woodlands.

### The site: *Guttowitz 35*

During the Second World War, the Nazi Germany opened – as it is assumed – approximately 40 000 prisoners of war camps, forced labour camps, internment camps, concentration and death camps (e.g. Homze 1967). One has to bear in mind that the concept of forced labour camp is a very broad category (see more in Herbert 1997). It includes structures of different functions and purposes, various shape and diverse infrastructure, etc. Accordingly, there are camps that are well known and about which many oral and historical records survived till present. Some of them are today museums or education centres, to mention but a few contemporary uses of the spaces after the Second World War's camps. There are, however, also structures about which relatively small number of historical documents preserved. Some of such structures were deeply hidden in the forests. In short, after nearly 80 years of closing of such camps, there is very limited knowledge about their functioning, infrastructure and prisoners (see also Myers, Moshenska 2011). One such example is the topic of this study: the camp *Guttowitz 35* hidden in the woodlands between Chojnice and Czernik between Chojnice and Czernik (e.g. Daniluk 2012).

Written down testimonies/ memories of the prisoners say that the camp mostly detained British, French and Belgian soldiers captivated on the Western Front (Fig. 1).

One of the British prisoners of war detained in *Guttowitz 35* was Walter Darbyshire (2005)



**Fig. 1.** Belgian (left) and French (French foreign legion) (right) uniform buttons found at *Guttowitz 35* (photo D. Kobiałka)

who served at the Duke of Wellington Regiment. In 1940, he was sent with his regiment to Cherbourg (north of France). Few weeks later, he was captivated by German troops. In short, he finally was taken to Stalag “Thorn” Camp 13XXA and later moved to *Guttowitz 35*. The memories of Darbyshire are – it can be said – a typical story of a soldier who survived the Second World War. For the purpose of this study the most important are those memories which directly refer to *Guttowitz 35*:

Following the solitary confinement, we struggled on for, I would imagine, somewhere round about six or seven months, when, along with about thirty or so other men, I was moved to Camp 35 at Guttowitz. Although this Camp left a lot to be desired, we did begin to live a bit. The beds were three tier bunks, with – straw palliasses, which were not too hygienic, as by this time, the first lice were beginning to appear, no doubt due to malnutrition and the filthy conditions that we were living in (Darbyshire 2005, available at <http://www.bbc.co.uk/history/ww2peopleswar/stories/71/a4083671.shtml>, accessed 1.08.2017).

The British soldier describes the camp infrastructure in a vague way (Fig. 2):

There were some cold showers in this Camp, but at first we had no soap, and not even a change of underclothing. We were issued with wooden clogs and foot rags but not much else. This Camp housed, I would guess, about 500 or 600 men, most of whom went out daily in working parties (Darbyshire 2005, available at <http://www.bbc.co.uk/history/ww2peopleswar/stories/71/a4083671.shtml>, accessed 1.08.2017).

All in all, Darbyshire spent four years in the camp. The British soldier also mentions the work they had to do. The prisoners were ordered to clean a way through the woods and – what was much more important – to work on a motor-way which run from Berlin to Königsberg, among others. What is also interesting in the Darbyshire’s memories is the fact that he mentions the moment and circumstances of the camp’s closing. It was in December 1944, while the Red Army was approaching the camp, the prisoners were ordered to carry only what they were able to hold in the hands and marched away towards west (Germany). Fortunately, Darbyshire survived the hash time of marching and was finally released by the Allies troops.

Roy Herbert Godfrey from the British Royal Army (‘Briggs’) was another British soldier who was taken into German captivity during



**Fig. 2.** It is striking that Walter Darbyshire did not describe the number, outlook and shape of barracks in which soldiers slept. Remains of some barracks are still visible in the woodland landscape: an outline of one of the them at the terrain of camp (*photo D. Kobiałka*)

the first months of the Second World War on the Western Front. Like Darbyshire, he was taken to a prisoner of war camp in Thor and in October 1940 moved to the camp hidden in the forests around Gutowiec. According to Godfrey, the camp had been still in construction when he arrived. He also mentions the fact that the Allied prisoners were constantly waiting for the Red Cross parcels. The only memory that says something about the outlook of the camp is the one when the British soldier mentions that the prisoners had two tier beds to sleep. He also highlights that the French soldiers were detained at the camp too.

Similar story concerns Bob Master (1960) from the 1st Battalion of the South Wales Borderers who after landing in France, had to surrender to a German patrol. He also, with his comrades, was taken to Thor. Master's memories confirm that Germans used the Allied





**Fig. 3.** A fragment of artillery shell documented during the field research at *Guttowitz 35* (photo D. Kobialka)

soldiers during a road building that was to link Berlin and Königsberg. The prisoners did some repairs of the local routes too. Just after a few weeks Master was sent back to Thorn.

The memory about *Guttowitz 35* is still alive among local communities as well. According to a regionalist Piotr Szulc (personal communication, 20.03.2017), the elders confirm that a German forced labour camp was functioning in the woodlands near Gutowiec. Elder people remember that French and British soldiers were captivated in the camp and that they had to build the road, among others. These memories also mention the advent of the Soviets who discovered abandoned camp and munitions depot full of stuff left by the Germans (Fig. 3). For a few weeks, the Soviet stationed in the woodlands and blew up the abandoned German munitions supplies.

Without any doubts, oral history of the local communities and memories of the soldiers detained in *Guttowitz 35* are a valuable historical record. However, they say very little about the camp and munitions depot infrastructure. In other words, they lack the very materiality that constituted day-to-day life and work of the prisoners at the camp and munitions depot. Material culture and material transformations in the local woodland landscape are also a valuable historical and archaeological

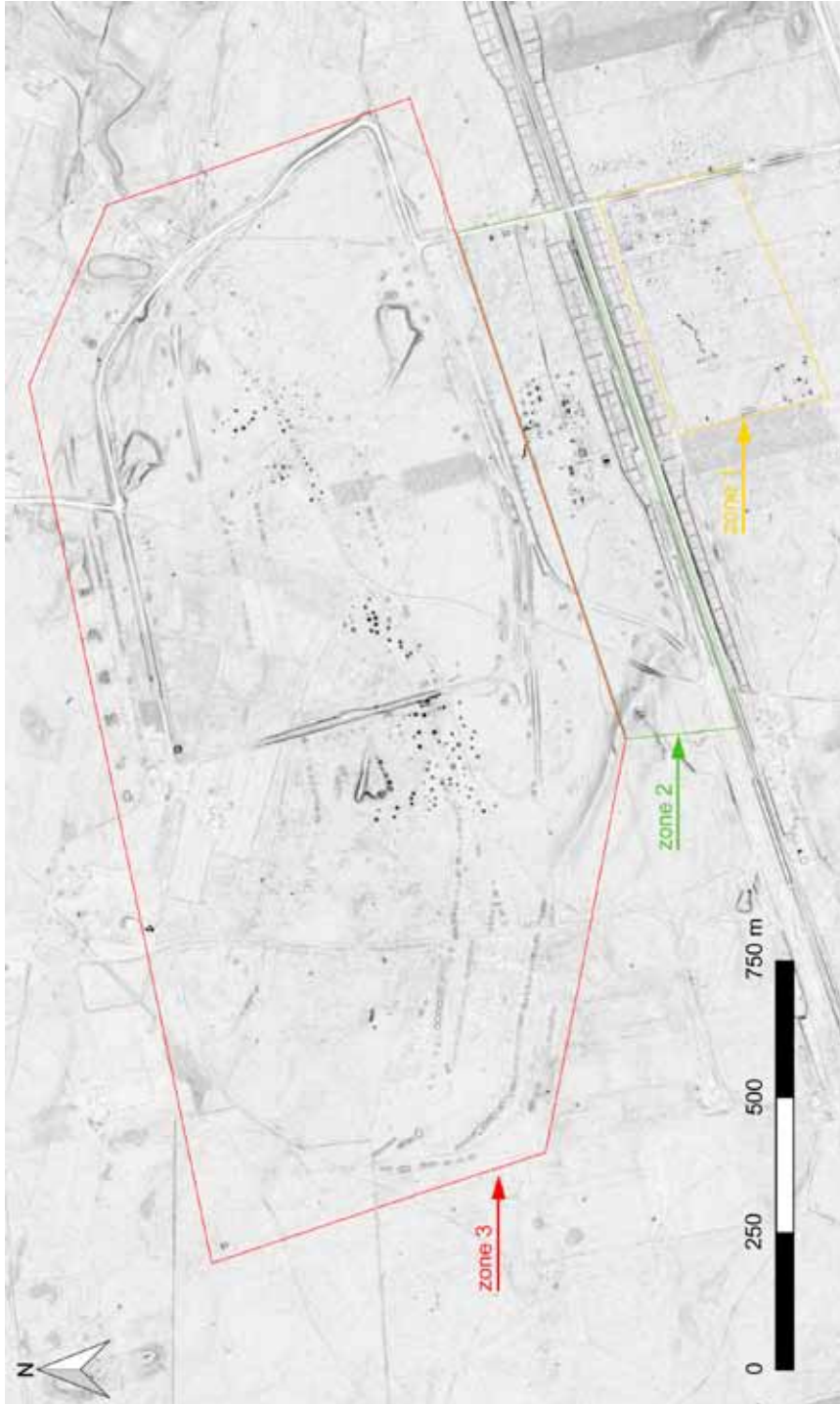


record. The preliminary results of interpretation of ALS data concerning the camp and munitions depot combined with fieldwalking at the site are discussed and presented in the last part of this paper.

### **The materiality of *Guttowitz 35*: between past and present of the site**

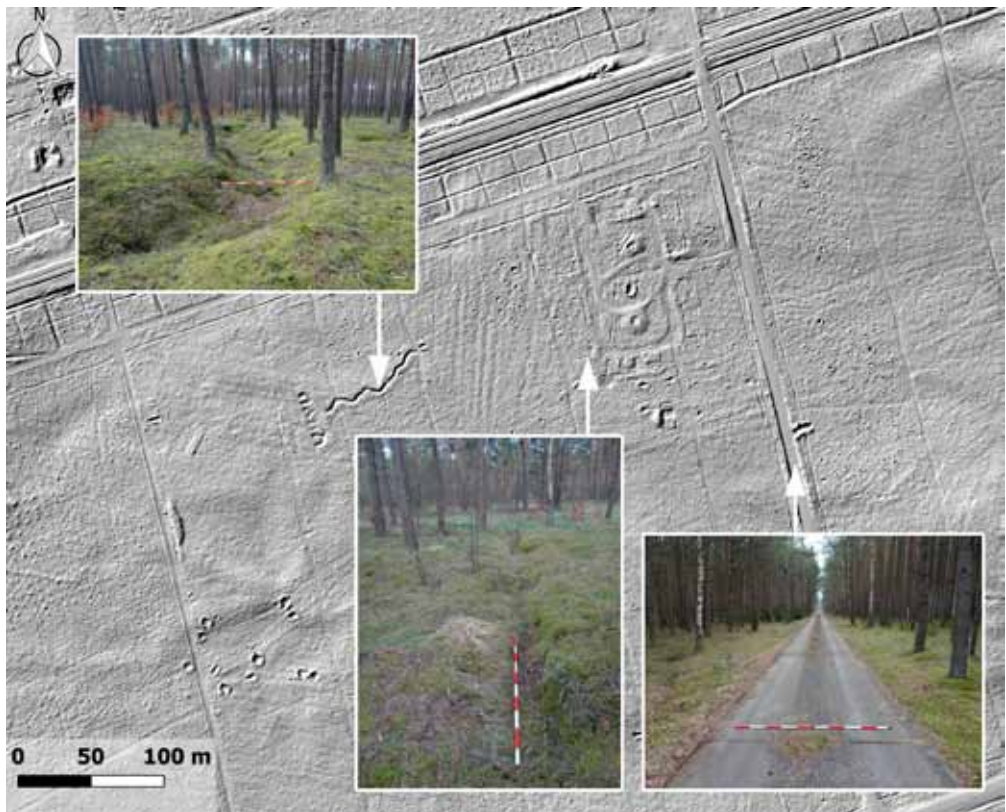
The first thing to notice is that the ALS data used in the following case study were not gathered for strictly archaeological purposes. The airborne laser scanning of *Guttowitz 35* was part of a larger, national-wide program called ISOK (Informatyczny System Osłony Kraju przed Nadzwyczajnymi Zagrożeniami; in English: IT System of the Country's Protection) (Wężyk 2014). Nonetheless, the archaeological practice of the last years proved the huge potential of the ISOK data regarding archaeological studies of past landscapes, including the conflict landscapes from the recent past (e.g. Kobiółka *et al.* 2016; 2017). Accordingly, the data for the analysis of *Guttowitz 35* were obtained from the Geodesic and Cartographic Documentation Centre, Poland. The density of scanned area was no less than four point per square meter. Relying on these data, Digital Terrain Model (DTM) was created with a 0,5 meter resolution. DTM was then used to prepare visualizations of certain parts of the landscape thanks to a use of various algorithms. Among these visualizations were a hill shade and local dominance (see more in Hesse 2010; Štular *et al.* 2012). Part of the research methodology was field surveys which aimed at revising structures *in situ* that were discernible on LiDAR derivatives.

Figure 4 presents the general view of *Guttowitz 35* visible on LiDAR derivatives. To put it simply, it makes visible the *quantity and diversity of Second World War stuff* hidden in the forests around Gutowiec. Accordingly, the diversity and quantity of material remains preserved in the forest cause difficulties while interpreting the data. Remains spread around approximately 40 hectares. They have different shapes and depths; it seems that they functioned for various purposes and survived in different condition till now. Even the precise number of – as Laurent Olivier (2011) would have put it – material memories of the camp and munitions depot is hard to assess. One thing is sure: it is a unique military complex consisting of hundreds of different structures built and used by the Germans during the Second World War.



**Fig. 4.** The quantity and diversity of Second World War stuff: material remains of the PoW camp and munitions depot in the forests around Gutowiec visible on LiDAR-derived data (visualization: hill shade)

For the purpose of this study one can distinguish at least three characteristic zones of *Guttowitz 35* readable on LiDAR derivatives which differ with regard to their past function. The first one actually seems to be what the prisoners like Walter Darbyshire, Roy Herbert Godfrey, and Bob Master meant by *Guttowitz 35*: remains of a forced labour camp (Fig. 5). The camp was located on the left side of road made of concrete slabs that linked the camp with the motor-way. There are visible outlines of four rectangular structures. They were approximately located on the N-S axis. Fragments of clay bricks and concrete debris documented around them might indicate that these are foundations of four wooden barracks in which prisoners slept. They were approximately 42 meters long and 13 meters wide. Between the barracks there were located two most intriguing structures which precise function is hard



**Fig. 5.** Remains of the forced labour camp in the forests around Gutowiec visible on LiDAR-derived data (visualization: hill shade)



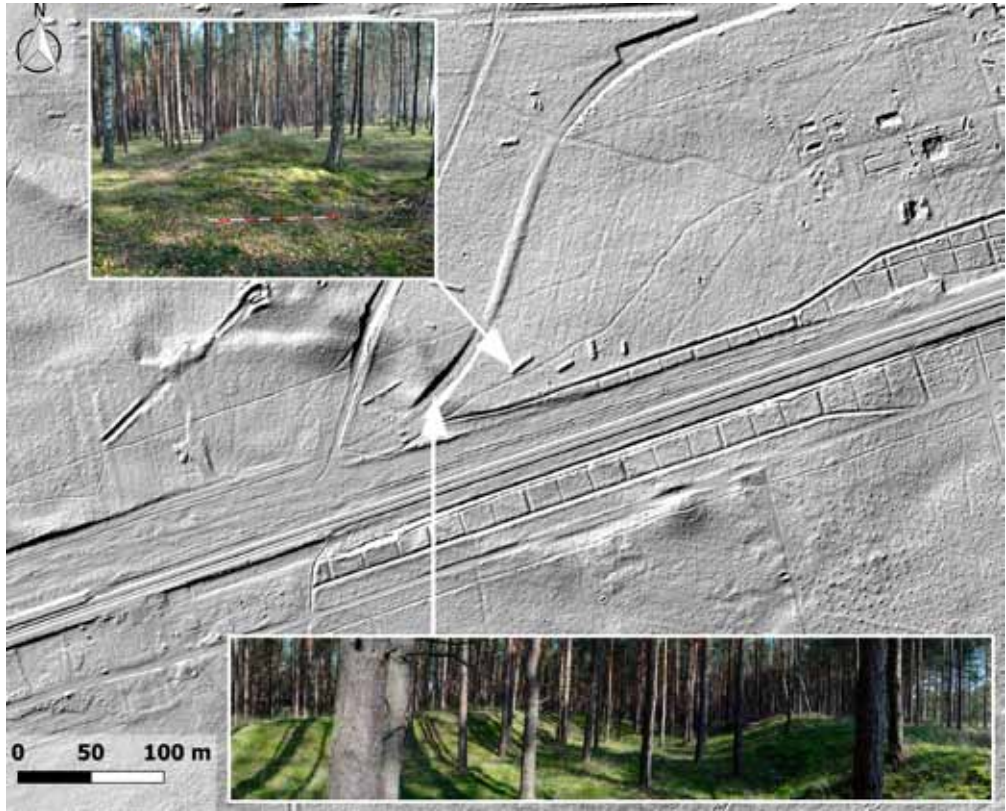
**Fig. 6.** Remains of structures related to administration of the munitions depot in the forests around Gutowiec visible on LiDAR-derived data (visualization: local dominance)

to interpret. They are a kind of concrete, circular silos embedded in the ground. Another structure was located to the southern from the barracks. It is smaller than the four barracks. It was 20 meters long and 10 meters wide. This could be a guard barrack.

A trench and gun nests located approximately 100 meters left from the barracks were also part of the camp. A group of 10 rectangular structure – most probably – relate to the functioning of the camp as well. Some researchers interpret such structures as vehicle shelters (Harrison *et al.* 2015, 241). Finally, one cannot but mention also the huge number of contemporary robbery pits visible on the LiDAR derivatives and at the woodland landscape during the field research. The camp had to be fenced. Traces of it, however, are not noticeable in the LiDAR data as well as during the field surveys.

*Guttowitz 35* had a deliberate localization. First, it was hidden in the thick forests. Second, the camp was located near the planned motor-

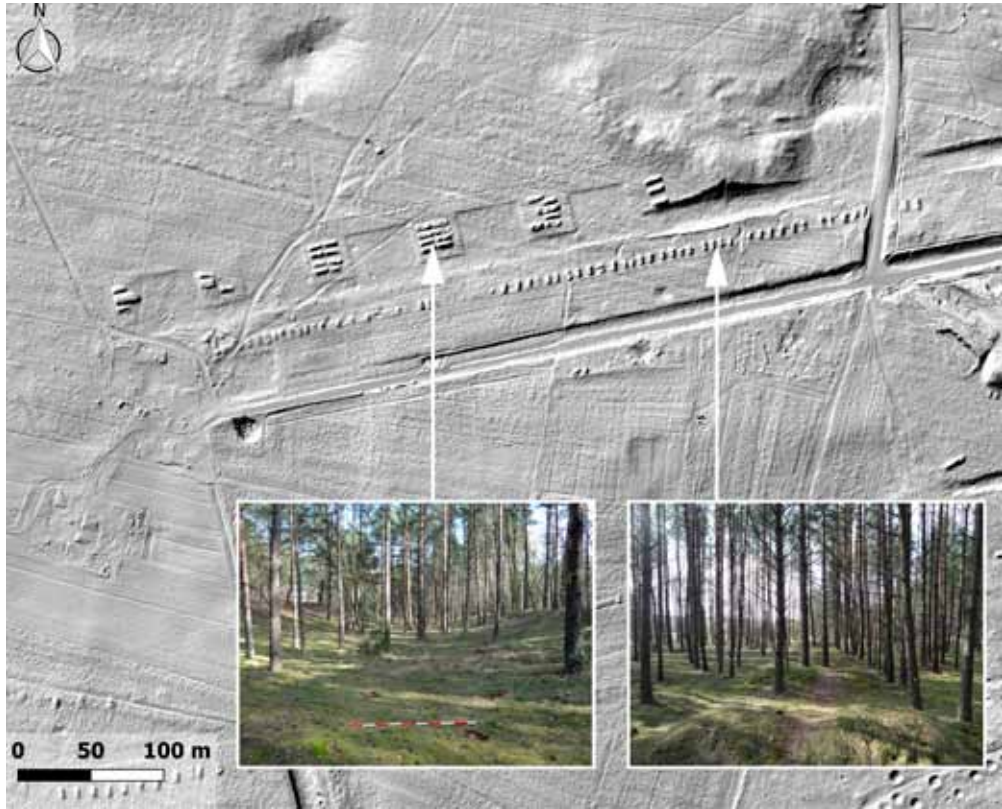




**Fig. 7.** Remains of a railway siding in the forests around Gutowiec visible on LiDAR-derived data (visualization: hill shade)

way. Last but not least, it was located close to a railway track which was used to deliver and transfer people (e.g. German soldiers, Allais prisoners of war) and material goods (e.g. food, equipment, parcels, up to and including munitions which were stored at the site).

The second distinguished zone of *Guttowitz 35* is a railway siding with infrastructure. The main railway track that links Chojnice and Tczew was – as one can assume – a kind of border which separated the camp from other parts of the site. It consists of various structures. One can distinguish outlines of at least five buildings which are most probably remains of administration barracks (Fig. 6). Traces of five rectangular and square structures which are embedded in the ground up to two-tree meters are also very intriguing. During the field survey, inside of them, I found concrete debris and ‘trash’ (e.g. tin cans, animal



**Fig. 8.** The remains of tens of different earthen platforms of various forms creating rows and clusters in the forests around Gutowiec visible on LiDAR-derived data (visualization: hill shade)

bones, an iron nail etc.). Part of this zone are also structures which might be interpreted as vehicle shelters.

While building such sites as *Guttowitz 35a* typical practice would be preparing for the air attack from the enemy. Indeed, an anti-air trench located northern to remains of administration buildings has survived in excellent condition till present. It is approximately 90 long and an adult man can hide in it without any trouble. During the field research remains of – what can be interpreted as – anti-aircraft positions consisting of trenches, earthen platforms and vehicle shelters were well visible. Finally, elements of this part of the site are long, rectangular structures dug in the ground which could as storage for ammunition for anti-aircraft gun. However, one of the crucial elements of this landscape is a trace where railway track was laid and siding itself (Fig. 7). Unfortunately,



**Fig. 9.** A cluster of craters in the forests around Gutowiec visible on LiDAR-derived data (visualization: local dominance)

iron, railway clippers have been – as I was told during the interview with the regionalist Piotr Szulc (personal communication, 20.03.2017), dismantled and sold at scrap metals during the last 20 years.

The last zone of *Guttowitz 35* is the biggest one at the same time. The remains of tens of different earthen platforms of various forms creating rows and clusters of the structures can be – without any doubt – interpreted as related in one way or another to the Germans activities in the forests of Gutowiec during the Second World War (Fig. 8). However, their precise function is hard to assessed at the preliminary stage of research. Most of them created rows of structures that run for up to 530 meters, the same as the ones in the northern part of the depot. Routes made of concrete slabs are part of the depot. Short fragments of trenches as well as rifle trenches had to be interpreted as part of the site. The central part of the depot is covered by tens of craters of various diameter and depth. It seems that this is the remain of the Soviet blowing up of the munitions supplies left by the Germans





**Fig. 10.** Examples of material culture documented during the field research (photo *D. Kobińska*)



**Fig. 11.** The contemporary re-use of the camp infrastructure: a silos as a vessel for water used by firemen during stopping a fire (photo D. Kobińska)

in 1945. The memories of this action are hold among local people till present. The craters are very well visible in the local landscape (Fig. 9).

One can distinguish the approximate outline of the area 3. Rows of small holes are remains of a fence of concrete posts dug in the soil. That is why part of the railway siding and entire zone 3 was fenced. Four structures, that run parallel to the railway track and were 84,5 meters long and 19 meters wide, might be remains of some magazines.

All in all, *Guttowitz 35* is not only a huge *archaeological site* full of different earthen structures related to the camp and munitions depot. Remains of barracks, trenches, gun nests, anti-air trenches, vehicle shelters, and so on are part of this unique landscape. Part of it is also material culture related to the functioning of *Guttowitz 35*. During the field research an interesting assemblage of things was documented. Among the Second World War *artefacts* were medicine and wine glass bottle, tin cans, fragments of artillery shells, shell of signal cartridge, fragments of broken plates, among others (Fig. 10).

Like many sites built and run during the Second World War, the camp and munitions depot were re-used after the war. For example,

local community used bricks which were the foundations of camp's barracks while re-building their own houses after 1945 (Szulc, personal communication, 20.03.2017). Similarly, the same history concerns the camp's routes made of concrete slabs. They were very valuable material used while laying foundations of houses and building cellars by local community (Szulc, personal communication 24.08.2017). On the other hand, firemen use two post-camps silos as vessels for water while stopping a fire (Fig. 11). Eventually, the depot's roads made of concrete slabs are used by citizens of local villages (e.g. Krzyż, Stodółki, Kłodnia) even today.

## Conclusion

This paper discussed the preliminary results of non-invasive field research at the terrain of a forced labour camp and munitions depot known as *Guttowitz 35*.

In the first part of the paper archaeological research on the woodland landscapes was shortly presented. Indeed, archaeological research in the woodlands is a new, growing field of scientific inquiry. On the other hand, the use of non-invasive methods gives new discoveries and offer more complex understandings of past societies and their relicts/heritage. To a certain degree, one can even risk a thesis that the *new prehistory* is written in front of our eyes. On the other hand, archaeological research concerning the conflict landscapes in the woodlands also brings interesting results (e.g. Passmore *et al.* 2014). In short, not everything was written down in historical documents.

Remains of shelters, trenches, barracks, bomb craters, munitions depots, etc. are a valuable heritage. Such heritage has an obvious historical and cultural value. By the same token, one can said that such heritage has an archaeological value as well (see more in Saunders 2007). There is a constant trend: one discerns the growing interest in the archaeological value of material relicts of the conflicts of the recent past (e.g. Zalewska *et al.* 2017). Sooner rather than later, these relicts will be considered as *archaeological sites*. This paper was also a call for paying closer attention to this kind of the archaeological record. Such landscapes have been systematically penetrated by the so-called treasure hunters who look for Second World War's memorabilia (Fig. 12).





**Fig. 12.** Contemporary robbery pit at the terrain of *Guttowitz35* (photo D. Kobialka)

One such site in the woodlands dated to the Second World War is so-called *Guttowitz 35* – a previous forced labour camp and munitions depot. The site was used as a case study. Only a few testimonies left by the British soldiers, among other, kept at the camp are known. Another historical material related to the site are memories of local communities. Without any doubt, archaeology can show its full potential in such cases as *Guttowitz 35* about which the historical record is very limited.

The last part of this article presented the materiality of *Guttowitz 35*: the quantity and diversity of material relicts of the site that preserved till present. Hundreds of structures related to the camp and depot are still visible in the local landscapes. Probably, thousands of artefacts are hidden still in the ground as well.

Archaeologists have just started to learn how to interpret complex structures and material culture related to modern armed conflicts (e.g. First World War, Second World War) (Schofield 2005). Their precise function is sometimes problematic to interpret. Nonetheless, these are structures and material culture that archaeologists will have to learn about in a near future.

All in all, I tried to back up the following thesis in this article: due to applications, among others, of non-invasive methods (e.g. ALS) archaeology is able to offer new data, a fresh insight into the material heritage in woodland's landscapes from the recent past. Without any doubt, Polish woodlands, as this research hopefully indicates, are an archaeological *terra repromissionis*.

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