
Aqueduct of Padre Tembleque (Mexico) No 1463

Official name as proposed by the State Party

Aqueduct of Padre Tembleque, Renaissance Hydraulic Complex in America

Location

Districts of Tepeapulco, Zempoala and Otumba
State of Hidalgo, State of Mexico
Mexico

Brief description

The aqueduct of Padre Tembleque, named after the friar Francisco de Tembleque, was constructed between 1554 and 1571 and constitutes an hydraulic system located between the states of Mexico and Hidalgo in the Mexican Central Plateau. The heritage canal system encompasses a water catchment area, springs, main and secondary canals, distribution tanks, arcaded aqueduct bridges, reservoirs and other auxiliary elements, which extend over a maximum distance of 48.22 kilometres. The aqueduct structures were built with supporting structures of earthen adobes in the Mesoamerican construction tradition, and reference European models of water conduction developed during the Roman period.

Category of property

In terms of categories of cultural property set out in Article I of the 1972 World Heritage Convention, this property was initially submitted as a serial nomination of 3 sites. At the recommendation of ICOMOS the State Party withdrew the nomination of 2 serial components by letter of 16 February 2015. The property accordingly remains a nomination of 1 site.

In terms of the *Operational Guidelines for the Implementation of the World Heritage Convention* (July 2013), Annex 3, the property is also nominated as a *heritage canal*.

1 Basic data

Included in the Tentative List

20 November 2001

International Assistance from the World Heritage Fund for preparing the Nomination

None

Date received by the World Heritage Centre

2 October 2013

Background

This is a new nomination.

Consultations

ICOMOS has consulted its International Scientific Committee on Earthen Architectural Heritage, TICCIH and several independent experts.

Technical Evaluation Mission

An ICOMOS technical evaluation mission visited the property from 9 to 12 September 2014.

Additional information received by ICOMOS

ICOMOS sent a letter to the State Party on 22 August 2014 requesting additional information with regard to the exact location of features described in the nomination dossier, the description of all features proposed for nomination, the justification for the serial contribution as well as the history and development of components 02 and 03, the justification of criterion (v), future conservation plans and operation of the aqueduct, ownership details as well as the protective designation of the property. The State Party provided additional information in response to the questions raised as well as further aspects on 24 October 2014

Following its World Heritage Panel, ICOMOS sent a second letter on 22 December 2014 recommending a reduction in number of the serial properties and requesting additional information with regard to management and monitoring. ICOMOS and the State Party further arranged an online conference call to have some dialogue with the technical experts concerned on 13 January 2015 and a meeting on 22 January 2015. The second additional information letter sent by the State Party on 16 February 2015 responded to some of the aspects discussed during this online meeting.

The additional information has been included under the relevant sections below.

Date of ICOMOS approval of this report

12 March 2015

2 The property

Description

Nominated as a heritage canal, the property presents the key components of an hydraulic system of water aqueducts located in the Mexican Central Plateau. The property was initially composed of three site components comprising an overall property area of 6,560.3 ha. These have been reduced by the withdrawal of site components 02 and 03, which are described below, which reduces the size of the property to 6,540 ha.

The first component, indicated as 01 Aqueduct of Padre Tembleque Hydraulic Complex and associative sites, covers these 6,540 ha and includes the key elements of the hydraulic system along a distance of 48.22 km. It is surrounded by a buffer zone of 34,820 ha. Component 02,

Town, Convent, Aqueduct and Water Tank of Tepeapulco, initially designated the second site component, was 17.7 ha in size. It shared a mutual buffer zone of 555 ha with the third site component entitled 03 Archaeological Site of Xihuingo, which covered an area of 2.6 hectares. The currently proposed and the two withdrawn components remain described separately below:

01 Aqueduct of Padre Tembleque Hydraulic Complex and associative sites

The key elements of the hydraulic system are located in this largest site component, which includes to the north the water source of the system in the form of the volcanic mountain El Tecajete, which acts as a water catchment area. In its vicinity are a series of springs, so-called *ojos de agua*, which are diverted into a main water canal. This main water canal covers the first 3.37km of the system up to the diverter or slit tank of El Tecajete, which divides the canal into two main branches, the branch to Zempoala of 5.98km length, and the branch towards Otumba which extends furthest south for 38.87km.

One of the key architectural features on the initially shared main canal is the aqueduct of the Hacienda el Tacajete, an arcaded structure carrying the water across 55 round arcades over a distance of several hundred meters. The branch towards Zempoala is frequently an underground canal cut to a depth of 1.2 meters into the hilly landscape. In Zempoala this branch splits again into two terminal 16th century square cisterns, which provided water to the key complexes in Zempoala, such as the Main House or the Todos los Santos Convent.

The branch towards Otumba heads largely south-west, passing by a number of haciendas, which are provided with water through smaller diverter tanks along the course. To reach the Hacienda of Guadalupe de Arcos an aqueduct of 14 round arches carries the water across the lake at Guadalupe de Arcos. Between the southern borders of the municipality of Zempoala and the northern borders of the municipality of Nopaltepec, one finds the key structures which facilitate the functioning of the southern hydraulic system, the monumental arcade which bridges the Tepeyahualco Ravine and the Papalote River. The aqueduct bridge is constructed of 68 round arches of stone masonry with lime-sand mortar, the tallest of which reaches to a height of 38 metres.

In the central section of this branch a number of haciendas are connected to the water canal before the hydraulic system enters the municipality of Otumba, such as the Hacienda of Santa Inés and the Haciendas of San Miguel Ometusco and Zoapayuca in the municipality of Axapusco. The town of Otumba marks the southern end of the hydraulic system, once more integrating several diverter tanks and water storage tanks. Their provision can still be understood in some architectural structures, such as the House of Culture, the House of Viceroy or the Convent of La Purísima Concepción.

02 Town, Convent, Aqueduct and Water Tank of Tepeapulco (withdrawn by letter of 16 February 2015)

The second site component is entirely located in the Town of Tepeapulco, about 12 kilometres east of the first site component. It contributes fragments of an antecedent to the aqueduct of Padre Tembleque, the aqueduct of Tepeapulco completed in 1545. In contrast to the first site component, this structure is limited to its urban and somewhat fragmented features and includes a small arcade, a water tank, a reception pond and communal laundries as well as an atrium and the terminal cistern. Of the previous 27km extension of the aqueduct of Tepeapulco, only around 600 meters of water canal and structures are included in this site component.

03 Archaeological Site of Xihuingo (withdrawn by letter of 16 February 2015)

This third site component, Xihuingo Archaeological Site, is located 5 kilometres north of the second and likewise circa 12 kilometres east of the first site component. The archaeological site comprises a walled settlement built for astronomical and calendar observation and contains several rock art petroglyphs. It has a number of occupation layers, all prior to Spanish contact, dating to the Tzacualli phase (0-200 CE), the Teotihuacan culture (200-600 CE) and Mazapa phase, and later complex Aztec phases. This site component does not contain any elements typical for water distribution systems.

History and development

After a shorter early presence in the years 1527-1540, the Franciscan friars settled in Otumba in 1553 under their guardian Francisco de Tembleque, who committed to assist the community of Zempoala and pay 20 annual pesos in exchange for water to be transported to Otumba via an aqueduct. The construction was commenced at a time during which Bernardino de Sahagún was collecting material for an anthropological text, which is considered an indispensable source for our knowledge of Mesoamerican cultures. This climate allowed local workers in the construction of the aqueduct to share their tangible and intangible expressions of local culture with the supervising friars.

Already a decade earlier, a smaller aqueduct had been built under the supervision of Andrés de Olmos in Tepeapulco between 1541 and 1545. This structure consisted of a rather simple sewage pipe, covered by lime and stone, predominantly underground with one visible arcade, located in the site component of Tepeapulco. However, only fragments of this earlier structure have survived until the present.

From 1553 onwards 17 whole years were dedicated to the construction of the aqueduct bringing water to Zempoala and Otumba. The construction was executed in close cooperation and with more than 400 stone masons and workers from the communities of Zacuala, Tlaquilpa, Zempoala and Otumba, working solely on the basis of their ancestral tradition of social work organization known as *tequio*. In particular the

construction of arcades was also based on local knowledge and techniques of the so-called Mestizo System, first building supporting structures of adobe and gradually raising the stone constructions, which allowed workers horizontal movement, rather than working with scaffolds or formworks. The local workers also left their signature on the structure by decorating keystones and spandrels with symbols corresponding to Mesoamerican cosmogony.

Following the hydraulic system's completion in 1571, regular maintenance and conservation works had to be coordinated among the four concerned communities as canals continued to clog or fracture over the centuries. Whilst initially the canal was intended to provide drinking water to the urban inhabitants, the demand for water for agricultural needs in the haciendas rose significantly in the 18th century, leading to conflicts over distribution rights. Following the independence of Mexico in the early 19th century further conflicts lead to the partial abandonment of the aqueduct, in particular of the Otumba branch. In 1851 the engineer Francisco Garay travelled along the canal system and pointed out the need for urgent conservation, which was finally decreed by the Emperor in 1865. However, conservation works were not carried out until the heritage value of the aqueduct was acknowledged in the early 20th century. Only in the last years of the 20th century, has a project to recover and restore the historic canal been initiated by the National Institute of Anthropology and History (INAH), funded by resources provided by the World Monuments Fund, the Ambassadors Fund and the US Congress. As the conservation works are only partially completed, the aqueduct is not yet once more operational along its full course.

3 Justification for inscription, integrity and authenticity

Comparative analysis

The property has been identified as best comparable in the typological framework of water management systems and in the chronological context of the Colonial period of Mesoamerica, whilst recognizing some cross-references to the European Renaissance and Roman period with regard to hydraulic architectural achievements. The comparative analysis accordingly aims to compare the property with hydraulic complexes of similar character – in particular examples already recognized on the World Heritage List or tentative lists –, with other aqueducts at a national or regional level, and with the most important European achievements of aqueduct construction from the Roman through to the Renaissance period.

Among the aqueducts already inscribed on the World Heritage List or located within larger contexts of some World Heritage Sites, the comparison highlights earlier structures such as the Pont du Gard, France (1985, (i), (iii) and (iv)), the Aqueduct of Segovia, Spain (1985, (i), (iii) and (iv)), the aqueducts of Los Milagros and San

Lázaro in the Archaeological Ensemble of Mérida, Spain (1993, (iii) and (iv)), the Amoreira Aqueduct in Elvas, Portugal (2012, (iv)), the Agua da Prata Aqueduct in Évora, Portugal (1986, (ii) and (iv)), or the Los Pegões Aqueduct in Tomar, Portugal (1983, (i) and (vi)).

However, also later structures which have been inscribed as important examples of hydraulic water systems have been compared including the Pontcysyllte Aqueduct, United Kingdom (2009, (i), (ii) and (vi)), the Carolina Aqueduct of Vanvitelli in the 18th century Royal Palace at Caserta, Italy (1997, (i), (ii), (iii) and (vi)) or three Mexican examples, the Aqueduct of Morelia (1991, (ii), (iv) and (vi)), the Aqueduct of Querétaro (1996, (ii) and (iv)) or the Aqueduct of Zacatecas (1993, (ii) and (iv)).

ICOMOS considers that this part of the comparison is unfortunately exclusively focused on the height of single arches in aqueducts to prove the point that the aqueduct at Tepeyahualco provides the highest elevation for a single arch. As a result the larger features of the water distribution system, its preservation of functional elements or construction details, have not been compared to other examples of water management systems, although some are briefly mentioned, such as the Shustar Historical Hydraulic System, Iran (2009, (i), (ii) and (v)), the Dujiangyan Irrigation System, China (2000, (ii), (iv) and (vi)) or the *Aflaj* Irrigation Systems of Oman (2006, (v)).

Other examples of aqueducts in France, Italy, Portugal, Turkey and Spain are likewise reduced to the comparison of height and illustrate that the Aguas Livres Aqueduct in Lisbon, Portugal is indeed a single level arch structure of about double the height of the aqueduct of Tepeyahualco and accordingly referred to as the highest historic aqueduct built in stone masonry. It dates to about two centuries later than the Padre Tembleque hydraulic system and was constructed from 1748 onwards.

In the regional chronological analysis, it is recognized that at present three Mexican aqueducts from the Colonial period in Mesoamerica have been included in the World Heritage List. However, all three have not been nominated as hydraulic water systems but were components of a city or archaeological site that was inscribed.

ICOMOS notes that the comparative analysis does not discuss the selection of serial components. ICOMOS further notes that all comparisons discussed are focused exclusively on the features in component 01 Aqueduct of Padre Tembleque Hydraulic Complex and associative sites of the property and do not reference the features included in the two other components, which have in the meantime been withdrawn at the recommendation of ICOMOS. However, even with regard to the first component, ICOMOS considers that the comparative analysis falls short of comparing the water distribution system of the Aqueduct of Padre Tembleque with relevant

similar examples of hydraulic systems and likewise lacks comparison with other structures created using similar adobe techniques merging local and European building traditions. Nevertheless, ICOMOS was able to confirm the exceptionality of the hydraulic water system included in the first serial component initially proposed by consulting its expert networks across the region.

ICOMOS considers that despite several gaps in the comparative analysis the first serial component proposed qualifies to be considered for the World Heritage List.

Justification of Outstanding Universal Value

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

- The hydraulic system is an outstanding example of a heritage canal because its main arcaded aqueduct at Tepeyahualco reaches a total height of 39.65m with its central arch of 33.84m height, which is the highest aqueduct ever constructed at that time with a single level of arches;
- The heritage canal initiated by Padre Templeque and built with support from the local communities is a unique representation of the ingenious fusion of Mesoamerican and European construction traditions, combining the mestizo tradition with the tradition of Roman hydraulics;
- The hydraulic complex is directly associated with the maguey landscape, an ancestral landscape of unique character, as well as to the birth of American anthropological sciences following the work of Bernardino de Sahagún, which is considered an indispensable source of knowledge of the old Mesoamerican cultures.

ICOMOS considers that this justification exclusively refers to component 01 of the three serial components presented in this nomination and identifies a justification for Outstanding Universal Value which components 02 and 03 make no distinctive contribution towards. In consequence, ICOMOS recommended excluding components 02 and 03 from the nomination proposal. These were subsequently withdrawn by the State Party.

In ICOMOS' view component 01 Aqueduct of Padre Templeque Hydraulic Complex and associative sites demonstrates Outstanding Universal Value as an early and unique example of an hydraulic system in the Mesoamerican context which is exceptionally well preserved, as well as an example of a unique fusion of ingenious Mesoamerican and European construction traditions. However, ICOMOS considers that this potential does not apply to the surrounding maguey landscape in the context of this nomination proposal and consequently cannot accept the landscape approach to justification of Outstanding Universal Value provided by the State Party.

Integrity and authenticity

Integrity

The initial component 01 Aqueduct of Padre Templeque Hydraulic Complex and associative sites retains the complete hydraulic system over a distance of approximately 48 kilometres. Its landscape setting is predominantly rural characterized by distinctive maguey plantations, with the canal system either historically buried and enclosed in stone with fired tile pipework in some sections, or built on the ground surface, either open or covered by stone. The six sections of aqueduct with 137 visible arches represent less than five percent of the total hydraulic system. All elements of the system are included in the component 01, which illustrates a high degree of integrity in reference to the historic extension and functionality of the hydraulic system. Components 02 and 03 did not seem to add to this completeness.

Extremely few threats of development or land-use seem to affect the Aqueduct of Padre Templeque. The rural landscape setting provides a high level of integrity with only occasional interruption by roads or power lines. The historic urban centres of Zempoala and Otumba have been encroached upon by some unsympathetic new constructions but these have little impact on the attributes of the hydraulic system. ICOMOS considers that component 01 includes all elements which are necessary to illustrate the Outstanding Universal Value proposed by the State Party.

ICOMOS considers that the integrity of component site 01 has been justified.

Authenticity

The physical manifestations of the hydraulic system are well preserved in its various elements, including *ojos de agua* (springs), *apantles* (water canals), *aljibes* (cisterns), arches, fountains, water tanks, and other water features. They retain authenticity in form and design, material and substance as well as location and setting. The hydraulic system also partially retains authenticity of use and function in the six-kilometre segment of Zempoala, which currently carries water supporting non-potable uses such as washing clothes, irrigation, etc. It is intended to regain completely authenticity of use and function by re-enabling the passage of water through the other branch of the system that connects to the town of Otumba, at a distance of 39 km. ICOMOS recommends that any measures to regain usability of this branch should be carefully supervised by heritage professionals and evaluated in terms of their potential negative impact to the authenticity of the property by means of Heritage Impact Assessments (HIAs).

Authenticity in traditions, techniques and management system is illustrated by the continuing maintenance and management by the local communities, during which repairs are undertaken in traditional construction techniques and materials. To a certain extent, the site still evokes feelings which could be related to its original time

of construction. This applies in particular where arches of the system exist and where one can see the hundreds of visible glyphs that were incorporated in the aqueduct's construction by the indigenous populations, underscoring that the spectacular engineering work was a collaborative effort between the indigenous population and the Spanish clergy.

ICOMOS considers that in regard to Outstanding Universal Value the authenticity of site component 01 has been demonstrated.

In conclusion, ICOMOS considers that the conditions of integrity and authenticity have been justified for component 01 of the initially submitted series.

Criteria under which inscription is proposed

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

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

This criterion is justified by the State Party on the grounds that the aqueduct is a masterpiece of Renaissance hydraulics in the New World which represents the realization of the ideal perfection proposed by Renaissance doctrines in American lands. It further integrates the highest single-level arcade ever built in aqueducts from Roman times until the middle of the 16th century, achieved as a result of the ingenious use of an adobe formwork as alternative to scaffolding.

ICOMOS considers that the monumental aqueduct arcade which bridges the Tepeyahualco Ravine and the Papalote River could be considered a masterpiece in the sense of criterion (i), and that this allows for its application to the remaining components of the hydraulic system, despite the fact that these combine construction technologies that had previously been developed in Europe or local contexts respectively.

ICOMOS considers that this criterion has been justified for serial component 01.

Criterion (ii): *exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;*

This criterion is justified by the State Party on the grounds that the hydraulic system exhibits an important interchange of European tradition in terms of the knowledge of Roman hydraulics evidenced in the canals' gradual slope through the irregular topography, and Mesoamerican culture represented by the use of the traditional social organization of collective working, the utilization and adaptation of local methods of adobe construction as well as the presence of glyphs illustrating preHispanic symbols and cosmology in several arcade structures. Also, the fusing of the humanist ideals of the

Franciscan order with the local collective traditions promoted common wellbeing and an impressive construction achievement over 17 years.

ICOMOS considers that for component 01 the conjunction of the Roman heritage of masonry aqueducts, hydraulic management techniques inspired by Arab-Andalusian know-how and pre-Hispanic indigenous traditions for adobe construction is indeed exceptional, with clear material evidence. Although the use of adobe brick instead of wood was applied elsewhere in Mexico, it wasn't often and certainly not with the same dramatic effect as in the aqueduct which bridges the Tepeyahualco Ravine and the Papalote River.

ICOMOS considers that this criterion has been justified for component 01.

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 aqueduct represents an outstanding example of hydraulic water architecture, based on in-depth knowledge of Roman and Renaissance hydraulic engineering and integrated with local Mesoamerican construction knowledge. This combination created the highest ever single-arch arcaded aqueduct, which, using the same technology, was neither achieved earlier nor reproduced later and reached a surprising scale which continues to lack comparators.

ICOMOS considers that, as in previous criteria, the justification presented applies exclusively to component 01 and cannot be considered relevant for the other two serial components. In relation to the first component, more important than the maximum height of the arches, which is emphasized in the nomination, are the specific techniques and regional materials used in construction which created a unique type of hydraulic system at the time of Mesoamerican-European encounters. ICOMOS considers that a comparative analysis which considers the construction technology provides a basis to justify this criterion for component 01.

ICOMOS considers that this criterion has been justified for component 01.

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 maguey landscape is representative of the interaction with the rural natural environment around the aqueduct and has supported an agave agriculture of

preHispanic origin. The cultivations, which are defined by parallel lines of plots and terraces, are utilized to produce a fermented drink called *pulque*. The ancestral maguey landscape has recently become vulnerable to agricultural and urban economic development.

ICOMOS considers that the boundaries of the site components contain very limited features of the maguey landscape which cannot be said to be of Outstanding Universal Value in comparison to several other agricultural landscapes in the Mesoamerican region. It has also not been illustrated in which way this ancestral landscape is linked or provides support to the hydraulic system presented at the core of this nomination and how its landscape features could be integrated in the wider context of this nomination.

ICOMOS considers that this criterion has not been justified.

Criterion (vi): *be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance;*

This criterion is justified by the State Party on the grounds that the aqueduct of Padre Tembleque is directly associated with the birth of ethnographic and anthropological science in America, more specifically with the writing of *Los Primeros Memoriales, Historia general de las cosas de la Nueva España* by Bernardino de Sahagún. The construction elements further illustrate the associations with preHispanic collective memory with regard to religious cosmogony, language and traditions as evidenced in the stones of the hydraulic complex which show various carved symbols.

ICOMOS considers that whilst the works of Bernardino de Sahagún may have had an important impact on the history of Mesoamerican anthropology, the fact that his researches were based in close vicinity to the canal's construction landscape and also coincided with the beginning of the construction under Francisco de Tembleque are not sufficient to illustrate a direct association that could be said to be of Outstanding Universal Value. ICOMOS further considers that while the symbols engraved in the hydraulic architecture do reference the integration of the workers' preHispanic cosmogony, these symbols are not of outstanding character in themselves but rather function as a reference to the integration of different traditions and cosmologies, which is better acknowledged under criterion (ii).

ICOMOS considers that this criterion has not been justified.

ICOMOS considers that the initial serial approach was not justified and recommended reducing the property to just component 01, which was agreed to by the State Party.

In conclusion, ICOMOS considers that criteria (i), (ii) and (iv) have been justified for component 01 and that authenticity and integrity have been demonstrated.

Description of the attributes

The attributes of Outstanding Universal Value comprise all elements of component 01 of the hydraulic system, including springs, main and secondary canals, distribution tanks, several arcaded aqueduct bridges, reservoirs and other auxiliary elements, extending over a distance of 48.22 kilometres. The elaborate techniques and cultural exchanges become specifically visible in the mastery of the monumental arcade bridging the Tepeyahualco Ravine and the Papalote River, which is constructed in 68 round arches the largest of which reaches a height of 38 metres.

4 Factors affecting the property

The Aqueduct of Padre Tembleque is located in a rural landscape dominated by agriculture and at present development pressures are low. However, ICOMOS considers that further gradual expansion of Mexico City can impact the integrity if proper management controls are not adopted. Important view lines could eventually be affected by urban sprawl from Mexico City, a city of over 20 million people located at only one hour's distance (62 km). The same risk could arise from a possible expansion of the industrial complex of Ciudad Sahagún, located at approximately 9 kilometre's distance to the aqueduct and currently shielded from view by a small mountain. New regional and local roads are still being planned in the property and ICOMOS considers that they will need to be controlled in terms of visual impact and construction methods in the vicinity of the hydraulic system.

The property receives few visitors today but given the proximity to the capital visitor numbers may rise considerably. With the majority of the hydraulic system being subterranean, the visitors will likely peak at the few visible and impressive architectural structures, in particular the grand arcaded aqueduct with its 68 arches. ICOMOS considers that it will be important to carefully plan and control the establishment of visitor infrastructure in these areas. Likewise, because large sections of the hydraulic system are underground, and thus are not visible, education and public awareness will be paramount in order to not cause inadvertent damage to these sections. Rows of maguey plants are currently planted alongside all sections to indicate the course of the aqueduct.

Under environmental pressures the State Party indicates the risk of pollution which could lead to contamination of the aquifers of El Tecajete Hill and would reduce the water quality and with it the means of use of the hydraulic system. Few natural risks affect the property but man-made risks can be identified. ICOMOS considers that a key threat is posed by unauthorized access of vehicles in the immediate vicinity of the key architectural structures. These not only adversely affect

the setting but also cause real risks to the physical structures.

ICOMOS considers that the main threats to the property are urban sprawl, vehicular access to the aqueduct, development of inappropriate visitor infrastructure and water pollution.

5 Protection, conservation and management

Boundaries of the nominated property and buffer zone

The boundaries of the remaining property component 01 and its buffer zone seem adequate in both its rural and urban areas. It is obvious that care was taken when establishing the boundaries to take advantage of topographic features (mountains, hills, and ridges) which will help protect the visual characteristics of the surrounding landscape. All boundaries are marked using GIS coordinates and are clearly delineated in the maps provided.

ICOMOS considers that the boundaries of the nominated property component 01 and of its buffer zone are adequate.

Ownership

The majority of land in the property is agricultural fields in the rural areas and residential properties in the urban components. Of these, 96% are in private ownership, 3.8% are communally owned and just 0.2% belong to the public administration. In the additional information that the State Party provided at the request of ICOMOS, it clarified that this 0.2% covers the key architectural structures, such as the Tembleque aqueduct. It was also specified that according to the General Water Act, waterways – including canals – are under federal administration and management, even if they pass through private land.

Protection

In the additional information that the State Party provided at the request of ICOMOS, it affirmed that all elements of the property are covered by the Federal Law on Archaeological, Artistic and Historic Monuments and Areas promulgated in 1972 as Historic Monuments by Determination of Law so that these do not require any specific decree or declaration.

This implies that in order to initiate any changes to the current condition of the property and its immediate setting, permission by the National Coordination of Historic Monuments of the INAH and from the Hidalgo and State of Mexico INAH Centres is required. The immediate setting has been defined as the buffer zone, which aims to preserve the characteristic maguey landscape as the property setting. Concerted efforts made by the federal, state, and municipal authorities to work together to achieve trans-governmental awareness and proper protection for the hydraulic system are still very recent and

ICOMOS considers it difficult to judge the effectiveness of these efforts at the present stage.

ICOMOS considers that the legal protection in place is adequate and that the application of protective measures will be adequate if consistently committed to.

Conservation

The elements and attributes included in component 01 of the property have recently been inventoried and described. The state of conservation of the hydraulic system is impressive, although several canals are not presently operational because they are filled with earth or dirt. The branch to Zempoala has been cleaned and restored and is fully operational to date. According to the additional information provided at the request of ICOMOS, it is planned to further restore the function of the Otumba branch.

Conservation works are currently ongoing in several sections of the aqueduct, including at the main arcade of Tepeyahualco, which is being conserved with funding made available by the US Ambassadors Fund. In ICOMOS' view the conservation is being implemented by well-trained specialists, who are using state-of-the-art techniques to conserve the large aqueduct section, by using time-proven traditional materials and techniques, coupled with modern analytical techniques. High-quality preservation and conservation projects are also being undertaken at other sections of the hydraulic system by Conaculta, INAH, and the Patronato Acueducto Tembleque A.C. Following on from the conservation projects, continuous repair, cleaning and maintenance is undertaken by trained individuals from the local communities. ICOMOS considers that the conservation measures are of high quality and very effective.

ICOMOS considers that the state of conservation is adequate and that conservation measures and maintenance schemes are commendable.

Management

Management structures and processes, including traditional management processes

The property falls into two states and five municipalities which share the administration of the hydraulic system and the development controls for its setting. The nomination dossier highlights that a management unit for inter-institutional coordination and follow up of the management plan, will coordinate federal, state (States of Mexico and Hidalgo) and municipal (Tepeapulco, Zempoala, Axapusco, Nopaltepec and Otumba) levels as well as agricultural and citizen associations. A two-stage approach is envisaged to establish such coordination. At the first stage, all government and other stakeholders shall agree on the implementation of a management plan, which is currently in preparation. Following this first agreement, the management unit will be set up to steer the inter-governmental implementation in September 2015.

In the intervening time, the Interstate Technical Commission for the nomination of the Aqueduct of Padre Tembleque Hydraulic Complex to the UNESCO World Heritage List, which coordinated the preparation of the nomination and management plan, acts as the executive management unit. The required funding for the establishment and operation of a management unit at this stage does not seem to have been estimated or identified. ICOMOS initially noted that risk preparedness measures did not feature prominently in the management mechanisms, although the planting of rows of maguey provides a first protection against risks caused by agricultural and other vehicles. However, in the additional information submitted on 16 February 2015, the State Party highlighted a number of measures undertaken to prevent damage in case of earthquakes and highlighted the national reference frameworks for the development of detailed disaster and risk management plans.

Policy framework: management plans and arrangements, including visitor management and presentation

A management plan has been submitted with the nomination dossier. The management plan follows a general, and several specific, objectives and introduces guidelines for the specific heritage categories included in the property. It further provides guidelines on how more operational management procedures can be established over the forthcoming years. A few actions/activities – called indicators – have been included under different categories. It is assumed that, as the management plan is considered an evolving document, these will be further detailed and presented with specific timeframes, responsibilities and indicators in a later operational version of the management plan.

At present the aqueduct is not a key visitor attraction and does not yet have considerable visitor infrastructure. However, the Department of Tourism and Culture of the State of Hidalgo and the Department of Tourism of the State of Mexico have teamed up for a promotional campaign to increase visitor numbers to the heritage site and intend to create a suitable visitor infrastructure in the future. The only infrastructure currently in place consists of recently installed interpretative panels placed at the most significant elements of the system. Unfortunately, these have sometimes been placed a little too close to the actual historic property and so negatively impact their setting.

ICOMOS notes that any future visitor infrastructure needs to be carefully selected, as well as be sensitive to the characteristics of the site and its setting. ICOMOS considers that although visitor numbers are low at present, these can significantly increase, as the nearby pyramids of Teotihuacan, a World Heritage Site, which are within view of the hydraulic complex, receive four million visitors a year and tourism officials will seek to capitalize on the proximity to this existing visitor attraction. In ICOMOS' view, visitor management considerations will have to be strengthened to be prepared for such visitor numbers.

Involvement of the local communities

Although the Patronato Acueducto Tembleque A.C. – a civil association supporting the aqueduct – has been involved in the preparation of the nomination dossier, the outreach to the general population seems limited. However, the Patronato itself has undertaken impressive work over the past two decades in not only educating the public, but also in organizing work projects with local inhabitants to restore and maintain various sections of the system under professional conservation guidance. In particular, the Patronato has succeeded in imparting an appreciation of the system to school children through various activities including art projects that depict the large aqueduct and the importance of water to our daily lives.

ICOMOS considers that the management efforts and arrangements are evolving and will likely be effective once the formal management unit and with its cooperation mechanisms with the states and municipalities have been established by September 2015.

In conclusion, ICOMOS considers that, at present, the management system for the overall serial property is still evolving but will be adequate once the management unit is established and the management plan has been reviewed and augmented to include operational management procedures for site management.

6 Monitoring

The management plan foresees that monitoring is undertaken on an annual basis. While it is foreseen to establish detailed qualified indicators for this process, the nomination already identifies some areas in which the indicators need to be established, including the periodicity for monitoring as well as the responsible agencies and location of records. The monitoring processes are divided according to the heritage category concerned, i.e. urban, archaeological, landscape heritage etc.

With the additional information submitted on 16 February 2015, the State Party submitted further indicators and guidelines for the monitoring procedures. The information also indicated how Periodic Reporting processes would be undertaken on site. ICOMOS considers that, whilst the envisaged monitoring procedures might be sufficient, the process of undertaking these exercises has only just started and might have to be fine-tuned over time. However, the hydraulic system has been monitored over centuries by means of regular maintenance procedures which continue in particular in the functional branch to Zempoala.

ICOMOS considers that the monitoring indicators and methodologies presented are adequate.

7 Conclusions

The Aqueduct of Padre Tembleque, Renaissance Hydraulic Complex in America was initially nominated as a serial property of three component sites. However, ICOMOS did not see a consistent theme and approach to Outstanding Universal Value within these three sites and recommended to the State Party to withdraw the submission of component sites 02 and 03 to allow for a stronger case to be made. The State Party followed this recommendation and withdrew the two components by letter of 16 February 2015. ICOMOS considers that the justification for Outstanding Universal Value is adequate when exclusively referring to component 01, the Aqueduct of Padre Tembleque Hydraulic Complex and associative sites.

ICOMOS accordingly considers that component 01 demonstrates Outstanding Universal Value and meets criteria (i), (ii) and (iv). ICOMOS considers that this component represents in an exceptional way the interchange between European hydraulic technologies based on Roman tradition and incorporating Andalusian influences, and the Mesoamerican building tradition. ICOMOS also considers that the specific techniques and regional materials used in construction have created a unique type of hydraulic system at the time of Mesoamerican-European encounters. While these aspects have not been fully supported by an adequate comparative analysis comparing the water distribution system of the Aqueduct of Padre Tembleque with relevant similar examples of hydraulic systems and with other structures created in similar adobe techniques merging local and European building traditions, ICOMOS, based on information from its expert advisers, was able to acknowledge the exceptionality of this property in a global context.

The Aqueduct of Padre Tembleque Hydraulic Complex and associative sites retains the complete hydraulic system over a distance of approximately 48 kilometres and therefore a high degree of integrity. The physical manifestations of the hydraulic system are well preserved in its various elements, and retain authenticity in form and design, material and substance as well as location and setting. The key factors affecting the property are urban sprawl from the capital Mexico City, inappropriate vehicular access to the aqueduct including the underground components, the potential development of inappropriate visitor infrastructure, and water pollution.

With a view to protection and management, ICOMOS considers that both will be adequate and effective once the cooperation between the two federal states and five municipalities concerned is formally guided by the establishment of an official attribution of mandate to the Site Management Unit in September 2015. Active conservation works of high quality are currently ongoing in several sections of the aqueduct, including at the main arcade of Tepeyahualco.

A management plan has been submitted with the nomination. This initial management plan is described as an evolving document and is currently being augmented to include operational aspects of site management. The State Party provided additional information on aspects of risk preparedness, visitor management and quality assessment, which were lacking in the initial draft. The property is currently not extensively visited but authorities have started promotional campaigns envisaging increased visitor numbers. ICOMOS notes that any future visitor infrastructure needs to be carefully selected, as well as sensitive to the characteristics of the site and its setting. With regards to the monitoring system, ICOMOS considers that the necessary monitoring processes and indicators established following the methodology described in the nomination are adequate.

8 Recommendations

Recommendations with respect to inscription

ICOMOS recommends that the Aqueduct of Padre Tembleque, Renaissance Hydraulic Complex in America, Mexico, with the exception of the following site components 02 Town, Convent, Aqueduct and Water Tank of Tepeapulco and 03 Archaeological Site of Xihuingo, be inscribed on the World Heritage List on the basis of **criteria (i), (ii) and (iv)**.

Recommended Statement of Outstanding Universal Value

Brief synthesis

The aqueduct of Padre Tembleque, named after the friar Francisco de Tembleque, was constructed between 1554 and 1571 and constitutes an hydraulic system located between the states of Mexico and Hidalgo in the Mexican Central Plateau. The heritage canal system encompasses its water catchment area, springs, main and secondary canals, distribution tanks, arcaded aqueduct bridges, reservoirs and other auxiliary elements, which extend over a maximum distance of 48.22 kilometres. The aqueduct structures were built with supporting structures of earthen adobes in the Mesoamerican construction tradition, but at the same time referencing European models of water conduction developed during the Roman era.

The hydraulic system is an outstanding example of water conduction in the Americas and integrates along its 48 kilometres' extent impressive architectural structures, such as the main arcaded aqueduct at Tepeyahualco, which reaches a total height of 39.65m, with its central arch of 33.84m height. The system was built by Franciscan friars with support from the local communities and as a result is a unique representation of the ingenious fusion of Mesoamerican and European construction traditions, combining the mestizo tradition with the tradition of Roman hydraulics. As an ensemble of canals and auxiliary structures, the system is exceptionally well-preserved and one branch remains operational up until today.

Since it is the complexity of the system and the human exchange which created it which contribute to the Outstanding Universal Value, all features of this hydraulic system, including springs, main and secondary canals, distribution tanks, several arcaded aqueduct bridges, reservoirs and other auxiliary elements, are attributes documenting this exceptional construction. The elaborate techniques and cultural exchanges become specifically visible in the mastery of the monumental arcade bridging the Tepeyahualco Ravine and the Papalote River, which is made up of 68 round arches.

Criterion (i): The aqueduct bridge of Tepeyahualco is an architectural masterpiece integrating the highest single-level arcade ever built in aqueducts from Roman times until the middle of the 16th century, achieved as a result of the ingenious use of an adobe formwork as an alternative to scaffolding. Although the use of adobe brick instead of wood was applied elsewhere in Mexico, it wasn't often and certainly not with the same dramatic effect as in the aqueduct, which bridges the Tepeyahualco Ravine and the Papalote River.

Criterion (ii): The hydraulic system of Padre Tembleque exhibits an important interchange of European tradition in terms of the conjunction of the Roman heritage of masonry aqueducts, hydraulic management techniques inspired by Arab-Andalusian know-how, and pre-Hispanic indigenous tradition as well as Mesoamerican culture, represented by the use of the traditional social organization of collective working, the utilization and adaptation of local methods of adobe construction as well as the presence of glyphs illustrating symbols and cosmology in several arcade structures. It is a monument fusing the humanist ideals of the Franciscan order with the local collective traditions, aimed at promoting common wellbeing through an impressive construction achievement over 17 years.

Criterion (iv): The aqueduct of Padre Tembleque represents an outstanding example of hydraulic water architecture, based on in-depth knowledge of Roman and Renaissance hydraulic engineering which was integrated with local Mesoamerican construction knowledge. The specific techniques and regional materials used in the construction created a unique type of hydraulic system at the time of Mesoamerican-European encounters.

Integrity

The Aqueduct of Padre Tembleque Hydraulic Complex retains the complete hydraulic system over a distance of approximately 48 kilometres. Its landscape setting is predominantly rural characterized by distinctive maguey plantations, with the canal system either historically buried or enclosed in stone, either open or covered. The six impressive aqueduct bridges with 137 visible arches represent less than five percent of the total hydraulic system and hence the presence of all auxiliary elements of the system is a key to its integrity.

At present, few threats of development or land-use seem to affect the Aqueduct of Padre Tembleque. The rural landscape setting provides a high level of integrity with only occasional interruption by roads or power lines. It is important that this landscape integrity is retained in the future. The historic urban centres of Zempoala and Otumba have been encroached upon by some unsympathetic new constructions but these have fortunately had little impact on the attributes of the hydraulic system. Any future construction in these historic centres should be reviewed in terms of any potential negative impact which may occur.

Authenticity

The physical manifestations of the hydraulic system are well preserved in its various elements, including *ojos de agua* (springs), *apantles* (water canals), *aljibes* (cisterns), arches, fountains, water tanks, and other water features. These retain authenticity in form and design, material and substance as well as location and setting. The hydraulic system also partially retains authenticity of use and function in the six-kilometre segment of Zempoala, which currently carries water supporting non-potable uses such as washing clothes, irrigation, etc. It is intended to regain completely authenticity of use and function by re-enabling the passage of water through the other branch of the system that connects to the town of Otumba, at a distance of 39 km. However, such reactivation should be carefully supervised by heritage professionals and evaluated in terms of its potential negative impact to the authenticity of the property.

Authenticity in traditions, techniques and management system is illustrated by the continuing maintenance and management by the local communities, during which repairs are undertaken in traditional construction techniques and materials. To a certain extent, the site still evokes feelings which could be related to its original time of construction. This applies in particular where arches of the system exist and where one can see the hundreds of visible glyphs that were incorporated in the aqueduct's construction by the indigenous populations, underscoring that the spectacular engineering work was a collaborative effort between the indigenous population and the Spanish clergy.

Management and protection requirements

The property is protected under the Federal Law on Archaeological, Artistic and Historic Monuments and Areas promulgated in 1972 as an Historic Monument. This implies that in order to initiate any changes to the current condition of the property and its immediate setting, permission by the National Coordination of Historic Monuments of the INAH and from the Hidalgo and State of Mexico INAH Centres is required. The immediate setting has been defined as the buffer zone, which aims to preserve the integrity of the characteristic maguey landscape.

The property falls into two states and five municipalities which share the administration of the hydraulic system. A

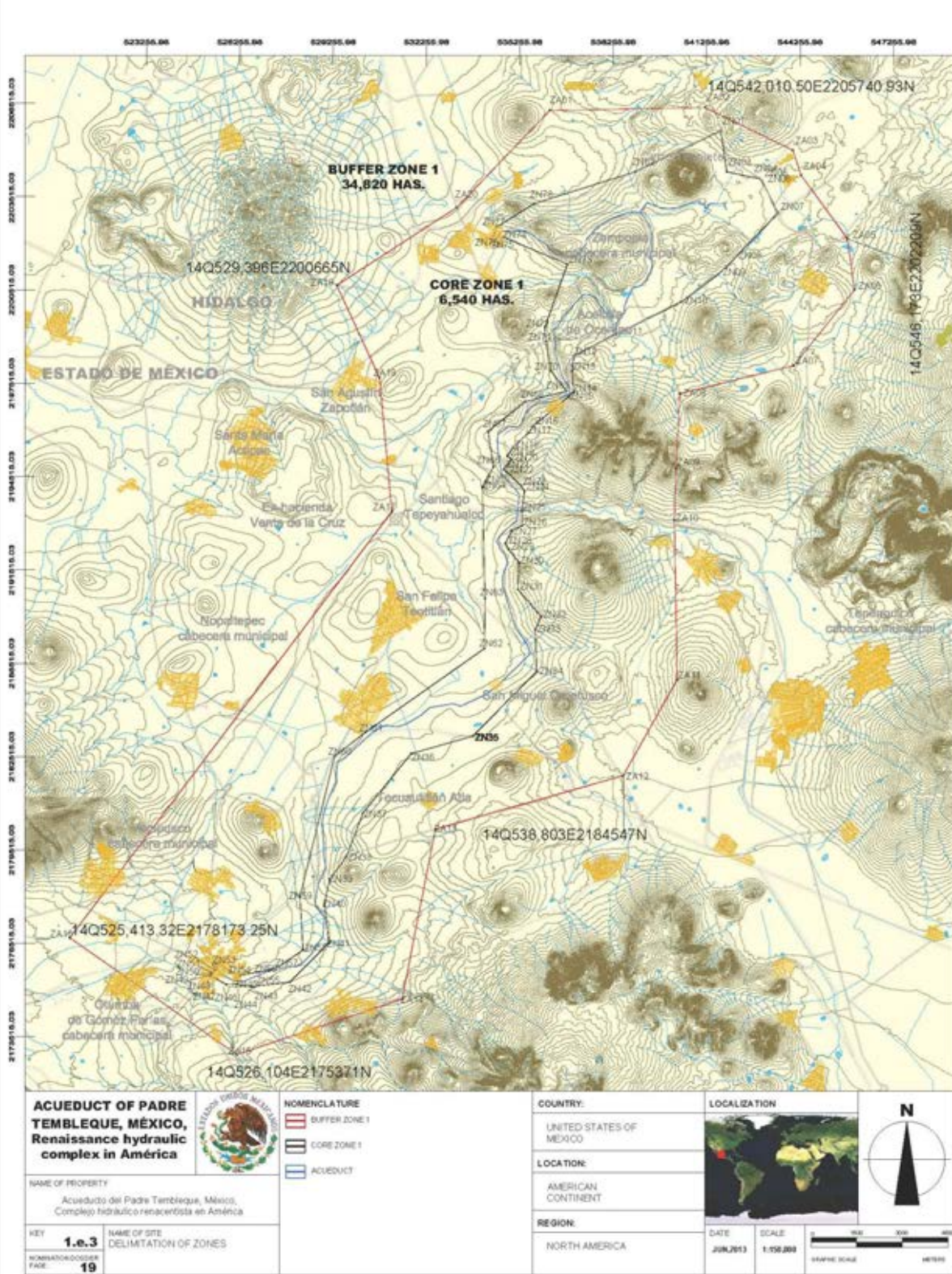
Management Unit for inter-institutional coordination and follow-up of the management plan coordinates federal, state and municipal levels as well as agricultural and citizen associations. The management as well as maintenance of the property builds strongly on the cooperation with the local communities and citizen organizations. Any visitor infrastructure planned to be created for the property needs to be carefully selected, as well as be sensitive to the characteristics of the site and its setting.

Additional recommendations

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

- Finalizing the establishment and attribution of mandate to the management unit by September 2015 to guide cooperation between the concerned federal and municipal administrations;
- Augmenting the management plan to include operational management procedures and finalize its operational version, integrating the strategies for risk and visitor management;
- Ensuring that any future visitor infrastructure be carefully selected, as well as sensitive to the characteristics of the site and its setting and be subject to a Heritage Impact Assessment before any approval is granted.

ICOMOS also recommends that the name of the property be changed to "Aqueduct of Padre Tembleque Hydraulic System".



Revised map showing the boundaries of the nominated property



Monumental arcade of Tepeyahualco, aerial view



Monumental arcade of Tepeyahualco



Hacienda Los Arcos, aerial view



Cistern at Zempoala Church