

October 2015

## JICA's Cooperation for Water Sector in Jordan

40 Years history of remarkable achievements



@JICA/Shinichi Kuno  
(Zai Water Treatment Plant)

# I. MESSAGE

## Message from Chief Representative of JICA Jordan

### Mr. Shokichi SAKATA

Development of the water sector ranks among the top priority areas of JICA's cooperation towards Jordan, and receives special attention as it represents the backbone for integrated social and economic development of the nation.

In Jordan, the available per capita of water resources is only 120-140 m<sup>3</sup>/year, which is far below the internationally recognized water scarcity level of 500 m<sup>3</sup>/year, the demand is far exceeds the water supply, and the challenge is to match the foreseen demands with the available conventional and non-conventional water resources.

Aiming at effective and fair use of limited water supplies, JICA provides continuous support for water infrastructure and capacity development of engineers and technicians, and has been implementing various studies and projects for rehabilitation, improvement and expansion nationwide to improve water supply availability and reliability as well as reducing energy consumption.

Recently, and due to the mass influx of Syrian Refugees, JICA, in addition to direct support for refugees, is supporting the host communities in the northern part of Jordan, where many Syrian refugees live, by providing 2.5 billion yen to support the development of water networks and also conducting technical support for development planning for water and sewage.

So far, JICA have been cooperating for development of the water sector for more than 40 years, we believe that our remarkable results could not be achieved without the efforts of the excellent counterparts at the Ministry of Water and Irrigation.



## Message from the Minister of Water and Irrigation

### H.E Dr. Hazim El-Naser

Jordan is facing crisis on top of crisis on managing precious water resources and coping with the humanitarian obligation to host several waves of refugees, displaced persons and returnees as a result of the prolonged conflict in the Middle East. The result has been a high cost of water projects associated with high annual cost for their operation and maintenance.

The Government of Japan through JICA is supporting the development policies of the Government of Jordan and is heavily involved in providing and managing various technical and financial assistance to the Ministry of Water and Irrigation. Many development studies such as Master Plans and Feasibility Studies have been conducted covering the whole Kingdom. Many experts, advisors, volunteers and development specialists were dispatched to provide their expertise and advice to the Ministry, equipment was provided, and training in Japan was offered to the Ministry's staff.

Jordan water sector is facing a challenging situation to recover costs due to two main interrelated constrains; high Energy consumption and respective cost and non-revenue water where JICA has placed efforts, knowledge and large scale grant aid to construct, rehabilitate and improve water supply facilities and has tirelessly supported Jordan in improving the efficiency of water resource management to conserve energy and reduce NRW.

Lately, JICA's pioneering role in assessing the impact of the Syrian crisis on the water and wastewater infrastructure till 2035 has generated a list of priority projects that will alleviate the impact of the Syrian crisis on the host communities, and has financed a water supply project to the host communities of the Syrian Refugees.

A word of gratitude would go to JICA for its diligent support to Jordan in providing sustainable solutions for water security as a key pillar for development and prosperity.





# II. INTRODUCTION OF MAJOR PROJECTS

iii. Non-Revenue Water Reduction



i. Water Sector Programme in Syrian Host Communities



ii. Safe Water Supply to Amman

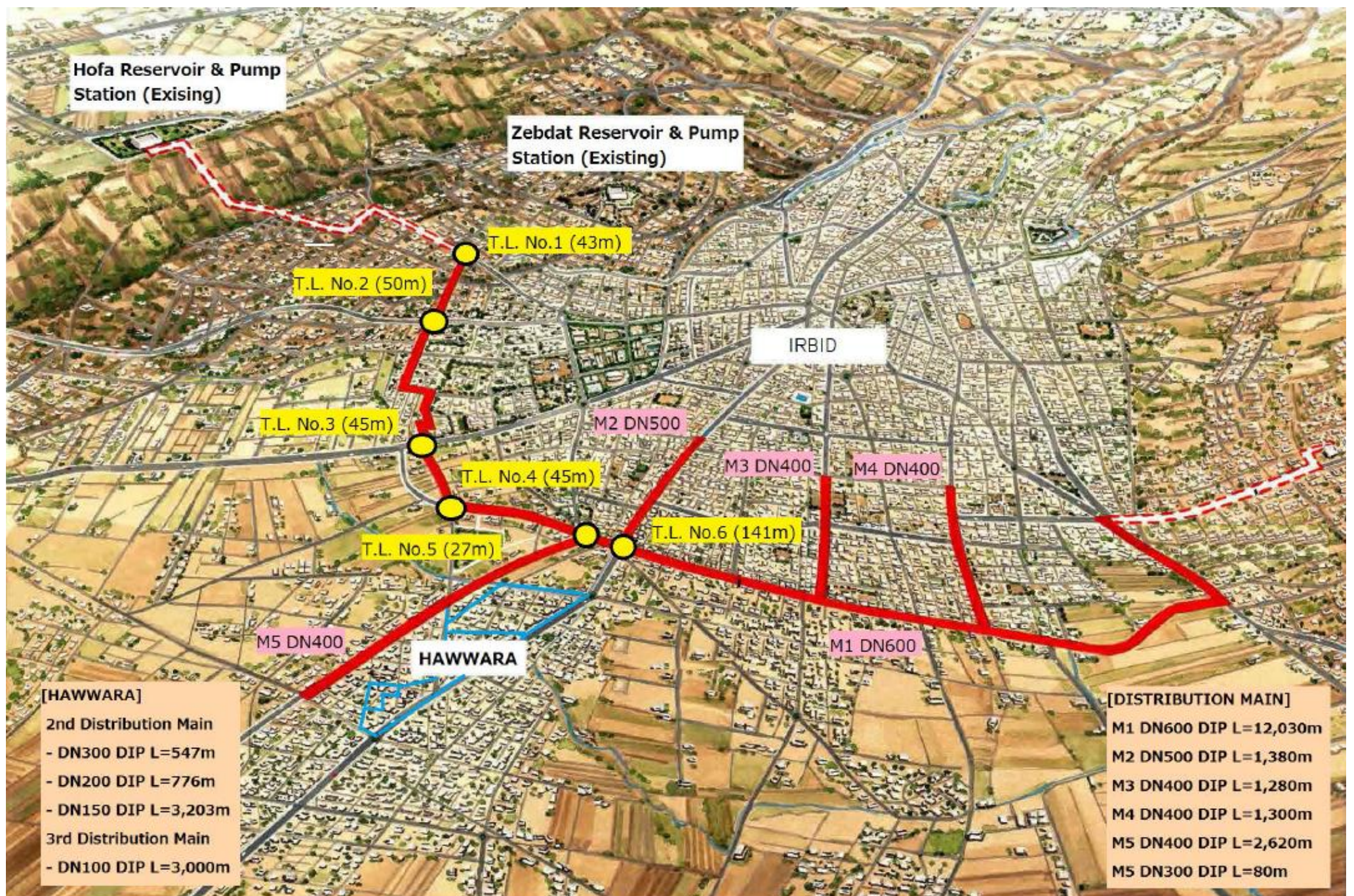


iv. Efficient Water Supply





## i. In Response to the High Influx of Syrian Refugees



- 1) The Project for the Study on Water Sector for the Host Communities of Syrian Refugees (2013-2016)
- 2) The Programme for Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees in Northern Governorates (2014-2016, JPY 2,510,000,000)

### Background

Since the crisis happened in Syria in 2011, the influx of Syrian refugees has further deteriorated the condition of water and wastewater services in Jordan and particularly in northern governorates which already suffers from limited water resources and high non-revenue water

### Outline of the Project

- Component A: Grant Aid Project  
New conveyor pipeline from Hofa to Bait Ras with DI pipe of 24Km length and 4 branch pipelines with DI pipe of 7 Km length
- Component B: Development Study (Master Plan), target year 2015-2035
  - Water Supply Master Plan for greater Irbid and Ramtha, - Wastewater Master Plan for Greater Irbid, Ramtha and Mafraq
- Component C: Pilot Activities in the field of Water Supply and Wastewater
  - Provision of Mobile Workshop and Tools to conduct on-the-job training on countermeasures against leakage
  - Provision of vacuum trucks to conduct on-the-job training for sewer cleaning

### Project Impact

- Increased available water from eastern water sources including Disi water to Bait Ras in Northern Irbid, to eastern part of Irbid City, and to Hawwara. 473,000 people in the host communities will get benefits from the program and the supply time is planned to double.
- Development of Master Plans including priority projects, implementation schedule, Financial, Economic and Environmental analysis
- Improved operation and maintenance of water supply and wastewater services in northern governorates





## ii. Supply Safe Water to Amman

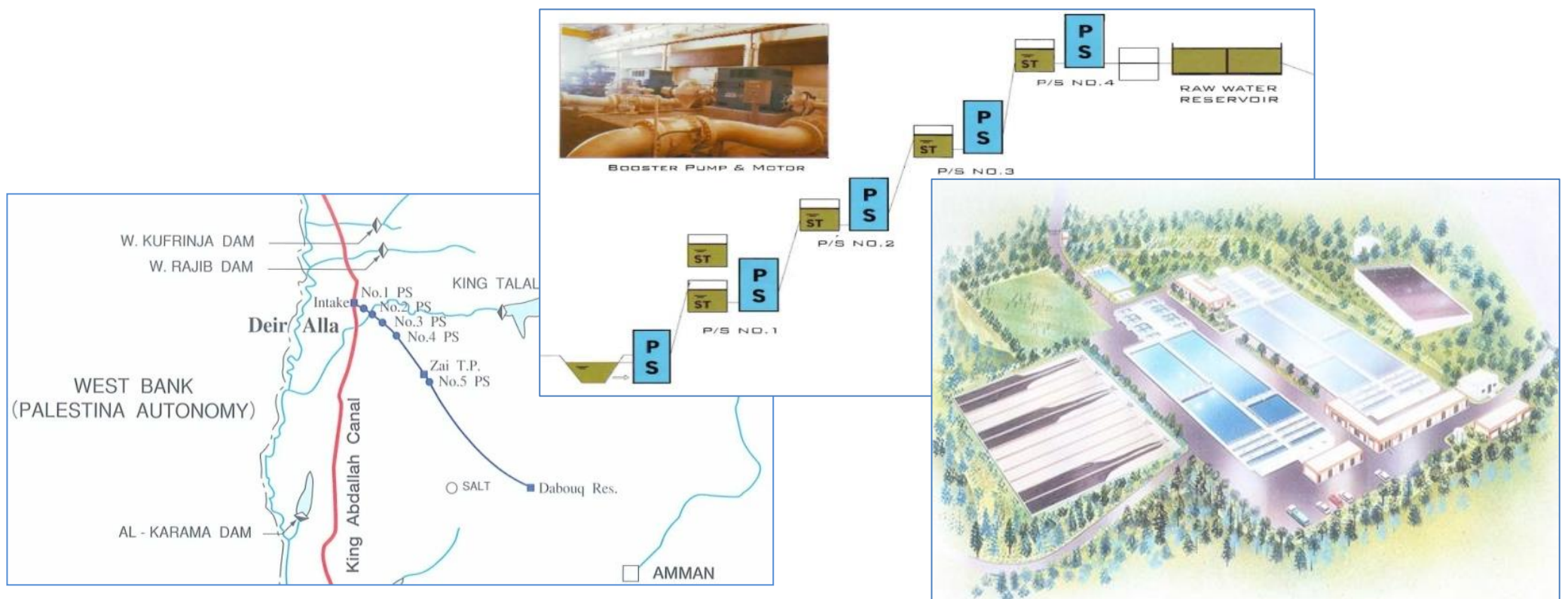
- 1) The Project for Improvement of Water Supply System to Greater Amman (1997-1998, JPY 1,275,000,000)
- 2) The Project for Improvement of Water Supply System to Greater Amman Phase II (1998-2002, JPY 7,422,000,000)

### Back ground

In 1994 the Peace Treaty was signed between Jordan and Israel, which brought additional water resource to Jordan from Yarmok river and Lake Tiberius in Israel as peace dividend.

### Outline of the Project

- The phase I project: Renewed the deteriorated 4 pumping stations in the Zai conveyance system between Deir Ala and Amman, which convey raw water between about 1,100 m difference of elevation.
- The phase II project: Expanded the 4 pumping stations in the Zai conveyance system and the existing Zai water treatment plant from 45 million m<sup>3</sup>/year to 90 million m<sup>3</sup>/year, which increased water supply amount to 250,000 m<sup>3</sup>/day in total covering a design population of 1,970,000



### Project Impact

1. The capacity of the existing Zai system including conveyance pumping stations and water treatment plant was expanded from 45 million m<sup>3</sup>/year to 90 million m<sup>3</sup>/year. The Zai system is the most important water source for Amman, which accounts for about 40 % of the Amman's water supply sources
2. In the summer of 1998 before the project, the Zai water treatment plant malfunctioned and unsafe water was supplied to Amman, which caused panic in the citizen. After the project, the water quality of supplied water is stable and ensured





### iii. Reduction of Non-Revenue Water (NRW)



- 1) Capacity Development Project for Non-Revenue Water Reduction in Jordan (2005 - 2008)
- 2) Capacity Development Project for Non-Revenue Water Reduction in Jordan Phase II (2009-2011)

#### Background

The increase in water demand from the rapidly increasing population is putting heavy pressure on the limited water resources. In addition, NRW reaching more than 50% of water produced as of 2002 is becoming an urgent issue as population continues to grow.

#### Outline of Project

The Project aims at developing the capacity of the WAJ staff in terms of designing and implementing NRW countermeasures in ten (10) Governorates to enhance the effective use of water resources in Jordan. Key elements of the Action Plan included ■Leakage survey (pipe line sounding), ■Leak repair, ■Leakage and illegal use survey (individual household sounding), ■Water meter replacement, ■Service pipe replacement, ■Rectification of illegal connection, ■NRW level reassessment (flow balance survey), ■Minimum Night Flow measurement, ■Public awareness campaign, ■GIS network drawing preparation and ■Subscriber database preparation.



#### Project Impact

The Governorate Water Administrations (GWAs) have achieved this target as shown in Table below



**Table NRW Level Achieved against the Set Target**

GWA	Pilot Area	Subs. (No.)	NRW Baseline (%)	NRW Target (%)	NRW Level Achieved (%)
Balqa	Al-Salalim	2,060	45	23	20
Zarqa	Hashimiah	1,030	58	29	25
	Wadi Al-Hajar	241	47	23	25
Madaba	Faisalea	695	57	28	28
Karak	Smakeheh & Hmoud	384	44	22	23
	Muhay & Hamdieh	220	63	31	-
Tafilah	Mansurah	566	28	14	18
Ma'an	Odruh 1	218	55	27	17
<b>Simple Arithmetic Average</b>			49	25	22

The majority of NRW countermeasures adopted in the pilot areas are underground leakage detection and repair, water meter replacement and illegal connection rectification. Pipe replacement was not carried out to any significant extent except for Balqa Governorate.

This experience indicates that substantial decrease of NRW (around 40% - 60%) is achievable if countermeasures are intensively applied. The GWAs are encouraged to continue to implement similar activities in other areas.



## iv. Efficient Water Supply through Zoning & Gravity

- 1) The Project for Improvement of the Water Supply for the Zarqa District (2002-2005, JPY 1,721,000,000)
- 2) The Project for Improvement of the Water Supply for the Zarqa District Phase II (2007-2010, JPY 2,371,000,000)

### Background

JICA conducted a Study covering areas of Zarqa District during 1994-96 to formulate a long-term water supply improvement plan. The Study identified major issues and proposed a plan of action for improvement of water supply of Zarqa District. Based on this Plan, JICA provided assistance to Water Authority of Jordan to improve water supply in Zarqa District through a project in two phases as listed above.

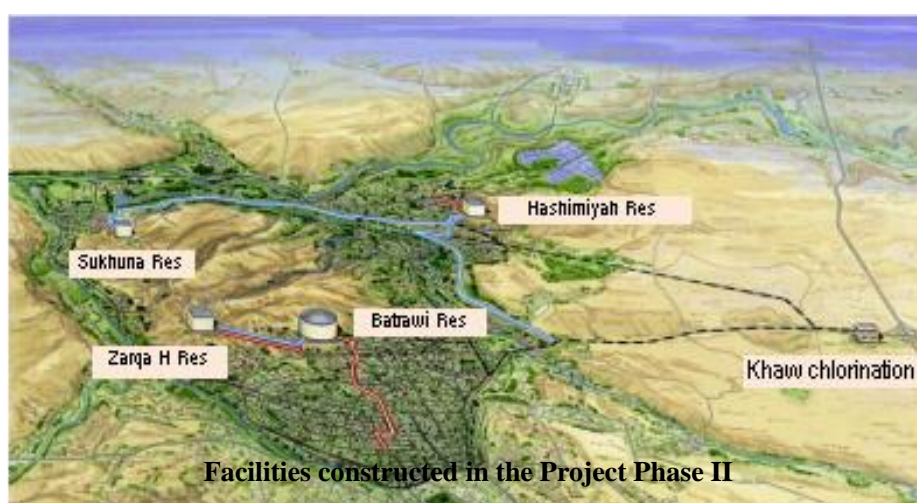
### Outline of Project

The physical facilities in Ruseifa, Awajan, Zarqa city, Hashemeyeh, and Sukhna areas were constructed and trainings were provided to Water Authority of Jordan staff. The main area of Zarqa District was divided into eight distribution zones. Eight number of service reservoirs (one in each distribution zone) with total storage capacity of 35,200 cubic meter, 23.2 km of transmission main with diameter ranging from 200 to 500 mm, and 15.3 km of distribution main with diameter ranging from 200 to 600 mm were constructed. In addition, a chlorination facility, a pumping station, and about a dozen isolation valves were installed.

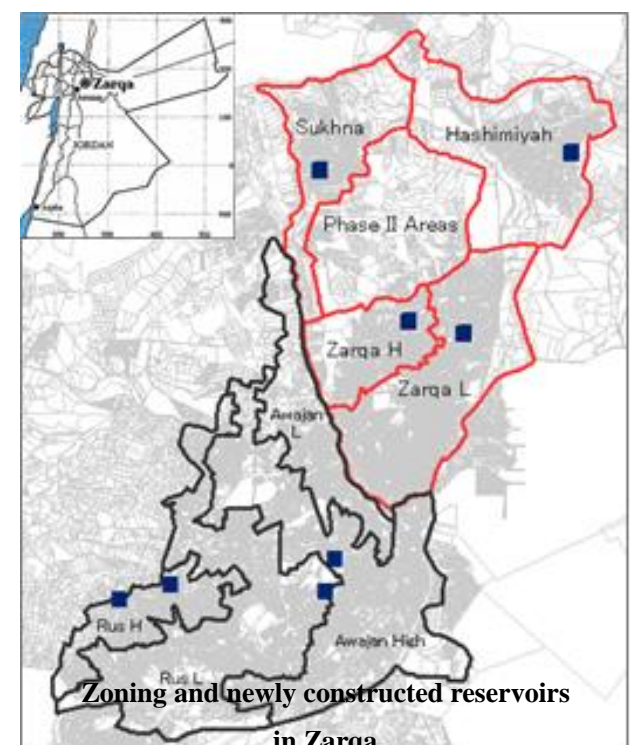


### Project Impact

The Zarqa Project has been an exemplary project in many respects. Through the zoning and gravity supply distribution operation has been greatly simplified. Stability has come to the supply pressure and customer complaints of unstable supply have been reduced. Cost of electricity and operation and maintenance have been also reduced. Water availability is increased by the amount saved from leakage reduction.



Facilities constructed in the Project Phase II



Zoning and newly constructed reservoirs in Zarqa

# III. JICA'S COOPERATION HISTORY (WATER SECTOR)

Water Works	Non-Revenue Water	Water Resource	Irrigation
			Study for Wadi Arab Irrigation Dam FY1975-1976
Dispatch of Project Formulation Advisor for Water Sector, FY1993		Mujib Water Use Development Planning Study FY1985-1987	The Project for Wadi Arab Irrigation Dam Yen Loan, FY1977, 7,500 M JPY
The Project for Improvement of Maintenance Equipment for Water Supply Facilities, Grant Aid, FY1994, 660 M JPY		Water Resources Study of Jafr Basin FY1987-1989	Mujib South Ghor Irrigation Dam Yen Loan FY1984, 13,900 M JPY
The Study for Improvement of the Water Supply System for the Zarqa District, Study, FY1994-1996		Study on Brackish Groundwater Desalination FY1993-1995	North Ghor Conversion Project Yen Loan, FY1989, 4,080 M JPY
The Project for Improvement of Water Supply System to Greater Amman, Grant Aid, FY1997, 1,275 M JPY	NRW and GIS / Distribution System Management Individual Expert, FY1999-2002	The Study on Water Resources Management FY2000-2001	
The Project for Improvement of Water Supply System to Greater Amman Phase II, Grant Aid, FY1998-2001, 7,422 M JPY	NRW and Water Distribution Management Individual Expert, FY2002-2005	The Project for Water Pollution Monitoring System Grant Aid, FY2000-2004, 868 M JPY	
The Project for Improvement of the Water Supply System for the Zarqa District, FY2003-2005, 1,721 M JPY	Policy Advisor and Project Formulation Individual Expert, FY2005-2007		
Improvement and Expansion of the Water Supply Networks in North/Middle Jordan Valley, Grant Aid, FY2003-2005, 2,011 M JPY	Capacity Development Project for Non-Revenue Water Reduction in Jordan Technical Cooperation Project, FY2005-2008		
Project for Energy Conservation through Upgrading Water Supply Network, Grant Aid, FY2010-2015, 1,132 M JPY	Capacity Development Project for Non-Revenue Water Reduction in Jordan Phase II Technical Cooperation Project, FY2009-2011		
Rehabilitation and Improvement of Water Facilities in Tafleh, Grant Aid, FY2011-2015, 1,911 M JPY			
Study on Water Sector for the Host Communities of Syrian Refugees, Study, FY2013-2016, Urgent Improvement of Water Sector for the Host Communities of Syrian Refugees in Northern Gov.. Grant Aid, FY2014-2016, 2,510 M JPY			
Rehabilitation and Expansion of the Water Networks in Balqa Gov., Grant Aid, FY2014-, 2,238 M JPY			

M: Million

JPY: Japanese Yen



