Chankillo Solar Observatory and ceremonial center (Peru) No 1624

Official name as proposed by the State Party
Chankillo Solar Observatory and ceremonial center

Location
Ancash
Province and district of Casma
Peru

Brief description
The Chankillo Solar Observatory and ceremonial center is a prehistoric site, located on the north-central coast of Peru, in the Casma Valley, comprising a set of constructions in a desert landscape that, together with natural features, functioned as a calendrical instrument, using the sun to define dates throughout the seasonal year. The nominated property includes a triple-walled hilltop complex, known as the Fortified Temple, two building complexes called Observatory and Administrative Centre, a line of thirteen cuboidal towers stretching along the ridge of a hill, and the Cerro Mucho Malo that complements the Thirteen Towers as a natural marker. The ceremonial centre was probably dedicated to a solar cult, and the presence of an observation point on either side of the north-south line of the Thirteen Towers allows the observation both of the solar rising and of setting points throughout the whole year.

Category of property
In terms of categories of cultural property set out in Article I of the 1972 World Heritage Convention, this is a *site*.

1 Basic data

Included in the Tentative List
18 January 2013

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.

Comments on the natural attributes of this property, and their conservation and management, were received from IUCN on 18 November 2019 and have been incorporated into the relevant sections of this report.

An ICOMOS Technical Evaluation mission visited the property from 14 to 21 August 2019.

Additional information received by ICOMOS
A letter was sent to the State Party on 3 October 2019 requesting further information about archaeological sites and features that the Chankillo complex is connected with, component parts, legal protection, infrastructure development, factors affecting the property, conservation projects, management, funding and research.

An Interim Report was provided to the State Party on 20 December 2019 summarising the issues identified by the ICOMOS World Heritage Panel. Further information was requested in the Interim Report including: clarification on heritage category, Chankillo within the Casma Valley; interpretation; tourism and visitor control; local community; management system; land use; conservation and funding.

Additional information was received from the State Party on 5 November 2019 and 28 February 2020 and has been incorporated into the relevant sections of this evaluation report.

Date of ICOMOS approval of this report
12 March 2020

2 Description of 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
Located on the north-central coast of Peru, in the Casma Valley, the archaeological site of Chankillo is composed of two components: Chankillo, and the Cerro Mucho Malo. The visible main features of the property are the following: the Thirteen Towers, an alignment of cuboidal constructions built of stone and mortar situated on top of a natural hill, that have been interpreted as astronomical markers; the Fortified Temple, which includes two round keeps and a rectangular building, known as the Temple of the Pillars, all of which together are encircled by three concentric ovoid wall constructions, with large baffled gates; the Observatory Building, with the Western Observing Point and an entrance facing the Fortified Temple, located at the foot of the hill with the towers; the Administrative Centre, with a U-shaped atrium and a series of courtyards and constructions, presumably where the public rites and ceremonies of solar worship were performed. The property also includes a natural component, the Cerro Mucho Malo, whose southern slope becomes a natural marker, as seen from the Western Observing Point, when it intersects the artificial profile of the Thirteen Towers to form a continuous astronomical horizon.

The dates obtained through dendrochronology and ^{14}C analysis has defined Chankillo´s occupation between 250 and 200 B.C. This locates the property in a narrow occupation window of only fifty years at the upper part of the very long chronological sequence of the Casma Valley. The buffer zone of the property includes further archaeological sites (for example, El Purgatorio, Moxeque/Pampa de las Llamas, Las Haldas, Manchan, and Pampa Calavera) on which ICOMOS requested information from the State Party in its first letter of October 2019. The State Party provided a map and pictures of some of the sites located in the buffer zone and outside it. In answer to the information requested in the Interim Report, the State Party submitted in February 2020 a description of the sites of Pampa de las Llamas/Moxeque, Sechin Alto, Sechin Bajo, Serro Sechin, Taukachi-Konkán, Las Haldas, Pampa Rosario and La Cantina.

After several investigators had worked in the Casma Valley starting in the 1930s, archaeologist Rosa Fung excavated in Chankillo during the 1960s, with the collaboration of architect-conservator Víctor Pimentel, who verified the authenticity of the Fortified Temple. Since 2001 the *Instituto de Investigaciones Arqueológicas* (IDARQ), through the Chankillo Project, has carried out 25 studies aimed at discovering, protecting and preserving the property's physical attributes. The project is carried out with the authorization of the Ministry of Culture and with sponsorship and financial support from various national and foreign institutions. The Chankillo Program, started in 2011, has excavated to date in all sectors and almost every building.

Boundaries

The nominated property is composed of two components: Chankillo, of 2,112 ha, and Cerro Mucho Malo, of 2,368 ha. They are surrounded by a single buffer zone of 43,990 ha. The boundaries of the two components of the nominated property were defined on the basis of archaeoastronomical considerations. Separating the two parts is a strip of agricultural fields that are linked to the bed of the Casma River, which forms part of the buffer zone.

ICOMOS appreciates the rationale put forward by the State Party for the delineation of the nominated property boundaries. It considers that the Casma Valley is home to many important archaeological sites that merit attention for their great age, specific cultural expressions or very early examples of certain crops (e.g. potatoes). The inclusion of any one of these sites would enrich the nomination and probably help to convey a more complete image of the Casma Valley cultures. However, it would also take the focus off the astronomical theme chosen by the State Party for the present nomination. A further problem with a more inclusive approach is the apparently rather basic information available on most of the sites, which is also probably in need of further discussion and confirmation.

The boundaries proposed by the State Party protect the constructions central to the astronomical theme (the Chankillo component), as well as the main natural markers (Cerro Mucho Malo) that complete the constructed horizon of the Thirteen Towers. Surrounding these two components is a large buffer zone that helps to protect the visual integrity of the property, as well as the general setting (including winds that come from the ocean to clear the clouds and a low general luminosity).

For that reason, ICOMOS concludes that the boundaries are adequate. ICOMOS also encourages the State Party to advance archaeological research in the buffer zone, and to consider the option of extending the property in the future, in case information comes to light that completes the picture of the development of astronomical knowledge in the Casma Valley region.

State of conservation

The property has been investigated by archaeologists and, since 2011, a research and conservation project has been developed.

Time has caused the deterioration of the constructions, particularly the stability of walls and their mud finish/plaster. Some parts of the walls are missing completely, mainly the tops and faces. In the case of the Thirteen Towers and the east side of the Fortified Temple, both built on steep slopes, the stability of the walls is affected. Displacement has also been detected, due to structural pressures on the constructions, bulging of the masonry, overload and lack of stability of the support for the stone blocks, loss of verticality and partial collapse in the upper third of the walls. In some places, the presence of deep cracks affects the integrity of the walls. The stones themselves are also affected by, for example, detachments, fissures and cracks, weathering, fragmentation, disintegration or shelling and exfoliation. In the case of the construction joints, the mortars used to lay the stone blocks, and architectural fills, the main types of deterioration are fractures, detachments, missing parts, disintegration, erosion and biological attacks. The wooden lintels at the Fortified Temple are also showing signs of deterioration: there are traces of rotting, attacks by xylophagous insects, crushing of the end of the lintel, deformation (bending) due to overload, and cracks. Sand and silting also constitutes an important element of deterioration and burial of the archaeological structures. Detailed studies have been conducted to identify the type and extent of deterioration in the different areas of the structures. Conservation interventions are urgently needed at nearly all of the main constructions identified at the property.

The state of conservation of the monuments of the property, especially of the Thirteen Towers, is a matter of concern. ICOMOS requested additional information from the State Party in its letter dated 3 October 2019, on the project "Chankillo Revalorization and Sustainable Development Project". This project is supported by the World Monuments Fund, in collaboration with the *Instituto*

de Investigaciones Arqueológicas (IDARQ), and the Ministry of Culture of Peru, and is aimed at elaborating an integral conservation and preventive measures on the Thirteen Towers at the property. Following the receipt of additional information on 5 November 2019, detailing the three-phased operation carried out on the Thirteen Towers, ICOMOS requested further information in its Interim Report on the short-, medium- and long-term plans for the conservation of the property as a whole. The State Party replied on 27 February 2020 that the conservation efforts had three stages: the comprehensive condition survey from 2011 to 2013; the development of the Nomination Dossier and Management Plan from 2015 to 2018; and the current stage, initiated in 2017 and projected through 2022, which was designed to carry out urgent conservation interventions focused on the Thirteen Towers. The towers were chosen due to the fact that they are central to the proposed Outstanding Universal Value and they were identified in the condition survey as the structures at greatest risk of damage. For the above-mentioned reasons, they were also prioritized in the contingency plan, which forms part of the Management Plan. The interventions are consolidating the towers as structures, following a methodology authorized by the Ministry of Culture. Although the conservation project is not yet officially approved by the World Monuments Fund, a letter signed by the Interim Chief Executive Officer confirms the availability of funds and the commitment to continue the collaboration with IDARQ. The State Party notes that the Chankillo project plans to extend the procedures and criteria developed during current interventions to address the conservation of other sectors and structures at risk, such as the Fortified Temple. This will depend on continued support from the private sector, but mostly on the initiation of conservation interventions funded by government at all its levels.

Based on the information provided by the State Party and the observations of the ICOMOS technical evaluation mission, ICOMOS considers that the property needs constant maintenance and some urgent conservation interventions in order to stop the progress of the collapse of the walls. The conservation studies that have already been realized, which are mentioned in detail in Appendix III of the Management Plan, will help to guide the prioritisation of future interventions. ICOMOS considers it essential that the State Party secure the necessary funds to continue the consolidation work at the property in the future.

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 and environmental pressures. The latter are mainly caused by weathering and other natural processes: strong winds that transport abrasive sand, transitory rains and rain due to the El Niño phenomenon, great temperature changes, annual seasonal floods in the Casma River, marine factors, geodynamics, and seismicity. The impacts of these pressures are worsened by intrinsic deficiencies of the construction: the lack of homogeneity in the conformation of the walls; the arrangement of stone blocks without following a construction logic according to their shape and size; the use of friable lithic materials for the blocks; the absence of efficient ties between the blocks, and between them and structural fills; the lack of structural connection between different sections of the same wall; and deficiencies in the transmission of loads due to the irregularities in the way the stone blocks are laid. Some superficial archaeological remains are situated within the relict dry forest, and there is a risk caused by the local practice, now under greater control but still happening, to burn the forest.

Furthermore, the Peruvian coastal valleys, including the Casma Valley, are prone to development pressures. The main risks of alteration of this landscape are from the expansion of cultivated fields; overlap with mining claims; human settlement with the installation of associated basic services; and infrastructure developments that produce conspicuous features in the landscape, such as elevated drinking water tanks, power lines in neighboring settlements, and the installation of electricity pylons within the visual fields, as is the case of the slope of Cerro Mucho Malo, where electricity pylons disturb the visual integrity of the property. Additionally, the expectation of the population regarding tourist development in the area increases the risk of constructions near the nominated area and buffer zone.

Other important factors affecting the nominated property are vandalism and looting.

In its letter sent to the State Party on 3 October 2019, ICOMOS requested information on whether a risk preparedness strategy exists to face the threats, also identified by the State Party in the nomination dossier. The State Party replied on 5 November 2019 that the National Disaster Risk Management System (SINAGERD) has been created by Law No. 29664, as an inter-institutional system to identify and reduce the risks or minimize their effects. Specifically, for the case of site invasion, the State Party mentioned Law No. 30230 which facilitates rapid eviction of persons and removal of constructions. It seems as well that a Risk management plan is under consideration in the management plan of the property.

In addition, ICOMOS requested information related to the control of quarries and mining activities, as well as the measures implemented to face the polymetallic illegal mine, in the first letter request for additional information. The State Party replied that risks due to mining activity have been minimized by the approval of the Territorial Conditioning Plan of the Province of Casma 2017-2037, which prohibits mining in the buffer zone of the property. The State Party furthermore highlights that the areas with potential interest for mining are located outside the property and its buffer zone. Regarding the information about informal mining in the

area, the Ancash Regional Office of the Ministry of Culture does not report mining activity in the area in recent years, but states that at the level of the Ancash region there are currently 40 cases of illegal mining that have been investigated by the Public Ministry of El Santa (covering the provinces of Santa, Casma, Huarmey, Pallasca, Corongo and Conchucos), with research to determine the degree of environmental pollution and establish responsibilities; five of the cases already have an effective sentence.

ICOMOS considers that the threats the property faces are serious and have to be confronted with determination and strict application of the law. The detailed studies concerning the state of conservation of the property will help to focus future restoration interventions. It will be essential to set aside the necessary funds to be able to continue the important work that has already been initiated.

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:

- Chankillo is a prehistoric (250-200 BC) ceremonial centre in northern Peru with astronomical, ritual, defensive and administrative functions.
- It contains a Solar Observatory, composed of the Thirteen Towers and the Western and Eastern Observation Points, from which the towers' profile spans the annual sunrise and sunset arcs, respectively.
- Chankillo is an outstanding example of ancient landscape timekeeping, which incorporates a "complete" solar horizon calendar, using built and natural markers to track the progressive passage of the sun along the horizon throughout the entire year. Furthermore, it is the only site where this was achieved on a monumental scale and where all the key component elements are still extant and functional.
- The nominated property also embodies an accumulation of knowledge about natural and astronomical processes and their connection to the solar cult, expressed masterly in the integration of the skyscape to the natural and built environment. Besides the Solar Observatory, a wider set of monuments forming the ceremonial centre likewise took advantage of both constructed and natural targets to define dates.

Although the nomination mentions the connection of the observatory with the surrounding elements (e.g. other sites) and the landscape, the approach chosen for the justification is principally centred on the monumental elements directly connected with the astronomical interpretation of the Chankillo complex. In addition, the uses of the property for calendrical purposes are accepted by the scientific community, but the uses related to the observation of the sky remain to be further explored, in particular in relation to the ceremonial and religious functions. Therefore, ICOMOS considers that due to the current knowledge of the property, it would be better not to include the term "observatory" in the title of the nomination. ICOMOS also considers that adding the term "complex", as already proposed by the State Party in the Tentative List entry, would be more appropriate to reflect all the elements of the property and its wider archaeological context.

Therefore, ICOMOS suggests that the name of the property be changed to "Chankillo Archaeoastronomical Complex".

Comparative analysis
The comparative analysis takes into consideration two thematic studies produced by ICOMOS in conjunction with the International Astronomical Union (IAU), the UNESCO–IAU Portal to the Heritage of Astronomy, the Springer *Handbook of Archaeoastronomy and Ethnoastronomy* (Ruggles 2014), as well as the World Heritage List and national Tentative Lists. The sites for the comparison are selected on the basis of two main thematic criteria; archaeoastronomy and ethnoastronomy, and more particularly on the basis of two of four sub-themes defined in the ICOMOS Thematic Study (2010): properties which by their concept and/or their environmental situation have significance in relation to celestial objects or events; and/or observatories and instruments.

The comparative analysis in the nomination dossier at the international level includes sites from, for example, Mexico, Ireland, Egypt and China. It compares the development of these sites in relation to the observation of the sky in the Andean cultures.

ICOMOS considers that the comparative analysis is exhaustive, scientific and covers a wide range of sites and time periods. It manages to highlight the specificities of the nominated property in comparison with other astronomical sites/observatories.

ICOMOS concurs with the State Party that, in general, the Chankillo calendar is distinguished from the other examples of archaeoastronomical sites by its great age, the size, the credibility (as defined by one of the ICOMOS-IAU Thematic Studies) and by the fact that the line of several towers spans the entire solar rising and setting arc, so that it functions throughout the year, rather than simply marking particular dates such as one of the solstices.

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) and (v).

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

This criterion is justified by the State Party on the grounds that the solar observation device, known as the "Chankillo Solar Observatory", incorporated in the Thirteen Towers, permits the time of year to be accurately determined not just on one date but throughout the seasonal year. This is considered to be unsurpassed as an example of ancient landscape timekeeping. Unlike architectural alignments upon a single astronomical target found at many ancient sites around the world, the line of towers spans the entire annual solar rising and setting arcs as viewed, respectively, from two distinct observation points, one of which is still clearly visible above ground.

ICOMOS considers that the archaeoastronomical complex is outstanding and stands out for its size, age and state of conservation. The choice of its location, the layout of the whole complex in relation to the astronomical movements, as well as the amount of work dedicated to its completion, express human creative genius.

ICOMOS considers that the use of criterion (i) is justified.

Criterion (v): *be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;*

This criterion is justified by the State Party on the grounds that the Chankillo Solar Observatory is an example, unique in the ancient world, of landscape time-keeping on a monumental scale that integrates elements of both the natural and built environment. Standing at the heart of a ceremonial centre, which incorporates further solar and possibly lunar alignments upon both constructed and natural targets, it exemplifies human interaction with a desert landscape and skyscape in a way that remarkably incorporates natural elements within the astronomical function, giving them a value similar to that of constructed elements. Astronomical observations at Chankillo are still possible at present, because this fragile landscape, very vulnerable to change in the face of development pressures and climate change, has maintained the characteristics that facilitated its astronomical functions over two millennia ago.

ICOMOS considers that the selection of this criterion would have been relevant if the wider encompassing cultural landscape was taken into account in the nominated area. In addition, the way it has been justified and interpreted does not fit with the current use of this criterion. This criterion has not been justified.

Instead of criterion (v), ICOMOS suggests the use of criterion (iv).

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;*

Chankillo was in use for a relatively brief period of time between 250 and 200 BC, during a late phase of the Early Horizon Period (500-200 BC) of Peruvian prehistory, after which it was destroyed and abandoned. The Chankillo Complex is a very particular type of building representing an early stage in the development of native astronomy in the Americas. It shows great innovation by using the solar cycle and an artificial horizon to mark the solstices, the equinoxes, and every other date within the year with a precision of 1-2 days. It is thus a testimony of the culmination of a long historical evolution of astronomical practices in the Casma Valley.

ICOMOS considers that the nominated property does not meet criterion (v), but that it meets criterion (i) and criterion (iv).

Integrity and authenticity

Integrity

The Chankillo Solar Observatory and the wider setting of related monuments that form the property take advantage of built and natural horizon markers to track the progressive passage of the sun along the horizon throughout the entire year. The natural environment and climatic conditions, that are the basis of the good visibility needed for astronomical observations at the site, are maintained to a large extent. The viewsheds that contain the main astronomical sightlines are generally unobstructed, but their preservation has to be monitored closely. Also, the visual integrity of the general setting of the property has to be maintained. Any infringement on the property by, for example, urban development or expansion of agricultural areas, has to be avoided.

The advancing collapse of structural elements, with the loss of clear edges (e.g. at the tower buildings and the observatories), jeopardises the exactness of the astronomical observations.

ICOMOS considers that the conditions of integrity have been met, since all the elements necessary to express the proposed Outstanding Universal Value centred on calendrical observations of the sun are included within the nominated property boundaries. In case the information from future research indicates relationships of the central monuments with other elements of the property and beyond, a boundary adjustment should be considered. ICOMOS also notes that some of the conditions (the low luminosity and good visibility, the viewsheds and sightlines, as well as the monumental elements) necessary to maintain the property's values, are very

fragile and will need to be closely monitored in the future, in order to ensure their conservation.

Authenticity

The State Party highlights that the position of the Western and Eastern Observation Points in relation to the Thirteen Towers at Chankillo, identified by archaeological excavation and geophysical survey, and supported by archaeoastronomical data, suggests that the primary purpose of all these structures was to act together as a calendrical instrument. Since the 3rd century BC the sun has shifted slightly at and around the solstices, less at other times in the year. This small change has a negligible effect on the solar and possibly lunar alignments around the property but does not affect the ability of a present-day spectator to observe and understand the way in which the Chankillo Solar Observatory functioned.

Since no invasive conservation and reconstruction campaigns have changed the material substance of the property, the conditions of authenticity in terms of material and form, are met.

ICOMOS considers that the conditions of authenticity have been met, but that some aspects of the archaeoastronomical interpretations of the property may need further discussion.

In conclusion, ICOMOS considers that the conditions of integrity and authenticity have been met.

Evaluation of the proposed justification for inscription

The scope, age, and the fact that Chankillo functions throughout the year, and not only on specific dates, makes it unique and is used to justify an inscription on the World Heritage List. The justification emphasises the monumental aspects of the property, namely the Fortified Temple and the Thirteen Towers with their observation points, as well as the astronomical use of this group of buildings. ICOMOS considers that it would be desirable to situate the group of buildings more explicitly within their historic, geographic and cultural context, showing and explaining the relationship of Chankillo with other archaeological sites and elements in the Casma Valley. However, it is understood that in order to be able to do this considerable research would be necessary. If, in the future, it becomes possible to link Chankillo with other elements in the valley, ICOMOS would welcome a readjustment of the property's boundaries and, if pertinent, its general narrative.

Attributes

The main attributes of the nominated property are the Thirteen Towers, the Fortified Temple, the Observatory Building, the Administrative Centre, and – as a natural component – the Cerro Mucho Malo, which complements the row of the Thirteen Towers as a natural landmark.

4 Conservation measures and monitoring

Conservation measures

The nomination dossier contains a detailed analysis of the factors affecting the nominated property and a diagnostic of the state of conservation of the different architectural elements. Part of this diagnostic is a classification of the types of risk that affect the architectural structures as well as an overall quantification of the walls in relation to their level of risk. The Management Plan indicates that 20.4 % of the reviewed walls of sectors I, II and III have *"elevated levels of deterioration"*. Until now, the most important conservation intervention at the property was realized with several World Monuments Fund collaborations, focused on architectural conservation in general and on the restoration of the Thirteen Towers in particular. In 2017, conservation work was started at the Thirteen Towers, following the principles of minimum intervention, respect for a building´s history, and reversibility of the materials applied. All conservation was done using the same materials used in the construction of the property, which have been recycled whenever possible. However, a big part of the efforts until now were concentrated on an analysis of the state of conservation rather than on interventions. More conservation activities are planned, and ICOMOS requested detailed information in its Interim Report. The State Party replied in February 2020, giving an overview of the conservation efforts currently focused on the Thirteen Towers (already mentioned in more detail in the section on the State of conservation).

The Management Plan mentions the need for the establishment of a long-term conservation program which should include, for example, preventive actions such as reinforcements and construction of temporary roofs. ICOMOS agrees with this necessity and considers that it should also include conservation, restoration and maintenance works, and, according to intervention phases, specific procedures, follow-up routines and monitoring. Furthermore, ICOMOS considers that the conservation activities need to be reinforced since the general state of conservation is fragile.

Monitoring

The Archaeology and Conservation Unit, which forms part of the Management Structure of the property, is responsible for the periodic monitoring of the state of the architectural structures throughout the property, in order to detect impacts and modifications in a timely manner, as well as to prioritize the conservation actions that are required. The monitoring of the deterioration processes, as well as of the effectiveness of restoration interventions, constitutes a permanent activity whose goal is to update the risk map and establish intervention priorities.

The property's Management Plan proposes routine monitoring, and the establishment of periodic reviews for early detection of changes in the structural situation of the buildings. Connected with the monitoring results, as mentioned above, the need for the elaboration of a long-term conservation program is expressed in the Management Plan. The Nomination Dossier also

mentions the monitoring of the application of different programmes and their impact on the property, the society and the environment. For the monitoring of the state of conservation of the buildings, the information generated during the registration of the site 2011-2013 can be used as baseline data. While this baseline information seems to be very complete, it is not clear if the Archaeology and Conservation Unit is already operational, monitoring the property and the application of the different programmes periodically.

ICOMOS considers that the conservation challenges the nominated property faces have been clearly identified and that the efforts towards the analysis of its state of conservation made it possible to gather very good baseline data. However, ICOMOS considers that concrete conservation and maintenance actions are necessary to avoid further deterioration of the main elements of the nominated property.

5 Protection and management

Documentation

The recompilation of the early mentions and descriptions of the site and the Casma Valley in the works of chroniclers and travellers, as well as the synthesis of the first archaeological and conservation interventions, is considered important.

The documentation of the state of conservation and the inventory of the nominated property itself are also considered to be very good, at least for the central parts. Several surveys registered the elements of the property, using a combination of data from differential GPS and Total Station surveys, which were georeferenced using terrestrial and aerial (LiDAR) laser-scanning data. The information was used to generate plans in AutoCAD and produce a GIS, which was completed with photos and descriptions of the different elements. Most of this work seems to have been completed between 2011 and 2013. The detail and the quality of the diagnostic are good and will function in the future as solid baseline data. However, it is not clear how much documentation was done on elements other than the four main buildings. In general, it has to be mentioned that the information on the cultural context of the nominated property (for example, sites in the buffer zone and beyond) and the development of the astronomical aspects over time, is rather scarce or non-existent.

ICOMOS recommends to improve this situation with further research in the area.

Legal protection

The nominated property has been declared as National Cultural Heritage, through National Direction Resolution 075/INC of January 18, 2008. As such, its legal protection is assured by the State, supported by Article 21 of the Political Constitution as well as by Article 6 of the General Law of National Cultural Heritage (No. 28296), which asserts the ownership of the Peruvian State over all Pre-Hispanic properties, independently of their private or public condition.

According to Article 195 of the Political Constitution, local governments are responsible for *"the conservation of archaeological and historical monuments".* In accordance with the provisions of Articles 28 and 29 of the General Law of National Cultural Heritage, Regional Governments are responsible for providing *"assistance and cooperation to the pertinent organizations for the execution of research, restoration, and conservation projects, and dissemination of the integral properties of the National Cultural Heritage in its jurisdiction".* Other laws at regional and municipal level also highlight the cooperation between the different levels of government in matters of cultural heritage.

The limits of the property, represented in the Delimitation Plan PP-027-MC-DGPA/DSFL-2015, were prepared by the Ministry of Culture. The "Chankillo Solar Observatory and Ceremonial Center" includes the "Chankillo Monumental Archaeological Zone" and "Cerro Mucho Malo" as unalterable zones.

The nominated property is reinforced by a buffer zone that extends around the property and includes part of the San Rafael Valley, Cerro Mongón, Lomas Las Haldas, Pampa Los Médanos, Cerro Manchán, Cerro San Francisco, and Cerro Monte Grande. The inscription of the property and its boundary in the Public Registry of Peru was still in process when the nomination was submitted. This step, however, is particularly important. In the additional information supplied in answer to a letter sent by ICOMOS on 3 October 2019, the State Party explained that the ownership and registration of the property in the name of the Peruvian State (Public Registry) are mandatory requirements for all types of official recognition of an archaeological site, that is, for the approval of the property and its buffer zone as well as for the development of public investment projects. In the additional information submitted in February 2020, the State Party confirmed that the property has been inventoried nationally by the Ministry of Culture, and was registered in the National Superintendence of Public Registry (SUNARP) on 20 February 2020. With this step, the process of legal physical sanitation of Chankillo has been concluded.

In its letter asking for additional information ICOMOS had also requested clarification of the differences of protection between the buffer zone and the proposed property. In response the State Party indicated that the Management Plan of the property contains maps and descriptions of the sub-zones of the nominated property and buffer zone. Part of the descriptions is detailed information on the permitted, conditioned and prohibited uses of the zones. In addition, the Provincial Municipality of Casma has approved a Territorial Conditioning Plan (PAT) 2017-2037, which recognized the proposed boundaries of the nominated property and its buffer zone.

ICOMOS considers that the general legal protection of the nominated property is adequate and recommends that as the Management Plan has been approved through Ministerial Resolution No. 077-2020-MC, dated 24 February 2020, the observance of the activity restrictions detailed in the zoning description should be closely monitored.

Management system

For the conservation, management and promotion of the nominated property and its buffer zone, the Ministry of Culture, in cooperation with the local municipality and other institutions, convened a multi-disciplinary team of professionals for the development of a Management Plan, as an instrument for the investigation, conservation, and social use of the Chankillo Solar Observatory.

The Management Plan foresees the participation of professional, technical and administrative personnel, dedicated to the direct administration of the programs, projects and 104 activities of the "Chankillo Solar Observatory and its Ceremonial Center". The personnel of the Decentralized Directorate of Culture – Ancash, of the Ministry of Culture, and of the Provincial Municipality of Casma, designated to support the implementation of the Management Plan, are added to this work team. In the additional information submitted in February 2020 in response to the request for clarification in ICOMOS' Interim Report, the State Party highlighted that within the Ministry of Culture three different options are examined for an institutional formalisation of a management system for the management of the property. These are the Special Projects, the Management Unit and the Executing Unit. The choice between these options will be evaluated and made at the time of the implementation of the Management Plan. The additional information states that the Executing Unit option is the institutional format adopted within the Ministry of Culture.

The Management System in general is designed in two levels: the Management Committee, and the Board of Trustees of the Chankillo Solar Observatory. The first is multi-sectorial, which guarantees a coordinated vision within the administrative system. Secondly, the Board of Trustees of the Chankillo Solar Observatory constitutes a social coordination body that is designed to guarantee rationality and social commitment. It also establishes three Line Units that cover the different technical and administrative aspects involved in the protection, conservation and management of Chankillo as an archaeological site.

The “Management Plan of the Chankillo Solar Observatory: Management of an ancient astronomical landscape in the Casma Valley 2018-2028" identifies the current conservation and management conditions of the property and its context, the risks and threats to the cultural and natural features of the nominated property and its surroundings, and establishes the policies that govern conservation and heritage management, the strategies and protection measures and the regulation of the use of the property and its buffer zone through zoning, as well as the programmes and projects focused on sustainability in the conservation of the property. In order to mitigate and eliminate the threats and vulnerabilities that affect the nominated property, the Management Plan strategically establishes the execution of 49 projects over a ten-year horizon, comprised of 14 programs.

The plan is multi-sectorial, decentralized and participatory; it includes government branches as well as members of civil society (community organizations, universities, etc.). In the additional information submitted in February 2020, the State Party informed ICOMOS that the Ministry of Culture, through Ministerial Resolution No. 077-2020-MC, dated 24 February 2020, approved the Management Plan for the Chankillo Solar Observatory: Management of an Ancient Astronomical Landscape in the Casma Valley 2020-2030.

ICOMOS considers that the approval of the Management Plan and the registration of the property in the National Superintendence of Public Registry (SUNARP) – both in February 2020 – finalized the necessary steps in order to complete the legal protection and the establishment of the Management System of the property. The State Party has to secure the necessary funds to keep the Management Plan with its projects on track, and the different levels of government have to apply the protective legislation in order to assure the conservation of the property.

Visitor management

At the moment, the Ministry of Culture manages the nominated property centrally, and relies on the infrastructure of the site at Cerro Sechin – which does not form part of the nominated property or its buffer zone – for controlling Chankillo. No staff are present at Chankillo and the property is not yet officially opened for public visits. At present, hardly any interpretation or signage is offered at the property.

Nevertheless, the approved Management Structure of the property includes a Participation, Communication and Tourism Unit, which will be responsible for the implementation of the tourism programmes. Annex XII of the Management Plan is a Public Use Plan, which includes the outline of a tourism strategy for the region, the proposal of two visitor circuits at the property, and the calculation of the property's carrying capacity. The State Party clarified that before detailed planning of the visitor facilities, more archaeological survey and research will be necessary in order to select locations for the installations that do not endanger pre-Hispanic remains.

In the additional information supplied by the State Party on 5 November 2019 it was mentioned that the Ministry of Culture approved the 4-year conservation and infrastructure development program for research, visits and interpretation of the site. Furthermore, the Archaeological Research Institute submitted a proposal to the World Monuments Fund for the conservation of the Thirteen Towers and funding to develop the infrastructure

plans for research and interpretation of the site as well as other facilities for visitors, such as walkways, signage, parking, bathrooms, etc.

ICOMOS considers that the cautious approach to the development of visitor facilities is commendable and should be maintained. However, once the property is included in regional tourism itineraries, the number of visitors might rise sharply. ICOMOS urges the State Party to take necessary measures to face potential increased visitation to the property and considers that the State Party should undertake a Heritage Impact Assessment before any infrastructure project is implemented.

Community involvement
In addition to the national and local legal framework for the protection of the nominated property, as described previously, there is a protection mechanism in operation on the ground since 2015, consisting of the surveillance of the "Chankillo Solar Observatory and ceremonial center" by staff from the Provincial Municipality of Casma. This activity is also used to promote awareness in the local community regarding the need to avoid damaging the property, as well as preventing the unregulated passage of vehicles and people.

While these activities indicate the will of the authorities to be inclusive and participatory, the local population seems to lack a traditional connection with the regional cultural heritage, due to an abandonment and a rather recent repopulation of the area in the 1950's. The main interest seems to be in tourism development.

ICOMOS recommends that the State Party emphasize the participation of local communities in future planning, protection and conservation efforts of the nominated property.

Evaluation of the effectiveness of the protection and management of the nominated property
In general terms the legal protection of the nominated property, especially its main elements, is considered sufficient. In this context ICOMOS commends the State Party for the approval of the Management Plan and the registration of the property in the National Superintendence of Public Registry (SUNARP). The effectiveness of the management system will have to be proven in practice. The State Party should emphasize the participation of local communities in future planning, protection and conservation efforts, which will be key in avoiding any negative impacts through, for example, inadequate tourism development.

ICOMOS considers that most of the elements for the protection and management of the nominated property are adequate. However, many of them are not yet operational. The property itself, for example, is far from being sufficiently prepared for receiving tourists in greater numbers.

6 Conclusion

The nomination dossier and the large amount of information that was supplied by the State Party as additional information helped a lot in the understanding of the property and its protective and management system.

ICOMOS recognises the Outstanding Universal Value of Chankillo as an archaeoastronomical complex, on the basis of cultural criteria (i) and (iv), and encourages the State Party to continue the archaeological research and analysis of the data for a better understanding of the complex itself within its wider environment. Important and urgent conservation interventions are still needed, especially on the Thirteen Towers, and ICOMOS encourages the State Party to develop a long-term conservation program which should include preventive actions such as reinforcements and construction of temporary roofs, as well as conservation, restoration and maintenance works, and, according to intervention phases, specific procedures, follow-up routines and monitoring. It is also essential for the State Party to ensure that funds will be secured to continue the conservation strategy. Legal protection and management system are in place and the State Party should further involve the local community within the management of the property. The tourism development and infrastructure installations should be cautiously managed.

ICOMOS suggests that the State Party consider the change of name of the property to “Chankillo Archaeoastronomical Complex”.

7 Recommendations

ICOMOS recommends that the Chankillo Solar Observatory and ceremonial center, Peru, be inscribed on the World Heritage List on the basis of **criteria (i) and (iv)**.

Recommended Statement of Outstanding Universal Value

Brief synthesis

The Chankillo Solar Observatory and ceremonial center is a prehistoric site, located on the north-central coast of Peru, in the Casma Valley, comprising a set of constructions in a desert landscape that, together with natural features, functioned as a calendrical instrument, using the sun to define dates throughout the seasonal year.

The property includes a triple-walled hilltop complex, known as the Fortified Temple, two building complexes called Observatory and Administrative Centre, a line of thirteen cuboidal towers stretching along the ridge of a hill, and the Cerro Mucho Malo that complements the Thirteen Towers as a natural marker.

Criterion (i): Chankillo Archaeoastronomical Complex is an outstanding example of ancient landscape timekeeping, a practice of ancient civilizations worldwide, which used visible natural or cultural features. Incorporated in the Thirteen Towers, it permitted the time of year to be accurately determined not just on one date but throughout the seasonal year. Unlike architectural alignments upon a single astronomical target found at many ancient sites around the world, the line of towers spans the entire annual solar rising and setting arcs as viewed, respectively, from two distinct observation points, one of which is still clearly visible above ground. The astronomical facilities at Chankillo represent a masterpiece of human creative genius.

Criterion (iv): Chankillo was in use for a relatively brief period of time between 250 and 200 BC, during a late phase of the Early Horizon Period (500-200 BC) of Peruvian prehistory, after which it was destroyed and abandoned. The Chankillo Complex is a very particular type of building representing an early stage in the development of native astronomy in the Americas. It shows great innovation by using the solar cycle and an artificial horizon to mark the solstices, the equinoxes, and every other date within the year with a precision of 1-2 days. The solar observatory at Chankillo is thus a testimony of the culmination of a long historical evolution of astronomical practices in the Casma Valley.

Integrity

All the elements necessary to express the Outstanding Universal Value of Chankillo Complex centred on calendrical observations of the sun are included within the property boundaries. Chankillo and the wider setting of related monuments that form the property take advantage of built and natural horizon markers to track the progressive passage of the sun along the horizon throughout the entire year. The natural environment and climatic conditions, that are the basis of the good visibility needed for astronomical observations at the site, are maintained to a large extent. The viewsheds that contain the main astronomical sightlines are generally unobstructed, but their preservation has to be monitored closely. Also, the visual integrity of the general setting of the property has to be maintained. Any infringement on the property by urban development or expansion of agricultural areas has to be avoided.

The advancing collapse of structural elements, with the loss of clear edges (e.g. at the tower buildings and the observatories), jeopardises the exactness of the astronomical observations. The conservation of monumental elements is fragile and needs to be closely monitored in the future.

In case the information from future research indicates relationships of the central monuments with other elements of the property and beyond, a boundary adjustment should be considered.

Authenticity

The position of the Western and Eastern Observation Points in relation to the Thirteen Towers at Chankillo, identified by archaeological excavation and geophysical survey, and supported by archaeoastronomical data, suggests that the primary purpose of all these structures was to act together as a calendrical instrument. Since the 3rd century BC the sun has shifted slightly at and around the solstices, less at other times in the year. This small change has a negligible effect on the solar and possibly lunar alignments around the site but does not affect the ability of a present-day spectator to observe and understand the way in which the Chankillo functioned. Some aspects of the archaeoastronomical interpretations of the property may need further discussion.

Since no invasive conservation and reconstruction campaigns have changed the material substance of the property, the conditions of authenticity in terms of material and form, are met.

Protection and management requirements

The property has been declared as National Cultural Heritage, through National Direction Resolution 075/INC of January 18, 2008. The property has been inventoried nationally by the Ministry of Culture and is registered in the National Superintendence of Public Registry (SUNARP). The property is reinforced by a buffer zone that extends around the site and includes part of the San Rafael Valley, Cerro Mongón, Lomas Las Haldas, Pampa Los Médanos, Cerro Manchán, Cerro San Francisco, and Cerro Monte Grande.

The Management Plan, recently approved, identifies the current conservation and management conditions of the property and its context, the risks and threats to the cultural and natural features of the property and its surroundings, and establishes the policies that govern conservation and heritage management, the strategies and protection measures, and the regulation of the use of the property and its buffer zone through zoning, as well as the programmes and projects focused on sustainability in the conservation of the property.

The effectiveness of the management system will have to be proven in practice. Participation of local communities in future planning should be reinforced, and protection and conservation efforts, which will be key in avoiding any negative impacts through, for example, inadequate tourism development, should be closely monitored

Additional recommendations

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

a) Developing a long-term conservation program which should include preventive actions such as reinforcements and construction of temporary roofs, as well as conservation, restoration and maintenance works, and, according to intervention

phases, specific procedures, follow-up routines and monitoring,

b) Implementing the Management Plan and setting in motion all the elements of the Management Structure,

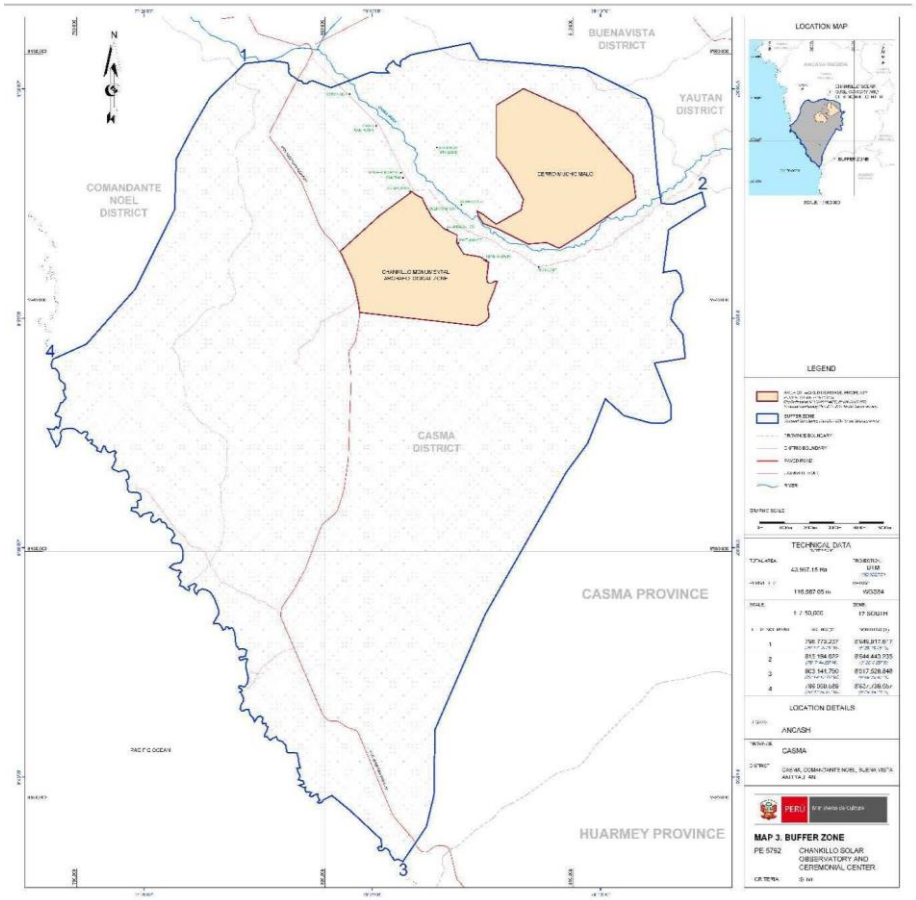
c) Securing the necessary funds to ensure the implementation of the conservation measures for the property,

d) Taking the necessary measures to face potential increased visitation to the property and undertake a Heritage Impact Assessment before any infrastructure project is implemented,

e) Involving local communities in the protection, conservation and promotion of the property, as well as in all of the planning processes,

f) Continuing archaeological research and analysis of the data for the understanding of the wider archaeological context of the area;

ICOMOS further recommends that the name of the property be changed to: "Chankillo Archaeoastronomical Complex".



Map showing the boundaries of the nominated property