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# The Persian Qanat (Islamic Republic of Iran) No 1506

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## Official name as proposed by the State Party

The Persian Qanat

## Location

Khorasan-e Razavi, Khorasan-e Jonubi, Esfahan, Yazd,  
Markazi and Kerman Provinces  
Islamic Republic of Iran

## Brief description

Throughout the arid regions of Iran, agricultural and permanent settlements are supported by the ancient qanat system of tapping alluvial aquifers at the heads of valleys and conducting the water along underground tunnels by gravity, often over many kilometres. Shaft wells providing access and ventilation to the tunnels appear as craters from above, following the line of the qanat from water source to agricultural settlement. The eleven qanats representing this system include rest areas for the workers, water reservoirs and watermills. The traditional communal management system still in place allows equitable and sustainable water sharing and distribution.

## Category of property

In terms of categories of cultural property set out in Article I of the 1972 World Heritage Convention, this is a serial property of 11 *sites*.

## 1 Basic data

### Included in the Tentative List

9 August 2007

### International Assistance from the World Heritage Fund for preparing the Nomination

None

### Date received by the World Heritage Centre

29 February 2015

### Background

This is a new nomination

### Consultations

ICOMOS has consulted its International Scientific Committee on Archaeological Heritage Management and several independent experts.

### Technical Evaluation Mission

An ICOMOS technical evaluation mission visited the property from 9 to 18 September 2015.

## Additional information received by ICOMOS

A letter was sent by ICOMOS to the State Party on 22 September 2015 requesting additional information on the serial approach, integrity in terms of non-inclusion of agricultural settlements and whether there was an inventory of the associated structures. A response was received from the State Party on 5 November 2015 and the information has been incorporated below. Following a meeting with representatives of the State Party on 1 December 2015 and the submission of the ICOMOS' interim report on 15 December 2015 the State Party provided further additional information regarding the selection and justification of sites, boundaries and integrity on 26 February 2016, which has been incorporated below.

## Date of ICOMOS approval of this report

11 March 2016

## 2 The property

### Description of the Serial Nomination

The nominated property comprises eleven serial properties (eleven qanats). A qanat comprises an almost horizontal tunnel collecting water from an underground water source, usually an alluvial fan, into which a mother well is sunk to the appropriate level of the aquifer. This part of the tunnel which collects the water is the *taran*. Well shafts are sunk at regular intervals along the route of the tunnel to enable removal of spoil and allow ventilation. Once out of the aquifer but still underground the tunnel is known as the *koshkan*, or transporter. The water is conducted by gravity due to the gentle slope of the tunnel to the exit (*mazhar*), from where it is distributed by channels to the agricultural land of the shareholders. The levels, gradient and length of the qanat are calculated by traditional methods requiring the skills of experienced qanat workers (*moqanni*) handed down over centuries. Many qanats have sub branches and water access corridors for maintenance purposes, as well as dependant structures including rest houses and cloak rooms for the qanat workers, public and private hamams and reservoirs, and watermills along the qanat. The property area of each qanat includes the qanat infrastructure: the wells, tunnels, and dependant structures. The water catchment of each qanat is nominated as the buffer zone. The water distribution is managed according to specific cycles by the qanat council manager (*mirab*) in each case, traditionally using a water clock. The agricultural demand area irrigated by each qanat is recorded in the nomination dossier but does not form part of the property or buffer zone. The eleven qanats have been selected from more than 37,000 across Iran.

1. Qasabeh, Khorasan-e Razavi/Gonabad, dates from 3-4 centuries BCE and runs for over 13 km with 222 wells. Its mother well is 200m deep. The Doolab-e branch runs for over 29 km with 153 wells. Its mother well is 300m deep. Dependant structures include a rest house, temporary rest room, a cloak room, water reservoir, and there were 5 watermills, of which 3 were in use until

1966. There are 2000 shareholders. Property area 4492 ha, buffer zone 25805ha.

2. Baladeh, Khorasan-e Jonubi/Ferdows, dates from 1600 CE and runs for 19 km with 153 wells. There are 15 branches each with their own mother well. Dependant structures include a rest house, 6 reservoirs and it had 12 watermills, one of which is still in use. There are 7200 shareholders. Property area 2757 ha, buffer zone 19321 ha.

3. Zarch, Yazd, dates from 1200-1300 CE and runs for 80 km with 3 branches. The deepest mother well is 90m. It has both circular and square well shafts. Dependant structures include a watermill, rest house/cloak room, 8 water reservoirs and 8 watermills, one of which is still in use. Property area 3984 ha, buffer zone 125162 ha.

4. Hasan Abad-e Moshir, Yazd, dates from 1400 CE and irrigates the World Heritage listed garden Pahlavanpur and 5 other gardens. It runs for 40 km with 1330 wells and 5 sub branches. The mother well is 20 m deep. Dependant structures include a rest house/cloak room, 8 water reservoirs and 5 watermills. Property area 2759 ha, buffer zone 121662 ha.

5. Ebrahim Abad, Yazd, dates from 1000-1200 CE and is associated with ceremonies and rituals associated with cleaning the qanat tunnels. It runs for 11 km with 311 wells on the main branch. There are two sub branches. Dependant structures include rest house/cloak room, a public hamam, public reservoir and charity buildings, mosques and houses. The mother well is 53 m deep. Property area 1238 ha, buffer zone 23655 ha.

6. Vazvan, Esfahan, dates from c 1200 CE and runs for 1800 m with 64 wells. It has an access corridor to an underground dyke which can be blocked for the winter. The mother well is 18 m deep and there are 750 shareholders. Dependant structures include a reservoir, watermill and rest house/cloak room. Property area 5 ha, buffer zone 29631 ha.

7. Mozd Abad, Esfahan/Meyme, dates from 600 CE and runs for 18 km with 615 wells. There are 3 branches and mother wells, the deepest of which is 80 m, and 3 underground dykes with access corridors. The well shafts are both rectangular and round, and as the largest and oldest qanat in the region it is associated with Zoroastrianism. There are 750 shareholders. Dependant structures included six watermills, one of which survives, a reservoir and a rest house/cloak room. Property area 3636 ha, buffer zone 29631 ha.

8. Moon, Esfahan/Ardestan, dates possibly from 578 CE and is a two level qanat due to the impermeable type of clay soil. It runs for 3 km with 30 wells. The upper level mother well is 27 m deep; the lower one is 3 m below that. Dependant structures include 2 watermills, 1 reservoir and 1 rest house/cloak room. Property area 5 ha, buffer zone 3047 ha.

9. Gowharriz, Kerman/Jupar, dates from c 600 CE and runs for 3560 m with 6 branches and mother wells and 129 well shafts. The distribution system of 6 canals shows the expansion of the city. The last well is named after the 12<sup>th</sup> Imam where the exit discharges into a reservoir in the courtyard of the mosque and there is a hamam for curative purposes associated with local belief in the spiritual importance of the qanat. Property area 151 ha, buffer zone 2980 ha.

10. Ghasem Abad, Kerman/Bam, is located within the Bam World Heritage property. It is around 100 years old and as a relatively new qanat like Akbar Abad demonstrates the survival and continuation of traditional knowledge of the qanat system. Neither was affected by the 2003 earthquake. It runs for 9840 m with 25 wells. The mother well is 60 m deep. There is a 10 m drop at the Bam fault, where the water collection tunnel in the aquifer (*taran*) becomes the water transport tunnel (*koshkan*). Property area 15 ha, buffer zone (shared with Akbar Abad) 80 ha.

11. Akbar Abad, Kerman/Bam, is located about 20 m from Ghasem Abad, running more-or-less parallel with it and joining at the exit. It is a relatively new qanat aged only 100 years and runs for 4811 m with 33 wells. The mother well is 59 m deep. It drops 10 m at the fault where the *taran* becomes the *koshkan*. Distribution from both qanats is via large reservoirs at the base of the fault to 120 shareholders for both. Property area 15 ha, buffer zone (shared with Ghasem Abad) 80 ha.

### History and development

The origins of the qanat system are not clear, with some arguing that it was developed by copper miners in Urartu in the early first millennium BCE to drain water from the rising water table in their mines and later adapted to supply water for agriculture, while others suggest that it developed as a practical means to extend water supply from a natural spring. The latter process apparently took place with the spring of Fin at the ancient settlement of Siyalk, Kashan in central Iran, dating from c 3000 BCE, and according to the nomination dossier is a process that has occurred very recently in Khorasan-e Jonubi following a drought in the 1990s. Evidence of qanat development in response to a documented dry period 4100 – 2100 years ago has been found in other areas of the Middle East and is borne out by an apparent qanat system description in an inscription of the Assyrian King Sargon II, 714 BCE. The nomination dossier discusses the traces of the qanat through Iranian history from the Elamites and Assyrians (1400-550 BCE), through the Achaemenian Empire (550-330 BCE), Seleucidian Era (312-250 BC), Parthian (250 BC-150 CE), Sassanid (226-650 CE) and in the Islamic period from 621 CE. It seems clear that however it began, the system has spread widely through Iran and the qanats were built, maintained, destroyed, repaired and new ones built with the system being discovered and rediscovered through each succeeding civilisation.

By the time of the Pahlavi dynasty from 1921 however, the nomination dossier records that most Iranian scholars had a low opinion of traditional technology and belittled it with the aim of paving the way for new technologies. A report in 1942 found that 40,000 qanats were operating with a total recharge of 600,000 litres per second or 18.2 billion cu m per year. However, pumped well technology was introduced in the early 1950s and led to the qanat system being phased out. By 1961, the number of qanats had reduced to 30,000, of which 20,000 were in use, discharging an estimated 12 billion cu m per year. Realisation of the impact of pumped wells on the overall groundwater resources led eventually to the water nationalisation law in 1968 and the law of fair water distribution in 1981. From this period, following the Islamic revolution, the rehabilitation of qanats was taken up and funds granted to stakeholders to maintain their qanats. In 2000 an international conference was held on the qanat in Yazd and in 2005 the Iranian government and UNESCO signed an agreement to set up the International Centre for Qanats and Historic Hydraulic Structures. An annual budget of 15 million USD was allocated by the Iranian government from 2005-9 for construction and maintenance of qanats. At the same time overall water management was brought under control by the government. According to the nomination dossier the total discharge of qanats is now almost steady.

The history of each nominated qanat is set out in the nomination dossier and the dates given in the description above derive from that. The rectangular shafts are attributed to the Sassanid period; these are found in the Zarch Qanat, Yazd and Mozd Abad Qanat, Esfahan/Meyme. Links to Zoroastrianism are discussed for the latter and it is noted that the builder of the Akbar Abad Qanat, Bam, 100 years ago was the steward of Zoroastrians at the time. A number of historical documents covered by the nomination dossier testify to the long traditions of qanat building and repair, water sharing and control.

### 3 Justification for inscription, integrity and authenticity

#### Comparative analysis

The nomination dossier records that some 50 thousand qanats are reported to exist in more than 40 countries, including Iran, where there are over 37,000. Of these the eleven nominated qanats were selected as “*somehow expressive of various aspects of technology as well as geographical, cultural, social and economic innovations during different historical episodes*”. The comparative analysis discusses the qanats in the various regions of Iran. They are generally located on the Iranian plateau, where the groundwater is fed by rainfall in the Alborz and Zagros mountains, and where until recently settlement depended on irrigation-dependant agriculture. Yazd, Kerman and Gonabad on the western, southern and eastern boundaries of the central desert are the arid agricultural areas best known for their dependence on

extensive qanat systems. Of the selected qanats, Qasabeh (No.1) in Gonabad has the deepest mother well; Baladeh (No. 2) has a complex traditional management system related to its complex technology; Zarch (No.3) in Yazd is the longest recorded; Hasan Abad-e Moshir (No. 4) in Yazd irrigates the Pahlavanpur Persian Garden (World Heritage List 2011 (i), (ii), (iii), (iv), (vi)) but is not included in that property; Ebrahim Abad (No. 5) has ceremonies and rituals associated with cleaning it; Vazvan (No. 6) in Esfahan has an underground dyke to regulate water when it is not needed; Mozd Abad (No. 7) in Esfahan has 3 underground dykes; Moon (No. 8) in Esfahan has a double gallery; Gowharriz (No. 9) has a 6 canal distribution system; and Ghasem Abad (No. 10) & Akbar Abad (No. 11) in Bam are associated with the Bam fault and are partly included in the Bam World Heritage listed (2004 (ii), (iii), (iv), (v)) property area, and partly in its buffer zone. Thus the eleven nominated qanats, as stated in the additional information provided by the State Party, together represent the technological, historical, social, cultural, geographical, climatic and economic aspects of similar Persian qanats.

Outside Iran, the comparative analysis covers qanats in Afghanistan, Azerbaijan, Iraq, Oman, Pakistan, China, Algeria, Morocco, Spain and Italy. Of these, five qanats in Oman are included on the World Heritage List as ‘*Aflaj* (qanat) Irrigation systems of Oman’ (2006, (v)) and are directly comparable in terms of age, technology and catchment areas. Qanats are included in the World Heritage listed ‘*Palestine: Land of Olives and Vines – cultural Landscape of Southern Jerusalem, Battir*’ (2014 (iv), (v)); the World Heritage listed (2011 (ii), (iv), (v)) ‘*Cultural Landscape of the Serra de Tramuntana*’, Spain and the World Heritage listed (2011 (iii) (iv) (v)) ‘*Cultural Sites of Al Ain* (Hafit, Hili, Bidaa, Bint Saud and Oases Areas)’, UAE. One might therefore consider that qanat systems could be said to be well represented on the World Heritage List. They are also included in the Tentative List of Morocco (Oasis de Figuig) and Algeria (*Les oasis à foggaras et les ksour du Grand Erg Occidental*) where they are called *foggaras*.

However the State Party argues that there are eight issues distinguishing Persian qanats from these others: the large number and quantity of water discharge; their “extraordinary” nature; they are engineering masterpieces using traditional expertise; associated cultural values including costumes, rituals and art; their role in (agricultural) production; the concern and support they receive from Iran’s government; the elaborate traditional water management system, and the contribution of the qanats to sustainable development.

However, in ICOMOS’ view, the comparative analysis could not demonstrate how these factors may indicate a specificity of the Persian qanat in relation to others in the wider region. Additionally, the selected components shape a series that is not fully coherent in terms of spectrum of values (see below the Justification for inscription section).

In the additional information provided by the State Party, it is stated that in not including the area irrigated by each qanat, so therefore not including the distribution part of the qanat system reflecting community management of the system, the nominated property is similar to the World Heritage inscribed Omani property. However ICOMOS noted that this is not correct. In fact as part of the nomination evaluation process the individual property component areas of 'Aflaj (qanat) Irrigation systems of Oman' were extended to include the wider landscape created by the aflaj irrigation system to include the demand areas in settlements and thus reflect social and community involvement. The revised plans are included on the World Heritage Centre's web site.

ICOMOS notes also that the properties of 'Palestine: Land of Olives and Vines – cultural Landscape of Southern Jerusalem, Battir', 'Cultural Landscape of the Serra de Tramuntana', Spain and 'Cultural Sites of Al Ain (Hafit, Hili, Bidaa, Bint Saud and Oases Areas)', UAE do include the areas dependent on the irrigation system.

ICOMOS noted that according to the State Party the significance of the nominated serial property derives from the above mentioned factors, however the additional information did not succeed to clearly show how these or other distinguishing features are peculiar to the Persian Qanat and not to other ones in the wider region. An expanded comparative analysis has only be outlined but not fully developed to support the arguments presented to justify inscription or the selection of the components.

Additionally, the selection of the components does not appear adequately elaborated and justified at this stage. In this regard, ICOMOS notes that paragraph 137 of the *Operational Guidelines*, serial nominations are required to demonstrate that each component contributes to the Outstanding Universal Value of the property as a whole in a substantial and specific manner. The additional information provided in this regard in response to the additional information first and then to the interim report has not clarified sufficiently the positioning of the selected group in the wider region and the motivations for the selection of each component, in relation to the proposed Justification for inscription and the criteria (see the relevant sections). In fact, in some cases, this outline suggests that further substantial work is necessary to select convincingly the components of the series (e.g., the role of qanat-related infrastructure in defining the urban structure and design in Yazd).

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ICOMOS considers that the comparative analysis does not justify consideration of this serial property for the World Heritage List at this stage.

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#### **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 large number and quantity of water discharge of Iran's qanats and their continued operation make them an outstanding means of traditional water management and sustainable development;
- They are engineering masterpieces using traditional expertise;
- They embody long-established, traditional communal water management and distribution practices, embedded in communal culture and accompanied by rituals;
- They enabled development of the vast central arid plateau of Iran for agriculture and settlement.

ICOMOS considers that the justification for inscription does not appear specific to the Persian Qanat but could be applied to other similar properties in the wider region. Additionally, not all components appear to be able to justify the whole spectrum of values as presented in the proposed Justification for inscription.

According to the State Party the justification of the serial approach is that each of the selected qanats exhibits a distinguishing feature as described above in the comparative analysis and together they combine to provide an overall picture of the qualities and features that make up The Persian Qanat. ICOMOS considers that, despite the additional information, the contribution made by each component and justification for the selection of components remains not adequately justified at this stage. The additional information provided in the State Party's response to ICOMOS' Interim Report has not addressed this satisfactorily.

#### **Integrity and authenticity**

##### **Integrity**

In response to ICOMOS' query as to how each site contributes significantly to the overall postulated outstanding universal value of the property, the State Party's main argument appears to be geographical – that the chosen qanats represent the contribution the qanats make to sustainable development in all the various arid regions of Iran. In addition they each have some distinguishing technical, historical or social aspects. Regarding the non-inclusion of the Deh Luran qanat, dated to c 3000 BCE, the State Party responded that the main factor in the selection process was that the qanats be alive and functioning.

The nominated property included neither the water catchment areas nor the irrigated areas dependent on the nominated qanats. The nominated property covered only the qanat tunnels and features immediately related to them.

In its response to ICOMOS' Interim Report, the State Party explained that the water catchment area specific to each qanat is included in the buffer zone and not in the nominated property because the catchment can in fact feed more than one qanat. On the other hand, some farmland which receives water from the qanat has been

included in the nominated area although it is not considered part of the qanat body.

ICOMOS considers that the additional information as of February 2016 does not clarify whether the farmland is comprised in the nominated property or not; additionally only two maps are presented and compared to the Aflaj system in Oman while the maps of the other qanats were not submitted.

Additionally, ICOMOS considers that any modification to the boundaries in this context would require an evaluation mission. Finally ICOMOS notes that the buffer zone does not surround the whole of the nominated components and it is not clarified why there is no need for a complete buffer zone to surround them.

ICOMOS recalls paragraph 89 of the *Operational Guidelines* which states that “*significant proportion of the elements necessary to convey the totality of the value conveyed by the property should be included*” and that “*Relationships and dynamic functions present in cultural landscapes, historic towns or other living properties essential to their distinctive character should also be maintained*”, therefore the definition of the boundaries should reflect this requirement.

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ICOMOS considers that the integrity of the individual sites and the whole series has not been demonstrated at this stage as not all the necessary elements to convey the Outstanding Universal Value of the property are included within the boundaries of the nominated components.

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#### Authenticity

The nominated qanats have been in use and repaired over many years and have consequently changed in form, location and materials. Nevertheless it is presumed that the fundamental route from mother well to exit has not been significantly changed. The setting has changed for several qanats due to the development of towns and urban areas where formerly there was little or none, such as around Zarch qanat and the mother wells of Vazvan, Moon, Ghasem Abad and Akbar Abad. What is authentic is the traditional qanat system itself, and its communal maintenance and management.

However, ICOMOS notes that the entire spectrum of values proposed to justify inscription is not credibly reflected by the nominated series as not all relevant attributes are included within, particularly those demonstrating the distribution practice and the development of agriculture and human settlement that was enabled by the qanat system.

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ICOMOS considers that the authenticity of the whole series has been justified in terms of the qanat system and its maintenance and management as a technological infrastructure; and that the authenticity of the individual sites that comprise the series has been demonstrated to the extent of the qanat system and its

communal maintenance and management, however the entire spectrum of the values included in the proposed justification is not credibly reflected by the elements included in the nomination.

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ICOMOS considers that the conditions of integrity and authenticity of the whole series are not justified at this stage.

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#### Criteria under which inscription is proposed

The property is nominated on the basis of cultural criteria (i), (ii), (iii), (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 constantly evolving creative design and building of qanats in the very heart of the arid lands in Iran is a unique representation of human genius, where science, architecture and technology are manifested in association and combination with nature which is hidden underground. The construction and upkeep of qanat systems is a continuous process based on human creativity and innovation over time.

ICOMOS considers that the comparative analysis does not support justification of the qanat system as a masterpiece.

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ICOMOS considers that this criterion has not been justified for the whole series.

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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 Persian Qanat is an outstanding example of a traditional water management system associated with irrigation and water supply that has been developed in ancient Persia spreading east as far as China along the Silk Roads, to the west and north Africa, and later to America by Arabs and the Spaniards. The traditional construction and maintenance technologies have continued evolving based on the interchange of values and knowledge for thousands of years.

ICOMOS considers that while the qanat technology is found in many lands it has not been shown how its development in Iran exhibits an important interchange of human values.

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ICOMOS considers that this criterion has not been justified for the whole series.

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

This criterion is justified by the State Party on the grounds that qanat systems bear an exceptional and fundamental testimony to cultural traditions and civilisations in desert areas and arid climate regions. Being based on a continuous process of maintenance and upkeep, systems of qanats form a historical stratigraphy of past achievements and historical solutions. The vital role of qanat in the formation of various civilisations is so expansive that the basis of civilisation in the desert plateau of Iran has been called "Qanat (or Kariz) Civilisation". Dispersion of primary settlements on alluvial fans of the inner plateau, desert margins and *kavirs* (deserts) of Iran has an intimate relation with the distribution pattern of qanat system.

ICOMOS considers that the qanat systems could be considered exceptional testimony to the tradition of providing water to arid regions for the purpose of forming and supporting civilisation. However, relevant attributes to credibly support this criterion and to demonstrate that the nominated series is evidence of the "Qanat Civilisation" do not appear included within the nominated property. In particular, attributes in the water catchment areas and in the downstream demand area should be included within the nominated area, as the qanat structure is insufficient to demonstrate this criterion.

The additional information provided by the State Party does not clarify if and what changes have been made to the originally proposed boundaries as only two maps, used to make comparison with the Aflaj system in Oman and not to illustrate modifications carried out to the proposed boundaries, have been provided.

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ICOMOS considers that this criterion could be justified for the whole series if the property areas include both the water catchment areas specific to each qanat and the agricultural development areas.

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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 Persian Qanat is an outstanding example of a technological ensemble illustrating significant stages in the history of human occupation of arid and semi-arid regions in the world. It is the cornerstone of prosperity in desert towns and villages. In arid and semi-arid regions, it has resulted in the creation of a desert style architecture and landscape involving not only the qanats themselves, but also associated structures, such as water reservoirs, water mills, irrigation systems, outstanding desert gardens, as well as urban and rural desert architecture.

ICOMOS considers that the qanat infrastructure could be an outstanding example of traditional technology which has been developed and refined over a long period of time, if additional documentation illustrated in what ways the typology of Persian Qanat differs from other types of traditional irrigation and management system. However the comparative analysis and the additional information provided by the State Party in this regard does not yet support this.

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ICOMOS considers that this criterion has not been demonstrated at this stage but could be through a deepened and expanded comparative analysis.

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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 Persian Qanat system is an outstanding example of human interaction with the environment, providing an environmentally and culturally sustainable land use in arid or semi-arid regions of the world. Qanat drains the aquifer by force of gravity, so its discharge always stays in balance with the recharge of the aquifer. Qanat systems have however become vulnerable under the impact of increasing urbanisation and transformation of technologies in rural areas.

ICOMOS considered that the qanats, their water catchment areas and the distribution system could form an outstanding example of human interaction with the environment, however this to be demonstrated would require including within the nominated area for each component of series the water catchment area and the irrigated area or at least parts of them.

In response to ICOMOS' Interim Report, the State Party has stated that, while the water catchment area is included in the buffer zone, the farmland and water demand area would be "*included in the nominated area but not considered part of the qanat body*". This does not address fully ICOMOS's concerns expressed in the interim report. Additionally, any change to the boundaries of the nominated components, would require to be assessed on site.

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ICOMOS considers that this criterion has not been demonstrated at this stage for the whole series but could be if the boundaries of the nominated components would be expanded to include the water catchment area and the water demand areas or at least sufficient parts of them to illustrate the related values.

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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 selected qanats are outstanding examples of living qanat traditions in Iran and are directly associated with local myths and epics which are deeply rooted and have shaped indigenous beliefs. The traditional system of water distribution and management on the Iranian plateau has merged with social relationships and culture of communities and are reflected in many of their beliefs.

ICOMOS observes that this criterion is used when exceptional associative values are powerfully conveyed by mainly intangible attributes of nominated properties and, in this case, ICOMOS does not consider that this criterion has been justified.

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ICOMOS considers that this criterion has not been justified.

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ICOMOS considers that the serial approach has not been justified at this stage.

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In conclusion, ICOMOS considers that none of the criteria have been demonstrated at this stage, although some could be but further work is needed on their justification, on the definition of the boundaries of the components and their buffer zones and on the comparative analysis.

#### **4 Factors affecting the property**

Qanats have been adversely impacted in the past by agricultural development dependent on water supplied by the construction of deep wells which reduce the water level of the aquifer. This is now controlled by laws banning the drilling of new wells. Where qanats pass through urban development they are protected by regulations which are respected by the communities due to their understanding of the importance of the water to their livelihood, and the shareholders' religious beliefs and traditions. The geographical location of qanats, usually distant from human habitats means they are not threatened by development, and traditional protection rules apply to the water catchments. Drifting sands are a constant threat to the blockage of well shafts of qanats and this is mitigated by covering the well mouths by slabs. All the nominated qanats have had their well shafts capped. Flooding of the plains during the winter can cause flooding of the qanat galleries and damage shafts and tunnels, resulting in sediment deposition and blockage of the passages. This is mitigated by the construction of stone and sand dykes to divert flood water and decrease its speed. Other measures include constructing a bypass tunnel, blocking well shafts or constructing cut-off walls around well shafts. The impact of drought and climate change has been countered by changes in cultivation and crop types and changes in water division methods, as well as increasing water distribution cycles so that in fact overall there has been a rising trend in water discharge from the qanat system. The threat of earthquake is always

present in Iran. Traditional methods of lining and reinforcing the galleries and shafts are used to preserve qanats against minor earthquake damage. Tourism in general does not impact on the qanat system but there is some pressure on visitors' facilities during the Iranian New Year. This is considered in the Management Strategy and Action Plan. There are no inhabitants within the nominated property or buffer zones.

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ICOMOS considers that the main threats to the property are natural disasters.

### **5 Protection, conservation and management**

#### **Boundaries of the nominated property and buffer zone**

The property boundaries shown on maps for each of the eleven nominated qanats include the physical structure of the qanats; well shafts, galleries, soil mounds dumped around the well shafts and all the dependant structures such as hamams and reservoirs. Where the qanat course passes through urban fabric and residential areas the property boundary runs 15 m on either side of the qanat axis but this does not apply within the agricultural demand areas.

The boundaries of the buffer zone are drawn around the watershed supplying the aquifer feeding the qanats, and also take into account environmental, natural and landscape values. Where the qanat course passes through urban fabric and residential areas, the buffer zone covers the area 50 m either side of the qanat axis except in the agricultural demand areas. The boundaries are not marked on the ground at all components.

ICOMOS noted that the lands using the qanat water (agricultural demand zone) and the water distribution system within them were not part of the property or buffer zone. These lands are described in the nomination dossier as exhibiting traces and signs of human interaction with the environment via qanat technology. They are protected by regulations forbidding functional change in the irrigated lands; activities which harm the tangible and intangible cultural heritage relating to the qanat including its water distribution system, and the landscape; dividing and extending lands without permission from ICHHTO; amassing garbage pollutants, livestock droppings and other waste and alterations to existing construction without the permission of ICHHTO.

In its response to ICOMOS' Interim Report the State Party explained that the water catchment area is included in the buffer zone, which does not surround all the nominated components, while the farmland would be included in the nominated area but not in the qanat perimeter. In ICOMOS view this does not respond to ICOMOS concerns and it does not clarify what is included within the boundaries of the nominated components and what not, particularly because not all maps have been included in

the supplementary information. Additionally any modification to the boundaries of the nominated property or to the buffer zone should be assessed by a mission on site.

Finally, ICOMOS notes that the boundaries are not marked on the ground at all components and that the buffer zones do not surround the whole of each property component, for which no explanation is provided.

With regard to the above, ICOMOS recalls paragraphs 99 and 100 of the *Operational Guidelines* which state that “boundaries should be drawn to incorporate all the attributes that convey the Outstanding Universal Value and to ensure the integrity and/or authenticity of the property” and “boundaries should be drawn to include all those areas and attributes which are a direct tangible expression of the Outstanding Universal Value of the property, as well as those areas which in the light of future research possibilities offer potential to contribute to and enhance such understanding” and notes that these requirements have not been met at this stage.

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In conclusion, ICOMOS considers that the boundaries of the nominated components of the serial property and of the buffer zones are not adequate at this stage.

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#### **Ownership**

Qanats are owned separately from the land by the owners of the qanat infrastructure and shareholders of the water supply from it. The eleven nominated qanats are owned either by a private collective or by an endowment (*waqf*), or are in joint ownership of private collective and *waqf*. According to the table in the nomination dossier Ebrahim Abad, Hassan Abad-e Moshir, Mozd Abad, Vazvan, Gowharriz, Ghasem Abad and Akbar Abad are owned 100% by private collectives, while the other 4 are jointly owned. Qasabeh, Baladeh, Zarch and Moon are owned by the *Waqf* to the extent of 38%, 60%, 16% and 20% respectively.

#### **Protection**

The nominated qanats are legally protected under the Law for the Protection of National Heritage (1930) by being included on the National Register as well as by national laws and regulations protecting underground water resources and qanats. The national laws and regulations protecting water resources also protect the water catchment areas nominated as the buffer zones of the nominated properties. Both qanats and their catchment areas have always been and still are protected by the traditional communal management system run by the shareholders of the qanat.

ICOMOS considers these measures to be effective.

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In conclusion, ICOMOS considers that the legal protection in place is adequate. ICOMOS considers that the protective measures for the property are adequate.

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#### **Conservation**

The eleven nominated qanats are all mapped and recorded in detail. Research and documentation records are held by the International Centre for Qanats and Historic Hydraulic Structures under the auspices of UNESCO in Yazd. Some data is held by the branch offices of ICHHTO in the local communities.

ICOMOS considers that the ICHHTO branch office responsible for each nominated qanat should hold the relevant data and this should be accessible to community members.

A detailed record of the conservation work undertaken to each of the eleven nominated qanats is included in the nomination dossier. The various traditional methods of conservation are described also.

ICOMOS considers that the nominated qanats are adequately maintained by the local communities with the support of relevant government authorities.

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ICOMOS considers that conservation measures are effective.

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#### **Management**

Management structures and processes, including traditional management processes

The overall management of the serial property is guided by a Steering Committee comprised of representatives of the Qanat Council and relevant government departments including the Cultural Heritage Handicrafts and Tourism Organisation (ICHHTO) responsible for legal protection, heritage conservation, promotion and presentation; Natural Resources, Agriculture, Energy, Road and Urban Development, Environment Protection Organisation, Rural Housing Foundation and NGOs relating to cultural heritage and the environment. The ICHHTO National Qanat Base has direct responsibility for management of the qanats through ICHHTO's provincial offices. The day-to-day management is carried out by the qanat traditional councils in the regions, the members of which are selected every 3-4 years by election among the shareholders. The traditional management group headed by the qanat council manager (*mirab*) comprises the water clock operator (*kayyal*), the accountant (*hesabdar*), together with other qanat workers generally termed *moqannis*, and other specialist works such as the bucket operator and the windlass operator.

ICOMOS notes that each group has 4-6 technical experts.

Funding for rehabilitation and maintenance is provided through the budget of the Ministry of Agriculture (about 70%) and by the shareholders (about 30%) in co-operation with the qanat councils. Research and planning for the conservation of underground water resources is carried out by the Ministry of Energy in co-operation with the qanat councils.



Elementary and advanced training courses are organised by the International Centre for Qanats and Historic Hydraulic Structures set up under the auspices of UNESCO. Training in qanat technology is provided at the Qanat College of Taft in Yazd, which was set up in 2005 to enable the passing on of the knowledge of older practitioners to the younger generation.

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

Policy and development plans in general consider qanats in terms of natural resources rather than urban development, since they are mostly located outside city limits. National and provincial development plans must consider the protection of qanats according to Article 106 of the law of the third plan for cultural, social and economic development. Qanats are also considered pursuant to Article 17 of the law of the fourth plan for cultural, social and economic development which requires master plans to consider the pivotal role of water in the country's development.

An outline Management Strategy and Action Plan for the nominated serial property are provided in the nomination dossier in accordance with the MoU signed by the relevant authorities. These include interpretation and tourism management and a Tourism Plan for Qasabeh Qanat is included as Appendix VIII. Risk preparedness does not appear to be covered.

ICOMOS notes that there is little interpretation to explain the qanat to visitors in relation to how the maintenance and management of the qanat and distribution of its water is undertaken by local people; the role of the *mihrab* and traditional rituals associated with the qanats. Key features that distinguish particular qanats such as the double gallery of Moon, and the underground dykes of Vazvan and Mozd Abad and other features that differentiate each of the nominated qanats need to be identified and explained in the interpretation and presentation of the qanats. The Qasabeh tourist plan needs to be developed more comprehensively for each nominated property to cover visitor facilities, uniform signage and visitor information.

Involvement of the local communities

Local communities are involved as shareholders and members of the qanat councils. Participation by the local communities in the maintenance and management of the qanats is voluntary and active.

ICOMOS notes that the communities expect more funds to be made available for maintenance of the qanats should they be inscribed on the World Heritage List.

ICOMOS considers that the current management is effective.

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ICOMOS considers that the management system for the overall serial property is adequate; the management strategy and plans should be extended to include a risk preparedness strategy and a comprehensive tourism strategy for all property components. Furthermore, ICOMOS recommends that boundaries of property components and buffer zones be permanently marked on the ground and data related to each qanat should be collected in the regional offices of ICHHTO and made accessible to members of the local communities.

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## 6 Monitoring

The condition of the qanats is monitored by the traditional qanat workers (*moqannis*) in cooperation with the three government departments primarily responsible for the qanats: Agriculture, Energy and ICHHTO. A table is provided in the nomination dossier setting out the key indicators, periodicity and methods/tools. Another table sets out the administrative arrangements.

ICOMOS considers that it would be useful to extend the indicator table to include the responsible authority in each case.

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ICOMOS considers that the monitoring system should be extended to identify the responsible authority for each key indicator.

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## 7 Conclusions

The nomination of a this serial property of 11 components aiming to illustrate the concept of the Persian Qanat as an example of a civilisation based on the careful management of a scarce resource represents a major undertaking and a complex task and the State Party should therefore be congratulated for having initiated this enterprise.

However, as the nomination dossier demonstrates, the cultural phenomenon of water harvesting and distribution in arid or semi-arid regions and related-infrastructure construction and management system establishment is a complex one which relies on many factors and gives rise to a variety of related structures, devices, territorial layouts, settlement organisations and land use practices that need to be taken into account when depicting the full spectrum of values related to the 'qanat culture'.

The State Party has approached this phenomenon in its broad significance and impact, as demonstrated by the fact that all cultural criteria have been considered. Although appreciable and understandable, this approach has three limits, in ICOMOS' view: the first concerns the insufficient specification of the justification for inscription which is based on arguments which do not appear peculiar only to the Persian Qanat; the second concerns the comparative analysis, which, despite the additional information provided by the State Party in two different

phases, does not adequately address and resolve how the Persian qanat, represented by the serial nomination, would stand out in respect to other similar qanat systems in the wider region; thirdly, this comprehensive approach has not been consequently dealt with when delineating the boundaries of the nominated areas and selecting the relevant attributes, thus undermining the integrity and the authenticity of the nominated series.

These limits were illustrated during the meeting with the State Party's representatives in December 2015, following the ICOMOS World Heritage Panel meeting and in the interim report which was sent to the State Party in January this year.

In its response to ICOMOS' Interim Report, the State Party has provided additional information on the specific nature of the Persian qanats in comparison to qanats in the wider region and regarding the supposed uniqueness of Persian qanats as a typology in the context of other traditional above ground and underground irrigation systems, for the selection of sites as well as for the delineation of the boundaries. However ICOMOS considers that the additional information is not yet adequate and sufficiently developed to address all the limits and weaknesses of this nomination, although the theme of the Persian qanat exhibits strong potential to justify consideration for the World Heritage List, although further substantial work is needed.

With regard to management aspects, ICOMOS considers that the management strategy and plans need to be extended to include a risk preparedness and a comprehensive tourism strategies for all property components. The boundaries of property components and buffer zones need to be permanently marked on the ground and data related to each qanat should be collected in the regional offices of ICHHTO and made accessible to members of the local communities. The monitoring system should be extended to identify the responsible authority for each key indicator.

ICOMOS acknowledges that the State Party has responded energetically to the issues raised during the evaluation period. This is particularly demonstrated in the additional information provided in February 2016. However ICOMOS considers that the time available to the State Party and to ICOMOS during the formal evaluation process is not sufficient to reformulate a nomination on this scale and that it is impossible to appropriately consider and evaluate the proposed changes without the opportunity of a mission. ICOMOS therefore concluded that a recommendation to defer the nomination is necessary in order to resolve these matters.

## 8 Recommendations

### Recommendations with respect to inscription

Whilst acknowledging that the State Party has responded vigorously to the issues raised during the evaluation period, ICOMOS considers that it is impossible to appropriately consider and evaluate these changes without the opportunity of a mission, and the time available to the State Party and to ICOMOS during the formal evaluation process is not sufficient to reformulate a nomination on this scale.

ICOMOS recommends that the examination of the nomination of The Persian Qanat, Islamic Republic of Iran, to the World Heritage List be **deferred** in order to allow the State Party, with the advice of ICOMOS and the World Heritage Centre, if requested, to:

- Further augment the comparative analysis in order to justify the specific nature of the Persian qanats in comparison to qanats in the wider region;
- Further strengthen the justification for the uniqueness of Persian qanats as a typology in the context of other traditional above ground and underground irrigation systems;
- Once a selection of serial components has been identified, ensure the full integrity of the property through the inclusion all elements of the qanat systems including catchment and irrigated areas.

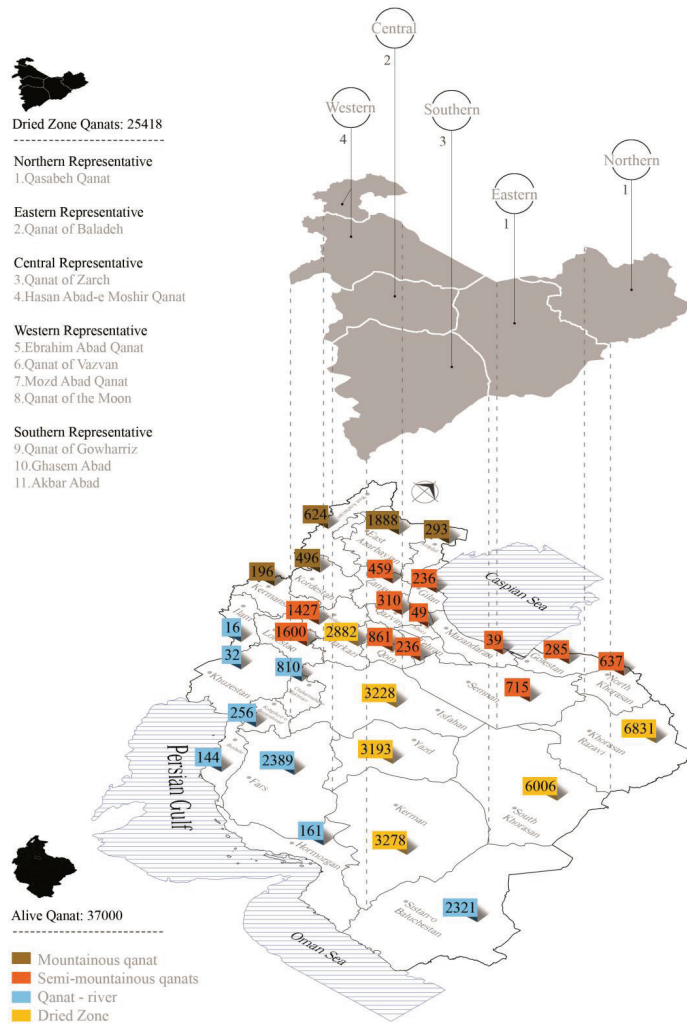
Any revised nomination should be visited by a mission on site.

ICOMOS remains at the disposal of the State Party in the framework of upstream processes to advise on the above recommendations, if requested to do so.

### Additional recommendations

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

- Collecting data related to each qanat in the regional offices of ICHHTO and making it accessible to members of the local communities;
- Extending the management strategy and plans to include a risk preparedness strategy and a comprehensive tourism strategy for all property components;
- Extending the monitoring system to identify the responsible authority for each key indicator;
- Permanently marking the boundaries of property components and buffer zones on the ground.





Qanat of Bam



Qanat of Baladeh



Qanat of Gowhar-riz, Aerial View, Jupar



Hassan Ābād-e Moshir Qanat water reservoir



Qanat of Vazvān



Mozd Ābād Qanat