

PD-GAC-297

UNCLASSIFIED

DEPARTMENT OF STATE
INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
WASHINGTON, D.C. 20523

PROJECT PAPER

JORDAN - IRBID WATER AND SEWERAGE PROJECT

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LOAN 278-K-028

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IRBID PROJECT PAPER
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AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET	1. TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete	Amendment Number _____	DOCUMENT CODE 3
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2. COUNTRY/ENTITY Jordan	3. PROJECT NUMBER 278-0233
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4. BUREAU/OFFICE Near East	5. PROJECT TITLE (maximum 40 characters) Irbid Water and Sewerage
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6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY 1 2 3 1 8 4	7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4) A. Initial FY <u>B 1 0</u> B. Quarter <u>4</u> C. Final FY <u>8 4</u>
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8. COSTS (\$000 OR EQUIVALENT \$1 =)						
A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total						
(Grant)	()	()	()	(2,500)	()	(2,500)
(Loan)	()	()	()	(21,000)	()	(21,000)
Other U.S.	1.					
	2.					
Host Country					13,500	13,500
Other Donor(s)						
TOTALS				23,500	13,500	37,000

9. SCHEDULE OF AID FUNDING (\$000)									
A. APPRO- PRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
		(1) ESF	720B	820	820				
(2)									
(3)									
(4)									
TOTALS								2,500	21,000

10. SECONDARY TECHNICAL CODES (maximum 5 codes of 3 positions each)	11. SECONDARY PURPOSE CODE
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12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)			
A. Code	EU	EQTY	ENV
B. Amount			

13. PROJECT PURPOSE (maximum 480 characters)

To improve the existing water distribution system and to construct new wastewater collection and treatment facilities in Irbid.

14. SCHEDULED EVALUATIONS Interim MM YY MM YY Final MM YY 0 8 8 3 0 8 8 6	15. SOURCE/ORIGIN OF GOODS AND SERVICES <input checked="" type="checkbox"/> 000 <input checked="" type="checkbox"/> 941 <input checked="" type="checkbox"/> Local <input type="checkbox"/> Other (Specify)
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16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

17. APPROVED BY	Signature <i>Edgar C. Harrell</i> Edgar C. Harrell Title Director USAID/Jordan	Date Signed MM DD YY 0 7 2 7 8 0	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION MM DD YY 0 7 1 8 8 0
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BEST AVAILABLE DOCUMENT

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3. COUNTRY/ENTITY JORDAN	4. DOCUMENT REVISION NUMBER <input type="checkbox"/>
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5. PROJECT NUMBER (7 DIGITS) 275-0233	6. BUREAU/OFFICE A. SYMBOL NE	B. CODE 3	7. PROJECT TITLE (MAXIMUM 40 CHARACTERS) IRBID WATER & SEWERAGE
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8. PROPOSED NEXT DOCUMENT A. <input type="checkbox"/> 2 = PRP <input checked="" type="checkbox"/> 3 = PP	B. DATE MM YY 10 79	10. ESTIMATED COSTS (\$000 OR EQUIVALENT, \$1 = JD .311)
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9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION a. INITIAL FY 80 b. FINAL FY 80	10. ESTIMATED COSTS (continued) FUNDING SOURCE A. AID APPROPRIATED 15,000 B. OTHER U.S. 1. 11,000 2. 11,000 C. HOST COUNTRY D. OTHER DONOR(S) TOTAL 26,000
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11. PROPOSED BUDGET AID APPROPRIATED FUNDS (\$000)							
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. FIRST FY		LIFE OF PROJECT	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	H. GRANT	I. LOAN
(1) SA	501		826		15,000		15,000
(2)							
(3)							
(4)							
		TOTAL			15,000		15,000

12. SECONDARY TECHNICAL CODES (maximum six codes of three positions each)

541 245

13. SPECIAL CONCERNS CODES (MAXIMUM SIX CODES OF FOUR POSITIONS EACH) BUW	14. SECONDARY PURPOSE CODE 720
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15. PROJECT GOAL (MAXIMUM 240 CHARACTERS)

To improve the quality of life for the Residents of Irbid.

16. PROJECT PURPOSE (MAXIMUM 480 CHARACTERS)

Expand Water Distribution and Stormwater Collection systems and construct a new sewage collection system and treatment plant.

17. PLANNING RESOURCE REQUIREMENTS (staff/funds)

July 1979 for 4 to 6 weeks. Include Economist and Social Scientist, AID/W funded.

18. ORIGINATING OFFICE CLEARANCE	19. DATE DOCUMENT RECEIVED 1. AID/W, OR FOR AID/W DOCUMENTS. DATE OF DISTRIBUTION
Signature: <i>Chambers H. Russell</i> Title: Mission Director, USAID/J Date Signed: MM DD YY 015 21 78	MM DD YY

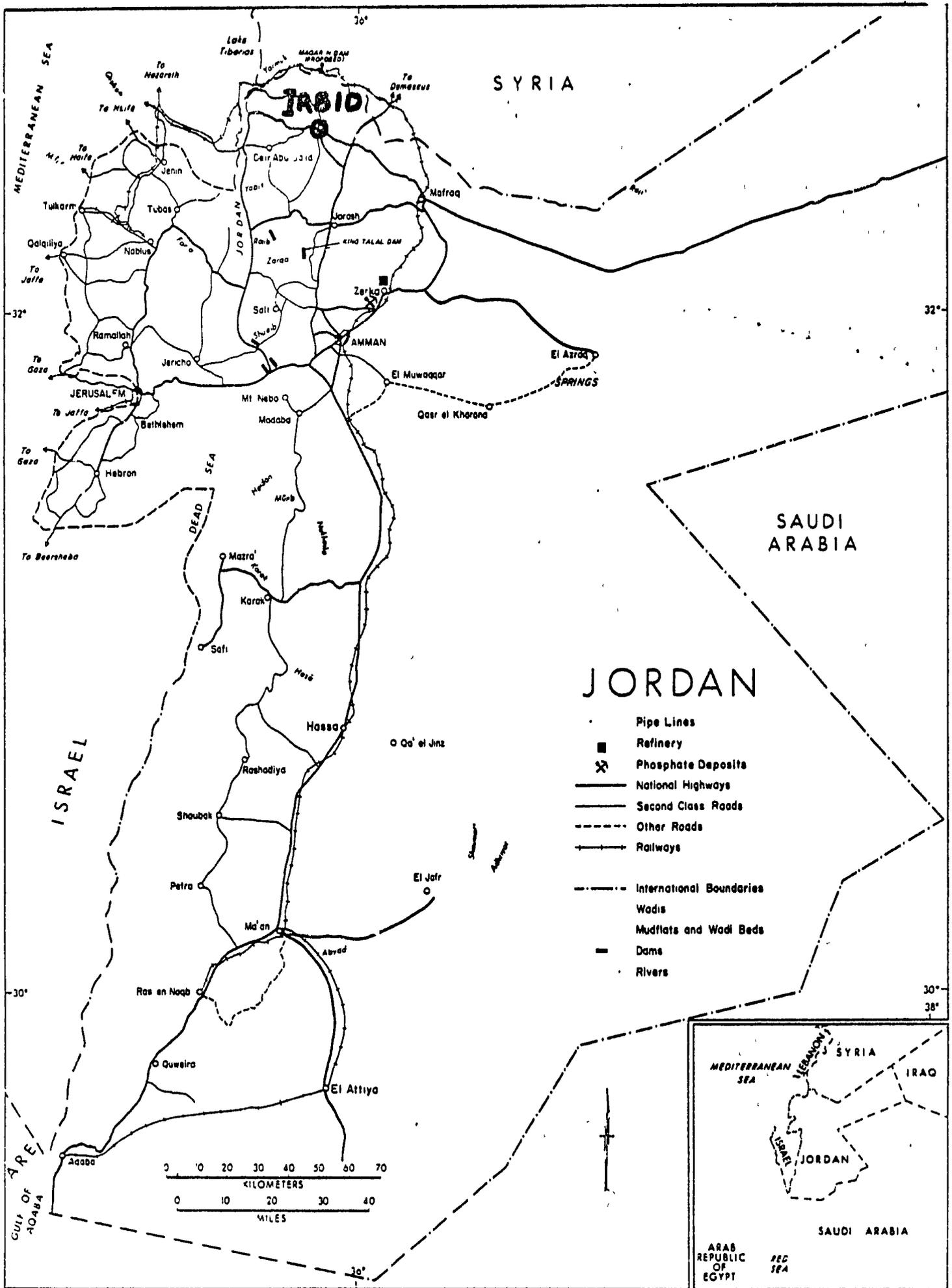


FIGURE 1

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GLOSSARY OF TERMS AND ABBREVIATIONS USED IN PROJECT PAPER

- GOJ - Government of Jordan
- WSC - Water Supply Corporation
- NRA - Natural Resources Authority
- NPC - National Planning Council
- MMREA - Ministry of Municipal, Rural and Environmental Affairs
- km - Kilometer = .62 miles
- m³ - Cubic meter = 35.31 cubic ft. = 264 U.S. gallons
- mcm - Million cubic meters
- mcm/a - Million cubic meters per year
- liter - .264 U.S. gallons
- lpc - Liters per capita
- lpcd - Liters per capita per day
- psi - Pounds per square inch
- JD - Jordanian dinar = \$3.33 U.S.

**PROJECT PAPER
HASHEMITE KINGDOM OF JORDAN
IRBID WATER AND SEWERAGE PROJECT**

Summary and Recommendations

1. Description of the Project: The proposed project will improve the service provided by the existing water distribution system to the benefit of all households connected to the system. It will also provide water to an estimated 2,000 households (15,000 residents) not presently connected. The project will also finance construction of first stage elements of a wastewater collection system for 7500 household connections and the installation of a sewage treatment facility. This construction ultimately will benefit the entire population of Irbid (113,000). The total estimated project cost is \$37.0 million. The project represents the first in a series of planned investments in water and wastewater at Irbid. It will also provide technical assistance to improve the administrative capability of the implementing agency and to provide training for its staff.
2. Borrower and Grantee: The Government of the Hashemite Kingdom of Jordan (GOJ) is the Borrower and Grantee. It will make the proceeds of the loan available to the Water Supply Corporation (WSC), a semi-autonomous organization, with responsibility for water supply and distribution and for the collection and treatment of wastewater in the city of Irbid.
3. Assistance
- (a) The Loan: Not to exceed Twenty-one Million U.S. Dollars (\$21,000,000) to finance the procurement of equipment, materials and construction services for the project. Procurement will be limited to Jordan and countries included in AID Geographic Code 941. *soft terms?*

(b) The Grant: Not to exceed Two Million, Five Hundred Thousand U.S. Dollars (\$2,500,000) to finance the procurement of engineering services for supervision of construction and technical assistance in training and for institution building. Procurement will be limited to the United States.

(c) Total Project Cost (in \$ Millions)

	<u>AID LOAN(57%)</u>		<u>AID GRANT(7%)</u>	<u>GOJ(36%)</u>		<u>TOTAL(100%)</u>	
	<u>FX</u>	<u>LC</u>	<u>FX</u>	<u>FX</u>	<u>LC</u>	<u>FX</u>	<u>LC</u>
Construction	15.1	5.9	0	0	13.5	15.1	19.4
Engineering and Technical Assistance	<u>0</u>	<u>0</u>	<u>2.5</u>	<u>0</u>	<u>0</u>	<u>2.5</u>	<u>0</u>
	15.1	5.9	2.5	0	13.5	17.6	19.4
Total	Loan - <u>21.0</u>		Grant - <u>2.5</u>	GOJ - <u>13.5</u>		Project - <u>37.0</u>	

8X

4. Loan Terms: The loan will be repayable in U.S. dollars over a period of 40 years, including a 10-year grace period for principal repayments, with interest at an annual rate of two percent during the grace period and three percent thereafter.

5. Summary of Findings

(a) Technical Analysis: The feasibility report and preliminary engineering studies were completed in March, 1980 by an experienced sanitary engineering consulting firm, Weston International, Inc. These have been reviewed by AID and are judged to be fully adequate for the purpose of establishing the technical soundness of the project. The feasibility study was the basis for this Project Paper and is available from NE/PD. The consulting firm will be providing engineering services through the completion of the project, including the preparation of final design, bidding and contracting documents for all construction, equipment and materials, and the engineering supervision of construction and start-up of all facilities.

(b) Financial Analysis: The improvement and replacement of the existing water system plus the construction of a sewerage collection and wastewater treatment plant (plus general price inflation) will significantly increase the costs and revenues required to meet the financial obligations of the Irbid water/sewerage system over the next ten years. Based on an analysis of ability to pay information by various consumer groups, it would appear that the financial capability to generate the level of revenues required to make the operating utility operationally viable will not be a major project constraint. Under these circumstances the operation of the project appears financially viable.

(c) Economic Analysis: Even excluding the monetary valuation of potential health benefits which under current state-of-the-art project analysis capabilities is unfeasible, the project's economic rate of return is 9.1 percent. The proposed project would appear to be economically sound.

(d) Social Analysis: The project will benefit all the residents of Irbid by providing improvements in the water distribution system and will benefit principally the lower-income residents that live in the parts of the city that will be sewerred. The chief benefits will be in the form of improved water and sewerage facilities, which should result in improved health among the population. It is believed that no aspect of the project will conflict with any of the social norms or cultural patterns of Irbid's residents.

(e) Environmental Considerations: An environmental assessment was prepared by the consultant using the guidelines of both AID and the U.S. Water Resources Council. The basic findings are that the project will have the normal short-run negative effects associated with major construction but that the long-term effects will be positive and substantial. Mitigating measures have been identified, two of which will be the subject of special covenants in the Project Agreement (see Section III D, Para 3.56).

6. Statutory Checklist: All statutory criteria have been met (see Annex G).
7. AID Funding Sources: Economic Support Fund, FY 1980 Continuing Resolution.
8. Mission's Views: The USAID Mission supports the project fully. The FAA Section 611(e) certification executed by the Mission Director is included in Annex H. The project directly addresses the priority development objectives of the Government of Jordan of meeting basic human needs in the water and wastewater sector.
9. Issues: There are no unresolved issues.
10. Recommendation: That a loan in the amount of \$21.0 million and a grant in the amount of \$2.5 million be authorized subject to the terms and conditions contained in the draft Project Authorization (Annex L).

PROJECT COMMITTEES

<u>USAID</u>	Chairperson Engineer Legal Counsel Social Scientist	James Shea <u>James Cassanos</u> Garber Davidson Jarir Dajani
<u>AID/W</u>	Chairperson Environmental Coordinator Desk Officer Legal Counsel Economist/Financial Analyst	Robert <u>Fedel</u> Stephen <u>Lintner</u> Tom Miller Steven <u>Carlson</u> Leonard <u>Rosenberg</u>

I. PROJECT BACKGROUND

A. Introduction

1.01. Rapid urban growth in Jordan has outpaced the development of infrastructure in the cities and has imposed hardships, particularly on the poor residents of the crowded inner cities. As the growth of urban areas has accelerated, so has the Government of Jordan's (GOJ) awareness of the necessity of meeting the inhabitants' needs for safe water and wastewater services. The proposed project for improvements in water distribution and for wastewater services in Irbid is part of a larger program being implemented by the GOJ to satisfy water and wastewater needs in all the nation's urban areas. For water, the GOJ intends to provide a fully-pressurized supply system in each urban community designed to provide 80 liters per capita per day (lpcd) for a price not to exceed 5 percent of household income. For sewerage, the GOJ intends to develop urban systems for the collection and treatment of sanitary and industrial wastewater at a reasonable cost.

1.02. The proposed loan and grant will be part of an on-going AID effort to support this GOJ initiative as fully as possible. AID's rationale and proposed programs of involvement in the water and wastewater sector have been the subject of special annexes to the 1981 and 1982 COSS's. The AID strategy is first to support the Government's program to increase the minimum supply of water for daily use and to provide for wastewater disposal on an equitable basis to all residents. To the extent practicable, it is AID's policy to target assistance so as to maximize benefits to the low income population by earmarking and directing AID basic human needs projects to the poor. In addition, it is AID's policy to insure that project design considers fully the need to provide services at rates which are affordable to low income residents.

1.03. USAID's second sectoral priority objective is to support the strengthening of Jordanian institutional capabilities, including the establishment of a national water policy entity and training facilities to assure that there exists, at a minimum, a trained, core cadre of technicians and managers to operate and maintain the water and wastewater projects that will be completed in the next few years. AID will address these and other related issues in this project and in the FY'82 project for Water Resources Management.

1.04. To date, AID has participated in several projects and studies whose objectives have been to provide adequate water supply and/or wastewater collection and treatment. These include the Amman Water and Sewerage Project (\$39 million, Loan 278-K-023) and Aqaba Wastewater Project (\$7.5 million, Loan 278-K-026). In addition, AID has assisted in financing the Zarqa-Ruseifa Water, Sewage and Stormwater Drainage and the Greater Amman Wastewater studies. AID also intends to assist in financing studies of water distribution and wastewater disposal for the cities of Ma'an, Tafila, Karak

and Madaba. The GOJ has financed wastewater facilities in Salt and Jerash. Completion of all of these projects will provide wastewater collection and treatment, improved water distribution, and in some cases, increased water supplies to approximately 55 percent of the country's population.

B. Irbid Profile

1.05. Irbid is the commercial, cultural, and administrative center of the northwestern plateau area of Jordan. Its central location makes Irbid the dominant commercial, trading and social center of the northwest region, a role Irbid has continuously filled throughout history. The Irbid Governorate, of which Irbid is the capital city, is the second most populous governorate in the Kingdom being exceeded in importance and population only by the Amman region. The city of Irbid is the third largest in the country.

1.06. The rate of growth of the city (5.2 percent) has not been greater than the average of other cities in Jordan, but as Irbid is one of three cities in Jordan with a population in excess of 100,000, its absolute incremental growth has been a significant factor in overtaxing the infrastructure of the city. Between 1961 and 1979, the dates of the last two official censuses, Irbid's population has increased by 68,269 from a 1961 base of 44,685 to 112,954 in 1979. This high growth rate is attributed in part to the several waves of migration of Palestinian Arabs, the high natural population growth rate and migration to the cities from rural areas. About 14 percent of the population lives in a refugee camp just north of the center of the city.

1.07. Irbid has a town plan which sets forth zoning boundaries and present and future utilization intensities of land areas. Although the town plan does not represent a cohesive planning policy, it has acted as a guideline for growth. The city has been divided into four residential zones and one commercial zone. The minimum residential lot size in zones A and B are 750 sq. m. and 550 sq. m., respectively and in zones C and D are 450 sq. m. and 420 sq. m., respectively. Sample surveys (by the project consultant and an AID social scientist) indicate that there is a definite correlation between lot size and income and that, for the most part, the poorer people live in zones C and D.

1.08. Two recent studies of the Irbid area provide considerable information on the social, and economic potential of Irbid, as well as problems which might be encountered in the further development of the Irbid-North Jordan area.* These studies indicate that

* These studies are: The "Integrated Regional study of North Jordan" performed by the Japan International Cooperative Agency (JICA) and "Water Use Strategy in North Jordan" conducted by Howard Humphreys and Sons in 1978. Other related regional and national plans which deal with the problems of the Irbid area

(Cont'd)

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the area, and particularly Irbid as the commercial hub of the region, will grow rapidly during the next 20 years. In addition the GOJ's National 5-year plan (1976-80) established the rationale and the policies and priorities for achievement of development goals in Jordan, including Irbid.

1.09. There have been two previous studies of water supply and distribution, sewerage and drainage schemes, performed by the U.K.'s Crown Agents (1977) and Polytechnic Praha, Hydroconsultant, Czechoslovakia (1969). Although the recommendations of these studies have not been implemented, the studies have proved useful to the project consultant.

C. Project History

1.10. In 1979, the National Planning Council retained the firm of Weston International, Inc. of West Chester, Pennsylvania, (with its subcontractors, Stanley Consultants, Inc., of Muscatine, Iowa and two Jordanian firms, SIGMA Consulting Engineers and MRM Consulting Engineers Co., Ltd.) to investigate the technical and economic feasibility of constructing, in two phases, four types of municipal services for the Irbid town-plan area: 1) a water distribution system; 2) a wastewater collection, treatment and disposal system; 3) a limited stormwater drainage system and; 4) a solid waste collection and disposal system. Phase I construction would provide for the needs of Irbid through the year 1990 and Phase II, through the year 2000. The Weston study provides the basic technical, social, economic and financial data used in this Project Paper.

1.11. The Consultant developed a plan to improve and expand the existing water distribution and solid waste disposal systems and to provide sewerage drainage and wastewater collection and treatment at an estimated cost of \$100.2 million for both Phases (at 1979 prices); the estimate for Phase I at 1979 prices is \$59.6 million.

1.12. Since funding for the total Phase I project is not available at this time, the Government decided to defer work on the storm water drainage and solid waste disposal systems. USAID and GOJ officials met in March and April 1980 to discuss the possible components that could be financed from the available financial resources. From AID's point of view, the components selected should be those water improvements that equitably benefit the total population and those elements of the wastewater collection and treatment system which would principally benefit the urban

* (cont'd) are: the "National Water Master Plan of Jordan" which was prepared by the German Agency for Technical Cooperation in 1977; an unpublished computerized population forecast by Dr. Hanna Rizk, a U.N. demographer with the Department of Statistics; and the "Jordan National Water Carrier" analysis made by Harza Overseas Engineering Company in 1979.

poor. Based on the selection criteria, AID proposed financial participation in constructing the following components as the first phase of the Irbid water and wastewater development scheme: 1) improvements to the water distribution network that are considered necessary to upgrade the system to meet the essential requirements through 1990; 2) portions of wastewater collection system that serve the poorer, densely-settled central and western portions of the city; and 3) that portion of the wastewater treatment plant necessary to meet the treatment demand of the collection system installed under (2) above. The project agreed upon with NPC is described in Paragraph 2.09.

1.13. On May 7, the National Planning Council met with Irbid city officials to review the project as proposed by USAID and approved by NPC. The city officials concurred in the proposed program with minor modifications. Assuming, conservatively, that construction will start in 1981 and end in 1984, escalated costs are estimated at \$37.0 million. AID's contribution to the project will be a loan of \$21.0 million and a grant of \$2.5 million.

II. PROJECT DESCRIPTION

A. General

2.01. The proposed project was derived from a report by the U.S. consulting firm, Weston International Inc., entitled "Feasibility Report and Preliminary Engineering Studies, Irbid Municipal Water Distribution, Sewerage, Storm Drainage and Solid Waste Disposal Project, March 1980." The report was submitted through the Ministry of Municipal, Rural and Environmental Affairs, the executing agency, to the National Planning Council of the Hashemite Kingdom of Jordan. The report as submitted in March, 1980 consisted of one main volume and an Executive Summary. The main volume is on file at NE/PD along with the revised Executive Summary and an addendum, which was prepared to take into account comments of the Client, AID and IBRD.

B. Existing Situation

1. Water Supply and Distribution

2.02. The source of water for Irbid comes principally from three Water Supply Corporation (WSC) well-fields at Summaya, Dhuleil and Azraq. Most of the water from these sources is pumped to a main pumping station at Za'atari, from which it is pumped through the 24-inch transmission main that serves Irbid and over 100 villages and municipalities in the Northern District of WSC. Figure 2 indicates the location of the water supply lines and reservoirs which presently provide water to Irbid. The WSC supply to Irbid (about 5,000 m³/day) is pumped through the 24-inch transmission main to the two 6,000 m³ reservoirs at Houfa, built in 1977, from which it flows by gravity to the city through an 8-inch line. In addition, water from the WSC supply is pumped directly to the

Irbid water distribution system at Kairawan Circle through a 12-inch branch line that takes off from the 24-inch transmission main. Because this line feeds other towns and villages enroute, the supply to Irbid averages only about 1,500 m³/day. See Figure 2.

2.03. In addition to the WSC supply, Irbid maintains its own springs and pumping stations at Rahoub and Khreiba some 9 kilometers northeast and 12 kilometers north of Irbid, respectively. These sources, controlled by the city, supply only a limited amount of water to the system (about 750 m³/day). Thus the total supply of water that could be available to Irbid in 1979 was about 2.6 million cubic meters per annum (MCM/a). Assuming about 25 percent water losses in the distribution system, the amount that could be sold is about 1.98 MCM/a. In 1979 Irbid actually sold 1.66 MCM.

2.04. The water department of the municipality of Irbid is presently responsible for all water system operations within Irbid and the two pumping stations at Khreiba and Rahoub. Most of the water to Irbid, however, is supplied by WSC. The supply from WSC is chlorinated. The municipal water department chlorinates the water at the pumping stations at Rahoub and Khreiba and maintains facilities within the city to provide additional chlorination if required.

2.05. Until 1978 the only connection of WSC supply to Irbid was to Kairawan Circle and due to hydraulic characteristics, did not provide sufficient quantities of water to meet system demands. In addition, the WSC well fields did not have sufficient capacity to supply all of their service area. In 1978, additional supply from the Samnaya wells was made available and storage at Houfa with a new connection to the Irbid system was completed. The presence of the Houfa storage tanks insures a more continuous supply. Previously, when WSC was unable to pump, Irbid did not receive any water. A remaining bottleneck to an improved supply is the undersize line from Houfa to Irbid.

2.06. The existing water distribution system in Irbid consists of a basic 10-inch loop in the center of town, some smaller loops of 4-inch and 6-inch pipes and numerous small pipes that extend to the outskirts of the city and "dead end" there; i.e., they can only be supplied from one direction, and if a break occurs, customers beyond that point will be out of water until the break is repaired. The system also includes a large number of pipes that are smaller than 4 inches.

2. Wastewater

2.07. For practical purposes, there are no sanitary sewers in Irbid. There are only three short 500-mm diameter pipes with a total length of approximately 600 m that drain into a box culvert, which is part of the existing storm sewer system that drains the central part of town. The rest of the city is served by cesspools. Each dwelling or building has a drain to an individual cesspool or to a common cesspool serving more than one building. Cesspools

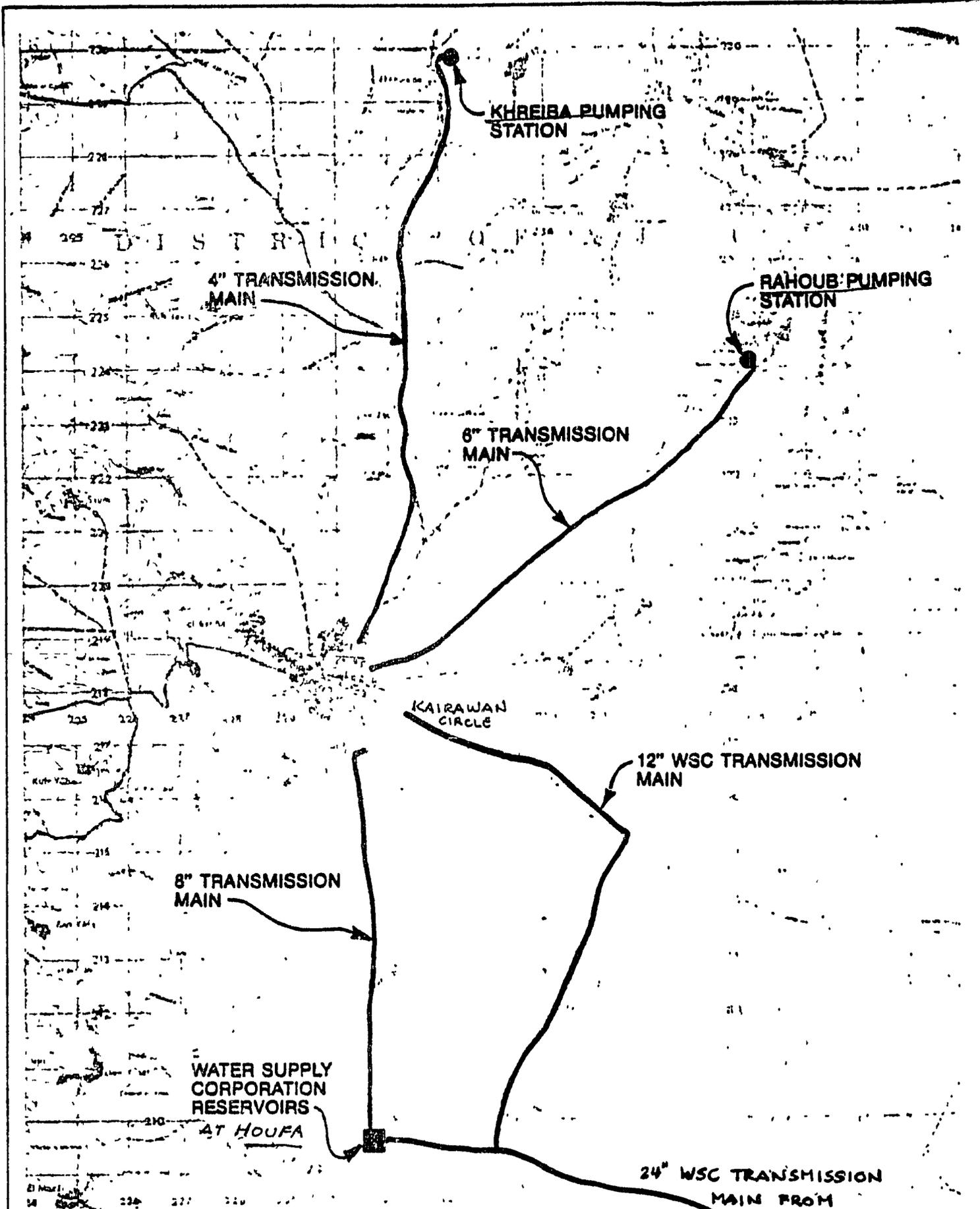


FIGURE 2
EXISTING IRBID WATER SUPPLY

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collect most of the heavier solids and allow the liquid portion to seep into the ground. The liquid wastewater either eventually reaches the groundwater or returns to the surface. In an area such as Irbid, which is underlain by fractured limestone, it is impossible to determine the travel time or degree of renovation of wastewater discharged through cesspools into the ground. In many locations in the city the soil is more or less impervious and cesspools fill up and overflow. The wastewater seeps into the ground at another location, or runs off to the nearest drainage channel. Even when cesspools are operating properly, the solids that collect in them must be pumped out periodically to recover storage capacity. Cesspools in impervious soils, which overflow, must be pumped out much more frequently. Cesspools are emptied at the owner's expense by public or private haulers, who pump the contents (also known as septage) into tank trucks. The trucks are emptied at a dumping site on the Wadi el Hamam at a point approximately 3 km. northwest of the Irbid city limits. Liquid septage from the site flows into the wadis. To save time and to conserve fuel, septage haulers often dump their trucks on open fields closer to the city. The cesspool method of wastewater disposal at Irbid can contaminate both surface and groundwater. It is a potential public health hazard.

C. Proposed Project

2.08. The availability of an adequate supply of water was considered critical to the proper functioning and utilization of the project components to be developed with AID funding. The issue is discussed in detail in the Technical Analysis (Section III A) and in Annex B. These analyses conclude that the proposed project will function under the "most conservative" condition which assumes that no additional supply of water will be forthcoming to Irbid before 1990.

2.09. The proposed project includes elements of water distribution, sewage collection and sewage treatment as derived from the Consultant's recommended master plan for Irbid. The water distribution element will provide for the installation of about 50 km of polyvinyl chloride and ductile iron pipe and associated valves. The sewage collection element will consist of about 113 km of concrete pipe for sewage collection and about 8 km of large interceptor sewers which will collect sewage from smaller lines and direct it to the treatment plant. A treatment plant scaled to meet the immediate needs of the project's collection system will be included in the project. Provision for future expansion is included. A full description of the project components is included in Annex A.

D. Project Costs and Financing

1. Project Costs

2.10. The total estimated cost of the project described in the foregoing paragraphs is shown in Table II-1. USAID has compared

TABLE II-1
SUMMARY OF PROJECT COSTS (in thousands of \$)

Item	AID		GOJ		SUBTOTAL		TOTAL
	FX	LC	FX	LC	FX	LC	
<u>Water Distribution</u>	3,696	1,109	-	2,082	3,696	3,191	6,887
<u>Wastewater Collection</u>	3,053	1,980	-	3,714	3,053	5,694	8,747
<u>Wastewater Treatment</u>	2,533	688	-	1,292	2,533	1,980	4,513
SUBTOTAL	9,282	3,777	-	7,088	9,282	10,865	20,147 <i>Construction</i>
Construction Contingen- cies - 15%	1,392	567	-	1,061	1,392	1,628	3,020
Escalation ¹	4,419	1,563	-	3,609	4,419	5,172	9,591 <i>Contingencies</i>
TOTAL CONSTRUCTION	15,093 ²	5,907 ²	-	11,758	15,093	17,665	32,758 <i>12,611</i>
GOJ Administration ?	-	-	-	1,542	-	1,542	1,542 <i>Supervision</i>
Engineering ³	2,000	-	-	-	2,000	-	2,000 <i>TA</i>
Technical Ass't. & Training ³	500	-	-	200	500	200	700 <i>4,242</i>
AID & GOJ SUBTOTAL	17,593	5,907	-	13,500	17,593	19,407	37,000
TOTAL PROJECT COST	AID	23,500	GOJ	13,500			37,000

¹ Escalation at 10% per year compounded - 41.4% over 4-year construction period.

² AID is financing 35% (34.8) of LC and 100% of FX.

³ Engineering and training are grant-funded.

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selected unit costs with recent contract prices for similar work in Amman. Although there are some sharp variations for particular items of work, between actual bid prices and the estimates for this project, the overall comparison supports the conclusion that the consultant's estimates are reasonable though probably conservative. Since AID's contribution to the project is 64 percent of the total estimated costs of \$37 million, any reductions in cost due to actual bids would increase the percentage of AID's participation in the project. AID's contribution to the project will not exceed 75% of total project costs. The consultant's report included an allowance for physical contingencies of 15 percent and an additional 15 percent allowance for both GOJ administrative costs and the engineering costs for supervision of construction. This latter percentage is considered high and downward adjustments have been made in the estimates shown in Table II-1. The costs have been escalated at a rate of 10 percent per year. In this era of rapidly fluctuating rates of inflation, no attempt has been made to develop rates of escalation of foreign and local costs. Because of the conservative cost estimates and ample contingency allowance, we believe that an escalation rate of 10 percent is adequate.

2.11. The local cost component of construction includes about \$325,000 to finance the cost of reconnecting about 15,000 customers to the new water distribution system. The estimate does not include the costs of new service connections. The Irbid Water Council will charge JD 32 as an administrative fee for each sewer connection. Home owners will make their own arrangements for the actual physical connection to the system. For a discussion of connection charges, see the Social Analysis (Annex D).

2. Project Financing

2.12. A summary of project costs by source and amounts is shown in Table II-1. Of the total AID funding of \$23.5 million, \$2.5 million are grant funds to finance the foreign exchange cost of engineering (\$2.0 million) and the training and other technical assistance element (\$500,000). Loan funding of \$21.0 million will finance all the foreign exchange costs of construction (estimated at \$17.6 million) and about \$3.4 million in local costs, which is about 20 percent of the total local cost component of construction.

2.13. The disbursement schedule for AID and GOJ funds is shown in Section IV, Table IV-2.

2.14. The GOJ will relend the \$21.0 million AID loan to WSC which, by letter (see Annex J), has been designated the implementing agency for the project. The terms of the relending agreement are expected to include 6 percent interest, a three-year grace period and repayment in 20 years. The GOJ contribution and AID's \$2.5 million grant will be passed on to WSC as equity.

3. Repayment Prospects

2.15. Repayment prospects are judged to be good. The latest country report for Jordan of the International Monetary Fund, dated April 27, 1979, states: "Jordan's debt service remains low, reflecting the concessional terms secured in the bulk of Jordan's foreign debt. Interest and amortization of foreign debts, as a ratio of earnings on exports of goods and services, fluctuated between 4 - 8 percent in the period 1974-1978." More information on the repayment prospects is contained in the 1982 CDSS. It is believed that the proposed loan will not have a significant adverse impact on Jordan's debt service capacity, considering the concessional terms being recommended. The prospects for loan repayment are thus favorable.

III. Project Analyses

A. Technical Feasibility

1. General

3.01. This project is part of the national economic development program of the Government of Jordan as set forth in the First Five-Year Plan (1976-80), which aims to improve and increase the access of all its citizens to a safe water supply and to provide for waste-water disposal on an equitable basis. The Government, through its Consultant, has examined several alternative plans for improving the existing water distribution system at Irbid and for installation of a wastewater collection and treatment system. The least-cost alternatives have been selected for implementation.

3.02. The alternative selected for improving the water distribution system will achieve a more efficient use of the additional water that will be supplied to Irbid by the Water Supply Corporation. The increased water supply and improved distribution system will alleviate health problems created by the current practice of rationing and by intermittent service, which result in contamination of water by infiltration of wastes into lines that are not under constant pressure. Because of water shortages in Jordan, the project agreement will include a special covenant that will require the Government to institute a leak-detection program to reduce water losses. This is a non-structural intervention that should conserve water and improve the management of the limited ground water resources.

3.03. The wastewater system should have a major beneficial effect on the environmental quality of the city and region by reducing the problems of cesspool overflows and pools of standing wastewater which currently present significant health hazards. Mitigations have been identified (see Environmental Analysis) that will minimize

the potential pollution of the Wadi Arab and the proposed Wadi Arab reservoir. These mitigations will be included as special covenants in the Project Agreement.

2. Technical Issues

3.04. The consultant's feasibility report and preliminary engineering studies provide a thorough, in-depth analysis and explanation of the bases for design. The project, as proposed by the consultant, represents a technically sound and least-cost solution to the problems of improving Irbid's existing water distribution system and of providing wastewater collection and treatment. The proposed project, developed within available funding, is also technically sound and the least-cost solution to meet the essential requirement for providing improved water distribution and construction of a basic wastewater collection system. The project will meet Irbid's needs until the end of this decade. A number of technical issues that were raised and considered in the AID project analysis are discussed in detail below and in Annex B.

a. Water Supply and Distribution

3.05. The major technical issues concerned the availability of an adequate supply of water to permit the proper functioning of the proposed improvements to the water system and the movement and treatment of sewage in the proposed wastewater collection system.

3.06. Although measures by the Water Supply Corporation to increase and improve the water supply to Irbid are not specifically included in the project, they are essential to its full implementation. These measures will benefit both Irbid and the entire Northern District of WSC. The cost of these improvements will be reflected in the wholesale price of water sold by the WSC to Irbid and the more than 100 villages and municipalities in the Northern District.

3.07. The measures to increase and improve water supply include the development of additional wells and their connection to the system and the construction of a 14-inch pipeline from the Houfa reservoir to Irbid. The former will benefit the entire Northern District and the latter, Irbid only. In the past year the WSC, with hydrogeological advice and drilling assistance from the Natural Resources Authority (NRA), has drilled three new wells in the Sarmaya well field and five new wells in a new well field at Wadi Aqib. According to WSC, these new wells will be developed and connected to the Northern District system by 1981.

3.08. The following table shows the water supply that will then be available to the Northern District:

<u>Source</u>	<u>Capacity - m³/hr.</u>	<u>Yield MCM/a</u>
Sammaya	600	5.256
Dhuleil	375	3.285
Azraq	300	2.628
Wadi Aqib	600	5.256
		<u>16.425</u>

3.09. If one assumes that the present allocations to the more than 100 communities in the Northern District will remain relatively the same, Irbid will continue to get about one-third of the total, or 5.48 MCM/a. If one also assumes that Irbid will continue to operate its pumping stations at Rahoub and Khreiba, which now supply about 0.26 MCM/a, the total water available to Irbid will be 5.74 MCM/a.

3.10. If, most conservatively, one assumes that, despite active exploration, no further groundwater supplies are found in the Northern District, that the surface supplies from the Yarmouk River will not be tapped until the end of the decade (1989-1990) and that water use will increase at a uniform rate of 6 percent per year and given the assumptions in Table III-1, it appears that residential water consumption will nearly double from 32 lpcd at the beginning of the period to about 60 lpcd at the end of the period. This is an extremely conservative, worst-case condition. The financial analysis is based on this worst-case condition.

3.11. Undoubtedly, additional groundwater will be found and Irbid's proportionate share of the total Northern District supply will increase because of a more rapid urban population growth rate and a slower growth rate in the villages that will lose residents through rural-to-urban migration. If the active exploration and drilling program initiated by WSC and NRA in the last two years results in additional productive wells, it is conceivable that domestic water consumption can approach 80 lpcd, which was the water demand that was projected for 1990 in the "Water Use Strategy for North Jordan" by Howard Humphreys and Sons, a British consultant. A covenant in the Agreement will require the Government to make funds available to WSC to continue exploration for, and development of, additional water supplies.

3.12. The success of the project is dependent upon increased pipeline capacity to deliver water from the Houfa reservoirs to the city of Irbid. WSC has awarded a contract for the construction of an additional 14-inch pipeline (the existing 8-inch line will remain) and expects that construction will be completed in 1981. The combined capacity of the two pipelines will deliver enough water to meet of Irbid's needs until 1990.

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TABLE III-1
IRBID WATER SUPPLY
WATER DEMAND PROJECTIONS

<u>Y^rAR</u>	<u>POPULATION THOUSANDS</u>	<u>WATER SOLD -MCM/a</u>				<u>WATER REQUIRED MCM/a</u>
		<u>TOTAL</u>	<u>NON-RESIDENTIAL</u>	<u>RESIDENTIAL AMOUNT</u>	<u>LPCD</u>	
1979 (actual)	113	1.65	0.33	1.32	32	2.06
1980	118	1.81	0.35	1.46	34	2.26
1981	123	1.99	0.40	1.59	36	2.65
1982	129	2.27	0.45	1.82	38	3.03
1983	135	2.49	0.50	1.99	40	3.32
1984	141	2.79	0.56	2.23	43	3.72
1985	147	3.05	0.61	2.44	45	4.07
1986	153	3.38	0.67	2.71	48	4.23
1987	159	3.72	0.74	2.98	51	4.65
1988	165	4.09	0.82	3.27	54	5.11
1989	172	4.49	0.90	3.59	57	5.61

Assumptions

1. Population increases at rate of 4.5% per year through 1985 and 4.0% per year thereafter.
2. Rate of increase in per capita water use - 6.0% per year. Rounding procedures account for subtotals occasionally exceeding (or being less) than totals.
3. Non-residential use - 20% of total.
4. Water losses - 25% through 1985 and 20% thereafter.

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b. Sewage Collection and Treatment

3.13. With respect to the functioning of the sewerage system, a minimum flow, particularly in flat areas of minimum slope, is required to keep the pipe free of sediment and solids. Although it is necessary to install a limited number of pipes of a larger size to meet present and long-term capacities, - which increases opportunity for sedimentation - the maintenance of free flow can be assured by a periodic surcharge of water into the system.

3.14. The treatment plant is being constructed in stages. The stage included in the AID project will satisfy the treatment demand created by the collection system to be installed. Provision is made for additional plant expansion at a later date to meet requirements of a future complete collection system.

c. Water Conservation

3.15. Critical to efficient utilization of the limited supply of water in Jordan is the need for water conservation. As noted in Annex B, AID has been encouraging the GOJ to direct its attention to conservation of water. An AID project is presently being developed through the National Academy of Science (NAS) which will provide for a water conservation technology workshop for GOJ participants concerned with water related activities.

d. Operations and Maintenance

3.16. The consultant has recommended procedures that should improve operation and maintenance. These include: (1) improving records of water supply and demand; (2) keeping complete records on the location, type and size of all mains, pipes, valves and other appurtenances; (3) expanding the program of testing for chlorine residual; (4) stocking an adequate supply of spare parts; (5) improving meter maintenance; (6) initiating a leak-detection program; and (7) increasing the frequency of inspection of the system. These steps are essential and will be included in the operation-maintenance-training package to be prepared for WSC and the Irbid Water Council (see Section III, paragraph 3.28).

e. Low Technology Alternatives

3.17. The consultant analyzed the low technology alternatives, particularly those related to the treatment of sewage. This analysis is discussed in the Technical Annex B.

3. Project Cost

3.18. As already noted in Section II, paragraphs 2.10 and 2.11, the consultant's report provided breakdowns of the foreign exchange and local costs of constructing the proposed project. These estimates were reviewed by the Project Committee and compared to the current costs for similar construction in Jordan. The cost esti-

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mates were reasonable. The project cost breakdown is found in Section II, Table II-1 and summarized below:

Project Cost in \$1000 (Including Contingencies & Escalation)

	<u>AID</u>	<u>GOJ</u>	<u>TOTAL</u>
Construction Materials & Services:			
Water Distribution	7.7	3.5	11.2
Sewage Collection	8.1	6.1	14.2
Sewage Treatment	5.2	2.2	7.4
Construction Engineering/ Administration	2.0	1.6	3.6
Utility Operation/Management Training	.5	-	.5
Total	<u>23.5</u>	<u>13.4</u>	<u>36.9</u>
Rounded	23.5	13.5	37.0

4. Statutory Criteria

3.19. The feasibility report and preliminary engineering studies of the consultant provide the engineering, financial and other plans necessary to carry out the assistance. The project meets the criteria of FAA Section 611(a)(1) which requires that no obligation may be thus entered into until engineering feasibility has been established and reasonably firm estimates of cost have been calculated.

3.20. The cost to the U.S. will be fixed at \$21.5 million. The Borrower will agree to provide any additional costs. The project will be implemented by the Water Supply Corporation, which is charged by law to build and operate water and sewerage systems. The project meets the criteria of FAA Section 611(a)(2).

3.21. Jordan's national economic development program, as set forth in its First Five-Year Plan (1976-1980), places a high priority on increasing the availability of safe water and of providing for wastewater disposal on an equitable basis to its residents. The Government, its consultant and AID have considered numerous alternatives for each element of the project and have selected the alternative that is technically sound and can be built at the least cost. This project will satisfy requirements for water as a final good to domestic and municipal users through an increase in water quantity, improvement in water quality and an improvement in the reliability of both quantity and quality. The wastewater elements of the project will have beneficial effects on the environmental quality of Irbid and the wadis leading to the Jordan Valley (see Environmental Analysis, Section III D, Para 3.56). Mitigation measures have been identified to minimize any potential adverse effects to the environment and will be the subject of covenants in the Agreement (see Section IV and Annex L). In addition, the GOJ is aware that water conservation is the least costly means

of extending its limited groundwater resources (see page 3 of Annex B). The technical assistance component of the project will improve the capability of WSC to manage, operate and maintain the water and wastewater facilities in Irbid. Water conservation and technical assistance are non-structural interventions that will improve the benefits derived from the project. The Social Soundness Analysis (Annex D) addresses the community impacts of the project. The criteria of FAA Section 611(b) and the Principles and Standards for Planning Water and Related Land Resources dated October 25, 1973, as amended on August 14, 1974 and by the proposed rules of April 14, 1980 have been applied in the project design and review.

B. Administrative Analysis

1. General

3.22. The consultant recommended that the project be implemented by an Irbid District Authority, at the municipal level, responsible through a Regional Planning Board, at the regional level, to a National Water Board, at the national level. For a discussion of the alternatives considered by the consultant, see Chapter 10 of the Feasibility Report. The Government has determined that the Irbid Municipality does not have the staff or expertise to implement and operate the project. Given the Government's commitment in 1979 to establish a National Water Authority and its current policy to decentralize administrative responsibilities by giving more powers to the regions and governorates, it is likely that an organizational structure similar to that recommended by the consultant, above, will be possible when the law for establishment of a National Water Authority is enacted. For more details on the National Water Authority, see paragraphs 3.43 - 3.46 below.

3.23. In the meantime, however, the President of the National Planning Council, in a letter dated May 5, 1980, informed USAID that "WSC will implement and operate the project in a similar manner to Aqaba Water and Sewerage Project. This will not require any legislative action because WSC charter gives it the right to implement and operate all water and sewerage projects in Jordan, with the exception of Amman. Details of the implementing unit with qualifications will be transmitted to you..." It will be a condition precedent of the Agreement that these details be furnished.

2. The Water Supply Corporation

3.24. The Water Supply Corporation (WSC) was established by Temporary Law No. 56 of 1973 (a copy of a translation of the law is available in NE/PD files). Under the law, the WSC became "the actual and legal heir" of the Natural Resources Authority (NRA) and of ministries and departments in all matters concerning water supply except in Amman. The law delegated to WSC the responsibility to "plan, design, construct, operate and maintain water supply projects for drinking purposes and domestic uses; to develop,

purify and distribute water, sell water, drain water and undertake all works related thereto within the area of supply and boundaries of supply." It also delegated to WSC the responsibility of conducting economic studies relating to wastewater and to supervise methods of drainage and treatment.

3.25. According to the law, WSC is an independent organization, both administratively and financially. The Minister of Municipal, Rural and Environmental Affairs (MMREA) is chairman of WSC's Board of Directors, which includes the Director-General of WSC as vice-chairman and members from the National Planning Council (NPC), NRA, MMREA, the Amman Water and Sewerage Authority (AWSA) and the Ministries of Health and of Interior.

3.26. The law also provides for the establishment of water councils to manage, operate and maintain urban or rural or regional water supply systems. The law states that management of water projects will remain the responsibility of the municipalities or other bodies until water councils are formed. The law further provides that the municipalities would be entitled to just compensation from WSC for what it takes from them. A decision was made in 1975 to set up three water councils to take over from WSC the direct management of some rural water systems in the Northern District that were administered directly by WSC. These councils were to assume control over systems in areas north of Irbid, south of Irbid and in the Mafraq area. Up to the present time, however, these water councils have not been formally constituted nor have the regulations for their functioning been issued. The Director-General of WSC has indicated to USAID that regulations will be issued soon and that the water councils, when established, will probably consist of a senior representative of the governor, the mayor or his representative and local representatives of MMREA and the Ministries of Health, Interior and Public Works. The powers and responsibilities that will be delegated to the water councils by the Board of Directors of the Corporation have not yet been defined. It is expected that an Irbid water council will be established for this project before construction is completed, but in the meantime WSC will manage the implementation of the project.

3.27. It is probable that the organizations included in the National Water Authority will at least include a National Water Board, the WSC and local water councils.

3. Administrative Capability of WSC

3.28. Analysis of the capability of WSC to oversee construction and to operate and maintain the project has raised a major project issue of whether or not the WSC will be able to recruit, train and retain enough capable persons to discharge these responsibilities adequately.

3.29. Although WSC has existed as a semi-autonomous corporation for only seven years, it inherited the responsibilities and staff of its predecessor organizations, the NRA and the Central Water Authority; the latter was organized with U.S. assistance more than twenty years ago and both organizations have received considerable support from the U.S. over the years. Its experience includes the installation, operation and maintenance of water supply systems throughout Jordan. It is constructing the water supply and wastewater distribution system at Aqaba and will soon begin construction of the AID-financed wastewater project there. It has also built many other water distribution systems.

3.30. While WSC does have the basic background needed to implement the project successfully, it is obvious that it does not yet have sufficient depth, in the form of enough trained personnel, to discharge its traditional responsibilities, its recently assumed responsibilities for the projects at Aqaba and the responsibilities that it acquired less than two months before the preparation of this paper, for the Irbid project. While the nucleus of the staff required for the water distribution system of the Irbid project will come from the Irbid Water Department, it is clear that WSC will have to recruit new personnel to staff the wastewater elements of the project.

3.31. Providing trained people both for actual operation, and for administration of projects is one of the most difficult problems facing Jordan's development planners, particularly since such people can get higher-paying jobs in other areas of the Middle East. The situation is exacerbated by the low pay rates in the public sector in Jordan. Semi-autonomous corporations such as WSC are, however, entitled to pay at higher rates, if their proposed employment regulations are approved by the Government. The present WSC Director General, when he took over the organization earlier this year, discovered that no such regulations had ever been prepared by his predecessors. New employment regulations were drafted by WSC and approved by the Council of Ministers; they will become effective on August 1, 1980. Recruitment of new employees and retention of trained and experienced staff should then be easier.

3.32. The present management of WSC recognizes the magnitude of the task it faces. The Project Committee believes that WSC has done an excellent job in providing a core staff for the Aqaba Water and Wastewater Project. It is working on the development of detailed staffing and training plans for Aqaba, as required by a condition precedent and covenant of the loan agreement for the AID-financed Aqaba Wastewater Project (Loan 278-K-026). A similar condition and covenant will be included in the project agreement for this loan for Irbid. We believe WSC will make every effort to meet its commitments under both projects.

3.33. Other agencies involved in the water and wastewater sector are also concerned about the problem of staffing and of training personnel for the many water and wastewater facilities that are coming on stream in the next few years. The National Planning

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Council is presently working on a National Training Program for the Water and Wastewater Sector. The Amman Water and Sewerage Authority, with a grant from the British Council for equipment and for training of trainers, is setting up a small center for training technicians and operators.

3.34. After a full consideration of the administrative capability of WSC, its efforts to staff and train people for the Aqaba project and various proposed training programs underway in Jordan, the Project Committee believes that, despite these efforts, WSC's projects cannot be effectively managed, operated and maintained without considerable technical assistance from outside Jordan. It therefore proposes that \$500,000 of the grant portion of this project be reserved for technical assistance to WSC. The GOJ will also contribute the equivalent of \$200,000 for training. Although intended primarily to ensure the success of the Irbid project, the grant may be used to strengthen the general capability of WSC and to support any training programs by WSC and other GOJ agencies that will train personnel for the Irbid project. The funds may be used for, but not be limited to, the following types of activities:

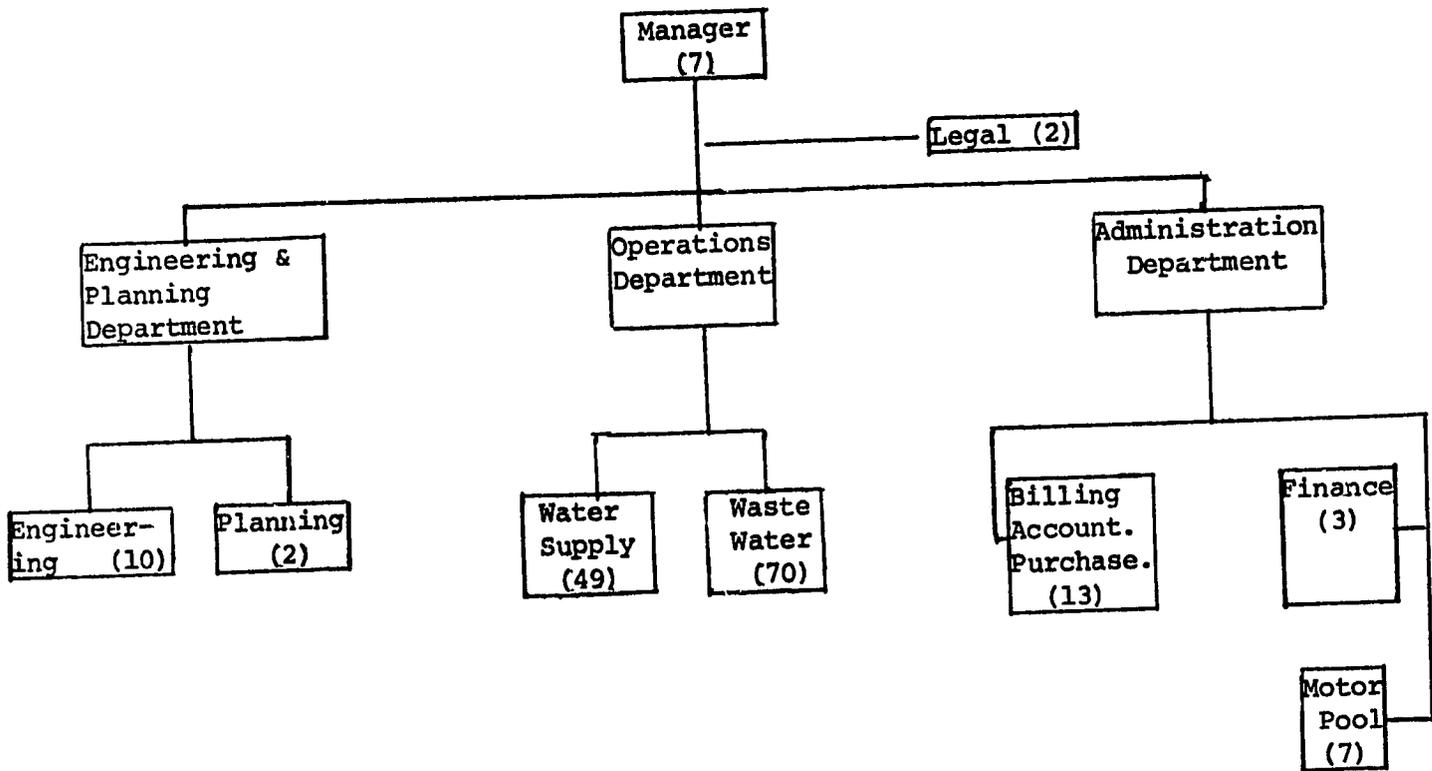
	<u>E s t i m a t e d C o s t</u>	
	<u>FX</u>	<u>LC</u>
1. Consulting services to improve administrative and fiscal management of WSC and to establish the Irbid Water Council (24 person-months).	\$200,000	--
2. Short-term consulting assistance in assessing training needs and in the development of detailed programs for training within Jordan of most of the staff for the Irbid project and for the National Training Program (12 person-months).	120,000	--
3. Academic and on-the-job specialized training in the United States for selected management and operating personnel and for trainers of trainers (64 person-months). The International Travel to be provided by GOJ.	180,000	50,000
4. In-Country		150,000
	<u>\$500,000 (AID)</u>	<u>\$200,000 (GOJ)</u>

4. Staffing and Training

a. Staffing the Irbid System

3.35. The consultant estimated that 163 persons will be required to manage, operate and maintain the Irbid water and wastewater system. The suggested organization is shown in Chart III-1. Included are the system manager, 6 engineers and planners, 10 section heads, and 35 operators and technicians. Although fewer

CHART III-1

IRBID WATER OFFICE

Adapted from recommendations of Consultant - (Weston Feasibility Report - Figure 10 - 5 and Table 10 - 5). Actual organization structure to be determined.

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people may be required for the reduced project, the number of senior employees and operators and technicians will probably be about the same. The actual number will be determined when the Irbid Water Office is established (for purposes of this paper, it is assumed that project staffing will require 163 persons, as recommended by the consultant).

3.36. The Irbid Water Department now employs about 125 persons, most of whom will be absorbed by the Irbid Water Office. Those in routine jobs (accountants, clerks, secretaries, surveyors, mechanics, repair technicians, meter readers and drivers) will continue to do similar work and will need a minimum of additional training. Some senior people in the Water Department can assume responsibilities in the new system without much training. Both groups, however, will need to upgrade their expertise to manage the more sophisticated system being developed. The remaining vacancies in the top positions could be filled from the staff at WSC headquarters or experienced people seconded from AWSA and by new recruitment.

b. Training for the Irbid System

3.37. As in earlier water and sewerage projects, it is clear that this project will require training inputs in order to start up, maintain, and manage the proposed Irbid system. Of the estimated number of 163 persons which will be required to staff the project, about 32 percent of this total will require varying amounts of specialized training in management, technical and operational aspects both in-country and out-of-country. The remainder of the projected Irbid staff (secretaries, clerks, drivers, helpers and laborers) who will require on-the-job, practical types of training can receive it in Jordan through existing programs or those to be developed in conjunction with overall water sector manpower development needs on a scale broader than the projected needs for this project. AWSA, WSC, and other water sector entities can make available to this project their training infrastructure and experiences in cooperation with the proposed National Training Program. Training for the personnel for the Irbid system will be accomplished by one or more of the following means: (1) Academic training under the Government's proposed training program; (2) On-the-job training at other water and wastewater facilities in Jordan and for some categories of personnel, during construction at Irbid; (3) Academic and/or on-the-job training in the United States; and (4) Training by the consultant during start-up and during plant operation. In its report, the consultant has outlined a program for the latter two types of training for wastewater treatment plant operators. During development of earlier water and sewerage projects USAID has given considerable attention to the magnitude of training problems and valuable experience has been gained in subsequent project implementation. For example, the mode used in the Aqaba Water Project is applicable to this project. In the Aqaba Water Project, the WSC selected the project manager and the senior engineers to be in charge of various parts of the system prior to construction. WSC assigned them to work

with the consulting engineer on the supervision of construction. Other personnel recruited for the Aqaba wastewater project will get similar on-the-job training. They will also get operational training during start-up. Additional academic and managerial training will also be required for key personnel in technical areas.

3.38. A similar arrangement should be initiated as soon as possible at Irbid. Because Irbid has an existing water system that is only being improved, most of the staff is in place for the water portion of the project. The proposed head and some of the technicians for the wastewater collection system could be recruited before construction starts to work with the consulting engineer on supervision and construction. At some stage during the construction period, the heads of the water and wastewater collection sections, as well as the head of the administrative section, should receive training in management and supervision, possibly under the Government's proposed training program described below. The head of the financial section could also be given on-the-job training at AWSA, which is expected to have an experienced American financial advisor, under a two-year AID-financed host-country contract.

3.39. The greatest need is to train people in the operation and maintenance of the wastewater treatment plant. Fulfillment of this need probably will mean academic and on-the-job training in the United States for key personnel (the consultant suggests that five engineers be trained). Such training will be funded from the grant. Plant operators would receive academic training under the Government's proposed training program (see below) and on-the-job training, possibly at Salt, which has just completed an extended aeration waste treatment plant that is similar to the one proposed for Irbid. On-the-job training could be carried out by the Washington Suburban Sanitary Commission (WSSC) which now has a staff exchange arrangement with AWSA, or at other wastewater treatment plants in the United States.

3.40. To approach training requirements systematically and to compile data applicable to the planned national training program, it is proposed that initially an early-on assessment of training needs be financed under the grant to determine among others: The magnitudes and types of specific training required in both water and wastewater components; an inventory of national training resources, programs and facilities either existing or proposed; training program development and design including recommendations for a proper ratio of host-country to out-of-country training; courses to be taught, skills to be mastered, content, structure and materials needed; cost estimates of such programs projected over life of project; adaptability and compatibility to other training requirements in the national water sector; and, public education campaigns for users to maximize efficient and proper use patterns for systems to be provided under the project. It is expected that the American Water Works Association (AWWA) or an equivalent, qualified organization or institution would be an effective conduit for the provision of the consultant services

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required for the proposed assessment and training requirements described above. Approximately three person-months of consultant time is proposed specifically for the needs of the Irbid project. To expand this effort to the National Water Sector would require an additional three person-months of inputs to compile data and to design appropriate programs for national training requirements, assuming that the program planning by the GOJ is ready for such inputs. This additional three person-months would make a total of six person-months of consultant services for both the Irbid project and the broader national training plan. Following a professional determination of training needs and the design of training programs, the AWWA or an equivalent organization or entity can provide continuing and intermittent consultant services for training implementation not to exceed six person-months over the life of the project.

3.41. It is expected that an organization such as the AWWA will be invited to assist in arranging for or conducting U.S. training programs using established organizational networks and linkages. It is further estimated that about 64 person-months of academic and practical training will be project-financed for programs in the U.S. in areas of management, operations, and maintenance of project systems for which local training is not suitable or available. Although subject to revision by the training needs assessment, it is proposed that of the 64 person-months, 24 will be for academic training and 40 for shorter-term, practical training. The project will provide an estimated total of \$180,000 for this purpose over the life of the project, \$40,000 for academic and \$140,000 for short-term programs. Every effort will be made to use local training resources and institutions to minimize costs and to permit maximum application of on-the-job, on-site practical training programs. It is expected that the proposed training needs assessment to be financed under the project will provide necessary and explicit base-line data for training needs with accompanying recommendations for types and where the training can best be accomplished in terms of situations existing at various phases of project implementation.

3.42. The above are the staffing and requirements of the project that are identifiable at this time. A Condition Precedent to Disbursement will require the Government to furnish staffing plans for supervision of construction and startup and for administration, operation and maintenance and a training plan for operating and administrative personnel. Technical assistance in developing and implementing staffing and training plans will be funded, as needed, from the grant.

c. The National Training Program

3.43. The Government is fully aware of the urgent need to train people to manage, operate and maintain water and wastewater systems, and has taken the initiative to develop a training program. A National Training Program in the Water and Wastewater Sectors (copy on file in NE/PD), prepared by the National Planning Council,

is being reviewed by an interdepartmental committee. This proposed national program has as its short-term objective, the "establishment of a training program which will provide essential skills to meet the immediate needs for all levels of operation and maintenance." It is expected that, to the maximum extent feasible, the program will serve the needs of all localities in Jordan. The long-term objectives of the program include: (1) establishment of a regional training center; (2) establishment of a school for training of trainers; (3) establishment of an operator's certification program; (4) establishment of a monitoring and surveillance agency; and, (5) establishment of an educational program directed at the general public. As this program is developed, its facilities and resources will be used to train personnel for the Irbid project.

3.44. The immediate task of the interdepartmental committee is to identify the training needs through a national manpower inventory, an inventory of training resources in relation to manpower requirements and a review of existing personnel policies. It will recommend a training program, the detailed design of which will require outside assistance. Because WSC and Irbid will be major beneficiaries of the National Training Program, the Project Committee recommends that grant funds from this project be used for technical assistance for the detailed design of the National Training Program and for the training in the United States of senior staff and teachers in the programs as needed.

5. National Water Authority

3.45. Concern in the Government and among international donors about the accelerating problems in the water sector and the apparent inability of the national and local governments to address these sectoral problems effectively led to the convening of a National Water Symposium in March, 1978. The major conclusion emerging from the Symposium was that Jordan urgently needed a national water authority to set and implement policy for all aspects of the water sector. The need for such an authority was accepted in principle by the Government and drafting of the enabling legislation and necessary implementation plans was begun immediately thereafter.

3.46. In April, 1979, a committee chaired by the Minister of Municipal and Rural Affairs submitted draft legislation to the Cabinet, which circulated it for comments. Because many of those who commented recommended substantive changes, the Government decided to get an outside opinion and asked the World Bank, in the summer of 1979, to review and comment. It is USAID's understanding that action on the legislation was held in abeyance until the World Bank's comments were received - in April 1980 - and that the closing date for further comments from GOJ ministries and departments was extended to early June 1980.

3.47. Given the number of entities with parochial interests in the water sector, passage of legislation establishing a national

water authority may still take some time. USAID proposes to continue to stress the need for a national authority and, when requested, to provide financial assistance for technical advice and training as required to establish an authority. The proposed Water Resource Management Project would provide funding for such assistance.

3.48. The establishment of a National Water Authority is not an essential precondition to the success of the Irbid Water and Sewerage Project. A major function of a national water authority would be the control and allocation of water resources. Until such an authority is created, it is USAID's view that if Irbid's ground water supplies and distribution facilities are under the control of one organizational unit, the Water Supply Corporation, the essential minimum objective of resource control and allocation will have been achieved. By the time, late in this decade, when surface water supplies, now under the control of another agency, will be needed, it is quite likely that a national water authority will have been established and will have addressed the problem of the allocation of those resources.

C. Social Analysis

General

3.49. The main purpose of this project is to improve the quality of life for residents of Irbid by providing a more constant, pressurized, higher volume of water and an economical wastewater system. Existing conditions, which are adverse from a public health standpoint and which will be corrected or mitigated by this project, are low and erratic water pressure, uncertain water quality, contamination of existing groundwater resources and water pipelines, wastewater discharge into unauthorized areas or areas eventually contaminating downstream communities, and the lack of a municipal wastewater disposal system throughout the project area. For a further discussion of the socio-economic and health aspects of this project and their effects on the residents of Irbid, refer to Annex D.

1. Benefits and Beneficiaries

3.50. USAID and GOJ officials met during the months of March and April, 1980 to discuss the possible components of the Irbid Water and Sewerage Project and to establish priorities for design and construction activities. The bases for selection of AID-financed phases of the proposed project were: 1) that all areas of Irbid would equitably benefit from the improved water distribution system, and; 2) that the new wastewater system would focus on those parts of the city containing most of the poorest neighborhoods.

3.51. Every household with present or future access to a municipal water connection will benefit from the improved system. More water will be available at increased pressure, including the extremities of the system, making daily consumption more convenient.

Increased pressure will reduce the opportunity for introduction of contaminated water into the system and the eventual exposure of residents to water-related diseases. Those who are expected to benefit most from the system are the estimated 15,000 residents (2,000 households, 13% of the population) who do not presently have a water house connection. For this group, both the expected increase in water use, and the expected savings in monthly water costs from the purchase of water from tank trucks, are the most dramatic. Water cost savings will also accrue to connected households that had to supplement their intermittent low-pressure water supply with purchased truck water.

3.52. Direct beneficiaries of the wastewater system in the first phase will ultimately include almost all the residents of Irbid, who will obtain a new sewerage connection under the project. These will include 7,500 households mostly in the low income areas. They will benefit economically over a longer period of time by not having to construct and/or maintain cesspools. All the residents will also enjoy a more healthy and sanitary environment by having less contaminated water introduced into their water supply system, and by the reduction of illegal dumping of cesspool effluent. It should be noted that while most residents with cesspools will save on the on-going operating costs of their sewage disposal systems, the initial cost may be high (20% of the annual income of a household at the poverty level). This may call for the implementation of a low-interest loan system of financing connections for these households. The category most hard hit are those having incomes of less than JD 1,000 per annum, which probably represents a third of the population. Evidence in Amman to date, however, has shown a high level of willingness to pay for these installations, and no problems in this regard are expected in Irbid. For the poorest households, the present water rate and sewerage surcharge structure results in payments for these services of about 3.5 percent of the annual household income. This is an acceptable level. It does, however, indicate that these rates cannot be increased significantly beyond corresponding increases in income before they reach the generally accepted threshold of 5 percent.

3.53. The provision of an adequate water supply and sewerage system can be expected to contribute to the improvement of the overall quality of life in the city and the acceleration of its industrial and commercial growth. Both of these factors will help reduce, and maybe reverse, outmigration to the capital. They will also help to strengthen Irbid's position as a major urban and economic center in Jordan.

3.54. Other beneficiaries of the proposed systems will be those people downstream from the present Irbid wastewater run-off areas who will be exposed to less contaminated water with the installation of the treatment plant. In addition, employment benefits will be realized by those people filling new jobs required to properly administer, operate and maintain the proposed Irbid facilities.

2. Health Effects

3.55. The proposed project can be expected to benefit public health for the following reasons:

- (1) The increased water supply will promote an increase in water consumption, with a concomitant improvement in hygienic practices.
- (2) A fully pressurized water supply system will reduce the risks of water pipe contamination by infiltration of sub-surface sewage.
- (3) A continuous water supply will eliminate, or at least reduce, the need for roof-top and/or ground-level storage tanks, thus eliminating a potential source of contamination.
- (4) The replacement of the high cesspool cleaning costs by the more reasonable sewer charges will encourage both higher water use and less illegal dumping by both residents and haulers. This is particularly applicable to lower income households.
- (5) The sewerage system will eliminate the use of cesspools, and thus reduce the potential for contaminating water pipes.

Recent research indicates that countries with a relatively high socio-economic status and educational level have a high potential for obtaining significant health benefits from sanitation projects. Jordan is definitely in that category.

3. Impact on Women

3.56. The benefits of the project are expected to accrue to men and women on an equal basis, as both sexes seem to suffer equally debilitating effects of illnesses that affect their productivity, be it in the home or outside. However, young children, who are especially susceptible to enteric disease, will possibly gain the most from reduced exposure to water-borne diseases.

4. Conclusion

3.57. In concert with the statements made above on improved health and living conditions, this project is believed to be socially sound.

D. Environmental Analysis

3.58. The following section provides a concise summary of both the beneficial and adverse impacts of the proposed water and sewerage

project. It is based upon the findings of (1) an Environmental Assessment* prepared by Weston International, Inc., and (2) supplemental investigations conducted by Stephen F. Lintner, Environmental Coordinator, Bureau for Near East, AID/W (See Annex E).

Environmental analysis of the project identified the following mitigations to be adopted in project design:

<u>Problem</u>	<u>Mitigation</u>	<u>Project Paper Section</u>
1. Potential pollution of Wadi Arab	Development of a water quality monitoring program	Project Agreement
2. Potential Industrial Pollution of Wadi Arab with future expansion of sewerage system	Adoption and Implementation of a Sewer Use Law	Project Agreement
3. Construction Period Disturbances	Contract Requirement	
4. Inadequate Post-construction site finishing	Contract Requirement	
5. Potential and/or Destruction of Archeological and/or Historical Sites	Consultation and Coordination with Dept. of Antiquities	

3.59. The proposed project will provide for the construction of a water and sewerage system to serve the city of Irbid. It is anticipated that the system will be expanded in a series of phases to include sewer services to current and planned industrial developments. The system will have a major beneficial impact through the provision of increased supplies of safe drinking water, and the provision of sewerage should have a major beneficial impact reducing the problems of septic tank overflows and pools of standing wastewater which currently present significant environmental health hazards.

* Weston International, Inc., 1980. "Environmental Assessment" (Chapter 8). Irbid Municipal Water Distribution and Solid Waste Disposal Project. Feasibility Report and Preliminary Engineering Studies.

3.60. Potential pollution of the Wadi Arab and the proposed Wadi Arab Reservoir could occur due to the discharge of inadequately treated or untreated wastewaters from the sewage treatment plant due to improper plant operation, inclusion of legally excluded industrial wastes or treatment plant failure. This potential adverse impact can be minimized by proper operation and maintenance of the sewage treatment plant, development of a water quality monitoring and reporting program for Wadi Arab (Mitigation 1) and strict enforcement of the "Sewer Use Law" (Mitigation 2). Proper advance planning of industrial developments to allow for pretreatment of wastewaters prior to discharge to the sewer system will greatly reduce the risk of pollution of Wadi Arab.

3.61. Implementation of the proposed project will result in short-term, localized physical disturbance associated with the construction of the water and sewerage systems. Such impacts could be minimized by improved planning and scheduling and their extent limited by enforcement of proper construction and post construction practices (Mitigations 3 and 4).

3.62. It is not anticipated that implementation of the proposed project would impact rare or endangered plant and animal species nor would it disturb any areas of critical habitat. The implementation of mitigation 5 will restrict disturbance and/or destruction of archeological and/or historical sites.

E. Financial Analysis

3.63. The details of the financial analysis are contained in Annex C. Based on the assumptions adopted in the financial analysis and the requirement that the utility generate adequate revenues to meet operating costs and debt service payments, consumer charges (whether rates or taxes) per m³ of water sold (or any other relevant measure) will have to increase substantially over the next ten years.

3.64. The above result is not surprising since the long-term cost of producing and delivering water to Jordanian consumers has been increasing, not only because of inflationary pressures but, more significantly, because of the need to locate and utilize additional and substantial sources of water for an expanding population that currently has relatively low consumption levels. In real resource costs, these will be significantly more expensive than current water sources.

3.65. The provision of a sewage collection and disposal services also adds substantially to costs. From 1984 through 1989, sewerage operating costs (Table 1, Annex C) were 38 percent of total operating costs. Sewerage services with connections to households and businesses and disposal through a wastewater treatment plant are costly but do provide a new dimension to the quality of urban life in Irbid.

3.66. There appears to be no serious problems in regard to the ability of Irbid consumers to meet the charges and revenue levels for 1981-1989 included in the financial analysis (see Social Analysis, Para 3.49-3.54). The project proposal, therefore, appears to be a potentially viable financial operation.

F. Economic Analysis

3.67. The details as to the economic analysis is contained in Annex C-2. The conversion of the financial data to economic values are explained in the Annex. Simplified procedures were adopted given the nature of the available information. Of major significance was the adoption of a 250 fils/m³ average incremental cost of water (in 1980 values) for the wholesale water cost in the project's 1981-2000 time horizon.

3.68. The rate of return calculated in Annex C-2 was 9.1 percent. For a combined water and sewerage project this is a most favorable economic result. It should be carefully noted, that quantification of health benefits have been excluded since the state-of-the-art does not permit calculation of those presumed benefits. The proposed project, therefore, appears to be economically justifiable.

IV. PROJECT IMPLEMENTATION AND EVALUATION

A. Project Implementation

4.01. Project Implementation Schedule Table IV-1 summarizes key actions and dates for the implementation of the project.

B. AID Loan Schedule

4.02. The anticipated schedule for AID actions is as follows:

Project Authorized	August 15, 1980
Agreement Signed	August 31, 1980
Initial Conditions Met	December 31, 1980
Interim Evaluation	August 1, 1983
PACD	December 31, 1984
TDD	June 30, 1985
Final Evaluation	August 1, 1986

C. Project Disbursement Schedule

4.03. Table IV-2 is the Project Disbursement Schedule.

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TABLE IV-1
IMPLEMENTATION SCHEDULE

<u>ACTIVITY</u>	<u>DATE</u>
1. CBD notices for contractor prequalification published	8/80
2. Final design completed	10/80
3. Draft bid documents submitted for approval	10/80
4. Bid documents completed	12/80
5. Contractors prequalified	12/80
6. Bid documents issued to prequalified contractors	12/80
7. Bid opening	3/81
8. Contract(s) signed	5/81
9. Contract(s) approved by AID	6/81
10. Notice to proceed given contractor(s)	6/81
11. Construction begins	9/81
12. Training programs begin	8/81
13. Interim evaluation	8/83
14. Construction completed	8/84
15. Startup operation of wastewater treatment plant begins	8/84
16. Systems in full operation	12/84
17. Final evaluation	8/86

TABLE IV-2

PROJECT DISBURSEMENT SCHEDULEin Thousands of Dollars

	<u>1981</u>		<u>1982</u>		<u>1983</u>		<u>1984</u>		<u>TOTAL</u>	
	<u>AID</u>	<u>GOJ</u>	<u>AID</u>	<u>GOJ</u>	<u>AID</u>	<u>GOJ</u>	<u>AID</u>	<u>GOJ</u>	<u>AID</u>	<u>GOJ</u>
<u>Foreign Exchange</u>										
Construction *	1,500	-	7,200	-	3,800	-	2,600	-	15,100	-
Engineering & Tech Assistance **	500	-	700	-	700	-	600	-	2,500	-
<u>Local Currency</u>	<u>200</u>	<u>1,300</u>	<u>2,200</u>	<u>4,200</u>	<u>1,600</u>	<u>3,400</u>	<u>1,900</u>	<u>4,600</u>	<u>5,900</u>	<u>13,500</u>
TOTAL	2,200	1,300	10,100	4,200	6,100	3,400	5,100	4,600	23,500	13,500

* AID Loan

** AID Grant

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D. Implementing Agencies

1. Government of Jordan

4.04. The Government of Jordan has named the WSC as implementing agency (see Annex J). As such, WSC will be responsible for all facets of project implementation, subject only to normal Government procedures, such as final approval of all contracts by the office of the Prime Minister.

2. Supervisory Engineering

4.05. All technical and engineering services for the implementation phase - including tendering, construction and installation supervision, start-up and final acceptance of all facilities -- are expected to be provided by Weston International and its associates. This same firm has done the feasibility study and will prepare the final design, with funding from TSFS Grant 278-0181.

3. Procurement

4.06. All procurement actions using AID provided funds will be conducted by Host Country contracting procedures in conformity with AID Handbook 11.

4.07. WSC and the consulting engineers understand that all tender documents will be written with U.S. standards and specifications and that all construction services and materials financed by the AID loan will have their source and origin in AID Code 941 countries and Jordan. AID Grant funds will only be used to finance engineering services and technical assistance of U.S. source and origin.

4.08. Given the standard nature of the equipment and materials and the routine nature of the construction, no unusual or difficult procurement problems are foreseen. Following the preparation of design and bidding documents USAID will make an effort to identify particular AID funded local cost items of construction. In the event this is not possible, AID local cost of financing will be disbursed as a percentage of each progress payment.

E. Project Monitoring

4.09. USAID/J will be responsible for AID project monitoring. Within the Mission, primary monitoring responsibility will rest with the Office of Capital Development. The Project Manager will be the Mission's Chief Engineer.

4.10. Construction progress will be monitored continuously by WSC and AID. Monthly progress reports will be prepared by the consulting engineer and submitted through WSC to AID. The submission and expected content of these reports are well known to WSC.

F. Project Evaluation

4.11. Evaluation of the project for purposes of determining whether its intended beneficiaries are, in fact, reached by the completed project will be conducted by the Government and AID. In accordance with the standard AID evaluation covenant to be included in the Agreement, the two parties are jointly pledged to develop an intensive evaluation of physical progress to be conducted during project implementation and at project completion. The interim evaluation scheduled for August 1983 will review not only physical implementation but will also evaluate progress towards satisfying the special covenants on such matters as organization staffing, training, the tariff study and water conservation. To the degree feasible at that time, it will also evaluate the development impact of the project.

4.12. A final AID evaluation will be scheduled for August 1986, at which time all of the project facilities should be in full operation. The evaluations will determine the progress that has been made connecting new households to the water system provided by the AID loan. Similarly, the number of connections made to the sewage collection system should also be assessed. During this evaluation, an assessment should be made as to the availability and functioning of trained staff to operate and maintain the facilities provided by the project. With regard to the administrative structure of the utility, the evaluation should focus on its demonstrated management functions including records keeping, billing, and other financial accountability requirements of the utility. The final evaluation will also examine more thoroughly the effects of user charges on the beneficiaries and of their willingness and ability to pay. It will also evaluate the operation of the total system, the effectiveness of water conservation measures, including the education of the public in conservation, and of the water quality monitoring systems.

G. Negotiation Status

4.13. USAID officers have discussed the preparation of this Project Paper with appropriate officials of the Government of Jordan at various stages during its development and have made them aware of the conditions precedent and special covenants which are being included in the Project Agreement. No difficulty is foreseen in negotiation of the Agreement or the conditions precedent and covenants.

H. PID Issues

4.14. The PID was signed 21 May 1978, and submitted to the NEAC with no issues on 11 July 1978. Actions on the NEAC comments were as follows:

(a) The project was approved with the recommendations that the feasibility study should be carried out in two stages. The initial stage would include the project design options that could be considered in the scope of work for the feasibility study (stage two). The Project Committee provided USAID with a detailed scope of work for the analysis of the socio-economic, beneficiary and health aspects as related to the project design. The National Planning Council seriously considered the NEAC recommendation but decided that doing the work in two stages would unduly delay the project, since it would mean inviting two proposals and negotiating contracts for each of the two stages. The NPC did, however, incorporate the Project Committee's scope verbatim into the overall scope of work for the single stage feasibility study.

(b) The NEAC commented that a price escalation factor should have been included in the PID, since costs were shown at 1978 level and should be included in the PP. These have been included in the PP.

I. Recommended Conditions Precedent and Special Covenants

1. Standard CP's

4.15. The CP section of the loan agreement will include the standard CP's concerning:

- a. Legal Opinion
- b. Nomination of B/G representatives
- c. Reloan agreement
- d. Contracts for construction services and construction supervisor services

2. Special Covenants

4.16. Concerning the Organization of Irbid Water and Sewerage Operation:

(a) B/G (Borrower/Grantee) undertakes to furnish or cause to be furnished to AID by March 31, 1981, the following: (1) Evidence that WSC has formally taken over the organization now operating the water and sewerage system in Irbid and that it has established its own organization in that city; and (2) A plan showing the organization and staffing of WSC's Irbid office which will manage the construction activities to be carried out, including the staff needed for contract administration, accounting and budgeting, and including the name and qualifications of the project manager and his key assistants.

(b) B/G undertakes to furnish, or cause to be furnished, to AID by March 31, 1981, the organization and staffing to be established for the operation of the Irbid Water and Sewerage System after completion of construction, including all technical and administrative functions and the names and qualifications of the manager of that system and his key assistants.

4.17. Concerning Training:

(a) B/G undertakes to furnish by March 31, 1981, a plan showing the arrangements made or to be made for training all categories of personnel needed for the operation of the Irbid Water and Sewerage System. Such plan should show all positions appearing on the staffing plan for operation of said system, specify, by position, the number of incumbents or prospective nominees requiring training and include a description of the length and type of training to be given.

(b) B/G undertakes to initiate implementation of training plan by July 31, 1981.

4.18. Concerning Revenues: The B/G undertakes to establish a system of rates, fees, taxes and charges designed to generate sufficient revenues to cover all costs of operating and maintaining the Irbid Water and Sewerage System, including the amortization of all debts contracted to construct, expand or modify such system.

4.19. Concerning Tariff: To permit the establishment of tariff, taxes, fees, charges, etc. permitting the collection of revenues required under 4.18 above, the B/G undertakes:

(a) To carry out studies examining in adequate detail the willingness and ability to pay user charges for all sections of Irbid's population included in the service area of the system and to submit the terms of reference for such study to AID for comment not later than June 30, 1981; at the same time, the B/G should indicate whether and to what extent outside assistance will be required to complete the study and the arrangements made or to be made to obtain such assistance; (b) To complete the study or studies mentioned above by December 31, 1982; and (c) To furnish to AID for comment a draft of the tariff schedules to be established not later than July 31, 1982; charges included in such tariff should be demonstrably consistent with the findings of the above mentioned studies as to the ability of different groups of consumers to pay such charges and with the costs of providing service to residential, commercial and industrial users.

4.20. Concerning Quality and Quantity of Waste Water: B/G undertakes to furnish to AID by July 31, 1982, plans for monitoring the quality and quantity of waste water discharged by the Irbid sewerage system into Wadi Arab and any other wadis into which waste water may be discharged, and to implement such plans by August 1, 1984.

4.21. Concerning Sewer Use Ordinance: B/G undertakes to submit to AID for comment by August 1, 1982, the draft of an ordinance regulating the discharge of industrial waste into the Irbid Sewerage System and to promulgate such ordinance by August 1, 1983.

4.22. Concerning Water Conservation: B/G undertakes: (a) to establish a special unit within the Irbid Water and Sewerage organization staffed in numbers, training and experience to carry out a continuing program for detecting leaks and to make appropriate arrangements for repairing promptly any leaks reported by such unit; and (b) to develop and carry out a program designed to educate the public in preventing losses of water caused by leaking taps and pipes on private premises and similar causes of waste.

4.23. Concerning B/G's Financial Obligations: B/G undertakes to provide all funds needed, in addition to revenues earned by WSC, to operate, improve, modify or expand the Irbid Water and Sewerage System and to enable WSC to continue its exploration and development of additional sources of water.

4.24. Above CP's and covenants will be included in the Project Authorization, Annex L.

J. Borrower's Performance Under Prior Special Covenants and Undertakings

4.25. The borrower is taking action to satisfy the special covenants in the loan agreements of the two AID loans to Jordan in the water and wastewater sector: Amman Water and Sewerage Project (AID Loan 278-023), with eight special covenants; and Aqaba Wastewater Project (AID Loan 278-026), with six special covenants. The Borrower's progress in satisfying these covenants is reviewed in Annex I.

4.26. The Project Committee concludes that the borrower has undertaken actions and necessary studies and investigations to resolve the issues which prompted A.I.D.'s inclusion of the C.P.'s and covenants in Loans 278-023 and 278-026. On the basis of this performance the Project Committee believes that similar performance can be expected with regard to the Irbid project agreement covenants set forth in Section 4.15.

DESCRIPTION OF PROJECT COMPONENTS

1. Water Distribution Component

The consultant's master plan for the water distribution system incorporates all improvements that are required by the year 2000. The plan creates four main pressure zones controlled by pressure reducing valves, which will insure that static pressures do not exceed an upper limit of 90 psi, or fall below a minimum of 30 psi under peak load conditions. The use of pressure zones is necessary to avoid excessive pressures under low-flow and static conditions. The long-term plan for water distribution in Irbid proposes the installation of 68 km of new water mains during Phase I. For purposes of establishing priorities and to permit the Government to decide on the construction program to fit the funding available, the consultant divided the work into four hypothetical "contracts." Contract WAT-1 improves the efficiency of supplying water to the system by the installation of about 20.5 km of water mains and the pressure reducing valves that are required to establish pressure zones. Contract WAT-2 includes about 15.4 km of water mains and Contract WAT-3, about 6.4 km of water mains and 7.6 km of laterals. Contract WAT-4, which includes larger mains to distribute surface water from the Yarmouk River, is not included in the project.

The proposed AID project includes the installation of about 50 km of pipe, to improve the distribution of the WSC supply from groundwater sources only. As stated above, these "contracts" were developed and selected to reflect priorities in improving service, depending upon the funds available. During the design phase, the consultant will prepare contract documents for one or more construction contracts. The quantities of pipes, valves and service connections were determined by a computer simulation of the system. In the actual design of system improvements, there may be changes in pipe sizes and street routings. It is expected, however, that changes will be minor.

2. Wastewater Facilities Components

a. Collection

The topography of Irbid slopes toward the north from a high area south of the city. The eastern area of the city is relatively flat but does slope to the north and west. In the western section of Irbid, there are several steep wadis that flow toward the Jordan River. A ridgeline passes through the center of town from west to east, creating two natural drainage courses around the city. Alternative methods of providing wastewater collection service were formulated and analyzed. The results of the 1971 Czech report were used as an input to these studies. Based on this analysis, an optimum sewer routing scheme was developed that minimized the need for pumping

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and lift stations. Interceptor A serves the southern and western portions of the city, while Interceptor B takes flow from the northern and eastern portions of the city.

The project area includes the commercial downtown area and the central and western sections of the city, which are mostly zoned for high-density housing. The areas in the north and northwest sections of the city, which are also zoned for high-density housing, are now only sparsely settled and will be included in the future development of the system as their population increases. The project does not include areas zoned for low-density housing in the southern and eastern parts of the city. For schematic drawings showing the Phase I system, the project system and area served by the project, see Figures 3, 4, and 5.

The collection component included in the project serves all of the areas identified by the consultants as having a of high potential health hazard. The project also includes a trunk sewer of sufficient capacity to accept in the future the wastes of approximately 16,000 residents of the refugee camp located near the center of the city. It does not include lateral sewers within the camp, since the camp is not under the control of either the municipality of Irbid or the Government of Jordan at this time. It is managed by the United Nations Relief and Works Agency (UNRWA). (Construction of the lateral sewers within the refugee camp is estimated to cost less than \$200,000. In discussions with WSC, USAID was informed that it is likely that funds, from sources other than this project, will be found to construct these sewers).

The consultant's Phase I system included 188.3 km of interceptors, trunk sewers and laterals, while the project will include 113.2 km or 60.2 percent of the Phase I total. Similarly, the project will include 7.8 km of interceptor sewers as against 10.5 km in the consultant's Phase I program. Thus, the project will provide a solid base for expansion and will also provide immediate sewage collection services to the areas with the most urgent need.

In addition, the AID project includes one pumping station at the western end of the city that will receive flow from a newly-constructed dairy, which now discharges wastes of high biological oxygen demand directly into the wadi. The consultant's Phase I program also included two additional pumping stations to serve the industrial park and the military housing area; these have not been included in the project.

b. Treatment Plant

The consultant considered a number of alternative methods of treatment of the wastewater and of disposal of the effluent and the solid residues. The alternatives included biological methods involving both high-level and low-level technology. The consultant also considered all available sites. A careful analysis of all the alternatives (see Technical Annex B) led the consultant to recommend the construction of an extended aeration waste treatment plant at a site at the north-western edge

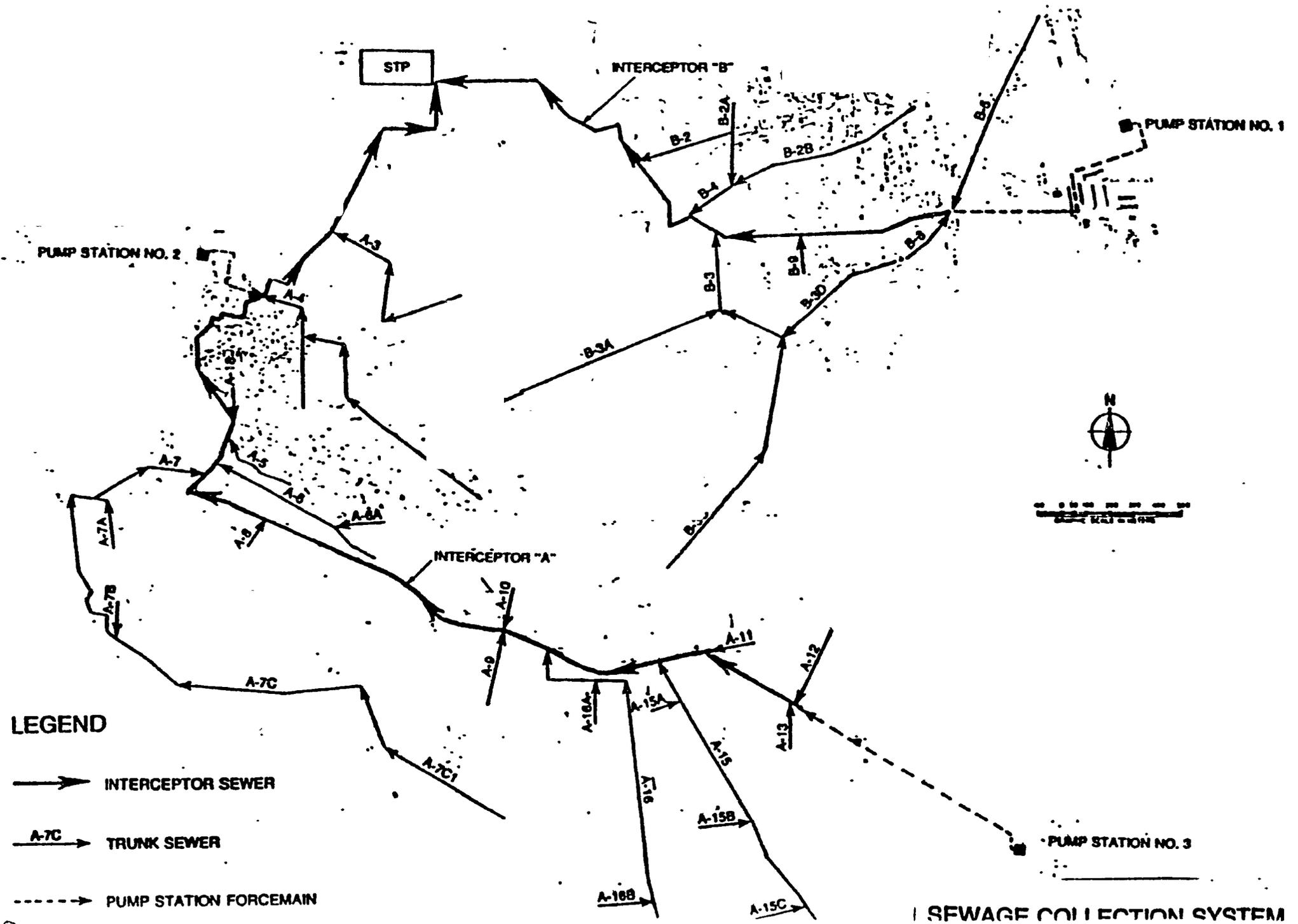
of the city, adjacent to the municipal slaughterhouse. The consultant's recommended treatment facilities through the year 2000 included a headworks, three extended aeration tanks, three final clarifiers and a chlorine contact chamber. Because only half of the wastewater collection system is being constructed by the project, the Government requested AID to finance construction of only one aeration tank and two smaller clarifiers, as well as the headworks and chlorine contact chamber (see Figure 6).

The consultant also recommended the dewatering of sludge on sludge drying beds at a site north and west of the treatment plant. The site is at higher elevation and sludge will have to be pumped to it. Although sufficient land will be acquired to meet the requirements of the master plan, the sludge drying beds will be sized to meet the needs of the project. It is expected that a market will be found for the sale of the dried sewage sludge to farmers in the Irbid region or in the Jordan Valley.

The effluent from the treatment plant will be discharged to the Wadi el Hamman, which is a tributary of the Wadi Arab (see Figure 7). The Wadi Arab is a steep river system that drops several hundred meters to a site twenty kilometers downstream at which the Jordan Valley Authority plans to store water for irrigation in the Jordan Valley. The opportunities for further aeration of the effluent in this stretch of the Wadi are excellent. Chlorination facilities will be included in the project design, however, to insure the environmental quality of the proposed storage site at all times. The Project Agreement will include a covenant requiring the Government to establish a water quality monitoring program for Wadi Arab and to develop a reporting procedure. In addition to insuring environmental quality, this monitoring program will measure the degree of natural aeration of biological matter (including bacteria) remaining in the effluent and will enable the operator of the treatment plant to minimize the use of chlorine for this purpose, thereby reducing the formation of trihalomethanes, which are potential carcinogenic compounds.

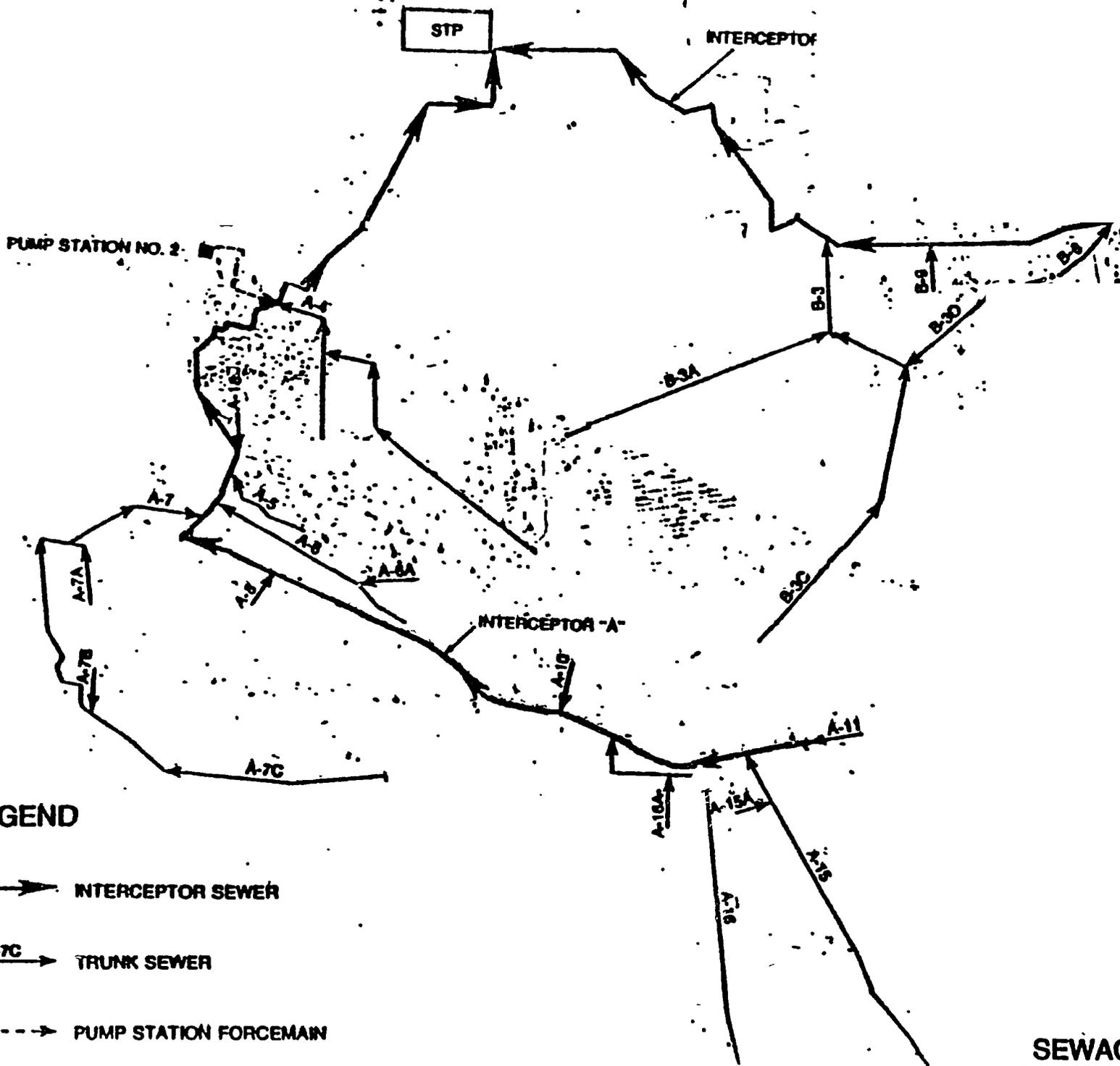
Until the city is completely sewered, some residents will have to continue to depend on cesspools. The treatment plant design includes a septage holding tank into which septage haulers will be required to dump their tanker loads from cesspools. These strong wastes will be released to the incoming wastewater flow uniformly throughout the day to avoid shock loading the treatment process. It is also expected that haulers from other communities in the Irbid region will be able to dump their loads into this septage holding tank, thereby reducing the contamination of the ecosystem.

The utilization of the wastewater collection system and the operation of the treatment plant are possible with the quantities of water that will be available to Irbid in the "most conservative" situation described in the Technical Analysis (Section III) and Annex B.

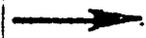


SEWAGE COLLECTION SYSTEM

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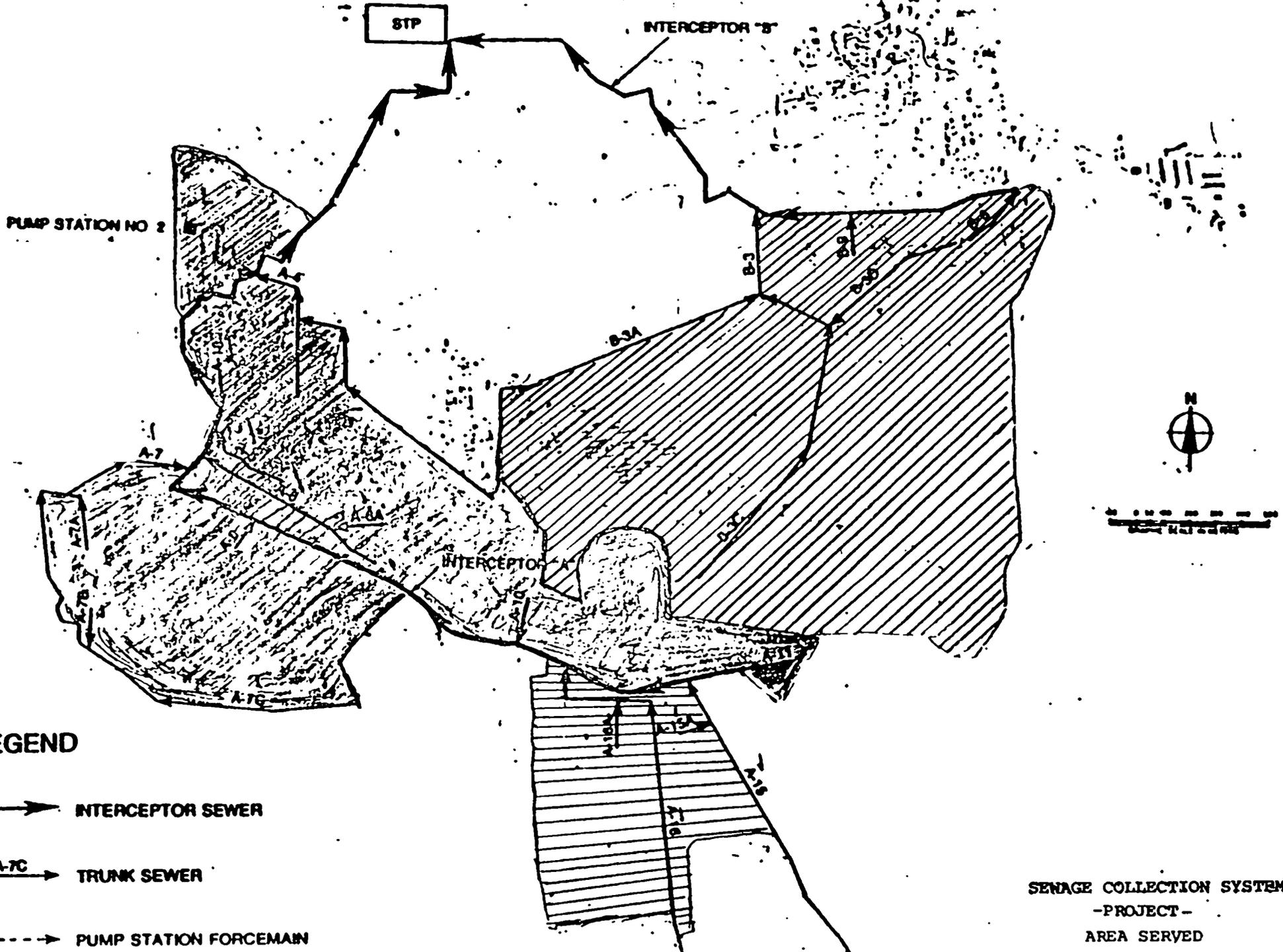


LEGEND

-  INTERCEPTOR SEWER
-  TRUNK SEWER
-  PUMP STATION FORCEMAIN

SEWAGE COLLECTION SYSTEM

22

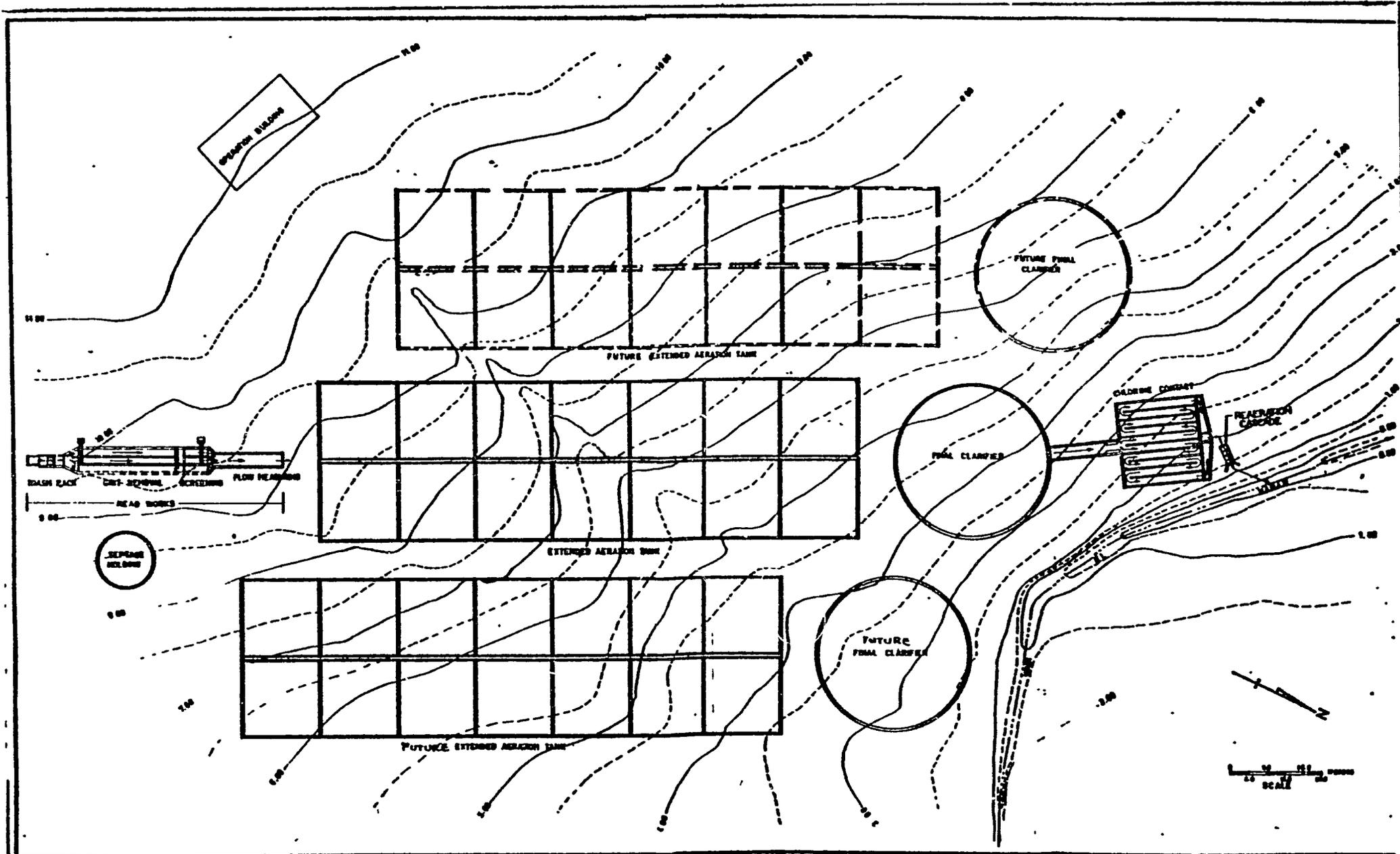


LEGEND

- INTERCEPTOR SEWER
- A-7C → TRUNK SEWER
- → PUMP STATION FORCEMAIN

SEWAGE COLLECTION SYSTEM
 -PROJECT-
 AREA SERVED

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LAYOUT OF PROPOSED EXTENDED AERATION
 ACTIVATED SLUDGE WWTP
 IRBID JORDAN

FIGURE 6

SA

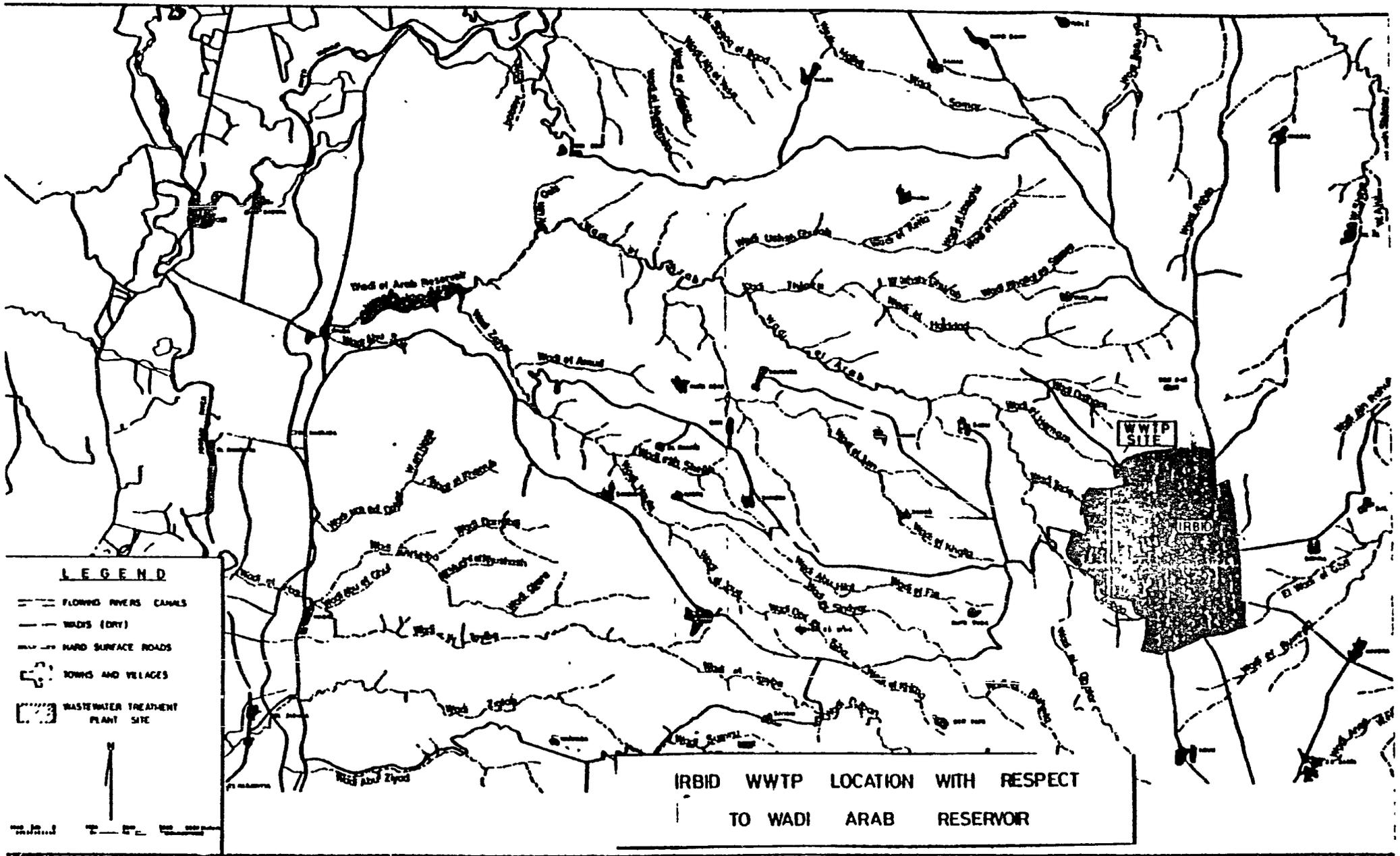


FIGURE 7

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TECHNICAL ANALYSIS

1. Water Supply

The project has been developed to serve a "most conservative" water supply situation, in which only the known quantities of groundwater (16.4 MCM/a) will be available to WSC's Northern District, of which 5.7 MCM/a will be allotted to Irbid. This minimal water condition was assumed to last until surface water from the Yarmouk River becomes available near the end of the decade. This is a conservative, pessimistic condition based on existing knowledge. WSC is, however, optimistic that it will develop additional wells with good yields in areas closer to Irbid than Azraq and Dhuleil. In fact, WSC has indicated that it plans to discontinue pumping from Azraq, which provides about 16 percent of the known supply, when an equivalent additional source is developed. Since Azraq is 120 km from Irbid, pumping costs associated with its use are high. Similarly, WSC will phase out the use of wells at Dhuleil when substitute supplies can be found, since the Dhuleil field is currently overpumped, primarily for agriculture. In any event, it is believed that at least the amounts of water projected in the "most conservative" analysis will be available to meet Irbid's needs until 1990. The increased population at that time will have nearly doubled its per capita consumption of water.

2. Water Distribution

There are no major issues relating to the proposed improvements to the water distribution system. In every long-range development program, portions of the system are sized to meet the requirements at the end of the design period. In a water distribution system this means that many pipes are larger than needed in the early years. In the Irbid system most of the large pipes have been deferred for later stage construction. In the proposed project less than 10 percent (4.7 km) of the total of 50 km of pipe installed under the project could be considered larger than required to solely meet the needs of the initial stage of development. Any savings to the project that could be realized by reducing the sizes of this small amount of pipe would be minimal and would be offset by the cost of replacement and installation of larger pipes at a later date to meet future pressure and flow requirements.

3. Wastewater Collection

As in the water distribution system, long-range development planning of a sewerage system results in unused capacity in the early years. A sewer with an inside diameter of 200 mm (8 in.) is considered the minimum size to avoid stoppages and to permit easy maintenance. About 84 percent of the sewers installed under the project are of minimum size. The consultant proposes to design the sewers to serve the projected saturation population of the tributary area. The slope of the sewer must be sufficient to provide self-cleansing velocities

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in the sewer. In hilly areas where the slope of the sewer and ground surface exceed the minimum slope and flow, velocities required for self-cleansing will probably be maintained even at lower flows. In flatter areas, especially in the early stage of the project, it may not be possible to continuously maintain the flow required for self-cleansing velocities. In such cases, it may be necessary to occasionally surcharge the sewers to flush out deposited solids. In the project design, the consultant will take full advantage of natural slopes and will use the maximum slopes feasible without increasing costs.

It is expected that the proposed sewer element of the project will serve about 7,500 customers. It has been Amman's experience that sewer connections usually lag behind sewer completion by about a year and in some cases longer. Obviously, household connections to the sewerage system should not be made until the wastewater treatment plant is ready to receive sewage. The consultant has estimated that the plant will take about 27 months to complete. Sewer construction can proceed concurrently, so that connections can start as soon as the plant is completed. It is anticipated, conservatively, that within three years after the plant is completed, all of the potential customers will have been connected.

4. Wastewater Treatment

The consultant considered four combinations of anaerobic, facultative and aerated waste stabilization ponds or lagoons and five different biological treatment processes to treat sewage, as well as several processes for sludge dewatering. In the analysis of the "low-technology" alternatives of lagoons or ponds, the least-cost alternative was that which required the least land area. The combination of anaerobic ponds and aerated lagoons requires approximately 27 hectares. The land required for the other alternatives ranges from 60 hectares to 172 hectares. The five "high-technology" forms of biological treatment that were considered were: rotating biological media, trickling filters, regular activated sludge, extended aeration activated sludge and oxidation-ditch activated sludge. Treatment efficiencies of the five processes were about equal. Socio-economic and environmental considerations, such as potential nuisances and odors, favored the extended aeration and oxidation-ditch processes. The least-cost alternative among these processes was the extended aeration process, despite high annual energy costs.

The consultant also compared the best low-technology alternative with the best high-technology alternative. It was found that the area required for ponds and lagoons is not available at the end of the interceptors at the Irbid plant site or in the narrow wadis below it. Reaching the closest available site involved pumping the total flow to a higher elevation. Operation of such a pumping station requires "high-technology" and is also energy-intensive, thereby canceling out any advantages of the simpler treatment process. In the project design the consultant will take full advantage of natural slopes and will use the maximum slopes feasible without increasing costs.

The consultant compared mechanical dewatering of sludge with sludge-drying beds. Because of the cost of land, the analysis favored the mechanical dewatering process (total annual cost for the belt-filter press was JD 34,500 as against JD 41,500 for sand drying beds). Annual operating costs for the drying beds, however, was only 54 percent of the annual operating costs for the belt-filter press, which is energy intensive. Government officials who reviewed the estimates raised questions as to consultant's assumptions on the future rate of increase of energy costs. They were also concerned about the problems of operating and maintaining the more sophisticated system. Furthermore, if the Government could obtain land for a lower price than the consultant had estimated, the small cost advantage of the mechanical dewatering system would disappear. These considerations led them to pick the less sophisticated sand-drying beds as the method for sludge dewatering.

5. Water Conservation

Irbid's records for 1979 show that only 75 percent of the total water purchased from WSC and produced from its own wells was sold to its customers. The difference is attributed to under-registration of customers' water meters and by losses through leakage in the distribution system. Although water flowing through a customer's meter without registering is not lost to the system, it does represent a loss in revenue due the utility. Leakage, however, is a loss of both water and revenue. The consultant determined that meter maintenance in Irbid is relatively good. It may be assumed, therefore, that most of the 25 percent of unaccounted-for water is lost through leakage.

Well operated utilities make every effort to reduce the amount of unaccounted-for water in their systems. In the United States, utilities try to keep this amount below 15 percent by active programs of leak detection and meter maintenance. Jordan, with its limited water resources, should be even more concerned about water losses than countries with more plentiful supplies. At Irbid, where additional surface water supplies from the Yarmouk River may not be available until near the end of the decade, it is particularly important to conserve the limited amounts of groundwater available. It is believed that Irbid can reduce its losses considerably through a well-organized leak-detection program. Improvements in its meter maintenance program should also yield additional revenues. Although water losses beyond the customer's meter are his or her responsibility, they are just as important to the community as those of the water utility. These losses occur because of leaking taps and plumbing fixtures and wastage by the customer and his family.

The Government of Jordan is aware that water conservation is the least costly means of extending its limited water resources. It has asked A.I.D. for technical assistance to set up a Water Conservation Technology Workshop, which will probably be held in the fall of 1980 or early in 1981. Recommendations and information disseminated to GOJ Agency participants in the workshop should be helpful to the Irbid Water Council and other water utilities in Jordan. In addition to this

workshop, there will be a special covenant in the Project Agreement requiring: (a) the establishment of a leak-detection unit in WSC's Irbid Water Council to conduct a leak-detection survey and to repair leaks on a continuing basis; and (b) the development of a program to educate the public on conservation measures to reduce household water losses.

FINANCIAL ANALYSIS

1. Introductory Statement as to Methodology

The financial analysis presentation in Tables 1, 2 and 3 of this Annex were prepared primarily by Weston International, Inc., (the Consultant) based on assumptions as to annual increases in new connections (water and sewerage), water requirements, annual growth in population and litres per capita daily consumption, etc, provided by USAID/Amman. The project description utilized in this PP is also somewhat different in scope and timing than the one recommended by the Consultant in the final feasibility study presented to the GOJ.

The Consultant's financial analysis is based on a cash flow system balancing of cash expenditures and revenues. Initially, the system requires the calculation of annual cash operating costs and debt service payments (interest and debt repayments). The next step is to match revenues to these costs over the analytical time period (in this instance, 1980 - 89) so that there is a general balance. Revenues consist of several types, administrative connection fees for both water and sewerage, user charges for water consumed, sewerage surcharges and septage dumping revenues (in the main from non-Irbid municipal-ity residents). Both administrative connection fees and septage dumping revenues are initially calculated with the balance to be derived from user charges. Water and sewerage user charges are calculated separately (based on their own cost structure). Monthly user charges for each component (and for residential and non-residential connections), multiplied by the number of connections provides the residential and non-residential revenue figures presented in Table 1, attached.

In view of this methodology, no effort was made to calculate the annual net return (including interest payments) to average net fixed assets. The Consultant's methodology does generally meet the financial covenant included in this PP - that the utility will generate adequate revenues to meet operating and maintenance costs, and debt service payments (interest payments and debt repayment). The Consultant's methodology generally will not result in precisely meeting the objectives of their procedure but variations from the ideal are not likely to be large or significant.

2. Past Performance - 1976 - 1979

The financial analysis tables and explanatory notes include practically nothing relevant as to existing operations. The Consultant did endeavor to piece together a financial picture of current operations. It was not successful.

In 1976, the Irbid municipal water system purchased 1.16 MM³; in 1979 that had increased to 2.06 MM³. Water sold in 1976 was about 0.9 MM³; in 1979, 1.5 MM³. Unaccounted for water in 1979 was about 25 percent. The above numbers appear

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firm. The additional financial analysis of 1976 - 1979 performance undertaken by the Consultant appear (according to the Consultant) relatively weak. Total income in 1979 was about JD 250,000; expenses about JD 330,000. The only relevant financial conclusion is that the existing operation is probably substantially in debt to the Water Supply Corporation for bulk water received and not paid for. Details as to the value (or cost) of existing assets are almost totally lacking in the Consultant's reports.

3. Future Performance - 1980 - 1989

Table 1 provides the projected income and expenditure stages for the Irbid water and sewerage operations for the 1980 - 1989 time period. As previously explained, the results are pre-determined - in general, the accounts over the ten-year period should balance. If debt repayments (JD 1,276,000 from Table 2) is substituted for depreciation charges (JD 3,869,000) in the calculation of surplus in Table 1, the result is a surplus of JD 919,000 available for post-1989 capital investment programs. Given the financial magnitudes included in Table 1, that is not an unexpectedly large surplus. If a deficit of a similar amount had resulted, the comment would have been identical.

The major cost element in Table 1 is in the wholesale water cost. During the 1980 - 83 time period, it accounts for about 50 percent of total operating costs. In 1984, when the sewerage system begins operation, its impact is reduced to 25 - 30 percent of total operation costs. In 1980, the bulk water cost charged by WSC was 65fils/m³. The most recent financial cost analysis available to AID of WSC water costs was in a report dated December 1976 (Report on the Financial Review and Recommendations for Financial Guidelines and Tariff Revision, Water Supply Corporation, Northern District, United Kingdom Technical Cooperation). That report (Table 4, p. 36) calculated that the WSC cost per M³ sold to Irbid Municipality in 1975 was 169fils/m³ before any net return on average net fixed assets. The report recommended that the WSC bulk water price be increased to 180fils/m³ (p.6, para 1.6.12) to provide some return on average net fixed assets.

The wholesale water cost in Table 1 has been escalated by 15 percent per annum from the 1980 level. The year-by-year wholesale water price is presented in item 5 of the attached explanatory notes. The 180fils/m³ recommended for 1975 by the financial analyst engaged to undertake the December 1976 dated report will not be achieved until about 1987 under the assumption included in Table 1.

For convenience, selected yearly revenue generated per M³ of water requirement is presented below, exclusive of septage dumpings (mainly paid by non-residents of Irbid). This calculation oversimplifies the actual situation, but does provide some comparative information as to the implications of the assumptions included in Table 1:

	<u>Water Required</u> (MCM)	<u>Revenues Required</u> (JD000)	<u>Fils/m³</u>
1980	2.26	413	183
1982	3.03	591	195
1984	3.72	827	222
1986	4.23	1605	379
1988	5.11	2905	568
1989	5.61	3685	657

The impact of the sewerage system that commences operation in 1984 is self-evident. The 1989 price projection, based on 1980 = 100 is 359 or about 15 percent per annum over a nine-year time period. This is not an overly surprising result but it should be remembered that this project deals with groundwater from wells and springs not with surface water sources that require substantial pumping facilities and must be lifted considerable heights. It should also be emphasized that this calculation is indicative, not suggestive. The numbers in this table are rough approximations based on assumptions as to future developments in the general price escalation area as well as possible (not necessarily probable) GOJ policy decisions.

4. Conclusion

The construction of an expanded water supply system and the addition of a waste collection and disposal service will necessarily change the structure and level of costs and revenues for the consumer and the operating utility. The rate study recommended in this PP should provide a more exact basis for estimating the probable revenue requirements and the distribution of the financial burdens by the various consumer groups. Both equity, conservation and the financial viability of the operating utility will most probably be considered in that study.

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IRBID WATER AND SEWERAGE PROJECT
INCOME AND EXPENDITURE STATEMENTS -

<u>YEAR ENDING DECEMBER 31</u> (1)	<u>1980</u> (2)	<u>1981</u> (3)	<u>1982</u> (4)	<u>1983</u> (5)	<u>1984</u> (6)	<u>1985</u> (7)	<u>1986</u> (8)	<u>1987</u> (9)	<u>1988</u> (10)	<u>1989</u> (11)
WATER SUPPLY										
Water Required (M ³ Millions)	2.26	2.65	3.03	3.32	3.72	4.07	4.23	4.65	5.11	5.61
Water Sold (M ³ Millions)	1.81	1.91	2.27	2.49	- 2.79	3.05	3.38	3.72	4.09	4.49
Unaccounted For (%)	25	25	25	25	25	25	20	20	20	20
Total Connections (000)	17.0	19.9	21.7	22.7	23.6	24.7	25.7	26.5	27.6	28.8
Residential	14.2	16.9	18.6	19.5	20.2	21.2	22.0	22.7	23.6	24.7
Non-residential	2.8	3.0	3.1	3.2	3.4	3.5	3.7	3.8	4.0	4.1
Total Population (000)	118	123	129	135	141	147	153	159	165	172
Consumption of Population Served (lpcd)	34	36	38	40	43	45	48	51	54	57
SEWERAGE										
Number of Connections (000)	-	-	-	-	3.6	6.2	8.2	10.6	15.7	22.6
Residential	-	-	-	-	2.0	4.0	5.8	8.0	12.2	18.5
Non-residential	-	-	-	-	1.6	2.2	2.4	2.6	3.5	4.1
----- JD (THOUSANDS) -----										
REVENUE										
Water Supply										
Residential	306	386	451	591	647	720	794	1171	1290	1433
Non-residential	93	106	115	148	167	183	204	301	336	365
Administrative Connection Fees	14	41	25	14	13	15	14	11	15	16
TOTAL WATER SUPPLY	<u>413</u>	<u>533</u>	<u>591</u>	<u>753</u>	<u>827</u>	<u>918</u>	<u>1012</u>	<u>1483</u>	<u>1641</u>	<u>1814</u>
Sewerage										
Residential	-	-	-	-	99	210	323	473	765	1232
Non-residential	-	-	-	-	121	177	206	236	336	419
Administrative Connection Fees	-	-	-	-	115	83	64	76	163	220
Septage Dumpings	-	-	-	-	151	148	147	143	129	106
TOTAL SEWERAGE	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>486</u>	<u>618</u>	<u>740</u>	<u>928</u>	<u>1393</u>	<u>1977</u>
GRAND TOTAL REVENUES	<u>413</u>	<u>533</u>	<u>591</u>	<u>753</u>	<u>1313</u>	<u>1536</u>	<u>1752</u>	<u>2411</u>	<u>3034</u>	<u>3791</u>

- Continued -

IRBID WATER AND SEWERAGE PROJECT
INCOME AND EXPENDITURE STATEMENTS - Cont'd

<u>YEAR ENDING DECEMBER 31</u> <u>(1)</u>	<u>1980</u> <u>(2)</u>	<u>1981</u> <u>(3)</u>	<u>1982</u> <u>(4)</u>	<u>1983</u> <u>(5)</u>	<u>1984</u> <u>(6)</u>	<u>1985</u> <u>(7)</u>	<u>1986</u> <u>(8)</u>	<u>1987</u> <u>(9)</u>	<u>1988</u> <u>(10)</u>	<u>1989</u> <u>(11)</u>
<u>OPERATING COSTS</u>										
<u>Water Supply</u>										
Salaries and Wages	41	42	44	48	52	59	70	83	98	116
Maintenance	62	68	73	77	86	97	115	137	161	192
Whole Sale Water Cost	147	198	261	328	423	532	636	804	1016	1283
Depreciation	-	10	47	105	167	209	230	252	277	304
Interest	6	5	43	88	141	149	152	151	145	139
Other	37	32	34	32	34	40	43	56	66	78
TOTAL OPERATING COSTS	<u>287</u>	<u>355</u>	<u>502</u>	<u>678</u>	<u>903</u>	<u>1086</u>	<u>1246</u>	<u>1483</u>	<u>1763</u>	<u>2112</u>
<u>Severage</u>										
Salaries and Wages	-	-	-	-	94	121	155	225	280	346
Operations and Maintenance	-	-	-	-	174	225	289	416	519	643
Depreciation	-	-	-	-	378	378	378	378	378	378
Interest	-	-	-	-	265	281	283	280	268	256
TOTAL SEWERAGE	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>911</u>	<u>1005</u>	<u>1105</u>	<u>1299</u>	<u>1445</u>	<u>1623</u>
GRAND TOTAL OPERATING COSTS	<u>287</u>	<u>355</u>	<u>502</u>	<u>678</u>	<u>1814</u>	<u>2091</u>	<u>2351</u>	<u>2782</u>	<u>3208</u>	<u>3735</u>
Surplus (Deficit)	126	178	89	75	(501)	(555)	(599)	(371)	(174)	58
Interest	6	5	43	88	406	430	435	430	413	395
Surplus (Deficit) Before Interest	132	183	132	163	(95)	(125)	(164)	53	239	453
Cash Operating Ratio (%)	69	65	78	76	99	98	99	89	84	81

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IRBID WATER AND SEWERAGE PROJECT
CASH FLOW STATEMENT
(JD 000)

<u>YEAR ENDING DECEMBER 31</u> (1)	<u>1980</u> (2)	<u>1981</u> (3)	<u>1982</u> (4)	<u>1983</u> (5)	<u>1984</u> (6)	<u>1985</u> (7)	<u>1986</u> (8)	<u>1987</u> (9)	<u>1988</u> (10)	<u>1989</u> (11)
INTERNAL CASH GENERATION										
Net Revenue (Before Depreciation & Int.)	<u>132</u>	<u>193</u>	<u>169</u>	<u>268</u>	<u>450</u>	<u>462</u>	<u>444</u>	<u>690</u>	<u>884</u>	<u>1139</u>
OPERATING REQUIREMENTS										
Working Capital	<u>43</u>	<u>6</u>	<u>(5)</u>	<u>13</u>	<u>62</u>	<u>20</u>	<u>17</u>	<u>77</u>	<u>71</u>	<u>79</u>
DEBT SERVICE										
Interest	<u>6</u>	<u>5</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>193</u>	<u>312</u>	<u>431</u>	<u>413</u>	<u>395</u>
Repayment	<u>12</u>	<u>13</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>113</u>	<u>196</u>	<u>285</u>	<u>303</u>	<u>321</u>
TOTAL DEBT SERVICE	<u>18</u>	<u>18</u>	<u>13</u>	<u>13</u>	<u>13</u>	<u>306</u>	<u>508</u>	<u>716</u>	<u>716</u>	<u>716</u>
TOTAL OPERATING REQUIREMENTS	<u>61</u>	<u>24</u>	<u>8</u>	<u>26</u>	<u>75</u>	<u>326</u>	<u>525</u>	<u>793</u>	<u>787</u>	<u>795</u>
TOTAL AVAILABLE FROM OPERATIONS	<u>71</u>	<u>169</u>	<u>161</u>	<u>242</u>	<u>375</u>	<u>136</u>	<u>(81)</u>	<u>(103)</u>	<u>97</u>	<u>344</u>
CONSTRUCTION COSTS										
Water Supply	-	<u>387</u>	<u>1109</u>	<u>1221</u>	<u>1288</u>	<u>390</u>	<u>429</u>	<u>472</u>	<u>519</u>	<u>571</u>
Sewerage	-	<u>691</u>	<u>3233</u>	<u>1679</u>	<u>1648</u>	-	-	<u>1475</u>	<u>1624</u>	<u>1784</u>
Interest Capitalized	-	-	<u>121</u>	<u>191</u>	-	-	-	-	-	-
TOTAL CONSTRUCTION COSTS	-	<u>1078</u>	<u>4463</u>	<u>3083</u>	<u>2936</u>	<u>390</u>	<u>429</u>	<u>1947</u>	<u>2143</u>	<u>2355</u>
BALANCE TO BE FINANCED										
Financed By:										
A.I.D. Grant	-	<u>750</u>	-	-	-	-	-	-	-	-
A.I.D. Loan (Relent by GOJ)	-	-	<u>2806</u>	<u>1971</u>	<u>1835</u>	-	-	-	-	-
GOJ Capital Contribution	-	<u>328</u>	<u>1657</u>	<u>1120</u>	<u>1101</u>	<u>390</u>	<u>429</u>	<u>1947</u>	<u>2143</u>	<u>2355</u>
TOTAL	-	<u>1078</u>	<u>4463</u>	<u>3091</u>	<u>2936</u>	<u>390</u>	<u>429</u>	<u>1947</u>	<u>2143</u>	<u>2355</u>
Surplus (Deficit)	<u>71</u>	<u>169</u>	<u>161</u>	<u>242</u>	<u>375</u>	<u>136</u>	<u>(81)</u>	<u>1947</u>	<u>2143</u>	<u>2355</u>
Cash Balance At End Of Year	<u>129</u>	<u>298</u>	<u>459</u>	<u>701</u>	<u>617</u>	<u>753</u>	<u>672</u>	<u>569</u>	<u>666</u>	<u>1010</u>
Debt Service Coverage (Cash Balance divided by Debt Service)	8.6	12.4	35.3	27.0	8.2	2.3	1.3	0.6	0.8	1.3

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IRBID WATER AND SEWERAGE PROJECT
BALANCE SHEETS
(JD 000)

<u>YEAR ENDING DECEMBER 31</u> (1)	<u>1980</u> (2)	<u>1981</u> (3)	<u>1982</u> (4)	<u>1983</u> (5)	<u>1984</u> (6)	<u>1985</u> (7)	<u>1986</u> (8)	<u>1987</u> (9)	<u>1988</u> (10)	<u>1989</u> (11)
ASSETS										
<u>Current Assets</u>										
Cash	129	298	459	701	1076	1212	1131	1172	1269	1463
Accounts Receivable	59	82	90	113	197	231	263	362	455	570
Inventories	5	8	10	12	19	26	33	45	57	69
TOTAL CURRENT ASSETS	<u>193</u>	<u>388</u>	<u>559</u>	<u>826</u>	<u>1292</u>	<u>1469</u>	<u>1427</u>	<u>1579</u>	<u>1781</u>	<u>2102</u>
<u>Fixed Assets</u>										
Water Supply	-	387	1496	2717	4005	4395	4824	5296	5815	6386
Less: Depreciation	-	10	57	162	329	538	768	1020	1297	1601
Net Water Supply	-	377	1439	2555	3676	3857	4056	4276	4518	4785
Sewerage	-	-	-	-	7563	7563	7563	7563	7563	7563
Less: Depreciation	-	-	-	-	378	756	1134	1512	1890	2268
Net Sewerage	-	-	-	-	7185	6807	6429	6051	5673	5295
Work In Progress	-	691	4045	5915	-	-	-	1475	3099	4883
TOTAL FIXED ASSETS	<u>-</u>	<u>1068</u>	<u>5484</u>	<u>8470</u>	<u>10861</u>	<u>10664</u>	<u>10485</u>	<u>11802</u>	<u>13290</u>	<u>14963</u>
TOTAL ASSETS	<u>193</u>	<u>1456</u>	<u>6043</u>	<u>9296</u>	<u>12153</u>	<u>12133</u>	<u>11912</u>	<u>13381</u>	<u>15071</u>	<u>17065</u>
LIABILITIES										
<u>Current Liabilities</u>										
Accounts Payable	21	27	33	40	65	81	98	128	157	199
Deposit	5	19	28	33	37	42	47	51	56	62
TOTAL CURRENT LIABILITIES	<u>26</u>	<u>46</u>	<u>61</u>	<u>73</u>	<u>102</u>	<u>123</u>	<u>145</u>	<u>179</u>	<u>213</u>	<u>261</u>
<u>Long-Term Debt</u>										
Existing Local Loans	46	33	23	12	-	-	-	-	-	-
A.I.D. Loan - Relent by GOJ	-	-	2846	4904	7144	7268	7195	6910	6607	6285
TOTAL LONG-TERM DEBT	<u>46</u>	<u>33</u>	<u>2869</u>	<u>4916</u>	<u>7144</u>	<u>7268</u>	<u>7195</u>	<u>6910</u>	<u>6607</u>	<u>6285</u>
<u>Equity</u>										
Equity, Retained Earnings and Capital	-	-	-	-	-	-	-	-	-	-
Contributions	121	1377	3113	4307	4907	4793	4572	6650	8251	10519
TOTAL LIABILITIES	<u>193</u>	<u>1456</u>	<u>6043</u>	<u>9296</u>	<u>12153</u>	<u>12133</u>	<u>11912</u>	<u>13381</u>	<u>15071</u>	<u>17065</u>
Debt Equity Ratio	37:63	5:95	48:52	54:46	60:40	40:60	62:38	50:50	45:55	38:62

ANNEX C

IRBID WATER AND SEWERAGE PROJECT
EXPLANATORY NOTE FOR FINANCIAL ANALYSES TABLES

Income and Expenditure Statements

REVENUE

1. Irbid municipality has a stepped tariff in operation for water supply. No waste disposal facilities are currently operated by the utility. (See Annex C-1 for listing of tariff, fee, charges and taxes on water/sewerage system.) Since the revenue generations for residential and non-residential customers were based on the requirement to meet projected operating and bulk water costs and debt service (interest payments plus debt repayments) expenditures, the level of revenue income (exclusive of administrative connection fees) were obtained using the following charges per connection :

Water Supply - Residential:	1980 - 82	- JD 1.70 per month
	1983 - 86	- JD 2.00 " "
	1987 - 89	- JD 2.70 " "
- Non-residential:	1980 - 82	- JD 2.62 per month
	1983 - 86	- JD 3.08 " "
	1987 - 89	- JD 4.15 " "
Sewerage - Residential:	1984 - 79	- JD 3.10 per month
- Non-residential:	1984 - 89	- JD 4.76 per month

Non-residential connections were assumed to use 1.54 times more water than residential connections.

2. Administrative connection fees for water supply are based on current charges of JD 19 per new connection, including a deposit of JD 5. Revenue from administrative connection fees to the sewerage system are based on a percentage of property net rental value plus an application fee. An average of JD 32 per new connection to the sewerage system is included in revenues for administrative connection fees.

3. Septage dumping revenues are based on JD 10 per truckload of septic tank material dumped into the wastewater treatment plant and will serve not only the Irbid municipal area but also surrounding villages.

Operating Costs

4. Operation and maintenance costs (exclusive of depreciation, interest and wholesale water cost) have been escalated at 6 percent per annum through 1983

and on the average by 15 percent thereafter. The post-1983 escalation assumes that approximately 7.5 per annum represents price escalation. Approximately 50 percent of the increase in sewerage operating costs in 1984 - 1989 also represents price increase.

5. Wholesale water cost has been escalated at 15 percent per year beginning with the current 1980 base figure of 65 fils/m³. The following annual cubic meter wholesale water costs was multiplied by the annual water requirement projection to obtain the annual wholesale water costs:

1980 - 65.00 fils	1985 - 130.70 fils
1981 - 74.75 fils	1986 - 150.41 fils
1982 - 85.96 fils	1987 - 172.97 fils
1983 - 98.86 fils	1988 - 198.71 fils
1984 - 113.69 fils	1989 - 228.75 fils

6. The derivation of interest payments and depreciation charges included in the income and expenditure statement are available in NE/PD files. (Weston International, Inc., dated July 18, 1980).

7. Cash Operating Ratio is calculated as operating costs before depreciation divided by total revenues.

CASH FLOW STATEMENT

8. The AID loan (21.0 million) to the GOJ is relent by the GOJ at 6 percent interest per annum for 20 years with a three-year grace period for debt re-payments. The details of the cash flow statement are presented in the Weston International, Inc., special financial analysis (dated July 18, 1980), mentioned above and available in NE/PD files.

BALANCE SHEET

9. Accounts receivable equal 15 percent of billings (including deposits) for the current year.
10. Accounts payable equals one-twelfth of all operating costs except salaries and wages and refugee reconnection costs incurred during the current year.
11. The reconnection cost for the existing water supply customers of JD 41,000, JD 45,000 and JD 50,000, which represents the escalated value for 1981, 1982, 1983, respectively, is shown under water supply capital costs and is financed entirely by GOJ capital contributions.
12. Capital expenditures for sewerage in 1981, 1982 and 1983 are treated as work in progress until 1984 when they are placed in service.

CURRENT TARIFF FEE AND TAX SCHEDULE
WATER AND SEWERAGE IN IRBID

WATER

1. TARIFF

CURRENT WATER PRICING SCHEDULE

<u>Water Consumption</u> (m ³ /Month)	<u>Consumption Charges</u> (fils/m ³)
0-5	80
6-15	120
16-25	220
26 and above	300

2. FEES (Administrative Connection Fee)

<u>Type of Fee or Charge</u>	<u>Charge</u> JD
Basic Fee (nonrefundable)	5.000
Deposit (refundable)	5.000
New network	3.000
Meter	5.500
Meter Installation	1.000
Pipe :	
Up to 30 meters	5.000
Additional length (per meter)	<u>0.100</u>
GROSS FEE	24.500

SEWERAGE

1. USER CHARGES

Regulations set by the sewer system law for municipalities of 1977 and Ordinance No. 30 of 1979 for sewer charges. The basic user charge is divided in two components:

1. A sewerage tax paid annually;
2. A consumption fee of 0.030 JD per cubic meter of wastewater entering the system.

The first component of the sewerage system is the sewage tax equal to 4 percent of the net rental value of a residential property.

69X

2. FEES

The wastewater system administrative connection fee is equal to 25 percent of the net rental of the property plus an application fee that varies for different areas in the city.

ANNEX C-2
ECONOMIC ANALYSIS

The attached table provides the basic information relative to the economic analysis of the proposed project for the 1981 - 2000 time period. Footnotes to the table provide either the basis for the costs and benefits included or the availability of more detailed analysis in the NE/PD Project File.

The economic rate of return for the proposed project based on the calculations in the attached table is 9.1 percent. This is a relatively high economic rate of return for a combined water and sewerage project and indicates that the proposed project is economically justified.

As noted in the Financial Analysis (Annex C), the current 65 fils/m³ wholesale cost of water is currently substantially below the financial cost to the Water Supply Corporation of bulk water delivered to Irbid. No calculation of the average incremental cost of water to the project has been made. Such a calculation would necessarily include additional groundwater sources in the post-1989 period and dependent on the projected water requirements, surface sources might also have to be included. A 250 fils/m³ (col.4 in attached table) has been included in the economic calculations as a proxy for the average incremental cost for water requirements above the 1980 level.

The cost side does exclude replacement costs for equipment utilized during the project time frame. On the other hand, no terminal period salvage values are included as an offset to investment costs. The value of health benefits are also excluded since quantification, given the state of art, is currently unfeasible.

In addition, little or no information is available on the use of private tankers by lower income groups in Irbid. By 1982, these consumers will be tied into the water system. These deliveries are usually made at m³ prices substantially above those available to metered customers. These potential savings, albeit, minor and of temporary duration, are also excluded in the calculation of the economic rate of return.

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IRBID WATER AND SEWERAGE PROJECT
ECONOMIC COSTS AND BENEFITS, 1981-2000
RATE OF RETURN
(JD 000)

ANNEX C-2
Page 2 of 2

C O S T S					B E N E F I T S					
YEAR	CAPITAL COSTS ^{1/}	OPERATING COSTS ^{2/}	BULK WATER COSTS ^{3/}	TOTAL	SALES REVENUE ^{4/}	ADMINISTRATIVE CONNECTION FEES ^{5/}	SEPTAGE DUMPINGS ^{5/}	SEPTIC TANK COST SAVINGS ^{6/}	TOTAL	NET BENEFITS
1981	891	8	98	997	93	41	-	-	134	(863)
1982	3263	17	193	3473	159	25	-	-	184	(3289)
1983	1981	23	265	2269	340	14	-	-	354	(1915)
1984	1823	296	365	2484	615	128	151	(270)	624	(1860)
1985	220	347	453	1020	891	98	148	(93)	1044	24
1986	220	412	493	1125	1128	78	147	21	1374	249
1987	908	639	598	2145	1782	87	143	46	2058	(87)
1988	909	736	713	2358	2328	178	129	(266)	2369	11
1989	908	862	838	2608	3050	236	106	(366)	3026	418
1990	-			1700			106	324	3480	1780
1991	-									1780
1992	-									
1993	-									
1994	-									
1995	-									
1996	-									
1997	-									
1998	-									
1999	-									
2000	-									

1/ Based on 1979 values.

2/ Excludes depreciation, interest and wholesale water costs presented in Table 1 of Annex C. For water, assumes that through 1983, redefined operating costs from Table 1, Annex C are reasonable proxy of economic cost; from 1984, 1/2 of incremental operating cost increase is included as an economic cost. For sewerage operating costs from 1984 onward 1/2 of incremental operating cost (excluding depreciation, interest and wholesale water cost) are treated as economic cost.

3/ Assumed that economic value of incremental water requirements (1980 base) is 250 fils/m³. In 1979-80, WSC's wholesale water price to Irbid was 65 fils/m³. No calculation of the average incremental cost of water for Irbid using, for example, surface sources has as yet been made. The explanatory note to Table 1, Annex C (item 5 under Operating Costs), shows that in 1989 the wholesale cost of water used in that financial analysis was 228.75 fils/m³.

4/ Obtained directly from Table 1, Annex C. Assumes that the sales revenue (residential and non-residential) represents an economic value.

5/ Obtained directly from Table 1, Annex C.

6/ Septic Tank cost savings represents the annual difference in septic tank operating savings and the cost of sewer connections. Details available in NE/PD project files.

RATE OF RETURN 9.1%

SOCIAL SOUNDNESS ANALYSISIntroduction

Irbid is the commercial, cultural and administrative center of the northwestern plateau area of Jordan. Inhabiting the third largest city in the country, its 113,000 residents represent 5.2 percent of the national population. Its influence over the surrounding area lends it an even greater importance than municipal population figures alone might suggest. Irbid is the heart of northern Jordan's prosperous farming region and is the commercial hub for 30 surrounding communities, each with populations in excess of 3,000 (combining to form a total population for the area of over 200,000 in 1979).

Two recent studies of the Irbid area provide considerable detail about the sociological, demographic and economic potential and problems for further development.* These studies indicate that the area, and particularly Irbid as the center, will continue to grow rapidly during the next 20 years. Between 1961 and 1979, which are the years of the two most recent population censuses, Irbid experienced on average annual growth rate of 5.2 percent, from a 1961 base of 44,685 to 112,864 in 1979. This growth is attributed to several waves of migration of Palestinian Arabs, to Jordan's high natural population growth rate (estimated at 4.0 percent), and to a continuing trend of migration to the cities. Irbid is now one of three cities in Jordan with a population over 100,000. Its rate of growth has been a significant factor in over-taxing the infrastructure of the city, including the system of supplying water to individual households.

No income distribution data or poverty level definitions are available in Jordan. Informal surveys conducted specifically for the Amman and Irbid water and sewerage systems, have attempted to provide rough estimates of both. The 1978 Amman study

* These studies are the "Integrated Regional Study of North Jordan," undertaken by the Japan International Cooperative Agency (1979) and the "Water Use Strategy in North Jordan," conducted by Howard Humphreys and Sons (1978). The most recent study "Irbid Municipal Water Distribution, Sewerage, Storm Drainage and Solid Waste Disposal Project" was completed in 1980 by Weston International Inc., and it is that study which provides the basic socio-economic data used in the project paper. These studies are

suggested that the poverty level in that city may be defined by household incomes of between JD 600 and JD 1000 (\$1,800 - \$3,000), or an annual per capita income of between JD 60 and JD 100 (\$200 - \$340).* These figures should be valid for Irbid, two years later, considering the generally lower cost of living in that northern city. The consultants to the Irbid study have provided some insights into the income distribution there, on the basis of a survey of a small random sample of the population (105 households).** This distribution is shown in Figure 1, and shows that 12.4 percent of the households had incomes of less than JD 600 per year, with an average of JD 507. A further 21.0 percent had incomes of between JD 600 and JD 1,000. About half the population had incomes of between JD 1,000 and JD 3,000, 13.3 percent had incomes of between JD 3,000 and JD 5,000, while 1.9 percent had incomes in excess of JD 5,000. The survey also shows that both the lowest and highest income groups had only one worker per household, while the intermediate income groups had a progressively increasing number of workers per household. These numbers were found to be 1.1, 1.4, and 2.25 for each of the three intermediate income groups, respectively.

AID strategy, as expressed in the 1981 and 1982 CDSSs, is to support the Government of Jordan in its program to the minimum supply of water for daily use and provide for wastewater disposal on an equitable basis. Particular emphasis is on the more heavily populated areas of the north Jordan plateau. The ultimate objective will be to provide a water distribution system under continuous pressure, from which an average family can draw 80 liters per capita per day for a price not to exceed five percent of its income (in urban areas), along with an associated system for collecting and treating wastewater at a reasonable cost before returning it to the national water cycle. The Irbid Water and Sewerage Project will be designed so that it can be expanded to accommodate, eventually, the demands for water supply and sewage collection of a "saturation population" of 450,000, estimated to be reached early in the 21st century. During the initial construction phases to be financed by AID, people from all income levels will benefit from the work being done. Most

Continued - available in NE/PD. Because we had some reservations about the sampling of households upon which Weston gathered and interpreted data related to household size and income levels, the Mission's social scientist conducted an independent field survey of a number of households. The information collected substantiated the basic conclusions of the Weston study with respect to social soundness.

* Dajani, Jarir S., A Social Soundness Analysis of the Amman Water and Sewerage Systems. AID Contract AID/NE-C-1943 (Jordan), April, 1978.

** Weston Report, Page 9-58.

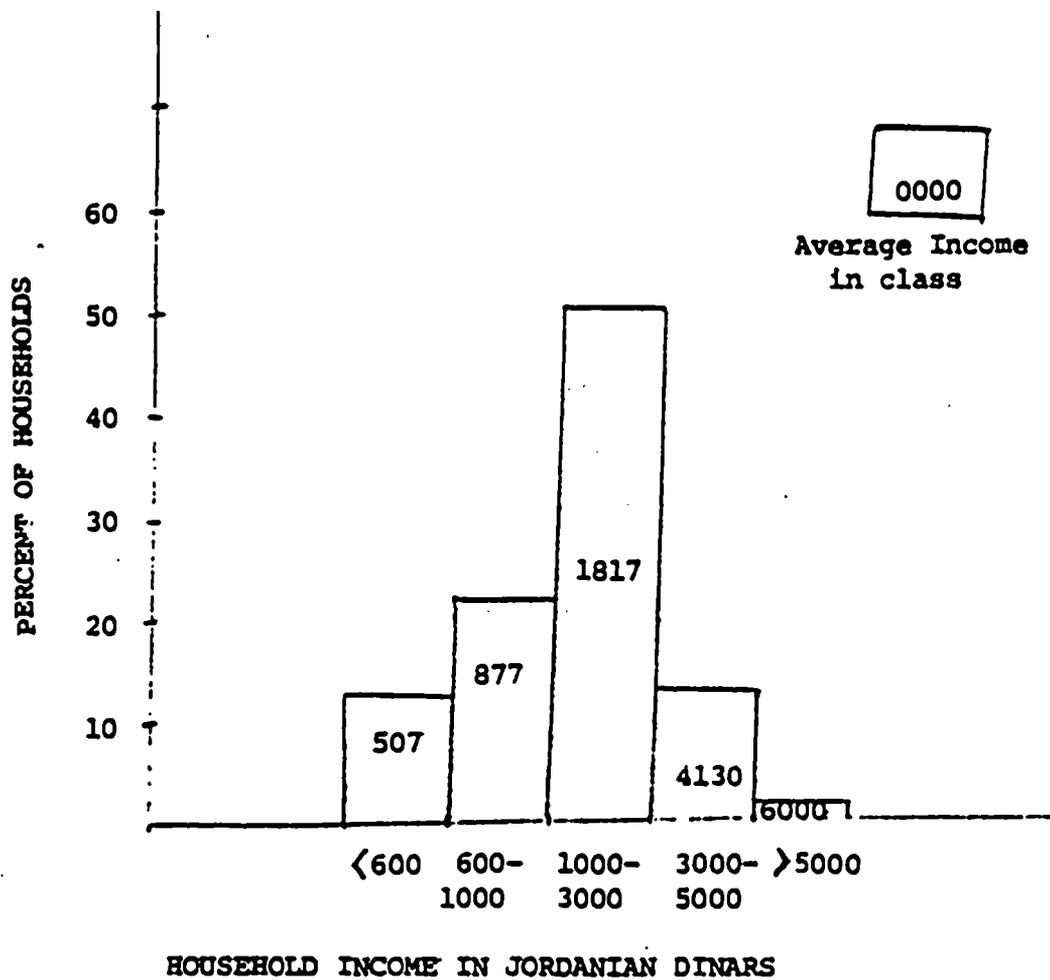


Figure 1

Household Income Distribution
in Irbid

of the work, however, particularly the construction of a wastewater collection system, will be targeted to areas containing families from the lowest income levels.

WATER

As of May 1980, there were 14,688 water connections in Irbid, excluding the Refugee Camp. It is estimated that about 20 percent of these connections serve non-residential locations, thus leaving about 11,735 residential connections. The 1979 Census has shown the population of Irbid to be 113,000, consisting of 16,000 households and averaging 7 persons per household. Using this latter figure, existing residential connections are estimated to serve about 82,000 people, or 73 percent of this population. Another 6,000 people, or 5 percent of the population, reside in the Refugee Camp, and are served by water sold in bulk to the Camp. This leaves 25,000 people, or 22 percent of the population, unserved. While all the residents of Irbid will benefit from the higher quality and larger quantities of water which will become available once the proposed system is installed, it is the latter group of approximately 3,500 households that will benefit most. These households represent the poorest sector of the population, who are forced to purchase water in tanks or from other residents at higher prices than those charged by the municipal service, or obtain water from stand pipes and sometimes have to hand-carry it to their residences.

The quality of water supplied to the connected households is poor, due to contamination of the water pipes. Portions of the water distribution system are over 30 years old. As a result of the age of the system and the intermittent supply of water, condition exists for, particularly during the dry summer months, a contaminated groundwater to seep into the water lines during periods of no pressure. When pressure in the zone is restored, this contaminated water is mixed with potable water and transported to homes for consumption. In addition, the municipality supplies water to customers through a small-diameter distribution system. As a result, people living at the extremities of the system are forced to cope with low water pressure, even when their zone is pressurized. The last substantial addition to the Irbid water distribution system took place in 1976. Since that time, there has been a sizable population increase, which means that the current system cannot provide the level of service required by the existing population in the service area. Until recently, these deficiencies have been somewhat overshadowed by the water shortages. But they will become all too evident when planned additions to the water supply from the development of new wells, the installation of pumping equipment at Za'atari and the new 14" pipeline come on line.

The water distribution system refurbished under the initial stages of this project (being financed by AID) will reflect those improvements to the water distribution networks considered necessary to upgrade the system to meet essential requirements through 1990. This will result in an increased number of households receiving better and more constant water pressure, thereby reducing the introduction of contaminated water to the system and alleviating the inconvenience of relying on a sporadic supply.

The total quantity of water sold in Irbid in 1979 was 1,662,405 cubic meters. Assuming a non-residential water consumption of 20 percent, the overall per capita domestic water use is 32 liters per capita per day (lpcd). The average quantity of water sold to connected households (excluding bulk sales and trucked water) is 36 lpcd.* These figures suggest that the 27 percent of the population (approximately 4,500 households) have no house connections both outside and within the Refugee Camps, consume an average of 21 lpcd. The proposed system will allow the doubling or in some cases, tripling of these consumption rates.

The present graduated rate structure for water is as follows:

<u>Water Consumption Group</u> <u>(cu. m. per month)</u>	<u>Unit Cost</u> <u>(JD/cu. m.)</u>
0 - 5 (0 - 166 e/d)	0.080
6 - 15 (200 - 500 e/d)	0.100
16 - 25 (533 - 833 e/d)	0.180
more than 25 (more than 853 e/d)	0.250

A minimum monthly payment of JD 0.400 is imposed on customers using less than 5 cu. m./month. Billing is undertaken on a bimonthly basis, thus effectively pushing some consumers into higher rate categories. For a poor family of 10 using a minimum of 20 lpcd, the total monthly consumption is 6 cubic meters, costing JD 0.500. This represents 1 percent of the income of a

*The Weston report estimates this value at 28 lpcd, assuming the population to be 147,000. On the basis of the available census figure of 113,000, the consumption figure is adjusted to equal $28 \times 147/113 = 36$ lpcd.

poor household at the JD 600 poverty level. If this household is billed on a bimonthly basis, its water bill would come to JD 0.550 per month, or 1.1 percent of its income. If this same household doubles its water consumption, as a result of increased water pressure and/or a new connection, its monthly water bill would rise to JD 1.100 or JD 1.560, depending on whether billing is done monthly or bimonthly. These costs would represent 2.6 and 3.0 percent of the household income, respectively. The cost of a new water connection is estimated at JD 24.500. This includes administrative fees of JD 19.000 and a house connection cost of JD 5.500.

Wastewater

Irbid currently has no system for the collection, treatment and disposal of municipal wastewater. The city has become almost totally dependent on individual wastewater disposal systems, i.e., cesspools, which have become increasingly inadequate and have posed a potential health problem as Irbid has grown. Regardless of proposed improvements to the water distribution system, a well-designed wastewater collection, treatment and disposal system is essential to eliminate the potential health hazard of the present situation.

The city of Irbid has only a few sanitary sewers in operation. These consist of three short separate lines with a total length of approximately 600 meters which drain into a box culvert and eventually join the existing storm sewer drainage in the central part of town. This sewage then flows untreated into the wadi system. About 98% of the households rely on cesspools for wastewater disposal. Each dwelling has a drain to an individual or to a common cesspool. At best, a cess pool provides only a limited degree of wastewater treatment. In many cases, the volume of wastewater is reduced by leaching through cesspool walls and bottoms, eventually seeping downward to the groundwater level. It is thought the wastewater from the 12,000 cesspools in Irbid may be contributing to the contamination of drinking water through leakages into the water distribution system. If the leaching rate is low and a cesspool fills up, the owner must have a septage hauler pump out and dispose of the contents. Each hauler is supposed to dump his tank contents at a site on the Wadi el Hamam, which means that liquid septage eventually flows downstream in the wadi to introduce contamination in other localities.

User charges for the sewerage system include: (1) a one-time application fee, (2) one-time connection charge, (3) annual sewerage tax, and (4) a consumption surcharge. The first three fee structures are indirectly pegged to the consumer's ability to pay. The one-time application fee varies with the type of residence. It is collected at the rate of JD 10 for class A residential buildings, JD 5 for class B residential buildings, JD 3 for class C and D residential buildings and JD 25 for commercial structures. Classes A and B are typical of higher income areas. The one-time connection fee is fixed at 25% of

assessed annual rent of the structure. The overall average of all assessed annual rental values in Irbid is JD 110, with the lower income areas having an assessed rental in the JD 80-100 range, mostly in type C and D buildings. Once an owner is connected to the sewerage system, he will continue to pay an annual property tax surcharge of 4% of the assessed rental. He will also have to pay cost of the house connection itself, which amounts to between JD 18 to 25 per meter-run. These connections average 3.5 meters in high-density areas, and 4.50 meters in low-density areas. Connection to the water system will result in a consumption fee which is collected as a surcharge to the water bill, and which amounts to 30 fils per cubic meter. The first three fees are normally payable by owner, while the consumption fee is payable by the renter or owner-occupant. Thus, typical costs on a type C or D residence (low income) are as follows (assuming an annual assessed rental of JD 100):

Owner Costs (one-time)	
Application Fee	JD 3.000
Connection Charge	JD 25.000
Connection (3 meters at JD 20)	JD 60.000
Total one-time costs	<u>JD 88.000</u>
Owner Costs (annual)	
Sewerage Tax	JD 4.000
Occupant Costs (annual)	
10 persons at 20 lpcd	JD 2.160
10 persons at 40 lpcd	JD 4.320
6 persons at 60 lpcd	JD 3.880
7 persons at 36 lpcd	JD 2.270
(average 1979)	

One-time owner costs in higher income areas (type A structure), are, of course, higher. If the assessed annual rental is JD 400, the one-time costs will amount to about JD 200. For the four types of house occupants listed above, the annual sewerage surcharge will amount to between 0.35 and 0.75 percent of the poverty-level annual household income of JD 600. In comparison, the cost for property owners to build new cesspools varies between three and four times the JD 100-200 total one-time connection charge. For the vast majority of property occupants with existing cesspools, the average fee to pump out the cesspool is estimated at JD 27 per year, or an average of three tanker loads every six months at a cost of about JD 4.5 per load. This is by necessity a rough estimate, since the

quantity and frequency of cleaning is dependent on the age, size, and construction of the cesspool being replaced. The relatively high cost of cleaning has led some residents to resort to illegal and generally unsanitary means for emptying their cesspools.

During the AID-financed phase of the project, two interceptor sewers will be constructed to service the western and central areas of the city, which comprise the majority of low-income high-density areas in Irbid and represent between 50 and 60 percent of the current population of approximately 113,000. Construction will initially provide sewage connection service for 7,500 customers. The sewage collection system will use existing street right-of-ways to the greatest extent possible, thereby minimizing disturbance to and destruction of private property.

The site for the proposed sewage treatment plant is an open field on the northwest side of the city. The area has few residences within a one half-kilometer radius of the proposed site. The capacity of the treatment plant will be sized to meet projected demand and to permit expansion to accommodate the full "saturation population."

Health

The availability of a safe, dependable, fully-pressurized water supply system coupled with an efficient wastewater collection, treatment and disposal system will do much to upgrade the health situation among the poorer residents of Irbid. The primary public health hazards involved are water-related diseases. It is generally accepted that an adequate, clean water supply for drinking and personal hygiene and a working wastewater system lead to improvements in public health and well-being. Under the present situation, Irbid has a relatively high potential or actual incidence of such water-related diseases as typhoid, amoebiasis, bacillary dysentery, infectious hepatitis, other forms of gastroenteritis and some skin infections.* These can all be related to poor water distribution and inadequate wastewater collection and disposal system, combined with an increase in population density and corresponding lack of knowledge or practice of good hygiene.

Unfortunately, good data to measure the size of the water-related health problem do not exist. The reporting of cases of water-related disease is estimated at somewhere less than 20% of

* Source: Weston study, with data taken from the Public Health Department in Irbid and the Ministry of Health, Statistics Department.

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actual occurrence, combined with the fact that physicians do not all properly record the cases they treat. In addition, the diagnosis of water-related disease is inadequate because the frequently-used public clinics do not have facilities or staff to identify cause of illness.

Although there is no doubt that the project will contribute to a healthier environment, improved sanitary conditions will not eliminate "behaviorial deficiencies" on the part of the beneficiaries. It is clear from AID's experience that health education leading to improved personal community and food hygienic practices is a necessary complement to the provision of safe drinking water in adequate amounts. USAID's planned FY 1980 Health Education Project should provide the basis for the corrective programs which must be introduced if the Irbid, as well as other water and sewerage projects are to achieve the full impact on health conditions.

There are further health hazards associated with the necessity to clean and maintain cesspools. Some residents purposefully reduce their water consumption in order to avoid the additional cost of more frequent maintenance of their cesspools. This self-enforced reduction in consumption results in poorer sanitation and individual hygienic habits. Additionally, when cesspools are pumped out by tanker trucks, it is known that, in order to save time and fuel and to service as many customers as possible, the drivers do not travel the full distance to the authorized septage dumping areas. Instead, they often empty their loads on agricultural land not far from residential areas. The installation of a municipal wastewater system will eliminate the need to over-conserve to avoid cesspool cleaning fees as well as stop the unsanitary dumping of cesspool contents in unauthorized areas.

The proposed projects can thus be expected to benefit public health for the following reasons:

- (1) The increased water supply will promote an increase in water consumption, with a concomitant improvement in hygienic practices.
- (2) A fully pressurized water supply system will reduce the risks of pipe contamination.
- (3) A continuous water supply will eliminate, or at least reduce, the need for roof-top and/or ground-level storage tanks, thus eliminating a potential source of contamination.

- (4) The replacement of the high cesspool cleaning costs by the more reasonable sewer charges will encourage both higher water use and less illegal dumping by both residents and haulers. This is particularly applicable to lower income households.
- (5) The sewerage system will eliminate the use of cesspools, and thus reduce the potential for contaminating water pipes.

The quantification of the relationship between sanitation improvements and health is not an easy task. A recent study suggests a threshold-saturation paradigm for the assessment of the health impacts of these improvements.* The paradigm proposes, and empirically demonstrates, that environmental interventions alone, at the low end of the socio-economic status (SES) scale, will produce little health improvement, unless they are supplemented by a variety of complementary investments in such areas as health education and nutrition. These health benefits, however, are expected to materialize much more dramatically as the socio-economic status of the population improves. This hypothesis uses literacy rates as a measure of SES and life expectancy at birth as a measure of health status. According to this paradigm, Jordan, with an adult literacy rate of 62% appears to have a socio-economic development position in which a high expectation of health benefits is reasonable.

Willingness and Ability to Pay

The cost for connecting to the water and/or sewerage system is borne by the property owner, while the monthly consumption costs are borne by the occupant, either owner or renter. There seems to be a general willingness to pay for these services in Jordan, and people are in fact usually anxious to connect to the water system. According to the national law which governs sewerage systems in the country, the responsible governmental agency publishes an official notice requiring property owners in a sewered area to connect to the system within 3 months of that notification. If the owner fails to do so during that period, the agency will carry out the necessary work at his expense and collect an additional 20% administrative fee from him. In a recent study of one high income and one low income area in Amman, it was found that 78.6% of all those required to connect in the high income area, did actually connect within a four month period (a one-month extension was granted). The corresponding percentage in the low income area was 92.1 percent. During the following four months these percentages rose to 90.0 percent and 95.4 percent, respectively.

* Shuval, H., R. Tilden, and R. Grosse, "The Effect of Sanitation Investments on Health Status: A Threshold-Saturation Theory," mimeographed paper, School of Public Health, University of Michigan, Ann Arbor, Mich., June, 1979.

No applications for installment payments were made, although such an arrangement can be negotiated. No connections were actually constructed by the Agency. Of the 21 owners who did not connect, 3 had their houses under construction, 12 resided in the Gulf area, and 5 were negotiating an arrangement with tenants, in order to share connection costs. These figures indicate both the ability and willingness to pay of the majority of the people.

Thus, while connection costs to the sewerage system are on the order of JD 100 for a low-income neighborhood, and to the water system on the order of JD 25 (exclusive of internal plumbing improvements), there are incentives for owners/occupants to connect. These incentives are reflected in lower water purchase and cesspool cleaning costs. For owners who do not occupy their property, and who have already paid the cost of constructing a cesspool, there are no incentives for paying the connection costs, especially since rents are controlled, and the owner can rarely capitalize on his investment. Negotiated arrangements are sometimes made between owners and renters, to facilitate the completion of the task. Renters will often indeed pay for the lower-cost water connection themselves. Thus there may be cases of unwillingness to pay the total connection cost by an owner who perceives such payments as a benefit to the renter, to whom the costs could not be passed on.

In order to assess the impact of water and sewerage charges on the poorest households in Irbid, an analysis was made of the combined cost to both a renter and an owner-occupant, who earns JD 600 per year, and who supports a family of 10. The results are shown in Table 1, which also shows all the assumptions of the analysis. These hypothetical households represent the lower end of the economic scale. They will pay 3.20 and 3.86 percent of their incomes, respectively. These percentages are probably an improvement over their "without system" costs, since both water and cesspool costs would be higher. The owner-occupant, however, may need a loan to finance his JD 125 investment in connection fees and expenses.

It should be noted, however, that if the conventional wisdom of using a 5 percent upper limit for these expenditures is to be maintained, there is not enough room to significantly increase water and sewerage rates, at least for the poorest sector of the population (perhaps 35% of Irbid's population have an annual income of less than JD 1,000). Rate increases which are in line with the annual increase of the cost-of-living index, however, should not present any undue hardships on the poorest sector of the population.

TABLE I
ANNUAL COSTS OF WATER AND SEWERAGE
FOR LOWEST INCOME HOUSEHOLDS*

	<u>Renter</u>	<u>Owner-Occupant**</u>
Water	JD 14.88	JD 14.88
Sewerage	JD 4.32	JD 8.32
Total	JD 19.20	JD 23.20
% of Income	3.20%	3.86%

* Assumes a household with 10 members, and annual income of JD 600.

Owner-occupants are assumed to live in houses with an assessed annual rental of JD 100. Water use assumed to be 40 lpcd. Water and sewerage rates at 1979 levels.

** Owner-occupant will also incur a one-time charge of JD 125 for both water and sewerage connections (21% of annual income). This is exclusive of any necessary plumbing improvements.

Benefits and Beneficiaries: A Summary

USAID and GOJ officials met during the months of March and April to discuss the possible components of the Irbid Water and Sewerage Project and to establish priorities for design and construction activities. The bases of selection of AID-financed phases of the proposed project were that: 1) all areas of Irbid would benefit from the improved water distribution system equitably, and 2) the new sewerage system would focus on those parts of the city containing most of the poorest neighborhoods.

Every household with access to the municipal water connection will benefit from the improved system. More water will be available at increased pressure, including the extremities of the system, making daily consumption more convenient. Increased pressure will rescue the opportunity for introduction of contaminated water into the system and the eventual exposure of residents to water-related disease. Those who are expected to benefit most from the system are the estimated 31,000 residents (4,500 households, 27 percent of the population) who do not now presently have a water house connection. For this group, both the expected increase in water use, and the expected savings in monthly water costs, are the most dramatic, with the exception of the 6,000 Refugee Camp residents who may continue to obtain water free from public standing pipes. Water cost savings will also accrue to connected households which had to supplement their intermittent low pressure water supply with purchased trucked water.

Beneficiaries of the wastewater system in the first phase will include those residents of Irbid who will obtain a new sewerage connection. Those will include 7,500 households, mostly in the low-income areas. They will benefit economically over a longer period of time by not having to construct and/or maintain cesspools. All the residents will also enjoy a more healthy and sanitary environment by having less contaminated water introduced into their water supply system, and by the reduction of illegal dumping of cesspool effluent. It should be noted that while most residents with cesspools will save on the on-going operating costs of their sewage disposal systems, the initial cost may be high (20 percent of the annual income of a household at the poverty level). This may call for the implementation of a low-interest loan system for these households, the category most hard hit is that having incomes of less than JD 1,000, which probably represents a third of the population. Evidence in Amman to date, however, has shown a high level of willingness to pay for these installations, and no problems in this regard are expected in Irbid. For the poorest households, the present water rate and sewerage surcharge structure results in payments for these services of about 3.5 percent of the annual household income. This is an acceptable level. It does, however, indicate

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rates cannot be increased significantly beyond the annual increase in the cost-of-living index before they reach the generally accepted threshold of 5 percent.

The provision of an adequate water supply and sewerage system can be expected to contribute to the improvement of the overall quality of life in the city and to the acceleration of its industrial and commercial growth. Both of these factors will help reduce, and maybe reverse, outmigration to the capital. They will also help to strengthen Irbid's position as a major urban and economic center in Jordan.

Other beneficiaries of the proposed systems will be those people downstream from the present Irbid wastewater run-off areas who will be exposed to less contaminated water. In addition, employment benefits will be realized by those people filling the new jobs required to properly operate the proposed Irbid facilities.

memorandum

DATE: April 22, 1980

REPLY TO
ATTN OF: NE/PD/PDS, Stephen F. Lintner, *SFL*
Bureau Environmental Coordinator

SUBJECT: JORDAN - Irbid Water and Sewerage Project
(278-0233) - Environmental Concerns

TO: AID/Amman, Royal C. Cline,
Environmental Officer

I have reviewed the Environmental Assessment prepared for the subject project by Weston International, Inc., and find that it is technically adequate to fulfill the requirements of 22 CFR 216, "A.I.D. Environmental Procedures."

On the basis of the Environmental Assessment and my personal knowledge of the project area I have prepared a proposed mitigation plan for the project. Incorporation of the mitigation plan into the design of the project will assure final environmental clearance during Washington review of the project paper. It should be noted that environmental concerns need to be addressed in the monitoring and evaluation plan.

1. The inclusion of a covenant to the project agreement providing for establishment of a water quality monitoring program for Wadi Arab and the development of a reporting procedure.
2. The inclusion of a covenant to the project agreement requesting that the Government of Jordan adopt a sewer use ordinance similar in nature to that proposed in Appendix C, "Sample Sewer Use Ordinance City of Irbid", Irbid Municipal Water Distribution, Sewerage, Storm Drainage and Solid Waste Disposal Project - Feasibility Report and Preliminary Engineering Studies. It is important that the sewer use ordinance adequately address the problem of industrial wastes.
3. Construction of water and sewerage systems often results in avoidable construction period problems due to inadequate planning and enforcement of good professional practices.

It is recommended that the construction contracts be written to specifically require adequate attention be given to planning construction to minimize disturbances during the short rainy season and to require the use of good professional practices. This contract provision would be monitored during the implementation phase.



Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

- 2 -

4. Construction of water and sewerage systems often results in avoidable post construction period problems due to inadequate attention to finishing work such as regarding of disturbed areas, repair of streets and clean up of constructional waste and debris.

It is recommended that the contracts be written to specifically require adequate attention be given to post construction site finishing. This contract provision would be monitored during the implementation phase.

5. The final project plan should be reviewed with the Department of Antiquities to assure known sites are avoided to the fullest extent possible. A formal agreement should be reached with the Department of Antiquities as to procedures to be accepted for the notification, examination and salvage of sites (if necessary) should construction encounter archeological sites.

cc: GC/NE, S. Carlson
NE/PD/SJIL, R. Fedel, Project Officer
AID/Amman, J. Cassanos, Sanitary Engineering Advisor
AID/Amman, G. Davidson, Regional Legal Advisor
AID/Amman, J. Shea, Mission Project Officer

NE/PD/PDS/Smintner:js:4/22/80

Life of Project.
 From FY 80 to FY 85
 Total U.S. \$ Funding \$ 23.5 million
 Date Prepared: July 15, 1980

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Project Title & Number: Irbid Water and Sewerage - Project 278-0233

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>A. Program or Sector Goal: The broader objective to which this project contributes:</p> <p>Improved access to safe water supply and wastewater collection and treatment facilities in all major urban areas.</p>	<p>Measures of Goal Achievement</p> <p>Numbers and percentages of urban residents provided with services.</p>	<p>Government of Jordan Records.</p>	<p>Assumptions for achieving goal targets:</p> <p>None - Achievement of project purpose will directly assist in sector goal achievement.</p>

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PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Project Title & Number: Irbid Water and Sewerage - Project 278-0233

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>B. Project Purpose:</p> <p>Improved water and wastewater facilities available to residents of Irbid at affordable rates.</p>	<p>Conditions that will indicate purpose has been achieved: End of Project status.</p> <p>About 95 percent of residents are receiving an increased quantity and improved quality of water.</p> <p>About 50 percent of households and businesses are sewerred.</p> <p>Environmental quality of Irbid region enhanced because of sewage collection and treatment.</p> <p>Irbid water office of WSC a viable entity with fully trained staff.</p>	<p>WSC records</p> <p>Chemical, biological and bacteriological tests.</p>	<p>Assumptions for achieving purpose.</p> <p>Systems completed and operated as designed.</p> <p>Water quality monitoring program for Wafi Arab established and sewer ordinance promulgated.</p>

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PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Project Title & Number: Irbid Water and Sewerage - Project 278-0233

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>C. Outputs:</p> <p>Improved water distribution system.</p> <p>Installed and operating wastewater collection system.</p> <p>Operating sewage treatment plant.</p> <p>Improved administrative capabilities of WSC and Irbid Water Office.</p> <p>Tariff study completed.</p> <p>Training programs established.</p>	<p>Magnitude of Outputs:</p> <p>About 50 km of new water pipe, pressure reducing valves and other valves and about 4500 new service connections. Existing customers recommended.</p> <p>About 113 km of concrete sewer pipe installed, about 7,500 sewer connections. Cess-pools eliminated when households are connected to sewers.</p> <p>Facilities capable of treating effluent from connected population and septage from population not sewered.</p> <p>Irbid Water Office established.</p> <p>Water and Sewerage rates set.</p> <p>All employees of Irbid Water Office have received training.</p>	<p>Construction progress reports.</p> <p>WSC and AID monitoring.</p>	<p>Assumptions for achieving Outputs:</p> <p>Technical design adequate to provide services at desired levels.</p> <p>WSC will supervise project implementation adequately.</p> <p>Progressive rate schedule enables access to system and contributes to cost recovery.</p> <p>WSC will be able to hire and train sufficient skilled people to operate system component correctly.</p>

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PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Project Title & Number: Irbid Water and Sewerage - Project 278-0233

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>D. Inputs:</p> <p>All necessary equipment and materials, construction and engineering services to build and start up anticipated outputs.</p> <p>Technical assistance and training.</p>	<p>Implementation Target (Type and Quantity)</p> <p>Water Disbritution</p> <ul style="list-style-type: none"> Pipes Valves Service Connections Sewers and Pumping Station Treatment Plant Construction Supervision Technical Assistance and training <p>Consulting services to assist WSC improve its administrative capability and prepare rate studies.</p> <p>Short -term technical assistance to set up training programs in Jordan</p> <p>Short-term observation & training of about 10 employees at water and waste water utility in U.S.</p>	<p>Budget and Implementa- tion schedule:</p> <p>(Million Dollars)</p> <ul style="list-style-type: none"> 13.0 (7.4) (0.6) 12.7 8.7 2.0 <u>0.6</u> 37.0 million <p>Bid document issued 12/80</p> <p>Contract awarded 5/81</p> <p>Construction completed 8/84</p>	<p><u>Assumptions for Providing inputs:</u></p> <p>All AID and GOJ funds made available in full on a timely basis.</p> <p>(Million Dollars)</p> <p>AID - 23.5</p> <p>GOJ - <u>13.5</u> 37.0</p>

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5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual fund sources: Development Assistance (with a subcategory for criteria applicable only to loans); and Economic Support Fund.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? IDENTIFY. HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT1. FY 79 App. Act Unnumbered; FAA Sec. 653(b); Sec. 634A.

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure)?

a) Notification will be accomplished by submission of an Advice of Program Change to the Congress.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of assistance?

a) Yes

b) Yes

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

No further legislative action is required.

4. FAA Sec. 611(b); FY 79 App. Act Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per the Principles and Standards for Planning Water and Related Land Resources dated October 25, 1973?

Yes

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5. FAA Sec. 611(a). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?
- You. Certification included among Annexes of Project Paper
6. FAA Sec. 209. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.
- Project is not so susceptible Assistance will not encourage regional development programs
7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.
- Project will encourage efforts under (b) as the project will be built by the private sector under competitive bidding. Project will assure some increase in the flow of international trade as various engineering services and possibly commodities of U.S. origin will be procured.
8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).
- U.S. private enterprise is expected to furnish virtually all of the engineering services performed under the project as well as a major portion of the equipment required for the project.
9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.
- The Loan Agreement will so provide.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release? Jordan is not an excess currency country.
11. FAA Sec. 601(a). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes.
12. FY 79 App. Act Sec. 608. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity? N/A

B. FUNDING CRITERIA FOR PROJECT

1. Project Criteria Solely for Economic Support Fund

a. FAA Sec. 531(a). Will this assistance support promote economic or political stability? To the extent possible, does it reflect the policy directions of section 102?

The project will promote the economic and political stability of Jordan by contributing to fulfilment of country's five year development plan.

b. FAA Sec. 533. Will assistance under this chapter be used for military, or paramilitary activities?

No.

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
AMERICAN EMBASSY
AMMAN - JORDAN

وكالة الولايات المتحدة للانماء الدولي
السفارة الاميركية
عمان - الاردن
==

OFFICE OF THE DIRECTOR

مكتب المدير

CERTIFICATION PURSUANT TO SECTION 611(e)
OF THE FOREIGN ASSISTANCE ACT OF 1961
AS AMENDED

I, Edgar C. Harrell, the principal officer of the Agency for International Development in Jordan, having taken into account, among other things, the maintenance and utilization of projects in Jordan previously financed or assisted by the United States, do hereby certify that in my judgment Jordan has both the financial capability and the human resources capability to effectively maintain and utilize the capital assistance project, Irbid Water and Sewerage.

July 21, 1952
Date

Edgar C. Harrell
Edgar C. Harrell
Director, USAID/Jordan

PROGRESS ON SPECIAL COVENANTS IN PRIOR LOANS

A. Amman Water and Sewerage - Loan 278-K-023

There are eight special covenants in the loan agreement signed in August 1978. In the amendment to the agreement signed in September 1979, three of the special covenants were amended. The status of compliance with the commitments of each covenant is as follows:

Section 6.1. Project Evaluation. Scheduled for December 1982.

Section 6.2. Water Monitoring System. The Government had reached an agreement in principle with the British Ministry of Overseas Development for a British firm to undertake a study of the Zarqa River Basin, from which a water monitoring system would be established; but that source of financing is no longer available. The Government has asked for USAID financing. A specialist from the USGS will review the scope of work for USAID in July 1980. In addition, a detailed review of industrial pollution from industries in Zarqa and Ruseifa has been completed by the AID-financed consultant studying wastewater collection and treatment at Zarqa and Ruseifa. A copy of its report is on file at NE/PD.

Section 6.3. Sludge Disposal. The problem is being addressed in two studies. A British consultant on solid waste disposal (see covenant in Section 6.7.) has considered the option of composting sewage sludge with solid wastes. The problem of sludge disposal is also being considered as part of the Greater Amman Wastewater Study (see covenant in Section 6.4.).

Section 6.4. Increased Sewage Treatment. The AID-financed Greater Amman Wastewater Study, now under way, will provide, within six months, a plan for expanding the treatment of the increased quantity of piped sewage that will result from the project.

Section 6.5. Access of Lower Income Families. AWSA is allowing poorer families, on a case-by-case basis, to pay sewer connection charges on the installment plan. A survey by USAID and AWSA of two areas of Amman has shown that, within four months after notification, 92.1 percent of the residents of Al-Nuzha, a low-income area, had connected to the sewers and that only 78.6 percent of the residents of Shmeisani, a high-income area, had connected. During the following four months these percentages rose to 90.0 percent and 95.4 percent, respectively. None of the residents had asked to pay connection charges by installment. The survey concluded that the problem of sewer connections is not as critical as anticipated at the time of project approval.

Section 6.6. Sufficient Water. Plans by JVA for supplying water to AWSA from the East Ghor Main Canal are nearing completion. JVA, AWSA and USAID have had several meetings on the subject. JVA has asked its AID-financed consultant to determine the best method of supplying water to AWSA's distribution system from JVA's terminal reservoir.

Section 6.7. Solid Waste Disposal. A study of solid waste disposal in the Greater Amman area has been completed by a British consultant. The Government is considering the consultant's recommendations.

Section 6.8. Water Rates. AWSA asked AID to finance the services of a financial advisor to help it improve its fiscal management and to provide the information on which to base water rates. AWSA has selected the advisor and expects to sign a contract with him in July 1980.

B. Aqaba Wastewater Project - Loan 278-K-026

Progress toward compliance with the commitments in six special covenants in the loan agreement is as follows:

Section 6.1. Evaluation. Scheduled for August 1982.

Section 6.2. Water and Wastewater User Charges. The Government expects to have developed a preliminary schedule of water and wastewater tariffs by the time construction of the systems is completed.

Section 6.3. Staffing and Training. The WSC has hired senior staff to work on construction supervision with the consultant. Additional staff will be recruited to fill other positions. Aqaba's training plan will be dependent on the National Training Program, which is just beginning to be implemented. The Implementation Schedule in the Project Paper shows training programs starting in May 1981.

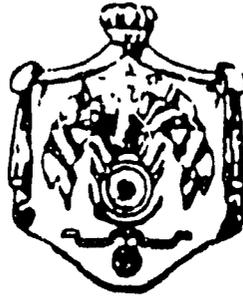
Section 6.4. Effluent Irrigation System. The effluent irrigation system described in the Project Paper will not be constructed since the method of treatment has been changed to waste stabilization lagoons. It is expected that the revised project will propose a simpler effluent irrigation system with no significant health or other hazards to Aqaba's inhabitants.

Section 6.5. Qa Disi Water Supply and Distribution Project. Construction of the water project is on schedule. It is expected to be completed early in 1981.

Section 6.6. Sufficient borrower Financial Support. Since construction has not yet started, it is too early to judge the Borrower's performance on this covenant. There is no reason to doubt that, to the extent not available from revenues, the Borrower will make available, from its own resources, sufficient funds to allow WSC to meet the operating capital needs and to carry out necessary extensions and improvements of the wastewater system on a continuing basis.

THE HASHEMITE KINGDOM
OF JORDAN
NATIONAL PLANNING COUNCIL
AMMAN

Tel. 44466 - 44470
P. O. B. 555
Teleg. NPC - Amman



المملكة الأردنية الهاشمية
الجلس القومي للتخطيط
عمان
الهاتف : ٤٤٤٦٦ - ٤٤٤٧٠
ص.ب ٥٥٥

No. 120/23/2486
Date 19/5/1980
Ref.

الرقم
التاريخ
الموافق

Dr. Edgar Harrell
Director
USAID/J
American Embassy
Amman

Subject: Irbid's Water and Sewerage Project

Dear Dr. Harrell,

Reference is made to your letter dated May 10, 1980 and attached list of talking points and project description concerning issues related to Irbid Water and Sewerage Project.

Please find below our response to your questions:

1. Component of Project to be financed by AID

We concur with your proposal to finance the following components:

- One Train of Wastewater Treatment Plant, WW 1
- Sanitary Project, SAN 1 (Interceptor A)
- Part of Sanitary Project, SAN 2 (Interceptor B)
- Sanitary Project, SAN 6
- 3 Water Projects, WAT 1, 2, 3

The total estimated cost of the above is \$ 32,200,000, with AID financing \$ 23,000,000 and the balance by the Government of Jordan.

Please be advised that WSC is requesting tenders to construct a 14" line from Haufa to Irbid. This line is expected to be commissioned by the first quarter of 1981.

2. Cost Estimates

The cost of waste water collection and treatment system as well as the solid waste are realistic, while the cost estimate of the water network and storm drainage system seems high. We have asked the Consultant to review and provide detailed back-up data.

3. Water and Sewerage Charges and Tariff

The subject of charges and tariff is under active consideration.

4. Loans and Grants

The grants will be passed on to Irbid as grants and the loans as loans with 6% interest. All loans will have grace period ranging from 3-4 years.

5. Cost Recovery of Investments

We envisage the Project to be economically viable, and all investment, operation, maintenance cost and interest are recoverable from its proceeds.

6 & 7. Institutional Organization during Implementation and Operation

WSC will implement and operate the Project in a similar manner to Aqaba Water and Sewerage Project. This will not require any legislative action because WSC charter gives it the right to implement and operate all water and sewerage related projects in Jordan, with the exception of Amman. Details of implementing unit with qualifications will be transmitted to you before construction proceeds.

8. Debts and Assets of Irbid's Municipal Water Department

All debts and assets will revert to WSC.

9. Camp

Since the camp is part of the city, it will be treated as such but the actual construction will be deferred.

10. Training Program

NPC is in the process of preparing a working paper on this subject for discussion with all the concerned authorities.

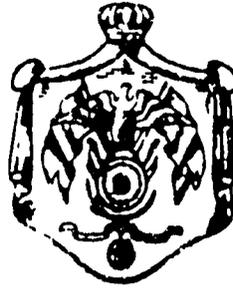
Sincerely yours,

President

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

THE HASHEMITE KINGDOM
OF JORDAN
NATIONAL PLANNING COUNCIL

AMMAN
Tel. 44466 - 44470
P. O. B. 555
Teleg. NPC - Amman



المملكة الأردنية الهاشمية
المجلس القومي للتخطيط

عمان

الهاتف : ٤٤٤٦٦ - ٤٤٤٧٠

ص.ب ٥٥٥

No.

128/23 / 3675

Date

27/7/1980

Ref.

الرقم

التاريخ

الموافق

Dr. Edgar Harrell,
Director,
USAID/J.,
Amman - Jordan

Subject: Irbid Water & Sewerage Project

Dear Dr. Harrell,

Reference is made to previous discussions concerning the financing of Irbid Water & Sewerage Project.

You are kindly requested to allocate the sum of (\$23.5M) Twenty Three million and five hundred thousand Dollar for participation in the financing of the said Project under the U.S. AID Economic Cooperation Programme to Jordan.

Yours sincerely


President

cc: Tech. & Eco. Cop. Dept.

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
 AGENCY FOR INTERNATIONAL DEVELOPMENT
 WASHINGTON D C 20523



THE ADMINISTRATOR

PROJECT AUTHORIZATION

Name of Country: Hashemite Kingdom of Jordan

Name of Project: Irbid Water and Sewerage

Number of Project: 278-0233

Number of Loan: 278-K-028

1. Pursuant to Section 532 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Irbid Water and Sewerage Project for the Hashemite Kingdom of Jordan ("Jordan") involving planned obligations of not to exceed \$21,000,000 in loan funds and \$2,500,000 in grant funds over a one-year period from the date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the Project.
2. The Project consists of improving the water distribution system and providing sewage collection and treatment facilities in the city of Irbid, Jordan (the "Project").
3. The Project Agreement(s) which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:
 - a. Interest Rate and Terms of Repayment

Jordan shall repay the Loan to A.I.D. in United States Dollars within forty (40) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. Jordan shall pay to A.I.D. in United States Dollars interest from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

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b. Source and Origin of Goods and Service

Goods and services, except for ocean shipping, financed by A.I.D. under the Project shall have their source and origin in the United States, Jordan and in countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States or Jordan.

c. Conditions Precedent

Prior to any disbursement, or to the issuance of any commitment documents under the Project Agreement, Jordan shall furnish in form and substance satisfactory to A.I.D.:

(1) a copy of an executed and delivered Reloan Agreement between Jordan and the Water Supply Corporation (WSC) by which Jordan agrees to make available to WSC the proceeds of the Grant and Loan for the Project; and

(2) an executed contract for supervision of construction services and start up of the facilities.

d. Jordan Shall Covenant:

(1) to undertake appropriate activities relating to the organization, staffing and training of the entity responsible for the construction and operation of the Project to be met by specified dates; and

(2) to undertake or cause to be undertaken, the establishment of a system of rates, fees, taxes and charges designed to generate sufficient revenues to cover all costs of operating and maintaining the Irbid Water and Sewerage System, including the amortization of all debts contracted to construct, expand or modify such system; and to undertake in consultation with A.I.D., to perform studies necessary for the establishment of tariffs which would reflect the ability of different groups of consumers to pay for water and sewerage services and to establish such tariffs.

Douglas J. Bennet, Jr.

Date

AUG. 14, 1980

Clearances:

A-AA/NE: Alfred D. White	<u>AWA</u>	Date: <u>8/8/80</u>
GC: Norman L. Holmes	<u>NLH</u>	Date: <u>8/11/80</u>
AA/PPC: Alexander Shakow	<u>AS</u>	Date: <u>8/13/80</u>
NE/PD: Selig A. Taubenblatt	<u>ST</u>	Date: <u>8/17/80</u>
NE/JLS: Blaine C. Richardson	<u>BCR</u>	Date: <u>8/17/80</u>
GC/NE: John E. Mullen	<u>JEM</u>	Date: <u>8/17/80</u>
NE/DP: Bradshaw Langmaid	<u>BL</u>	Date: <u>8/17/80</u>

Drafter: GC/NE:SECarlson:paj:8/7/80:X28826

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