The Water Authority of Jordan

Water and Wastewater Cost/Tariff Models

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FORWARD

Collaborative Approaches for Resolving Water Issues

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TABLE OF CONTENTS

FIGURES

TABLES

CHAPTER 1
INTRODUCTION

MWI and WAJ Background

The Water Authority of Jordan (WAJ), especially in its Amman Governorate Water Authority (AGWA) service area, has entered an era of change Over time, rapid population growth and expansion of water and wastewater service has placed great pressure upon the service capabilities of the utility systems serving Amman Acquisition of more expensive supplies, transfers of water supplies from other governorates, declining groundwater supplies in the highlands, varying water qualities among different water sources, rehabilitation of treatment and the distribution systems, and other issues have all posed new and significant challenges to the management of the urban utilities

These matters have required the government to rethink its approaches to traditional methods of operations and management, and various strategies are being pursued Private sector participation, cost-of-service recovery, and additional funding requirements have become increasingly prominent issues facing AGWA, and various strategies are being pursued to improve performance and raise efficiency As the Water Authority of Jordan faces the challenges of maintaining and improving service levels and institutional change, WAJ needs new and more modern tools for utility and financial planning to respond to future needs proactively rather than reactively

USAID FORWARD Project

In 1996, the United States Agency for International Development (USAID) initiated the Fostering the Resolution of Water Resources Disputes Project (FORWARD) It was designed to combine technical and mediation/facilitation expertise in order to address critical water resource issues more effectively

Many times, strictly technical efforts fail to address underlying issues that impede agreement or buy-in from the parties involved A key aspect of FORWARD's approach is to work closely with stakeholder interests to foster on-going participation and agreement so that conflicts can be avoided and implementation realized

FORWARD's efforts in Jordan started in January 1997 when the government identified the cost/tariff issue as a key, but difficult, policy matter in the water sector This led to a design mission in April 1997 to develop financial planning cost/tariff models for WAJ/AGWA, contracting in August 1997, and completion of the development of the WAJ/AGWA water and wastewater models in April 1998 FORWARD then conducted presentations and training for WAJ officials and staff

Building on Other Programs

FORWARD was able to build upon existing data and previous assessments performed by WAJ and others In particular, the prior and current GTZ Operation and Management Support Project (OMS) studies and efforts were reviewed and substantially used as the current (1995,1996, and 1997) cost bases for the models

Goals and Objectives of the Cost/Tariff Models

The goal of developing the cost/tariff models is to provide WAJ with powerful tools for improved near- and longer-term annual financial planning and budgeting The models were not intended to be monthly cash flow accounting models or engineering system operations models However, they can be put to a variety of planning and evaluation uses

Objectives of this effort were to

- Identify the costs of delivering water and wastewater services under present conditions and more efficient conditions,
- Assess the viability of alternative management measures to improve efficiency,
- Provide the costs at transfer points from other governorates to AGWA and from AGWA to other governorates, and
- Use the costs and the efficiency scenarios as a basis to assist WAJ in restructuring tariffs

CHAPTER 2
COLLABORATIVE PLANNING PROCESS AND AGREEMENTS

In April 1997, FORWARD developed the Analytical and Policy Tools for Costing and Tariffs workplan with MWI and WAJ staff Water and wastewater cost/tariff models are the main tools for the costing and tariff program The nature of both models and their intended use and design were agreed to by the senior MWI and WAJ staff

In August 1997, MWI, WAJ, and FORWARD met to initiate the WAJ program The meeting was an opportunity to identify the technical issues of model design and to agree on the process of collaborative planning throughout the course of the program In that meeting, coordination levels and channels were agreed to as follows

- Technical staff from WAJ, AGWA, and OMS project would build consensus on the data of costing, revenues, and the water balance

- Technical Working Group (TWG) from WAJ and AGWA was to follow on the project progress, participate in the model conceptualization, share data analysis and interpretation, and provide advice to resolve technical issues

- Policy and decision makers would agree on policy issues related to evaluating multiple tariff and efficiency scenarios, such as the overall cost recovery, the willingness and ability of customers to pay, who should pay for public/national interest expenses (for example, water resources management, planning and monitoring), and determining the applicability of efficiency criteria and their relevancy to AGWA operations

Coordination at the three levels was carried out on a continuous basis throughout the modeling effort Monthly meetings were carried out with the Technical Working Group to review the program progress and plan activities

Major issues and agreements within the modeling effort included

- Delineation of AGWA service area boundaries and determination of transfer points,

- Definition of customer classes and block categories for each class,

- Water balance projections based on future demands and water supplies, including the Disi Aquifer,

- Incorporation of the capital cost component of future projects including rehabilitation, and

- General and Administrative (G&A) costs allocated to AGWA

AGWA Service Area Boundaries

Some changes to the boundary delineation the AGWA service area are pending due to the management contract, which will transfer responsibility for the operation and maintenance of the Greater Amman wastewater system to a private operator, and recent changes in governorate boundaries Traditionally, each governorate has its own WAJ utility that provides water and/or wastewater services Due to the location of water supplies, which are external to the AGWA service area, the complexity of Amman water and wastewater systems, and the difficulties of its operations, WAJ has considered attaching or detaching some water sources and/or network systems from its direct supervision Subsequently, bulk and retail sales or purchases were defined for the management contract purposes

The Technical Working Group and FORWARD agreed to design the water and wastewater models to accommodate the pending changes in the service area boundaries FORWARD prepared and presented schematic diagrams of water and wastewater systems which show the external sources, internal sources, transmission facilities, pumping facilities, treatment facilities, and networks The Technical Working Group and FORWARD agreed to use the schematics as a basis for the models' design

Customer Classes and Block Categories

At the time of model development, AGWA initiated field surveys to identify categories of customers, who are subscribers to WAJ The 270 thousand customers in Amman were divided into 57 categories However, the WAJ/AGWA current tariff structure has only two components — residential and non-residential The non-residential tariff covers all uses other than household

FORWARD expressed concern about designing a model with 57 user categories, believing that it would complicate the model as well as customer billing and understanding Moreover, it is unlikely that WAJ/AGWA will have a tariff system with more than three or four user categories Instead, the Technical Working Group and FORWARD identified four major groups of categories for the model residential, commercial, industrial, and institutional users

Water Balance

For forecasting purposes, it is essential to establish the water balance of supplies and demands over the ten-year forecast period This has a direct impact on costs and revenues water costs vary enormously among supply sources and water revenues are

linked to the demands met FORWARD reviewed several national master plans, feasibility studies, and reports Water resources allocation among different governorates and Amman was based on the previous studies and discussions with MWI and WAJ officials Of particular concern was the allocation of Disi water to Amman and the reallocation of current AGWA external water supplies to different governorates

Capital Costs

The water utility policy addresses the issues of cost recovery in view of increasing marginal costs of water supplies The policy opts for partial or full cost recovery of the capital investment in addition to full cost recovery of operation and maintenance costs Based on this, MWI/WAJ officials asked FORWARD to incorporate the capital cost component of future projects WAJ outstanding debts prior to 1997 were transferred from WAJ books to the government books However, for future projects, MWI /WAJ and FORWARD agreed to use the debt-service method to calculate the capital cost components of the utility services

General and Administrative Costs

General and administrative costs of WAJ were allocated to AGWA based upon a ratio of AGWA employees to the total employees of WAJ This AGWA/WAJ employee ratio was then applied to the various expenses of WAJ to allocate assigned general and administrative expenses back to AGWA

CHAPTER 3
MODEL OVERVIEW

Uses of the Models

The WAJ/AGWA water and wastewater cost/tariff models provide the capability to

- examine and forecast the demand for utility service,
- compare customer demands against available system capacity,
- allow for rationing or full provision of service,
- calculate the annual cost of service at various cost centers in the system,
- aggregate those costs in various useful ways,
- specify different types and levels of utility tariffs and fees,
- model different levels of revenue recovery, and
- explore planning and policy parameters for what-if type analyses on the Authority's operations and finances

AGWA Structure

Cost-based models must consider the organizational structure of the utility since budgeting and monitoring are typically configured along these lines It is also desirable to consider the physical system structure of AGWA since it affects the cost of service at various points in the supply and delivery system and in the overall system This information is useful for cost center analyses and tariff setting

Institutional Organization

The Water Authority of Jordan has been organized into 12 different operational units, generally defined along governorate boundaries However, service area delineation has undergone some changes in the area of the Amman Governorate - AGWA Utility The AGWA management contract provides for private operation and maintenance of the water and wastewater utilities in the Amman area In the contract, the service area boundary for the Amman metropolitan area is amended to include the Deir Alla conveyance and Zai treatment systems along with certain retail (suburban) service responsibilities in adjacent portions of the Madaba, Zarqa, and Balqa Governorates

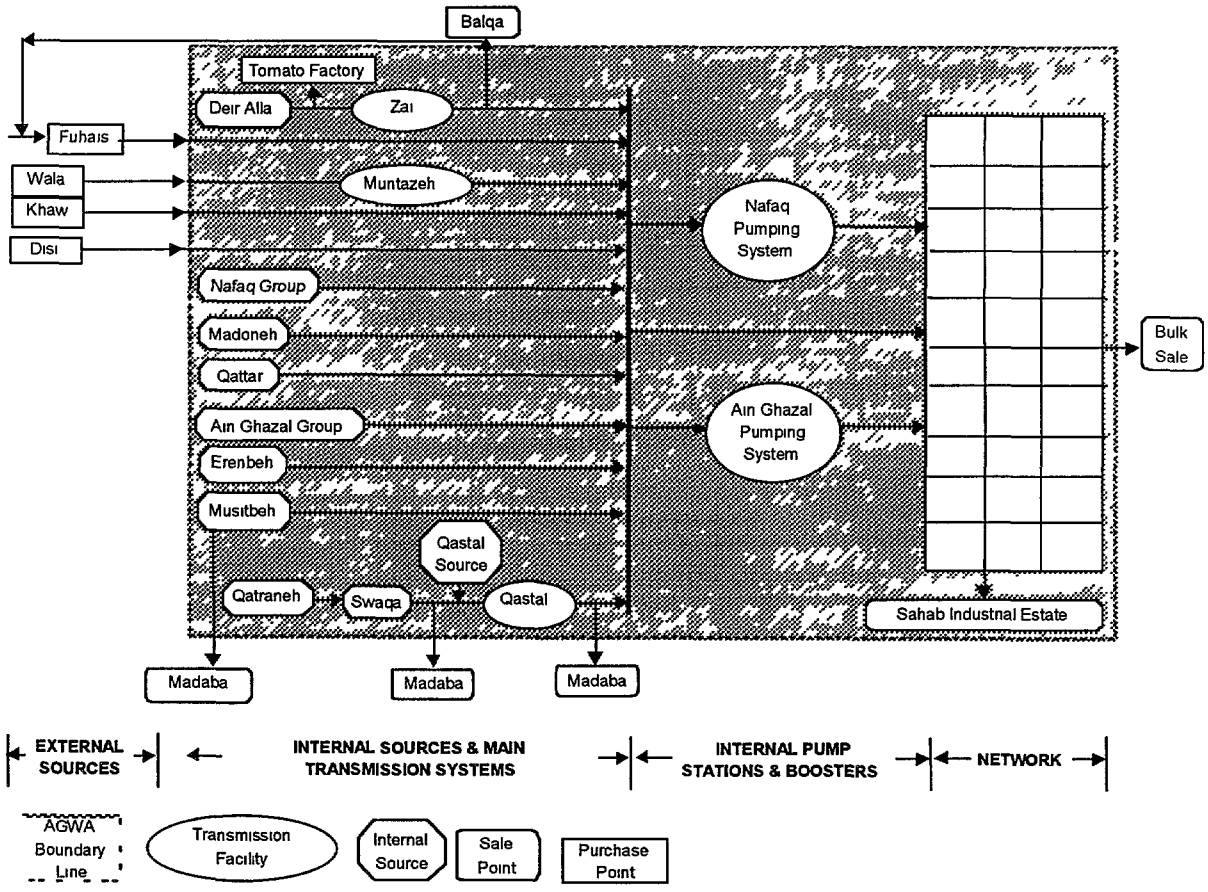
WAJ will provide some bulk supplies to the operator from sources outside AGWA WAJ currently provides a centralized planning and customer billing functions to AGWA

Water System

For purposes of cost-center evaluation, possible tariff setting, and commercialization assessment, the WAJ-AGWA water system was subdivided into bulk (wholesale) and network (retail) components As shown in Figure 1, there are many different supply sources for the utility The surface water system and some of the major groundwater sources originate beyond Amman Other major groundwater resources are located within AGWA In several instances, the external water resources are shared with other governorates or other water uses, such as JVA irrigation

Figure 1

Schematic of AGWA Water System



These water resources, once treated, are supplied to the Amman transmission and distribution network for ultimate retail delivery There is also the potential for wholesale treated water sales from the Amman network for industrial or municipal purposes The

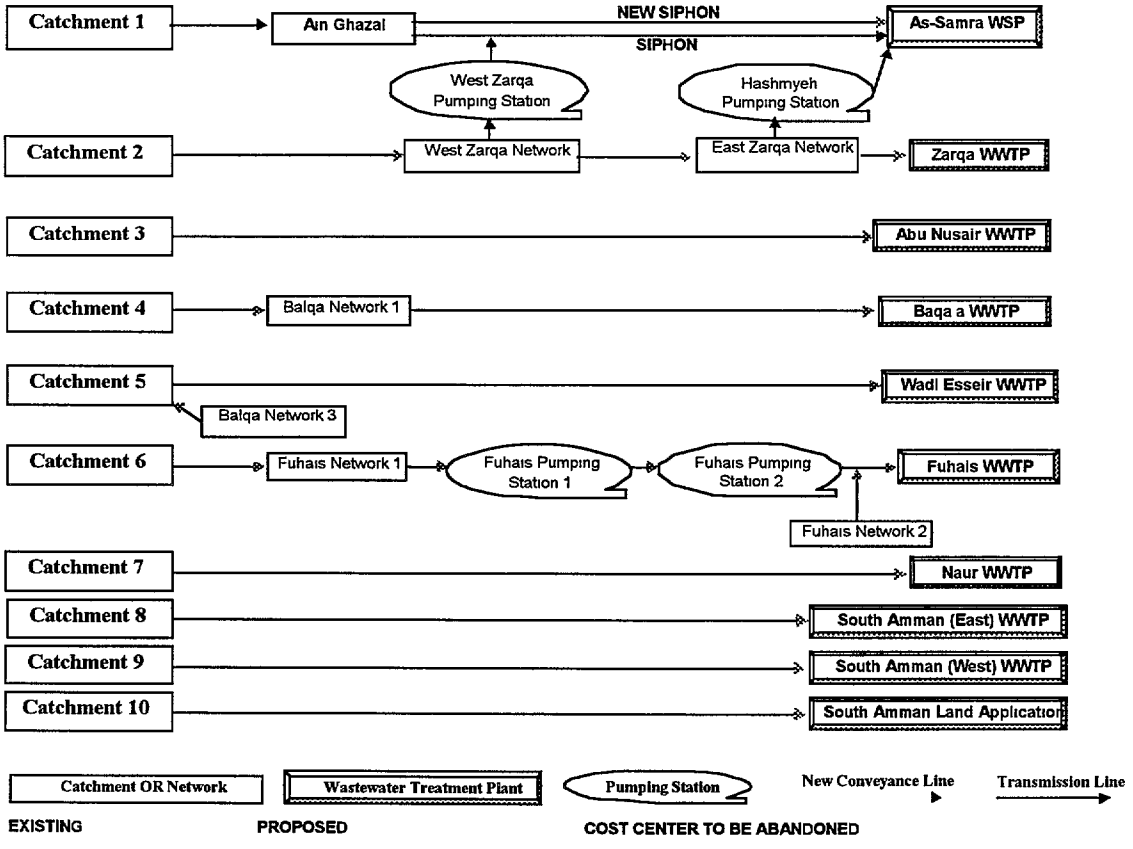
various supply and network concepts were delineated as individual cost centers for the purposes of cost efficiency, commercialization, and tariff setting purposes In particular, several of these cost centers are identified as possible transfer points where a future sale of raw or treated water may be made between parties (WAJ, management contractor, other governorates, other wholesale customers), and cost-of service or pricing information at that point is desired

Wastewater System

The WAJ-Amman wastewater system consists of a number of different watershed collection areas Many ultimately drain to the large treatment facility at As Samra, while smaller treatment facilities serve other collection areas within the metropolitan area Facilities conveying Amman wastewater flows also pass through other governorates collecting additional flows before arriving at the treatment facilities This presented some complications in the cost/tariff modeling At the time of the model development efforts, flows at certain key junctures were not yet metered, so wastewater flows were estimated at different points in the system

Figure 2

Schematic of AGWA Wastewater System



The various collection network and treatment concepts, shown in Figure 2, were delineated as individual cost centers, where possible, for the purposes of cost efficiency, commercialization, and tariff setting purposes In particular, several of these cost centers are identified as possible transfer points where a future sale of treatment services may be made between parties (WAJ, management contractor, other governorates, other wholesale customers), and cost-of-service or pricing information at that point is desired

Structure of WAJ/AGWA Water and Wastewater Models

The WAJ/AGWA water and wastewater models were developed using Microsoft Excel 7 0 electronic 3-D spreadsheet software to permit an easy understanding of the models' organization, calculations, and links, and to facilitate what-if analyses of different planning scenarios The models comprise two workbook files, one for water and the other for wastewater Each workbook file is subdivided into logical planning, engineering, and financial components, assigned to one or more worksheets (pages) of the workbook Data links exist between individual components (worksheets) within each model To the extent possible, care was taken in the models' design to develop standard cost accounts and parameters for each cost center and to structure tables, where possible, in a similar location and format A few years of historical data are provided in each model for reference and benchmarking purposes, and the forecast timeframe is ten years into the future

Major Components

At the most simple level, the water and wastewater models for Amman each contain four major analytical components or processes that represents either a single worksheet or groups of worksheets within the model, including

- **Financial/Model Parameters** — summary financial information in tabular and graphical form, as well as global model parameters that, when changed, can have widespread effects upon the model's calculations and results

- **Planning** — various underlying factors and calculations affecting system growth, water and wastewater flows projections, unaccounted-for water and infiltration/inflow contributions, and comparison of service demands with available resources and plant capacities

- **Revenue** — calculations that generate system revenue from bulk and retail sales, consider miscellaneous fees, as well as other adjustments to revenue

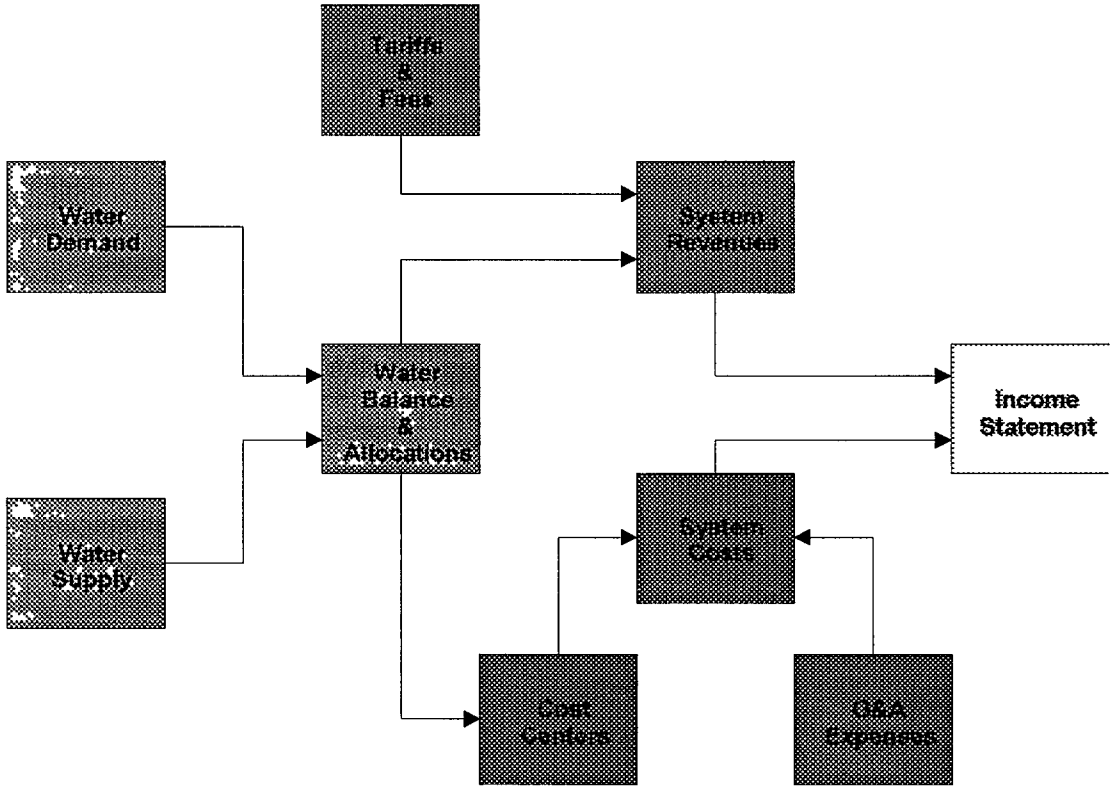
- **Costs** — variously defined cost centers of the utilities, the local parameters that uniquely affect that cost centers' expenses, the calculation of costs for that cost center, and various aggregations of cost centers used for tariff considerations

Model Flow

While the WAJ/AGWA water and wastewater models can be simply categorized into the four major components listed above, the underlying details are somewhat more complicated with a larger number of sub-components addressing various planning, engineering, or financial issues and data flowing from one table and portion of the model to another An example of the water model logic is shown in Figure 3

Figure 3

Conceptual Water Model Flow Chart



While input parameters affecting the calculations are present at various steps throughout the model, the water model essentially begins with population, per capita water demand, and a relationship between water use and wastewater generation This is compared to available water supplies and treatment or convenyance system capacity Decisions are made on how to ration supplies during shortages or how to allocate or draw upon various supplies during surplus conditions It is used along with other data to determine the expenses of variously defined cost centers The model also allows WAJ to input information related to each cost center and allocate the

common expenses to cost centers as specified by WAJ management The cost data are then aggregated in certain ways for various levels of financial analyses

Expected system income is generated from usage data multiplied by the applicable tariffs (which may include customer category or usage-level features), fee income is calculated, and then adjusted for billing collections The expected utility income is then compared with utility expenses, resulting in the net income of the water system Various management decisions can then be made to change variables (changes in inflation rates, staffing levels, unaccounted-for water) underlying utility income or expenses to see how this affects desired performance goals

The logical flow of the wastewater model is very similar to the water model, shown in Figure 3, except that wastewater service demand is compared to treatment capacity to ascertain if there is a pending capacity shortage Each major treatment facility has a separately-defined cost center calculation They are summed to arrive at overall wastewater utility costs Wastewater billing and revenues are based on metered water consumption Wastewater fees are added to arrive at overall wastewater income Wastewater income is then compared with wastewater expenses to calalate the net revenue of the utility on the income statement

CHAPTER 4
MODEL RESULTS

Current Water Costs

Several warnings are in order with respect to these cost estimates The new AGWA financial accounting system has only recently begun to track operations and maintenance (O&M) expenditures at a cost-center level Therefore, for the purposes of model development, it was necessary to rely upon management studies that were performed by the OMS efforts and professional opinions of WAJ and FORWARD staff The initial data coming from the new AGWA accounting system was used to check the historical estimates and near-term model forecasts Capital costs of new projects and their debt service agreements were obtained from WAJ staff The O&M and capital costs were then converted to a unit cost basis using the average supply capability of the source

Cost by Supply Sources and System Components

Table 1 reflects the estimated cost of supply by individual water source for 1997 The surface water supply through the Deir Alla/Zai system, due to significant pumping and treatment cost, has a high unit cost of supply, as do the small-capacity groundwater systems of Madoneh and Qattar

Table 1
Unit Cost of Water Supply Sources to Amman (1997)

Source	Cost (JD/m^3)	Source	Cost (JD/m^3)	Source	Cost (JD/m^3)
Deir Alla	0 254	Qastal	0 032	Qattar	0 251
Fuhais	0 206	Qatraneh	0 075	Erenbeh	0 064
Wala	0 130	Ain Ghazal	0 044	Mustibeh	0 000
Khaw	0 147	Nafaq	0 015	Disi	0 000
Swaqa	0 047	Madoneh	0 227		

Table 2 reflects the various cost components of municipal water service to Amman customers in 1997 Of the JD 24 million in total system expenses estimated for 1997, water supply sources accounted for 64 1%, followed by network pumping at 23 8%, general and administrative at 7 8%, distribution and customer administration at 3 8%, and finally tankers at 0 5% of the total expenses for that year

Costs at the Bulk Transfer Points

The estimated cost of bulk water supply at various possible transfer points in the system is of interest in the FORWARD analyses With the management contract

concept, there would be potential sales from WAJ to AGWA and from AGWA to various bulk customers, including WAJ, either from the Amman network or from supply sources directly to neighboring governorates

Table 2 Total Water Expenses for Amman Service Area (1997)	
Item	Cost (JD million)
Water Sources	15 463
Tankers	0 116
Pumping System	5 738
Distribution and Customer Administration	0 911
General and Administrative	1 886
Total	**24 114**

Table 3 indicates the estimated 1997 cost of service at transfer points No costs are shown at Musitbeh, as they were not yet available Costs for 1998 for Musitbeh are expected to total around 68 fils/m^3

Table 3 Cost of Water at Potential Transfer/Sale Points (1997)			
From WAJ to AGWA		From AGWA to Bulk Customers	
Item	Cost (JD/m^3)	Item	Cost (JD/m^3)
Fuhais	0 224	To Network customers	0 232
Wala	0 300	To Tomato factory	0 123
Khaw	0 330	To Qatraneh customers	0 093
		To Swaqa customers	0 065
		To Qastal customers	0 051
		To Erenbeh customers	0 082
		To Musitbeh customers	0 000

Current Wastewater Costs

Several warnings are in order with respect to these cost estimates The new AGWA financial accounting system has only recently begun to track operations and maintenance expenditures at a cost-center level Therefore, for the purposes of the wastewater model development, it was necessary to rely on data and studies that were performed by the OMS efforts and professional opinions of WAJ and FORWARD staff Aside from the GTZ data on the As Samra Wastewater Treatment Plant (WWTP), few site-specific historic accounting data were available at the time of the model development for the rest of the wastewater system As the new accounting system accumulates cost center information for the wastewater utility, the data should replace the estimates that are currently placeholders in the model

Unit Cost by Wastewater Treatment System

Table 4 indicates the estimated unit costs by wastewater treatment system service area in Amman for 1997 The total cost incorporates wastewater treatment, network collection, and allocated general and administrative expenses As expected, the high-volume, non-mechanical As Samra WWTP realizes the lowest total cost of service The smaller and mechanical treatment plants incur noticeably higher treatment costs

The Wadi Esseir plant was being completed, but no expenses were reported for the year 1997 The anticipated wastewater systems for Naur, South Amman-East, South-Amman-West, South Amman-Land Application, and the Zarqa had not yet been constructed, but placeholder cost-centers were allowed for in the model

Table 4
Unit Cost of Wastewater Service by Service Area in Amman (1997)

AGWA System	Total Cost per m^3
As Samra	0 045
Abu Nusair	0 199
Baqa'a	0 118
Fuhais	0 266
Wadi Esseir	0 000
Naur	0 000
S Amman – East	0 000
S Amman – West	0 000
S Amman – Land Application	0 000
Zarqa	0 000

Cost by System Components

Table 5 presents the estimated total cost of wastewater service in Amman in 1997 Wastewater treatment accounts for about 43%, network and pumping about 34%, and general and administrative about 23% of the total JD 2 678 million in annual wastewater expenses in 1997

Table 5
Total Wastewater Expenses for the Amman Service Area (1997)

Item	Cost (JD million)
Treatment	1 141
Network and Pumping	0 921
Allocated G&A	0 616
Total	**2 678**

Current Revenues and Financial Performance

Tariff Structure, Billings, Collections, and Revenues

The current WAJ tariff structure has been in place only the last year The non-residential tariff for water is 1 000 JD/m^3 and 0 500 JD/m^3 for wastewater The residential water tariff is structured into four usage block charges The tariff in some blocks is formula-based with the unit price increasing with each additional cubic meter of water consumption For illustrative purposes, the water price per cubic meter is shown below for the weighted mid-point of the water tariff blocks

Water Use Level (cubic meters)	Water Tariff (JD per cubic meter)
0-20	2 000
21-40	0 113
41-130	0 369
>130	0 850

In 1997, about 57 8 million cubic meters of water was billed by AGWA, including retail, bulk, and tanker sales, which resulted in collected revenue of about JD 17 988 million based on the old tariff system Current non-collections totaled only about 1% of water billed, although historical non-collections are higher

The current wastewater tariff structure is based on the amount of metered water use The tariff in some blocks is formula-based with the unit price increasing with each additional cubic meter of water consumption For illustrative purposes, the water price per cubic meter is shown below for the weighted mid-point of the water tariff blocks

Water Use Level (cubic meters)	Wastewater Tariff (JD per cubic meter)
0-20	0 600
21-40	0 033
41-130	0 141
>130	0 350

In 1997, billed wastewater revenue was about JD 3 509 million With fee receipts included and adjusted for non-collections, overall wastewater income was about JD 5 878 million based on the old tariff system Current non-collections totaled only about 1% of wastewater billed, although historical non-collections are higher

Overall Financial Performance

Combined Water and Wastewater Utilities Given the JD 26 721 million in combined annual water and wastewater operating costs for AGWA in 1997 compared with the JD 23 866 million in combined annual water income, the Authority would incur an estimated operating loss of JD 2 855 million In other words, WAJ recovered about 89 3% of its operating costs for the combined water and wastewater utility When new capital (new debt service) costs are also included, the cost basis increases to JD 26 791 million and the annual loss increases slightly to JD 2 925 million or a full cost recovery of 89 1% for 1997

A noticeable tariff increase implemented part-year in 1997 is predicted to make a substantial improvement in WAJ/AGWA financial performance for the combined utilities with operating costs and a major portion of capital costs being covered with the anticipated revenue In 1998 with a full year of increased tariff revenue, the combined utilities' financial picture is expected to make substantial financial gains, attaining full cost recovery overall However, as described below, this overall picture is the result of a profitable wastewater utility covering slight losses from the water utility Increased revenues are based on continued demand patterns and maintained subscription to the AGWA system

Water Utility Given JD 24 043 million in annual water operating costs for WAJ in 1997 compared with JD 17 988 million in collected water income, the Authority would incur an estimated combined operating loss of JD 6 055 million Put differently, AGWA recovered about 74 8% of its operating costs When new capital (new debt service) costs are also included, the cost basis increases to JD 24 114 million and the annual loss for the water utility increases slightly to JD 6 125 million or a full cost recovery of only 74 6% for 1997

The tariff increase implemented in the last billing cycle in 1997 is making a substantial improvement in WAJ/AGWA financial performance for the overall combined utilities Operating costs and a noticeable portion of capital costs are covered with the anticipated revenue In 1998, with a full year of increased tariff revenue, the water utility is expected to make substantial financial gains, reducing the expected operating loss to JD 1 143 million or covering 96% of operating costs However, more noticeable debt service is beginning to be incurred, and full cost recovery is expected to total about 83%

Wastewater Utility Given JD 2 678 million in annual water operating and debt service (none for that year) costs for AGWA in 1997 compared with the JD 5 878 million in collected water revenue, the Authority would realize a profit of JD 3 200 million or 119% of its full costs for the wastewater utility

The tariff increase implemented in mid-1997 is predicted to make even more improvement in the financial performance for the wastewater utility In 1998, with a full

year of increased tariff revenue, the wastewater utility is expected to make substantial financial gains, producing a net profit of JD 6 753 million or 260% of full cost recovery As discussed above, this net income is valuable on the overall combined water and wastewater utilities' income statement for AGWA

CHAPTER 5
FUTURE FINANCIAL PLANNING SCENARIOS

While financial performance is anticipated to greatly improve with the recent tariff increase, as the network is rehabilitated and surface water becomes a greater percentage of WAJ/AGWA supplies, projected increases in capital and operating costs will place additional cost pressure upon the Authority The most pressing questions are what are the expected results of commercialization of the operation of the AGWA system and system rehabilitation improvements, and what further action or series of actions can be done to mitigate future tariff increases

In order to evaluate the relative merits of various alternative course of action, benchmarks need to be defined For the purposes of the February 1998 workshop, the current condition and a defined no action future were specified as benchmarks or bases for comparison of various new action alternatives The following scenarios for the water utility are illustrative of the water and wastewater models' financial planning capabilities

Scenario 1 – No Action Future

This planning scenario assumes that no action is taken to improve efficiencies or otherwise change management policies This is neither probable nor realistic, but it provides a benchmark to evaluate the relative contribution of other action-oriented programs In the no action case, inflation continues and costs increase, grace periods on existing debt service may expire, new debt service may be initiated, and new major water projects, such as the Amman network rehabilitation, Zai expansion – Phase I & II, and the Disi water supply, are implemented as planned

Two versions of this scenario are (1) where no new tariff increases are implemented and financial performance suffers, and (2) where tariffs are increased to meet operating or full cost recovery goals

In the first instance, operating losses for the water utility could grow to over 10 million JD by the year 2002 if no new tariff increases were provided In the second instance, as illustrated in Table 6, relying on tariff increases alone to cover operating costs results in the average water price increasing by 115% by 2002 over the year 1997 average price To allow for full water utility O&M cost recovery, the average water price would need to increase to about 685 fils/m^3 by the year 2006, about 2 6 times the 1997 average water price

Table 6 Comparison of Planning Scenarios Average Price of Water Needed to Attain O&M Cost Recovery				
Scenario	Average Price of Water (JD/m^3)			
	Year 2000	Year 2002	Year 2004	Year 2006
Scenario 1 – No Action	0 462	0 551	0 605	0 685
Scenario 2 – Management Contract with Moderate Performance	0 438	0 539	0 597	0 676
Scenario 3 – Management Contract with Maximum Performance	0 436	0 537	0 595	0 674

Scenario 2 – Management Contract with Moderate Performance

In this more action-oriented scenario, inflation and system improvements still occur, but a private-management operating contract is implemented with the following goals reducing physical losses in the system to 14% and administrative unaccounted-for water to 9%, improving pumping efficiency by 5%, and reducing overall AGWA staffing by 20% by 2002

As shown in Table 6, these additional moderate management measures are expected to buffer some of the anticipated tariff increases The year 2002 average price is expected to increase only 110% over current levels versus the possible 115% increase under the no action scenario

Scenario 3 – Management Contract with Maximum Performance

With a more aggressive management contract scenario, inflation and system improvements would still occur, but the private-management operating contract goals are increased to reducing physical losses in the system to 14%, administrative unaccounted-for water to 5%, improving pumping efficiency by 10%, and reducing overall AGWA staffing by 40% by 2002 Because much of the improvement in reducing physical losses is being accomplished with the rehabilitation of the Amman network, it is not predicted that more financial gain from further efficiency measures could be made in this scenario beyond that realized in Scenario 2

As shown in Table 6, more aggressive management measures are expected to buffer slightly more of the anticipated tariff increases The year 2002 average price is expected to increase 109% over current levels versus the possible 115% increase under the no action scenario and the 110% increase with Scenario 2

Analysis of the Planning Scenarios

Three interesting issues can be identified from comparing the planning scenarios

- All of the scenarios, even those with additional management contract efficiencies, require noticeable tariff increases needed over the years to maintain O&M cost recovery The underlying factor driving this need for higher tariffs is the planned shift in composition of water supplies from the low-cost and more proximate groundwater supplies that have historically served Amman to more expensive surface water sources and more distant groundwater sources The cost of pumping and treatment of these new supplies will place significant cost pressure on the water utility and is predicted to offset anticipated savings arising from network improvements and management contract efficiencies

- The most significant efficiency improvement in the WAJ water system should occur with the network rehabilitation improvements already underway The anticipated reduction in water loss, improved pumping efficiencies, and storage-fed system should allow for increased sales from the conserved water and lower electrical and maintenance costs Without the network rehabilitation program, the average price of water is predicted to reach 772 fils/m^3 by the year 2006, over three times the current average price of water

- There is relatively little financial gain in the more aggressive management contract in Scenario 3 of reducing staffing by an additional 20% over Scenario 2 The cost of staff is relatively small in the overall future budget compared to the costs of pumping and purchased new water

In general, the water model forecasts that changes in the water supply mix and associated costs of treatment and transport will be a dominating factor in the future cost increases and tariff changes facing the Authority While further management efficiency improvements help the future financial picture, they are not as influential as changing supplies and network modernization However, it should be stressed that the potential water tariff increases would be even greater, and donor cooperation perhaps reduced, if these further management efficiency improvements are not undertaken

CHAPTER 6
MODEL COORDINATION, TRAINING, AND TRANSFER

Coordination with WAJ and Others

FORWARD's approach to addressing issues is based on close coordination with the stakeholders, early agreement on approach, assumptions, and methods, and continuing coordination and agreement throughout the efforts to help assure ultimate buy-in and implementation of the study tools and recommendations

This level of coordination and agreement was essential to the success of the WAJ/AGWA cost/tariff models The close working relationship began with the initial scoping efforts in April 1997, was furthered at a multi-day workshop in August 1997 to jointly-define key issues, and continued with day-to-day communications with WAJ and AGWA staff, and regular monthly coordination meetings with an appointed WAJ Technical Working Group Senior MWI and WAJ officials were kept appraised of the FORWARD efforts and results The efforts culminated in two policy/planning meetings in February 1998, where the results of the FORWARD efforts were reviewed and accepted

Transfer to WAJ Planning Capability

At the beginning of the efforts, FORWARD asked WAJ to identify a model operator who would be the designated person to operate and maintain the model for the Authority A capable WAJ financial staff member was assigned to this role and was involved in the model development and coordination during the course of the efforts Their active participation resulted in an institutionalized familiarity with the model, its components, and data sources To further facilitate WAJ capacity-building and transfer, use, and upkeep of the model, FORWARD prepared an informative users manual and conducted a two-day training workshop at the completion of the program activities attended by several WAJ staff FORWARD will continue to work closely with WAJ staff on the maintenance, updating, and expansion of the models within Greater Amman and elsewhere