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Water crisis between scarcity and availability in eastern of Libya
(Case study: Ain Al-Daboussiya /Al-Qubbha)

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Abstract:
Water is the basis for the economic, social and urban growth and development of societies. Therefore, this paper specialized to study the most important water sources in Al-Qubbha town in eastern Libya, which represented in (Ain Al- Daboussiya) wellspring and groundwater never the less the town suffering from water shortage problems. Thus, a survey was conducted, in purpose of collecting water consumption data for the available sources; taking into account, previously the only source for this area was Ain-Daboussiya; whereas, groundwater becomes the main one. The results showed that Ain Al-Daboussiya currently covers only10% of the residential area. In addition, 52.2% are directly supplied by groundwater, whereas they never have an access to Ain Al-Daboussiya; because of the complete absence of the infrastructure. Based on these results, some laboratory tests were conducted to a number of samples of groundwater wells to confirm that increasing reliance on underground water with the absence of sewage networks is reason for biological pollution with sewage wells leaking. Consequently, laboratory results showed that most old wells have an indicator of biology pollutions.

Keywords: Consumption rate, wellspring of Ain Al Daboussiya, groundwater, infrastructures problems.

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أزمة المياه ما بين الندرة والوفرة في الشرق الليبي

(دراسة حالة: عين الدبوسية بمدينة القبة)

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الملخص:

المياه هي الأساس للنمو والتطور الاقتصادي والاجتماعي والحضري للمجتمعات، لذلك خصصت هذه الورقة لدراسة أهم مصادر المياه في مدينة القبة شرق ليبيا والتي تمثلت في نبع (عين الدبوسية) والمياه الجوفية، ومع ذلك تعاني من مشاكل نقص المياه، لذلك تم إجراء مسح بهدف جمع بيانات استهلاك المياه للمصادر المتاحة، مع الأخذ في الاعتبار أن المصدر الوحيد سابقًا لهذه المنطقة هو عين الدبوسية، بينما أصبحت المياه الجوفية هي المصدر الرئيسي، وأظهرت النتائج أن عين الدبوسية تغطي حاليًا 10٪ فقط من المنطقة السكنية، بالإضافة إلى ذلك، يتم تزويد 52.2٪ منها بالمياه الجوفية بشكل مباشر، بينما لا يمكنهم الوصول إلى عين الدبوسية أبدًا؛ بسبب الغياب التام للبنية التحتية، وبناءً على هذه النتائج، تم إجراء بعض الفحوصات المعملية لعدد من عينات آبار المياه الجوفية للتأكد من أن الاعتماد المتزايد على المياه الجوفية مع عدم وجود شبكات الصرف الصحي مما سبب تلوث البيولوجي نتيجة تسرب مياه الصرف الصحي. وبالتالي، أظهرت النتائج المخبرية أن أغلب الآبار القديمة تحتوي على مؤشرات التلوث البيولوجي.

الكلمات المفتاحية: معدل استهلاك، عين الدبوسية، ابار جوفية، مشاكل البنية التحتية.

1. Introduction:

Most Libyan cities are witnessing a huge cultural development accompanied by an increase in water consumption rates, which led to an increase in the water crisis in the country, where Libya is

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considered among the dry and semi-dry countries. This led to the water resources are being out of control in most of the cities of Libya. Consequently, to meet the required needs of water a number of alternatives water resources are taking such as desalination in coastal area (Bashir Brika, 2019).

From these cities the town of Al Qubbha, which is located in the east of Libya, about 40 km east of the city of Al Bayda. There are a number of wellsprings in this area, however, the most important, great, sustainable source of water is Ain Al-Daboussiyawith a productivity of 720 m^3/h according to the report of the General Water Authority 2006. Which is located east of the city, where previously covered all the residential areas of the town as well as some neighboring cities in the last decade (Manal Alkalosh et al., 2005), however, there has been a significant increase in drilling underground wells to extract water to supply most of the town'smodern residential districts. Since this town is located in a prohibited area of groundwater mining (General water authority report, 2006). Therefore, this study supposed that there is no need for increasing drilling underground water since the productivity of Ain Al Daboussiya can cover the entire town requirements of a suitable human uses water. In the meantime, the daily consumption for each person in Libyan towns is 150 l/day (Ali Okasha, 2002). The second hypothesis of this study is the increase of drilling wells among the residential areas could affect negatively on water quality with the complete absences of infrastructures.

This study aims to shed light on the most important challenges facing the residents of the city of Al Qubbha to provide their buildings with water suitable for domestic use from available sources represented in Ain Al Daboussiya, which is one of the most important wellsprings of the eastern region extending from Benghazi in the west to the Derna in the east. It related back to the wellsprings of the Eocene era, which is located mostly East of the Daboussiya area east of the city of Al Qubbha, in addition to Ain Astwa, Ain Mara, Ain Krasna, in al-Baling (Public Authority for Water, 2006).

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2. Main sources of water in the study area:

–Ain Al-Daboussiya wellspring:

This wellspring is located north of the town of Qubbha at a distance of about 10 km. Ain Al Daboussiya is one of the most important water sources in eastern Libya with a production of 720 m3/s. Ain Al Daboussiyah station was established in 1965 with a 140 km supply line from Derna in the east to Al Marj city in the west. (Manal Al-kalosh et al, 2005). However, it has been limited in suppling till the city of Al Bayda. Since 2011, the station has been supplied only a part of Al Qubbha and its suburbs. Due to the increase in population density and the random urbanization without urban planning, Ain Al Daboussiya provides only the old residential areas of the town, which represent less than 37.7% of the town's inhabited areas.

–Underground wells:

According to the data recorded by the town's Water Company underground wells are the second main source in the town with 43 wells. In addition to a number of wells drilled in a random and illegal manner. The production of the wells is between 2 and 6 l/s and a total depth of 350 - 400 m (see the appendix). 21 of the wells are connected to the network of the city to cover the shortage resulting from technical problems in Ain Al Daboussiya, while the rest of wells are stored in ground tanks in the new neighborhoods to store water and then pumped to residential buildings at a rate of two days per week or a day after day maximumly.

It is recognized that drilled wells, springs, and coastal wells are more susceptible to the process of water pollution; wherever shallow wells are likely to be affected by surface pollutants (Esraa Harb, 2020).

3. Importance of research problem:

Groundwater is the best choice to supply citizens with clean suitable water, but must be located, built, and maintained properly, as an accurately maintained well must include a lid with a tightly sealed cap, and a cover of at least 12 inches above the ground, and free of holes and cracks. The land adjacent to the casing must also descend

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away from the well, and the area surrounding the well must be free of collected water, waste and any pollutants (Isra Harb, 2020).
While the wells of the study area when excavated did not take the necessary, design standards and conditions to maintain the source from pollution. Most of the wells in modern residential areas are constructed near sewage collection wells, because there is no infrastructure for these areas. Consequently, the groundwater in Al-Qubbha is vulnerable to contamination if Ain Al- Daboussiya is not used optimally. Groundwater is the only resource for the study area and any over withdrawing will lead to disastrous future outcomes. In addition, continuous increase in groundwater depletion and the lack of seasonal rainfall will lead to a decrease in groundwater levels compared to the sea level, which in turn will lead to increasing salinity due to the interference of seawater. As well, decreases in the groundwater level may cause soil collapsing; if its recharge is delayed. Moreover, the decrease in the groundwater level increases the costs of future extraction (Gary Battenberg, 2019).

However, the main objectives of this study are to:
1. Highlighting a future crisis: The deficit of supplying all residential neighborhoods with water suitable for human use in Al Qubbha town. Although of the availability of sustainable spring.
2. Find out the reasons for the inability of Ain Al-Daboussiya to supply all residential neighborhoods despite of its huge productivity.
3. Raising the society awareness of the negative effects of groundwater depletion; If the of drilling of groundwater is continuous to rise.
4. Determine the quality of water supplied to most buildings that come from underground wells with the complete absence of sanitation infrastructure.
Therefore, this study highlighted this problem, which might worsen with the development of civilization and the increase in the population density of the town. A questionnaire was distributed to all residential neighborhoods of the town for a referendum on the extent of water consumption from both sources as well as the most important problems of water supply.

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4. Previous studies:

A previous study by Araby Ahmed Naji (2022) entitled the current and projected environmental effects of over withdrawal of groundwater in the eastern section of Wadi Shati (Ashkda-Barqin). This study examined the current and projected future environmental impacts of overconsumption of groundwater in the eastern part of Wadi Shati and its impact. To estimate the extent of this excess, the data of the groundwater table monitoring wells in the region were studied and analyzed and the negative environmental changes; and as a result, it is subject to higher rates of decline in the groundwater table than other regions. Therefore, the study recommended thatit is essential to stop the random drilling of groundwater.

In a second study by Salah Hamad (2012) entitled the status of water sources in the Green Mountain in northeastern Libya, the aim of this study was to provide an overview of water resources in the Jabal al-Akhdar region in northeastern Libya, the results of this study showed that water resources in east of Libya are mismanaged in integrated comprehensive approach, in addition to technical challenges of networks of water. Consequentially, that led to several negative effects and water-related problems, such as water shortages and deterioration in water quality. Another study is the Monitoring of groundwater Quality in Tajoura-Libya for (Abdul Razzaq Abdul Aziz et al., 2008). However, this paper results demonstrated that most groundwater wells have an indication of some pollutants that arises from the direct discharge of wastewater.

A study was also conducted by Ibrahim al-Assawi, et al (2022), on six wells that were randomly identified in the area of Murabat in the city of Misrata during the time period from 10/01/2021 to 28/01/202 to identify the extent of the interference of seawater with groundwater in the region and the extent of water quality. Through the results of this study, it was noted the presence of high concentrations of some characteristics related to the interference of seawater with groundwater, such as: Total dissolved salts (ppm1303-2400), electrical conductivity (µs/cm 2170-4150) and chloride (1212-2834 ppm) and the results showed the presence of interference of sea water due to overdraft groundwater in the area.

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Based on the four previous studies, we found that the total dependence on groundwater as a source of water supply for cities will lead to negative effects, including intrusion of seawater as a result of the reduction of water levels in the groundwater wells than sea level and this causes the flow of seawater toward low-level wells. There are also other negative effects that we will address later in our study hypotheses.

During our study of water consumption in the town of Al-Qubbha it was assumed that the neglect of a sustainable water source with huge productivity represented in Ain Al-Daboussiya, and the total dependence on groundwater wells; will lead to damage to this source by sewage pollution with the total absence of the infrastructure of the town.

5. Materials and Methods:

5.1. Study Area:

In the city of Al Qubbha , located north-east of Libya in the area of the Green Mountain between latitude 32° 46′ 0″ N, and longitude 22° 15′ 0″ E (wikipedia, 2024), there is a shortage of water suppling in all the residential neighborhoods of the city.

5.2. Estimated water consumption in the city of Al Qubbha from available sources:

The different types of consumption can be divided into the following:

–**Domestic consumption**: It includes everything related to water consumption inside the house, such as cleaning, drinking, preparing food, etc.

–**Non-domestic consumption:** It includes all elements of non-domestic consumption such as commercial, industrial consumption and general consumption of schools, hospitals, hotels, mosques, offices, etc.

Due to the lack of a Libyan code and estimates of daily consumption, studies have been adopted for cities of the Egyptian Republic to determine the average daily consumption of different regions in terms of being cities, capitals, centers or countryside, and

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the average daily consumption represents household consumption, in addition to consumption for general purposes and small industries. Network losses range from 20-40 liters/person/day, which is included in the average daily consumption, and losses are discounted when other consumption rates are calculated.
Table 1 gives the average daily consumption as well as the quantity of losses through the network. (Ahmed Rifaat, 2014). Considering that, the population density of the town of Al Qubbha is 48000 capital (according to the town civil registration office) and taking into account the increase in population density in the future.
According to the difference in the rates of domestic consumption of water compared to the standard of living of the residents at the study area; the average daily household consumption estimated to be about 150 liters/ person/ day.

Table (1) average daily consumption by population density

Average total consumption Liter/person/day	Amount of loss Liter/person/day	Average daily consumption Liter/person/day	Status of use
200-220	20-40	180	Provincial capitals (cities)
165-180	15-30	150	Centers
135-150	10-25	125	The village has 50000 inhabitants
280-300	0 - 20	280	The new cities

Based on the above table average daily consumption for Al- Qubbha is 150 L/per/day; as the total population density for this region is 480000cap, and the annual consumption rate of Al Qubbha estimated using the following equation (Lubbnah bin Taher 2021).

Consumption per year =

(Daily consumption * population density * 30 *12)/ 1000

$= (150\times 48000\times 30\times 12) /1000$

$= 2{,}592{,}000\ m^3/year$

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Productivity of Ain Al-Daboussiya per year = 720 m^3/hr ×24×365= 6,307,200 m^3/year

From these calculations can be noticed that the productivity of Ain Al- Daboussiya in a year is three times of the annual demand of Al Qubbha. On one hand, this huge productivity only supplies a small part of the town and the rest of the production wastes to the sea. On the other hand, most of the residential areas totally use groundwater wells for their daily consumptions. Consciously, neglecting of this important source of water will lead to groundwater depletion and negative environmental effects.

5.3. Methodology

Based on the consumptions results of Al Qubbha town, a questionnaire was distributed to all residential neighborhoods in the town to confirm the validity of the hypothesis. In addition, some field visits were arranged to the General Water Company and to the control center of Ain Al Daboussiya station in order to obtain sufficient data to achieve the research hypothesis.

As well as some tests were conducted for groundwater wells, which supply most of the residential areas of the town to determine the suitability of water for human uses with the poor capability of the General Water Company. Additionally, this study assumed that underground wells in the area may be contaminated or vulnerable to sewage contamination due to the lack of sewage networks and treatment plants. Therefore, some bacteriological tests have been carried out and among these tests, the total number of bacteria to detect total coliforms, and e coli as it can be considered a strong indicator of the occurrence of sewage pollution. Ammonia is also an indicator of biological contamination.

However, the survey was distributed to three houses from each district in the town with a total of 68 house. The survey includes questions about the main source of supplying for the district as well as questions about the most important water supply problems in the city. Taking into account that the town has random network supply system, where founded only in the old neighborhoods and established since the eighties. This led to the assumption that water

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obtained from underground wells may be contaminated with wastewater as a result of leakage from the black water dumps of each house due to the lack of drainage systems for most modern neighborhoods in the town, and samples were taken from three groundwater wells in the town as follows:

Sample No. 1: 200 ml was taken from a residential area located between 32°45'33"N ;22°13'55"E, this area depends entirely on groundwater wells with a complete absence of infrastructure, as this area depends on drilling special wells for each house to collect its wastewater.

Sample No. 2: 200 ml was taken from a residential area located (32°45'18"N ;22°14'38"E), which suffered the same conditions as the previous area more than 18 years ago, but recently, about two years ago, the buildings of this area were connected to a sewage network.

Sample No. 3: 200 ml was taken from a rural area outside the city located 32°45'59"N " ; 22°15'06"E.
Chosen tests were conducted on the three samples to confirm the validity of the hypothesis of the study. These tests are the ammonia ratio test andtotal number of bacteria substances tests, which are a clear indication of the presence of black water mixing with groundwater wells (J. K. Bohlke et al., 2006).

5.4. Tests procedure and results:

A sample of the three wells selected for testing was sent to chemical testing laboratories for water. The test was carried out using the Spectrophotometer 2800 made by the German company Hach Company (Figure 1)

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Figure 1. Ammonia testing device and three samples

1 mm was loaded in the device's test tube and deposited in its place, the experiment was carried out using detectors designed to measure ammonia at the length of the waves 655 nm, and the test results showed that the three samples have a percentage of ammonia as shown in Table 2.

Table (2) percentage of ammonia in the three samples

The sample number	Ammonia level NH3-N(mg/l)
Well No. 1	0.05
Well, No. 2	0.04
Well, No. 3	0.01

The total number of bacteria was also tested as follows:
Biological analysis was conducted on the same water samples to estimate the total number of bacteria, by planting 1 ml of each sample in the Petri dish Compact Dry Ec. According to the method of pouring in the dishes where the sample is distributed regularly inside the dish and then close the dish with its own cover and placed inside the incubator, then incubated at 37°C for 48 hours. Which is that a simple and quick way to identify the coliform and e coli bacteria. After the required incubation period for the growth of the bacteria, the dishes were taking out for the three samples. The results

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shown pink and blue stains covering the plates of samples No. 1 and No. 2, while sample No. 3 does not have any stains. The number of bacteria for the three wells are shown in table (3). However, these results confirmed that, there is a clear indication of wastewater pollution in the old drilled wells, even if it is a simple proportion; but overtime may increase as long as the source of pollution still exist; as a results of infrastructures absence.

Table (3) the results of samples for the presence of Coliform and Ecole bacteria

Sample No.	Total number of bacteria	Proportion of contamination
Well No. 1	Existing	*
Well No. 2	Existing	**
Well no. 3	Non- existing	-

*- There are no bacteria, * Bacterial growth less than CFU50*
*** bacterial growth of CFU50- 100*

6. Result and discussion:

According to the results of the questionnaire, more than half of the town are supplied from groundwater as shown in figure 2. While Ain Al-Daboussiya covers only 37.7% of the town buildings, and 27.8% of these buildings are currently connected to the groundwater; because of the interruption of this source many times; that means about 90% of inhabitants of the town currently obtain water from underground wells. Additionally, the study outcomes show that 83% of total mostly have to buy water when the main source is out of work. In particular, the results also show that more than 80% of the residents confirm that the water crisis is increasing exponentially with the rise in population density and urbanization. The results have also shown that the problem of water shortage becomes more stressful in summer.; this confirms the mismanagement of the General Water Company for the available resources, since 73% of public confirmed that, although the water company of the town trying to cover any disruptions with the available capabilities.

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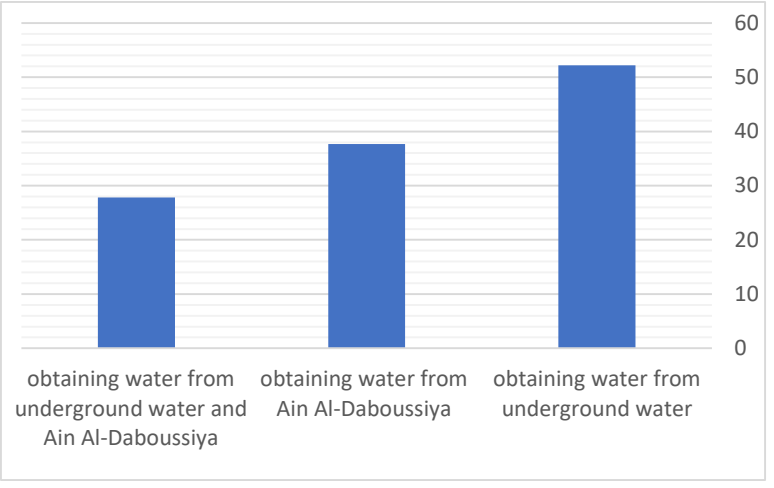

Figure 2. Supplying of water to Al Qubbha town from available resources

Nevertheless, overall results of the study confirmed that water from drilled wells in densely populated area have a proportion of ammonia; which is a clear indication of sewage pollution. From (table 2) it can be seen wells No. 1 and No. 2 located in non-infrastructure residential areas, have a higher proportion of ammonia than well No. 3 that located in the outskirts of the city and away from pollution sources. There is also a proportion of Coliform and Ecole bacteria in the same two wells as shown in (table 3), this is evidence of recent biological pollution (Amita Godbole et al., 2023).

However, the results of this study demonstrated that there is no reason for drilling underground water in an area considered one of the prohibited regions according to the report of the Public Authority for Water in 2006. The reason behind that is preventing environmental effects and its adversely impact on the soil and water of the city. In addition, the complete use of Ain Al Daboussiyais only the solution for this problem in the future; which gradually started to appear in some water supplying wells by detecting an indicator of sewage water mixing with underground water in wells No. 1, 2. Consequently, the complete reliance on Ain Al Daboussiya as a one

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supplying water is the perfect solution to avoid these environmental problems in the future; which are actually appeared with a small amount, but this proportion will increase, if this situation continues to be overlooked by the high authority.

7. Conclusion:

Securing the demand of water for citizens is a great challenge, especially in Libya, which suffer a lot from water shortage problems. On the other hand, according to the General Water Company the study, area did not reach the stage of severe water shortage; it is just a technical difficulties and poor management of available resources. Since, the existence of sustainable water source (Ain Al Daboussiya) with a production can cover all the requirements of the region; makes it logically to decrease the number of drilled wells and stop overdraft of groundwater.

To conclude, increasing the population of Al- Qubbha town in parallel with the absence of sanitation system, in addition to over drafting of groundwater will make the situation worse; if Ain Al Daboussiya do not used optimally.

Therefore, some recommendations are proposed in order to mitigate this crisis as follow:

1. Development of water supply systems for Ain Al Daboussiya to cover all the residential area, as well as solving all technical difficulties in a regular and quick ways.
2. Urgently, establishing of sewage networks for areas that supplied directly from groundwater.
3. Monitoring the level of water in groundwater wells, in order to avoid the overdraft of water, which lead to pollution problems such as seawater intrusion.
4. Establishing reference laboratories for the General Water Company; to periodically monitor the quality of groundwater wells that supply the most residential area of the town.
5. Apply regulations and legislations to prevent the raising and illegal drilling of groundwater wells.

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6. Increasing public awareness of the serious water crisis and the outcomes dangerous environmental effects; to preserve available resources.

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10. appendix

*الشركة العامة للمياه والصرف الصحي*نموذج جرد الابار/ إدارة التشغيل والصيانة بالجبل الاخضر

ت	اسم البئر	رقم البئر	الموقع	الحالة الفنية				مواصفات البئر						طريقة ربط البئر	عدد المشغلين
				يعمل	عاطل	معدوم	تجهيز	الانتاجية ل/ث	العمق الكلي م	قطر التغليف مم	عمق انزال المضخة	نوعية المياه	درجة الحرارة		
1	الشمالية المعدني	6-3-1-1	القبة	يعمل				6	350	12 3/4	325	عذبه		خزان	2
2	مقر الشركة	6-3-1-2	القبة	يعمل				5	350	12 3/4	335	عذبه		خزان	2
3	البراس	6-3-1-3	القبة	يعمل				3	350	12 3/4	335	عذبه		شبكة	2
4	وادي الحي	6-3-1-4	القبة	يعمل				8	350	12 3/4	330	عذبه		خزان	2
5	الشعلة	6-3-1-5	القبة	يعمل				3	350	12 3/4	335	عذبه		شبكة	-
6	أسكندر	6-3-1-6	القبة	يعمل				6	350	12 3/4	335	عذبه		خزان	1
7	المجد	6-3-1-7	القبة	يعمل				5	350	12 3/4	330	عذبه		خزان	3
8	بيت ثامر المعدني	6-3-1-8	القبة	يعمل				4	350	12 3/4	330	عذبه		خزان	1
9	المواصلات	6-3-1-9	القبة	يعمل				4	350	12 3/4	335	عذبه		خزان	2
10	الحواشين الخمسة	6-3-1-10	القبة	يعمل				5	350	12 3/4	330	عذبه		خزان	-
11	بووزنة	6-3-1-11	القبة	يعمل				3	350	12 3/4	306	عذبه		خزان	1
12	الجريولة	6-3-1-12	القبة	يعمل				3	350	12 3/4	335	عذبه		خزان	1
13	الخضروات	6-3-1-13	القبة	يعمل				3	350	12 3/4	335	عذبه		شبكة	1
14	العمارات	6-3-1-14	القبة	يعمل				4	350	12 3/4	330	عذبه		خزان	-
15	دغوش	6-3-1-15	القبة	يعمل				4	350	12 3/4	335	عذبه		خزان	1
16	راس تاجو	6-3-1-41	القبة	يعمل				3	350	300	320	عذبه		خزان	-
17	صفرون	6-3-1-42	القبة	يعمل				4	350	300	320	عذبه		خزان	-
18	الزعترة	6-3-1-43	القبة	يعمل				3	350	300	320	عذبه		خزان	1
19	شهداء القبة	6-3-1-44	القبة	يعمل				3	350	300	320	عذبه		خزان	2
20	بجوار المقر	6-3-1-45	القبة	يعمل				2	400	300	370	عذبه		خزان	1
21	بووزنه الجديد	6-3-1-46	القبة	يعمل				4	380	300	360	عذبه		شبكة	1
22	مسجد ابوبكر الصديق	6-3-1-47	القبة	يعمل				2	350	300	320	عذبه		شبكة	-

ت	اسم البئر	رقم البئر	الموقع	الحالة الفنية				مواصفات البئر						طريقة ربط البئر	عدد المشغلين
				يعمل	عاطل	معدوم	تجهيز	الانتاجية ل/ث	العمق الكلي م	قطر التغليف مم	عمق انزال المضخة	نوعية المياه	درجة الحرارة		
24	مسجد دغوش	6-3-1-49	القبة	يعمل				2	350	300	320	عذبه		شبكة	1
25	حي 17 فبراير	6-3-1-50	القبة	يعمل				4	350	300	320	عذبه		شبكة	1
26	سوق الثلاثاء	6-3-1-51	القبة	يعمل				5	350	300	320	عذبه		شبكة	-
27	المعهد العالي	6-3-1-52	القبة					3	350	300	320	عذبه		شبكة	-
28	حي ال400	6-3-1-53	القبة					2	350	300	320	عذبه		شبكة	-
29	ابشارة	6-3-1-54	القبة					5	350	300	320	عذبه		شبكة	-
30	الحشن الجديد	6-3-1-55	القبة	يعمل				5	350	300	320	عذبه		شبكة	-
31	شعبية الملك	6-3-1-56	القبة	يعمل				5	350	300	320	عذبه		شبكة	-
32	الزيتية	6-3-1-57	القبة	يعمل				5	350	300	320	عذبه		خزان	-
33	بجوار الروحة	6-3-1-58	القبة	يعمل				3	350	300	320	عذبه		شبكة	-
34	مسجد البقيع	6-3-1-60	القبة	يعمل				2	350	300	320	عذبه		شبكة	-
35	لملوده	6-3-1-61	القبة	يعمل				5	350	300	320	عذبه		خزان	-
36	مخطط الحي	6-3-1-62	القبة	يعمل				3	400	300	360	عذبه		شبكة	-
37	سيرة شنيب	6-3-1-63	القبة	يعمل				4	350	300	320	عذبه		خزان	-
38	عوينات فايد	6-3-1-64	القبة	يعمل				5	350	300	320	عذبه		خزان	-
39	المجد الجديد	6-3-1-67	القبة	يعمل				2	400	300	350	عذبه		شبكة	-
40	المواصلات الجديد	6-3-1-68	القبة	يعمل				3	400	300	350	عذبه		شبكة	-
41	حي ال300 الجديد	6-3-1-69	القبة	يعمل				3	350	300	320	عذبه		شبكة	-
42	مخطط الشاق	6-3-1-70	القبة	يعمل				5	350	300	320	عذبه		شبكة	-
43	الجرولة سوق الثلاثاء	6-3-1-72	القبة	يعمل				5	350	300	320	عذبه		شبكة	-