

# **Site STUDY OF roman POOLS' SITE**

**Partnership project for the rehabilitation of  
cities for economic development**



**Preparation team the Local Development Unit and  
the Geology researchers**

# Introduction

Jerash is a Jordanian city, the capital and largest city in the governorate. Inhabited by approximately 37.8 thousand people. the population of the Greater Municipality of Jerash is 69.1 thousand people out of 179 thousand people living in the governorate.

Jerash away from the capital Amman, about 48 km to the north. it is located in the northern part of the Hashemite Kingdom of Jordan. And rising from the sea about 600 meters. Can be accessed from Amman via the southern entrance or the east, and west of Ajloun and Irbid in the north, and from souf which in the north-west. Jerash, located in a green valley water runs in it. The archaeological features are still visitors destination and the focus of attention travelers, tourists, and students of knowledge from all over the world. Passed over the city several ages, since the age of Greece, roman then the era of the Islamic conquests, then entered oblivion book until it was rediscovered in the nineteenth century, where regiments of Bastitanha Circassians, Arabs and other nationalities as well as Armenians began to settlement in the region.

Jerash indicate the existence of human life in the archaeological area dating back more than 6500 years old. Establishment of the city date back to the reign of Alexander the Great area in the fourth century BC, or what is known as the Greek era, and was then called (Graca) distoration of Commissioner or the Canaanite name (Jursc), which means "place of

dense trees". The city's golden age came under Roman reign, and the site is now generally acknowledged to be one of the best conservative ROMANIAN cities in the world. The city remained buried in sand for centuries before being excavated and restored over since seventy years ago, Jerash reveals a wonderful example of civil when the Romans in the Middle East, which consists of paved streets and colonnaded, and high temples on hilltops, elegant theaters, feilds and plazas, Baths, fountains and city walls lead to towers and gates. In addition to the external Graeco - Roman nature, Jerash also preserves a nature blend of east and west at the same time. Its architecture, religion and languages that reflect a process of integration and coexistence of powerful cultures, namely the Roman – Greek world in the Mediterranean region and the ancient traditions of the Arab Orient.

## **PART ONE**

### **Antiquity: -**

Jerash was a place "of the early human settlement during the following periods: -

- Neolithic period: - (7500 - 4500 BC)., And the period of the Stone Age, Chalcolithic (4500 - 3200 BC)., And the period of the Bronze Age I (3200 - 2200 BC). Where it appears that Jerash has been abandoned in the

subsequent period since the eighth century and until the fourth century BC.

- Hellenistic period (333-63 BC). The archaeological features didn't remain visibly, only some remnants of fees found in the Southern hardened.

- Roman period (63 BC. M - 332 m)

Jerash Entered Decapolis - ten cities and enjoyed autonomy that has led to a boom in agricultural, commercial and technical life, and established business relationships with the Arabs Nabataeans during the first century BC, many monuments and features architectural has built as theaters, temples, horse racing field and ponds.

- Byzantine period (332-636 AD)

Where there was architecture activity in the sixth century of the Byzantine period that building of many churches in Jerash due to its importance and strategic location.

- Islamic period (636 AD .....)

The results of the excavations, appear that there are some architectural remnants of the Umayyad period. In the eighth century AD (the Abbasid period) Jerash economic conditions deteriorated due to distance from the center of the caliphate in Baghdad.

In (747) AD Jerash was exposure a violent earthquakes destroyed many of the architectural landmarks, it was abandoned in the ninth century AD. In the twelfth century the city witnessed intermittent periods of settlement and between (1118 - 1131 AD) seized by the Crusaders and destroyed the temple of Artemis that taken by the Muslim to protect them.

After that Jerash housing by different communities and settlements continued there until the present day.

## **Contemporary History**

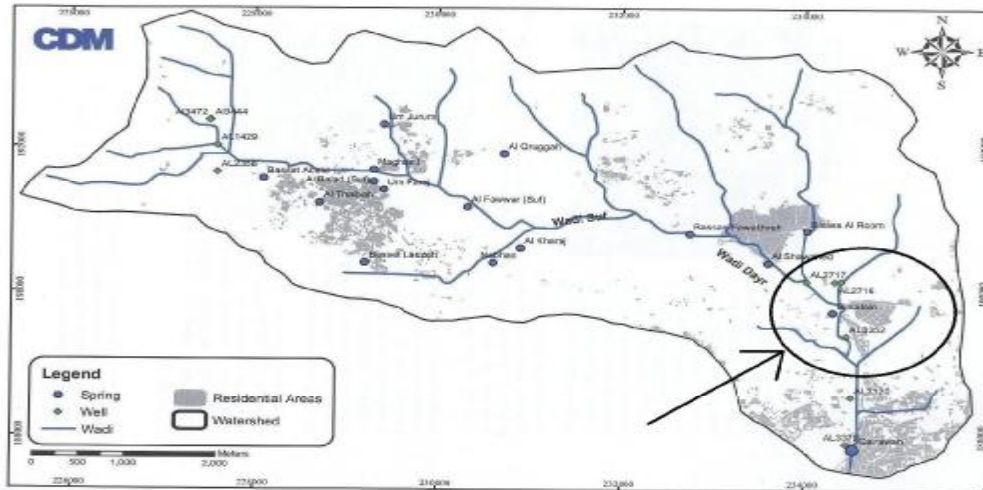
In the twentieth century, specifically the period of the fifties, Jerash population and urban grew in rates exceeded those in previous periods because of the stability of some Palestinian refugees there and continued influx of residents of areas adjacent to it and the importance of tourism increase because there are some ROMANIAN important archaeological features and to its location on the main arteries transportation in Jordan representative of Amman – Irbid highway. In this period, the expansion of urban sprawl in all directions except the west side because of the archaeological area where construction is prohibited. And urban development and population growth increased in the city in the sixties and seventies period, which helped to increase the importance of the city and the multiplicity of functions and services and thus increase the population and the spread of urbanization, which form a large number of sprawling neighborhoods in the east north and south.

### **- The roman pools site: -**

The site of the pools on an area of 12.323 acres backed by all the public services of water, electricity, roads, sanitation, and the site just in 1200 to the north of the north gate of the ancient city of Jerash and is accessed through a clear path from the north gate.



The region is a fertile valley stretches gently and simple folding through the highlands and the northern hills around the place, informing from sub valleys coming from: Souf Valley, Wadi Al-dier Algharbi valley and Al-shawahed, continues over the valley to be linked to Jerash Valley and the Gold River, passing through the region of Qairouan, which contains the spring of Qairouan, and ultimately linked to King Talal dam valley. Two springs flowing from inside the pools in heavy winters with notice that the water flows towards the ancient city.



The surrounding highlands are full of the forest that temper the air, and reduce the temperature felt by the man within the walls of the city, The Sun is working on the heating pond water and make it suitable for tourism.

This site elevation is (628 m) and the lowest point is (616 m) on Jerash-souf camp road, that be from the eastern side, it is surrounded by pine trees, cypresses and olive groves, lemon, and it is now used as a park by the local community.

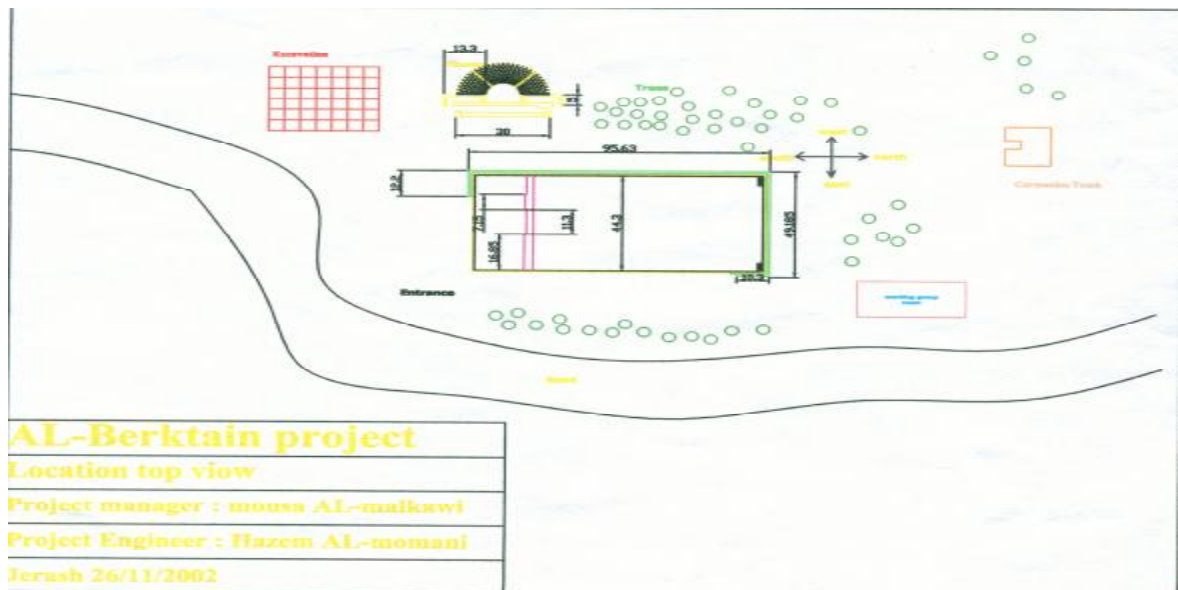
There are two wells in the valley owned to the authority of Water and Irrigation and another one is Al-shawahed, establishment of such wells resulted to decrease the level of water in the aquifer, leading to drought pools at the present time -noted that the water in these wells used for drinking- .

## The archeological features in the site :-

The pools site contains the following features :-

### 1 –The celebrations theater: -

Located at a distance (30 m) to the west of the southern end of the pool, overlooking to the northern wall, and it is a part of the surrounding buildings, which is independent of the architecture side, and the level rises from it about eight meters (8m).



Studies indicate that the history of the theater may be due to the end of the second century or the beginning of the third century AD, were found in the theater Roman coins, covering the period from the third to the sixth century.



### **\*\*\* targets for pools establishment:**

1 - According to inscriptions dating to the sixth century AD that this pool was used for celebrations of water festival which has been known in the name (Mayomas). The Christian elements consider that celebrations are scandalous and look at it into anger because the shower which was mixed for both sexes, with the knowledge that this festival, Continued in the era of the Christian religion at the height of its power.

2 - This large stony pool consider as the most important sources that supply the western part of the city of Jerash with water, and specially the north theater and the west bathrooms and the main source of the water of its spring the Qairouan which located in the north of the city, which is one of the most important springs in terms of strength and abundance of water.

3 - Perhaps the Romans keen to provide or feeding their facilities of water, was the main reason for the establishment of pools and without prevents using it to swim and water games, and a number of terraces in the ribs-west and north of the pools indicates clearly that it was the custom to sit down and follow up offers of water, and don't Forget that the Romans were always careful the practice of various sporting activities outside the city walls, as is the case in Jerash, where the existence of the pool and racing track.

### **Targets for the theater establishment:**

There are no indications clearly refer to the goals of pools theater establishment at this site and outside the walls of the ancient city.

McQueen and Browning Indicates that the theater has been created to follow the celebrations offers water, but the previous excavations in the site did not reach to the existence of any relationship between the theater and the pool, However, the theater overlooking only at north wall, and the person who sits on any row of rows included the theater can not see clearly the pool site, or what is the activities on the surface of the water, even sat in the upper part of the theater.

Perhaps the theater used for religious purposes, as is the case in Romanian theaters that were practiced the rituals, religious prayers, sermons and lessons before going down to the pool to celebrate, and perhaps these rituals were practiced once a year and to this end, the theater was small in terms of size and space.

Relatively small size of the theater and free of decorations and architectural ornaments that is in other theaters of Jerash and the simplicity and cleanliness of the architectural and structural evidence that is use for certain class of people and at specific times of the year.

This away the possibility that it was dedicated to music (small Odeon), taking into account that sit on the grandstand seats are not comfortable, therefore, the ceremony was for a short time in the theater, especially the theater direction is not suitable for wind and sun, and is not on the stage, and build any architectural addition in later periods.

### **Architectural description of theater pools:**

this theater had Been building on a semi-circular on the western slopes overlooking the pool, and the stones were used in the reconstruction of sections different of the theater are harsh limestone available in the region, it is quite clear "that the area and the size of this

theater much less of the area and the size of the north and south theaters in Jerash archaeological city.



## **2 -The pools:**

### **Architectural description of the pool: -**

It is a rectangular pool, except the southern end of the eastern section, where its slightly tilted towards the east, that for possibility of control, and increase the flow of water towards the stone channels that relating to the pool of the south wall.

Its dimensions is (45.88 × 89.55 m) and at a distance (17.96 m) of the southeast corner there is the barrier with width (2.17 m), from the east, and at the end of the west side becomes (2 m), and the length of the wall (45.88 m) at a distance ( 4.76 m) to the west, we find splitter in the wall with width (80 cm), and that for water passage between the pools, after this splitter at distance (9.5 m), a gate to control the water flow away

about (50 cm) for the party north wall.

Take the southern wall of the pool, a stone corridor with width (2.25 meters), has two openings in the ground containing two gates to reservation or payment of water towards the southern part of the stone channels.

And at a distance (85.3 m) from the southeast corner, at a distance (60 cm) starts a theater includes three-stairs wrapping around the pool and the western and northern wall completely and a short distance towards the east wall.

There are in the Western, Northern and Eastern corners of the pool stairs to reach ground pool, its eight stairs they was using for the purposes of cleaning and repair of any malfunction in the gates or channels in the walls.

the area in front of the north wall contains the remains of stone walls and may refer to the existence of side rooms were used to break or to change clothes and perhaps shower.

The building materials used were of local limestone hardened, and some with jagged edges and other soft and irregular in shape.





### **3 – The Bathroom:**

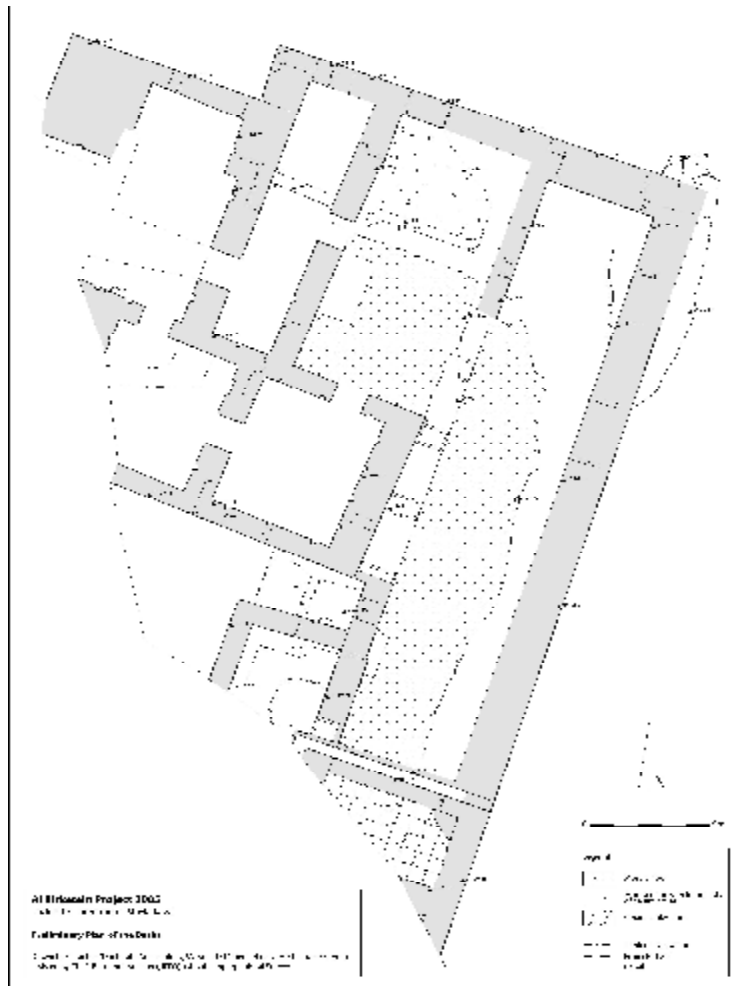
#### **Description of the bathroom: -**

Roman Bath which discovered until now (excavation 2005) it was covering a large part of the site, and the most important features that have emerged in this bathroom the walls that composed of large and medium-sized limestone the walls contained places to put the clay pipes which supplied the bathroom with water.

The stones type are debranching, but they were corrosive that for crumbling the stones surface, in addition to corrosive the rock by wind and rain (ie, erosion factors).

That corrosive stones also came as a result of melting of linking material because of the great change in temperature during the day and night so that the outer layers of the exposed surfaces working to reduce the energy in the daytime and at night leaking this energy to the inside, leading to the disintegration of linking material between this stones, the changes in the

rates of moisture lead to damage these stones and the disintegration of linking material.



## **The exploration results in the site :-**

One of the main results of exploration at the site:

1 - Detection of Roman bathroom walls and its entrances, consists of three rooms in a row, namely: -



A – cold bathroom ( frigidrium)

B – warm bathroom ( Tepedarium )

C – hot bathroom (Caldarium )



2 - detection Umayyad ground composed of medium-sized stones and trimmed.



3 - find the fraction of colored pottery, which dates back to the Umayyad period .

4 - detected Ayoubi Mamluks wall .

5 - find the stone spindle.

6 - find a bowl of pottery belonging to the Ayyubid Mamluk period.

7 - to find the tile floor and smooth texture can be used at a later stage.

8 - Detection of stone pavements, consisting of small stones and medium-sized enterprises.

9 - make sure that there is no a relationship between the theater and Roman baths.

10 - disclosure of drainage outside the building to the east, and by detection of these channels show that has been used cracks natural rock as channels for water drainage, and shows that the channels that have been covered through the remainder of the stones had been



built on Aspects of the channel, and channels extending toward the north-south.

11 - disclosure of the northwest corner of the bathroom, which is an architectural element is rectangular in shape, all sides with solid-like tower in the design and the incident on the corner of the building and thought to represent a reservoir for water collection, and there is no indication of whether the nature and function of this element.

12 - drilling in the room No. 4 and found to represent the main room in the building of the bathroom (room hot) and dimensions of 5.9 m × 5.45 m was detected columns are built from disks brick circular which was held on the floor of the brick box shape, and on the sides have been built terraces are boxes Of brick small size, these terraces are isolated from each other has left, including spaces narrow and uneven, and during exploration and was found showing that the columns were covered by the (underlying) floor tiles, pottery of dimensions 56 cm × 56 cm and a thickness range from 5 cm approximately was found on one of the Broken tiles, but completed three broken when compiling.



13 - drilling in the room 5 and remove the layer mosaic that do not bear any fees or decorations and this layer was in poor condition, has been working in a subsequent period to build a bathroom and level higher than the other rooms, has been detected on a channel for water drainage on the eastern side of the room, The room is square and through the exploration had been found on a stone trimmed were the result of the collapse of the roof and walls have been used as a basis for the mosaic floor in later period , the work was not completed in this room did not know the nature and function of this room.

14 - work in the room 3 and detect small columns were built from disks brick circular built on the base (slab) of brick square on the floor paved with pottery like the hot room 4, in addition to the presence of terraces, but the least number of terraces hot room 4, has been used columns To raise the floor paved with bricks, and found a small door surmounted by a semi-circular and the door a little rise believed to be used to provide hot room water, fuel, and related to the room with some entrances and each room has two entrances to enter

and exit a course incomplete, and evidence suggests that the threshold lower entrances on level ground Carried by the columns in the room.

15 - drilling in the room 1 and the detection of the Ceramic floor tiles , some devastating underlying columns and column bases and did not keep falling, unless one in some places and other areas lost their columns.

16 - disclosure of a cemetery in the South East outside the bathroom walls, one regular construction at the east-west and another wall is a regular at the North-South parallel to the cut rock, and covered the graves with large and thick Stone tiles 150 cm × 65 cm × 25-30 cm, the graves have covered with four tiles Of approximately the same size and these tiles chipped it remains only one still in place, was found in these graves broken pottery and bones, through a building wall adjacent to the graves and through the broken pottery show that these graves belonged to the Romanian period.

(Source of Information Directorate of the effects of Jerash)

# **PART TWO**

## **The results of geological studies of the site:**

### **Climate :**

In winters almost cold wet temperatures could reach it to 10 ° C, summers are hot and dry where temperatures range between 20-35 ° C by month of the year.

### **Historical Geology: -**

Sedimentation in the region was part of the middle Mesozoic era life and early Cenozoic era it was controlled by a balance between progress and decline tethys ocean and the formation of the Arabian-Nubian shield.

### **Rocks and geological structures: -**

Jerash area – in general - contains the best unfolding of sedimentary rocks including limestone, marl, sandstone, chalk and chert , mainly of the Cretaceous era.

Naur limestone formation ( within Ajloun group ) (NL) Unfolding in the region and its located above the kurnub sandstone group (k).

- **kurnub sandstone group :-**

Several marine levels composed of dolomite, limestone, marl, glauconite and others successive with sandstone originally forms kurnub group. we may consider this group as a good stockist of water.

This group was deposited in a fluvial environment which sequences – many times – with shallow marine environment .

- **Ajloun Group (specially naur limestone formation )**

Different thickness layers ( no more than 30 m) of limestone or sandydolomite with marl, and may contain chert nodules . What distinguishes sandydolomite that its rich in iron, which could support the hypothesis of the existence of mineral water if the aquifer in this region.

At this sedimentation period , the sea level increased over kurnub sandstone group , which led to deposition of these layers .

**- geological structures:**

Jerash area is located near the Jordan Valley which controlled by the Dead Sea transform fault.

Is structurally , the region governs by a major approximately east- west fault system (EW) this is the main fault, and to a lesser important North East - North North-East tending faults (NNE - NE).

- **East – West faults system :**

The majority of these faults have sub-vertical planes and with few meters to few 10's of meters down throw , a number of these faults are strike-slip mainly with sinistral movement .

- **North northeast to northeast faults system :**

The majority of these faults are thought to be normal , and only a few of them have any significant down throw .

Both of these faults are far from the location and the intersect point also in afar area . whatever , all of them are approximately stable .

## **Seismic history for the area :**

Earthquake Known the area for thousands of years , the reason of earthquakes returns to Dead Sea transfer fault that relatively near to the area – geologically -. from the facts associated with seismic history

that earthquakes that occur in the region is mostly not strong \_ less than 4.5 on the Richter scale).

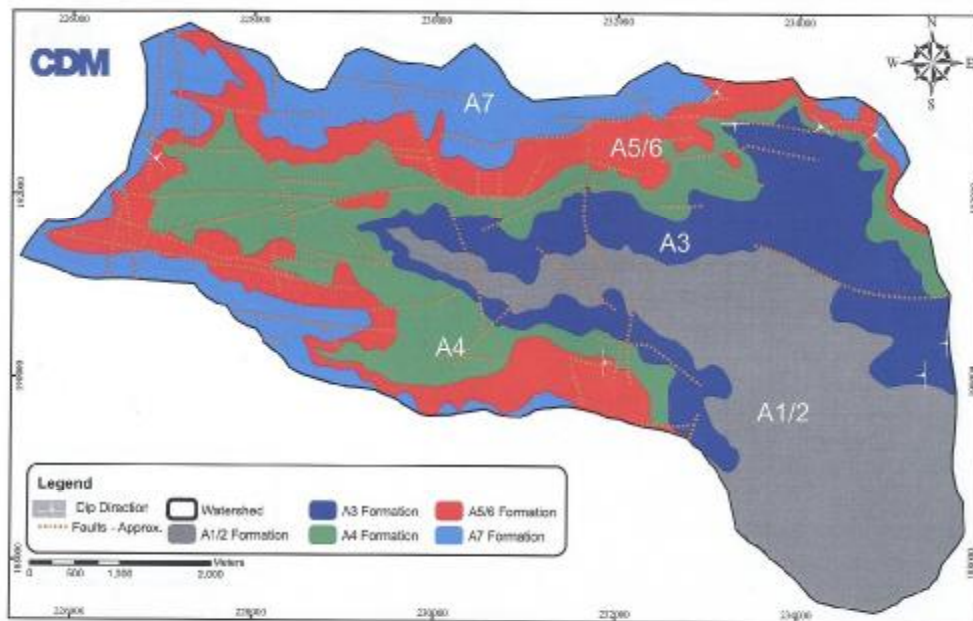
The according to some scientists that the strong earthquakes ( greater than 5.5 on the Richter scale) may occur once every 200-400 years.

The earthquake of Ramadan (130 for Migration - 747 AD) of the strongest earthquakes that occurred in the region where the epicenter in the Jordan Valley , has left a Destructive effect in both Jerusalem and Tiberias and Lydda, Jerash, Jericho , this earthquake led to the destruction of the city architecture and abandoned the city after that.

### **The Aquifer: -**

Since the region stratified from nau'r limestone formation ( A 1,2) , Status of the aquifer may be low due to lack of thickness of limestone and dolomite that marl comes the reservoir water layer in the bottom of kurnub sandstone group.

If the aquifer was in kurnub sandstone group (K) , if the water recharge was good – but usually the aquifer is recharged with only small quantities of water - and therefore water be metal (such as deposition of Fe).



As for the spring in the pools , the last analysis was in 2003, as indicated by the increase in salinity (EC = 778), the rate of NO<sub>3</sub> was within the average (NO<sub>3</sub> = 51.07). This analysis depending on the specifications of Jordan for drinking water .

To find out more information about the aquifer, for example, we take a well near the site to reach the nearest conception of the aquifer :

### 1- Shawahed east 3A :

(station ID AL 3493 )

Coordinates of the well by quadrature Palestinian system

( x= 234222.143 , y = 140178.895 )



The aquifer is located within nau'r limestone formation (NL) productivity up to (80 m<sup>3</sup> / hr), As for the rock layers above the aquifer are, respectively:

- 1- top soil depth of 15 m .
- 2- chalk depth of 30 m .
- 3- marly limestone depth of 40 m .
- 4- limestone marly depth of 80 m .
- 5- sandstone with limestone marly depth of 135 m .
- 6- sandy limestone and limestone with marly limestone depth of 160 m .
- 7- shale depth of 175 m .

Generally production of wells and springs less over the years due mainly to global warming on the one hand, and the proportion of rainfall decreased and increased temperatures, on the other hand drilled wells in the Neighboring areas of the site which led to decline in groundwater level and decreased its quantity.

### **Environmental notes : -**

- 1 - There is a distance 800m from the site of the red meat slaughterhouse, but does not pose any problem that may affect the site.
- 2 - It is worth mentioning that the stream of the discharge of wastewater is located within the stream of the valley but does not affect environmentally on the region.

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