

---

## Krzemionki (Poland) No 1599

---

### Official name as proposed by the State Party

Krzemionki Prehistoric Striped Flint Mining Region

### Location

Świętokrzyskie (Holy Cross) Voivodeship  
Districts (Powiat) () of Ostrowiec Świętokrzyski and Opatów  
Poland

### Brief description

Located in the region of the Świętokrzyskie Mountains, Krzemionki is a set of four mining sites, dating from the Neolithic to the Bronze Age (c. 3900-1600 BCE); where striped flint was mined and processed. The nominated property covers a wide range of mining techniques on the same site, Krzemionki Opatowskie, with more than 4000 extraction structures. Among the known extraction systems, the chamber type is the most representative in terms of its dimensions and its highly systematic extraction organisation. The mining landscape of Borownia and Koryczna may contain intact extraction systems. The settlement site of Gawroniec has furnished a very substantial set of flint artefacts bearing witness to axe-making activities. The polished axes produced, and the scale of their distribution, are emblematic of the Neolithic period.

### Category of property

In terms of categories of cultural property set out in Article I of the 1972 World Heritage Convention, this is a serial property comprising four *sites*.

## 1 Basic data

### Included in the Tentative List

12 January 2016

### Background

This is a new nomination.

### Consultations and Technical Evaluation Mission

Desk reviews have been provided by ICOMOS International Scientific Committees, members and independent experts.

An ICOMOS technical evaluation mission visited the property from 24 to 28 September 2018.

### Additional information received by ICOMOS

A letter was sent to the State Party on 17 October 2018 requesting further information about documentation, research, the justification for the serial approach, the

factors affecting the property, protection, management, and visitor facilities and infrastructure.

An Interim Report was provided to the State Party in December 2018, summarising the issues identified by the ICOMOS World Heritage Panel. Further information was requested in the Interim Report, concerning matters including integrity, buffer zones, protection, the management plan, research, the cultural park, and visitor facilities and infrastructures.

Additional information was received from the State Party on 28 February 2019 and has been incorporated into the relevant sections of this evaluation report.

### Date of ICOMOS approval of this report

13 March 2019

## 2 The property

Note: The nomination dossier and additional information contain detailed descriptions of this property, its history and its state of conservation. Due to limitations on the length of evaluation reports, this report only provides a short summary of the most relevant aspects.

### Description and history

The nominated property, located in the Mountains of the Holy Cross (Świętokrzyskie in Polish), in central Poland, is a set of four prehistoric and protohistoric mining sites dating from the Neolithic and the Bronze Age (c. 3900-1600 BCE), comprising three striped flint extraction sites (Krzemionki Opatowskie, Borownia and Koryczna), and one settlement site connected to the mining activity (Gawroniec).

The three mining sites worked the same raw material, a bluish-grey striped flint of the same geological level: upper Jurassic limestone. This geological level forms a narrow linear outcrop about 11 km long. The general dip of the layers explains the variety of extraction systems, the deepest of which reach 9 metres. This is also what gives the mining zone its unusual form: a highly dissymmetrical U shape, with non-continuous workings on the longer side. The three mining sites are located at the two ends and in the central part of the zone. The settlement site a few kilometres south of the mining zone has been excavated only very partially, but has provided archaeological artefacts supporting the interpretation that it was the village of the miners and knappers.

Krzemionki Opatowskie is the largest of the four components selected, in terms of extraction and export volume, and is also the best documented in scientific terms, with 4000 shafts recorded over an area of 78 ha. The other two mining sites, Borownia (3.7 ha) and Koryczna (1.7 ha), are far more modest in scale. The three mining sites selected have a surface post-mining landscape consisting of a hummocky surface of shaft hollows ringed by mining waste tips. They have largely retained their original appearance since the end of mining, i.e. since the late

Neolithic period and the early Bronze Age, thanks to the wooded environment.

Extraction systems have up to now only been found at Krzemionki Opatowskie, where excavations have been regularly undertaken from 1923 to the present day. Five extraction systems on this site have been studied and described: shallow pits up to 2 metres deep (opencast pits); underground niche-gallery mines; shafts and gallery(ies); underground pillar-chamber mines, with chambers supported by rock pillars; and underground chamber mines (large chambers). The chamber mining system is particularly outstanding in terms of its dimensions and the extremely systematic organisation of the mining activity. Some of the mining chambers are as large as 400-500 square metres. The various mines have been dated to 3900-1600 BCE. Most of them however, and particularly the chamber mines, were dug out between 2900 BCE and 2500 BCE, at the time of the Globular Amphora culture.

The nature of the geological substrate, a very hard limestone, explains the stability of the surrounding rock mass, which enabled the extensive horizontal development of galleries, and thus exhaustive mining of the flint beds during the Neolithic period, and also the conservation of these underground workplaces. The organisation of the extraction activity (passageways, advancement of the working face, mining waste management) and the technical solutions adopted during working (starting of small fires for lighting and air circulation, placing of timber props, extraction tools), are documented. Charcoal graffiti on the walls of the galleries have been recorded, and are interpreted as being connected to symbolic practices.

Although the Borownia and Koryczna sites have not yet been subjected to thorough excavations, the mining landscape may contain other intact mining systems comparable with those at Krzemionki Opatowskie. Excavations at Borownia in 2017 confirmed the existence of pits and flint workshops.

Striped flint was used mainly to make axes. The manufacturing chain was located partly or entirely on the extraction site. At the time of the Funnel Beaker culture (3900-3000 BCE), part of the axe production chain was located some distance away from the extraction site. The settlement site of Gawroniec, respectively 9 km from the Krzemionki mines, 5.5 km from Borownia and 5 km from Koryczna, is the source of a very rich set of flint artefacts bearing witness to this fact. It shows that the community established at Gawroniec is directly involved in the working of the striped flint mining sites and in the production of the flint tools.

The striped flint was distributed in the form of axes over distances that varied according to the period: 330 km in the Funnel Beaker culture period (3900-3000 BCE), 660 km at the time of the Globular Amphora culture (3000-2400 BCE) and 85km in the Mierzanowice culture (2200-1600 BCE).

The early discovery of Krzemionki Opatowskie in 1922 enabled rapid identification of the nature of the site, and led to the delineation of the Krzemionki mining zone in 1929. From 1928 to 1932, some 24 hectares of the Krzemionki Opatowskie mining field were purchased, thus forming the precursor of the archaeological reserve. In 1945, the mining site was given official historic monument status, and the reserve was officially created. The lack of crop-growing on the soil, and above all the absence of deep subsoiling (a practice increasingly common after World War Two, with the development of mechanisation), prevented the levelling of the surfaces, and the increase in vegetation effectively fossilised the archaeological structures just as they had been when abandoned more than 5000 years earlier. In 1985 the first underground tourist circuit was opened, in 1995 the site was granted nature reserve status, and in 2012 a new interpretation centre was built on the site. The other two mining sites (Borownia and Koryczna) have not been thoroughly investigated, unlike Krzemionki, apart from an initial excavation at Borownia in 2017. The Gawroniec settlement site was partially excavated from 1947 to 1961.

### **Boundaries**

The area of the four components totals 349.2 ha, with buffer zones totaling 1828.7 ha.

The State Party stresses that the nominated zone of Krzemionki Opatowskie comprises the whole of the mining field and the associated structures. The boundaries coincide largely with the zone inscribed on the Register of Monuments, except in the north-northwest, where the boundary line has been modified to exclude from the nominated property both the museum and the immediately surrounding area. The State Party indicates that half of the museum and surrounding area was included in the zone inscribed in the Register of Monuments and half was excluded. In the south, the former limestone quarry has also been excluded from the nominated property, as the quarry does not contribute to the potential Outstanding Universal Value, although it lies partly inside the zone inscribed in the Register of Monuments.

A buffer zone has been delineated for each of the four components forming the nominated property. The State Party indicates however that the buffer zone has no legal basis at national or regional level. Nevertheless, the State Party stresses that the buffer zones provide additional protection in the form of increased surveillance by the local authorities for any development that might be planned there. The delineations of the buffer zones are set out in the local development plans at local and regional level.

In its Interim Report, ICOMOS asked for more information about the justification of the buffer zone boundaries, and asked if the creation of a single buffer zone for all the components of the nominated serial property and the nearby flint zones could be, or has been, considered by the State Party.

In the additional information provided in February 2019, the State Party indicates that the creation of a single buffer zone has also been examined. The State Party chose to

prefer an individual buffer zone for each component because of the clearly defined spatial relationships, and the possibility of including its buffer zones in communes that already have local land development plans.

ICOMOS considers that the local land development plans must clearly establish how they will guarantee that the buffer zones provide an additional protection level for the nominated property, as indicated in the *Operational Guidelines for the Implementation of the World Heritage Convention* (103-107).

ICOMOS also considers that the Kamienna River cultural park will strengthen the protection level of the buffer zones.

### **State of conservation**

Archaeological excavations took place at the mining site of Krzemionki Opatowskie in the 1920s and 1930s, and then resumed in the 1950s and have continued up to the present day. The mines, backfilled after working, have been preserved intact up to today. Of the 4000 mines, only about one hundred have been destroyed by the modern-day limestone quarries. The archaeological excavations opened up some of the mines, in the “pillar-chamber” mines and “chamber” mines sector. Underground alterations were carried out to make the mines safe and enable them to be visited (underground routes). Conservation measures were carried out on the mines with large chambers and on the “pillar-chamber” mines, at the visitor access level: roof support, door frames and steel pillars, and rock consolidation. Excavated prehistoric pits have also been modified to enable access for researchers and visitors, or for use as emergency accesses, for example by placing concrete domes over the shafts (shafts 1, 2 and 3).

The archaeological research at Borownia, in 2017, uncovered two shafts. The geophysical studies suggest the existence of underground structures that have not been excavated, as at Koryczna.

The three mining sites selected have a “post-mining landscape” on the surface, consisting of shaft hollows ringed by mining waste tips. Despite some alterations, they have partly retained their original appearance thanks to their environment.

The excavations conducted from 1947 to 1961 examined 0.5 ha out of the 8 ha of the whole site of Gawroniec, and uncovered 328 pits, which are today backfilled. ICOMOS notes however that deep ploughing and soil erosion in sloping areas may result in the destruction of archaeological remains.

Based on the information provided by the State Party and the observations of the ICOMOS technical evaluation mission, ICOMOS considers that the state of conservation is satisfactory.

### **Factors affecting the property**

Based on the information provided by the State Party and the observations of the ICOMOS technical evaluation mission, ICOMOS considers that the main factors

affecting the property are development, with limestone quarries and urban development pressure in the buffer zone of Krzemionki Opatowskie. The State Party stresses that extraction has been discontinued at the quarry in the immediate vicinity of Krzemionki Opatowskie, and that the quarry has been rehabilitated as a protected nature zone. It is stated that, in accordance with the management measures, new quarries are no longer authorised inside the property.

ICOMOS notes that there are parcels of land that could be built on in the villages of Magonie and Sudół close to the property, which could have a negative impact on the view, both towards and from the property. The State Party stresses that the local authorities limit the extent of construction zones and restrict the height of the buildings inside them, and that only single-family houses are accepted.

The environmental constraints at Krzemionki Opatowskie comprise the uprooting of trees, which removes part of the original ground surface, flood and run-off water in the mines, problems of mine stability, and periodic high levels of dampness in the mines. ICOMOS considers that, while the forest is a positive conservation factor for sites on the surface and mines underground, falling trees can affect remains on the surface (flint workshops, potholes, etc.). ICOMOS notes that falling trees are not mentioned as a factor that could affect the property, and considers that long-term monitoring of this factor is advisable.

Constraints arising from the presence of visitors and tourism mainly relate to Krzemionki Opatowskie, the only site that is currently open to the public. The State Party has identified the following factors: the development of infrastructure and paths for tourists, the deterioration of the prehistoric mining landscape, the reduction of water resources, an increase in waste, air pollution linked to means of transport, and the increase in noise pollution. The State Party stresses however that all these factors will be monitored as part of the management plan. ICOMOS notes however that the creation of a new underground route, referred to as a solution for tourism development, could potentially result in damage to the component.

The factors affecting the property in the nominated zone at Borownia are illegal excavations and the dumping of garbage. As at Krzemionki Opatowskie, agricultural activities, the forest management mode and the uprooting of trees can also be identified as factors. The State Party stresses that measures have been taken to limit the risk of illegal excavations to extract striped flint, and to prevent unauthorised garbage tips. The Technical Evaluation Mission has indicated that there have been no recent excavations, and that no unauthorised garbage tips were observed. ICOMOS also stresses that, as agriculture causes the levelling of structures, deep ploughing could result in a loss of data.

As for Korycizna, the State Party mentions the presence of a quarry in the east of the buffer zone. In the additional information, it is stated that limestone is extracted on a small scale for the production of quicklime and fertiliser. The working quarry, with an area of 11.5 ha, is separated from the nominated property zone by two parcels of land outside the property of the quarry operator, and by the local road. The State Party also notes that another limestone quarry was operating until recently near this component of the property, but that this activity has now been abandoned.

ICOMOS considers that this working quarry has a negative impact on the integrity of the property. The quarry exploitation permit is not set to expire until 2028, which means there is a risk of an increasing negative impact over the coming decade. To ensure the protection of the property, ICOMOS recommends that the State Party should take appropriate measures immediately to attenuate the impact of the quarry.

The factors affecting Gawroniec are agricultural, and are linked to deep ploughing and soil erosion in sloping areas. Both these factors can result in the destruction of archaeological remains. In the buffer zone, the risk identified consists of the urban development of Cmielów, north of the site. The State Party stresses that it is unlikely that the buildings will have a negative visual impact, as the site is on a promontory, but says this will be covered under a specific section in the management plan.

ICOMOS considers that, although most of the factors that could affect the property have been identified, some should be thoroughly evaluated, such as the erosion due to crop-growing in sloping areas at Gawroniec.

In the additional information provided in February 2019, the State Party stresses that activities leading to the abandonment of intensive arable farming have already been introduced at Gawroniec. In view of its inscription on the Register of Monuments, the owners of the parcels will receive conservation directives about how farming activities should be conducted in the zone (depth of ploughing, prohibition of the planting of trees, replacement of arable fields by prairies). It is also planned that the State Treasury will buy land and change its management mode.

ICOMOS stresses that the inscription of Gawroniec on the Register of Monuments must be confirmed to ensure the effective protection of this component of the serial property.

### 3 Proposed justification for inscription

#### Proposed justification

The nominated property is considered by the State Party to be of Outstanding Universal Value as a cultural property for the following reasons:

- The nominated property presents the widest range of types of prehistoric mines, bearing witness to the most advanced techniques, skills, tools, methods and

processes of underground extraction of Neolithic flint known anywhere in the world.

- The same raw material, striped flint, has been exploited from the same limestone outcrop, known as the only source of striped flint extracted in prehistoric times.
- The industrial landscape on the surface bears witness to the extraction of flint in the Neolithic period, and illustrates the whole system for working flint: pits, knapping workshops, temporary camps and permanent settlements.
- The period of activity of the prehistoric Krzemionki striped flint mining region is the longest known worldwide, spanning three cultures: the Funnel Beaker culture, the Globular Amphora culture and the Mierzanowice culture.
- The nominated property bears witness to the organisation and planning capabilities of a deposit management system through the layout of the mine shafts, galleries, chambers and waste (on the surface and underground) at the mining site of Krzemionki Opatowskie.
- The striped flint was distributed, in the form of axes, over a radius of more than 650 km, acting as a marker for the study of flint trade networks in the Neolithic period and the early Bronze Age.
- The nominated property includes the widest range of prehistoric extraction tools ever found in a mine.
- The prehistoric mining sites include a distinctive set of paleo-environmental bio-indicators (fauna and flora).

#### Comparative analysis

The comparative analysis is presented in four parts: an external comparison with relevant World Heritage Sites; an external comparison with Relevant Tentative List Sites; an external comparison with global sites that are comparable on the basis of the proposed Outstanding Universal Value and attributes; and an internal comparison with properties in Poland.

The State Party stresses that the Neolithic flint mines at Spiennes (Mons) (Belgium, 2000, (i), (iii), (iv)), the only flint mines inscribed on the World Heritage List, are of a similar size but are very different in terms of technology (the shafts are narrow and deep, with galleries that are limited in length and in some cases have pillars), type of flint, and socio-technical system.

Comparisons are made with prehistoric flint mining sites in Europe. The State Party stresses that the other important mines in this analysis, in particular Grime's Graves and Cissbury (UK) and Rijckholt-St Geertruid (Netherlands), are mining sites of lesser surface area; furthermore, they worked a type of flint that is very different in colour, and is difficult to use as a marker to study flint trading networks. The State Party indicates that these sites do not present a wide variety of extraction techniques, as they are limited to shafts and galleries, and have no large chambers of the type found at Krzemionki.

In Poland, more than twenty prehistoric flint working sites are known. All the sites except for Krzemionki, Borownia and Korycizna have been excluded, mainly because of their small dimensions and because surface remains have been degraded by limestone quarrying in the past, ploughing and intensive forest exploitation.

ICOMOS considers that the nominated property and the mining site of Spiennes have several points in common, such as the complexity of the extraction structures, high quality materials, distribution of the finished products over long distances, and mines that were worked over a long period of time. ICOMOS notes however that the conservation of the surface structures at Krzemionki has no equivalent at Spiennes, where the land has since been used for crop-growing. Another difference lies in the morphology of the extraction structures. The structures are deeper at Spiennes (up to 15.5 metres), as the geological substrate does not have a comparable level of hardness allowing chambers to be extended over equivalent surface areas, and require on the other hand the conservation of pillars to ensure the stability of gallery roofs. ICOMOS notes that these techniques are known to exist only at Krzemionki. Other differences between the two properties include the very large surface area of the sites at Spiennes (more than 100 ha), the greater number of shafts (estimated at between 25,000 and 30,000), and the earlier date of the beginning of mining (c. 4300 BCE).

If a comparison is made with other mining systems, either for flint (Grime's Grave in the UK, Rijkholt in the Netherlands, Le Grand Pressigny and Jablines in France, Defensola in Italy) or for other raw materials (variscite at Can Tintorer in Spain, pigments and then iron ore at Ngwenya in Swaziland), ICOMOS considers that none of these sites matches the region of Krzemionki in terms of quality of conservation and diversity of mining system remains. On these sites, while extraction is clearly characterised, the production zones have often been damaged by erosion, the diversity of extraction structures is lower, and the cultural contexts remain uncertain.

ICOMOS also notes, that, unlike in most other mines in which the materials are often macroscopically little different from those from comparable geological horizons, the flint at Krzemionki is easily identifiable, which means its distribution can be retraced with a high degree of precision.

ICOMOS considers that the nominated serial property constitutes an outstanding ensemble, as the sites offer the possibility of reconstituting the organisation of the specialised and also the domestic activities that took place in the vicinity of the extraction pits. Such information is in most cases inaccessible today.

---

ICOMOS considers that the comparative analysis justifies consideration of this property for the World Heritage List.

### **Criteria under which inscription is proposed**

The property is nominated on the basis of cultural criteria (i), (iii) and (iv).

*Criterion (i): represent a masterpiece of human creative genius;*

This criterion is justified by the State Party on the grounds that the Krzemionki Prehistoric Striped Flint Mining Region is an outstanding example of creative ability, providing clear testimony to early human inventiveness, mining techniques and organisation. The network of mine shafts, galleries, and chambers excavated in hard limestone illustrates the greatest range of prehistoric mining techniques evidenced in a single site.

ICOMOS considers that the property includes a comprehensive range of techniques with types of extraction that are specific to the property.

ICOMOS considers however that the justification of criterion (i), as presented by the State Party, would be more applicable to criterion (iv). The diversity of extraction techniques would strengthen the justification of the latter criterion.

ICOMOS considers that criterion (i) has not been justified.

*Criterion (iii): bear a unique or at least exceptional testimony to a cultural tradition or to a civilisation which is living or which has disappeared;*

This criterion is justified by the State Party on the grounds that the Krzemionki Prehistoric Striped Flint Mining Region is illustrative of the living and working patterns of settled prehistoric communities, and bears witness to a distinctive cultural tradition that has disappeared. The distribution of striped-flint axes has been identified in a radius of over 650 kilometres, which represents the greatest recorded range for prehistoric flint axes as significant indicators of prehistoric movement.

ICOMOS considers that the nominated property bears witness to the economic and social organisation linked to a specialised activity, the extraction of flint and its use for the production of polished axes. The Krzemionki region contains remains that originated in the miners' and knappers' camps, and bears witness to a specialised settlement whose location is linked to the working, processing and distribution of mining products. The remains enable the documentation of some major aspects of production organisation, the knapping techniques used, the levels of expertise used, and their transmission.

ICOMOS considers that the polished axes produced and their scale of distribution, are emblematic of the Neolithic period, including the period's symbolic and ritual aspects, depending on the context. ICOMOS notes that today there is no comparable distribution of flint axe blades at a European level. Distribution over longer distances (more than a thousand kilometres) has however been attested in the Neolithic period, but for hard rocks such as jadeites.

ICOMOS considers that criterion (iii) is justified.

Criterion (iv): *be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;*

This criterion is justified by the State Party on the grounds that the Krzemionki Prehistoric Striped Flint Mining Region provides exceptional evidence that the prehistoric period, with flint mining to produce tools, was a watershed period in the history of humankind. Various prehistoric underground mining structures are present in the nominated property, and knapping workshops for the flint extracted from the mines have been conserved intact among more than 4000 shafts and pits.

ICOMOS considers that the property is representative of Neolithic societies and their adaptation to the natural environment. The flint mines bear witness both to a complex technical and social system and to a human adaptation to the conditions of natural resource exploitation that is a landmark in the history of mining.

ICOMOS stresses that all the elements relating to the extraction and processing of striped flint are included in the nominated property. The preservation of the surface remains, thanks to the conservation of the Neolithic mining landscape (flint knapping workshops, shelters, passageways, etc.), enables an understanding of the exploitation and knapping processes. These techniques are moreover linked to the conditions of the deposit, particularly in the hard limestone, enabling the hollowing out of very large underground chambers that are the largest known for the prehistoric exploitation of flint. These techniques are only known to have existed at Krzemionki.

ICOMOS considers that criterion (iv) has been justified.

---

ICOMOS considers that the nominated property meets criteria (iii) and (iv), but that criterion (i) has not been demonstrated.

---

### **Integrity and authenticity**

#### **Integrity**

The State Party points out that the archaeological investigations at Krzemionki Opatowskie have enabled the determination of the extent of the property, with some 4000 extraction flint extraction pits and shafts in the zone, and provided information about the state of the property's conservation.

The State Party indicates that the property is constantly monitored by museum staff and by nature reserve employees. In the 1920s, measures were taken to restore the integrity of the site. The vegetation clearings on the site were ended in 1945, enabling the natural and gradual recolonisation of the site by tree species. Measures were introduced to ensure that the village of Krzemionki, located

inside the protected zone, was abandoned by its inhabitants.

The State Party also indicates that several measures are currently being taken to support the integrity of the site on the surface, and to ensure its conservation and readability. The new museum and its car park have been established outside the protected site, while the old infrastructure inside the protected zone (car park, museum and storage depot) is shortly to be dismantled to restore the integrity of the site.

The State Party stresses that the inclusion of the levelled zone in the proposed boundary for Borownia enables the inclusion of all the underground mining systems identified by geophysical studies. The State Party indicates that the sector in the north-west of the site where traces of temporary human settlement have been found, potentially linked to mining, has been included inside the boundary.

As for Korycizna, the State Party indicates that the mining landscape has been preserved under forest cover, and that the presence of underground mines has been evidenced by geophysical studies. ICOMOS points out that the site has been damaged because striped flint is a highly desirable material, but that the extent of this damage is hard to estimate. ICOMOS also considers that the working quarry has a negative impact on the integrity of this component of the serial property, and that appropriate measures need to be taken immediately to ensure its protection.

The State Party points out that the nominated zone for Gawroniec includes the whole of the hill on which the settlement stood. The State Party indicates that Gawroniec Hill has not been built on, despite its proximity to the town of Ćmielów. The site lies beneath cultivated fields at the summit and on the edge of the slopes, and under grassland and woods in the sloping areas. The classification procedure currently under way should strengthen protection of the site by encouraging farming practices that limit soil erosion. ICOMOS underlines that deep ploughing and soil erosion in the sloping zones would lead to the destruction of archaeological remains and adversely affect the integrity of this component part, if crop growing were to continue there.

ICOMOS considers that the selection of the components of the serial property is justified. ICOMOS notes however that some 495 sites linked to striped flint exploitation have been documented in the middle valley of the Kamienna River, whose protection is ensured by the creation of a cultural park.

ICOMOS stresses that the buffer zones and cultural park must be effective, in order to ensure the protection of the nominated property.

ICOMOS considers that the conditions of integrity of the nominated serial property have not been met at this stage.

## Authenticity

According to the State Party, the property meets the condition of authenticity, with regard to situation and setting, form and conception, materials and substance, use and function.

The archaeological structures have largely retained their original form and conception, which enable an understanding of the life of the societies that occupied the serial property. ICOMOS also considers that the results of archaeological research and excavations since the early 20<sup>th</sup> century, in the case of Krzemionki Opatowskie, bear witness to the property's authenticity.

However, ICOMOS considers that the works undertaken to make the mines safe and to enable visits at Krzemionki Opatowskie are likely to more or less strongly impact the property's authenticity, particularly the creation of a new underground route mentioned as a solution to the increase in tourism.

The geophysical studies suggest that underground mining systems may potentially exist at Borownia and Koryczna. Underground, the mining systems that were backfilled when mining ended have remained intact. ICOMOS notes however that – while the surface post-mining landscape at Borownia has been conserved under wood cover – part of the original surface has disappeared, with the use of the land for crop-growing and the construction of a road connecting the north-eastern and central parts of Ćmielów. ICOMOS also stresses that the Koryczna site, which is relatively isolated, has undergone superficial illegal excavations up to 2011, which destroyed some workshops and waste tips on the surface.

The excavations at the Gawroniec site have shown the richness of discoveries and the good conservation of the site since the Funnel Beaker culture period (3600-3200 BCE), and bear witness to the authenticity of the site.

---

ICOMOS considers that the requirements of authenticity have been met, but that the conditions of integrity have not been met at this stage.

---

## Evaluation of the proposed justification for inscription

ICOMOS considers that the comparative analysis justifies consideration of this property for the World Heritage List.

The nominated property provides readability of the whole striped flint extraction and knapping process from the Neolithic period to the early Bronze Age in the mountains of Świętokrzyskie, and constitutes one of the most comprehensive prehistoric underground flint extraction and processing systems recorded to date.

The property presents a wide range of techniques on the single site of Krzemionki Opatowskie. It also bears witness to a degree of craft specialisation, both in flint extraction and processing. The polished axes produced, and their scale of distribution, are emblematic of the Neolithic period.

The nominated property bears witness to the diversity, originality and technical sophistication of extraction methods in the Neolithic period and the early Bronze Age (with the chamber mining techniques).

It meets criteria (iii) and (iv). The conditions of integrity have not been met, and authenticity have been met.

## Attributes/features

The attributes that confer Outstanding Universal Value on the property are the quality of the flint and its products, and the diversity of the extraction structures and techniques employed. The prehistoric post-mining landscapes conserved cover thousands of underground mines over an area of some 1828.7 ha, which corresponds to the area of the buffer zones. The raw material extraction and transformation zones, the settlement and the miners' camps also enable the reconstitution of a territory that was economically specialised in all these component parts. This mining tradition also takes on, in addition to its utilitarian function, a symbolic and political function, in which control of flint production and distribution is of central importance.

---

ICOMOS considers that the nominated property meets the conditions of authenticity but not the conditions of integrity at this stage, and meets criteria (iii) and (iv).

---

## 4 Conservation measures and monitoring

### Conservation measures

The State Party indicates that the regular inspection, maintenance and small-scale conservation of the underground chambers of Krzemionki Opatowskie are carried out by the staff of the Krzemionki Archaeological Museum on a continuous basis. For the conservation of the mines, Museum staff are advised by engineers from the Faculty of Mining and Geoengineering of the Kraków University of Science and Technology (AGH).

As the surface of the site is a nature reserve, conservation is jointly carried out by the nature reserves authorities and by the Museum staff. Collaborative projects have been set up in conjunction with the Universities of Kielce and Łódź.

Consolidations and maintenance are carried out regularly at Krzemionki Opatowskie. Krzemionki Archaeological Museum receives the necessary funding for conservation and maintenance. On the other three sites, the maintenance activities (Borownia, Koryczna and Gawroniec) are also coordinated by Krzemionki Archaeological Museum, with the help of the local authorities and also of associations, as at Gawroniec where the local history association participates in the maintenance of the site.

The State Party points out that archaeological research is continuing sporadically today, but that new means of investigation are now used, including geophysical studies.

The main conservation activities planned for 2017-2019 will be carried out as part of the project entitled "Increase of the availability of the Historical and Archaeological Museum in Ostrowiec Świętokrzyski by improving the infrastructure of the Archaeological Museum and Krzemionki Reserve and the Wielopolski Palace." Several sets of works are planned on the underground routes, including the replacement of the power supply and the lighting in the underground tourist access level; equalisation, reduction and levelling of the bottom of the visitor gallery; the replacement of the wire meshes securing waste management features and mine workings protection covers; conversion and reconstruction of the pavilions; conversion and reconstruction of shafts and installation of lifts for disabled persons; the replacement of the viewing platform over the Neolithic exploitation field between the pavilions; the replacement of the House of Archaeologists; the demolition of the former Museum buildings; the improvement of safety conditions; visual monitoring of the exploitation field; and the preparation of a new exhibition in the pavilions.

In the additional information, the State Party notes that these activities are solely intended to improve the system for the protection of the property itself and to increase safety for tourists. This is why no heritage impact study has been carried out. According to Polish law, any intervention on an officially recognised monument requires the agreement of the voivodship Conservator of Monuments. For the works referred to, Krzemionki Museum obtained the consent required.

ICOMOS considers it necessary for the State Party to provide guarantees about the long-term funding of the archaeological research programme, and about the adequacy of the research objectives of the programme in view of the conservation plan.

The additional information stresses that the preparation of a programme of this kind is one of the first scheduled tasks in the revised management plan, and that the programme will be linked to the conservation plan. Its execution will depend on the financial capacities of Krzemionki Archaeological Museum, and the possibility of obtaining external funding. The State Party indicates that, with this aim in mind, it has decided to take actions intended to change the status of the Museum and to ensure coordination and co-funding by the regional and central authorities.

### **Monitoring**

The State Party indicates that Krzemionki Opatowskie is permanently monitored by qualified staff from the Krzemionki Archaeological Museum. The State Party states that, when the management plan is finalised in 2018, indicators will be used to assess the state of conservation, the factors affecting it, and the effect of conservation measures, including the management plan.

The additional information provided in February 2019 refers to a programme for monitoring the state of conservation of the property that is integrated with the management plan,

with 22 specific indicators corresponding to the attributes, data collection methods and periodicity.

---

ICOMOS considers that guarantees must be given about the long-term funding of the archaeological programme, and that this programme must be adequate in view of the conservation plan.

---

## **5 Protection and management**

### **Documentation**

Krzemionki Opatowskie has been the subject of a great deal of research from 1923 to the present day. It has been described and documented in detail. The first comprehensive plan of the mining field of Krzemionki Opatowskie was drawn up in 1947-1948. On the plan, each depression corresponding to a mine working was recorded and numbered. In 1995, the Warsaw Museum team, referring to the results of the excavations and the geological data, produced a relief model indicating the mining system type and its location. The whole mining field, including the levelled zone, is included in this model. The plan, revised and digitalised in 2015, is used as a work of reference to guide research and document the conservation of the site. In 2017, a 3D scan of the whole tourist route and of mine shaft 4/606 was carried out, visualising the conservation of these workings.

Borownia and Korycizna underwent a detailed survey in 2011 by 3D laser scanning, and the same applies to the ring of striped flint outcrops on the Magoń-Folwarczysko syncline. Other geophysical studies have been conducted, including ground-penetrating radar profiles, which have revealed the presence of underground workings. The excavations at Borownia in 2017 led to radiocarbon datings and confirmed the presence of pits. At Korycizna, there has been no excavation, and the site dating is based on artefacts collected on the surface.

At Gawroniec, an area of 4600 square metres, or 1/16th of the whole site, has been archaeologically investigated. The excavations have been documented.

ICOMOS notes that at the moment no archaeological research is taking place. The last excavations carried out were those at Borownia in 2017. The State Party indicates that the excavations planned for 2018 at Korycizna did not take place because of a lack of funding, but that they will be carried out in 2019. The additional information mentions a research programme based on non-invasive methods, which will be devised by the end of 2019 and integrated in the management plan.

### **Legal protection**

Krzemionki Opatowskie is inscribed on the Register of Monuments, and part of this component has National Memorial of History status. The State Party indicate that this is the part of the mining field containing the most elaborate extraction modes ("chamber-pillar" and "chamber"). The State Party stresses however that being



listed as a National Memorial of History offers no additional protection, but is merely a recognition of prestige. Obtaining this status is moreover necessary for the site to be nominated for the World Heritage List.

The State Party indicates that almost the whole of the property also benefits from protection at national and European level as a Natura 2000 site. Only a very small part of the mining field in the south-east is excluded from this protection.

At regional and local level, the property is also covered by additional cultural and national protection as a monument, a nature reserve and an Area of Protected Landscape of the Kamienna River Valley. The same protection mechanisms also apply to half of the buffer zone.

Almost the whole of the nominated zone of Borownia is inscribed on the Register of Monuments. The western part of the component is also protected as a Natura 2000 site. The mining site of Koryczna is also inscribed on the Register of Monuments.

The additional information provided in February 2019 states that the procedure of inscribing Gawroniec on the Register of Monuments ended with an administrative decision that was handed down on 27 February 2019. The decision will come into force after validation.

ICOMOS considers that the inscription of Gawroniec on the Register of Monuments and its implementation must be confirmed in order to guarantee adequate protection for this component of the serial property.

#### **Management system**

The actual management of the nominated property is carried out by the Krzemionki Archaeological Museum and Reserve, a branch of the Ostrowiec history and archaeology museum. Protection measures were introduced in 1929. In view of the world heritage list nomination, Krzemionki Museum has extended its management to include all the component parts of the nominated property.

The State Party indicates that the property management plan is currently being drawn up. The plan is being coordinated by the Krzemionki Archaeological Museum and prepared with the help of the bodies in charge of heritage protection and the regional and local authorities.

In the additional information provided in February 2019, the State Party has included a revised management plan in Polish, and a summary of the plan in English. The State Party indicates that this is a draft document, to be used as the basis for the continuation of works. The works will begin immediately after the decision of the World Heritage Committee, if the property is inscribed on the World Heritage List. The plan includes, among other things, the basic elements of the tourism strategy for the nominated property zone, and an analysis and evaluation of risks, with a proposal for the monitoring of factors affecting the

property. Detailed action plans for various aspects of management will be devised at a later stage.

ICOMOS considers that confirmation of the operational implementation of the management plan is necessary in order to ensure effective protection of the property.

As the entity in charge of the property's management, 'Krzemionki' Archaeological Museum and Reserve, has a team of 25 employees, including a director, a curator specialising in the study of prehistoric mining sites, and two archaeologists assigned to site conservation and archaeological research.

Inspections and small conservation and maintenance tasks are carried out by the museum staff. Work of this type is regularly scheduled, and a budget is provided for this purpose.

The State Party indicates that, in addition to the inscription of Gawroniec on the Register of Monuments, appropriate control mechanisms will be included in the management plan to increase the protection of the property. The creation of a cultural park encompassing the 495 sites documented in the Middle Valley of Kamienna River is under development. The objective is to set up a protection system for all sites linked to striped flint exploitation. The State Party stresses that this project is being developed in a long-term perspective, and requires the involvement of the local communities, by the adoption of the project and its integration in local development plans.

In the additional information provided in February 2019, the State Party stresses that Polish legislation does not provide for any form of protection that is specifically dedicated to the protection of World Heritage. The management plan for the nominated property takes the form of a multi-lateral agreement, and its execution depends on the collaboration and coordination of all stakeholders. The creation of a cultural park will include the preparation of a local spatial development plan and a management plan, which will enable planned and coordinated execution of the tasks. The State Party stresses that a cultural park is the most appropriate way of protecting the nominated property zone, in a wider geographic context. Without being able to indicate a detailed schedule at this stage, the State Party notes that the draft master plan states that the cultural park should be created in 2020-2025.

In this context, ICOMOS recommends that the process of creating the cultural park, which is one of the objectives of the master plan, should begin immediately.

#### **Visitor management**

The State Party stresses that the Krzemionki site is currently visited by 30,000-40,000 persons annually, mainly consisting of school parties for educational purposes. The State Party believes it is possible to increase visitor numbers, taking advantage of periods during which maximum visitor capacity is not attained.

The investments granted by the regional authorities (approx. 460,000 euros) include, in addition to the adaptation of the tourist route to cater for reduced mobility visitors, the upgrading of Krzemionki Museum and of the two pavilions at the surface on the tourist route.

In the additional information, the State Party stresses that, at the Gawroniec site, only panels indicating the heritage status of the site and of the rest areas will be installed. For Borownia, a parking area is to be provided for cars and buses, and rest areas, together with the installation of information panels. For Korycizna, the least accessible site, the State Party mentions the construction of a tourist route, with signage, rest areas and toilets. The State Party indicates that these tourism infrastructures, constructed in conjunction with the local authorities and private investors, will require authorisation by the Conservator of Monuments of the voivodship.

ICOMOS considers that, in view of the number of visitors expected, the property is believed to have great potential to provide a substantial economic contribution to the tourism sector in the region.

In the additional information provided in February 2019, the State Party sets out the basic elements of the tourism strategy in the revised management plan, with the integration of the property in national and regional tourism development strategies; the opening of tourist information desks; the development of tourism infrastructures in the subregion; the development of secondary tourist facilities in the buffer zones; and the development of new trails for visitors.

#### **Community involvement**

The State Party stresses that local communities have been involved in the nomination process, and are actively supporting the nomination and the conservation measures.

The population's awareness of the need to preserve the site has been raised by the local authorities. Some associations are actively involved in the maintenance of the property, including the Ćmielów local history society which is participating in the maintenance of the Gawroniec site.

#### **Evaluation of the effectiveness of the protection and management of the nominated property**

With regard to the protection of the components of the nominated property, the inscription of Gawroniec on the Register of Monuments and its implementation must be confirmed to ensure it is adequately protected.

ICOMOS notes with concern the presence of the working limestone quarry in the Korycizna buffer zone, which is detrimental to the integrity of this component of the serial property. Appropriate and immediate measures should be taken to attenuate the negative impact on this component.

Polish legislation does not provide any form of protection specifically for World Heritage. The buffer zone has no legal basis at national level. The creation of the Cultural Park of the Kamienna River prehistoric flint mining region is

considered by the State Party to be the appropriate control mechanism, by virtue of Polish legislation, to protect the wider framework of the nominated property and to strengthen the effectiveness of the buffer zones. In view of this, the process of creating the cultural park, which is one of the objective of the master plan, should begin immediately.

The revised management plan should be finalised and officially adopted to ensure effective protection of the property. It should include a monitoring programme, and a tourism management plan and a risk management plan. It is also necessary to begin thinking about the way the existing underground tourist routes can be strengthened and enhanced, in order to ensure the integrity and authenticity of the property, and the aesthetics of the systems used.

---

ICOMOS considers that the management plan, which is currently being revised, should be made operational to ensure adequate protection of the property. The inscription of Gawroniec on the Register of Monuments should be confirmed to ensure its adequate protection. Appropriate measures should be taken immediately to attenuate the negative impact of the working quarry at Korycizna. ICOMOS also notes that the process of creating the cultural park, which is one of the objectives of the master plan, should begin immediately.

---

## **6 Conclusion**

The four component parts of the nominated property form a comprehensive ensemble representing the prehistoric working of flint in the Neolithic period and the early Bronze Age. All the elements relating to the extraction and processing of striped flint are included. The preservation of remains on the surface, thanks to the conservation of the prehistoric post-mining landscape (flint workshops, shelters, circulation zones, etc.) enables a thorough understanding of the mining and knapping processes. In all, more than 4000 extraction structures of varied morphologies are preserved today. The nominated serial property bears witness to the Neolithic mining phenomenon as a major stage in the processes of landscape transformation, social complexification and the emergence of power.

ICOMOS considers however that the management plan should be effective to ensure that adequate protection and management are put in place to preserve the property. The inscription of Gawroniec on the Register of Monuments should be officially adopted, and the process of creating a cultural park should be started. The articulation between the management of the nominated property and that of the cultural park will require clarification, as will the way in which the local development plans will provide an additional level of protection for the nominated property, in accordance with paragraphs 103 to 107 of the *Operational Guidelines for the Implementation of the World Heritage Convention*.

ICOMOS also encourages the State Party to incorporate a heritage impact study methodology in the management system for the nominated property, so as to ensure that any programme or project relating to the property should be evaluated in terms of its impacts on the proposed Outstanding Universal Value and the associated attributes.

## 7 Recommendations

### Recommendations with respect to inscription

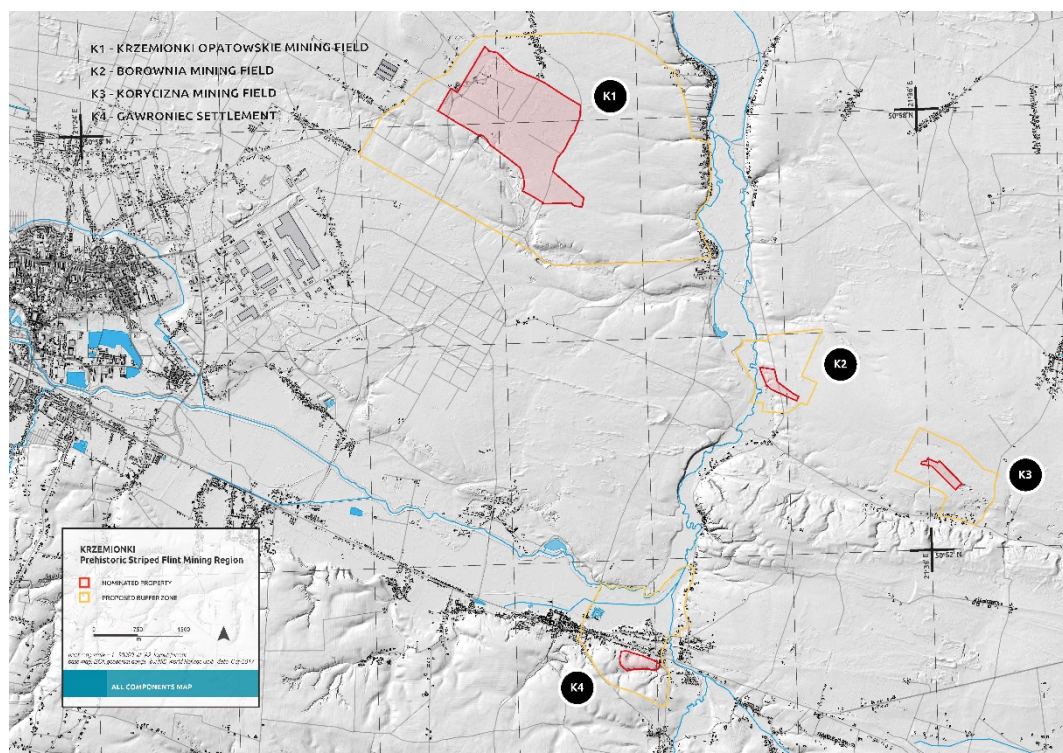
ICOMOS recommends that the nomination of Krezemionki Prehistoric Striped Flint Mining Region, Poland, be **referred back** to the State Party in order to allow it to:

- Finalise the inscription of Gawroniec on the Register of Monuments,
- Confirm the operational implementation of the management plan to ensure the effective protection of the nominated property,
- Take appropriate and immediate measures to attenuate the negative impact of the working limestone quarry in the Korycizna buffer zone, to the immediate south-east of the nominated property,
- Immediately begin the process of creating the cultural park, in order to make the buffer zones effective,
- Specify in detail how the land development plans, which are a condition for the establishment of the cultural park, will ensure that the buffer zones provide an additional level of protection for the nominated property, in accordance with paragraphs 103 to 107 of the *Operational Guidelines for the Implementation of the World Heritage Convention*;

### Additional recommendations

ICOMOS further recommends that the State Party give consideration to the following:

- a) Including a heritage study methodology in the management system of the nominated property, to ensure that any programme or project relating to the property is evaluated in terms of its impacts on the Outstanding Universal Value and the associated attributes,
- b) Ensuring the long-term funding of the archaeological research programme, and guaranteeing that the research objectives of the programme are adequate in view of the conservation plan;



Map showing the location of the nominated components





Krzemionki Opatowskie Mining Field, pillar-chamber mine



Original prehistoric communication gallery





Prehistoric 'industrial landscape' in forest



Striped flint nodule, and flint axe used for mining, *in situ* underground