

Geographic Analysis of the Large Al-Amara Irrigation Project in Southern Iraq

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Abstract

The large AL-Amarah Irrigation Project is one of the important and old irrigation projects in Maysan Governorate, one of the governorates of southern Iraq. The project has been subject to several studies in the years (1945, 1980, 1992, 2012). It is mainly based on establishing a network of dams and systems that ensure appropriate distribution of the Tigris River water starting from The city of Amara (the center of Maysan Governorate) and up to the district of Al-Uzayr, the southernmost part of the governorate, and from the areas of Al-Musharrab, Al-Kabla and Qal'at Salih in the east to the areas of Al-Maymouna and Al-Salam in the west. This is certainly accompanied by the reclamation of agricultural lands located within the aforementioned areas, and many agricultural crops are grown in the project lands, such as grains, vegetables and orchards, in addition to Livestock raised by the residents of these areas, or based on many data, the Al-Amara irrigation project can provide the water requirements of the crops grown throughout the growing season, taking into account the development of appropriate solutions to some of the problems facing the completion of all stages of its completion.

Keywords: *Al-Amarah, A city located in southern Iraq that represents the center of Maysan Governorate. It contains the Al-Amarah Dam, which distributes the waters of the Tigris River between the Al-Batira, Al-Kabla, and Al-Musharrab streams. Drains: These are networks for draining surplus water in agricultural areas into large drains that end in the marsh areas of southern Iraq or in the low-lying areas of the region. Irrigation facilities: These are engineering facilities that serve the irrigation project directly or indirectly, and the regulators and the building dam are at the forefront of securing the water shares of agricultural lands.*

INTRODUCTION

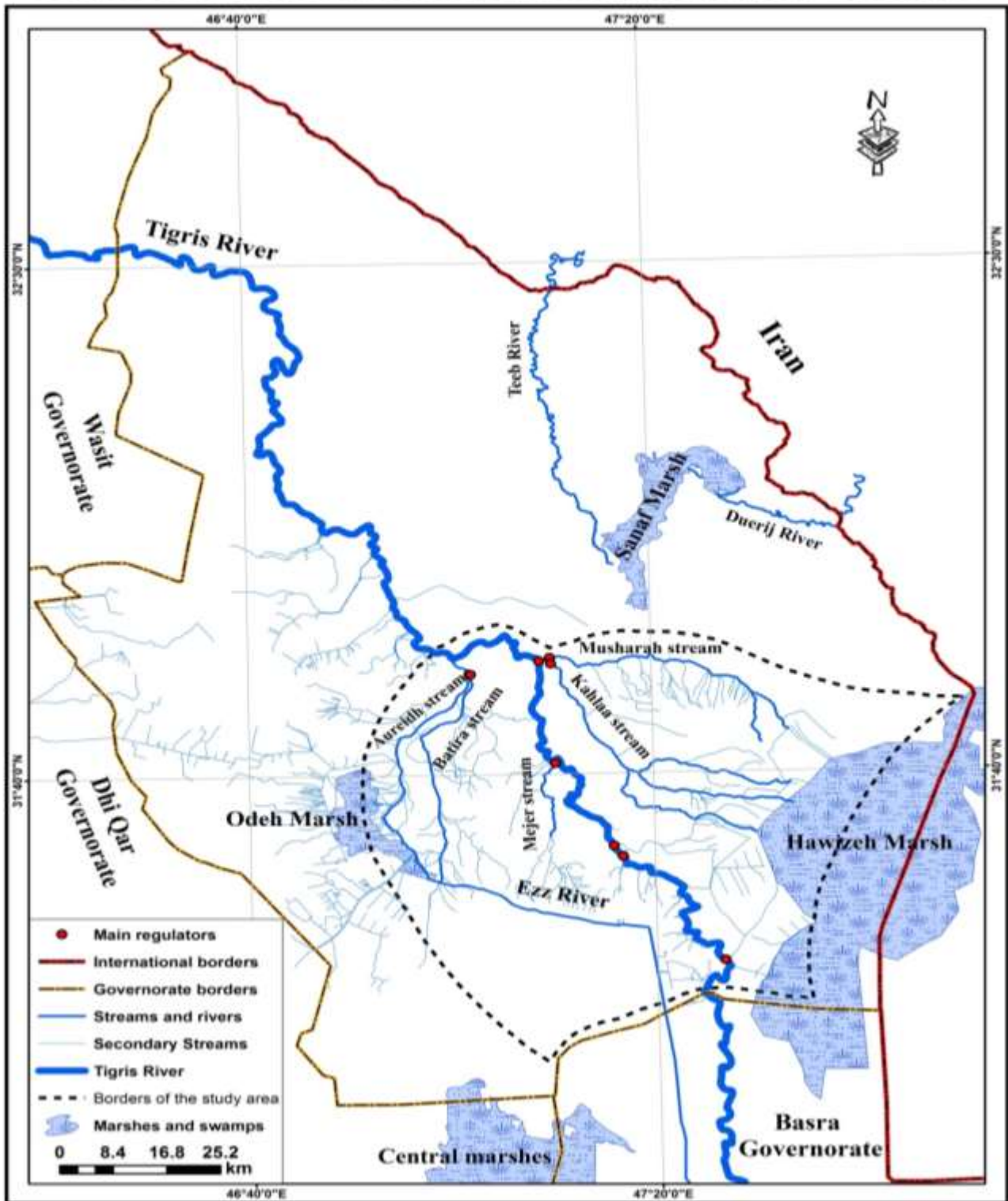
Irrigation projects are among the important engineering achievements that serve the agricultural reality in different regions, especially those with dry and semi-arid climates, as they work to reclaim important agricultural areas and ensure the provision of water shares for irrigated agriculture from a fixed water source. Many irrigation projects have been completed in different regions in the center and south Iraq. Some of them gave positive and distinguished results, while others failed to achieve their goals due to soil salinization and poor management of those projects. The large Amara Irrigation Project is one of the important irrigation projects in Maysan Governorate, as it has a regular river network the likes of which we rarely find in other areas of Iraq .

First: The Location of the Amara Irrigation Project and its Importance

Al-Amarah irrigation project is located in Maysan Governorate and extends within the borders of the governorate center in the north and up to the Al-Uzair district in the south, parallel to the Al-Hawizeh Marsh, and to the east at the northeastern edge of the Al-Masharrab River, and to the west it extends at the northern edge of the Al-Aridh river until the southern dam of the Al-Ezz River. The total area of the project is one million dunums, while its net area is about (580,000) dunums, Map (1) .

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Map (1)
Location of the Great Architecture Irrigation Project in Maysan Governorate



Source : From the researcher's work based on :
 1- Satellite visualization of the Landsat 8 (OLI) satellite, beams (2,5,7) of Maysan Governorate, for the year 2020 .
 2- Satellite visualization of the Quick Bird satellite, for Maysan Governorate, for the year 2009 .

The important procedures that fall within the project are as follows:

- 1- Al-Hafirah project in Qalaat Saleh, with an area of (80,000) dunams.
- 2- Reclaiming the Al-Jakka area (between Al-Musharrah and Al-Kahla.
- 3-Reclamation of lands located between the center of Amara and Al-Kahla.
- 4-Construction of a drain (58 km long) and it has been completed.
- 5-Drain (Ahmida) and it has been performed.
- 6-There are lands located east of the Tigris (within sectors: DR21 - DR18-DR20) with an extension of the east of the Tigris from Qalaat Saleh district to Al-Uzair. They have integrated designs that, when implemented, will solve the problem of the residents of the residential clans in the project lands, to which the marshes were returned after the fall of the previous regime, so that they suffered. These clans face the problem of housing and agriculture .

The large Al-Amarah irrigation project gains importance from the following aspects : 1-Due to the fact that the lands in the southern region have been affected by salinity due to the lack of extensive networks and the deterioration and deterioration of the productivity of the dunum with the lack of regulation of irrigation works, control of water distributions and reduction of waste in it, so reviving this project will help create agricultural areas with high productivity that serve the region . 2-Serving the population of the peasant families who used to live in the dried-up lands in the areas of Al-Aziz and Qal'at Saleh, to which the marshes were returned again, which are distributed as follows :

A. East of the Tigris, Al-Kahla District: Jassim River, right side / Al-Suwaidayeen clan complex, Al-Bubakhit clan, Al-Khashnanah clan, Al-Sada Al-Nawaji clan.

Adal Jassim River. Left side: Al-Bubakhit clan compounds (Beit Sakr... Al-Farihat clan compounds / Kreisha area, Al-Bughnam / Al-Mutaybej area (all located on the Shalfa River).

Umm Al-Tus River, right side / Al-Bughnam clan complex, Beit Khudair / Abu Khasaf area.

Umm Al-Tus River, left side / Al-Bughnam clan complexes / Al-Daban area, Al-Hilijiyah, Abu Khanazir area.

Al-Ma'il (Zubair) River - left side / Nawafil clan complex.

The number of families in these communities is (650) families and the population density is (35,000) people.
B. East of the Tigris / Saleh Qalaa District: Albu Muhammad clan complexes (Beit Hlehle, Al-Bughnam, Al-Hussan and Umm Fasima areas in Al-Taraba and Al-Sakinah at the end of the main canal of the East Tigris Saleh Qalaa district.

The number of families in these communities is (1000) families and the population density is (6750) people.

C. East of the Tigris / Al-Uzair District: Albu Muhammad clan complexes (Beit Hlehel, Beit Ardhil), and the Mubader / Albu Daraj clan / Umm Sabita area.

Compounds of the Albu Muhammad Al-Nawafil clans, Al-Buaita - Al-Bubakhit (including the thighs of Beit Shouka, Beit Abdullah, and Beit Khalaf).

The number of families in these communities is (2,100) families and the population density is (15,000) people.

Second: Components of the Large Al-Amarah Irrigation Project

The large Al-Amarah irrigation project includes many water facilities that accompany the integrated land reclamation in its various directions, as well as extensive irrigation and drainage networks.

Accordingly, these facilities are as follows:

- 1- Al-Amarah Dam Project

The project is located in the center of Maysan Governorate, and the Amara Dam is considered part of the Amara irrigation and drainage project, with a total area of (1140,000) dunums of land located east of Amara. The study of the hydraulic works of the project began in 1979, and the final designs for it were completed in 1982 by the Indian company (Wabcos). Its implementation was delayed until the year 2000.

Parts of the project: It includes 1- The regulator's body, which is a concrete structure with dimensions of (59.2*46.1) m with (6) openings with a width of (8) m for each opening, and these openings are equipped with radial iron gates.

2.Navigation Corridor: It is a concrete structure with dimensions of (217*20) m and equipped with metal gates of the (METER GATE) type in a hinged shape at the front and back with approaches with a length of (110) m.

3.Fish passage: It is a concrete structure with dimensions of (57.2*3.5) m.

4.The structure of the bridge: It is a concrete structure with a width of (9) m, side walkways with a width of (2) m, and dirt approaches with a length of (710) m.

The ground level of the dam is +2 m.

The design level of the advance is +9 m.

The operational level of the advance reaches +7.80 m and its maximum discharge is 350 m³/s

Note that the highest level of the Tigris River in Amara was 8.37 m in 1988, before the construction of the Amara Dam.

The lowest level of the Tigris River in Amara was 4.60 m before the construction of the Amara Dam

The purpose of the project: The purpose of this project is to raise the water level in the foreground for the purpose of increasing the amount of water and controlling it to balance the rivers of Al-Batira - Al-Aridh - Al-Kahla - Al-Masharrah, according to agricultural needs, flood requirements, and the needs of the marshes.

2.AL- Betera and Al-Arrayed regulators, north of the center of the city of Amara, are about 16 km from the right side of the Tigris River. The design discharge for each of them is approximately 700 m³/s, but at the present time, due to the drying of the marshes and the construction of AL- Ezz River in 1992 and the large amount of sediments in them, the discharge of AL- Betera regulator in 2019 reached 220 m³ /s and the width is about 120 m³/s. There is a plan at the Ministry of Water Resources to make the discharges of AL- Betera River reach 400 m³/s and the Al-Aridh River to 300 m³/s through a comprehensive irrigation plan that began in mid-2020. These two regulations were completed in 1979.

3.AL-Musharrah Regulator: Completed in 1979, with a design discharge of 100 m³/s and an operational discharge of 50 m³/s.

4.AL-Kahla Regulator: It was completed in 1979 with a design discharge of 450 m³/s and an operational discharge of 220 m³/s.

5.Qalaa Saleh Regulator: The flag was completed in 1979 with a design discharge of 150 m³/s and an operational discharge of 100 m³/s.

6.Great Hungary Regulator: Completed in 1979, with a design discharge of 170 m³/s and an operational discharge of 9 m³/s.

7.AL-Majria Regulator: It was completed in 1979 with a design discharge of 30 m³/s and an operational discharge of 10 m³/s.

8.Implemented drainage ditches: The Amara irrigation project covers a network of main drainage ditches, which are:

A. Kasiba drain, 36 km long and draining into the Hawizeh marsh via a pumping crew .

B. The Ahmida drainage basin is 16 km long and also empties into the Hawizeh marsh.

C. Al-Jakka drain, 24 km long and empties into the Al-Hawizeh marsh.

Third: Geographical Characteristics of the Large Al-Amarah Irrigation Project

The area of the Great Amarah Irrigation Project acquires some geographical, natural, economic and demographic characteristics. In terms of its climate conditions, the average number of hours of sunshine is about 9 hours during the year. The average maximum temperature reaches 33°C, and the minimum temperature reaches 19°C. The region enjoys... With an amount of rain of 141 mm annually, the average wind speed was about 3 m/s, and the average relative humidity was 46%, Table (1) .

Table 1. Climatic data for the large Imara irrigation project.

Months	Rainfall (mm)	Tmax-C	Tmin-C	Relative Humidity RH%	wind speed m/sec	Sunshine (h)
Jan	27	17	7.0	72	2.2	6.5
Feb	20	19	8.5	64	2.6	7.6
Mar	28	24	12	58	2.8	7.6
Apr	12	32	17	48	2.9	9.0
May	3.0	38	24	36	3.2	9.5
June	0	44	28	27	4.5	12
July	0	46	29	25	4.5	12
Aug	0	50	32	27	3.8	11.5
Sept	0	43	28	30	2.9	10.5
Oct	4.0	37	20	43	2.4	9.0
Nov	17	25	11	59	2.3	7.20
Dec	30	18	8.0	70	2.2	6.5
The annual rate	14.1	33	19	46	3	9

Source: Ministry of Transport and Communications, General Authority for Meteorology, Climate Section, unpublished data.

As for the available water, it is represented by the Tigris and the streams branching from it, which are many: Al-Aridah, Al-Betera, Al-Musharrah, Al-Kahla, Al-Majar Al-Kabir, Al-Majria, and there is also groundwater whose depth ranges between (2-22) meters and the concentration of dissolved salts in it ranges between (5000 - 10000) parts per million and in a way. General It is transparent groundwater. Effective management of irrigation water in the region at a rate of 45% for non-reclaimed lands and 60% for reclaimed lands. In order to establish large agricultural irrigation, it amounts to 80% for the island and 20% for summer. The productivity of a single dunum for general agriculture is between (25 - 300) kg / dunum, but it does not differ from one crop to another. Finally, the wheat and barley crops reach (500 kg/dunum) and the yellow corn crop (100 kg/dunum), and the large and wonderful crops grow only between (1500 - 17000) dunums, all winters (5000 - 6000) dunums until the end of summer, and irrigation with surface planes depends on methods of Irrigation.

The population of the region is about 3,400 people, of whom about 65% work in agriculture. They also work in fishing and bird hunting in the marsh areas near them, as well as raising animals such as sheep, cows, buffalo, goats, and others The population enjoys good results, but the farmers suffer due to a group of problems due to high salinity of moisture and low productivity per dunum, which requires saving the costs of reclaiming the project's soil, and it is not bad from a percentage. This is a large building irrigation project that extends over several administrative units, which are districts (Al-Amara center , Al-Kahla) . , (Al-Maimonah, Al-Majar Al-Kabir, Qalaat Saleh) and the great areas (Al-Mushrah Al-Salam, Al-Aziz Al-Khair, Al-Adl) .

Fourth: Water Needs for the Crops of the Amara Irrigation Project

The farmers in the Great the Amara Project grow many agricultural crops, whether those grown in the winter season or in the summer season. Based on the type of crop, growing season, climate conditions, and available irrigation water, the total water needs of the crops grown in this area were calculated, which is shown in Table (2). Which shows that there is a clear discrepancy in these needs during one agricultural season, but thanks to the engineering projects established within the scope of the project, which were previously discussed, it is clear that agricultural lands do not suffer from a deficiency in meeting the water needs of crops if we know that the

main source of irrigation for the project is a river. The Tigris and the streams branching from it, as correct water management provides guaranteed shares for the cultivated lands in this project.

Table 2. Total water requirements for agricultural crops in the project (m3/dunum).

Annual need	m3/acre											Crop name		
	September	August	July	June	May	April	March	January	November	October	a period Germination			
15651377						435	430	262,5	127,5	60	35	215	11/16-4/30	Wheat
57						270	422,5	257,5	122,5	55	35	215	11/16-4/20	Barley
9357651251737	215				210	482,5	345	232,5	155	85	132,5	82.5	11/10-10/5	Clover
576512							5.47	242,5	122,5	5.67	107,5	177,5	11/1-5/3	Beans
751251737	177,5	65			17.5	90	105	240	132,5	90	135	202,5	August - May	Vegetables
37	142,5	682,5			110	460	387,5	227,5		65	115	177,5	10/16-5/10	Onion
52877	47.5	240	913,5	672,5	397,5	170							1/5-5/9	Sesame
529502576440952			935	802,5	525	277,5	170						1/4-15/8	Soybean
756440952		980	382,5	975	652,5	355	40	170					11/3-25/7	Sunflower
440952		727,5	1190	1470	1257.5	1542.5							1/6-10/10	The Rice
0952	577,5		272,5	765	847,5	435	200	170					1/3-30/9	Corn
4540			127	707,5	800	435,5	250	202,5					2/16-7/10	Tomatoes

3 8 0 0 3 9 7 0 3 6 2 0 5 0 1 7 . 5 5 9 6 2 . 5 5 7 8 0 7 0 9 0	322,5	692,5	919,5	860	590	330	220						7/21-11/30	Eggplant
	322,5	692,5	885	890	615	347,5	40	135					11/3-30/9	Okra
	461,5	717,5	797,5	735	477,5	70	135						4/10-10/15	Pepper
	540	727,5	772,5	815	660	422,5	272,5	162,5	70	5.47	160	367,5	K2-K1	
	632,5	800	580	842,5	702,5	652,5	352,5	220	142,5	122,5	205	440	K2-K1	Alfalfa
	575	775	822,5	910	742,5	540	397,5	240	125	75	185	392,5	K2-K1	Palm
	722,5	1147.5	1157,5	1150	942,5	660	462,5	280	145	87.5	152,5	225,5	11/16-4/30	Sugar Cane

Source: Researcher based on data from Maysan Irrigation and Agriculture Directorate.

Fifth: The Problems of the Al-Amara Irrigation Project and the Requirements for Its Success

The large Al-Amara irrigation project faces some difficulties that can be summarized as follows: 1.The studies and designs that were announced for the Amara irrigation project by the consultant WAPKUS were in the seventies, and as a result of the passage of about (50) years since their completion, many topographical changes have occurred in most of the project areas, as well as due to the urban expansion in Maysan Governorate, such as the city center, districts, districts, and villages, and the accompanying development of roads. With the expansion of the old roads at the expense of the project areas, as well as the drying up of the marshes and the disappearance of some rivers and canals, and also due to the reclamation projects that took place in the nineties, which encroached on many agricultural areas .

2.The Al-Amara irrigation project consists of integrated reclamation of agricultural lands with an integrated set of regulators and irrigation facilities on all rivers within the boundaries of the project. Only the main facilities below have been implemented.

Amarah Dam with the main regulators on the Batira rivers, the Al-Arid Al-Musharrah Al-Kahla and Al-Majar Al-Kabir, as well as the Qalat Saleh, Al-Majria and Al-Kassara regulators, all of which require continuous maintenance.

As for the remainder, according to the maps of the consultant Wapcus, there are more than (20) flood regulators or flood escapes.

Distributed across all rivers, it regulates levels and drainage in order for the Amara irrigation project to work, but it is not currently implemented.

3.The design party relied on tourist irrigation in the designs of the Al-Amara irrigation project, and as shown in paragraph (2) above, regulators and interrupting regulators were distributed to all river networks within the project to obtain the operational levels and drainages that serve the tourist irrigation option, and by looking at the site map For the architecture irrigation project and the study of operational capabilities (P.L.), we see that

it is impossible to obtain these locations in light of the current changes in neighboring countries and the water scarcity that the country suffers from. However, in the case of using the option of irrigation by means of pumps (pumps), it runs into a problem, which is that the consultant WAPKUS has relied on His designs for the above project, in all its sectors, include a large group of small canals with low drainage that take water directly from the source (rivers) using small regulators, and these intakes are spread over large and far apart distances. It is not logical to make a pumping station for each canal, and it is also very difficult, especially with the difference in topography. The land and the large distances between the outlets, to combine each group of channels to create a pumping station on it, noting that this device, despite its difficulty, is considered the ideal solution, as each sector of this project must be studied to collect all the channels that can be collected in one station, even if a group of stations is not implemented. In every sector.

In order for the large Al-Amara irrigation project to achieve the goal of its construction, achieve the required benefit, and develop its performance, the matter requires several requirements, including.

1. Integrated reclamation because the lands are affected by salinity due to dissolved salts, especially sulfate salts. The sediments also contain up to 35% of sodium and calcium salts, and 15% of gypsum salts, which makes the water salty and alkaline.

2. In view of the drying up of large parts of the eastern marshes in the Hawizeh Marshes and the central marshes of Maysan Governorate, and large areas exploited for agriculture and tribal housing in the region, it is possible to establish semi-reclaimed projects, including:

- a. East Tigris/Al-Uzair District land reclamation project, with an area of 90,000 dunams.
- b. East Tigris Land Reclamation Project/Qalaa Saleh District, with an area of 40,000 dunams.
- c. East Tigris Land Reclamation Project/Al-Kahla-Al-Jakka District, with an area of 24,000 dunams.
- d. East Tigris Land Reclamation Project / Al-Masharrah District - Al-Jakka, with an area of 18,000 dunams.
- e. Irrigation Charity Project / First Phase, Central Marshes.
- f. Al-Qadisiyah Project No. (1).
- g. Al-Qadisiyah Project No. (2).

The total area of the three projects is 50,000 dunams, which requires adding it to the project after it was limited to the marshes.

3. Excluding areas located within the project that were exploited as residential lands, industrial facilities, or oil areas, or that became within the flood line from the Al-Masharrah district and the Al-Musandak stream in the right of Al-Areedh river.

4. Narrowing the section of the Ezz River by the distance between the old Bazl Hor Awda station and the Khums system by approximately 14 km, so that the width of the section is (500-600) meters instead of 4 km, in order to reduce water losses in the region.

It is worth noting that, if the project is completed, the situation of the residents there will change for the better, and it is possible to exploit agriculture using modern methods other than surface irrigation, such as constructing greenhouses, covered agriculture, sprinklers of all kinds, and using fodder for livestock, as the yield of one dunum is expected to reach 800 kg/dunum. Here, it is possible to expand by increasing the number of grain receiving centers, as it is known that in the center of Maysan Governorate there is one silo to receive grain with a capacity of 100,000 tons, with a small number of silos in different areas. In the nature of the case, they are not sufficient to accommodate the entire production, as they do not have the correct storage conditions .

It is also noted that there is a network of rural roads that facilitate communication with city centers and at the village level, in addition to the fact that some of them are connected to the (Baghdad - Maysan - Basra) road, parallel to the Tigris River. It is also noted that there are water pipe services, dispensaries, schools, police stations, and telephone and communications services in various regions. From the extension area of this project.

REFERENCES

- Ministry of Water Resources, Directorate of Water Resources in Maysan Governorate, report on the project Ray Grand Architecture, unpublished.
- Maysan Governorate Agriculture Directorate, unpublished data.2
- Water Resources Directorate in Maysan Governorate, Technical Section, unpublished data.3
- Ministry of Transportation and Communications, General Weather Authority, Climate Department.4
- Directorate of Water Resources in Maysan Governorate, unpublished data.5
- Al-Amara Irrigation Project Report, unpublished.6
- Maysan Governorate Agriculture Directorate, agricultural divisions in (Al-Amara, Al-Mashhara, Al-Kahla, Al-Maymouna, Qalaat Saleh, Al-Uzayr, Bani Hashem, Al-Majjar Al-Kabir, Al-Adl, Al-Khair, Al-Salam).