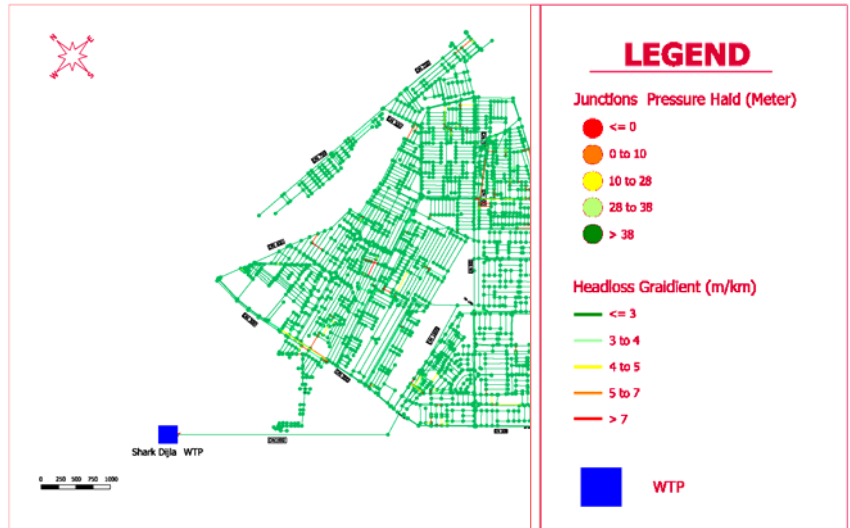
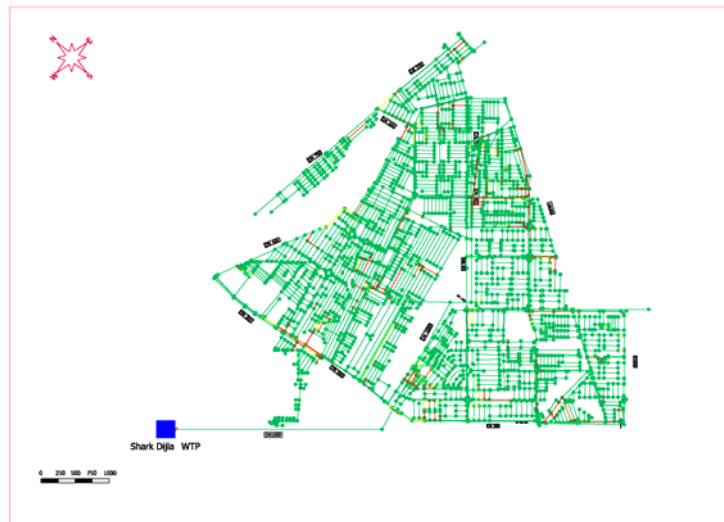


2027-ADF



2027-MDF



2027-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



Tokyo Engineering  
Consultants Co.,Ltd.

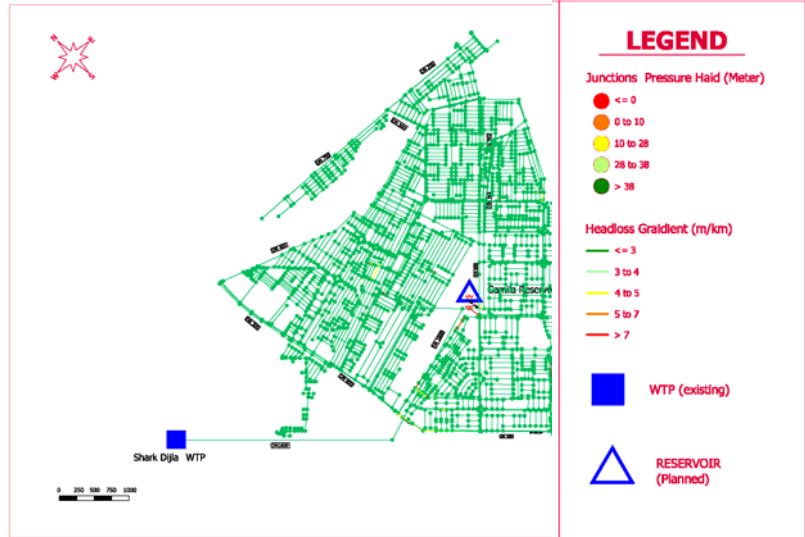
**Title**

DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R2  
SUPPLY FROM SHARK DJILAH WTP  
-2027 (ADF, MDF, PHF)

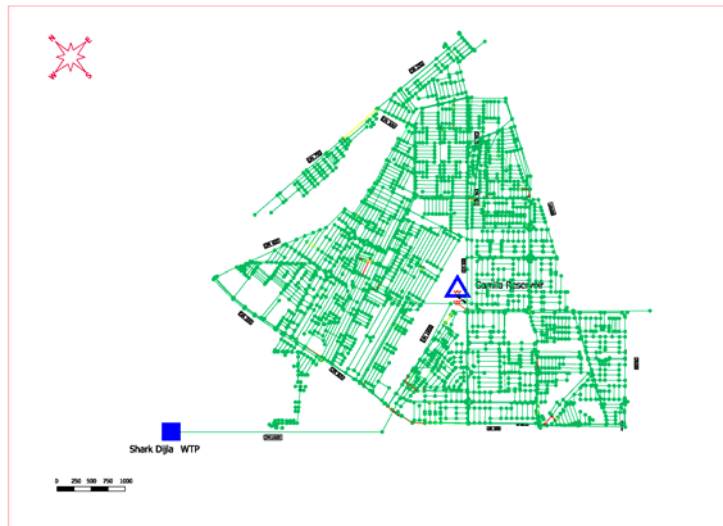
**Figure**

Figure A.3.14

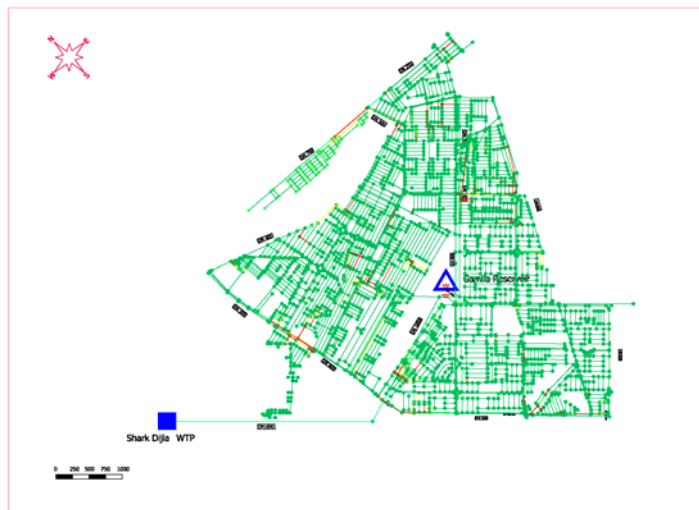
2005-ADF



2005-MDF



2005-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



Tokyo Engineering  
Consultants Co.,Ltd.

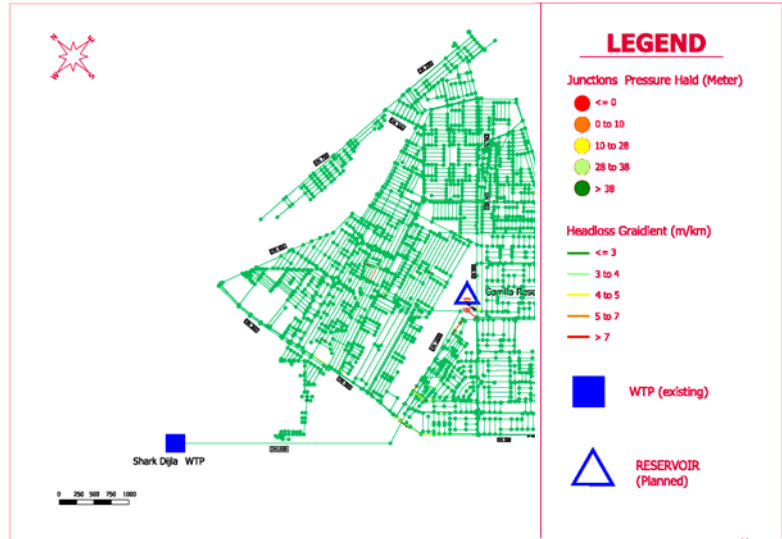
**Title**

DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R2  
SUPPLY FROM R2 SERVICE  
RESERVOIR -2005 (ADF, MDF, PHF)

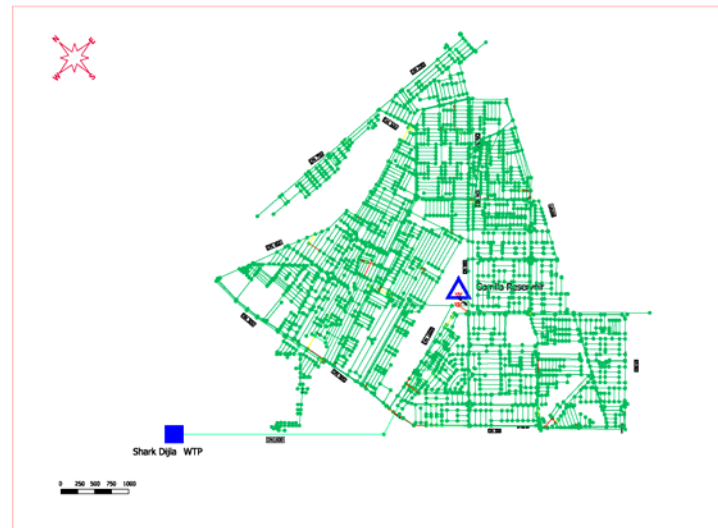
**Figure**

Figure A.3.15

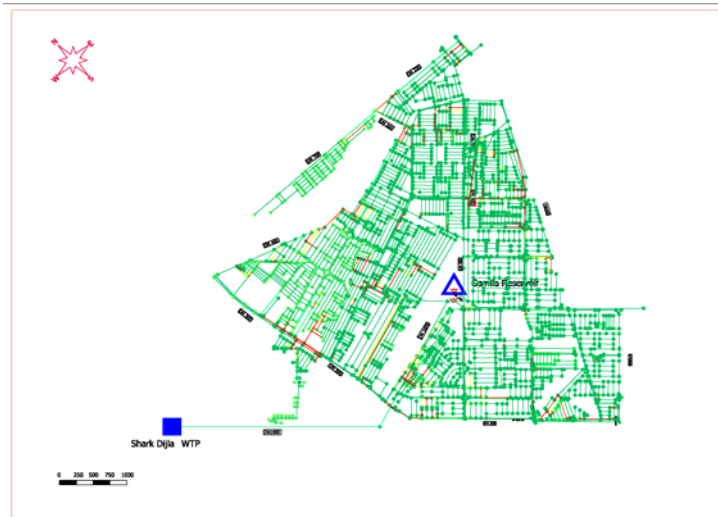
2014-ADF



2014-MDF



2014-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



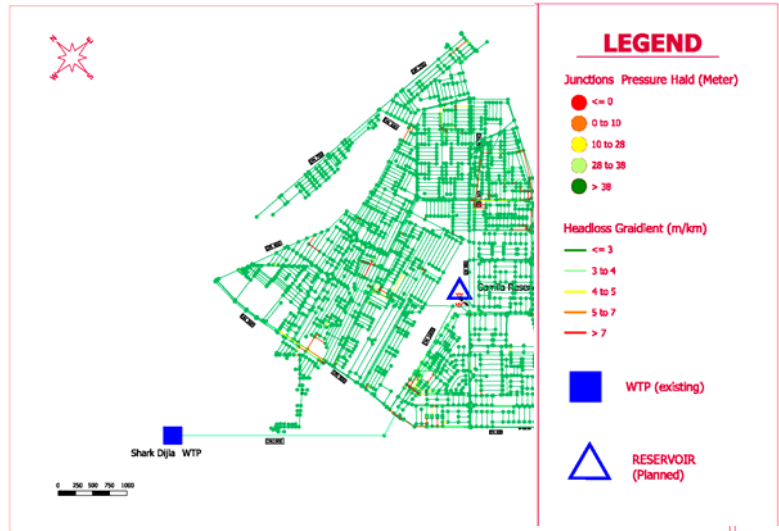
Tokyo Engineering  
Consultants Co.,Ltd.

**Title**  
DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R2  
SUPPLY FROM R2 SERVICE  
RESERVOIR -2014 (ADF, MDF, PHF)

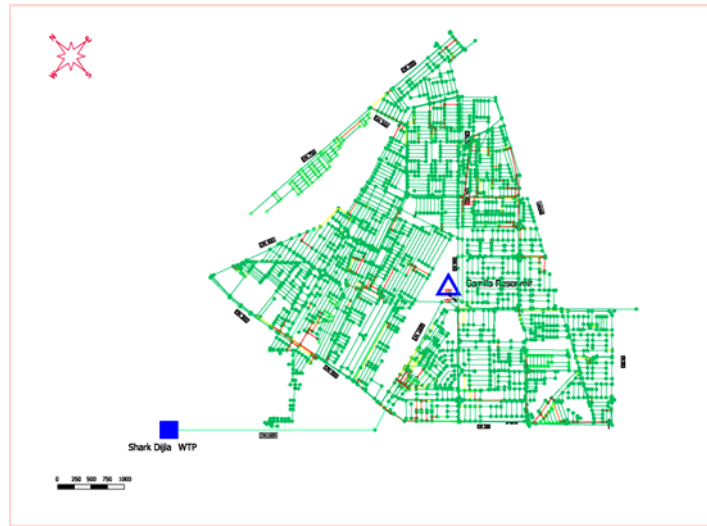
**Figure**

Figure A.3.16

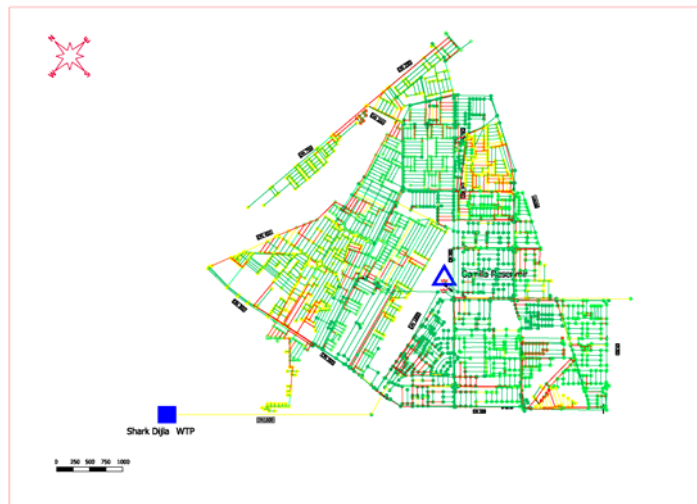
2027-ADF



2027-MDF



2027-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



Tokyo Engineering  
Consultants Co.,Ltd.

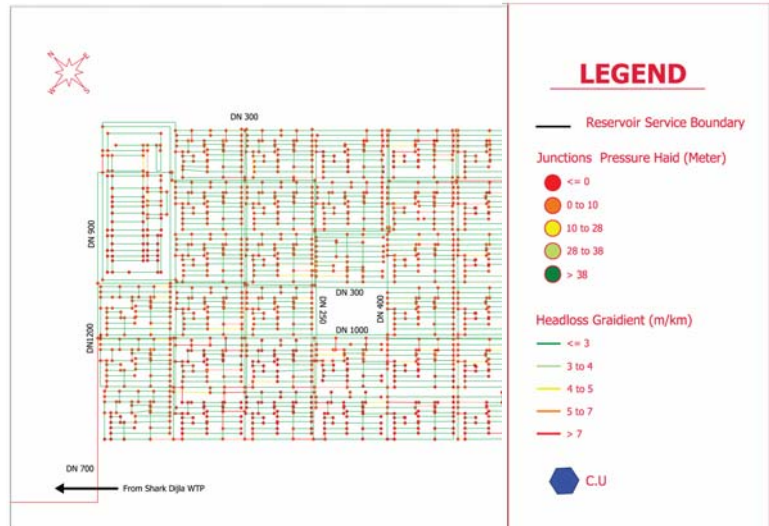
Title

DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R2  
SUPPLY FROM R2 SERVICE  
RESERVOIR -2027 (ADF, MDF, PHF)

Figure

Figure A.3.17

2005-ADF



2005-MDF



2005-PHF



Japan International Cooperation Agency

The Feasibility Study on Baghdad Water Supply System Improvement Project in the Republic of Iraq



NIPPON KOEI CO.,LTD.



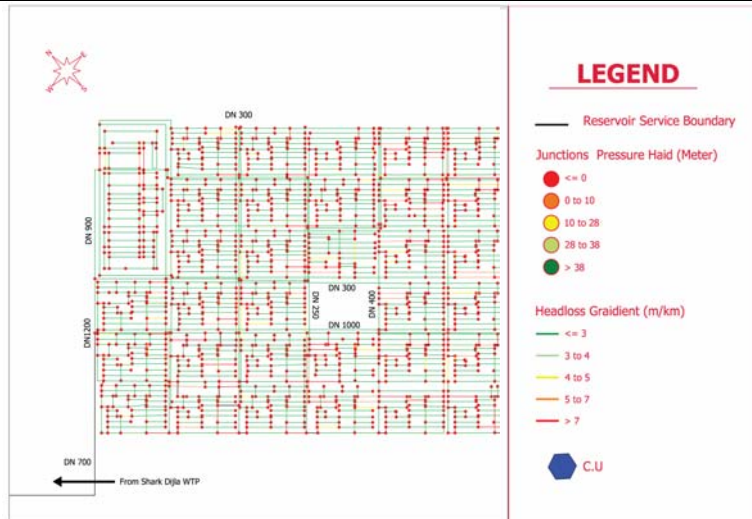
Tokyo Engineering Consultants Co.,Ltd.

**Title**  
DISTRIBUTION NETWORK FOR IMPROVED NETWORK IN WSZ R3 SUPPLY FROM SHARK DJILAH WTP -2005 (ADF, MDF, PHF)

**Figure**

Figure A.3.18

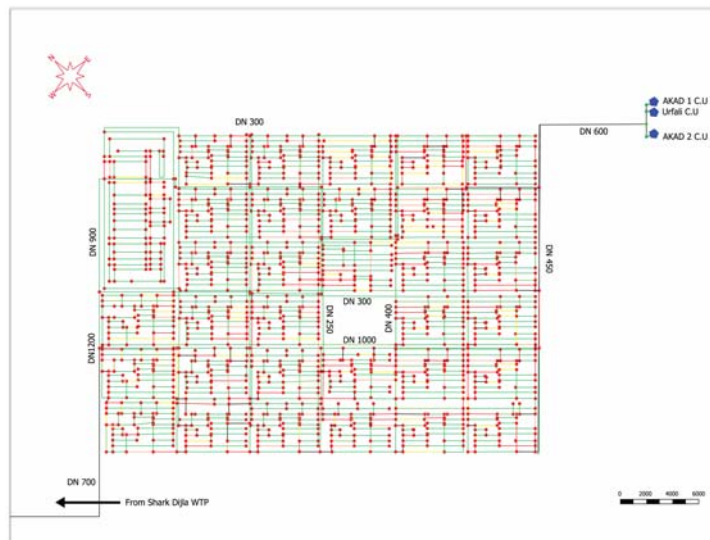
2014-ADF



2014-MDF



2014-PHF



Japan International Cooperation Agency

The Feasibility Study on Baghdad Water Supply System Improvement Project in the Republic of Iraq



NIPPON KOEI CO.,LTD.



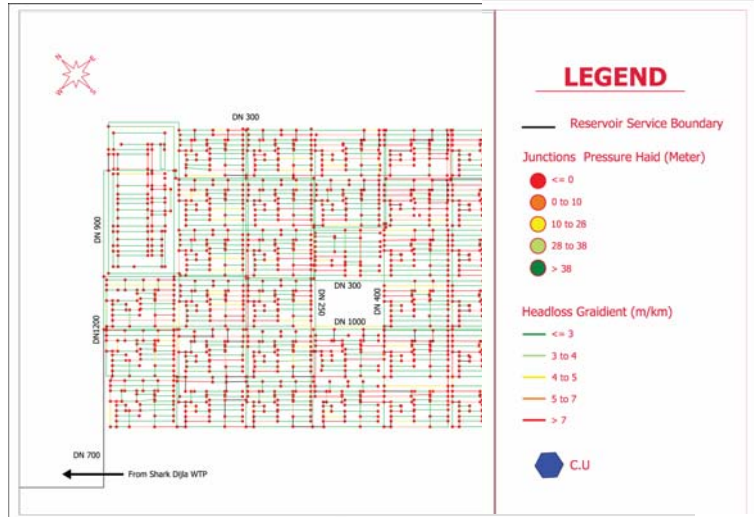
Tokyo Engineering Consultants Co.,Ltd.

**Title**  
DISTRIBUTION NETWORK FOR IMPROVED NETWORK IN WSZ R3 SUPPLY FROM SHARK DJILAH WTP -2014 (ADF, MDF, PHF)

**Figure**

Figure A.3.19

2027-ADF



2027-MDF



2027-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO., LTD.



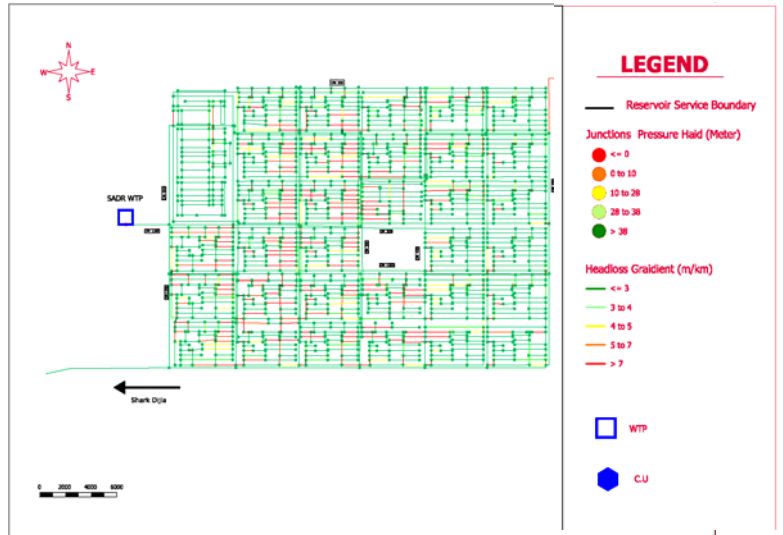
Tokyo Engineering  
Consultants Co., Ltd.

**Title**  
DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R3  
SUPPLY FROM SHARK DIJLAH WTP  
-2027 (ADF, MDF, PHF)

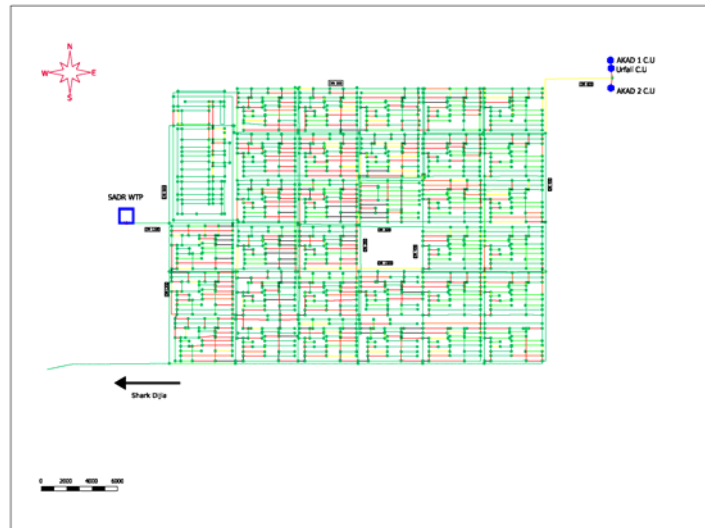
**Figure**

Figure A.3.20

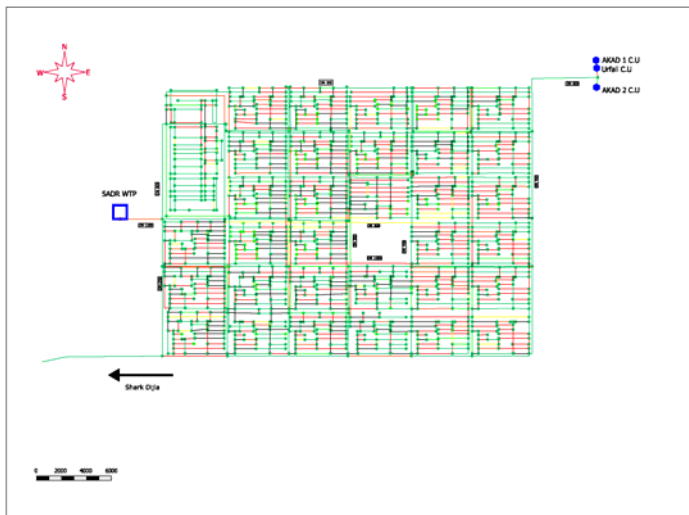
2005-ADF



2005-MDF



2005-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



Tokyo Engineering  
Consultants Co.,Ltd.

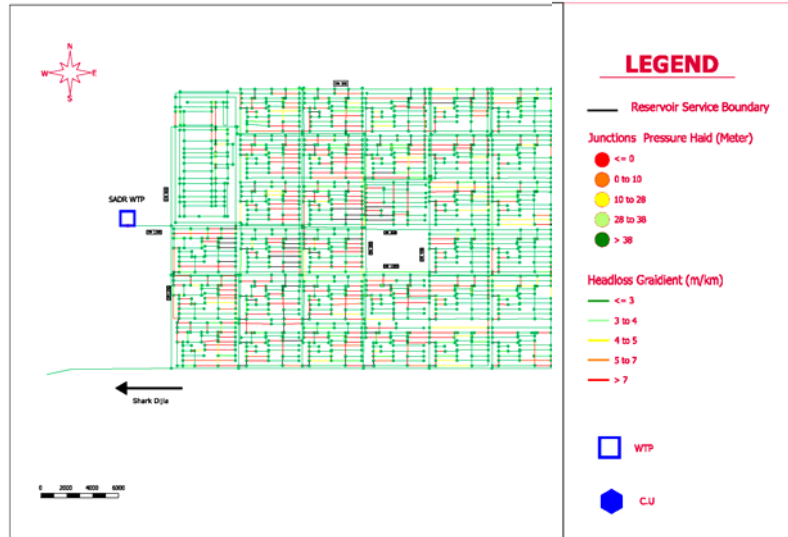
**Title**  
DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R3  
SUPPLY FROM R3 SADR WTP  
-2005 (ADF, MDF, PHF)

**Figure**

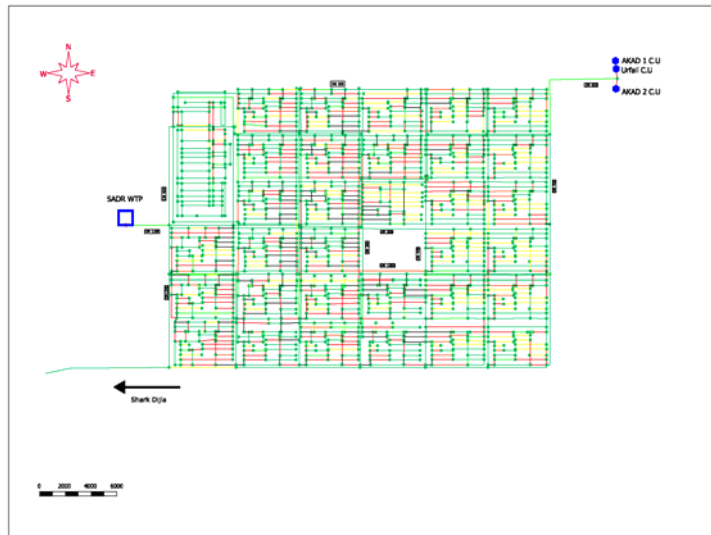
Figure A.3.21



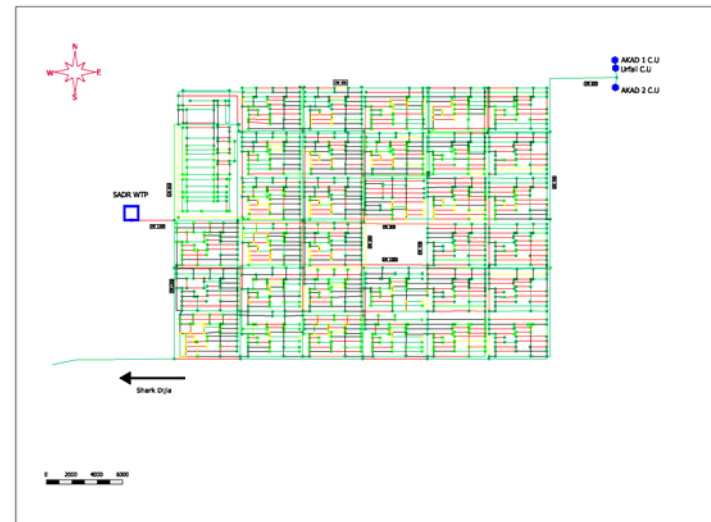
2014-ADF



2014-MDF



2014-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



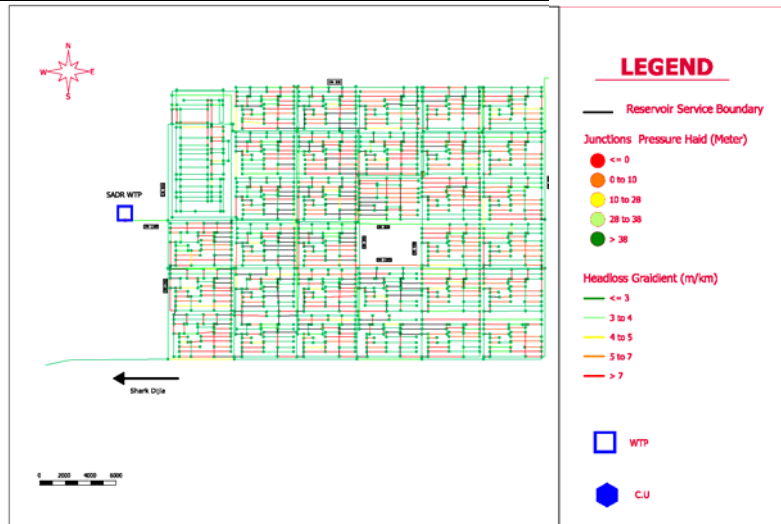
Tokyo Engineering  
Consultants Co.,Ltd.

**Title**  
DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R3  
SUPPLY FROM R3 SADR WTP  
-2014 (ADF, MDF, PHF)

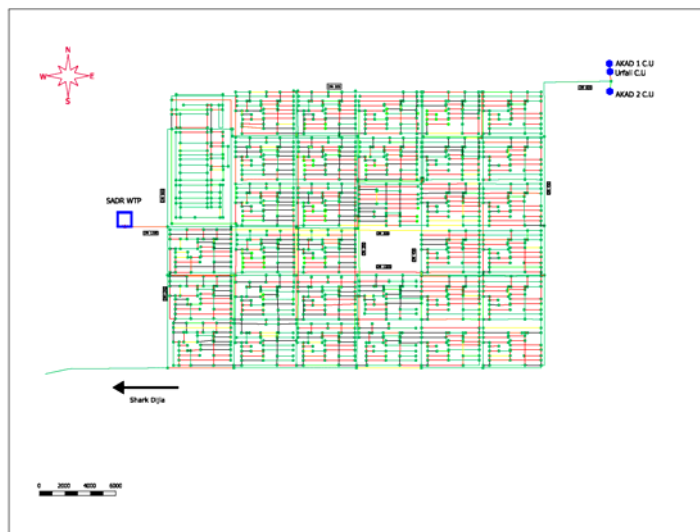
**Figure**

Figure A.3.22

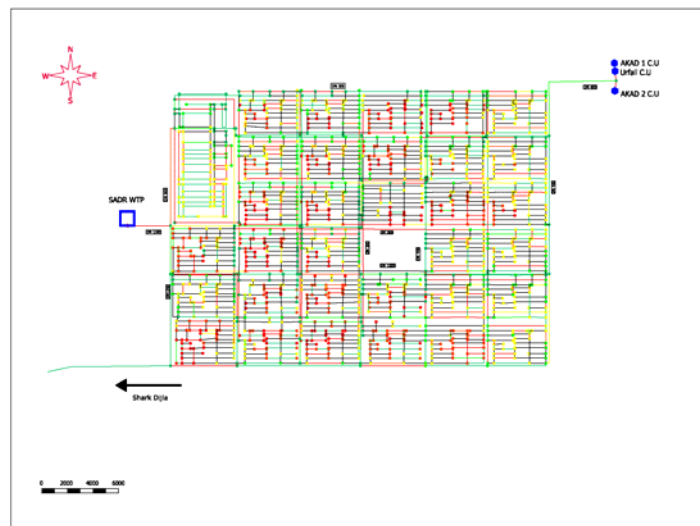
2027-ADF



2027-MDF



2027-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



Tokyo Engineering  
Consultants Co.,Ltd.

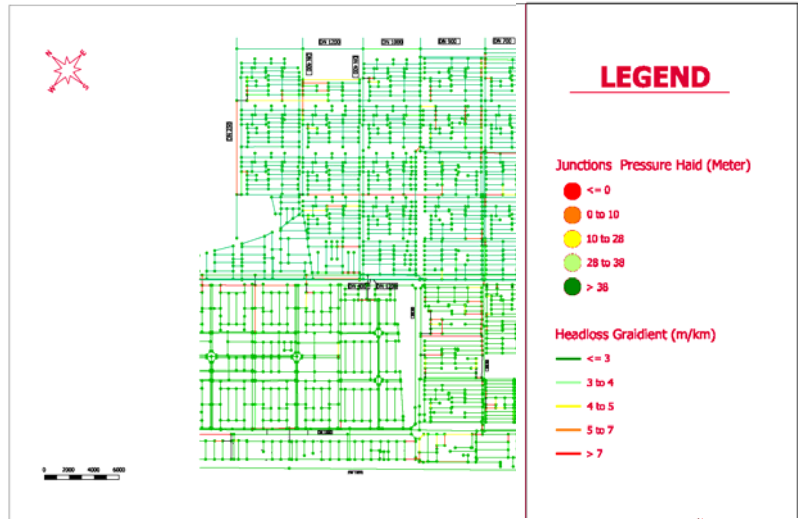
Title

DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R3  
SUPPLY FROM R3 SADR WTP  
-2027 (ADF, MDF, PHF)

Figure

Figure A.3.23

2005-ADF



2005-MDF



2005-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



Tokyo Engineering  
Consultants Co.,Ltd.

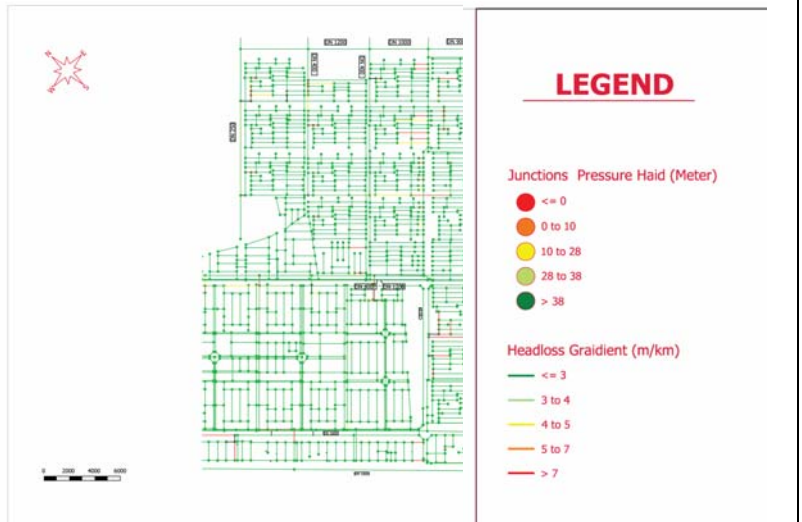
**Title**

DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R14  
SUPPLY FROM SHARK DJLAH WTP  
-2005 (ADF, MDF, PHF)

**Figure**

Figure A.3.24

2014-ADF



2014-MDF



2014-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



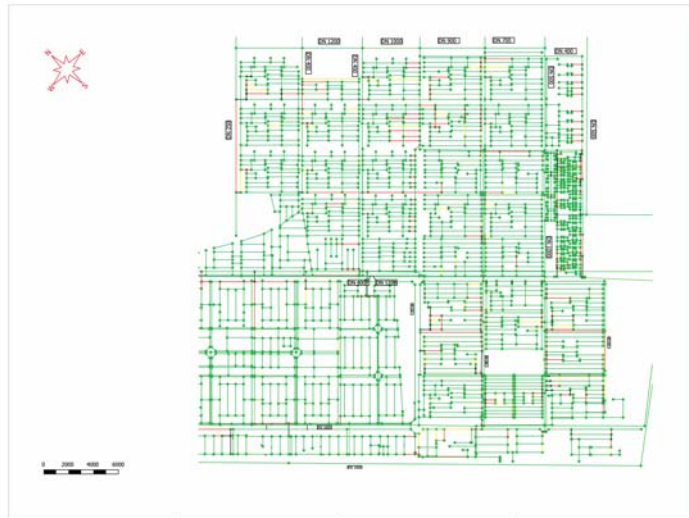
Tokyo Engineering  
Consultants Co.,Ltd.

**Title**  
DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R14  
SUPPLY FROM SHARK DJLAH WTP  
-2014 (ADF, MDF, PHF)

**Figure**

Figure A.3.25

2027-ADF



### LEGEND

Junctions Pressure Head (Meter)

- ≤ 0
- 0 to 10
- 10 to 28
- 28 to 38
- > 38

Headloss Gradient (m/km)

- ≤ 3
- 3 to 4
- 4 to 5
- 5 to 7
- > 7

2027-MDF



2027-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



Tokyo Engineering  
Consultants Co.,Ltd.

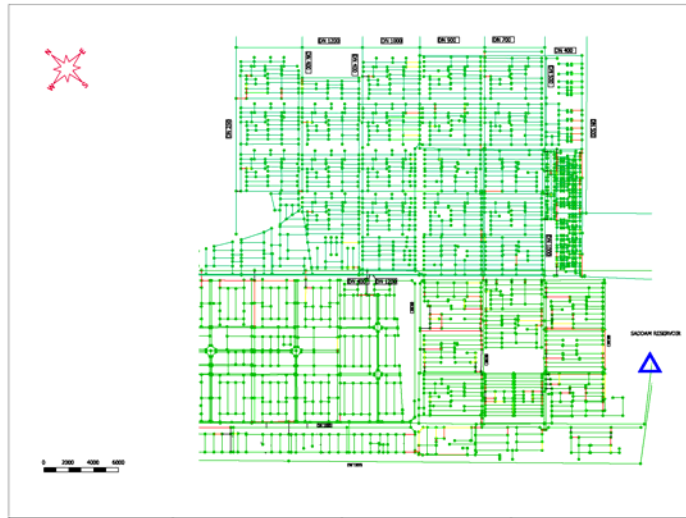
Title

DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R14  
SUPPLY FROM SHARK DJLAH WTP  
-2027 (ADF, MDF, PHF)

Figure

Figure A.3.26

2005-ADF



**LEGEND**

Junctions Pressure Head (Meter)

- ≤ 0
- 0 to 10
- 10 to 28
- 28 to 38
- > 38

Headloss Gradient (m/km)

- ≤ 3
- 3 to 4
- 4 to 5
- 5 to 7
- > 7

▲ Reservoir

2005-MDF



2005-PHF



The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



**Title**  
DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R14  
SUPPLY FROM R14 SERVICE  
RESERVOIR.  
-2005 (ADF, MDF, PHF)

**Figure**  
Figure A.3.27

2014-ADF



**LEGEND**

Junctions Pressure Haid (Meter)

- ≤ 0
- 0 to 10
- 10 to 28
- 28 to 38
- > 38

Headloss Graident (m/km)

- ≤ 3
- 3 to 4
- 4 to 5
- 5 to 7
- > 7

▲ Reservoir

2014-MDF



2014-PHF



Japan International Cooperation Agency

The Feasibility Study on  
Baghdad Water Supply  
System Improvement Project  
in the Republic of Iraq



NIPPON KOEI CO.,LTD.



Tokyo Engineering  
Consultants Co.,Ltd.

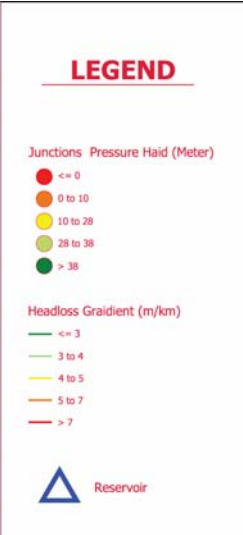
**Title**

DISTRIBUTION NETWORK FOR  
IMPROVED NETWORK IN WSZ R14  
SUPPLY FROM R14 SERVICE  
RESERVOIR. -2014 (ADF, MDF, PHF)

**Figure**

Figure A.3.28

2027-ADF



2027-MDF



2027-PHF



The Feasibility Study on Baghdad Water Supply System Improvement Project in the Republic of Iraq



**Title**  
DISTRIBUTION NETWORK FOR IMPROVED NETWORK IN WSZ R14 SUPPLY FROM R14 SERVICE RESERVOIR. -2027 (ADF, MDF, PHF)

**Figure**  
Figure A.3.29



**APPENDIX B**  
**ENVIRONMENTAL EXAMINATION**  
**OF THE PROPOSED PROJECT**

## APPENDIX B

ENVIRONMENTAL EXAMINATION OF  
THE PROPOSED PROJECT

## TABLE OF CONTENTS

B.1	Environmental Institutions and Examination Process in Iraq.....	B-1
	B.1.1 Environmental Legislation .....	B-1
	B.1.2 Environmental Examination Process in Iraq.....	B-2
B.2	Important Environmental Factors .....	B-5
	B.2.1 Social Environment.....	B-5
	B.2.2 Natural Environment.....	B-6
	B.2.3 Pollution.....	B-6
B.3.	Scoping for the Feasibility Study Level EIA.....	B-6
	B.3.1 Possible Negative Impacts due to the Proposed Project.....	B-6
	B.3.2 Recommendations and Conclusion .....	B-8

## LIST OF TABLES

B.1.1	Environmental Legislation.....	B-1
B.1.2	Necessary Environmental Items for the EIA report as required by the Environmental law/1997 .....	B-2

## LIST OF FIGURES

B.1.1	Flow Chart of Environmental Impact Assessment Process .....	B-3
-------	-------------------------------------------------------------	-----

## APPENDIX B

### ENVIRONMENTAL EXAMINATION OF THE PROPOSED PROJECT

#### B.1 Environmental Institutions and Examination Process in Iraq

##### B.1.1 Environmental Legislation

The Environmental Protection and Improvement Directorate (EPID), which had been a unit of the Ministry of Health (MOH) since 1975, was organized as an independent body and formally disassociated from the MOH in 1997 under the environmental law. EPID mainly carried out the establishment of the guidelines and standards, justification and assessments of environmental issues and monitoring. Later, on September 1<sup>st</sup>, 2003 the Ministry of the Environment (MOE) was created based on the EPID in order to establish effective environmental governance.

Related environmental legislation and laws are listed as shown in Table B.1.1. The basis for environmental law in Iraq is the Environmental Protection and Improvement Law/1997 which is a revised edition of that of 1986. Part of this law was updated again in 2001 as listed in Table B.1.1. Article-18 of the Environmental Protection and Improvement Law/1997 prescribes that the technical and economical feasibility study for any project must include a report about the environmental effects and contain the 6 items shown in Table B.1.2. Additionally, the National Development Strategy 2005-2007/September, 2004 also prescribes that an Environmental Impact Assessment (EIA) shall be conducted for any new reconstruction and development activities.

Environmental Instructions for Industrial, Agricultural and Services Projects/1990 prescribes the kinds of restrictions and project categories of each type of project such as definition, environmental classification, location requirements and environmental requirements.

Standard No.417 on Drinking Water and Analysis, which was updated in 2001, provides that the quality of drinking water must be checked through testing and analyzing.

The MOE is reviewing all environmental legislation and is nearly ready to issue a new version involving the international standards that includes all projects.

Table B.1.1 Environmental Legislation

Law	Enforcement Year
Law No.76 of 1986 on Protecting and Improving the Environment	1986
Law No.3 for the year 1997 on Environmental Protection and Improvement	1997
Updated Law No.73 of the year 1997 on Environmental Protection and Improvement	2001
Environmental Instructions for Industrial, Agricultural and Services Projects	1990
Standard No.417 on Drinking Water and Analysis	2001

Regulation No.25 for the year 1967 on Maintenance of Rivers and Public Waters from Pollution	1967
Noise Prevention Law No.31 for the year 1966	1966
Law No.99 for the year 1980 on Protection from ionized radiation	1980

Table B.1.2 Necessary Environmental Items for the EIA report as required by the Environmental Law/1997

- Evaluation of the positive and negative environmental effects of the project
- Measures to avoid the causes of pollution
- Measures to address possible emergencies and probable sources of pollution
- Possible alternatives using clean environmental techniques, and using the resources economically
- Reducing the amount of solid waste and recycling
- Estimating the relative values of the benefits and any environmental damage

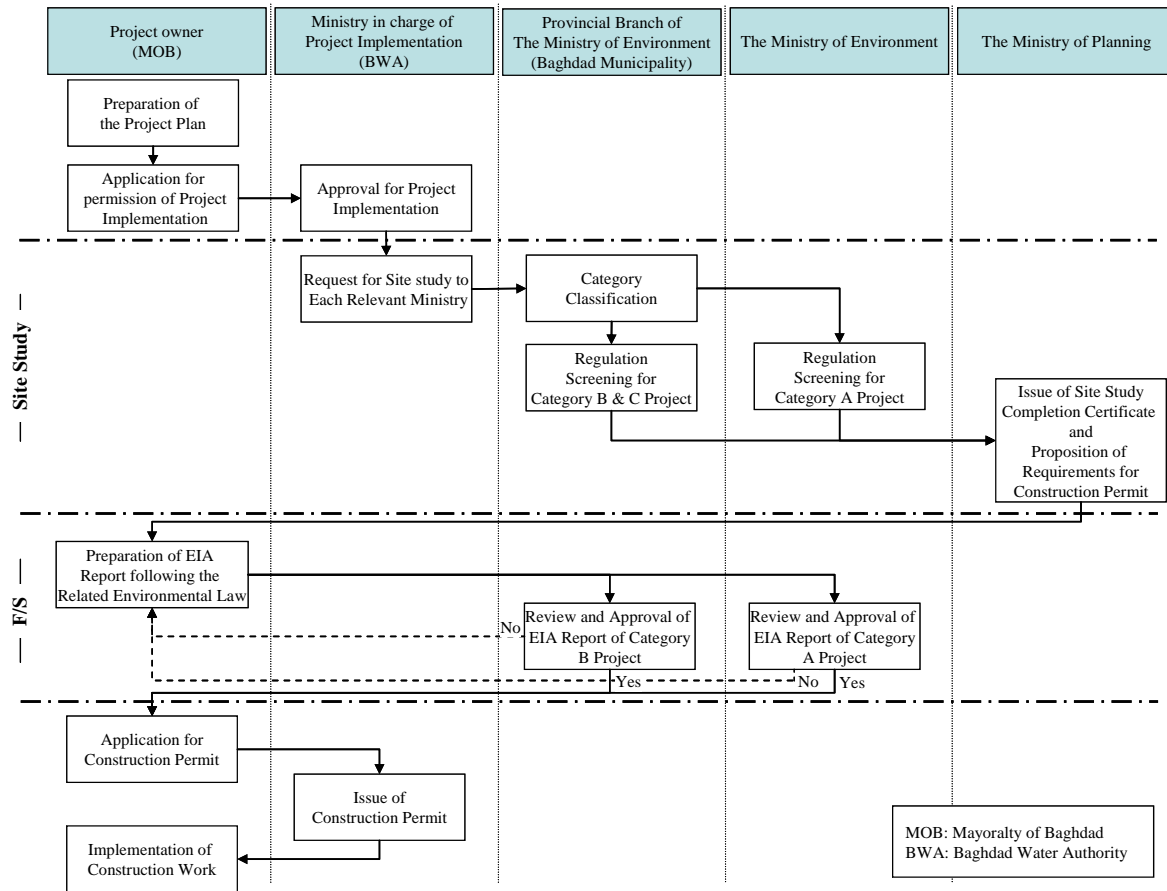
Source: Environmental Law/1997

### B.1.2 Environmental Examination Process in Iraq

The environmental institution consists of two studies. One is the site study based on the Environmental Instructions for Industrial, Agricultural and Services Projects/1990 and the other one is the Feasibility study (F/S) including an environmental examination based on the Environment Protection and Improvement Law/1997, as shown in Figure B.1.1.

The main purpose of the site study is to carry out the Screening. The provincial branch office of the MOE divides the projects into categories 'A', 'B' or 'C' as to the severity of the environmental impacts. In case of being rated as 'A' or 'B', the project owner has to prepare the Terms of Reference (TOR) for the environmental examination. An environmental examination is conducted as a part of the F/S after the Ministry of Planning approves the results of the site study. An environmental examination will be requested if the project category is rated 'A' or 'B' according to the classification stage of the site study. The project owner would then prepare the EIA report in compliance with the Environmental Law/1997. Generally, category 'C' projects will not need an environmental examination, and then the environmental examination process would continue to the next stage without preparation of an IEE and EIA report.

The screening and scoping for the proposed projects are to be carried out by the Iraqi side through the Environmental Department in the Mayoralty of Baghdad (MOB) in cooperation with the JICA study team through discussions in the technical meeting in Amman in accordance with the Iraqi environmental law. The JICA environmental guideline will be applied if these environmental processes are not covered in the related Iraqi environmental law. After the MOE reviews and approves the EIA report, a construction permit will be issued by the ministry in charge of the project implementation.



Source: JICA study team through interviews with the Environmental Department of Baghdad Mayoralty

Figure B.1.1 Flow Chart of the Environmental Impact Assessment Process

(1) Screening

The screening was conducted for the planning of the project in compliance with the Iraqi environmental law and JICA guideline for Environmental and Social considerations from the viewpoints of the following items.

- 1) Possible negative impacts on the environment based on the results of the screening checklist.
- 2) Legal requirements of the EIA based on Iraqi legislation.

The following three categories were used for the screening process based on the Environmental Instructions/1990 and the JICA environmental guideline.

Category A:	Projects are likely to have significant adverse impacts on the environment and society.
Category B:	Potential adverse impacts from the Projects on the environment and society are less adverse than those of Category A projects.
Category C:	Projects are likely to have minimal or little adverse impacts on the environment and society.

The results of the screening are shown in DATA BOOK 3 in Volume IV. The proposed projects were rated as category 'B' according to the screening conducted by the Environmental Department in the MOB because it will be limited to improving the water supply system as opposed to a category 'A' project with high environmental impacts.

#### (2) Scoping

The scoping was conducted for the expected impacts to be caused by the project implementation in order to identify the most favourable construction methods and mitigation measures, including their alternatives. The scoping was done using the format of the JICA environmental guideline.

#### (3) Initial Environmental Examination of the Proposed Projects

The proposed projects for the water supply system improvement are mainly composed of replacement of the old Asbestos Cement Pipes (ACP) and Cast Iron Pipes (CIP) with new Ductile Iron Pipes (DIP) and installation of water meters to all subscribers in water supply zones R2, R3 and R14 in Baghdad city. An initial environmental examination (IEE) was conducted for the proposed projects by the Environmental Department of the MOB. The main items of the IEE affecting the environment either positively or negatively that could be caused by the implementation of the proposed projects are as follows;

Positive impacts	Negative impacts
<ul style="list-style-type: none"> <li>• Reducing UFW leads to reducing the cost of the operation and maintenance of the water supply network</li> </ul>	<ul style="list-style-type: none"> <li>• Fine fibre of ACP affect human health</li> <li>• Blocking traffic during construction</li> <li>• Noise from heavy machines</li> <li>• Generating waste soil</li> <li>• Possibility of damaging underground utilities</li> </ul>

Potential environmental impacts were examined using the factors described in section B.1.2 (Important Environmental Factors). Based on those identified environmental impacts, measures to minimize them were proposed as shown in section B.1.3 (Scoping for the Feasibility Level EIA).

#### (4) Disclosure of Information and Stakeholder Meeting

Disclosure of information basically occurs after the screening process. Basically, the project name, country, location, project descriptions, sector and category shall be disclosed. This process is included in the JICA environmental guideline, and is also prescribed in the law of Environment Protection and Improvement/1997 article-12. Article-12 provides the necessity

of discussing the project impacts with the stakeholder. However, as the project under study has no severe negative affect on the citizens, Baghdad Water Authority (BWA) participated alone in the discussion and information exchange with the Environmental Department in the Mayoralty of Baghdad, which is in charge of preparing the EIA report.

(5) Other Related Donor's Projects

USAID

The USAID project is being conducted to improve the water supply system including replacement of old ACP in Sadr city. No environmental examination was carried out on the project. Instead of an EIA report, an Environmental Check List dated September 2004 was adopted.

World Bank Projects

Projects funded by the World Bank are to be implemented in Baghdad city. Environmental and Social Screening and Assessment Frameworks (ESSAF), which are only for the emergency reconstruction projects in Iraq, were applied in that project. ESSAF aim to assist the project implementation agency in screening all the subprojects for their social and environmental impacts, identify documentation and preparation requirements and prioritize the investments. ESSAFs were prepared on many kinds of emergency projects. ESSAF Report No. E1022 was prepared for the Iraq emergency Baghdad water supply and sanitation project.

In the Project Information Document (PID) of the emergency Baghdad water supply and sanitation project dated September 9, 2004, the water supply projects in Baghdad City including water mains, distribution pipes, sewer collectors, pumping station, small treatment plants, and auxiliary facilities were classified 'B'.

## **B.2 Important Environmental Factors**

The environmental examination identified that the following potential environmental factors are related to the implementation of the proposed projects.

### **B.2.1 Social Environment**

#### **(1) Land Acquisition, Resettlement and Cultural Assets**

It is supposed that no new land acquisition, resettlement or damage to cultural assets will take place in the proposed project area because the new pipe installation work will be carried out along the path of existing pipes installed under the roads.

(2) Noise and Vibration

There is a possibility that the noise and vibration caused by using heavy machines during construction works of excavating the ground or cutting of pipes could affect the psychological health of the people.

(3) Traffic

Blocking the traffic during the construction has to be minimized to affect usual daily life or commercial activities although the replacement works are unlikely to have a significant impact around the proposed area.

**B.2.2 Natural Environment**

(1) Flora and Fauna

Pipe installation works are for replacement of old Asbestos Cement Pipe (ACP) and Cast Iron Pipes (CIP). Flora and Fauna will not be affected because new Ductile Iron Pipes (DIP) are to be replaced along the path of the old pipes under the roads.

**B.2.3 Pollution**

(1) Effect to Health by Disposal of Old Asbestos Cement Pipes

The project is for installation of new Ductile Iron Pipes (DIP) to replace old ACP. There is a possibility of health problems to the persons engaging in the removal or cutting of old ACP due to absorbing the fine fibre of asbestos.

(2) Water Pollution

There is a possibility that the chlorinated discharged water to the river is to be affected on the environment negatively.

(3) Waste Soil

The remaining waste soil shall be transported to a suitable place. On the other hand, it is possible that the waste soil could become contaminated if sewage or drainage pipes adjacent to the old ACP are broken by the excavating machine during construction.

**B.3 Scoping for the Feasibility Study Level EIA**

**B.3.1 Possible Negative Impacts due to the Proposed Project**

An EIA was conducted by the Environmental Department in the Mayorality of Baghdad (MOB) in cooperation with the JICA study team through discussions in a technical meeting in Amman. The main environment and social impacts listed above in section B.2 due to the proposed project implementation are considered in detail as follows;



(1) Noise and Vibration

The level of noise and vibration due to the use of heavy machines, such as excavators and compactors, during construction works of removal or cutting of old Asbestos Cement Pipes (ACP) has to be minimized, although construction works will not be carried out during the night time due to security reasons according to the present situation in Iraq. The expected level of noise and vibration is not hazardous to the general health of the people since it is supposed that the level of noise is the same as traffic noise during the daytime.

(2) Effect on Health by Disposal of Old Asbestos Cement Pipes

The dust released has to be minimized during the construction.

The replacement of old ACP will be done without cutting as much as possible. Old ACP will be left buried in situ after replacement with the new Ductile Iron Pipes (DIP). When cutting old ACP, workers will use masks to protect themselves against fine fibre of ACP and spray water on the construction site in order to keep it wet during construction.

USAID published a Weekly update dated July 28, 2005, in which disposal of old ACP was mentioned. And the article concluded that the form of disposal currently being proposed would be suitable. It was proposed that the old ACP was also to be left buried in that project.

(3) Discharged Water

Disinfection of the inside of pipes is necessary after installation of new pipes. Normally a 10ppm concentration of chlorinated water is used for disinfection of pipes in Japan. The location where the chlorinated water is to be discharged must be investigated from the viewpoint of negative environmental effects.

According to the technical specifications of the USAID project dated February 8, 2005, the environment to which the chlorinated water is to be discharged shall be inspected. If there is any possibility that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to be wasted to thoroughly neutralize the residual chlorine.

(4) Waste Soil

Excavated soil shall be used mainly as backfill material. If any remaining waste soil is generated, it must be transported to a suitable place. The sewer and drainage pipe locations must be identified before implementation of pipe replacement work in the project in order to avoid damaging the sewer during construction work. A typical section of the underground facilities such as sewer, telecommunication and electricity is shown in DWG-08 in DATA BOOK 2 of Volume IV. It seems that they will not be affected during construction.

### B.3.2 Recommendations and Conclusions

#### (1) Recommendations

The following are recommendations based on the EIA report for reduction of negative environmental effects as much as possible.

- 1) Any excess soil generated by the replacement works has to be transported to a suitable place where it will not affect the surroundings although the excavated soil is mainly to be used as a backfill material.
- 2) Interfering with the activities of daily and commercial life during construction has to be minimized.
- 3) Providing drinking water tanks is a good way to deal with problems such as cutting off the water supply during construction.

#### (2) Conclusions

IEE and EIA were conducted by the Iraqi side through the Environmental Department of the MOB through cooperation with the JICA study team through discussions in the technical meeting in Amman.

The EIA report (see attachment in DATA BOOK 3 in Volume IV) was approved by the Ministry of Environment (MOE) with the following comments. Especially, the most sensitive issue mentioned, 3), was about the Asbestos Cement Pipes (ACP) although they were assured that the proposal in the EIA was for the ACP to be left buried in situ.

- 1) It is preferred that the new water supply pipes would be made of Glass Fibre Reinforced plastic subject to availability.
- 2) The alignment of the new water supply pipes shall be at a depth that is far removed from the sewage network in the area to reduce the possibility of water pollution problems.
- 3) The old network pipes shall be collected and transported to special places since they contain the hazardous Asbestos material.
- 4) The drinking water for the network shall comply with the First Edition of Iraqi Standard No. 417.

Through the discussions between BWA and the MOE, the above issue was solved in a letter shown in DATA BOOK 3 in Volume IV. It was confirmed that no Environmental Law and/or Guideline in Iraq prescribes the elimination of ACP as shown in the attached letter in DATA BOOK 3 in Volume IV. The MOE approved the proposal that the ACP will be left buried in situ after Project implementation.

**APPENDIX C**  
**INSTITUTIONAL ISSUES**  
**AND FINANCIAL AFFAIRS**

APPENDIX C  
INSTITUTIONAL ISSUES  
AND FINANCIAL AFFAIRS

TABLE OF CONTENTS

	<u>Pages</u>
C.1. Institutional Issues .....	C-1
C.1.1 Organization of BWA .....	C-1
C.1.2 Organization of Municipalities .....	C-15
C.2. Water Tariff .....	C-16
C.2.1 Present Water Tariffs .....	C-16
C.2.2 Problems Analysis.....	C-17
C.2.3 The Need for Change .....	C-19
C.3. Customer Metering, Billing and Collection.....	C-20
C.3.1 Billing and Collection System of BWA.....	C-20
C.3.2 Problems Analysis.....	C-21
C.3.3 The Need for Change .....	C-22
C.4. Financial Management.....	C-22
C.4.1 Budget System .....	C-22
C.4.2 Financial Management of BWA .....	C-23
C.4.3 Accounting System .....	C-24
C.4.4 The Need for Change .....	C-27

LIST OF TABLES

C.1.1 Break Down of BWA Staff Number by Educational Background (1/2) .....	C-2
C.1.1 Break Down of BWA Staff Number by Educational Background (2/2) .....	C-3
C.2.1 BWA Water Tariff Regulations .....	C-16
C.2.2 Water Tariff Regulation for Subscribers without Meters .....	C-17
C.3.1 Situation of Access to the Meters for Reading .....	C-21
C.4.1 Profit and Loss Statement of BWA .....	C-24
C.4.2 Accounting System of Iraqi Government .....	C-26

LIST OF FIGURES

C.1.1 BWA Organization .....	C-4
C.1.2 Planning & Follow Up Section Organization .....	C-5
C.1.3 Implementation Section Organization .....	C-6
C.1.4 Design Section Organization .....	C-7
C.1.5 Operation & Maintenance Section Organization .....	C-8
C.1.6 Quality Control Section Organization .....	C-9
C.1.7 Machinery (Vehicle) Section Organization .....	C-10
C.1.8 Computer (Billing) Section Organization .....	C-11
C.1.9 Administration & Finance Section Organization.....	C-12
C.1.10 Stores (Warehouse) Section Organization .....	C-13
C.1.11 Auditing Section Organization .....	C-14
C.1.12 Typical Organization Chart of Municipality .....	C-15
C.2.1 Water Tariff for a Typical Residential Subscriber in Neighbor Countries .....	C-19

C.4.1 Audit Balance Form (2006) ..... C-25

## APPENDIX C

### INSTITUTIONAL ISSUES AND FINANCIAL AFFAIRS

#### C.1 Institutional Issues

##### C.1.1 Organization of BWA

BWA is the sole entity responsible for operation and maintenance of the main water intakes, treatment plants, transmission lines, storage reservoirs, and water distribution network pipes of diameter 300 mm and above in Baghdad. Regarding the organizational structure of BWA, firstly the Director General (DG) incorporates three Deputy Offices and two sections. The Deputy DGs have responsibility for the administrative issues and technical issues, respectively. Six technical sections are under the responsibility of the two Technical Deputies, and four sections are under the Administrative Deputy.

The Design section has the responsibility for all designing for the entire water supply network in Baghdad. The Implementation section, whose main duty is to carry out operation and maintenance services for water distribution pipes and the Operation and Maintenance section, which deals with operation and maintenance of the eight water treatment plants (WTPs), eight reservoirs, booster pump stations, and raw water supply, are responsible for all technical services regarding water supply. The Vehicle section and Quality control section support the above two executing sections' works. As a research and development institution, The Planning and follow up section plays an important role in both the design and implementation stages. Through field research, this section feeds back the operating issues and solutions based on the customer needs analysis to the Design section. As shown in Table C.1.1, the senior engineers of these technical sections seem proficient, whereas there are no administrative specialists who especially have financial and management skills. The organizational structure of each section is summarized in Figures C.1.1 to C.1.11.

Table C.1.1 Break Down of BWA Staff Number by Education Background (1/2)

No.	Category	MS.C.	High Diploma	B.S.C.	Diploma	Junior High	Medium School	Elementary School	Literate	Total
1	<b>Director General</b>			1						1
	Director General Office			5	2	2	2		1	12
2	<b>Auditing Section Head</b>			1						1
	Stores Auditing Unit			1	2	2				5
	Store-In Auditing Unit			2		4				6
	Store-Out Auditing Unit				2	2				4
	Auditing Assistant					1				1
3	<b>Tenders &amp; Contracts Section</b>		1	1	1	1				4
4	<b>Administrative Deputy</b>			1						1
	Deputy Office			1			2			3
5	<b>Legal Section</b>			5	1					6
6	<b>Stores Section</b>			1						1
	Head Office Stores				1		1			2
	Wathba Stores			2	6	4	3	2	1	18
	Taji Stores					1	1			2
	Yousifiyah Stores					2				2
	Shark Dijila Stores				1			1		2
	Wahda Stores					1		2		3
	Otaifiyah Stores				1					1
	Taremiyah Stores				2		1	2	2	7
7	<b>Head of Computer Section</b>			1						1
	Head of Section Office			1		3		1		5
	Programming & Printing Branch			3	1	2	1			7
	Data Entry Unit			2	1	3	3			9
	Bills Auditing & Preparation Unit			1	2	4	1			8
	Inquiries Unit					2				2
	Reading & Distribution Branch H.Office			1	1	2	1	1		6
	R & D Rasafa A Group				2	6	1	2		11
	R & D Rasafa B Group			1	6	2	1			10
	R & D Kadhemiyah Group			1	4	8		4		17
	R & D East Kanat				2	6	6	1		15
	R & D West Kanat			1		7	2	1		11
	R & D Bavaa Group			1	3	8	3	3		18
	R & D Karada Group			1	1	5	3	2		12
	R & D Adhamiyah Group			1	1	7	7	4		20
	R & D Doura Group			1	3	3	4	2		13
	R & D Sadr City Group			1	3	9	8	6		27
	R & D Mansour Group			1	7	12	3	1		24
	Customers Services Unit				1	8	4	2		15
	Insurance & Tariff Unit			1		2		1		4
	Rasafa Priorities Unit					2	1	3		6
	Karkh Priorities Unit			1		1	2	2		6
	Subscriptions Branch			3	4	12	13	6		38
	Guages Branch			1	1	3	4	12		21
	Services Auditing Branch			1	1	4	1			7
	Water Supply Branch					2	4			6
8	<b>Head of Admin. &amp; Financial Affair Section</b>			1						1
	<i>Chief of Administration</i>			1						1
	Personnel Branch			1	1	7		2		11
	Regular Staff Branch			1		1		1		3
	Pension Branch					1	1			2
	Documents Branch					1				1
	Archives Branch				1	2	2	1	1	7
	Printing Branch							2		2
	Data Bank Branch						1			1
	Contracts Branch			1	2		1		1	5
	Printer Branch						6		2	8
	Papers Branch				2	2	3	7		14
	Information Unit						1	1		2
	Postal Unit								2	2
	<i>Chief of Finance</i>					1				1
	Salaries Organizing Unit				1	4				5
	Staff Salaries Unit				1			1		2
	Taxes Unit				1	2	1			4
	Bills Auditing Unit				2	3	1			6
	Computer Unit					1	1			2
	Cash Unit				3	11	2	2		18
	Budget Unit			1	2	3				6
	Acquittances Unit			1	2	2			1	6
	Expenditures Unit		1	3	3	4				11
	Planning Unit			1	2					3
	Properties Unit			1		2	1	1		5
	Warehouses Unit			1	3	10	1			15
	Bills Registry Unit				1					1
	Assistants			1	2					3

Table C.1.1 Break Down of BWA Staff Number by Education Background (2/2)

No.	Category	MS.C.	High Diploma	BS.C.	Diploma	Junior High	Medium School	Elementary School	Literate	Total
9	<b>Technical Deputy</b>			2						2
	Deputy Office			4	2	2				8
10	<b>Head of Implementation Section</b>			1						1
	Networks Branch			1						1
	Execution Branch	1	1	11	1	4	3	2	1	24
	Control Branch					4	3	9		16
	New Karkh Networks Branch			5	1	2	2	11		21
	Karkh Unit				2	8	2	2		14
	New Rasafa Networks Branch	1	1	9	9	5	7	24	4	60
	Rasafa Unit			1	3	7	1			12
	Mansour Maintenance		1	3	3	2		8	1	18
	Qadissia Maintenance		1	2	4	3	2	7		19
	Kilani Maintenance					3	1	8	2	14
	Services Branch	1		8	7	9	8	21	15	69
11	<b>Machinery (Vehicle) Section</b>			4	2	3	6	33	7	55
12	<b>Head of O &amp; M Section</b>			1						1
	Head of Section Office			1	1		4	1		7
	Chemical Branch			1	1	1		2		5
	Electricity & Generators Branch			2		1	1	1	1	6
	Karkh Water Plant			16	13	20	13	86	5	153
	Transmission Lines			6	1	3	2	8	1	21
	Karama Water Plant			8	5	3	1	3	8	28
	Wathba Water Plant			5	3		6	20		34
	Rasheed Water Plant			3	1	3		6	6	19
	Doura Water Plant			5	3	2	2	9	6	27
	Wahda Water Plant			1	4	2	1	1	7	16
	Shark Dijila Water Plant			13	15	10	6	5	7	56
	Qadissia Water Plant			9	4	2	1	8	2	26
	Taji Reservoir			4		2	3	7	1	17
	Rostamiyah Reservoir			3		1	2	1	1	8
	Northren Reservoir			6	6	5	3	18		38
	Southern Reservoir			6	8	5	7	6	2	34
	Obaidi Reservoir			2	4	2	1	9	1	19
	Abu Gharib Reservoir			2	3		7	5	10	27
	Rasafa Boosting Station		1	8	14	11	10	8	3	55
	Karkh Boosting Station			8	16	15	4	10	3	56
	Raw Water Boosting Station			9	14	7	8	5	10	53
	Karkh Compact Unit			3	11	8	23			45
	Sadr City Compact Unit			1	7	6	10	19		43
	Al Obour Compact Unit				8	2	7	10	4	31
	Boetha Compact Unit			1	1		11	1		14
	Abu Nowas Compact Unit			2	9		1	8		20
	Kamaliyah Compact Unit			2	2		1	2	2	9
	Taji compact Unit			3		4		6	4	17
	Senak & Jumhoriyah Compact Unit			1		1				2
13	<b>Head of Planning and Follow-Up Section</b>			1						1
	Quantity Survey Branch			6	2	2			1	11
	Follow-Up Branch			4	1					5
	Industrial Safety Branch			1	2					3
14	<b>Head of Design Section</b>			1						1
	GIS Branch			2	2					4
	Studies & Research Branch			3						3
	Auto CAD Branch			1	2	2				5
	Networks Branch	1		5				3		9
	Electrical & Mechanical Branch	1		2						3
	Structure Branch			2						2
	Drawings (Drafting) Branch				8	2	1			11
	Assistants				1	2				3
15	<b>Head of Quality Control Section</b>	1								1
	Head of Section Office			1	1			1		3
	Quality Control Laboratory			6	1			2		9
	Karkh Laboratory			6		1	1	1		9
	Wathba Laboratory			7		2				9
	Shark Dijila Laboratory			2	2	2		1	1	8
	Karama Laboratory			9		2	3			14
	Qadessia Laboratory	1		8	2	1	1			13
	Doura Laboratory	1		6	1	1	1		1	11
	<b>Gross Total</b>	<b>8</b>	<b>7</b>	<b>316</b>	<b>305</b>	<b>385</b>	<b>282</b>	<b>477</b>	<b>128</b>	<b>1908</b>

\*Source: BWA as of 12/10/2006



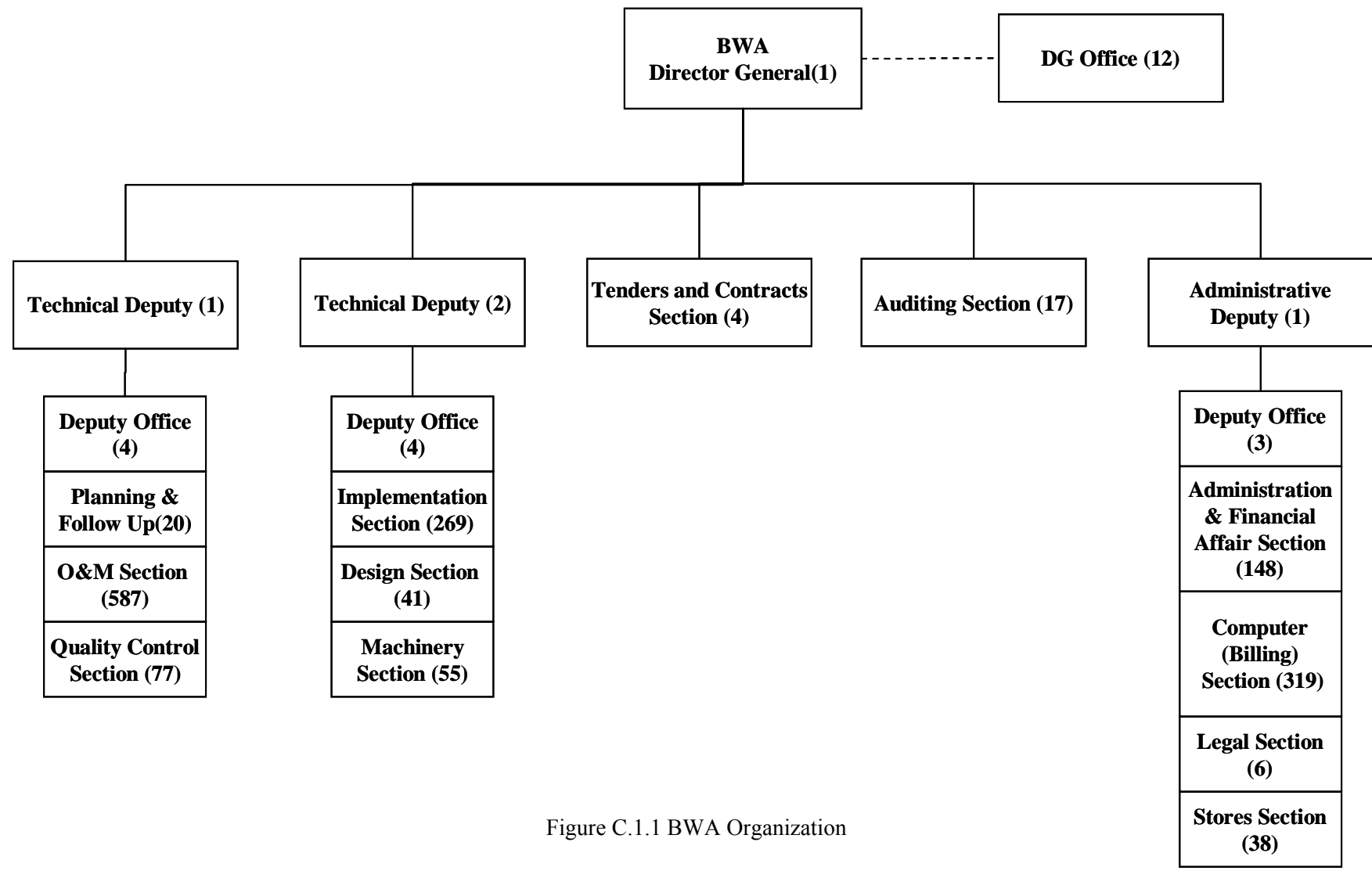
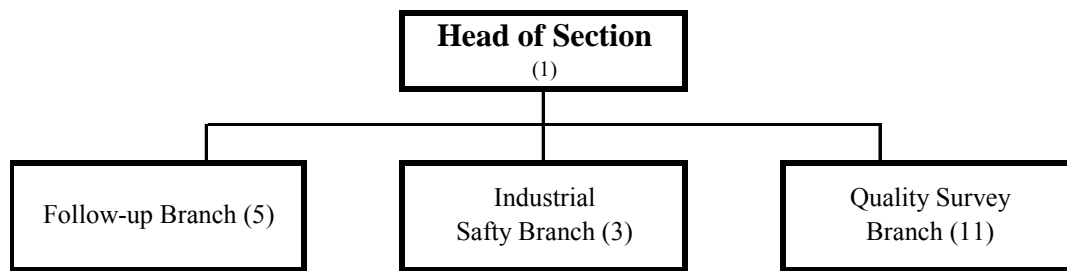


Figure C.1.1 BWA Organization



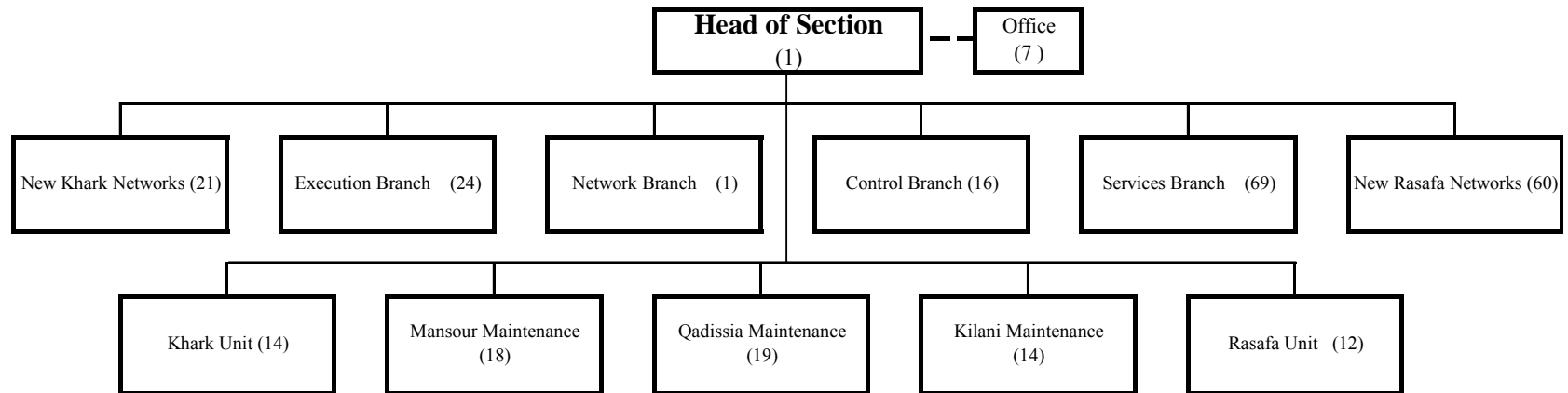
### Main tasks of the section

- 1 Collecting investment and production plans which are prepared by the other sectors, and also assesing the balance total development plan.
- 2 Monitoring and following up implementation of the approved plans and proposing solutions for implementation
- 3 Carrying out capacity development and traning programs to BWA staff in coordination with Training intitutes like the national center for planning and administrative development, universities, the Engineers association or the vocational training institute related to Baghdad mayoralty.
- 4 Collecting and classfyng statistical data concern to BWA's activities for planning and follow-up the project implementation and reporting those data to Ministry of Planning.
- 5 Restructing and empowering human resources according to each sectoral work in order to improve operation and management efficiently .
- 6 Undertaking university and institute students for OJT program

*\*Digits indicate staff number*

*\*Source: BWA as of 01/06/2006*

Figure C.1.2 Planning & Follow Up Section Organization



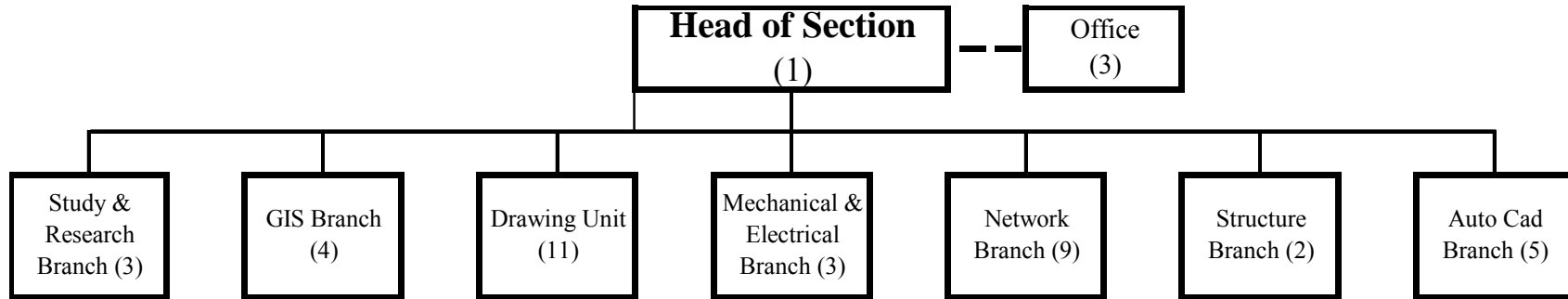
Main tasks of the section

- 1 Controlling the main water locks which are distributed according to the required pressures, also preparing plans for maintenance of the locks both managed by the BWA (main locks) and by the local council (secondary locks)
- 2 Managing water networks through numbering according to water connections where Municipalities are obligated to execute these orders.
- 3 Repairing breakage, leakage and water outlets in distribution network pipes.

*\*Digits indicate staff number*

*\*Source: BWA as of 01/06/2006*

Figure C.1.3 Implementation Section Organization



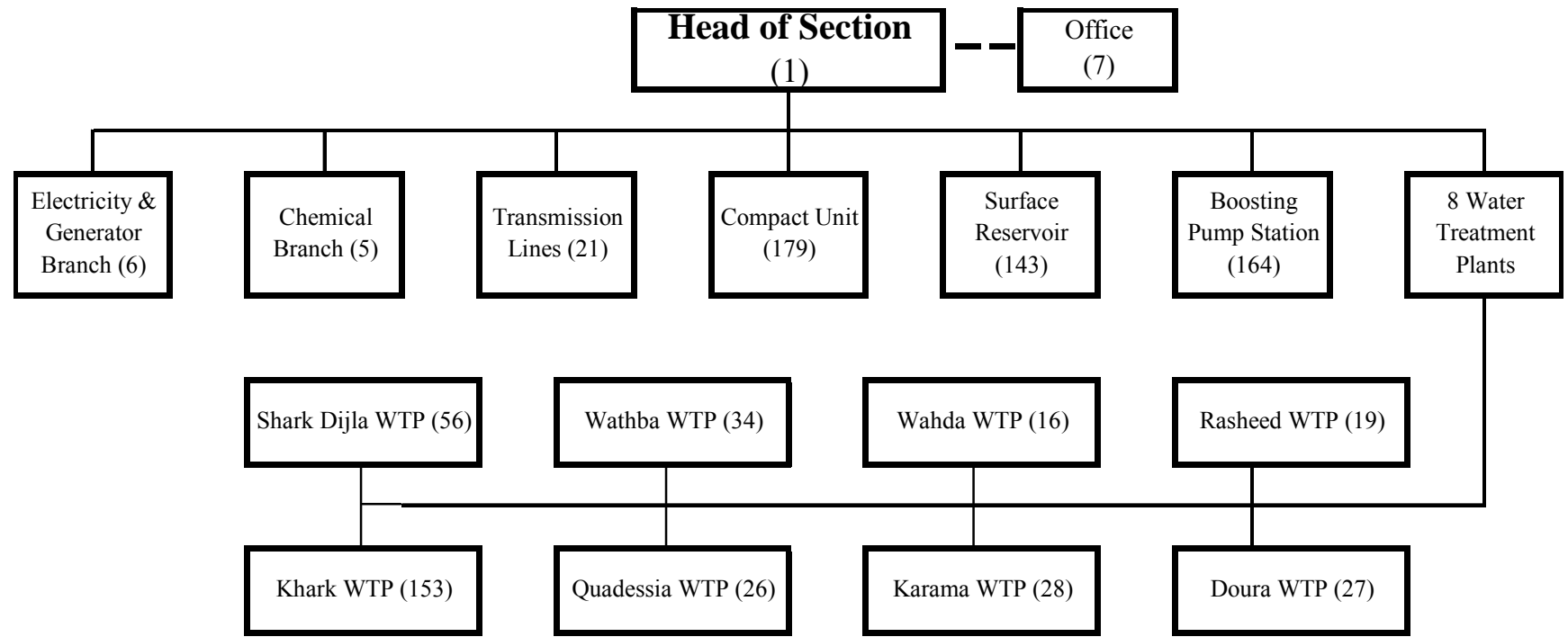
Main tasks of the section

- 1 Preparing the design for potable water and raw water networks
- 2 Preparing the design for construction works
- 3 Preparing the tender documents
- 4 Carrying out field surveys in order to hear the customer's request for the service improvement

*\*Digits indicate staff number*

*\*Source: BWA as of 01/06/2006*

Figure C.1.4 Design Section Organization

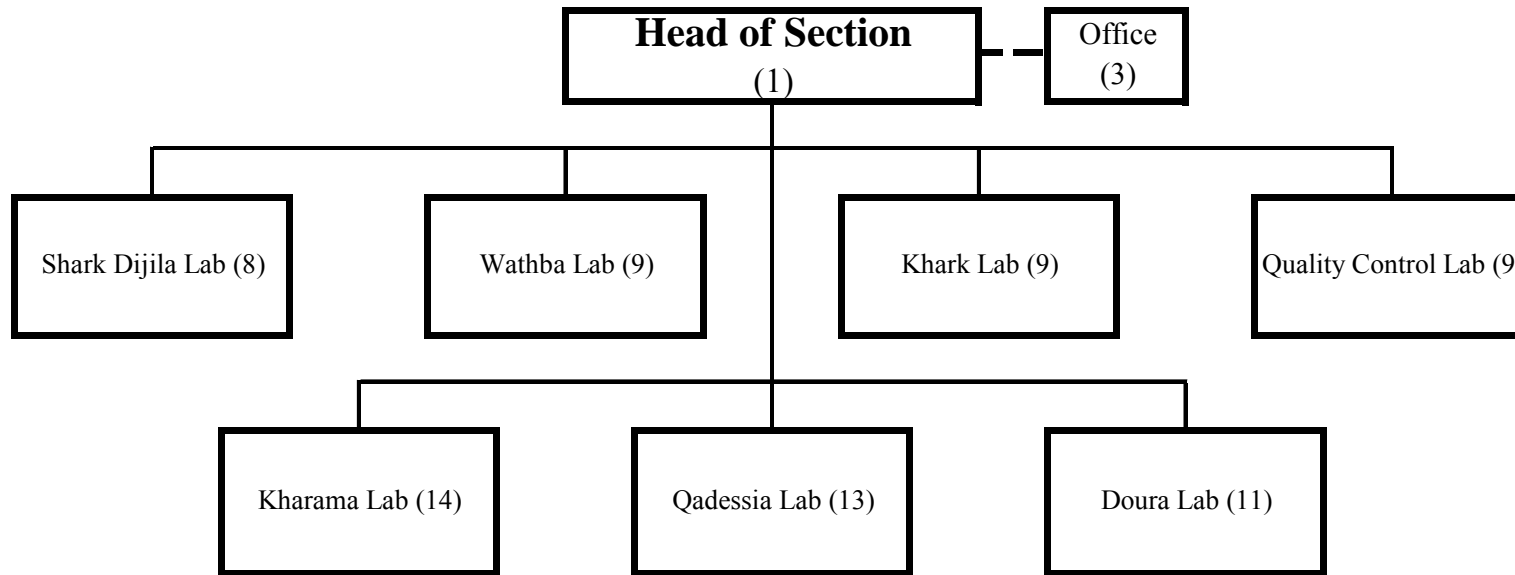


Main tasks of the section

-Operating and managing 8 water treatment plants (WTPs), 8 reservoirs, booster pump stations, and raw water supply.

*\*Digits indicate staff number*  
*\*Source: BWA as of 01/06/2006*

Figure C.1.5 Operation and Maintenance Section Organization



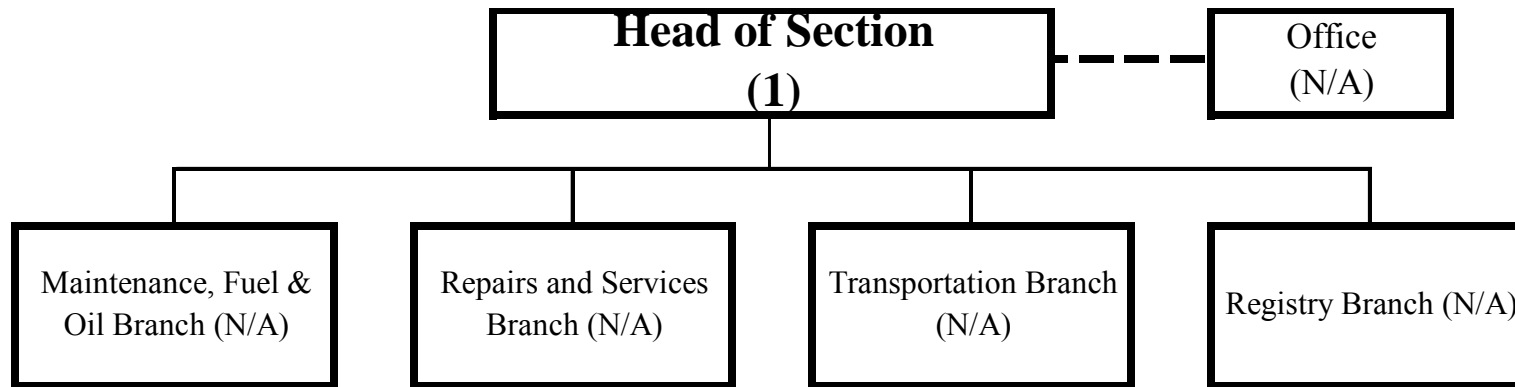
### Main tasks of the section

- 1 Controlling water quality by using Chlorine and also maintenance of facilities regarding the WTPs.
- 2 Procurement of necessary materials such as Chlorine gas bottles, the Hypo and chalk for purification of water and storage in water treatment complex.

*\*Digits indicate staff number*

*\*Source: BWA as of 01/06/2006*

Figure C.1.6 Quality Control Section Organization



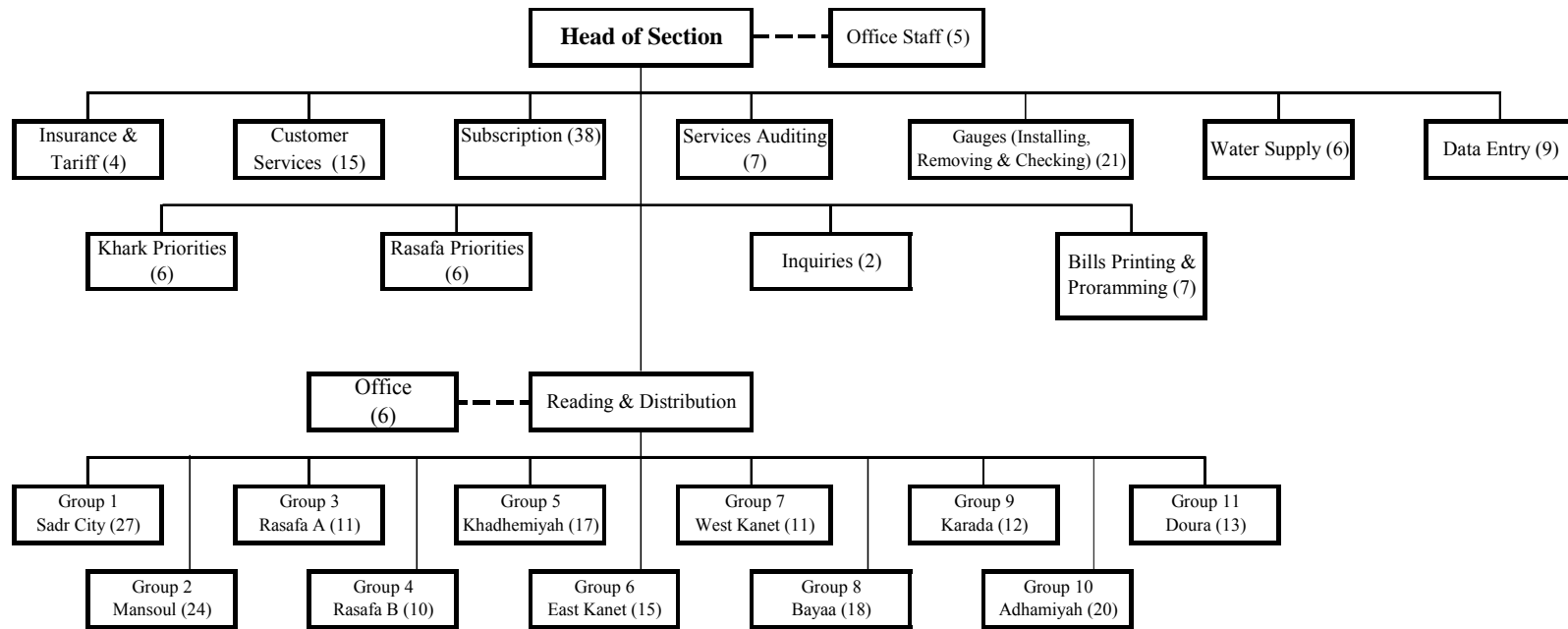
### Main tasks of the section

- 1 Managing and Repairing all vehicles used for BWA's operation.
- 2 Receiving and distributing the section's share of fuel to all locations and projects.
- 3 Manufacturing pump spare parts, welding pipes and all other easy mechanical works
- 4 Assessing for sale and disposing old vehicles.

*\*Total staff number of the section is currently 55.*

*\*Source: BWA as of 01/06/2006*

Figure C.1.7 Machinery (Vehicle) Section Organization



Main tasks of the section

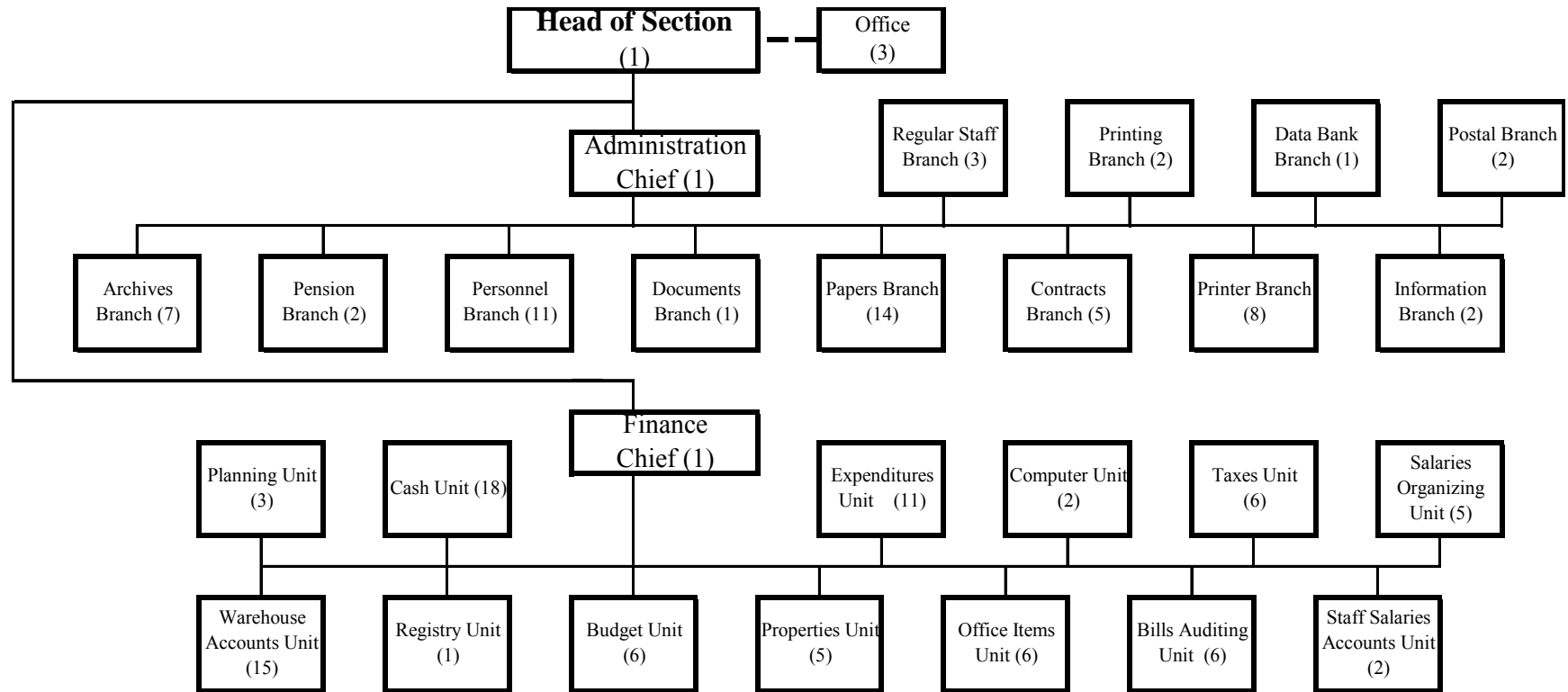
- 1 Managing payment data on every subscriber by computer system.
- 2 Issuing and distributing bills to every subscribers.
- 3 Reading meters and collecting water fare from subscribers

*\*Digits indicate staff number*

*\*Source: BWA as of 01/06/2006*

Figure C.1.8 Computer(Billing) Section Organization





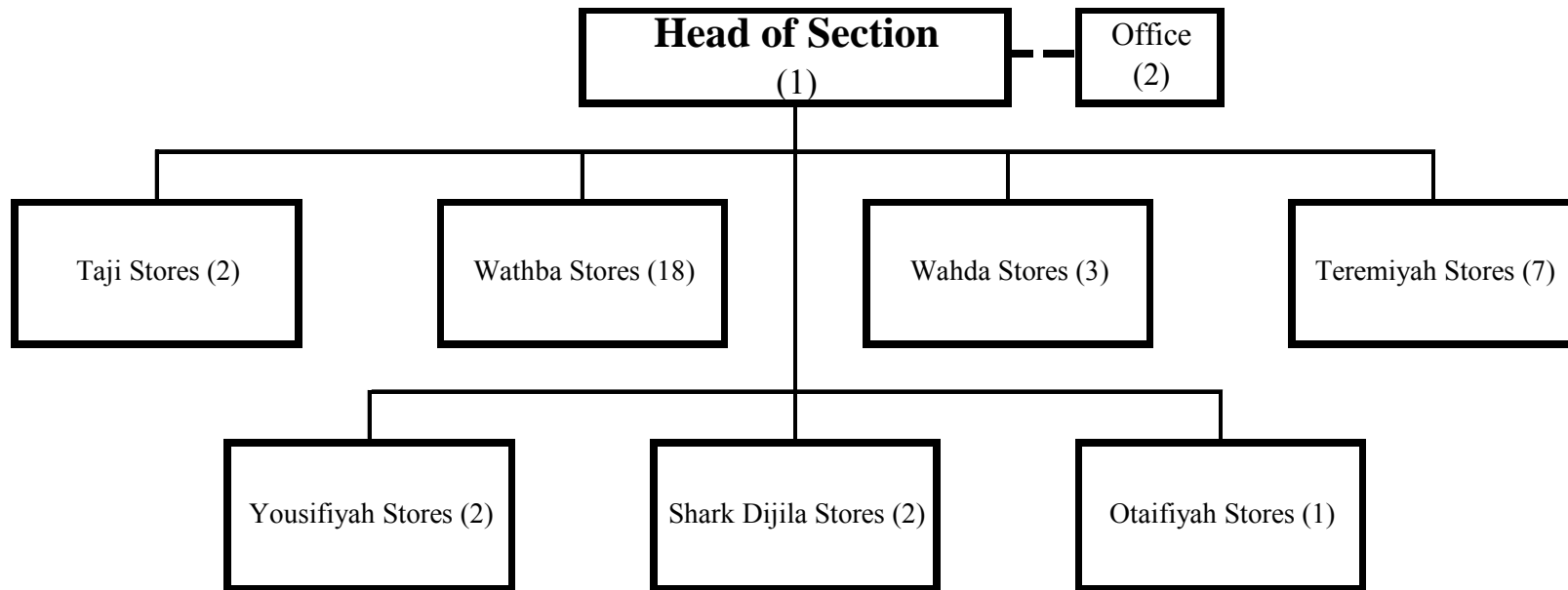
**Main tasks of the section**

- 1 Responsible for all administrative works for BWA staff, such as personnel data management and wage payment
- 2 Responsible for office management of BWA
- 3 Printing and distributing documents for PR and working reports to all the stakeholders
- 4 Proceeding all the accounts works with Income and Expenditures according to roles and regulations of financial systems

*\*Digits indicate staff number*

*\*Source: BWA as of 01/06/2006*

Figure C.1.9 Administration and Finance Section Organization



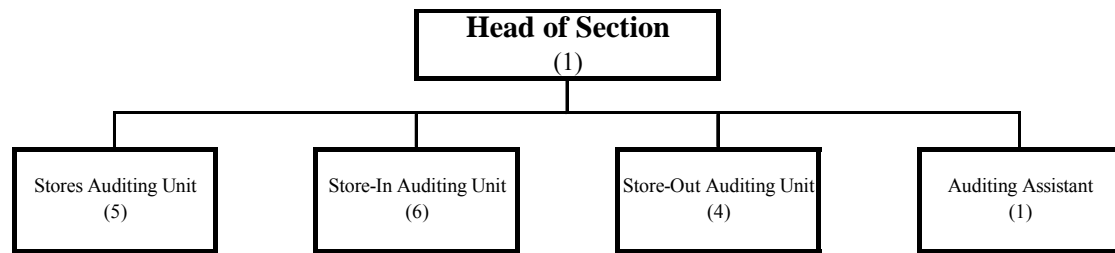
Main tasks of the section

-Monitoring management of 7 warehouses in custody of necessary equipment.

*\*Digits indicate staff number*

*\*Source: BWA as of 01/06/2006*

Figure C.1.10 Stores (Warehouse) Section Organization



Main tasks of the section

- 1 Monitoring payments and accounts in regard of implemented projects.
- 2 Investigating and checking tenders and invoice process.

*\*Digits indicate staff number*

*\*Source: BWA as of 01/06/2006*

### **Legal Section Organization (N/A)**

Main tasks of the section

- 1 Responsible for legal matters regarding contract, claims and so forth.

The total number of staff: 6

### **Tenders & Contracts Section Organization (N/A)**

Main tasks of the section

- 1 Assessing and monitoring the contractors' performance before and after the Contracts.
- 2 Preparing the Contract documents and carry out the public announcement of the Tender.

The total number of staff 4

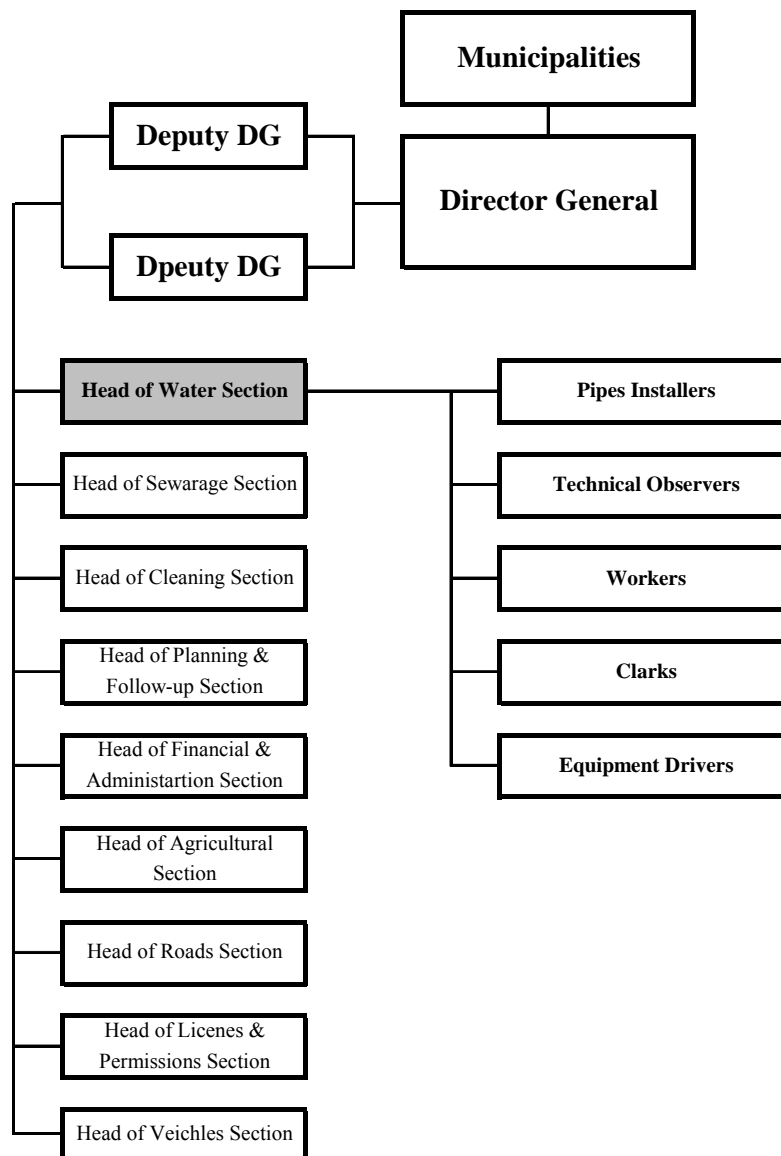
*\*Digits indicate staff number*

*\*Source: BWA as of 01/06/2006*

Figure C.1.11 Auditing Section Organization

### C.1.2 Organization of Municipalities

The Municipality Affairs Deputy of the Mayoralty of Baghdad currently manages 13 Municipalities. Each Municipality operates and manages its own urban infrastructure services in Baghdad City, such as water supply, sewage, waste, road and agriculture sectors. Every Municipality has almost the same organizational structure which is shown in Figure C.1.12. The Water section of each Municipality has responsibility for the operation and maintenance of water distribution network pipes of diameter less than 300 mm according to the 1995 Law.



\* Source: BWA as of 20/05/2006

Figure C.1.12 Typical Organization Chart of Municipality

## C.2 Water Tariff

### C.2.1 Present Water Tariffs

The volumetric water tariff scheme which is shown in Table C.2.1 is applies to all metered subscribers at present. Domestic water charges are on the basis of a stepped tariff structure. The first block is for 30m<sup>3</sup> or less with the water fee at only 2 ID per m<sup>3</sup>. Unit rates for consumption become progressively higher as consumption increases: 5 ID, 7.5 ID and 20 ID per m<sup>3</sup>. Non domestic subscribers also pay the tariffs on the basis of flat unit rate for water use per m<sup>3</sup>. Governmental subscribers are charged at 20 ID per m<sup>3</sup>, whereas commercial subscribers are at 30 ID per m<sup>3</sup>. At present, there seems to be no minimum monthly consumption charge. The current tariff schemes were set in 2000 and have not been revised since.

Table C.2.1 BWA Water Tariff Regulations

Categories			Rate year 2000* (Iraqi Dinar/ m <sup>3</sup> )
Domestic	House hold	1 to 30 m <sup>3</sup> /month	2
		31 to 60 m <sup>3</sup> /month	5
		61 to 90 m <sup>3</sup> /month	7.5
		> 91 m <sup>3</sup> /month	20
Non domestic	Governmental subscriber		20
	Private subscriber (Commercial use)		30

Only 52 % of the total service connections currently have meters installed. However, 55 % of these installed meters are malfunctioning. This means that the properly metered connection ratio is only 23% of the total service connections.

The tariff scheme for those unmetered connections is on the same principle of stepped tariff depending on the daily consumption. Each the daily consumption is fixed and categorized according to the size of the accommodations and water pressure in the area, as shown in Table C.2.2. Unmetered commercial subscribers are charged on the basis of the respective conditions, whereas unmetered governmental subscribers are exempted from paying the water tariffs.

Table C.2.2 Water Tariff Regulation for Subscribers without Meters

Domestic User (Flat House)		
Size of Housing	Estimated Consumption (per day)	Monthly Rate (Iraqi Diner/m <sup>3</sup> )
1 100 m <sup>2</sup> or less	1 m <sup>3</sup>	2
2 100 m <sup>2</sup> to 200 m <sup>2</sup>	1.5 m <sup>3</sup>	5
3 200 m <sup>2</sup> to 400 m <sup>2</sup>	2 m <sup>3</sup>	5
4 more than 400 m <sup>2</sup>		
	Surface Pipe $\phi$ 12mm 2.5 m <sup>3</sup>	7.5
	Surface Pipe $\phi$ 18mm 5 m <sup>3</sup>	20
Domestic User (Apartment)		
Type of Housing	Estimated Consumption (per day)	Monthly Rate (Iraqi Diner/m <sup>3</sup> )
5 Located in Drinking Water Shortage Area	1 m <sup>3</sup>	2
6 Small Apartment in normal Area	1 m <sup>3</sup>	2
7 Large Apartment in normal Area	1.5 m <sup>3</sup>	5
Commercial User <sup>a</sup>		
Type of Housing	Estimated Consumption (per day)	Monthly Rate (Iraqi Diner/m <sup>3</sup> )
8 Company needing much drinking water	4 m <sup>3</sup> to 6 m <sup>3</sup>	20
9 Company needing medium drinking water	1.5 m <sup>3</sup>	5
10 Company needing little drinking water	1 m <sup>3</sup>	2
Note:		
a: Company having surface pipe of $\phi$ 18mm should be estimated twice as the above consumption.		
Governmental User		
*No Water Charge		

(Source: BWA, as of May 2006)

Note: Statistics of the Year 2005.

Raw water tariffs are still at the level of 1995. There are only three categories, governmental gardens, house gardens and irrigated farms, and tariffs are set in increments of 100 m<sup>3</sup>. Respective water rates per 100 m<sup>3</sup> are set at 0.1 ID, 0.05 ID and 1 ID.

New registration fees are currently set at 2,600 ID. New subscribers are charged 2,500 ID for the house connection work and 100 ID for the proceedings.

### C.2.2 Problems Analysis

It is obvious that current BWA water tariff systems are much too low and inappropriate compared with the real socio-economic situation of Baghdad City. The current average water tariff per m<sup>3</sup> was estimated at 12.6 ID, which is calculated on the basis of the annual billed water supply and the annual water sales in 2005<sup>1</sup>. This converts into USD 0.009 per m<sup>3</sup>, at the

<sup>1</sup> The basic assumptions for the calculation are 1) UFW 46%, 2) Billed rate 50% and 3) No water sales generated by raw water supply. The average water tariff stands for the average of all subscribers and consists of both

current rate of 1USD = 1,475.262<sup>2</sup>. The monthly water demand per subscriber is calculated at 84.6 m<sup>3</sup> based on the current unit water demand at 244 lpcd as estimated by BWA. Accordingly, the monthly payment for their water use is estimated at only USD 0.76 per subscriber. The recent household budget survey report published by the Ministry of Planning, Development and Cooperation mentioned that average monthly household income in urban areas was about USD 321<sup>3</sup>. Therefore, a typical water subscriber in Baghdad City is charged only 0.2% of their total household income. It is often concluded in the reports of World Bank and other international donor agencies that the appropriate water tariff levels of developing countries are generally in the range of 3 to 5% of household income.

Even the water tariff levels of the other neighbour countries also prove that Iraq's water tariff level is a rare case, as shown in Figure C.2.1. The average water tariff for a typical household in those countries is more than USD 0.50 per m<sup>3</sup>. This means that they are almost 55 times higher than the current average water tariff per m<sup>3</sup> of BWA, whereas the average GDP per capita of those countries is about 7.5 times higher than that of Iraqi. Although this is not a fair comparison since each country's economic structure is different, such as some having high oil revenue and some being poor.

---

domestic and non-domestic subscribers.

<sup>2</sup> As of June 1<sup>st</sup>, 2006.

<sup>3</sup> The middle level of monthly household income of Baghdad City was estimated at 474,241 ID in Iraqi Rapid Household Budget Survey 2005, which was published by the MPDC, COSIT & Information Technology.

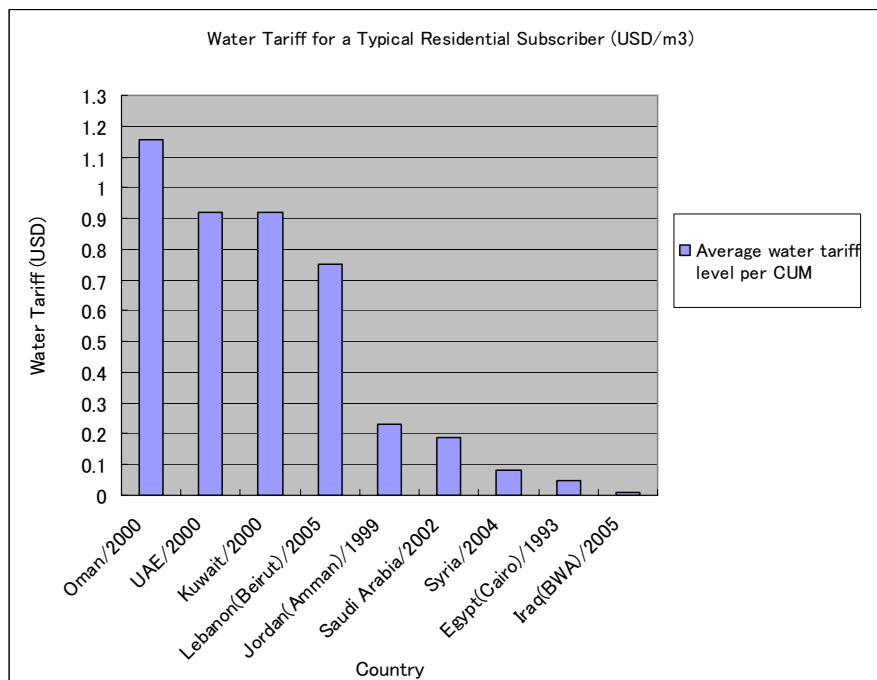


Figure C 2.1 Water Tariff for a Typical Residential Subscriber in neighbour countries  
(Source: a. World Bank MENA web site, b. Tariff Study for Syrian Water Sector Final Report, HYDRATEC Consortium (2006), c. Water Pricing Reform for the Kingdom of Saudi Arabia, Sale Al-Mogrin & Abdulaziz Al-Maziad (2002))

Note: Some of the above figures are rough estimates.

### C.2.3 The Need for Change

A new tariff policy based on a cost recovery basis is necessary for BWA in order to improve its financial situation. According to Article 8 under Law Number 16 of the Year 1995, BWA has full responsibility to operate and maintain the water supply services in Baghdad. However, tariff setting is currently the responsibility of the Head of Council of the Prime Minister.

If the tariff remains unchanged and improvements in efficiency are not applied, fiscal management of BWA will only worsen since operating cost in the future is projected to be higher than the current level. Consequently, the following issues are recommended regarding water tariff:

- BWA should have full authority for setting tariffs.
- BWA should form a working group on the tariff policy reform directly under responsibility of the DG, which would consist of concerned staff currently working for organizations such as the Planning and follow up section, Administrative section and Computer section. The working group should carry out willingness to pay and affordability to pay surveys in order to revise the current tariff structure into an



appropriate level which reflects socio-economic standards of citizens and also allows operation on the cost recovery principle.

- A new tariff structure should be considered the following issues;
  - Adequate block setting: New block structure should be revised based on the subscribers' income level structure. The minimum block should target only for the poverty stricken subscribers.
  - Cost recovery level: If the domestic subscriber's affordability to pay could not cover the operating cost, subsidy from the MOB or cross subsidy tariff setting between domestic and commercial subscribers.
  - Minimum charge system: In order to collect the sustainable water revenues, the minimum water charge system should be considered

### **C.3 Customer Metering, Billing and Collection**

Currently BWA has a computerized billing system. Every subscriber's latest billing and payment status is managed by its Master system. Meter reading, billing and collection of water fees are mainly executed by the Computer section. Billing and collection is the first step to generate revenues for BWA. Therefore, if the cycle of billing and collection is not functioning, it causes serious damage to the financial situation of BWA. However, although, in principal, the billing and collection cycle is carried out every four months, in fact, time delays occur. Especially, the performance of meter readers who have the responsibilities for meter reading, distributing bills and collecting water fees seems not efficient. As a result, the collection ratio remains at 50%. That contributes to generate the high rate of Non Revenue Water (NRW).

#### **C.3.1 Billing and collection system of BWA**

Meter readers belonging to the Distribution, Reading and Cash unit are directly visiting all subscribers and reading the meters of each under the direction of group leaders. The consumption information gathered by the meter readers is transferred to Customer services unit. The Computer unit enters each subscriber's data into the master file of their computer system, and then issues a bill. Meter readers again visit all subscribers in order to collect the water fees. Subscribers can choose either pay the fee directly to the meter readers or visit the Cash unit of the Administrative section to pay the charge later. The Cash unit of the Administrative section collect revenues from meter readers and subscribers, while the Collection and audit unit compares the amount of money with the computer information.

Finally, the Cash unit deposits the money collected in the bank and also reports the payment situation of each subscriber to the Computer unit for updating of the master file.

### C.3.2 Problems Analysis

As mentioned in the previous section, the actual collection ratio remains at only 50%. This is because the first step of meter reading is not performed effectively. The following table shows the actual accessed or not accessed situation of the metered subscribers by the meter readers.

Table C.3.1 Situation of Access to the Meters for Reading

	Category	No. of Subscribers with meters		
			Accessed	Not Accessed
<b>Sadr City</b>	Domstic	37,086	9,577	27,509
		100.0%	25.8%	74.2%
	Non-Domestic	4,949	1,622	3,327
		100.0%	32.8%	67.2%
	Total	42,035	11,199	30,836
		100.0%	26.6%	73.4%
<b>BWA District Total</b>	Domstic	233,563	104,683	128,880
		100.0%	44.8%	55.2%
	Non-Domestic	52,936	23,299	29,637
		100.0%	44.0%	56.0%
	Total	286,499	127,982	158,517
		100.0%	44.7%	55.3%

(Source: BWA as of Apr. 2006)

As the figure indicates, currently meter readers could reach only 45% of all subscribers' meters. The case in Sadr City, where the Project areas are located is much worse. It shows that the accessibility to the subscribers' meters is only 27%. Of course, the current conflict situation makes it difficult to reach each subscriber. However, the main problem with meter reading is that there are only about 134 meter readers working against 555,600 subscribers. This means simply that each meter reader has to visit 4,146 subscribers in a cycle. Even if they were to totally omit visiting unmetered subscribers, each meter reader would still have to visit more than 2,000 subscribers. Due to the limited budget received from the Mayoralty of Baghdad, it is assumed that each meter reader does not use a car for visiting subscribers.

It should also be noted that the substantial monitoring system does not work in the current cycle of reading, billing and collection works. Although the Collection and audit unit has the responsibility to compare the collected money with the billed price, as a whole, the collection ratio can never be improved under current practices.

### C.3.3 The Need for Change

It is necessary for BWA to establish an integrated monitoring system for inspecting each action of the reading, billing and collection works. Whether the subscribers are metered or not, it is necessary for BWA to attain a 100% collection ratio as a service provider. As mentioned in the previous section, reading, billing and collection works are very important for the sustainable operation and maintenance of BWA, since this is only means to generate the necessary income to fund BWA's services. It is obvious that inefficient water meter reading and billing operations have caused such a low attainment of tariff collection.

- BWA should form a working group on the billing and customer accounting which consists of the concerned staff from the Computer section and Administrative section.
- The working group should prepare a strategy for improving the current low collection ratio. The group should examine the following issues put in the strategy;
  - Increasing the number of meter readers / Giving incentives to meter readers for improving collection ratio / Systemizing the meter readers' works / Transferring meter reading works to the appointed representative citizens of settled areas, and so forth.
- The group should also prepare the improvement plan for accurate and on time billing cycle management.
- Establishing a monitoring system in order to improve the low collection ratio and delayed billing services.

## C.4 Financial Management

### C.4.1 Budget System

BWA has been the entity to provide safe water to the subscribers at an affordable level and are funded by budget from the Mayoralty of Baghdad. Since this organization is still one of the administrations of the Mayoralty of Baghdad, it does not provide a solid self-management system, such as how to recover its expenditures by increasing revenues, how to render better and more efficient services for customers, and so forth. Budget is allocated to BWA from the Mayoralty of Baghdad, according to the decision of the cabinet council at the beginning of the fiscal year in January, just same as the other governmental administrations.

As for the Budget requests from BWA to the MOB, firstly, annual expenses are roughly estimated by each technical section. The Design section compiles the total sum. The Finance branch, under the Administrative and Finance Affairs section, receives the budget request from the Design section for comments and consultations. The planned budget request is

formally presented to the MOB. After receiving the planned budget from each administration, the MOB decides the budget allocation for each administration. The actual allocated budget amount is generally much lower than the planned budget. Therefore, the BWA has to reduce expenses, such as capital cost, depreciation cost, customer service expenses and so forth.

At present there are two budget schemes allocated by the Mayoralty of Baghdad. The O&M Budget, which is funded by the Ministry of Finance, is allocated for expenses including wages, all office expenses and daily maintenance and repair services. The other is the Investment Development Budget. This budget is disbursed to each region of Iraq and financed by the Ministry of Planning, Development and Cooperation. It is allotted for project implementation, such as rehabilitation of WTPs, booster stations, compact units, distribution water pipes and so forth. In fiscal year 2006, the Strategic Investment budget scheme (to expedite construction) and the Emergency budget scheme were introduced under the Investment Development Budget. These new budget schemes have been designed to carry out huge construction or rehabilitation projects. For instance, the reconstruction of the three reservoirs in R5, R7, and R14 are to be financed by this budget.

#### C.4.2 Financial Management of BWA

Since BWA relies entirely upon the annual O&M Budget for annual expenses, there is no incentive to generate revenue to cover its expenses. Actually, in their financial management system expenses and revenues are not linked to each other in any way. Profit and loss statements for the years 1999, 2004 and 2005 are shown in Table C.4.1. The fiscal data of the year 1999 was quoted from the UNCEF report.

Operating cost of both years, 2004 and 2005 increased drastically compared with 1999. The operating cost was 3,512 million ID in 2004 and 3,282 million ID in 2005. This was because BWA could obtain a much larger budget for their capital investment than before due to the lifting of the economic sanctions. The monetary value of water sales in 1999 was quite low because the water tariff levels of that year were still much lower than the current level. In 2004, the conflicts after the War heavily affected the financial figures. Since BWA has no requirement to cover total operating expenditures from its revenues, operating revenues are actually neglected. All revenues obtained from its services are transferred to the Mayoralty of Baghdad. The 1999 accounts showed that net operating income somehow achieved 11% of the total operating income, estimated at 152.5 million ID due to the restraint of capital investment under the economic sanctions. The Annual Operating Ratio was estimated at 89%. Whereas, the financial statement of 2005 recorded a net deficit of 153.4 million ID and accordingly operating ratio increased to 105 %.

**Table C.4.1 Profit and Loss Statement of BWA**

	1999*		2004**		2005**	
	ID Million	%	ID Million	%	ID Million	%
<b>Expenditures</b>						
Total Salaries & Wages	324.0	24%	877.6	25%	776.4	24%
Total Materials	610.9	44%	907.4	26%	1,801.3	55%
Total Service Requirements	145.5	11%	319.8	9%	516.6	16%
Total Miscellaneous Expenses <sup>a</sup>	4.8	0%	29.4	1%	143.0	4%
Total Other Expenditures	78.3	6%	1,377.7	39%	44.7	1%
Total Depreciations	58.2	4%	N/A	0%	N/A	0%
Grand Total Expenditures	1,221.8	89%	3,511.9	100%	3,282.0	100%
<b>Revenues</b>						
Water Sales	1,288.1	94%	1,137.9	32%	3,103.6	95%
Total Income from Services Provided	36.3	3%	53.3	2%	24.9	1%
Revenues from Operating for Others	0.0	0%	0.0	0%	0.0	0%
Rentals of Land	13.1	1%	N/A	0%	N/A	0%
Transferred Revenues, Penalties	3.6	0%	N/A	0%	N/A	0%
Total Other Income	33.0	2%	0.0	0%	0.1	0%
Grand Total Revenues	1,374.3	100%	1,191.2	34%	3,128.6	95%
<b>Net Income (Deficit)</b>	<b>152.5</b>	<b>11%</b>	<b>-2,320.7</b>	<b>66%</b>	<b>-153.4</b>	<b>5%</b>
Working Ratio		85%		295%		105%
Operating Ratio		89%		295%		105%
Profit Margin		0.11		-1.95		-0.05

Note: a, Including Capital Expenses  
 (Source: \*UNICEF Report, \*\*BWA, as April of 2006)

### C.4.3 Accounting System

BWA employs a unified government accounting system similar to the other governmental entities. Unlike the general commercial accounting system with a double entry, the accounting system of BWA has no direct link between the actual expenditures and revenues. Although BWA introduced double entry balance sheets for keeping accounts, the system is only linked to the budget from the Mayoralty of Baghdad. (See a sample form as Figure C.4.1.) This system is frequently used by many non-profit government entities in developing countries. Actually the unified governmental account system classifies items in detail as shown in Table C.4.2, the system does not contribute the effective financial accounting practices.

Debit			Account	Credit		
Current Month	Past Month	Total		Current Month	Past Month	Total
			Bank			
			Treasury			
			Final Bank			
			Final Revenue			
			Advances			
			Trust			
			Revolving Cash Balance			
			Unpaid due disbursements			
			Checking Account with Baghdad Mayoralty			
			Final Total			

**Figure C.4.1 Audit Balance Form (2006)**

Table C.4.2 Accounting System of Iraqi Government

Table of Expenses	
Accounting Guideline Number	Accounting Guideline Name
3	utilizations
31	salaries and fees
311	cash salaries for employees
3112	family allocations
3113	extra work fees
3114	encouraging bonus
3115	vocational and technical allocations
3116	compensation allocations
3117	expensiveness of living
3118	cut allocations
3119	other allocations
312	workers cash fees
3121	fees
314	employees social security
3141	distance share in
32	goods requirements
321	raw materials
322	fuel and oil
3221	kerosene
3223	oil and grease
323	spare parts
325	miscellaneous
3251	requirements
3252	details
327	water and electricity
3272	electricity
33	service needs
331	maintenance services

Table of Expenses	
Accounting Guideline Number	Accounting Guideline Name
3312	maintenance of buildings and structure
3313	maintenance of equipments and apparatus
3314	maintenance of transportation modes
3315	maintenance of tools and forms
3319	maintenance of furniture and office devices
3319	other maintenance
332	consultancy and research services
333	advertisement
3331	publicity
3332	printing and publication
3335	celebrations
334	transportation, deputation, and communications
3341	employees transportation
3343	traveling and deputing
3343	transportation for training and study
3344	public communications
335	hiring of fixed assets
3352	Hiring of buildings
3353	hiring of equipment and apparatus
336	miscellaneous service expenses
3361	subscriptions
3362	installments of insurances
3365	legal services
3367	training and qualification
33672	training and study fees
3369	other services expenses
36	interests and lands hiring
362	land hiring
37	depreciation
372	depreciation of buildings
1/372	depreciation of buildings and structures
2/372	depreciation of warehouses and storage tanks
3/372	depreciation of residential structures

Table of Expenses	
Accounting Guideline Number	Accounting Guideline Name
9/372	depreciation of potable water pipes
10/372	depreciation of raw water pipes
373	depreciation of transportations modes
1/373	depreciation of passenger transportations modes
2/373	depreciation of goods transportations modes
3/374	depreciation of other transportations means
375	depreciation of tools and forms
1/375	depreciation of tools
3/375	depreciation of tents
367	depreciation of furniture and offices
1/376	depreciation of furniture
2/376	depreciation of air conditioning devices
3/376	depreciation of computers
4/376	depreciation of calculators
5/376	depreciation of tools and offices devices
6/376	depreciation of curtains and carpets
7/376	depreciation of books and magazines
378	covering of postponed expenses
38	transferring expenses
383	miscellaneous transferring expenses
3832	compensations and penalties
3833	deleted debts
39	other expenses
391	previous years expenses

Table of Revenues	
Accounting Guideline Number	Accounting Guideline Name
41	Water revenues
416	Water and Electricity revenues
417	scrapings revenues
43	service activity revenues
437	miscellaneous services revenues
438	fixed assets rents
46	Interests and rents of lands
461	Interests
462	rents of lands
48	Transferring revenues
483	miscellaneous transferring revenues
4831	received donations
4832	compensations and penalties
49	other revenues
491	revenues of previous years
492	incidental revenues
493	capital revenues

#### C.4.4 The Need for Change

If the current financial management system and skills of the concerned staff are not improved, no financial improvement can be expected. Total budget received from the MOB is generally much lower than the budget planned by BWA. Therefore, BWA can not carry out sufficient operation and maintenance works as long as it is relying upon the budget from MOB. It is highly recommended to have a certain level of autonomy for BWA so that they can decide the proper level of water tariff and generate the required revenues. However, currently BWA does not have such specialists in their organisation. Therefore, an institutional strengthening programme should be executed with the assistance of foreign donor agencies. Otherwise, the impact of the Project will remain very small and no sustainable services can be expected in the future.

- BWA should form a working group on financial management and cost accounting. The group should collaborate with the also proposed tariff policy team in order to achieve the ideal shift from a budget dependent fragile operation and management into a cost recovery based operation and management in the future. The government should accord a certain level of autonomy to BWA in order to execute the financial management action plans immediately.
- The following goal settings are recommended by the Study Team as reference;
  - Immediate action: Every related staff in the financial management understands why the cost-recovery principle is necessary for the sustainable O&M and efficient water supply services. They also understand why current financial management system does not work and what is the exactly necessary for the financial management for the sustainable water supply services.
  - By the end of fiscal year 2007: The working group should have the availability for setting an appropriate tariff policy based on the current operating cost recovery level. The group also should be able to estimate the appropriate budget plan by calculating the proper water demand volume and operation and maintenance expenditures. The commercial double entry accounting system should be prevailed as a BWA's cost accounting system.
  - By the end of fiscal year 2012: The working group should be able to revise the water tariff to the level for full cost recovery which includes the depreciation cost.



- Finally, BWA financial management team can initiate the other water supply entities into the cost recovery based financial management.