VirtualArch

Visualize to Valorise – For a better utilisation of hidden archaeological heritage in Central Europe

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O.T1.3. Regional strategy for the Ore Mountains Mining Cultural Landscape including pilot region 2 – medieval silver mines of Dippoldiswalde (DE)

Project

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	3. Museum of Natural History, Vienna, Austria (AT)
	4. Nicolas Copernicus University, Department for Archaeology, Torun, Poland (PL)
	5. Institute of Archaeology of the Czech Academy of Sciences, Prague, Czech Republic (CZ)
	6. Autonomous Province of Trento, Cultural Heritage Department, Trento, Italy (IT)
	7. Institute for the Protection of Cultural Heritage of Slovenia, Centre for Preventive Archaeology, Ljubljana, Slovenia (SI)
	8. Slovak Academy of Sciences, Institute for Archaeology, Nitra, Slovak Republic (SK)
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1. BACKGROUND

Since June 2019 the region of the german-czech Ore Mountains is listed among the UNESCO World Heritage Sites as "Mining Cultural Landscape Erzgebirge/Krušnohoří". It consists of 17 component parts on the german side of the Ore Mountains, 5 component parts are located in the Czech Republic (https://www.montanregion-erzgebirge.de/en). Among the 17 German component parts, three sites are primarily archaeological sites and thus under the heritage protection responsibility of the Archaeological Heritage Office of Saxony:

I.   Silver mines of Dippoldiswalde (*VirtualArch pilot region 2*):
This archaeological site demonstrates the presence of silver mining in and around Dippoldiswalde in the eastern Ore Mountains as early as the High Middle Ages. The almost completely preserved underground mining landscape from the 12th/13th century is of exceptional importance for research into the early history of mining in the Ore Mountains. To date, archaeological excavations have identified more than 15 shafts and galleries, and the historical objects found there provide a unique insight into early mining in the Erzgebirge.

Medieval wooden finds and rescue excavation in the mines (photos: Archaeological Heritage Office of Saxony/M. Jehnichen).

II.   Mining landscape of Hoher Forst:
One of the oldest and best-preserved mining landscapes in the Ore Mountains, named the "Hoher Forst", is located inside the Hartmannsdorfer forest in the area of Langenweißbach, Kirchberg and Hartmannsdorf. Here, the mining of silver ore, and later copper ore, dates back to as early as 1306; a mining town called Fürstenberg emerged but was swiftly abandoned during the mining crisis in the 14th century. There is evidence of mining activity in Hoher Forst continuing into the 20th century. Today the remains of the mining town, the numerous heaps and sinkholes bear testimony to the changing history of this intense mining area.

III.   Mining landscape of Eibenstock:
In the western Ore Mountains near Eibenstock, numerous monuments document the important transregional role of former tin mining and processing. In the impressive mining landscape today mostly covered by forest, heaps from tin placer mining and water ditches for washing out minerals situated alongside each other and still provide evidence for above-ground tin placer mining. Completely excavated lodes and sinkholes are a record of underground tin mining. The extracted tin was processed in the surrounding hammer works, where a regional centre for tinplate production of European importance developed.

Archaeological remains in the forest area "Hoher Forst" near Kirchberg
(photo: Archaeological Heritage Office of Saxony/Ch. Lobinger).

Beside the heritage protection an enhanced cultural communication of this World Heritage will be in the foreground of future activities as well as providing a smart tourist offer and infrastructure. For these activities the communal association **Welterbe Montanregion Erzgebirge e.V.** is in general responsible**:**

Matthias Riedel
Chief executive officer
phone: 03733 / 145 351
riedel@montanregion-erzgebirge.de
phone: +49 3733 / 145 352

Kristin Hängekorb
Project manager (education), marketing
Phone: +49 3733 / 145 352
haengekorb@montanregion-erzgebirge.de

Further, the Free State of Saxony established in 2019 a central coordination unit, which steers and supports the several activities:
Friederike Hansell
Institute of Industrial Archaeology and History of Sciences and Technology, TU Bergakademie Freiberg
Silbermannstr. 2, 09599 Freiberg
Phone: +49-3731-393406
friederike.hansell@iwtg.tu-freiberg.de

2.   ANALYSIS OF SITUATION AND ENVIRONMENT

I.   Silver mines of Dippoldiswalde

In 2008 remains of high medieval mines were discovered in Dippoldiswalde, 18 km south of Dresden in the periphery of the Eastern Ore Mountains. Since then the Archaeological Heritage Office of Saxony (LfA) explore and record extensive but almost intact and untouched mining systems from the time around 1200 under the current town. The unique archaeological finds – in the majority of sensitive wooden material - introduced completely new preconditions for medieval mining research and presentation in Europe. The galleries and veins are examples for the importance of medieval mining activities facilitating the economical and political development of the Margraviate of Meissen and later Electoral Saxony between the 11th and 17th centuries.

Despite of the great importance and the fact, that the mines are well preserved, they have to remain filled up and sealed as a matter of public security. This means also that these outstanding monuments are the only site within the UNESCO World Heritage component parts where the public couldn´t visit and explore. Furthermore, as the heritage lies more than 8 and up to 30 m deep under the recent houses of the city, this heritage is completely hidden from aboveground eyes.

Hence the archaeological objects found in the mines were exhibited, after their conservation, restoration and 3D documentation in the laboratories of the Archaeological Heritage Office Saxony, Dresden, in the MiBERZ – Museum of Medieval Mining in the Ore Mountains at Dippoldiswalde. The MiBERZ was realised within the Interreg Va project Archaeomontan 2018 and opened in August 2018 in the vaults of the ancient castle of Dippoldiswalde (https://www.miberz.de). The museum is maintained by the town administration, also responsible for the local tourism:

Bürgerbüro der Großen Kreisstadt Dippoldiswalde
Markt 2, 01744 Dippoldiswalde
Phone: +49-3504 / 64990
www.dippoldiswalde.de

In Charge for the museum management, guidances, all communication and promotion activities is the director :
Jitka Steßl / Linda Burghardt (acting)
Freiberger Str. 16,
01744 Dippoldiswalde
Phone: +49 3504 612 418
leitung@miberz.de

Also in 2018 a mining trail ("Bergbaulehrpfad") was established, throughout the town and nearby some points of interest such as spots of archaeological mining excavations underground. Information boards about the mining archaeology and related topics (such as the town history) were produced by the local association "Förderverein mittelalterlicher Bergbau Dippoldiswalde e.V." in close cooperation with the Archaeological Heritage Office of Saxony, financed by a public crowd-funding project.

Having the inaccessibility of the medieval mines in mind, several supplementary digital features within the "Dippoldiswalde Digital Information System" offers visitors the virtual experience of this World Heritage. These were developed and completed within the Interreg Central Europe project **VirtualArch – Visualize to Valorize**, based on the 3D documentation, reconstruction and visualization data of the Archaeological Heritage Office of Saxony:

- VR media station in the MIiBERZ (https://www.miberz.de/de/bergbau-virtuell):

  The museum visitors – VR glasses on the head – sit in a secure zone and view a complete virtual environment (medieval mine) on a small chair reenacting a daily miner´s work in a short scenario. By using joysticks, it is possible to grab miners´ tools like hammer and pick (the real ones are exhibited behind them) and cut out silver ore from the rock in front of them. Afterwards, They could take the ore and put it into a bucket. By pulling the rope, the bucket will be transported the shaft up crossing archaeological features like shutes.

Experiencing medieval mining via the new VR media station (photos: MiBERZ/S. Dittrich).

- Location-based mobile application "Montanarchäologie in Dippoldiswalde":

  At some points of interest of the above mentioned outdoor mining trail, additional information about the archaeological site as well as digital material such as videos, panorama views and rotatable 3D files will be offered in a free accessible mobile application (for Android devices). A WiFi access was established at the museum entrance as "starting point".

3D panorama view of the medieval town of Dippoldiswalde, visible via the transnational mobile application for Dippoldiswalde (new VR media station (©Archaeological Heritage Office of Saxony; graphic: Jiří Unger).

- Augmented Reality-Application Medieval Mines[AR]:

  Additional to the mobile application the free accessible Augmented Reality-Application Medieval MinesAR for Android mobile devices allows visitors and other users by scanning two special markers an outdoor interactive and immersive experience of the non-visible heritage. The first marker is located in front of the entrance of the MiBERZ museum, where users could explore a virtual model of the town center appears and discover its hidden underworld. Located in the green park area near the mining spot "Glashütter Straße" visitors can detect medieval mine shaft-entrances on their display, inviting the users to walk to and enter them and discover a virtual mine 15 m below their feet.
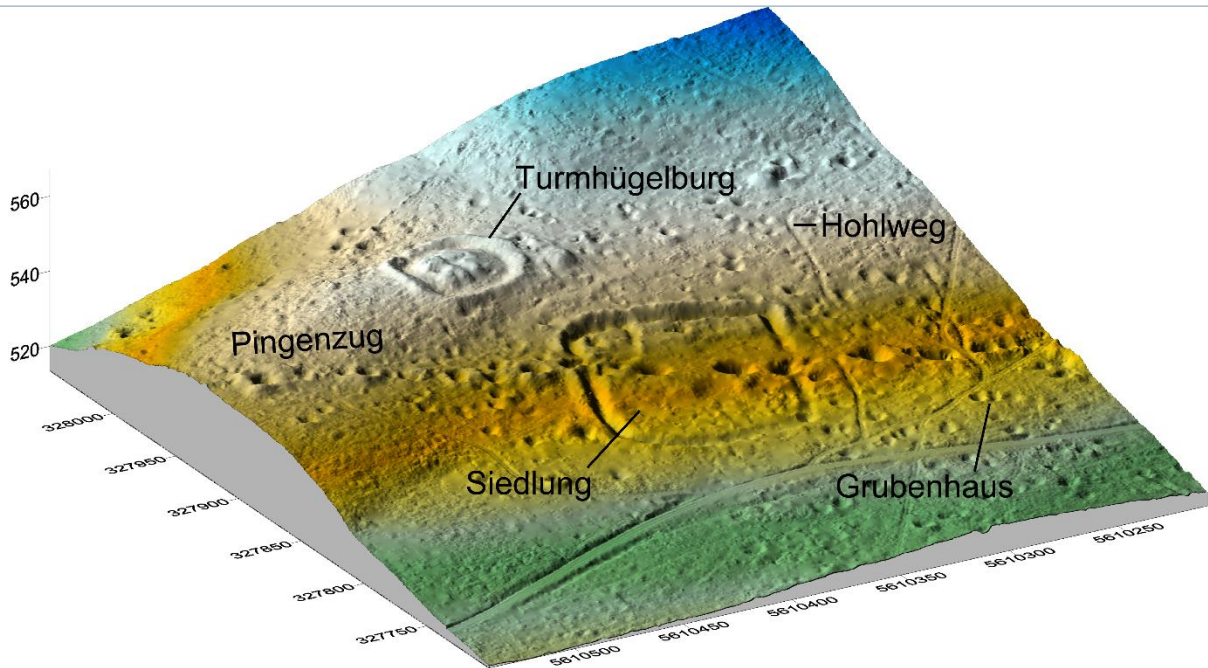

Experiencing virtual mines directly above original find spots in Dippoldiswalde (photo: MiBERZ/L. Burghardt)

Key issues and opportunities relevant for this site:
- Despite the unique cultural and historical value of the medieval mines, the well preserved relics remains inaccessible for security reasons and thus will be limited tangible, unveiled and unknown, even to the local population.
- The museum MiBERZ as well as the analogous and digital infrastructure is developing and extending the touristic offer of the town as "gate of the Eastern Ore Mountains" continuously.
- Dippoldiswalde still lacks sufficient numbers of visitors from the nearby metropolitan area of Dresden with approximately up to 750'000 citizens including areas in direct vicinity (in comparison to other quite popular spots within the county such as the *Sächsische Schweiz*).
- Especially smart technologies like the VR/AR tools could attract younger visitors from Dresden and beyond.
- The site is under the protection as UNESCO World Heritage and the Saxon heritage protection law, but in the case of valorisation concerning of planned (sustainable) tourism, a proper model for site management should be defined in order to promote and provide sustainable valorisation.

II.   Mining landscape of Hoher Forst

The first historical records about this site goes back to the year 1306 when the prevot (Reichsvogt) of Plauen, Heinrich II., received the lordship of Wiesenburg as well as a silver mine in a forest called "Hohenforst" in the Western Ore Mountains. But with the rising power of the Margraves of Meißen, the mines became an object of dispute. It seems that Margrave Friedrich I. was the winner as he bestowed mining rights and offices in his "town of Fürstenberg" to retainers and as well as to loyal citizens of Zwickau. Nevertheless, the area was sacked and plundered by the opponent troops, such as the destruction of a (fortified) house and the occupation of half of the mines around 1330 by Heinrich II. The mining activities came to an end in the second half of the 14th century but was revived in the late 15th century under innovative entrepreneurs like Niklas Staude.

3D digital terrain model of the mining town of Fürstenberg / Hoher Forst (©Archaeological Heritage Office of Saxony; graphic: F. Schröder/M. Schubert).

Today the above ground in the forest visible archaeological heritage consists of a rectangular walled enclosure (mining town "Fürstenberg") next to a close mound of a former Motte-and-Bailey-castle and more than 160 sinkholes as relicts of collapsed and filled shafts. The since 1940 protected area of more than 1 km^2 is owned by the *State of Saxony* and managed by the *Public enterprise Forest Administration Saxony.* In close cooperation with the Archaeological Heritage Office of Saxony, exclusion zones for the forestry were established in 2018 to reduce damages to the heritage.

Archaeological field research in form of few survey ditches were undertaken 1989 recovering parts of late medieval houses (walled cellars) and pottery from the 13th and 14th century. To get a better understanding of this mining landscape, additional surveys were done by the Archaeological Heritage Office of Saxony using non-destructive 3D methods like photogrammetry based on aerial photographies or digital terrain models based on laser scanning.

In the 80s interested citizens founded an association, since 1993 a chapter of the Nature and Biodiversity Conservation Union:

Kirchberger Natur- und Heimatfreunde des Naturschutzbundes Deutschlands e.V. im Landesverband Sachsen e.V., Ortsgruppe Kirchberg e.V.
c/o Wolfgang Prehl, Innungsstraße 18 – 08107 Kirchberg
nabu-og-kirchberg@t-online.de

Major aim of this association is the protection and promotion of their local natural and historical heritage, especially parts of the accessible postmodern mines. 2001/2002 a 5 km long mining and nature trail with information boards was established. 2014 a cottage as "Naturschutzstation" was built. 2019 the association welcomed the Archaeological Heritage Office of Saxony and its employees on a common field trip (company excursion).
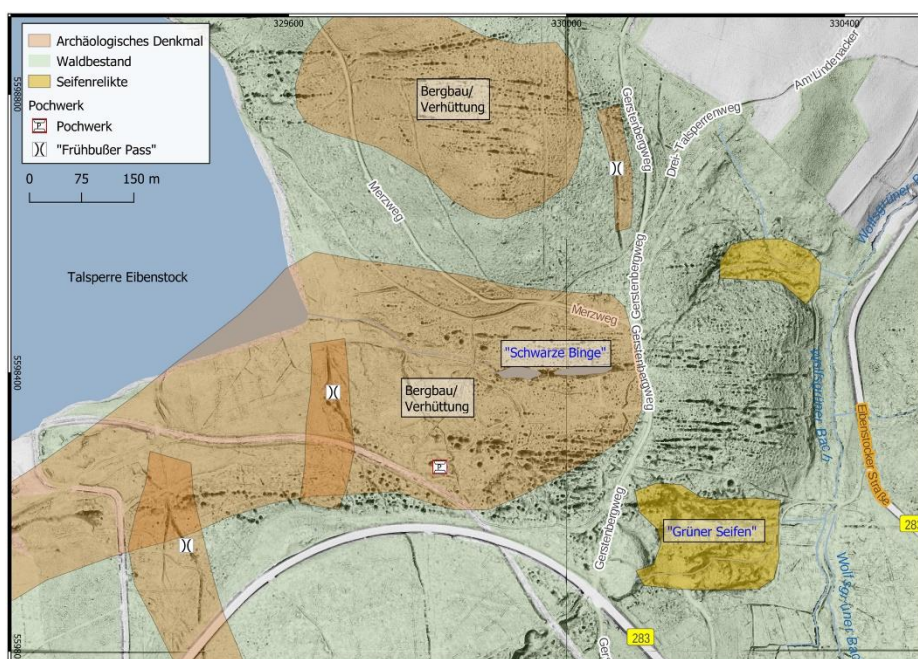
Key issues and opportunities relevant for this site:

Despite its good preservation and the local efforts by the volunteering association this outstanding heritage ensemble, especially the abandoned mining settlement in his original appearance is limited tangible to tourists and other visitors. Further the site is characterised by a peripheral location.

- Except of the above ground monuments, the medieval mines underground are neither accessible nor explored. The typical combination of settlement aboveground and mines underground are also hardly to understand.
- Beside some finds like medieval pottery, typical items as found in Dippoldiswalde are missing/not presentable.
- The site is under the protection as UNESCO World Heritage and Saxon heritage protection law, but in the case of planned tourism valorisation, additional touristic offers to promote and provide sustainable valorisation are missing.

III.   Mining landscape of Eibenstock

North of the town Eibenstock a forest area owned by the the *State of Saxony* and managed by the *Public enterprise Forest Administration Saxony* of appr. 1 km^2 full of sinkholes, heaps, water ditches and other features indicate an intensive tin mining from the Late Middle Ages onwards. Between 1524 and 1821, more than 1'000 mining grants for this region are known. Being almost unchanged to these days, the landscape and its above ground visible structures are an extraordinary heritage of (tin) mining in the Higher Ore Mountains. Making this site better tangible, a first mining trail was installed in 1999 by the town Eibenstock. During the world heritage nomination process, this trail was replanned and enlarged in 2018/2019 with several models of mining equipment and ore processing installations. A local association with a promotion task is not existing yet although the municipality of Eibenstock is supporting these actions and local volunteers doing research and publish on this tin mining in cooperation with the Archaeological Heritage Office of Saxony.

Mining heritages in the area north of Eibenstock
(©Archaeological Heritage Office of Saxony; graphic: M. Schubert).

Key issues and opportunities relevant for this site:
- Despite its good preservation and its protection as archaeological heritage, this site is not researched sufficiently from archaeological point of view.
- Except of the above ground monuments, the tin placer mining as well as the medieval underground mines are neither appropriately accessible nor explored.

- ## OBJECTIVES, MEASURES, AND ACTIVITIES

I.   Silver mines of Dippoldiswalde

On the 27 May representatives of the town Dippoldiswalde and the LfA met to discuss further progress with the communication and promotion of their common World Heritage. Because of the COVID-19 pandemy a major public event – a city festival on the World Heritage Day (6th of June 2020) – with presentations and activities by the LfA had to be cancelled. Only digital information via social media about available tools and applications were published.

Next event will be the European Days of Archaeology (20/21th of June 2020). The directrice of MiBERZ together with VirtualArch staff member will guide interested people alongside the mining trail and present digital and virtual tools.

Another big fair in December 2020 is foreseen connecting the aspects of Mining and Christmas.

After the project finishing, both institution – LfA and Town of Dippoldiswalde – agreed that in future communication and promotion matters of the World heritage the director of MiBERZ museum will be the central contact point but supported by a team of the town administration. In this role the director also will take over the promotion and further utilisation of VirtualArch products.

Regarding the communal association **Welterbe Montanregion Erzgebirge e.V.** and their planned communication activities and tools, an inclusion / relinking to VirtualArch applications is foreseen.

II.   Mining landscape of Hoher Forst

An enforced survey, digitisation and visualisation of the visible heritage will be the major objective for the next years. Especially, landscape archaeological aspects of this site come into the focus of research. Here, a master thesis concept is already be submitted dealing with minimal invasive archaeological and remote sensing methods. The results should be visualised via special 3D software (such as bumpmap and blender).

Depending on available funds for the realisation, probably via a new project in the Interreg Va-program, a transfer of tools and application created for Dippoldiswalde and other VirtualArch pilot regions is also possible: for instance the inaccessible (medieval) mines could be discovered and explored by visitors with similiar methods like the above mentioned Augmented Reality-Application Medieval Mines[AR].

In Utín (VirtualArch Pilot Heritage 8) the Czech Colleagues created a smart adventurous computer game called Buchberg 1269, allowing the user to discover an invisible mining settlement and participate in the investigation of a criminal case. The field of virtual games is undoubtedly a very good alternative teaching and educational method, which offers perspectively new ways of interaction between archaeologists and the public.

Both sites – Fürstenberg (Hoher Forst) and Buchberg (Utín) – are characterised by a lot of resemblances in their archaeological appearance. Also providing exciting "stories to tell" such as the struggles and fights between the overlords, a similar game could be created based on virtual reconstruction and interactive panorama views of the mining towns, the houses, the workshops or the motte castle. In order to make life-like virtual figures for the characters and visible people in the game, the local population could be involved and perform as models enhancing in this very smart way, which also increases their identification with their heritage site.
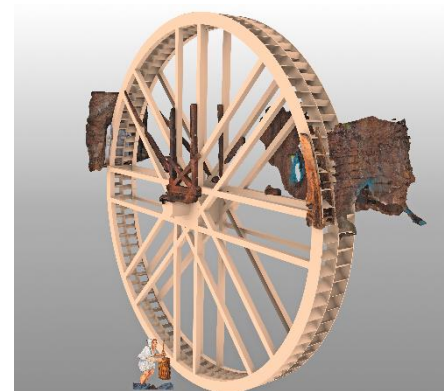
The game mediates for tourists, students or residents in attractive, lively and authentic way the previously reached archaeological and historical state of research on the medieval life and silver mining in Fürstenberg. Beyond such digital approaches and possibilities, the *Kirchberger Natur- und Heimatfreunde* plans in Association with the Archaeological Heritage Office of Saxony to convert their private mines ("Engländerstolln") into a touristic visitor mine.

III.   Mining landscape of Eibenstock

As mentioned above, an intensified research and profound knowledge about the archaeological heritage as well as tin mining in premodern times are necessary and next objective of the Archaeological Heritage Office of Saxony. Based on the recent discovery of even Bronze Age tin mining in the Ore Mountains, the Archaeological Heritage Office of Saxony will enforce the surveys and mapping of these so far unknown relics, using also 3D landscape reconnaissance techniques such as Airborne Laser Scanning or Aerial Photogrammetry. Further, together with universities and other research institutions, the Archaeological Heritage Office of Saxony request new research projects in which tin mining in the Ore Mountains will be researched in a multi-disciplinary way from prehistoric up to late medieval periods. Following the example set by the activities realised in Dippoldiswalde and its silver mining, also a visualisation of this tin mining are possible communication and valorisation projects for the future.

IV.   Other activities

Beside the three World Heritage component parts the Archaeological Heritage Office of Saxony proceeds in a consequent survey- and documentation process of other archaeological mining relics in the region. In the last years, a special role was occupied by the excavation, documentation, recovery and preservation of the huge reversible waterwheel of Bad Schlema. Consisting of more than 400 component parts and having a size of appr. 11 m diameter, this complex is so far the biggest archaeological monument found underground. Currently the extremely big finds are in conservation, so a public representation of this impressive and technologically important object is not possible for years. Here, due to a good 3D documentation of the finds (in their position underground as

3D reconstruction of waterwheel of Bad Schlema (©Archaeological Heritage Office of Saxony; graphic: T. Reuter/F. Schröder).

well as after their recovery in the 3D laboratories) a 3d visualisation of this underground installation – may be as an interactive VR station in the local Museum of Schneeberg or in the planned world heritage information centre – might be very well possible.