INTERNATIONAL JOURNAL OF CONSERVATION SCIENCE
ISSN: 2067-533X Volume 16, Issue 3, 2025: 1511-1528 www.ijcs.ro
DOI: 10. 36868/IJCS.2025.03.19

REVITALIZING UPPER SILESIA'S INDUSTRIAL HERITAGE ON THE EXAMPLE OF THE 'QUEEN LUISA ADIT' COMPLEX IN ZABRZE

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Abstract

Revitalization is a complex and multifaceted phenomenon. It is very difficult to carry out on post-industrial sites, which are characterized by a highly degraded environment and technical infrastructure. The revitalization carried out by the Coal Mining Museum in Zabrze is an impressive example of revitalizing a historic industrial site, transforming it into a modern tourist and educational attraction. Today, the Adit is one of the most important mining monuments in Poland and is the venue for numerous cultural and educational events that introduce the region's mining heritage. Thanks to careful conservation work and modern presentation solutions, the adit is a unique combination of history, education, and entertainment, while retaining the authentic character of a former coal mine.

Keywords*: Heritage; Revitalization; Architecture; Mining; Adit; Museum; Industry*

Introduction

The issue of modernization and adaptation of historic buildings is currently one of the most serious and difficult conservation problems [1]. The problem of revitalization of post-industrial sites is today both an architectural and urban planning challenge. New functions introduced into post-industrial sites can provide a development impulse not only for a selected area but also for the entire region. This article presents the history of the construction and exploitation of one of the largest state-owned mining plants in Upper Silesia and juxtaposes it with the revitalization activities currently underway. New functions being introduced into historic interiors not only provide another opportunity for historic industrial buildings but also provide an impulse for the development of the entire region.

The historical heritage of Upper Silesia and its relationship with the mining industry

The spatial development of Upper Silesia is linked to the mining industry. Witnesses to this history are the preserved historical buildings that form part of the region's heritage. The impulse for economic growth was the demand for coal, which dates to the turn of the 17th and 19th centuries. At the turn of the 17th and 19th centuries, coal became one of the most valuable mineral resources. It was essential both for burning in smelter furnaces and for powering the steam pumps draining the mines. It was a raw material that changed the image of many regions by subordinating their development to the dictatorship of coal and steel. Upper Silesia was one such region. The turn of the 18th and 19th centuries ushered in a series of changes in the coalfield

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area, linked to the mining industry. Silesia's position as one of the largest mining districts in Europe was evident both in the changing political situation and in the economic development of the region. Upper Silesia became part of the Prussian state. The region became an important part of the plan to expand the state's power [2]. In 1768, King Frederick II unified the mining law, imposing a new mining law for Silesia and the entire county of Kłodzko. The creation of the Higher Mining Authority and the unification of mining law gave the state free disposal of the deposit, bypassing the issue of land ownership. In the second half of the 18th century a mining law was introduced entitled 'Revidirte Bergordnung' [3]. The unification of the mining law allowed the state to freely dispose of the deposit regardless of who owned the land. The location of mine deposits had an impact not only on the dynamic development of individual towns but also on the spatial development of the entire region. The huge economic transformation that took place in the Upper Silesian area from industry and mining to a culture of services and trade has a huge impact on spatial changes today [4].

The legal solutions that were introduced gave the central authority the possibility to freely dispose of the land, so to speak, bypassing the question of ownership. The Mining Act excluded areas of mines from the jurisdiction of the cities in which they were deposited. This solution offered the possibility of central control of mining areas and the possibility of dynamic development of industrial infrastructure. Today, this legal status often poses a huge problem. Post-mining areas located in the heart of towns and cities are not owned by local governments but, for example, by the Mine Restructuring Company (*State-owned company set up for the restructuring of mines. The company deals with the liquidation of assets and the management of the assets of liquidated mines*). The consequence is that the local authorities have no influence whatsoever over the huge areas of the center that need to be revitalized. Another problem remains the financial aspect and the need for large sums of money when local governments take over former mine sites.

An important place in the history and present-day revitalization activities of the region is occupied by the Historic Coal Mine Complex in Zabrze, which is now a cultural institution of the City of Zabrze co-managed by the Local Government of the Silesian Voivodeship. In the 19th century, the site was part of an expansion plan in which the 'Królowa Luiza' Mine and the 'Main Key Heritage Adit' were important elements of the concept of revitalization and development of the region's economy. After the Second World War, the 'Królowa Luiza Zachód' and 'Królowa Luiza Wschód' mines were renamed the 'Zabrze-Zachód' and 'Zabrze-East' mines, and in 1957 the plants were merged to form a model propaganda mine [5].

Aim and research methods

The aim of the paper is, firstly, an attempt to provide a synthetic account of the important issues related to the construction and subsequent exploitation of one of the newest mining sites in post-war Poland. The second important aim of the paper is to present the possibilities of revitalizing post-mining post-industrial sites, illustrated by the example of the Complex of Coal Monuments in Zabrze. The scope of historical research on the complex ranges from the 17th and 19th centuries to the present day. The analyses were based on primary and source materials, local inspections, analyses of design documents, and own and third-party expert opinions. As part of the research, the resources of the Archives of the Coal Mining Museum in Zabrze and the State Archives in Katowice Branch in Gliwice were used.

In terms of revitalization modeling, expert interviews were conducted with those leading revitalization processes. In addition, interviews were conducted with users, as well as expert interviews with employees involved in the revitalization of the Main Key Heritage Adit. Analyzing the possibilities of conducting revitalization processes, the barriers and problems faced by those leading the revitalization of the complex were identified. The final conclusions also refer to the possibility of modelling revitalization processes.

The work touches upon the problem of the methodology of revaluation, renewal, and revitalization of post-industrial historic buildings. A very difficult activity. The post-industrial heritage of Upper Silesia still requires the reinforcement of appropriate protection measures. The still considerable stock of objects of this type is faced with the difficult dilemma of the costs and outlays required, which are very difficult to estimate. Currently, the Coal Mining Museum is a joint institution of the City of Zabrze and the Silesian Voivodeship and was established in 2013 as a result of the merger of two institutions: the Coal Mining Museum in Zabrze (in operation since 1981), for which the Silesian Voivodeship was the organizer, and the Historic 'Guido' Coal Mine in Zabrze (launched in 2007), for which the City of Zabrze and the Silesian Voivodeship were the organizers [6].

The Head Key Heritage Adit was inscribed on the List of Historical Monuments by a decree of the President of the Republic of Poland of 14 July 2020, together with a complex of historic coal mines in Zabrze. A Monument of History is one of the five forms of monument protection specified in the 2003 Act on the Protection and Care of Monuments. It is a form of monument protection established by the President of the Republic of Poland at the request of the Minister of Culture and National Heritage. From 1994 to the present day, only 129 sites can take pride in being awarded this distinction. The objects on this list are characterized by their special tangible and intangible values and are of significant importance for the cultural heritage of our country [7]. The 'Zabrze—a complex of historic coal mines' complex is an important testimony to the history of a key branch of the Upper Silesian industry; it includes the protection of three elements. The Królowa Luiza mine, one of the first two state-owned hard coal mines in the country; the Main Key Heritage Adit, the continent's longest hydrotechnical structure associated with hard coal mining; and the Guido mine, an example of a private mine established in the mid-19th century [8]. All the monuments mentioned are under conservation protection based on three decisions on entry in the register of monuments (decisions no.: A/1539/93, A/220/07, A/1342/87).

The beginnings of the Królowa Luiza Mine date back to the end of the 18th century, when the Prussian authorities, having won the Silesian wars, wanted to increase the revenue of the state treasury and became interested in the mineral wealth of the region. In 1779, the then director of the Silesian Mining Office, and later mining starost, Count Friedrich Wilhelm von Reden (*Count Friedrich Wilhelm von Reden - came from Hanover, had both university studies and an education at the Freiburg Mining Academy*), undertook the creation of modern mining in Silesia [9]. The search for coal seams was carried out on his behalf by Salomon Isaac, an engineer from Brabant. In 1790, he found numerous coal seams in the vicinity of Zabrze (Fig. 1). The first state-owned mine was established in 1791, and in 1811 it was named 'Queen Louise ('Koenigin Luise") in honor of the wife of Prussian King Friedrich Wilhelm III, who died in 1810. The Guido Mine was founded by Count Guido Henckel von Donnersmarck. The 1.03km^2 mining field was granted on 2 October 1855. The Main Key Hereditary Adit was built between 1799 and 1863 on the order of Friedrich Wilhelm von Reden; its purpose was to drain the mining fields for the first coal mines in Silesia and to transport coal.

Status of research

The Królowa Luiza mine appears in numerous studies on coal mining in Upper Silesia. Research on mining in Upper Silesia and the history of the mine was conducted by Stanisław Kossuth [10, 11]. Another author discussing the issues related to the mine complex and the Main Key Hereditary Adit is Jerzy Jaros [9, 12, 13], who extensively describes the beginnings of the Królowa Luiza mine and the first methods of coal excavation, describes the reasons for the creation of the adit, and describes the technical aspects of coal extraction and transport. Another author of numerous studies on mining construction is Jan Gustaw Jurkiewicz [14], who deals extensively with mining construction in his research. Tomasz Bugaj, in his 2007 publication, describes the technological aspects of the construction of the Main Key Heritage Adit [1, 2].

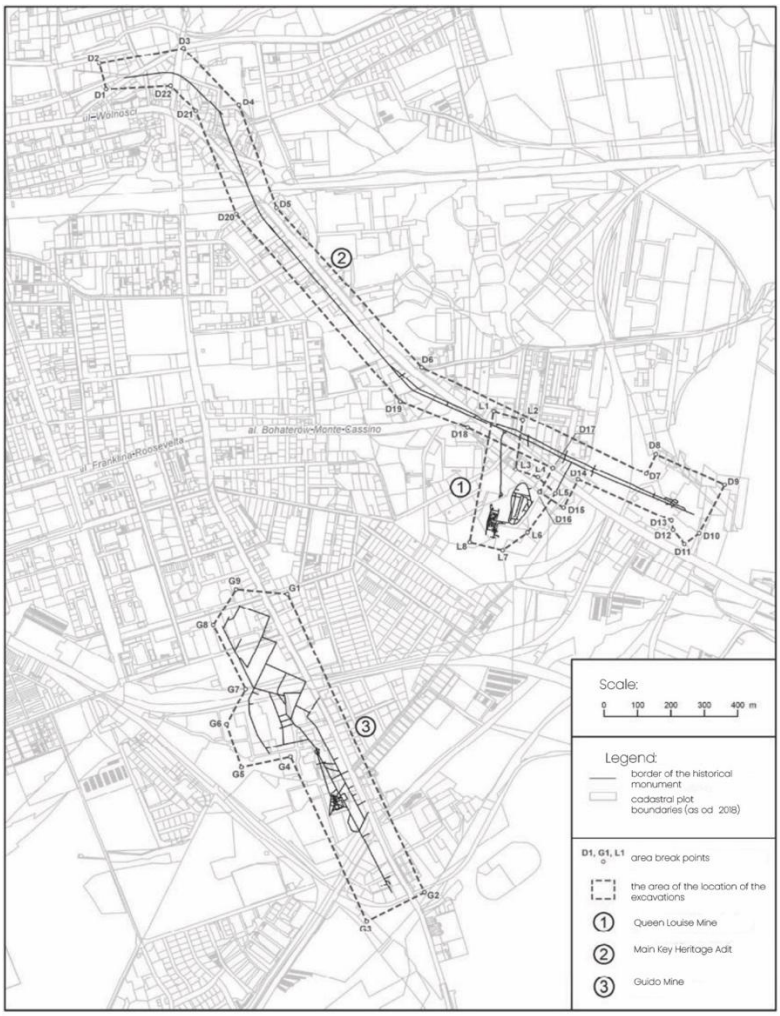

Fig. 1. Individual elements of the Monument of History 'Zabrze—a complex of historic coal mines'
Source: Materials of the Coal Mining Museum in Zabrze—documentation of the entry on the UNESCO List, compiled by Jerzy Wowczak, Andrzej Siwek, Roman Marcinek, and Aleksandra Rykaczewska

An extensive compilation of archival material related to the Main Key Hereditary Adit is included in the material titled 'The construction of the Main Key Hereditary Adit. A comprehensive list of archival material related to the Main Key Hereditary Adit is included in the material entitled 'Excavation of the Main Key Hereditary Adit with preliminary inventory taking into account location of skylights, types and condition of lining, condition of silting, water inflow, sampling of material filling the Adit, taking geodetic measurements and preliminary geological and hydrogeological studies of soil in the vicinity of the Adit and the "Królowa Luiza" Open-Air Museum, together with the Supplement,' commissioned by the Zabrze City Council in 2008.

The issue of revitalization of post-mining areas and facilities is widely discussed in many magazines and publications from both the mining and financial sectors. Tomasz Bugaj writes about the revitalization of the complex in terms of its architectural and construction values; in his publications he describes in detail both the technological aspects of the construction of the Main Key Heritage Adit and the process of its revitalization [1, 2]. Marzena Lamparska-Wieland [15] writes about selected problems of maintaining mine workings and post-mining facilities as

important elements of tourism development. In addition, the association 'Pro Futuro,' which brings together academics, museum workers, mining entrepreneurs, and other supporters of mining history, has repeatedly organized many conferences and symposia aimed at broadening knowledge of the Królowa Luiza complex.

The Królowa Luiza Mine and Main Key Heritage Adit

An extensive collection of drawing documentation is currently held in the resources of the Coal Mining Museum in Zabrze and the State Archives in Katowice. The 19th-century archives come from the collections of the Higher Mining Office in Wrocław and depict projections and cross-sections, as well as elements of adit equipment. Extensive documentation has also been collected by the Pro Futuro Association. The association has at its disposal, among other things, such documents as plans of the course of the adit in the Zabrze area or a plan of the excavations in the present 'Królowa Luiza' open-air museum. Wide range

The history of the 'Królowa Luiza' mine begins with the first task of the Silesian mining starost and director of the Higher Mining Office (*The Higher Mining Authority began its operations in 1969*), Friedrich Wilhelm von Reden. It consisted in the search for coal seams. In 1760, significant coal seams were discovered in the vicinity of Zabrze, and in 1791, the first state-owned coal mine in Upper Silesia was established, which was renamed the 'Królowa Luiza' mine in 1810 [16]. The mining field for the Królowa Luiza mine was granted on 20 June 1789 and enlarged on 15 August 1823. Together with the Król mine, these were the two largest mining fields in Upper Silesia, providing up to 50% of the entire district's supply. The mining fields reserved at that time for these mines were 29km^2 for the 'Król' mine and 19.6km^2 for the 'Królowa Luiza' mine, respectively [13] (Such large areas were only granted to state-owned mines. Fields granted to private mines could be a maximum of 2.5km^2). In the literature we find information about seven coal seams:

a. Pochhammer (now 510) – about 5.1 - 6.3m thick
b. Reden (now 509) – about 3.1 - 4.2m thick
c. Heinitz (now 507) – about 4.2 - 5.1m thick – was on outcrop (a place in the field where a deposit comes to the surface of the earth) up to a depth of 38m (slope of about 20 degrees)
d. Schnekmann (now 504) – 8.4 - 9.4m thick
e. th Einsiedel (now 501) – 1.3 - 1.6m thick
f. 70-inch deck – irregular and with poor quality properties (approximately 1.8m)
g. George (Georg) (now 417) – about 3.1m thick

At the 'Królowa Luiza' mine in Zabrze (Figs. 1, 2, and 3), coal extraction was growing rapidly. However, the problem was the cost of dewatering the pits and transporting the excavated material, which was so high that the mine was becoming unprofitable. It was necessary to implement a plan to expand and improve the mine. The Silesian mining authorities therefore decided to build the Main Key Heritage Adit. This facility was intended to drain the entire mining field between the Królowa Luiza mine in Zabrze and the Król mine in Chorzów [12]. In 1799, the construction of the longest hydro-technical structure of the 19th century mining industry - the Main Key Heritage Adit (Hauptschlüsselerbstollen), colloquially known as the 'Królowa Luiza Adit' - began. All mines located in Upper Silesia at that time were confronted with the problem of inflowing water. This problem was solved in various ways. Water was pumped to the surface, drawn, or drained by gravity.

The mine used gravitational water drainage, which consisted of excavating a special excavation—i.e., an adit, through which water was discharged to the surface (Frużyński, Klajmon, and Szczypkowska, Sztolnia Królowa Luiza w Zabrzu—podziemna podróż w czasie, 2020). Adits that served to drain water from more than 1 mine were called hereditary. The undoubted advantage of an adit, apart from its dewatering function, was the possibility of

transporting coal. Thus, in 1799 a decision was made to build the Main Key Hereditary Adit, a construction object that was part of the expansion plan [2].

Fig. 2. The Queen Luiz Mine - view from the east, dated ca. 1910.
Source 1: Resources of the Coal Mining Museum in Zabrze

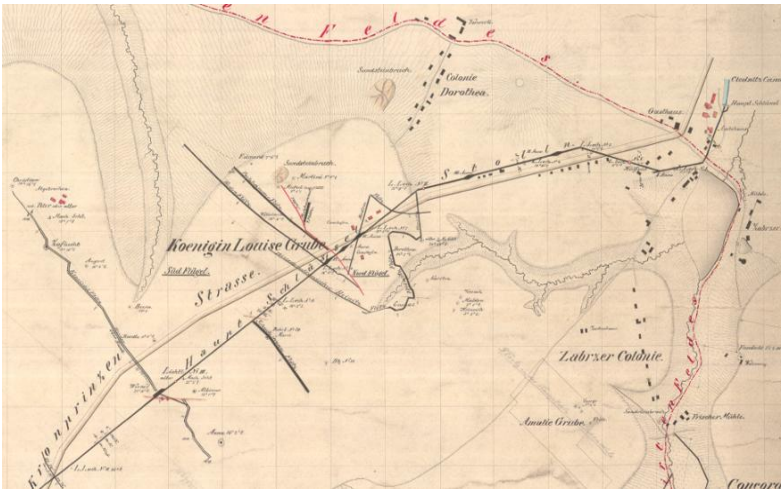

Fig. 3. Map of Królowa Luiza Mine with the Main Key Hereditary Adit highlighted
Source 2: Resources of the Coal Mining Museum in Zabrze

The coal seams accessible by the adit were excavated using the so-called notching method. This method consisted of cutting a horizontal notch in the wall by means of a hammer and wedge, located at the bottom, and vertical notches at the sides. The technique involved undercutting the deposit so that it fell under its own weight. The method made it possible to extract a larger percentage of coarse coal, which was much more expensive than smaller pieces. Initially, coal mining was carried out on the Heinitz, Reden, Pochhammer, and Einsiedel seams [11].

The Main Key Hereditary Adit is part of the former 'Królowa Luiza' mine (Fig. 4). It is located on the section between the adit mouth located at K. Miarki Street and the dam in the area of the Carnall shaft. The construction and existence of the adit were conditioned by the functioning of as many mines and excavations as possible in its area. At its highest capacity, the adit drained more than 20 mines located around today's Chorzów and Zabrze.

The adit was excavated between 1799 and 1863 and measured 14.25km in length. Its construction was initiated by Count Frederick Reden, and its main purpose was to drain the mining fields for some of the first coal mines in Silesia [13]. The adit connected the surface outlet located in Zabrze with the "Krug" shaft of the "Król" mine in Chorzów Stary. Among others, it drained such mines as the Katherine Mine, the Litandra Mine, the Saara Mine, the Orzegów Mine, and the Matilda Mine. Construction of the adit took 64 years, starting in 1799 and completed in 1863, and was 14,250m long. The construction process was carried out with simple tools such as oskards, iron wedges, and hammers; the builders also supported themselves with blasting methods [2].

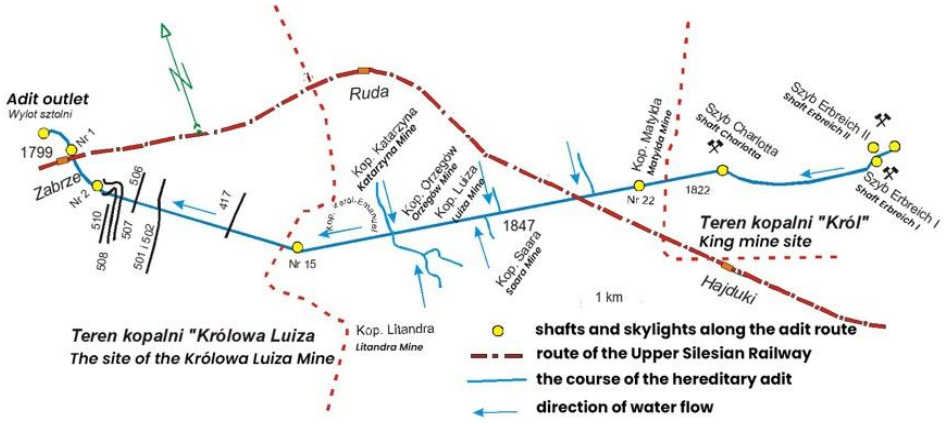

Fig. 4. Course of the Main Key Hereditary Adit according to St. Kossuth
Source 3: Materials of the Coal Mining Museum in Zabrze, documentation "Execution of exploratory research with preliminary inventory taking into account ..." - "Analysis of existing documents and documentation of the Main Key Heritage Adit ..."

The construction of the adit was carried out using the method of multiple counterexcavations (Fig. 5) (Corridors drifted from two opposite sides finally met in one place to form one long tunnel). It consisted in carrying out works simultaneously from many shafts, the so-called skylights, drilled along a route marked out to guide the adit [17].

The counter-boring method consisted of working simultaneously in both directions of the horizontal corridor (Fig. 5) [5]. Construction work was carried out with iron wedges driven into the stone and with a hammer. With the aforementioned tools, the excavated material was extracted and the bottom was deepened. If it was necessary to cut through very hard sandstone, blasting work was carried out (*The shooting work consisted of hollowing out a hole, which was then cleaned with cock feathers. A charge of gunpowder was then inserted into the hole, a rod ended was inserted and then clogged with clay. When it was finished, the rod was slid out and in its place a straw with gunpowder was inserted. The straw was finished off with a non-sulphured thread. The end of the thread was fired from a miner's lamp and the blasting man fled with other miners a few hundred metres from the blast site.*). The adit was partly lined with stone and partly without lining.

The average gradient of the adit was 0.86m per 1.0km, the difference in level between the mouth in Zabrze and the end in Chorzów was about 12.34m [16]. In addition to dewatering state and private mines, the adit had a transport function, providing the possibility of floating the ore

(*The excavated material was to be floated through the GKSD, then through the Klodnica Canal to the Gliwice Steelworks. The Królowa Luiza mine was to be the main coal supply for this steelworks*) [16]. It had a height of about 2.5m and a width of about 1.6m in the light; the depth of the water in the adit was 1.3m (empty boats were submerged at 34cm and full boats at 73cm). The workman would stand in the first boat and, moving to the last boat by leaning on pegs driven into the stub and ceiling, would move the boats forward with his feet. After reaching the last boat, he would walk back to the first boat and push the whole transport again. The entire process of pushing the boats from about 1.6 to 2.5km (from the loading port to the mouth of the adit) took 6-7 hours. In order to make the transport more efficient, the use of wooden rods with which the carrier pushed off the ceiling was initiated. This reduced the transport to 3-4 hours. The visible traces in the adit lining do not exclude the installation of iron rods ending in a pulley in some sections, through which a rope (hemp rope) was passed to help the miners push the boats with their hands.

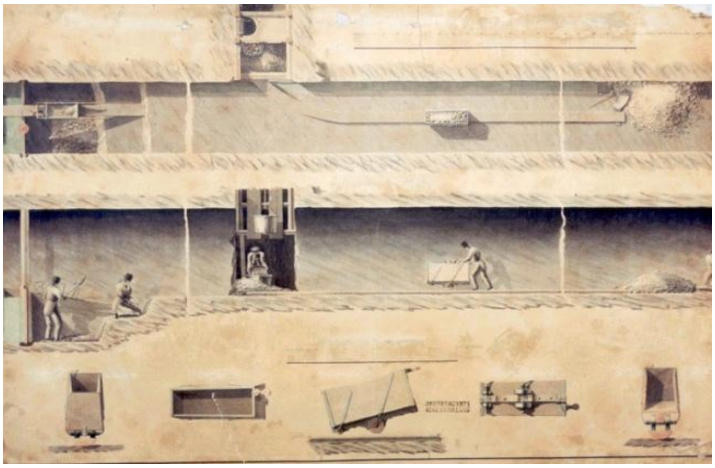

Fig. 5. Construction of the Main Key Heritage Adit.
Source: Archive of the Coal Mining Museum in Zabrze, author unknown (MGW/TG/A: 3091)

Transport in the adit was by means of wooden boats reinforced with iron rails. Coal was transported to the shore of the adit on four-wheeled platforms (Jaros, Dwa wieki Kopalni Węgla Kamiennego "Zabrze-Bieleszowice," 1991). The capacity of each box was 370 tonnes, and the boxes were loaded using a specialized crane (Fig. 6). One boat held between 10 and 11 crates, transporting a total of approximately 4 tonnes of net ore. An average of 3-4 boats were chained together for a single transport (Jaros, Two Centuries of the Zabrze-Bieleszowice Coal Mine, 1991). Crates with excavated material were placed inside the boats and transported to the shore of the adit on four wheels [18]. The boats were pushed through the adit by a single worker. The design of the adit envisaged the construction of 3 underground ports, which were 4m high due to the cranes working in them.

Archival engravings show three harbors with loading cranes used for handling excavated material. The crane consisted of a vertical swivel shaft on which was a horizontal beam, at the end of which was located a block for releasing and lifting a chain with a transport box (Fig. 7). The chain was set in motion by a large sprocket moving a larger sprocket. This mechanism was used to wind or unwind the chain onto the drum. The entire crane had a rotating mechanism, allowing it to stagger its arm in a circle. This gave the possibility of unloading an empty box from the boat and transferring it to the platform [19]. The crane was actuated by a pinion crank reel.

Fig. 6. View of loading port and crane for loading coal boxes, Królowa Luiza mine—north part of the Red Seam
Source: Coal Mining Museum in Zabrze, by Gardt and Plünicke (MGW/TG/A: 2596)

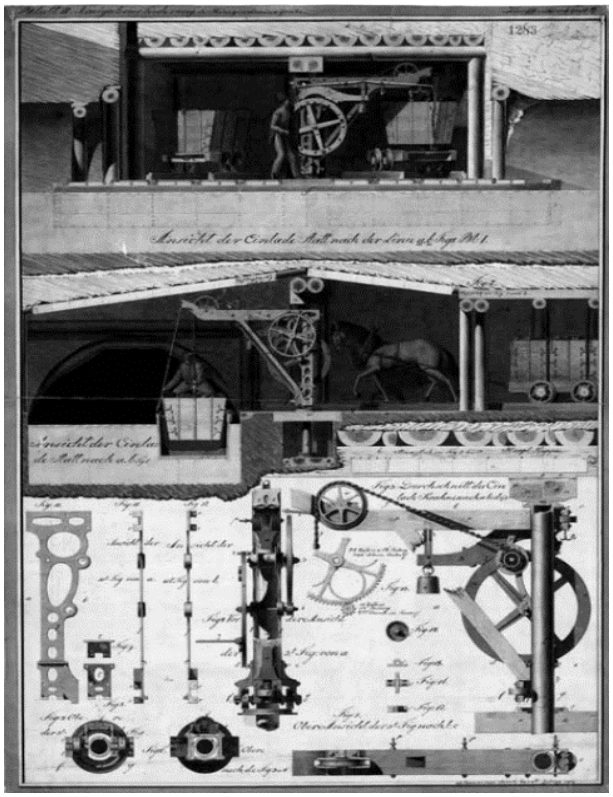

Fig. 7. Drawing of coal loading at the coal port of the "Królowa Luiza" mine
Source: Coal Mining Museum MGW/TG/A: 759, author Gardt 1812, OBB 1283

Illustration 7, made by surveyor Gardt in 1812, complements the drawings of the loading port [20]. It formed the basis for a replica of the crane located today in the 'Królowa Luiza Adit' (Fig. 8).

Fig. 8. Photograph of a replica crane with a loading dock in today's "Queen Luisa Adit" complex
Source 4: https://www.sztolnialuiza.pl/index.php/pl/trasa-wodna

With the development of technology, it became possible to mine coal on seams below the level of the adit. In addition, the development of roads (the construction of a highway from Królewska Huta via Bytom to Tarnowskie Góry, and then from Królewska Huta via Zabrze to Gliwice) meant that the adit lost its importance both for drainage and transport [2]. Although the transport of coal by adit ceased to be paid for around 1846 (when coal was also transported by railways), the Main Key Hereditary Adit was completed. Until the end of the 19th century, part of the mine water was still discharged through it. Unfortunately, later disused, it gradually silted up, and in 1953 its outlet was closed and part of the Kłodzko channel was backfilled [2].

Revitalization of the "Królowa Luiza Adit" complex

For the first time, fragments of the underground corridors of the Królowa Luiza Mine were opened to tourists in the years 1965-1979, making it possible to visit the underground workings of an active mining plant. During this period, the underground tours were managed by the Międzyzakładowy Górniczy Oddział Polskiego Towarzystwa Turystyczno-Krajobrazowego (Inter-Union Mining Branch of the Polish Tourist Society), and the tours were intended to serve a propaganda function, encouraging young people to work in the mining industry [5].

The Coal Mining Museum in Zabrze, as we know it today, has been operating under various ownership structures since 1981. Until 1993, the Coal Mining Museum was a state museum subordinate to the Ministry of the Economy. In 1993, Rudzka Spółka Węglowa SA handed over to the Coal Mining Museum in Zabrze the facilities of the decommissioned "Zabrze Bielszowice" Western Field. On 2 April 2013, an act to establish the Coal Mining Museum came into force. Currently, the "Coal Mining Museum in Zabrze is a joint cultural institution of the City of Zabrze and the Silesian Voivodeship. It was established through the merger of two cultural institutions: the Coal Mining Museum in Zabrze (in operation since 1981), for which the Silesian Voivodeship was the organizer, and the Historic 'Guido' Coal Mine in Zabrze (launched in 2007), for which the City of Zabrze and the Silesian Voivodeship were the organizers" [21].

The modern history of the adit begins with attempts to enter the adit in 1998. It was then that the first attempts at exploration were made from the former Municipal Office and District

Office building located on Karola Miarki Street. Expert interviews showed that the search for the adit entrance continued until 1999, when the first articles appeared in the local press about the discovery of the adit. The first accounts of the descent to the adit were described as follows: "After just a few steps we knew why no one had come this far before. I had fallen into the silt up to my waist and didn't really know how to get out of it. The other participants couldn't help me because they had similar problems themselves. That's when the wooden paws that Sylvester carried came in handy. Even so, at times, walking on all fours and pushing the shovel in front of you to distribute your body weight, the mud was almost up to your mouth... In addition to this, there was a stench - something between the smell of rot and that of a sewage or rubbish dump. That's how we walked about 400-500 meters over the next hour. And suddenly the low tunnel ended..." [22].

The first visions concerning the expansion of the open-air museum appeared in 1998, and in 2000 the "Pro Futuro" association was established in Zabrze, consisting of enthusiasts, museum workers, and entrepreneurs whose aim was to create a complex of underground tourist routes in Zabrze [23]. In 2006, the Zabrze City Council set up a team to establish a European Center of Technical Culture and Industrial Tourism in Zabrze. In 2007, the company BPW - Zakład Wierceń, Kotwieni i Usług Górniczych from Zabrze, commissioned by the Zabrze City Council, conducted a study of the adit. During the survey, measurements, photo documentation, and a description of the lining, as well as a study of the deposited silt, were carried out (Fig. 9).

Fig. 9. Adit from link walkway 'B' (0m) to 86m wrought in sandstone (view towards the sub-pit). Width of corridor 160cm
Source: Design documentation for the unblocking, protection, and adaptation of the underground part of the project, i.e., the Main Key Hereditary Adit, the Carnall Shaft with its shaft and connecting excavations for the needs of tourist traffic as well as the performance of the necessary preparatory work, by Zakład Wierceń, Kotwienia i Usług Górniczych BPW Spółka z o.o., December 2009

The work on unblocking the Main Key Hereditary Adit began in 2012 and was carried out from two directions: from the Carnall shaft and from the adit mouth at Miarki Street (Figs. 10 and 11). The work was carried out using traditional methods. Backfilled silt was shoveled out and removed with wheelbarrows [24]. The excavation was completed on 21 March 2014. According to data made available by MGW, 19,000 tonnes of silt were removed from the adit corridors. This

corresponds to 750 thousand tonnes of wheelbarrows, the total length of which would correspond to the road from Zabrze to Gdańsk [5].

Fig. 10. Main Key Heritage Adit corridor during exploration
Source: Photograph by Marcin Lesiak, Materials of the Coal Mining Museum in Zabrze

Fig. 11. A fragment of the revitalized Main Key Heritage Adit
Source: Coal Mining Museum, https://www.zabytkitechniki.pl/poi/1703/sztolnia-krolowa-luiza-strefa-carnal

The institution not only carries out museum activities but also dynamically revitalizes further buildings and pits. Today, as part of the accessible complexes, tourists can visit more than 10 km of underground tourist routes located on 5 levels of the mine. The wide offer of attractions includes a boat trip down the revitalized section of the Main Key Heritage Adit and several other attractions located in the mine's underground, such as an underground shift, where visitors in full gear and clothes perform a number of mining works, or an underground mine walk. Additionally, the revitalized corridors are used for a few events and exhibitions.

Table 1. List of elements revitalized between 2009 and 2023 with costs, based on Coal Mining Museum in Zabrze data

ELEMENTS REVITALISED IN THE PERIOD 2009-2023					FINANCIAL RESOURCES FOR REVITALISATION	
	Duration	Assignments	Total net cost		Source	Net cost
Revitalisation Stage I	2009-2017	revitalisation of the Main Key Hereditary Adit: clearing and securing it for tourist traffic (4 km of excavations)	317 475 783,00 zł		Subsidies - funds raised by MGW	242 902 622,00 zł
		comprehensive renovation of excavations in Mochnackiego Street				
		revitalisation of levels 170, 320, 355				
		creation of zone K8				
		modernisation of Guido Hostel			Own resources - MGW	11 520 916,00 zł
		adaptation for tourist traffic of 10 km of underground excavations				
		revitalisation and use of 4 underground chambers for cultural, educational and commercial activities				
		revitalisation of 16 buildings				
		construction of two new facilities including landscaping				
		construction of two theme parks 12C and the Military Technology Park			Credit taken out by Coal Mining Museum in Zabrze	12 694 082,00 zł
Revitalisation Stage II	2017-2023	renovation of the historic steam engine of 1915 including construction of a boiler room				
		revitalisation of the former starost's office building located at 19 3 May Street (adaptation of the building for museum and commercial functions)				
		Revitalisation of the engine room of the Prinz Schonaich shaft (exhibition function)			City of Zabrze	37 470 046,00 zł
		revitalisation of the back of the former eclectic workshop (function as a workshop facility and exhibition and educational space)				
		conversion of the guildhall building into a studio warehouse			Silesian Voivodship	12 888 117,00 zł
		revitalisation of the water tower				

Discussions

The functions that industrial buildings once performed are now a thing of the past. Rational revitalization makes it possible not only to adapt facilities to new functions but also to bring neglected and abandoned post-industrial areas back to life.

Both the construction project and today's revitalization of the adits represent epoch-making engineering projects. European industrial sites differ from other immovable monuments in that they lose their original function irretrievably. Numerous foreign examples of the revitalization of such areas prove that good and well-considered revitalization is an opportunity for a second life not only for monuments but also for entire communities. The process of revitalization and adaptation of the coal mine complex in Zabrze proves that in order to restore former post-industrial areas of mines, it is necessary not only to carry out an efficient construction process but also a well-thought-out real estate acquisition procedure, providing the possibility to design the financial assembly for individual revitalization undertakings. Ownership structures forced, as it were, by the necessity of a unified mining law in the 19th century are today a formidable obstacle to revitalization processes. It is necessary to return former mining areas to local authority structures, which are both willing and able to apply for external funding.

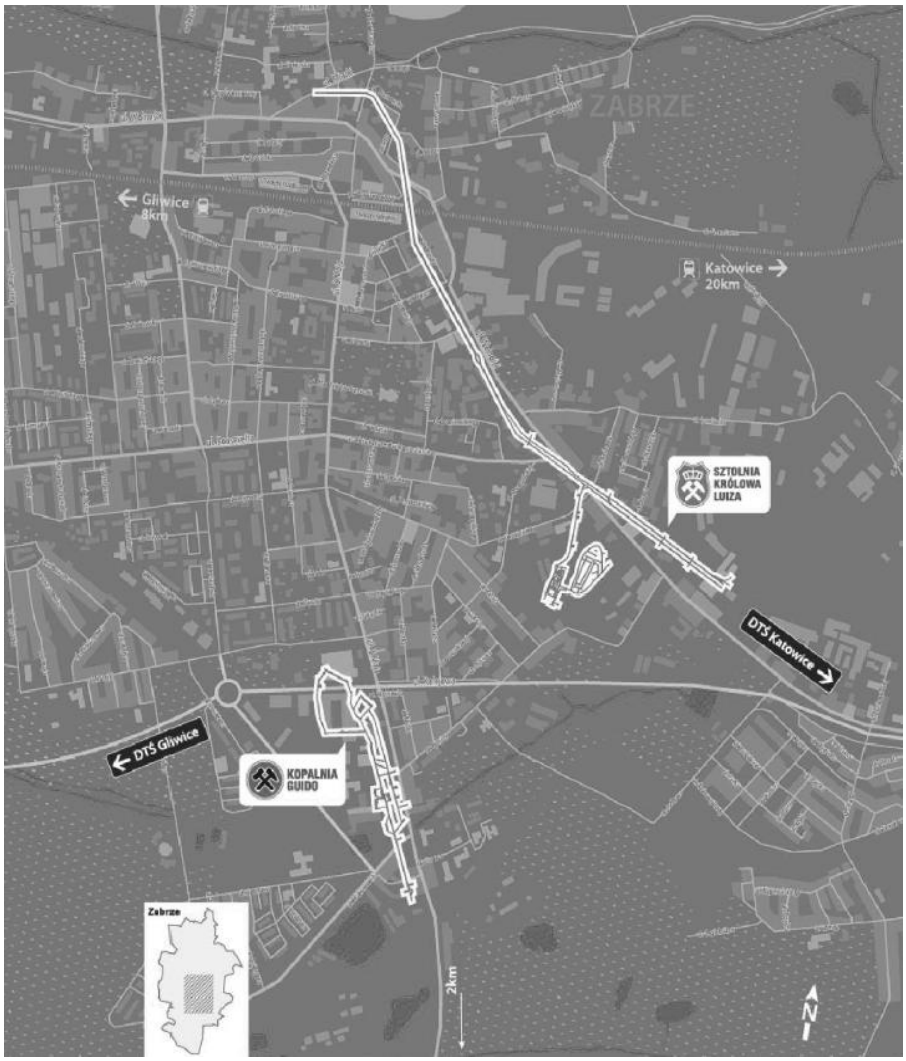

Fig. 12. Historic coal mine complex in Zabrze
Source: Museum materials. Presentation of the process of revitalization of post-mining objects on the example of the Coal Mining Museum in Zabrze

The example of adaptation and revitalization carried out in Zabrze clearly illustrates the problems faced by professionals involved in "bringing back to life" post-industrial sites. Using the example of Zabrze, we can see how big the problems of these projects are. The problem is the dispersed and disorganized system of ownership, and in the case of underground sites, it is impossible to determine the owner, while building sites have different owners (city, province, or association). There is also a lack of detailed legal regulations on the conduct of construction works in tourist facilities subject to the requirements of geological and mining law. One of the biggest problems faced by those carrying out revitalization projects is the limited budget and lack of funds.

Today, the historic coal mine complex in Zabrze (Fig. 12) provides an example not only of ambitious revitalization of facilities but also shows that good management of the entity gives the possibility to obtain gigantic external funds to carry out revitalization processes. Modernized mine buildings not only bring a new quality to urban spaces but are also testimonies of their era.

Conclusions

The Zabrze coal mine revitalization project exemplifies how well-managed initiatives can overcome structural, legal, and financial barriers in post-industrial transformations. Recognition at the European level — including the 2019 European Heritage Award / Europa Nostra Award — underlines the project's success and its value for both Polish and European cultural heritage.

The Queen Luisa Adit now stands as a powerful symbol of Upper Silesia's mining legacy. Its designation in 2020 by the President of Poland as a Monument of History confirms its national importance. Current and future plans aim to continue the adaptation and revitalization of both underground and above-ground facilities, supported by funding from EU programs, the National Fund for Environmental Protection, and public budget allocations.

Ultimately, the Zabrze case shows that with strategic planning, legal support, and sustainable funding, post-industrial heritage can be successfully preserved and repurposed — enriching regional identity and providing educational, cultural, and tourism opportunities for future generations.

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Received: August 28, 2024
Accepted: June 30, 2025

Appendix 1. Additional Sources

Projects:

1. Research and inventory works - study no. 3. Inventory of the Main Key Heritage Adit on the section from the bifurcation in the area of the 6th skylight to the bifurcation on the eastern side of the Carnall shaft.
2. Application documentation: concept of an application for inscription on the tentative list in the UNESCO World Heritage System for the "Historical complex of the coal mining industry in Zabrze," currently under preparation.
3. Application documentation: Operational Programme Innovative Economy—European Centre of Technical Culture and Industrial Tourism.
4. Carrying out an exploratory survey with preliminary inventory taking into consideration the location of skylights, the types and condition of lining, the condition of siltation, water inflow, taking samples of material filling the Adit, carrying out geodetic measurements and preliminary geological and hydrogeological surveys of soil in the vicinity of the Adit and the "Królowa Luiza" Open Air Museum together with the Supplement, Zabrze City Hall, Zabrze 2008.
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Archives:

Archives of the Coal Mining Museum - collection of drawings from the Higher Mining Office in Wrocław:

1. MGW/TG/-AR/3091-0000 - drawing of an adit during excavation (visible skylight, people working, carts, wheelbarrow, water buttress),
2. MGW/TG-AR/756-1283, 758-1283 to 760-1418, 774-1293, 775-1294, 2596-558, 3092-0000 - drawings of three different harbors with loading facilities