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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

JORDAN - ZARQA TRIANGLE IRRIGATION PROJECT

AID-DLC/P-2048

UNCLASSIFIED

June 12, 1974

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

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AID-DLC/P-2048

June 12, 1974

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Jordan Zarqa Triangle Irrigation Project

Attached for your review are recommendations for authorization of a loan to the Government of the Hashemite Kingdom of Jordan ("Borrower") in an amount not to exceed four million five hundred thousand dollars (\$4,500,000) to assist in financing certain foreign exchange and local currency costs of goods and services for the construction of the Zarqa Triangle Irrigation Project.

No meeting is scheduled for this loan proposal. However, please advise us of your concurrence or objection as early as possible, but in no event later than close of business on Tuesday, June 18, 1974. If you are a voting member a poll sheet has been enclosed for your response.

Development Loan Committee
Office of Development
Program Review

ATTACHMENTS:

Summary and Recommendations
Project Analysis
ANNEXES I - VI

UNCLASSIFIED

June 12, 1974

HASHEMITE KINGDOM OF JORDANZARQA TRIANGLE IRRIGATION PROJECTPart I - SUMMARY AND RECOMMENDATIONS

1. Borrower: The Borrower will be the Hashemite Kingdom of Jordan (GOJ) acting through the Jordan Valley Commission (JVC). The Natural Resources Authority (NRA) will execute the program as directed by the JVC.
2. Loan: a) Amount: Not to exceed four million five hundred thousand dollars (US \$ 4,500,000).
b) Terms: Repayable in 40 years, including a grace period of 10 years at an annual interest rate of two percent (2%) during the grace period and three percent (3%) thereafter.
3. Total Project Cost: The estimated cost of the project is \$6.0 million of which \$4.5 million will be from loan funds and \$1.5 Million will be from the GOJ. On the assumption the successful bidder will be either from the US or an other eligible third country, the following division between foreign exchange and local currency expenditures is projected. 1/

(US Dollars 000)

<u>Funds</u>	<u>Foreign Exchange</u>	<u>Local Currency</u>	<u>Total Cost</u>
AID	\$ 4,000	\$ 500	\$ 4,500
GOJ		1,500	1,500
	<u>\$ 4,000</u>	<u>\$ 2,000</u>	<u>\$ 6,000</u>

4. Project Description: The proposed loan will assist the GOJ in its program to increase the utilization of farm land in the project area by the installation of sprinklers to replace the existing gravity flow canal system. About 3,718 acres of land will be irrigated by sprinklers as a result of this project. Annex II, Exhibit 1 is a map of the Jordan Valley indicating not only the Zarqa Triangle Project area but the location of the previously AID financed East Ghor Canal (project 278-12-120-086), the GOJ financed 8 kilometer extension of the East Ghor Canal, the Kuwait Fund financed King Talal Dam and the recently AID loan funded 18 kilometer extension of the East Ghor Canal (Loan 278-H-009). As shown on the map, the Zarqa Triangle project area consists of two distinct locations, with the larger section of 2,753 acres adjacent to and to the east of the existing East Ghor Canal and the smaller section of 965 acres downstream from Canal near the confluence of the Zarqa and Jordan Rivers. A diversion weir, see map, will be built on the Zarqa to permit the gravity flow of water to the areas on either side of the Zarqa River above the Canal and a pipeline will be installed from the East Ghor Canal to the smaller area near the Jordan River.

1/ The exchange rate used throughout this paper is one Jordanian Dinar (JD) equals US \$3.09. (324 fils equals one US Dollar)

There will be 29.6 kilometers of primary transmission pipeline leading to the 31.2 kilometers of secondary pipeline which will deliver water to the estimated 376 farms which will benefit from the project. A spacing of 12 meters by 12 meters was selected for the sprinkler layout on the individual farms based on a standard size for farm units of 180 meters by 216 meters.

Engineering design and supervision of the construction project, to be funded by the GOJ, will be accomplished by the joint venture of Dah-Al-Handasah and Netherlands Engineering Company.

The implementation of the project will be the responsibility of the Natural Resources Authority. Implementation of the project will consist of the redistribution of farmland in the project area, as provided in Law No. 12, and the actual construction phase. Subsequent to completion of the project, the Authority will operate and maintain the system up to and including the meter at the individual farm. Authority personnel will be trained, under AID grant funded participant training and by other international lenders in the operation and maintenance of a sprinkler system. Farmers will be instructed in the operation and maintenance of their individual systems by Authority and Ministry of Agriculture personnel at the Deir Alla Agriculture Station located in the project area.

5. Project Purpose and Justification: The purpose of the total Valley irrigation program, and this project, is the upgrading of irrigation facilities in the Jordan Valley to take maximum advantage of the Valley's unique soil and climate conditions which offer the opportunity for off-season production of high value fruits and vegetables. Because of its topography, the Valley is best described as a natural hot house which lacks only the necessary irrigation to permit Jordan to capitalize on its location to produce high value produce for the European and Gulf States markets during the off season. The second compelling rationale to maximizing the agricultural production in the Valley is the need to meet Jordan's indigenous food requirements thereby reducing the present heavy import of foodstuffs.

Development of the Jordan Valley is not limited to the agricultural sector. Several other donors, notably A.I.D., the United Kingdom, Kuwait, Federal Republic of West Germany and the World Bank, have or are in the process of providing grants and loans for improvements in the Valley's communications, highways, electric power, housing and educational facilities. About \$70 million has been committed to this effort by these organizations and the GOJ. An additional \$25 million is expected to be made available from the above sources during the next two years to permit attainment of the GOJ's plan for the Valley.

6. Other Sources of Financing: The Export-Import Bank indicated no interest in the proposed financing of the project in their letter of April 15, 1974. As a result of discussions between AID and the World Bank in August 1973 it was agreed that AID would fund this project.

7. Mission Views: The Mission endorses the proposed loan. Attached as Annex 1 is the Foreign Assistance Act, Section 611(c) determination.
8. Statutory Checklist: All statutory criteria have been met. (See Annex 111, Statutory Checklist for details).
9. Issues: None.
10. Loan Administration: The applicable Capital Project Guidelines will be adhered to in all implementing actions.
11. Recommendations: On the basis of the conclusion of the Capital Assistance Committee that the project is technically, economically and financially sound, it is recommended that a loan be authorized to the Hashemite Kingdom of Jordan for an amount not to exceed four million, five hundred thousand (US \$4,500,000) subject to the following terms and conditions:

A. Interest and Terms of Payment

Borrower shall repay the loan to AID in United States dollars within forty years (40) from the first disbursement under the loan, including a grace period of not to exceed ten (10) years. Borrower shall pay to AID in United States Dollars on the disbursed balance of the loan interest of two (2) percent per annum during the grace period and three (3) percent per annum thereafter.

B. Other Terms and Conditions

1. Goods and services financed under the loan shall have their source and origin in A.I.D. Geographic Code 941 countries plus Jordan.

2. The loan agreement shall provide that prior to the first disbursement under the loan, Borrower shall submit, or cause to be submitted, the following in form and substance satisfactory to A.I.D.:

- (a) An Agreement executed by the Jordan Valley Commission and the Natural Resources Authority setting forth the precise duties, relationships, and responsibilities of each party in the execution of the Project;
- (b) Evidence that the provisions of Law No. 12 for the Year 1968, or a substantially similar law, apply to the area to be irrigated by the Zarqa Triangle Irrigation Project;
- (c) A definitive construction schedule for the Project, established by the Jordan Valley Commission, that is coordinated with the construction schedule of the Yarmouk - Dead Sea Road Project so that the irrigation pipes for the Zarqa Triangle Irrigation Project are installed under the highway prior to road construction in the relevant areas;

(d) Evidence that the Borrower has obtained all rights of way necessary for temporary detours and permanent construction of transmission lines and farm access roads beside the water distribution system.

(e) Such other conditions as A.I.D. may deem advisable.

3. The loan agreement shall contain the following special covenants by Borrower:

- (a) United States dollars utilized under the loan to finance local currency costs shall be made available to the Borrower or its designee through appropriate procedures.
- (b) Borrower shall maintain the Project and shall make adequate provision in its annual budget for that purpose. Such amount shall be in addition to those amounts Borrower provides in its budget annually for the maintenance and upkeep of other irrigation facilities in Jordan.
- (c) The Government of Jordan will finance at least 25 percent of the costs of the Project.

4. The loan agreement shall include such other terms and conditions as A.I.D. may deem advisable.

PART II - PROJECT

SECTION 1 Setting and Justification

A. Existing Irrigation Development

The existing East Ghor system consists of the following physical features:

1. An intake works on the Yarmouk River for diversion of water into the East Ghor Canal.
2. A 10 foot (3m) diameter tunnel, approximately 0.6 mile (1 km) in length, to carry the flow diverted from the Yarmouk to the Jordan River Valley.
3. East Ghor Canal, concrete-lined, capacity at intake approximately 706 cfs (20 cms) 48 miles (78 km) in length. Of this length 5 miles (8 km) has been completed in recent years.
4. Waki Ziglab Reservoir, capacity 1875 ac. ft. (2.3 mcm).
5. Waki Shueib Reservoir, capacity 1875 ac. ft. (2.3 mcm).
6. Waki Kafrein Reservoir, capacity 3490 ac.ft. (4.3 mcm).
7. Laterals and distribution systems which presently serve an area of approximately 30,700 acres (124,400 dunums).

B. Irrigation Work Currently Under Construction

Irrigation development work currently under construction or in the bidding stage is as follows:

1. King Talal Dam - This dam, which was designed by ENERGOPROJEKT and is currently under construction by a Yugoslavian contractor is located on the Zarqa River approximately 10.5 miles (17 km) upstream from the point where the river is crossed by the East Ghor Canal. The estimated cost of this structure is \$27.4 million.

While the dam is a key feature in the Zarqa Triangle Project, it is not being financed by the proceeds of A.I.D. loan. Financing is being provided jointly by the Governments of Jordan and Kuwait.

The dam will have the following characteristics:

<u>Item</u>	<u>Size</u>
Height	303 ft. (92.5 m)
Crest length	1278 ft. (390 m)
Spillway capacity	104,000 cfs. (2,950 cms)
Freeboard	6.5 ft. (2 m)
Storage capacity	32,400 ac.ft. (40 mcm)

2. Extension of East Ghor Canal - This work, which is currently at the bidding stage and is being financed by A.I.D. loan 278-H-009, is comprised of the following elements:

- a) Eleven mile (18 km) extension of existing concrete lined East Ghor Canal.
- b) Diversion structure and carrier canal to deliver water from the Zarqa River to the East Ghor Canal system.
- c) Sprinkler irrigation system for the irrigation of 8,650 acres (35,000 dunums) of new farmland.
- d) Land levelling of 3,210 acres (13,000 dunums) of new land adjacent to the recently completed 5 mile (8 km) extension to the East Ghor Main Canal.

C. The Zarqa Triangle Project

The new irrigation development to be financed under the terms of this loan is briefly described as follows:

1. Diversion structure on Zarqa River to deliver water to the Zarqa North and South main supply lines.
2. Zarqa Project North - 2,630 acres of sprinkler irrigation located north of the Zarqa River, adjacent to and above, the existing East Ghor Canal.
3. Zarqa Project South - 123 acres of sprinkler irrigation located south of the Zarqa River, adjacent to and above, the existing East Ghor Canal. This land is situated in three pockets formed by loops in the river course and is bounded by the hills on the south. This portion of the project will receive its water supply by an extension of the pipeline which serves the north project.
4. Zarqa Zor - 965 acres of sprinkler irrigation located between the Zarqa River and the Jordan River in the incised gorge. This area will receive its water from a pipeline which will be fed by the existing East Ghor Canal. The take-off for the pipeline will be located approximately 1 km north of the village of Muthallath El Arda.

Since the project utilizes sprinkler irrigation throughout, only very minor land levelling operations will be required, i.e., the filling of small local depressions and the levelling of isolated high spots. No pumping plants will be required since there will be sufficient head for gravity operation and night storage reservoirs will not be necessary.

5. Diversion Weir - The diversion weir will be constructed at a point on the Zarqa River approximately 6.5 km upstream from the siphon which carries the East Ghor Canal under the Zarqa River. This is about 3 km upstream from the intake of the Zarqa Carrier Canal which will convey water which has been stored in King Talal Reservoir to the East Ghor Canal. The height of the weir will be such as to provide a minimum water level of -135m. to maintain a gravity head of 3 atmospheres (44 psi) in the main supply line which is sufficient to operate sprinklers in the entire project area.

6. Main Supply Lines - The main supply line for the north area will have a length of 18.3 km. The diameter will vary from 800 mm at the diversion weir to 400 mm at the tail end. It will have a maximum capacity of 700 l/sec. The main supply line for the south area will begin as a branch off of the north main at station 4+000. It will have a length of approximately 3.3 km and its diameter will vary from 400 mm to 175 mm. Its carrying capacity will be 56 l/sec. The Zarqa Zor area will obtain its supply from the existing East Ghor Canal by means of 400 mm. pipeline approximately 8 km. in length. It will have a carrying capacity of 254 l/sec.

7. Secondary Pipelines - The total length of secondary pipelines for the north area is 21.3 km. and the number of farms to be served is 265. The length of secondary pipelines for the south area is 1.4 km and the number of farms to be served is 14. The length of secondary pipelines for the Zor area is 8.5 km and the length of submains is 2.8 km. The number of farms to be served is 97.

8. System Layout - The layout of the sprinkler irrigation system was based on farms ranging in size from 30 to 50 dunums. The standard size selected was 180 m x 216 m giving an area of 38.85 dunums. These dimensions allow farms at the end of head-gate units to vary in size so that they are not larger than 50 or smaller than 30 dunums.

Farms were laid out so that the longer dimension (216 m.) was parallel, as much as possible, to the contours and the shorter one (180 m) perpendicular to them. Designing "flyline" sprinkler laterals along the 180 m. dimension contributes to a reduction in their size.

The layout also incorporates a system of farm access roads alongside the water distribution system. The right-of-way consists of 8 m. and includes a 3 m. gravel service road with 1.25 m. shoulders and a 2.5 m. strip for buried pipelines, turnouts and water meters.

A spacing of 12 m. x 12 m. between sprinklers has been selected for use on this project and is believed to be reasonable. This spacing enables a

a 40 dunum farm to be irrigated in 6 days with 18 moves of the sprinkling equipment (assuming 8 hour settings, 3 moves per day).

D. Background of the Project

1. History

A minimal canal irrigation system has existed in the project area since the 1950's. During the 1950's to mid 1960's some 1,000 acres of land were irrigated from the unregulated flows of the Zarqa River. The extent of the area irrigated by the unregulated flow gradually increased to the point in 1972 where virtually all the land area to be sprinkler irrigated under this project received at least some benefit from the Zarqa River's unregulated flow. With the decision to build the King Talal Dam, which eventually will permit virtually year round irrigation, and the decision to greatly increase the area in the Valley under irrigation, it became necessary to determine the optimum water distribution method in view of the tremendous increase in total water requirements. The ensuing analysis pointed to the use of sprinklers as the most feasible method of delivering water. Accordingly the GOJ has embarked on a program of installation of sprinklers throughout the Valley. The first use of the sprinkler system will be under the East Ghor Canal Extension Project (Loan 278-H-009).

A.I.D.'s involvement in the project stemmed initially from the agreement reached in November 1972 among the GOJ, World Bank, A.I.D. and Germans that the three major lenders concentrate their activities in discrete geographical sectors of the Valley. Accordingly it was agreed the World Bank would finance development of the northern third of the Valley, A.I.D. the middle and the West Germans the lower third. It was on the basis of this agreement that A.I.D. participated in the East Ghor Canal Extension Project (Loan 009) and now plans to assist in the development of the Zarqa Triangle Project. In October of 1973, USAID and AID/Washington personnel began the intensive review of this project which led to an application in May 1974 by the GOJ for a development loan of \$4.5 million.

2. Evaluation of Previous A.I.D. Assistance

A.I.D.'s previous involvement in irrigation activities in the Valley (other than the current East Ghor Canal Extension Project - Loan 009) was a grant funded project for the construction of the backbone canal system which now exists in the Valley. This project financed the diversion tunnel on the Yarmouk, a 69 kilometers concrete lined canal, some 398 kilometers of lateral canals, a small storage dam on the Wadi Ziglab and a primary drainage system to dispose of surface runoff. The project also aimed at securing passage of legislation to provide the necessary organization to operate the project and to initiate

land redistribution in the Valley. The project began in 1958 and terminated in 1967. U.S. funds of \$12,018,837 and \$9,000,000 equivalent in GOJ funds were expended in the effort. In 1970, the Mission conducted an evaluation of the project. The study concluded the project "has been very instrumental in reorganizing completely the project area's economy. Land holding patterns were changed, a large number of subsidiary projects were completed including dams on the side wadis, farm to market roads". This report is the subject of TOAID A-11 of January 29, 1971.

Under a later grant project (1960-68) AID provided a wide range of engineering services to the Natural Resources Authority and its predecessor agencies. One of the major elements of the project was participant training. Of the 34 individuals trained, 28 are currently employed by the Natural Resources Authority, including the head of the Department of Irrigation. A review and analysis of this project is contained in TOAID/A-159 of July 10, 1970.

Both of the above projects were judged to have been successful. No adverse audit report comments were noted. Prior AID funded highway projects were discussed in the Yarmouk-Dead Sea Road Loan Paper. Again there were no adverse criticisms found as to project implementation.

3. Reviews and Recommendations of A.I.D. Mission

USAID and A.I.D./Washington TDY personnel conducted a series of preliminary reviews and on-site examinations in evaluating the project. These reviews have included, at times, the President and staff members of the Jordan Valley Commission, and the Director General and the Head of the Department of Irrigation of the Natural Resources Authority and staff members of these organizations who have been directly responsible for the formulation of the project. The project has been modified from the original proposal of the JVC by the inclusion of financing for Zarqa Zor (965 acres) and maintenance equipment for the system. The AID Mission is satisfied that the project as now presented is technically, economically and financially sound.

Under previous construction contracts AID agreed to lower the percentage requirements for performance and payments bonds from the amounts recommended in the MO 1442.2. It is intended to follow this precedent and to establish the amounts at 20 per cent for both payment and performance bonds.

4. Opinion of Other Institutions - As a result of the Agreement reached in November 1972 concerning the geographic division of emphasis noted in paragraph D(1) above and subsequent consultations with the World Bank in August, 1973 as to the respective roles of A.I.D. and the Bank in the financing of development projects in the Jordan Valley, it was agreed that A.I.D. would fund the Zarqa Triangle Project.

The Export-Import Bank was queried by A.I.D. as to its interest in participating in this project. A reply of no interest was received in a letter dated April 15, 1974.

5. Environmental Effects

The environmental analysis (See Annex IV) was performed by a team of consultants from the Department of Civil Engineering of the University of Maryland. This work, financed by an AID grant, was made in compliance with AID Manual Circulars 1214.1 and 1221.2.

The analysis concluded that the net social and economic impact of the project will be positive. A summary of findings is as follows:

- a) Climatic modifications - very small and almost negligible effects.
- b) Incidence of insects, plant diseases and new diseases to man - an unknown quantity; however, the use of insecticides and pesticides and proper monitoring by the Ministries of Agriculture and Health should minimize these effects.
- c) Changes in water table and soil salinity - this will require careful supervision and monitoring in order to reduce severe impacts.
- d) Changes in economic and social structure of the area - as a result of the project the standard of living and the economic base are expected to increase substantially.

E. Project Justification

1. Introduction

Jordan depends primarily on agricultural commodities and services which provide, with the help of foreign aid, a per capita income of about \$291 per year. The country's dry climate and rocky terrain severely limit the areas of agricultural production and the small industrial sector accounts for only 11 percent of the Gross National Product.

Prior to the 1967 war with Israel, Jordan achieved an economic growth rate of nearly 10 percent per year with the help of developmental assistance from the United States and others. The war and its aftermath of disruptive Palestinian guerrilla activity reversed this growth as internal insecurity made effective developmental programs impossible and brought a reduction in external developmental aid.

The Jordanian Government challenged the guerrillas in 1970 and defeated them in the ensuing civil war. With restored internal security, the Jordanians turned again to the pressing need for economic growth and asked the United States in 1971 to resume developmental assistance as well as budgetary support. In order to maintain the political stability needed for Jordan to continue its moderate and pro-Western approach to international issues, including the Arab-Israeli conflict, the United States renewed budgetary support in FY 1972. However, the United States advised the Jordanians at that time that it could not consider further development aid until the country rebuilt its planning capacity and adopted a nation-wide development strategy so that individual projects could be reviewed within an overall context.

Heeding US advice, Jordan began, in late 1971, to prepare a national development plan. The Jordanians completed the plan in September 1972 and presented it to a conference of possible assistance donors in November, 1972. AID reviewed the plan carefully and found it to be a sound and reasonable framework for Jordan's development efforts over the next few years. Other participants at the Conference, which are noted below, were impressed with the plan and subsequently recommended specific programs for development assistance to Jordan in support of the plan.

The "Rehabilitation and Development Plan of the Jordan Valley" provides not only for future development (1973-75) but also the rehabilitation of the Jordan Valley to levels of development which existed prior to 1967. The Plan is comprised of a series of integrated projects dedicated to the eradication of poverty and the enhancing of dignity and prosperity to the profession of farming. While the availability of land and water resources makes the Valley an ideal ground for development and settlement of farming communities, the difficult terrain and consequential heavy development cost permits only marginal activity by private enterprise. Therefore, the Government, acting through the Jordan Valley Commission, has undertaken the responsibility for the conservation of water resources, the distribution of these resources, land preparation and the financing of equipment and social and public infrastructure.

The Rehabilitation Plan calls for investments of some \$95 million during the period 1973-75. It is probable that it will require at least five years to carryout the program. A total of \$52 million in external assistance has either been committed or proposed in support of the program from the Kuwait Fund for Arab Development, UNDP, Federal Republic of West Germany, the United Kingdom and AID. The GOJ has either committed or proposed expenditures in support of this external assistance of \$16.5 million or 25 percent of the total cost of all projects. The unfinanced, or uncommitted balance is approximately 26 million. The GOJ is expected to maintain the current ratio in support of project costs, i.e. about 25 percent.

External + GOJ Commitments and
Proposed Financing (US \$000)
Total

Sector	Total \$	External Committed \$	External Proposed \$	GOJ Committed \$	Balance \$
Irrigation	48,489	24,900	9,687	12,300	1,602
Agriculture	8,913	3,390	4,149	900	474
Social & Public Infrastructure	37,035	999	8,522	3,300	24,214
	<u>94,437</u>	<u>29,289</u>	<u>22,358</u>	<u>16,500</u>	<u>26,290</u>

For a fuller examination of the financial commitments and the projects being financed by the external donors the reader is referred to the FY 1975 Budget Submission for Jordan.

2. Place of Project in Country Program

The FY 1974 Budget Submission presented a thorough discussion and analysis on the rationale for concentrating the use of AID's development oriented resources within the Jordan Valley. This presentation summarized our previous assistance in the Valley, the deleterious effects of the 1967 war and 1970 Fedayeen action and the combined A.I.D. and GOJ planning efforts that resulted in the Rehabilitation and Development Plan for the Jordan Valley. In essence, the Submission links economic growth and A.I.D.'s overall policy objectives.

3. Impact on the US Economy

We anticipate that 40-50 percent of the loan's proceeds will be expended for goods and services of US source and origin only if a US contractor is selected to perform the work. The employment of a Jordanian or third country contractor could reduce procurement from US sources to about 30-35 percent. The engineering services, to be financed by the GOJ, will be provided by a non-US joint venture consulting engineering firm.

4. A.I.D. Representative's Certificate

A copy of the AID Representative's Certificate attesting to the satisfactory performance by the Borrower with respect to previous A.I.D. loans and the Borrower's capability of implementing the loan proposed herein is contained in Annex I.

5. Economic Analysis

Jordan has no known coal reserves, limited existing mineral deposits and agricultural potential on only about ten percent of its land area. Industrial and agricultural production run a poor second to services in the value of Gross Domestic Product (GDP). Consequently, the cost of maintaining a high level of services and financial stability falls primarily on foreign aid donors.

War in 1967 reversed an otherwise favorable economic situation. Jordan lost control over the West Bank including 6 percent of the country's territory and 29 percent of its population. Economic losses were more severe: 35-50 percent of GDP, one-third of government revenues, three-quarters of Jordan's tourist earnings, and a portion of remittances from Jordanians abroad. Moreover, the influx of 400,000 refugees from the West Bank placed a severe strain on social services in the East. Only large infusions of Arab aid kept Jordan's budget and balance of payments afloat.

By early 1974 the economy experienced a return to pre-1967 trends despite being hampered at times by poor weather, guerrilla fighting, Israel border conflicts, closure of Syrian and Iraqi borders, and suspension of Kuwait and Libyan budget support. The latter loss was offset by the United States; Syria opened its borders in 1972; and Kuwait restored its subsidy in 1973.

The economy was severely affected between 1967-1974 by previously mentioned factors. By 1972, however, economic activities expanded due to large increases in production in all sectors stimulated by large increases in government expenditures, particularly in development outlays, industry and construction. The expansion of industrial and construction activities continued into 1974.

Agriculture represents the leading production element. It employs about one-third of the labor force, mainly small landowners, and accounts for about half of the exports. Agricultural performance plummeted by about 50 percent in 1973 to one of the worst records in history. A winter freeze and severe drought damaged fruit and vegetable production. This, plus reduced field crop harvests, is expected to decrease the 1973 growth rate by 3-4 percent.

Forecasts for 1974 are optimistic. The GOJ continues efforts to restore irrigation systems and increase credit to farmers, especially in the Jordan Valley, the main agricultural production area. Early rains have provided the recently planted wheat crop with a good start toward a bountiful harvest.

The service sector, contributing more than 60 percent to GDP, has continually increased due to military and civil government expenditures.

Industrial production accounts for a small, 11 percent, yet increasing percentage of the GDP. Principal industries are phosphates, cement, iron, petroleum refinery and a conglomeration of small units producing consumer goods. Although major industries are located on the East Bank, the loss of the West Bank in 1967 and the 1970 civil disturbances hampered industrial production. In 1971, the trend reversed in response to increased foreign demand and improved domestic economic activities, with an increase of 18 percent followed by a 1972 increase of 25 percent. In 1973 the rise is expected to increase, but at a decreasing rate, due to immediate capacity limitations.

Military budget expenditures increased from JD 27.4 to 44.0 million between 1967-1972 while capital expenditures for debt servicing, emergency relief and development projects rose to about JD 20 million. The 1973 budget of JD 118.0 represents a doubling of budget support for development projects with civilian spending rising modestly.

Domestic budget revenues increased from JD 25.7 million in 1967 to 37.9 million in 1972, mainly due to higher tax rates, fees and improvements in the collection procedures. Domestic revenues represent only about 40 percent of projected expenditures, the balance comes from foreign aid budget support. Kuwait, Libya, Saudi Arabia and the United States have provided these funds on an intermittent basis since 1967. In 1972 the U.S. and Saudi Arabia contributed \$50 million and \$64 million respectively.

In addition to budget support, GOJ receives economic and technical assistance from the U.S., United Kingdom, West Germany, IBRD and Arab countries. This support totaled \$144 million in 1972 and is estimated at \$160 million for 1973. This estimate exceeds the 3 Year Plan of \$105 million. Although efforts to step up development outlays are considerable, the GOJ encountered unanticipated delays in 1973 and it is unlikely that the full amount will be spent.

A 1967-70 increase in budget deficits led to a 40 percent increase in the money supply even though foreign aid and exchange earnings would have permitted a higher level of imports. Prices rose by only about 15% during this period apparently because the West Bank of Jordan absorbed the increase in the money supply during the period of surplus trade with the East Bank. The net inflow of dinars was used largely as a store of value.

Controlling the budget deficit during 1971 to the prior year's level led to a modest increase in credit to the private sector and to an increase in imports and replenishment stocks. The money supply increased by about two percent and domestic prices rose by four percent. In 1972, greater political stability, a rise in credit and an increase in budget expenditures led to an increase of 25 percent in imports with an increase in the money supply of 7 percent and prices of 8 percent.

The money supply rose by 15 percent during the first six months of 1973 due to large budget expenditures and a rise in credit, while prices increased by only 18.5% for the entire year. Although the money supply has been increasing at a faster rate than foreign exchange reserves, foreign exchange revenues represent, by the end of 1972, 119 percent of the currency in circulation and 85 percent of the money supply. Thus, the strong position of the dinar led to an increase of 11 percent in the value of the dinar against the dollar in February 1973.

Jordan has experienced considerable price stability despite substantial monetary expansion. The average increase in the Amman consumer price index between 1967-1972 is five percent. Since 1972, the return of political stability, increasing private demand along with the poor agricultural harvest and increasing world agricultural prices has sent the index up by about 18.5 percent. Buying power of the population has generally kept up with inflation. Unemployment, at about eight percent, is highest among white-collar workers and lowest among manual workers, responding to the recent building boom need for employees.

Trade deficits are more than covered by foreign aid inflows and remittances from abroad. Foreign aid receipts total between \$105-180 million between 1967-1974. Remittances from abroad amount to about \$70 million in 1973 according to Central Bank figures and are probably larger. Reserves rose from \$271.3 million in December 1972 to \$353.0 million in July 1973 including a \$30 million increase due to revaluation. Even though last year's drought will increase import demand for foodstuffs it is unlikely to reduce the balance below the 1972 level.

The Three Year Plan envisages borrowing about \$160 million, a net increase of outstanding loans by about \$100 million. External public debt rose from \$87.1 million in 1967 to over \$200.0 million in 1973. Debt service payments increased from \$2.5 million in 1967 to \$7.8 million in 1972,

increasing from 2.4 to 5.6 percent of foreign exchange earnings on exports of goods and services. Debt service requirements for 1973 are estimated at \$13.6 million or 11 percent of 1972 foreign exchange receipts for goods and services.

See Annex II, Exhibits 2 and 3 for a tabular presentation of the above economic data and Part II, Section I (c) for a discussion of that part of the Three Year Plan which pertains specifically to the development of the Jordan River Valley.

Conclusion

For at least the foreseeable future, even with full attainment of the Development Plan's objectives, reliance on foreign budget subsidies will continue to be a fact of life in Jordan. A continuation of the current inflationary situation is expected although at a level more approximating the Western inflation rate. Although the 3 year plan will generate a higher level of employment, Jordan lacks the proven indigenous resource base to sustain high levels of employment without the heavy subsidies. Similarly the repayment prospects depend heavily on the existence of budget subsidies or a severe curtailment in the standard of living of the country. Judged by past events and commitments of donor nations, the continuation of such subsidies appears assured.

SECTION II PROJECT ANALYSIS

A. BORROWER

1. Principal and Participating Agencies

The Borrower will be the Hashemite Kingdom of Jordan. The Jordan Valley Commission (JVC) will be the implementing agency although actual supervision of construction and technical and administrative functions will be accomplished by the Natural Resources Authority (NRA) as directed by the JVC.

To ensure that the specific responsibilities, noted below, of the NRA and JVC, are clearly delineated in advance, it is recommended that a "Memorandum of Understanding" or some similar document be executed between the two agencies which will detail their relationships, responsibilities and authorities in the implementation of this project. A condition precedent to initial disbursement concerning this matter is recommended.

Within the NRA, the project will be controlled by the Department of Irrigation. The Department of Irrigation has satisfactorily demonstrated its capacity to perform the functions required in the construction of the original East Ghor Irrigation Project (A.I.D. Project 278-12-120-086) and the 8 kilometer extension of that project. The Department will be responsible for implementation of the

East Ghor Canal Extension Project (Loan 278-H-009) as well as the Zarqa Triangle project.

Annex II, Exhibits 4 and 5 show the staffing pattern of the JVC and the organizational relationship of the JVC to the implementing Agency. There are five professionals employed in the JVC's Irrigation, Drainage and Farm Roads Section. The staff also includes one highly experienced Pakistani irrigation specialist. The Deputy Director General of the JVC, who also will be the coordinator with the NRA, earned his PhD in the United States. He is both highly experienced and an extremely able administrator.

The JVC will be responsible for (1) providing overall policy guidance, (2) formal issuance of tender documents, (3) signing of contracts, (4) establishment of payment procedures and (5) certifying payments. The JVC also will be responsible for all matters pertaining to the preparation of final plans and specifications, the development of bid documents and the bidding procedures.

The NRA will evaluate bids, recommend award of the construction contract, supervise construction and certify to the JVC the correctness of requests for payment.

For engineering services the JVC has developed the scope of work and will negotiate a contract with the engineer currently employed on the East Ghor Extension Project. The NRA will direct the efforts of the engineering contractor and certify to the JVC as to the correctness of payments requested by the engineer for the construction contractor and the Engineer.

2. Organization and Management of the Implementing Agency

The Chief Engineer of the Department of Irrigation of the Natural Resources Authority reports to the Director General of the Authority. Directly subordinate to the Department of Irrigation are seven Divisions: Administration, Construction, Pumps, Operation and Maintenance, East Ghor Canal Operation and Maintenance and Soils.

An organization chart of the Natural Resources Authority is contained in Annex II, Exhibit 6.

The Heads of the Divisions and the Head of the Department of Irrigation are all highly trained, experienced and technically qualified to perform their responsibilities.

An organization chart of the Department of Irrigation is presented in Annex II, Exhibit 7. The staffing and the quality of the personnel are adequate to cope with the present work load of the Department. However, the NRA has determined, and the Committee is convinced, that increases in personnel and additional equipment will be necessary in order to permit

the Department to implement and to maintain the projected World Bank irrigation projects in the Northern section of the Valley, the AID loan funded East Ghor Canal Extension Project (Loan 278-H-009), Zarqa Triangle project and the proposed sprinkler irrigation of about 4,000 acres near the Shueib and Kufrein Dams in the southern section. The Department has completed its analysis of requirements, initiated its budgetary requests and begun to recruit the necessary personnel. AID has reviewed and concurs in the level and types of staffing proposed by the Department. This loan includes the financing of the maintenance equipment necessary to permit the Department to raise its maintenance capability to the level required to keep the existing canals, proposed canals and other facilities operating at maximum efficiency.

Because of the decision to gradually convert the various irrigation methods employed in the Valley to sprinklers, the NRA will be required to have between 4 and 6 people trained in the use and maintenance of sprinklers. AID will provide grant funded training to two members of the Department in FY 1975 with additional training in FY 1976. The World Bank also will provide training in conjunction with its loan funded sprinkler irrigation program in the Northern Section.

The NRA's (then the East Ghor Canal Authority) performance in supervising the construction and maintenance of the AID financed 69 kilometer East Ghor Canal Project (278-12-120-086) and subsequent construction and supervision of the various smaller projects, including the eight kilometer extension to the East Ghor Canal, have demonstrated the Natural Resources Authority ability to plan, construct and maintain the Valley's irrigation system.

B. ENGINEERING FEASIBILITY

1. Studies

a. Jordan Valley Commission Studies - The Jordan Valley Commission's Irrigation, Drainage and Farm Roads Division prepared the basic engineering study in support of this loan. The Commission's report, entitled "Preliminary Design and Cost Estimate of the Zarqa Triangle Irrigation Project" was submitted to AID/W in March of 1974. Also in March, the Commission's engineer for the project (Dar-Al-Handasah and Netherlands Engineering Consultants) submitted the "North Ghor Upland's Water Balance Study" which demonstrates clearly the availability of sufficient water for the irrigation system's development in the Valley. These reports may be obtained from SA/CCD.

b. AID Study - Concurrent with the preparation of the above mentioned studies, SER/ENGR(SA) made the necessary detailed analysis of pertinent factors not included in either the JVC's or the Engineer's studies. This analysis is presented below:

1. Climate - The climate of the project area is predominately Mediterranean with modifications resulting from topography and proximity

to the desert on the east. The summers are hot and dry while the winters are moderately cold and wet. Nearly all precipitation occurs as rain during the winter months with a well defined dry season of from four to six months. The prevailing winds are from the west and southwest, but periodically shift to the east and north. The pattern is influenced considerably by local topography.

The average annual precipitation in the Zarqa area is 7.9 inches (200mm). Mean monthly temperatures range from 58-61°F (14-16°C) in January to 88-91°F (31-33°C) in August. Mean monthly relative humidity readings range from 40-50 percent in June to 65-70 percent in January. The average annual evaporation, obtained from neighboring stations (Class A Land Pan) reduced by a 0.7 Pan Factor, is 77.5 in. (1968 mm).

2. Geology - The Jordan Rift Valley is the northern extension of the great African Rift Valley. This fault system extends from Central-East Africa to Syria in the north. It is essentially a strike-slip fault with a minor tensional component. This created the down-drop portion forming the Jordan Valley. From its inception (late-Mesozoic) a series of fluvial deposits of various ages have been deposited on faulted Cretaceous limestones and marlstones. Several movements along the fault have resulted in the various depositional and erosional features presently making up the Valley.

The "Lisan Marl" is a thick, fairly impervious formation cropping out over much of the Jordan Valley. It can be seen along the boundary between the "Ghor" and "Zor" ("Zor" is referred to as the Jordan River flood plain and "Ghor" as the higher bench lands of the Jordan Valley). The fact that the marls are fairly impervious causes drainage problems in several areas of the Valley wherever the soil zone overlying the marls is shallow. The marls are soft and erode easily. This feature of the marls accounts for the "Bad Lands" topography occurring along the Ghor-Zor escarpment.

Along the escarpment, east of the Jordan Valley, limestones of the Ajlun Series and the locally named "Kurnub Sandstones" crop out. They are folded and faulted. Numerous normal type faults with displacements ranging from a few to tens of meters are quite common. These tensional faults usually strike in a north-south direction, parallel to the Jordan Valley. The folds also trend in a north-south direction. They are either drag folds adjacent to large faults or compressional component folds.

The Kurnub sandstone is a soft, friable rock. The limestones are often karstic, especially along fault lines and fold axes. Both rock types can cause serious problems in dam construction. The karstic qualities of the limestones leads to leakage and grouting problems. The lack of strength in the Kurnub Sandstones is also a problem if this rock forms the abutments of dams.

Ground water occurs in the Cretaceous limestones (Ajlun Series) cropping out on both sides of the Jordan Valley. Several test wells have been drilled showing ground water of good quality occurring at depths of 15 to 100 meters or more. Pump testing of the wells has produced yields ranging from 25 to more than 150 cubic meters per hour.

Ground water also occurs within the valley itself. Water is usually encountered in the same Ajlun Series aquifers as found on the adjacent outcrops. It varies greatly in quality ranging from 300,000 ppm total dissolved solids (Dead Sea Water Quality) to less than 500 ppm. Much of this aquifer system has already been developed, and even over-developed in the southern portion of the Valley.

Recharge to the entire aquifer system occurs in the Ajlun mountains where rainfall varies from 400 to 650 m.m. (16 to 26 inches) per year. It is estimated that 15 to 25% of rainfall is recharged to the Jordan Valley aquifers.

3. Soils and Land Classification - A soils survey and land classification exercise in the Jordan Valley was undertaken by Baker-Harza in 1953-54. U.S. Bureau of Reclamation standards were used and the total area covered was 150,000 acres (605,840 dunums). In 1966-67 another semi-detailed soil survey and land classification was undertaken by NEDECO and Dar-Al Handasah using the USDA system. In total, 11 soil units at series level were distinguished. Three series levels were distinguished. Three series (Lacustrine, Fluviatile and Alluvial) were further differentiated into 27 types. The land classified and mapped in the more recent survey is summarized below:

<u>Class</u> <u>No.</u>	<u>Description</u>	<u>Acres</u>	<u>Area</u> <u>Dunums</u>
1	Soils with above normal yield potential	14,250	57,650
2	Soils with normal yield potential	61,700	249,910
3	Less suited for fruit trees and sensitive vegetables	4,160	16,850
4	Less suited for deep rooting and relatively salt sensitive crops	<u>10,750</u>	<u>43,540</u>
	Total Suited	90,860	367,950
	Total Unsited	<u>77,600</u>	<u>314,180</u>
	GRAND TOTAL	168,460	682,130

Specific comments regarding the Zarqa area are as follows:

The Zarqa Triangle area covered by this proposed project is generally suited for the further development of irrigation agriculture. Soils are predominately medium to heavy in texture, of good water holding capacity and are surprisingly fertile. Areas involving salinity problems are relatively small, about 5% of the available acreage, and where they occur are generally associated with drainage deficiencies.

The installation of adequate sub-surface drainage facilities and the addition of soil amendments such as gypsum is recommended.

4. Cropping Patterns

Cropping patterns and cropping intensities depend on many factors such as (1) supply of irrigation water, (2) availability of land, (3) profitability of crops, (4) rotation, (5) climate and (6) soil fertility. The cropping pattern must be planned with both domestic needs and foreign markets in mind. As a result of a year round growing season in the Jordan Valley, multiple cropping is feasible whenever the water supply permits. The growing season can be divided into a "winter season" during which wheat, barley, tomatoes, potatoes, beans and cabbage are cultivated and a "summer season" with such crops as sesame, maize, squash, cucumber, watermelons and okra. Bananas, citrus and alfafa occupy the land throughout the year and eggplants for ten months. The general planting time of winter crops extends from August till December and for summer crops from February till May.

The recommended cropping patterns (intensities) for the Zarqa Triangle area are given in the following table:

NOTE: Intensity is the ratio of the total area cropped to the cultivated farm area (expressed as a percentage).

(Table on next page)

Cropping Patterns (Intensities) Zarqa Triangle Area*

Crop	(Unit %)			
	1975	1980	1990	2000
Tomatoes	21.7	21.7	21.7	21.7
Eggplant	9.7	9.7	9.7	9.7
Cabbage + cauliflower	4.3	4.5	5.2	5.2
Onions	1.6	2.6	2.6	2.6
Potatoes	2.0	3.2	3.2	3.2
Squash + cucumber	5.8	4.6	4.6	4.6
Beans	5.8	6.3	7.0	7.0
Sweet pepper	2.2	2.2	2.2	2.2
Watermelons	3.0	1.3	-	-
Other Vegetables	-	-	-	-
Total vegetables	56.1	56.1	56.2	56.2
Bananas	2.1	3.0	3.8	4.8
Citrus	5.5	6.2	6.2	9.0
Other fruits				
Total fruits	7.6	9.2	10.0	13.8
Wheat + barley	40.0	31.5	20.7	7.5
Coarse grains (maize)	7.0	13.1	16.7	11.5
Sesame	-	-	-	-
Total cereals	47.0	44.6	37.4	18.8
Alfalfa	1.2	3.0	7.1	13.2
Berseem	0.8	2.0	4.6	8.8
Fodder maize	0.8	2.0	4.6	8.8
Total fodder	2.8	7.0	16.3	30.8
Total intensity**	113.5 (122.3)	116.9 (129.1)	119.9 (137.0)	119.6 (146.6)

* Adapted from Table H-3 NEDECO 1969 report.

** The figures between brackets represent intensities if perennials are counted twice.

5. Water Resources

a. Hydrology - The principal water resources of Jordan are the surface flows of the Jordan River and its tributaries. Ground water and the surface flows of adjacent basins are potential sources of water but are of relatively minor significance.

There are numerous tributaries to the Jordan River the most important of which is the Yarmouk River with a drainage area of 2,630 square miles (6,805 sq. km), 1,930 square miles (5,000 sq. km) of which are in Syria. The Zarqa River is the second major tributary flowing from the east approximately 24 miles (38 km) north of the Dead Sea. The Zarqa drainage area is 1,330 square miles (3,440 sq.km), almost completely within the Kingdom of Jordan.

There are nine other tributaries (side wadis) which enter the Jordan from the east. The total recorded annual flows in these wadis as compared with the Yarmouk and Zarqa Rivers is as follows:

<u>Stream</u>	<u>Drainage Area</u>		<u>AVERAGE</u>		<u>MAXIMUM</u>		<u>MINIMUM</u>	
	<u>sq. mi.</u>	<u>sq.km.</u>	<u>m ac. ft.</u>	<u>mcm</u>	<u>m ac. ft.</u>	<u>mcm</u>	<u>m ac.ft.</u>	<u>mcm</u>
Yarmouk	2,630	6,805	.356	438	.705	870	.235	240
Zarqa	1,330	3,440	.069	85	.120	148	.023	29
Side Wadis	<u>446</u>	<u>1,156</u>	<u>.091</u>	<u>112</u>	<u>.139</u>	<u>172</u>	<u>.035</u>	<u>43</u>
TOTAL	4,406	11,401	0.516	635	0.964	1,190	0.293	312

The Zarqa Triangle area will obtain its water supply exclusively from the King Talal Dam which is located approximately 20 km upstream from the confluence of the Zarqa River with the Jordan River. The

safe annual yield of the reservoir has been calculated by Sir M. McDonald (1965) as 33.9 mcm; however, in certain years considerably more water will be available. Reservoir operation studies performed by Harza-Baker (1955) indicate a reservoir yield of 70 mcm while the ENERGOPROJEKT report (1971) gives yields from 23.4 to 56.8 mcm, depending on the area irrigated and the cropping pattern used in the operation study.

The King Talal Reservoir will also supply some water for the 8 km and 18 km extensions of the East Ghor Canal. However, the supplies will be supplemented by uncontrolled flows drawn from the Yarmouk River and delivered to project lands through the canal. The minimum recorded flow of the Yarmouk at the East Ghor Canal intake is approximately 240 mcm per year. However, because of the uneven distribution of runoff throughout the year (as much as one fourth of the total sometimes occurs in the month of February), it is impossible to withdraw that volume via the canal (maximum capacity 20 cms). Also, a sum of 69 mcm must be reserved for the following purposes:

Upstream lands in Syria	47 mcm
Lands in the Yarmouk Gorge	5 mcm
Demilitarized Zone	<u>17 mcm</u>
TOTAL	69 mcm

This would leave $240 - 69 = 171$ mcm for canal diversion.

After careful consideration of the above and a review of the Yarmouk hydrographic records (1953-63) driest 10 year period on record tabulated on page 7 of the North Ghor Uplands Water Balance Study, Dar Al-Handasah, March 1974, it is believed that the value 175 mcm, for the driest water year (1959-60), should be adopted as the minimum annual diversion available through the Canal. This is equivalent to a flow of approximately 5.5 cms on a continuous basis. According to Harza-Baker data the flow in the river has dropped to 5 cms for short periods and on one occasion, in more recent years, it is reported to have reached a reading of 3 cms.

b. Water Quality - In general surface water in the Jordan River tributaries is satisfactory for irrigation. In most cases salinity varies inversely with the discharge. Winter flows are invariably lower in salt content and better for irrigation use than summer flows. By the storage of winter runoff, and eventual mixing with summer flows, it is possible to maintain water of acceptable quality throughout the year. Typical electrical conductivity values for water (base flow) from the principal tributaries are as follows:

1. Yarmouk River upstream from Khalid Bin Al Walid Dam site: 420-720 micromhos/cm.
2. Springs below the Walid dam site: 1700-2400 micromhos/cm.
3. Yarmouk River below the springs: 530-820 micromhos/cm.
4. Zarqa River: 850 micromhos/cm.
5. Other side wadis: 400-500 micromhos/cm.

According to USDA standards water having a conductivity (EC) from 250-750 micromhos/cm. is considered as "medium salinity". Plants having a moderate salt tolerance can be grown without special practices. Water having a conductivity value from 750 to 2,250 micromhos is considered as being "highly saline" and cannot be used on soils with restricted drainage. Any water having a conductivity exceeding 2,250 micromhos/cm is classified as "very highly saline" and is not suitable for irrigation under ordinary conditions.

From the above it will be seen that the Zarqa River water (base flow) is classed on the low side of a "highly saline" water. This places it in Class C3 which means that it will require special salinity control measures on lands with restricted drainage. It also means that crops with good salt tolerance should be selected. All streams in the Jordan Valley, including the Zarqa River, exhibit a negligible presence of sodium carbonate, no boron and a sodium absorption ratio (SAR) value of less than 10 which indicates a low sodium or alkali hazard (Class S1).

Fortunately, with construction of the King Talal Dam, it will be possible to dilute the Zarqa River base flows (EC 850) with flood flows (EC 130 micromhos/cm.). Dar Al-Handasah, after making a study of flood frequencies, estimates that the diluted water will have a conductivity of approx. 570 micromhos/cm. This places it in USDA Class C2 which means that crops having moderate salt tolerance can be grown without special practices. According to U.S. Salinity Laboratory standards the stored Zarqa River water would fall in Class 1 (suitable for most plants under most conditions).

c. Sedimentation - Sediment measurements of the Jordan River and its tributaries are very few. The Harza-Baker Report (1955) indicates that the Yarmouk River carries a very small sediment load. This is borne out by the fact that the small Tel Or power plant reservoir located at the mouth of the river shows only minor siltation after more than 20 years of use. The Harza-Baker staff has estimated that the annual deposition in reservoir would not exceed 0.5 percent of the total storage capacity.

The ENERGOPROJEKT Report (1971) gives a value of 1.3 million tons per year for suspended sediment load, based on measurements made in 1963-64 and 1968-69, for the Zarqa River at King Talal Dam site.

Measurements made in 1965-66 show that the bed load in the Zarqa River is less than 2.5% of the total sediment load.

It is anticipated that the water at the intake for the Zarqa Triangle Irrigation Scheme will be relatively clear and free from sediment since it will have been desilted by King Talal Reservoir.

d. Drainage - With the increased application of irrigation water a number of plots within the East Ghor Canal service area have been experiencing sub-surface drainage problems. A comprehensive study of these areas was carried out in 1971 by the USBR under an AID PASA. A program of corrective action has been developed and will be executed by the Jordan Valley Commission as a part of the Three Year Plan. Funding for this work will be arranged by the Government of Jordan. This drainage work will not be covered by funds made available under the terms of the AID loan. Open drains provided for the evacuation of storm water will control the level of the water table in the Zarqa Triangle project area during the initial phases. Individual drainage problems will be resolved, as they develop, on a case-by-case basis.

e. Flood Control - Floods on the Jordan and Yarmouk Rivers have washed out some farm units in the East Ghor Canal Project area. This action persists from year to year and large areas of good cultivated land are being lost. Another problem is erosion and undermining of laterals which are located near the banks of the river. As a remedy for this problem the Jordan Valley Commission has planned an extensive program which involves bank protection utilizing approximately 1,440,000 cubic yards (1,100,000 cu.m) of dumped rock rip-rap. The cost of this work will not be chargeable to the AID loan. The King Talal Dam will provide a high degree of flood protection for the lands located in the Zarqa Valley downstream. No flood control work is envisaged in the Zarqa Triangle Irrigation Project.

f. Hydroelectric Power - The ENERGOPROJEKT Study (1971) analyzed the various possibilities for development of the hydroelectric power potential of the Zarqa River. The most promising of the schemes studied entailed the use of a pressure supply tunnel, a short surface penstock and a powerhouse located immediately downstream from King Talal Dam.

A decision was made not to construct the proposed 5000 kw hydroelectric plant as a part of the initial phase of King Talal Dam, which is currently under construction by a Yugoslavian Contractor. This portion may be constructed later, if funds become available.

g. Water Requirements - Using the cropping patterns shown in 4 above the following is a summary of net irrigation requirements (m3/dunum) calculated for the years 1975, 1980, 1990 and 2000.

Net Irrigation Requirements - Zarqa Triangle Area*
(Unit: m3/dunum)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total**
1975	46.7	53.6	61.9	74.0	55.1	33.4	21.4	24.6	39.6	50.5	59.2	43.6	565
1980	51.1	60.2	70.1	85.9	64.9	43.0	28.9	35.2	50.2	59.5	65.2	47.3	660
1990	48.6	58.1	69.5	88.5	74.9	55.1	39.8	48.7	64.6	69.9	68.6	47.9	735
2000	46.6	54.5	69.2	90.2	85.1	69.7	58.1	66.1	82.0	82.1	68.1	49.1	820

Notes:

* Based on Table G-16, NEDECO 1969 report, using valley averages of North and South zones.

** Figures rounded to nearest 5.

In order to obtain diversion requirements conveyance efficiency and field application efficiency values had to be established. The present conveyance efficiency in the Jordan Valley was established as 86%. With the proposed system it is anticipated that this could be increased to 90% for surface irrigation and 94% for sprinklers. Present data of field application efficiency indicate an average of 55%. However, with the new project it is expected that this value can be increased to 66% for surface methods and 85% for sprinklers.

In establishing irrigation requirements, some allowance should be made to provide water for leaching. In the above table net requirements were calculated using an average of the values established for the north and south zones. However, since only 500 dunums are located in the south zone, and the other 14,520 dunums are in the north zone, it would be logical to proportion the requirements as 500/15,020(3.3%) due to the south zone and 14,520/15,020(96.7%) due to the north zone. Since the north zone requires less water per dunum the proportioning results in a reduction in net requirements of approximately 12.8%. Thus the values in the table, which have not been reduced in later computations, may be considered to include a 12.8% allowance for leaching. For example, for the year 1975, the total requirement of 565 m³/dunum includes 501 m³/dunum for the basic water requirement plus 64 m³/dunum for leaching.

Thus overall irrigation efficiencies will be as follows:

Surface methods	90% x 66% = 60%
Sprinklers	94% x 85% = 80%

Applying these overall irrigation efficiencies to the net irrigation requirements given in the preceding table the following diversion requirements are obtained (net req. ÷ eff. = diversion req.):

<u>Year*</u>	<u>Net Average Annual Irrigation Req. (m³/d)</u>	<u>Diversion req. at Indicated Efficiency (m³/d)</u>	
		<u>(60%)Surface</u>	<u>(80%)Sprinklers</u>
1975	565	940	706
1980	660	1100	825
1990	735	1225	920
2000	820	1365	1025

*Adapted from NEDECO 1969 report Annex G, P. 19.

Part of the King Talal Reservoir water supply will be used for the Zarqa Triangle. The following table is a Water Balance Study for the Valley.

Water Balance Study, Jordan River Valley (East Bank)

Location of Area	Irrigated Area (dunums)			Type of Irrig	(m/3 dunum) Annual Diversion *	(mcm) Total Annual Req'd.	(mcm) Total Annual Avail	Source	(mcm) Surplus or Shortage
	Existing	Proposed	Total						
North Ghor	111,000	-	111,000	SU	1365	152	175**	Yarmouk R.	+23
NE Side Wadis	8,137	24,410	8,137 24,410	SU SP	1365 1025	117 25 } 36	61 4	Side Wadis Zigtab Dam	+25 + 4
E Ghor Canal 18 km Exten.	-	13,878	13,878	SU	1365	19	34***	King Talal Dam	-38
E Ghor Canal 8 km Exten.	-	35,950	35,950	SP	1025	37			
Zarqa Triang. North	-	10,620	10,620	SP	1025	11			
Zarqa Triang. South	-	500	500	SP	1025	1			
Zarqa Zor	-	3,900	3,900	SP	1025	4			
Shueib-Kafrein-Hisban Complex	5,260	7,890	5,260 7,890	SU SP	1365 1025	7 8 } 15	2	Shueib & Kafrein Dams	-13
TOTALS	124,397	97,148	221,545			275	276		+ 1

NOTES:

* Taken from NEDECO 1969 report, Annex G, P. 19, for the year 2000 (surface irrigation @ 60% overall efficiency and sprinklers @ 80% overall efficiency).

** Based on minimum water year 1959-60, Table, "Available Water in East Ghor Main Canal from Yarmouk River," p. 6, North Ghor Uplands Water Balance Study, Dar Al Handasah, Mar. 1974.

*** Sir M. McDonald 1965 report gives annual yield of 33.9 mcm for reservoir having a capacity of 40 mcm.

From the above table it will be seen that the total annual diversion requirement for the Zarqa Triangle Area using the maximum unit value of 1025 m³/d, established by NEDECO based on sprinklers, is 16 mcm whereas the yield of the King Talal Reservoir is approximately 34 mcm. Thus it is obvious that there is sufficient water for the Zarqa Triangle with an annual surplus of 18 mcm for lands located below the East Ghor Canal.

Likewise it can be seen that there is sufficient water to irrigate Jordan Valley lands (prior to construction of Khalid Bin Al Walid and/or Maqarin Dams) provided that the area supplied does not exceed 221,545 dunums. The total annual water requirement is 275 mcm and the total estimated supply is 276 mcm.

It should be pointed out that, while there is an adequate water supply for the entire area considered in the water balance study on an annual basis, there are brief periods when shortages may be expected to occur. According to the most recent monthly operation studies performed by Dar Al-Handasah (March 1974) there were no shortages in the Zarqa area during the driest period of record 1953 - 1963; however, the following shortages were noted in the original East Ghor Project area: 1959-60, May - 5%, June - 11%, July - 5%, August - 5%, and September - 5%; 1960-61, September - 6%, and October - 12%; 1961-62, October - 10%.

Using Paper No. 3714, Vol. 89, No IR4, Journal of Irrigation and Drainage, American Society of Civil Engineers, December 1963, as a basis, the aforementioned shortages are considered "permissible."

In addition to having an adequate supply of water throughout the year, an irrigation system must also be designed to deliver a certain peak flow during periods of highest water use. For a specific crop, banana is the one having the highest water use on this project; i.e., 252 m³/dunum in the month of July. Alfalfa is the second highest with 193 m³/dunum required in the same month. For the cropping pattern adopted, NEDECO indicates (in table G-16 of their 1969 report) that the peak irrigation requirement for the year 2000 occurs in the south zone during the month of April and amounts to 92.5 m³/dunum. In order to permit some factor of safety to compensate for flow reduction due to the incrustation of pipes and other uncertainties, the JVC has adopted a peak water use of 168 m³/dunum. This is equivalent to a flow rate of 0.065 liters/sec./dunum. For the Zarqa Triangle north area (10,620 dunums) this gives a peak requirement of 700 liters/sec., for the south area (500 dunums) 32 liters/sec., and for the Zor area (3,900 dunums) 25 liters/sec. In the system design leaching requirements should not be overlooked. Fortunately there is "built in" to every sprinkler system the capacity to handle most leaching requirements, as the system is designed to handle peak moisture requirements and leaching can generally be done during the off season or in periods of off peak use. This type of operation is what is planned for the Zarqa Triangle.

2. Cost Estimates

Cost estimates based on unit quantities were prepared as prescribed in M.O. 1223.1 dated September 14, 1970.

Sources and availability of pipe, valves, fittings, cement and raw materials were investigated. It is possible for a contractor to secure all but a minor amount, by value, of his raw materials and labor in Jordan while virtually all of the other items will have to be imported. The consulting engineer will be the joint venture of Dar-Äl-Handasah and Netherlands Engineering Company which is the Engineer for the East Ghor Canal Extension Project (Loan 278-H-009) and several other projects financed through the JVC. Jordan does not possess the necessary indigenous expertise, even in the JVC and NRA, to perform the engineering required for the several projects which are scheduled for construction during the next two years.

3. Engineering Plans for Execution of the Project

a. Plan Preparation

The JVC has prepared the final draft, general terms and conditions for the contract documents. The Engineer has completed much of the survey work and should be able to produce the technical portion of the contract documents within the schedule shown in paragraph c below.

b. Construction and Maintenance Equipment

There are no new techniques or unusual construction problems involved in the implementation of the project. The proposed equipment is standard and does not require any specialized modifications.

c. Time Table

The Jordan Valley Commission estimates that the project should be completed within 21 months after A.I.D.'s approval to issue the tender documents. In view of the ample time provided and the relatively simple nature of this project, the schedule presented below does not appear unreasonable.

The following schedule shows estimated completion dates for various phases of the project.

<u>Activity</u>	<u>Date</u>
Plans and specifications completed	July 1, 1974
Bids received	August 15, 1974
Analysis of bids	August 16-31, 1974
Contract award	September 1, 1974
Contractor mobilization	September 10-30, 1974
Construction complete	April 1, 1976

d. Monitoring

The A.I.D. Mission does not have any direct hire technical staff. There is one US-trained local hire engineer on the staff of the Mission. Although a schedule of engineering visits to post has been devised, it is now questionable if the degree of monitoring will be satisfactory in view of the concurrent construction schedules for the East Ghor Canal Extension, Yarmouk-Dead Sea Road, and Zarqa Triangle projects. The total dollar value of these projects will approach \$22 million, of which \$17.4 million will represent A.I.D. Loan funds. Given, also, the distinct possibility of two more loans in FY 1975 which will involve a significant amount of construction, it is recommended that a civil engineer be assigned to the Mission before next fall to assure adequate project monitoring.

e. Basis of Cost Estimates

The Jordan Valley Commission prepared the original cost estimate of the project based on an extensive analysis of prevailing catalogue prices and known costs for similar work in various other locations. These estimates were reviewed by the A.I.D. Loan Committee and revised to take into account known price increases in various items and projected price rises foreseen for many of the items.

f. Engineering Conclusion

After a review of all available engineering data, feasibility reports and other material, it is concluded that the technical requirements of the proposed work are sufficiently well defined to execute the project on an orderly schedule. It is considered that the degree of engineering planning undertaken and the determination of costs are adequate to meet the applicable requirements of Section 611 of the Foreign Assistance Act.

C. ECONOMIC EVALUATION

Agriculture is one of the major activities in Jordan engaging about one-third of the economically active population and contributing about one-fifth of the gross domestic product. Despite substantial increases in the value of agricultural production and rising exports of fruits and vegetables during the past 10 years, Jordan continues to experience a heavy annual balance of trade deficit and imports of food stuffs represent about a quarter of the total value of all imports. With the importation of fruits and vegetables in 1972 alone exceeding \$10 million the Three Year Plan (1973-75) aims at a major reduction in the trade deficit by revitalizing all economic activities in the Kingdom and reactivating all economic activities in the Kingdom and reactivating the development process which was disrupted by the 1967 War and its aftermath. In particular income from the agricultural sector is targeted to increase 6.4 percent annually by expanding land utilization and irrigation particularly in the Jordan Valley. The maximum extension of irrigation throughout the Jordan Valley is foremost in the policy of the Government.

The introduction of sprinkler irrigation will permit a greater land area eventually to come under irrigated conditions (sprinklers will use less water than surface methods) and should permit the eventual achievement of a 150 percent utilization factor of the land.

The Agriculture, Marketing and Credit Division of the Jordan Valley Commission prepared the economic analysis paper in support of the Loan Application. The method employed is an internal rate of return analysis of net incremental benefits to be generated by the project over a 20 year period.

Review of the JVC study raised questions concerning the production levels forecasted and the ability of the marketing system to absorb that production. Subsequent discussions with the JVC on these points resulted in the JVC's submission of a paper detailing the actions designed to permit achievement of production and marketing targets. Based on our discussions and the evidence submitted the Committee considers the production targets in the JVC analysis reasonable and perhaps understated. We note, for example, that the targeted production for several major crops, notably cucumbers, potatoes, tomatoes, cauliflower and cabbage, and citrus, is less than that achieved in Israel and in Asia in 1971, according to FAO. We are reasonably assured that the water, research and marketing constraints, which were our other areas of concern will be resolved satisfactorily by the time this project and the East Ghor Canal Extension (Loan 009) have been completed.

There do exist additional impediments to the attainment of maximum agricultural production in the Valley such as the limited availability of credit and subsurface drainage problems. In order to assure that these problems are overcome, AID will conduct an agriculture sector analysis of the Valley in FY 1975 with the objective of providing a sector loan to remedy the impediments

to the GOJ achieving the production and marketing targets of the total irrigation scheme being implemented in the Valley.

The JVC presentation projects a 17 percent internal rate of return. We have recomputed the analysis to indicate the effect of the maximum slippage we could anticipate (one year) in the schedule of construction of this project or the King Talal Dam and to take account of the higher construction cost estimates for the project developed subsequent to the completion of the JVC analysis. Our computation of the Benefit/Cost Ratio was made at 10 percent which represents, based on analysis of recent industrial project investments in Jordan, the minimum acceptable rate of return. Our basic computation indicates an internal rate of return of 12.9 percent and a Benefit/Cost Ratio of 1.26 at 10 percent. If the project or the King Talal Dam were to slip one year from the present construction schedule the internal rate of return would be 11.18 percent and the Benefit/Cost Ratio 1.12. A higher internal rate of return and Benefit/Cost Ratio could have been developed by either extending the period of analysis or assigning a salvage or residual value to the project at the end of the 20 year analysis period. Both of these could be properly included but were not in order to give a maximum compatibility to the JVC's study.

We anticipate that about 20 percent of the construction funds will be used to finance various categories of skilled and unskilled labor. The construction techniques expected to be employed probably will not be labor intensive in keeping with 1.5 percent unemployment rate which currently exists in the Valley 1/.

Annex II, Exhibit 8 presents the JVC's analysis. Exhibit 9 is our revision to the JVC's internal rate of return analysis and our Benefit/Cost computation.

The forecast of returns, based on conservative assumptions, is higher than the marginal expectations for the application of capital in Jordan indicating that the investment should be undertaken.

The objective of Law No. 12 is to effect the redistribution of land to small farmers. Under the Law, an area of 30 dunums is the smallest farm unit permissible. The maximum sized unit allowed is 200 dunums. Although there will be four or five farms in the project area of maximum size, the greatest number of farms will be about 30 dunums, with the average farm close to 39 dunums. To judge the benefits anticipated to accrue to the smallest farm unit, an analysis was made of the effect of the use of sprinkler irrigation on a typical 30 dunum unit in the project area. This analysis, shown in Annex II, Exhibit 8, Table 10, indicates that the smallest farm unit should experience a 139 percent net income growth by the time the farm unit is fully developed.

1/ Department of Statistics, Social and Economic Survey of the East Jordan Valley, 1973, p.13.

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NO. 33 & 34

SECTION III LOAN ADMINISTRATION

A. Execution Plan

It is anticipated that the loan will be authorized during June of 1974. The Government of Jordan and the Jordan Valley Commission are well acquainted with AID loan agreements. Detailed discussions have been held with the Jordan Valley Commission's President and Deputy Director General and members of the Natural Resources Authority concerning the relationships of each agency regarding the financial, engineering and construction conditions of the loan. Consequently, we believe the loan will be signed within approximately one month of authorization. Advertisement for selection of, and contract negotiations with, a construction contractor will require no more than two months, since the tender documents are under preparation at this time. The scope of work for the engineering services is complete and a draft contract has been presented to the JVC. Therefore the Committee anticipates that all conditions precedent to disbursement will be met within two months of execution of the Loan Agreement.

The Natural Resources Authority has taken the necessary steps to make Law No. 12 applicable to the land in the project area. The necessary orders, issued April 25, 1973, prohibit any buying or selling of the land unless the land is bought or sold by the NRA, acting for the Government. Under the procedure, the Land Department of the NRA will divide the land area among farmers in accord with Law No. 12, the provisions of which are briefly described in Annex V. The Land Department will utilize the final construction layout drawings for the project to establish the precise pattern of farm land distribution. Once the land distribution scheme is established, the Committee of Appraisal of the Land Department will place a value on the land and improvements thereto for selling and buying purposes. If a land holder is required to sell land to the NRA, the NRA is obligated to pay the holder over 10 years at 4 percent interest. A buyer of land purchased by the NRA is required to repay the NRA over 20 years at 4 percent interest. Obviously there is a need for budgetary support to the NRA because of the difference between maturity periods. This amount is met from the GOJ budget, and provisions in the budget will be made as required. The actual transfer of ownership and the working of the land by the new owner will not begin until the project is able to deliver water to the individual farmer.

B. Disbursement Procedure

Payment procedures will be spelled out in the maintenance equipment and construction contracts in accord with M.O. 1442.3 and 1442.2 and the established Agreement between the GOJ and AID dated May 5, 1966.

C. Procurement Procedures

The contracts for construction and procurement of maintenance equipment will be awarded in accordance with the latest revision of M.O. 1442.2 and 1442.3 (A.I.D. Capital Project Guidelines: Borrower Procurement of Construction Services, and Borrower Procurement of Equipment and Materials). A.I.D. will ensure advertisement in the Commerce Business Daily notifying U.S. bidders as to the prequalification procedure. Advising other eligible source contractors will be the responsibility of the Jordan Valley Commission. Sealed bids on the basis of unit prices will be received from prequalified bidders and the contracts awarded to the lowest responsive and responsible bidder. The successful bidder will be required to furnish all labor, equipment, materials and supervision, in accordance with established AID regulations, to complete the work as specified in the plans, specifications and bid documents. Payments will be made monthly on the basis of number of units of work completed during the month, less retentions as specified in the contract documents.

The scope of services and the contract for engineering services will be approved by AID, but financed by the JVC.

D. Conditions and Covenants

1. Goods and services financed under the loan shall have their source and origin in A.I.D. Geographic Code 941 countries plus Jordan.

2. The loan agreement shall provide that prior to the first disbursement under the loan, Borrower shall submit, or cause to be submitted, the following in form and substance satisfactory to A.I.D.:

- (a) An Agreement executed by the Jordan Valley Commission and the Natural Resources Authority setting forth the precise duties, relationships, and responsibilities of each party in the execution of the Project;
- (b) Evidence that the provisions of Law No. 12 for the Year 1968, or a substantially similar law, apply to the area to be irrigated by the Zarqa Triangle Irrigation Project;
- (c) A definitive construction schedule for the Project, established by the Jordan Valley Commission, that is coordinated with the construction schedule of the Yarmouch-Dead Sea Road Project so that the irrigation pipe for the Zarqa Triangle Irrigation Project are installed under the highway prior to road construction in the relevant areas;
- (d) Evidence that the Borrower has obtained all rights of way necessary for temporary detours and permanent construction of transmission lines and farm access roads beside the water distribution system.
- (e) Such other conditions as A.I.D. may deem advisable.

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

AMERICAN EMBASSY
AMMAN - JORDAN

AID-DLC/P-2048

وكالة الولايات المتحدة للانماء الدولي

June 12, 1974

السفارة الامريكية
عمان - الاردن

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

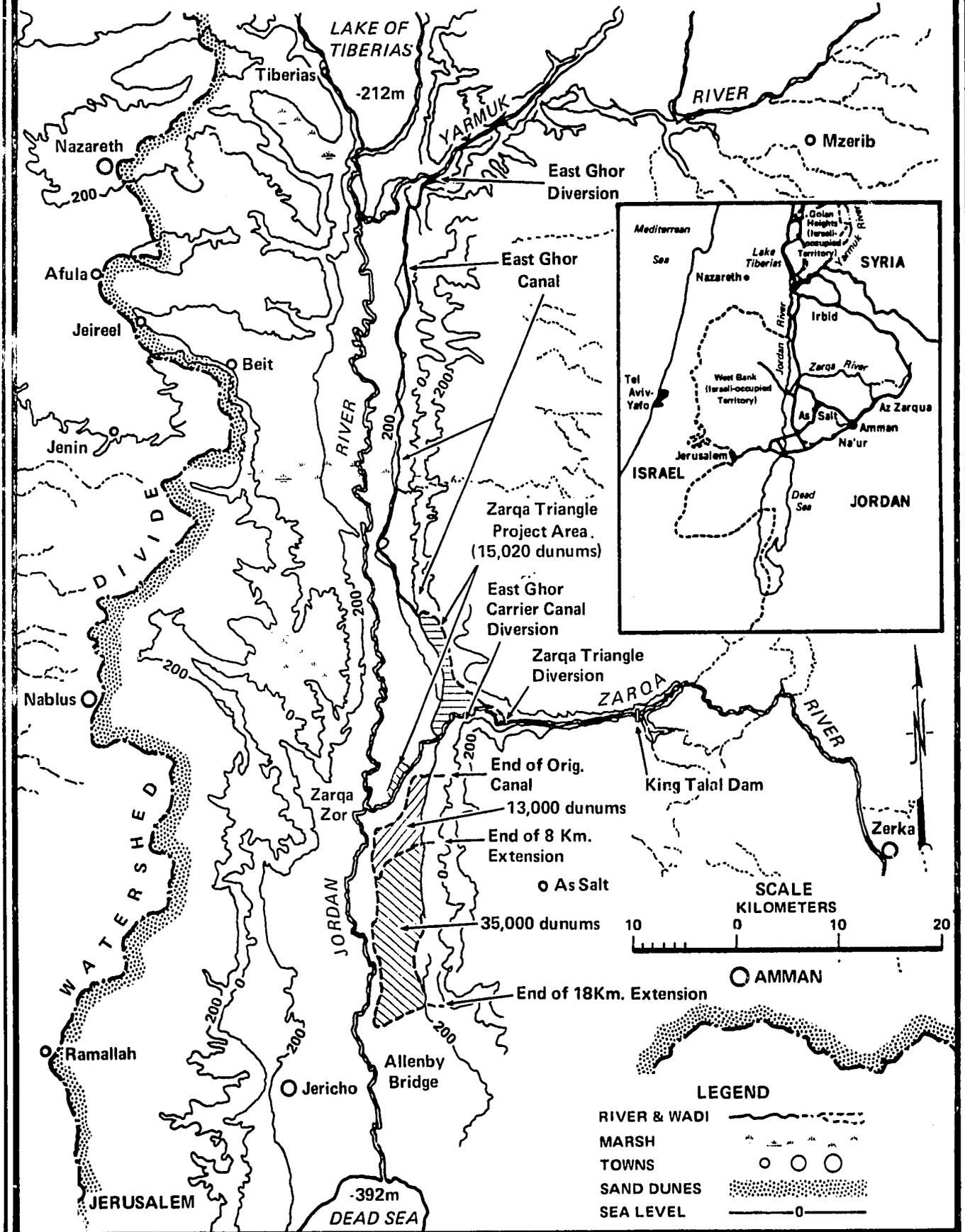
I, Frederick F. Simmons, the principal officer of the Agency for International Development in Jordan, having taken into account, among other things, the maintenance and utilization of projects in Jordan previously financed or assisted by the United States, do hereby certify that in my judgement Jordan has both the financial capability and the human resources capability to effectively maintain and utilize the capital assistance project, Zarqa Triangle.

Frederick F. Simmons

Frederick F. Simmons
AID Representative

Date: May 29, 1974

ZARQA TRIANGLE IRRIGATION PROJECT



ANNEX II, EXHIBIT 2

JORDAN Basic Economic Data

(\$ Millions — unless otherwise stated)

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>
Population (Millions — mid 1973): 2.50^a							
Annual Growth: 3.1%							
Literacy: 32%							
Gross National Product	577	553	685	634	669	707^b	n.a.
Per Capita GNP (\$)	281	280	298	277	283	291^b	n.a.
Budget^c							
Total Expenditures	172	224	244	222	230	273	367 ^b
As % of GNP	30	41	37	35	35	39	n.a.
Security Expenditures	77	108	127	105	111	123	132
As % of Total Expenditures	45	48	52	47	47	45	36
Domestic Revenues	72	74	93	86	100	106	137
Budget Deficit	100	150	151	136	136	167	230
Foreign Budget Support	107	111	105	93	98	114	127 ^b
Tax Revenues							
As % of GNP	48	45	54	51	53	62	
Money Supply (End of Year)	211	240	269	295	302	322	412 (June)
% Increase	34	17	9	10	2	7	28
Consumer Prices (Average for period; 1967=100)	100	99.7	107.5	114.8	119.7	129.4	137.1 (June)
% Increase	3	—	8	7	4	8	6
Foreign Trade							
Exports (F.O.B.)	32	40	41	34	32	48	23 (1st Half)
% Increase	10	25	3	-17	-6	+50	n.a.
Imports (C.I.F.)	182	100	169	163	215	287	189 (1st Half)
% Increase	-19	59	18	-3	18	—	n.a.
Foreign Exchange (Official Gross End of Year)	244	204	263	260	253	271	353 (July)
of which: gold	3	30	30	29	35	30	34 (July)
of which: U.S. dollars	58	67	60	49	37	n.a.	n.a.
Months of imports which reserves represent for each year	19	21	17	17	14	12	n.a.

Foreign Exchange Rate — \$2.90=1 dinar prior to February 1973, \$3.11=1 dinar thereafter

^a Estimate^b FY Ending December 31.^c Budget Submission

Jordan: Balance of Payments, 1969 - 1973
(In millions of Jordan Dinars)

	1969		1970		1971		1972		1973	
	Credit	Debit								
A- Goods and Services	47.3	110.2	44.1	90.5	40.3	98.2	52.0	120.9	81.4	134.3
1. Merchandise	14.8	67.5	12.2	65.5	11.4	76.2	17.0	94.9	17.2	102.5
2. Nonmonetary gold	—	—	—	—	—	—	—	—	5.1	—
3. Insurance	1.1	0.3	1.0	0.8	3.4	0.3	3.2	1.1	3.8	0.5
4. Other transportation	0.2	0.6	0.2	0.6	3.1	2.9	3.5	3.8	5.0	3.9
5. Travel	5.8	8.7	4.8	9.4	6.3	9.6	8.3	11.3	11.0	12.0
6. Investment income	6.8	0.8	6.8	0.6	5.8	1.0	4.4	1.1	5.8	1.5
7. Government, n.i.e.	11.0	29.2	11.9	11.3	3.7	5.1	1.4	7.3	1.5	12.4
8. Receipts from Jordanians abroad	6.9	—	5.5	—	4.9	—	7.4	—	15.0	—
9. Other Services	0.7	3.1	1.7	2.3	1.7	3.1	6.8	1.4	17.0	1.5
Not goods and services	—	62.9	—	46.4	—	57.9	—	68.9	—	52.9
Trade balance (1 +2)	—	52.7	—	53.3	—	64.8	—	77.9	—	80.2
Net services (3-8)	—	10.2	6.9	—	6.9	—	9.0	—	27.3	—
B- Unrequited transfers	47.4	—	40.6	—	36.6	—	68.3	—	60.6	—
10. Private	1.6	—	1.5	—	1.1	—	2.3	—	3.0	(—)
11. Government	45.8	—	39.1	—	35.5	—	66.0	—	57.6	(—)
From Arab Governments	(41.1)	(—)	(33.1)	(—)	(19.1)	(—)	(23.2)	(—)	(23.3)	(—)
From UN agencies	(3.4)	(—)	(4.5)	(—)	(3.6)	(—)	(6.8)	(—)	(5.6)	(—)
From the U.S. Government	(1.2)	(—)	(1.4)	(—)	(12.8)	(—)	(23.5)	(—)	28.7	(—)
From other governments	(0.1)	(—)	(0.1)	(—)	(—)	(—)	(12.5)	(—)	(—)	(—)
Net Total (1-11)	—	15.5	—	5.8	—	21.3	—	0.6	7.7	(—)
C- Capital transactions	5.3	—	0.2	—	6.8	—	8.4	—	5.2	—
12. Private	0.8	—	—	1.4	—	1.3	—	0.4	—	0.7
13. Local government	—	—	0.2	—	0.2	—	0.1	—	—	—
14. Central government	4.5	—	1.4	—	7.9	—	8.7	—	5.9	—
Loans received	(4.7)	(0.8)	(3.0)	(1.4)	(9.4)	(1.7)	(10.8)	(2.2)	(10.9)	5.1
Assets	(0.6)	(—)	(—)	(0.2)	(0.2)	(—)	(0.1)	(—)	(0.1)	—
D- Net errors and omissions	—	0.7	—	3.1	—	1.8	—	0.5	—	1.9
E- Net total (A through D)	—	10.9	—	2.5	—	12.7	—	5.9	—	12.4
F- Allocation of SDRs	—	—	1.0	—	0.9	—	0.9	—	—	—
G- Net total (E and F)	—	10.9	—	1.5	—	11.8	—	6.8	—	12.4
H- Monetary movements	10.91/	—	1.5	—	11.8	—	—	6.8	—	12.44/
15. Commercial banks: Liabilities	0.7	—	0.2	—	—	1.0	—	0.1	0.3	3.2
16. Commercial banks: Assets	1.5	—	—	1.2	3.0	—	—	0.3	—	3.2
17. Central institutions: liabilities	—	—	—	—	1.6	—	—	—	—	0.9
18. Central institutions: assets	8.7	—	2.5	—	8.2	—	—	6.4	—	8.6
Reserve position in the Funds	(—)	(—)	(—)	(0.6)	(—)	(—)	(—)	(—)	(—)	(—)
Monetary gold	(—)	(—)	(0.6)	(—)	(—)	(—)	(—)	(—)	(—)	(—)
SDRs	(—)	(—)	(—)	(1.0)	(—)	(0.9)	(—)	(0.9)	(—)	(—)
Other claims ^{3/}	(8.7)	(—)	(3.5)	(—)	(9.1)	(—)	(—)	(5.5)	(—)	(8.6)4/

Source: World Bank

1/ Excluding a net revaluation profit of JD 0.8 million.

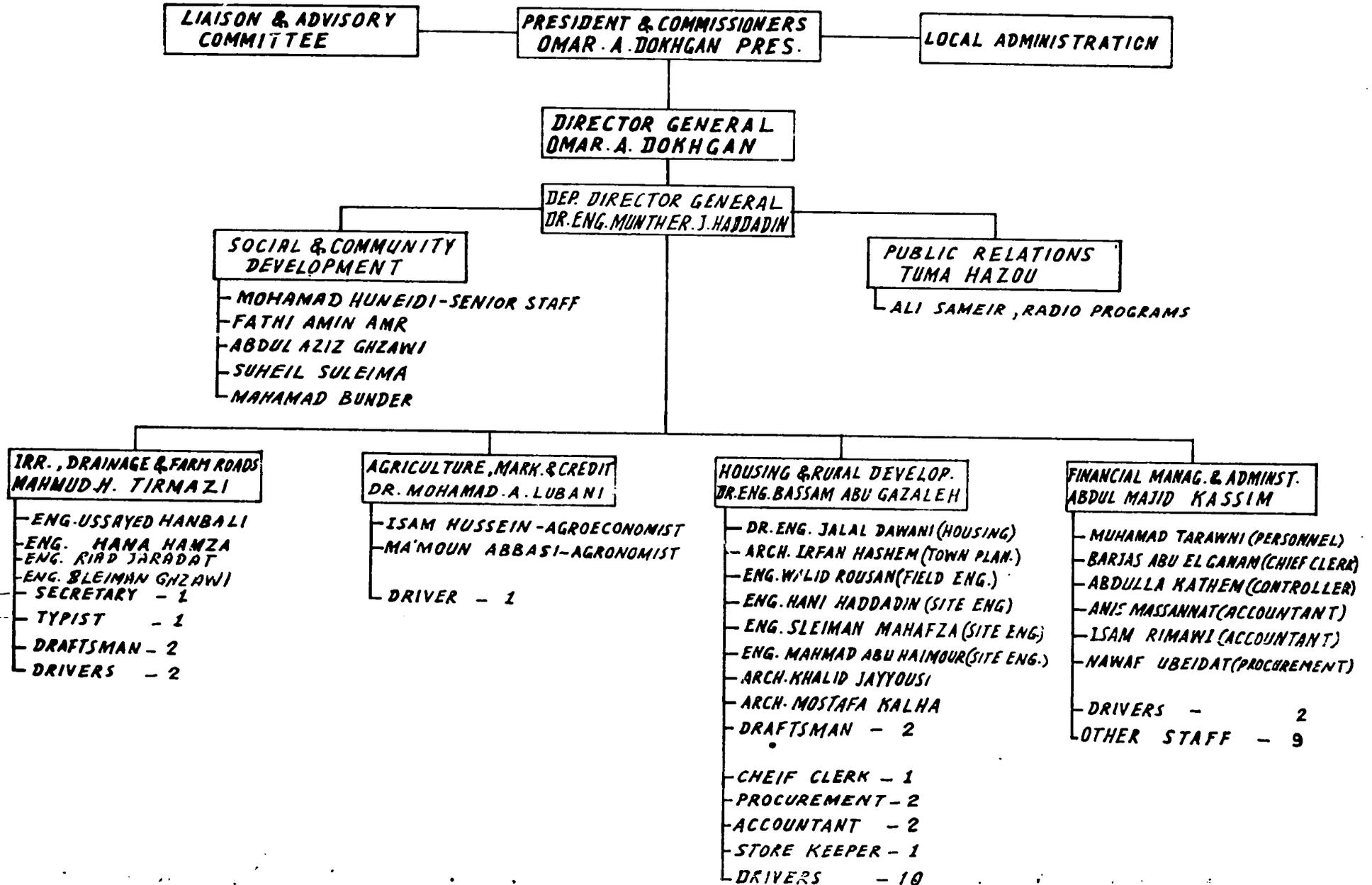
2/ Excluding a net revaluation profit of JD 7.2 million following the realignment of currencies in December 1971.

3/ Foreign exchange holdings.

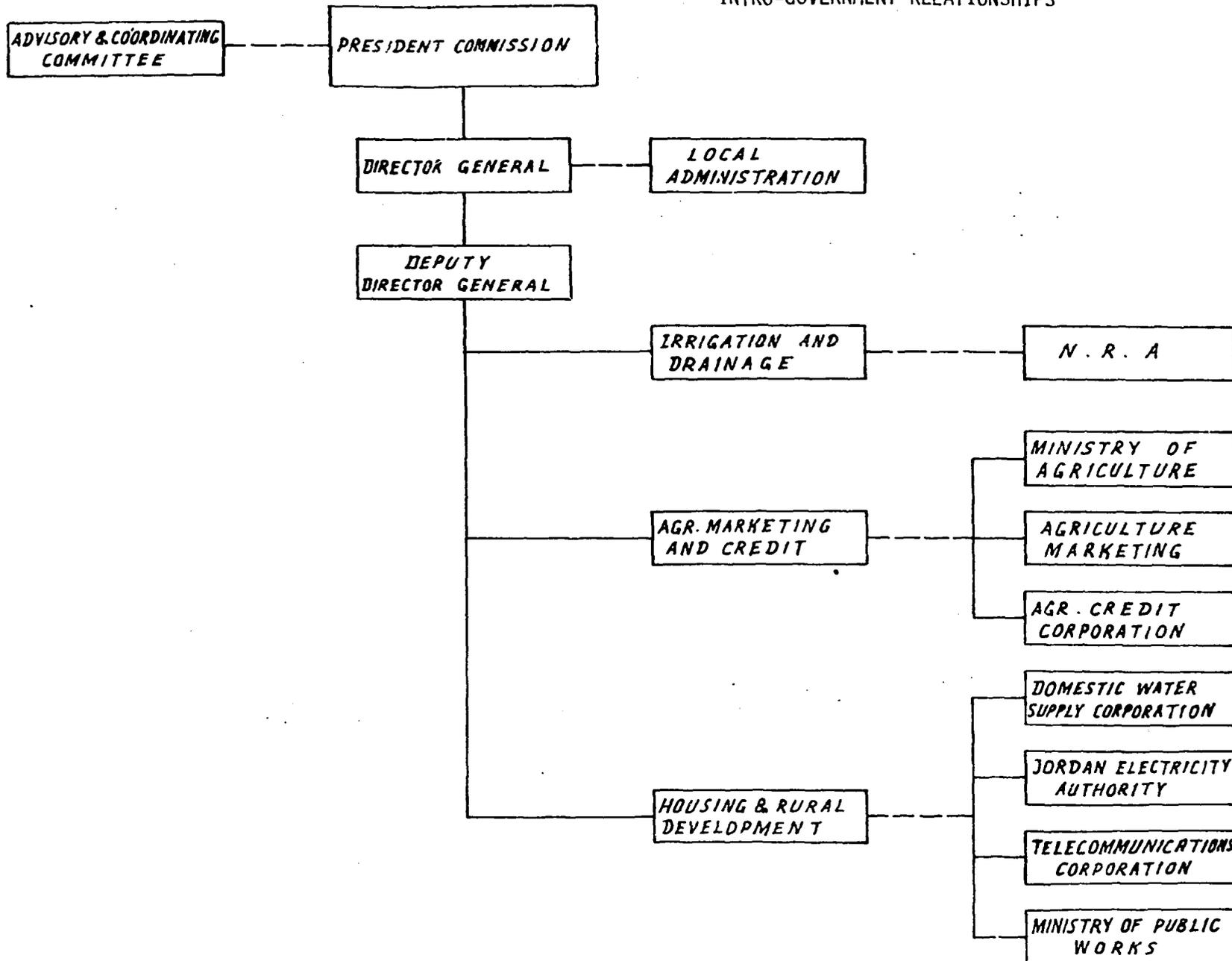
4/ Excluding a net loss of JD 5.0 million due to fluctuations in foreign exchange notes.

* Estimates.

JORDAN VALLEY COMMISSION
ORGANISATION CHART



JORDAN VALLEY COMMISSION
INTRO-GOVERNMENT RELATIONSHIPS



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HE. PRIME MINISTER

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- RESEARCH & TRAINING DIVISION
- SOIL DIVISION

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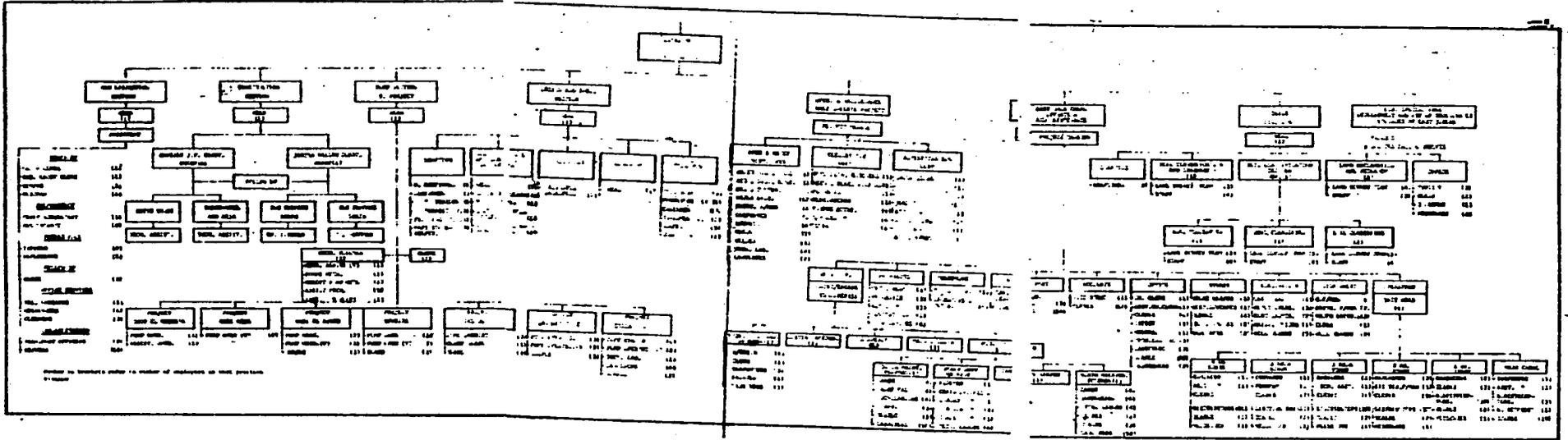
- PLANNING AND DESIGN DIVISION
- CONSTRUCTION DIVISION
- AREA ENGINEERS DIVISION
- OPERATION & MAINTENANCE DIVISION
- MANAGEMENT & ADMINISTRATION DIVISION
- ADMINISTRATION DIVISION

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- PERSONNEL DIVISION
- STORES DIVISION
- PROCUREMENT DIVISION
- ACCIDENT DIVISION
- ELECTRIC POWER & TELECOMMUNICATIONS DIVISION

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- REVENUE DIVISION
- REGISTRATION DIVISION
- FINANCIAL DIVISION



BEST AVAILABLE DOCUMENT

Zarqa Triangle Irrigation Project - Jordan Valley

Annex II
Table 1

Present Crop Returns

Crops	+Area Cropped (Dunums)	Yield (t/dunum)	Total Products (Tons)	Ex-Farm Price (JD/ton)	Value of products (1000) JDS.
Tomatoes	2693	1.7	4578.1	25	114.45
Eggplants	1500	1.6	2400.0	25	60.00
Cabbage & Cauliflower	551	1.4	771.4	20	15.43
Potatoes	192	0.7	134.4	35	4.70
Squash	450	1.15	517.5	27	13.97
Cucumber	430	0.7	301.0	65	19.56
Beans	567	1.3	737.1	40	29.48
Sweet Pepper	282	1.0	282.0	40	11.28
Water Melons	503	1.4	704.2	20	14.08
Other Vegetables	785	0.5	392.5	25	9.81
Total vegetables	7953 ✓		10818.2		292.76
Citrus	2696 ✓	1.75	4718.0	25	117.95
Wheat - Irrigated	3827	0.16	612.3	30	18.37
- Rainfed	600	0.1	60.0	30	1.80
- Fallow	600	-	-		
Other Cereals	294	0.06	17.6	160	2.81
Total Cereals	5141 ✓		689.9		22.98
Grand Total	15790				433.69

+ Intensity of Irrigation 106.8%.

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Zarqa Triangle Project - Jordan Valley

Annex 1 (continued)

Table 2

Returns at Full Project Development

Groups	Area Irrigated (hectares)	Intensity of Irrigation (%)	Field Yield (t/hectare)	Yearly Total Production (Tons)	Export Price (JD/ton)	Value of Production (1000) JD
Tomatoes	2660		1.5	25.0	6072.5	20
Eggplant	1193		2.5	25.0	2982.5	25
Cabbage & Cauliflower	655		2.0	20.0	1310.0	20
Onions	640		1.7	17.0	1088.0	25
Potatoes	806		2.1	21.0	1692.6	35
Squash	1700		1.6	16.0	1700.0	27
Cucumber	1262		1.2	12.0	1514.4	65
Beans	1618		1.5	15.0	2427.0	40
Sweet Pepper	297		1.5	15.0	445.5	40
Total Vegetables	10240	16.5%			19892.5	
Bananas	720		2.0	20.0	1440.0	60
Citrus	2696		2.5	25.0	6740.0	25
Total Fruit	3416	10.9%			8180.0	
Wheat-irrigated	945		0.35	3.5	330.7	30
Maize	1449		0.5	5.0	724.5	25
Total Cereals	2394	10.5%			1055.2	
Alfalfa	1980		8.0	80.0	15840.0	8
Berseem	1320		8.0	80.0	10560.0	8
Fodder maize	2640		5.0	50.0	13200.0	5
Total Fodder	5940	22.9%			39600.0	
Grand Total	21990					1157.87

x Intensity of Irrigation 146.6%

Table 3

Zarqa Traingle Irrigation Project-Jordan Valley

Production Costs and Crop Returns (fils per dunums)- Present Situation

C R O P	Yield kg/dm	Ex-farm Price fils/kg	Gross Reve- nue	Seeds	Land pre- para- tion	Chemica- ls	Ferti- lizers & Manure	Nur- sary	Culti- vation	Harvest ing	Total Product- ion costs	Net Reve- nue
Tomatoes	1700	25	42500	570	930	1730	3600	1370	6520	4820	19540	22960
Eggplants	1600	25	40000	400	990	1000	2600	1120	6380	3620	16110	23890
Squash	1150	27	31050	780	890	1200	2950	-	3840	3510	12270	18780
Capsicum	1000	40	40000	850	1000	460	1180	1890	5240	3970	14590	25410
Broad beans	1300	40	52000	1500	790	510	370	-	3950	4160	11280	40720
Cucumber	700	65	45500	900	900	840	2260	-	4740	1920	11560	33940
Mellon	1400	20	28000	1600	1060	24	2210	-	4530	1730	11154	16846
Cabbage &												
Cauliflower	1400	20	28000	650	900	640	3400	1980	6500	950	15020	12980
Potato	700	35	24500	9600	890	190	4430	-	4910	1850	21870	2630
Other Veg.	500	30	15000	850	890	180	990	310	4110	2370	9700	5300
Wheat-irri- gated	160	30	4800	640	450	20	-	-	550	520	2180	2620
Wheat-rain- fed	100	30	3000	640	450	20	-	-	300	520	1930	1070
Barley	95	30	2850	300	320	-	-	-	230	610	1460	1390
Maize	200	25	5000	600	850	-	1000	-	600	700	3750	1250
Other Cear.	66	160	10560	750	740	-	-	-	1050	1710	4250	6310
Citrus	1750	25	43750	-	-	930	7670	-	9600	2420	20620	23130

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Zarqa Traingle Irrigation Project - Jordan Valley

Production Costs and Crop Returns (fils per dunum) - At Full Project Development

C R O P S	Yield Kg/dm	Ex-farm Price fils/kg	Gross	Seeds	Land pre- para- tion	Chem- icals	Ferti- lizers & Manure	Nur- sary	Culti- vation	Har- vest- ing	Total Pro- duct- ion Costs	Net Reve- nue
Tomatoes	2500	25	62500	820	1000	950	3700	900	1600	3600	12570	49930
Egg plant	2500	25	62500	360	1200	950	2900	900	2100	2800	11210	51290
Cabbage & Cauliflower	2000	20	40000	560	1000	850	3500	700	750	1800	9160	30840
Onions	1700	25	42500	3500	1000	400	2800	-	750	2000	10450	32050
Potatoes	2100	35	73500	9500	1400	650	3500	-	1700	2200	18950	54550
Squash	1600	27	43200	475	1000	800	2780	-	1750	2836	9641	33559
Cucumber	1200	65	78000	1250	1400	900	2500	-	1000	2600	9650	68350
Beans	1500	40	60000	1214	1200	850	2500	-	800	2600	9164	50836
Sweet pepper	1500	40	60000	512	1200	850	2700	900	3000	3800	12962	47038
Wheat-irri- gated	350	30	10500	660	750	350	1300	-	300	500	3860	6640
Maize	500	25	12500	800	1000	350	2100	-	450	600	5300	7200
Bananas	2000	60	120000	-	1300	-	8500	-	15800 ⁽¹⁾	2300	27900	92100
Citrus	2500	25	62500	-	1200	3500	6800	-	9000	4500	27500	35000
Alfalfa	8000	8	64000	1500 ⁽²⁾	750 ⁽²⁾	450	1500	-	1500	1600	5425	58575
Berseem	8000	8	64000	1200	750	450	1500	-	1000	1000	5900	58100
Fodder Maize	5000	5	25000	1500	1200	850	3000	-	1500	2500	10550	14450

1. Including supports and plastic covers for bananas

2. Covers a 5 year period.

Zarqa Traingle Irrigation Project-Jordan Valley

Production Costs and Crop Returns (fils per dunums)- Present Situation

C R O P	Yield kg/dm	Ex-farm Price fils/kg	Gross Reve- nue	Seeds	Land pre- para- tion	Chemica- ls	Ferti- lizers & Manure	Nur- sary	Culti- vation	Harvest ing	Total Product- ion costs	Net Reve- nue
Tomatoes	1700	25	42500	570	930	1730	3600	1370	6520	4820	19540	22960
Eggplants	1600	25	40000	400	990	1000	2600	1120	6380	3620	16110	23890
Squash	1150	27	31050	780	890	1200	2950	-	3840	3510	12270	18780
Capsicum	1000	40	40000	850	1000	460	1180	1890	5240	3970	14590	25410
Broad beans	1300	40	52000	1500	790	510	370	-	3950	4160	11280	40720
Cucumber	700	65	45500	900	900	840	2260	-	4740	1920	11560	33940
Mellon	1400	20	28000	1600	1060	24	2210	-	4530	1730	11154	16846
Cabbage &												
Cauliflower	1400	20	28000	650	900	640	3400	1980	6500	950	15020	12980
Potato	700	35	24500	9600	890	190	4430	-	4910	1850	21870	2630
Other Veg.	500	30	15000	850	890	180	990	310	4110	2370	9700	5300
Wheat-irri- gated	160	30	4800	640	450	20	-	-	550	520	2180	2620
Wheat-rain- fed	100	30	3000	640	450	20	-	-	300	520	1930	1070
Barley	95	30	2850	300	320	-	-	-	230	610	1460	1390
Maize	200	25	5000	600	850	-	1000	-	600	700	3750	1250
Other Cear.	66	160	10560	750	740	-	-	-	1050	1710	4250	6310
Citrus	1750	25	43750	-	-	930	7670	-	9600	2420	20620	23130

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Table 4

Zarqa Traingle Irrigation Project - Jordan Valley

Production Costs and Crop Returns (fils per dunum) - At Full Project Development

C R O P S	Yield Kg/dm	Bx-farm Price fils/kg	Gross	Seeds	Land pre- para- tion	Chem- icals	Ferti- lizers & Manure	Nur- sary	Culti- vation	Har- vest- ing	Total Pro- duct- ion Costs	Net Reve- nue
Tomatoes	2500	25	62500	820	1000	950	3700	900	1600	3600	12570	49930
Egg plant	2500	25	62500	360	1200	950	2900	900	2100	2800	11210	51290
Cabbage & Cauliflower	2000	20	40000	560	1000	850	3500	700	750	1800	9160	30840
Onions	1700	25	42500	3500	1000	400	2800	-	750	2000	10450	32050
Potatoes	2100	35	73500	9500	1400	650	3500	-	1700	2200	18950	54550
Squash	1600	27	43200	475	1000	800	2780	-	1750	2836	9641	33559
Cucumber	1200	65	78000	1250	1400	900	2500	-	1000	2600	9650	68350
Beans	1500	40	60000	1214	1200	850	2500	-	800	2600	9164	50836
Sweet pepper	1500	40	60000	512	1200	850	2700	900	3000	3800	12962	47038
Wheat-irri- gated	350	30	10500	660	750	350	1300	-	300	500	3860	6640
Maize	500	25	12500	800	1000	350	2100	-	450	600	5300	7200
Bananas	2000	60	120000	-	1300	-	8500	-	15800 ⁽¹⁾	2300	27900	92100
Citrus	2500	25	62500	-	1200	3500	6800	-	9000	4500	27500	35000
Alfalfa	8000	8	64000	1500 ⁽²⁾	750 ⁽²⁾	450	1500	-	1500	1600	5425	58575
Berseem	8000	8	64000	1200	750	450	1500	-	1000	1000	5900	58100
Fodder Maize	5000	5	25000	1500	1200	850	3000	-	1500	2500	10550	14450

1. Including supports and plastic covers for bananas

2. Covers a 5 year period.

Model A.

Zaeqa Triangle Irrigation Project - Jordan Valley

Annex 1 Exhibit 9
Table 5

30 Dunum Farm Model Under Vegetable - Mixed Farms Rotation with Sprinkler Irrigation

	Area (Du.)	Yield (t/Du.)	Production (tons)	Ex-Farm price (JD/Ton)	Sales (JD)	Production Costs (1)	80% Irri- Require- ments (M3/Du.)	Irrig. Costs (JD)	Net re- turns (JD)
<u>I. Present Production and returns</u>									
Dryland Wheat	15	0.10	1.5	30	45.00	28.95	-	-	16.050
<u>II. Future Production and returns</u>									
Tomatoes	6.5	2.5	16.25	25	406.25	81.705	513	20.007	304.538
Eggplant	5.0	2.5	12.50	25	312.50	56.050	931	27.930	228.520
Cabbage & Cauliflower	2.0	2.0	4.00	20	80.00	18.320	338	4.056	27.624
Onions	1.0	1.7	1.70	25	42.50	10.450	573	3.438	23.612
Squash	1.5	1.6	2.40	27	64.80	14.461	438	3.942	46.397
Cucumber	2.0	1.2	2.40	65	156.00	19.300	457	5.484	131.216
Beans	2.1	1.5	3.15	40	126.00	19.244	332	4.183	102.573
Potatoes	1.0	2.1	2.10	35	73.50	18.950	390	2.340	52.210
Sweet Pepper	1.0	1.5	1.50	40	60.00	12.962	931	5.586	41.452
Wheat	2.3	0.35	0.71	30	21.30	8.878	468	6.458	5.964
Maize	7.0	0.5	3.50	25	87.50	37.100	731	30.702	19.698
Alfalfa	4.0	8.0	32.00	8	256.00	22.000	1113	26.712	207.288
Berseem	3.0	8.0	24.00	8	192.00	17.700	397	7.146	167.154
Fodder Maize	5.6	5.0	28.00	5	140.00	59.080	453	15.221	65.699
Total	44.0		134.21		2018.35	396.200		163.205	1458.945

1) See Table 3, 4

30 Dunum Farm Model Under Vegetable - Mixed Farms Rotation with Sprinkler Irrigation

	Area (Du.)	Yield (t/Du.)	Production (tons)	Ex-Farm Price (JD/ton)	Sales (JD)	Production Costs 1)	30% Irri- requirements (M3/Du.)	Irrig. Costs (JD)	Net Returns (JD)
<u>I. Present Production and returns</u>									
Tomatoes	6.3	1.7	10.71	25	267.75	123.102	-	-	144.648
Eggplant	3.5	1.6	5.60	25	140.00	56.385	-	-	83.615
Cabbage & Cauliflower	1.5	1.4	2.10	20	42.00	22.530	-	-	19.470
Potatoes	0.5	0.7	0.35	35	12.25	10.935	-	-	1.315
Squash	1.3	1.15	1.49	27	40.36	15.951	-	-	24.409
Cucumber	1.0	0.7	0.70	65	45.50	11.560	-	-	33.940
Beans	1.6	1.3	2.08	40	83.20	16.920	-	-	66.280
Sweet Pepper	0.8	1.0	0.80	40	32.00	11.672	-	-	20.328
Water Mellons	1.5	1.4	2.10	20	42.00	16.731	-	-	25.269
Other Vegetables	2.2	0.5	1.10	30	33.00	21.340	-	-	11.660
Wheat	10.5	0.16	1.68	30	50.40	22.890	-	-	27.510
Maize	1.2	0.2	0.24	25	6.00	4.500	-	-	1.500
Other Cereals	.1	0.07	0.007	160	1.12	0.425	-	-	0.695
Total	32.0		28.957		795.58	318.210			238.652
<u>II. Future Production & returns</u>									
2)	44.0		134.21		2018.35	396.200		163.205	1458.945

1) See Table 3, 4 Annex 11

2) See details in Table 5 Annex 11

Model D

Zarqa Triangle Project - Jordan Valley

Annex 11
Table 7
Exhibit 9

**30 Dunum Farm Model Under A 18% Citrus, 4.8% Bananas
And 77.2% Vegetable - Mixed Rotation with Sprinkler Irrigation**

	Area (Du.)	Yield (t/Du.)	Production (ton)	Ex-Farm Price (JD/t)	Sales (JD)	Production Costs (JD)	80% Irri. Require- ments (M3/Du.)	Irrig. Costs (JD)	Net Returns (JD)
<u>Present Production and Returns</u>									
Citrus	5.4	1.75	9.450	25	236.250	111.348	-	-	124.902
Vegetable-Mixed 1)			23.745		652.376	260.932	-	-	391.444
Total					<u>888.626</u>	<u>372.280</u>			<u>516.346</u>
<u>Future Production and Returns at full Development</u>									
Citrus	5.4	2.5	13.50	25	337.50	148.500	701	22.712	166.288
Bananas	1.44	2.0	2.88	60	172.80	40.176	1349	11.655	120.969
Vegetable-Mixed 2)					1558.17	305.866		125.994	1126.310
Total					2068.47	494.542		160.361	1413.567

1) See details in Table 6 (1) Figures are 82% of Model B.

2) " " " " 6 (II) " " 77.2% " " B.

Model C**Zarqa Triangle Irrigation Project - Jordan Valley**Annex 1 Exhibit 9
Table 8**30 Dunum Farm Model Under A 18% Citrus, 4.8% Bananas and
77.2% Vegetable-Mixed Rotation with Sprinkler Irrigation**

	Area (Du.)	Yield (t/Du.)	Production tons	Ex-Farm Price (JD/T)	Sales (JD)	Production Costs (JD)	80% Irri. Require- ments (M3/Du.)	Irrig. Costs (JD)	Net re- turns JD
<u>Present Production And Returns.</u>									
Dry land Wheat	15	0.1	1.5	30	45	28.95	-	-	16.050
<u>Future Production and Returns of full Development</u>									
Citrus	5.4	2.5	13.50	25	337.50	148.500	701	22.712	166.288
Bananas	1.44	2.0	2.88	60	172.80	40.176	1349	11.655	120.969
Vegetable-mixed ⁺					1558.17	305.866		125.994	1126.310
Total					<u>2068.47</u>	<u>494.542</u>		<u>160.361</u>	<u>1413.567</u>

+ See details in Table 5(II) Annex 1. Futures are 77.20 % of Model A.

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Zarqa Triangle Irrigation Project - Jordan Valley

Annex 11

Table 9

Exhibit 9

30 Dunum farm Model Under Vegetable - Mixed farms Rotation with sprinkler Irrigation
Project Cash Flow (in JD)

	Present 1)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7 Onward
A. Inflow								
- Sales 3)	45.00	1000.0	1300.0	1300.0	1600.0	1800.0	2018.35	2018.35
- Farmer's Contribution to production costs	6.38	50.0	65.0	65.0	80.0	90.0	100.0	100.0
- Short-term loan for production costs	22.57	230.0	250.0	250.0	270.0	285.0	296.2	296.2
- Long-term loan for Sprinkler	-	390.0	-	-	-	-	-	-
Total Inflow	73.95	1670.0	1615.0	1615.0	1950.0	2175.0	2414.25	2414.25
B. Outflow								
- Cost of sprinklers	-	390.0						
- Production Costs	28.95	280.0	315.0	315.0	350.0	375.0	396.2	396.2
Total Outflow	28.95	670.0	315.0	315.0	350.0	375.0	396.2	396.2
C. Cash balance before charges.	45.00	1000.0	1300.0	1300.0	1600.0	1800.0	2018.35	2018.35
D. Charges								
- Irrigation costs	-	145.0	150.0	150.0	155.0	163.2	163.2	163.2
- Repayment of short-term loan including interest	24.43	249.0	270.6	270.6	292.3	308.5	320.6	320.6
- Repayment of sprinkler equipment.	-	23.4	101.4	96.7	92.0	87.4	82.7	-
Total Charges	24.43	417.4	522.0	516.3	539.3	559.1	566.5	483.8
E. Owner operated farm cash balance after charges	20.57	583.6	778.0	783.7	1061.7	1240.9	1451.85	1534.55
F. Sharecropper operated farm cash balance after charges.2)	10.28	291.8	389.0	396.85	530.85	620.45	725.92	767.27

1) See details in table 5 Annex 11

2) Assumed at 50% of owner operated farm
net returns.3) Farm-gate prices exclusive of marketing
charges and fees.

Zarqa Triangle Irrigation Project - Jordan Valley

Annex 11

Table 10

30 Dunum farm Model Under Vegetable - Mixed Farms Rotation with Sprinkler Irrigation
Project Cash Flow (in JD)

Exhibit 9

	Present 1)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year Onwar
A. Inflow								
- Sales 3)	795.6	1000.0	1300.0	1300.0	1600.0	1800.0	2018.35	2018.35
- Farmer's Contribution to production costs	100.2	50.0	65.0	65.0	80.0	90.0	100.0	100.0
- Short-term loan for production costs	218.0	230.0	250.0	250.0	270.0	285.0	296.2	296.2
- Long-term loan for sprinkler	-	390.0	-	-	-	-	-	-
Total Inflow	1113.8	1670.0	1615.0	1615.0	1950.0	2175.0	2414.25	2414.25
B. Outflow								
- Cost of sprinklers	-	390.0	-	-	-	-	-	-
- Production costs	318.2	280.0	315.0	315.0	350.0	375.0	396.2	396.2
Total Outflow	318.2	670.0	315.0	315.0	350.0	375.0	396.2	396.2
C. Cash balance before charges	795.6	1000.0	1300.0	1300.0	1600.0	1800.0	2018.35	2018.35
D. Charges								
- Irrigation costs	-	145.0	150.0	150.0	155.0	163.2	163.2	163.2
- Repayment of Short- term loan including interest	236.0	249.0	270.6	270.6	292.3	308.5	320.6	320.6
- Repayment of sprinkler Equip.	-	23.4	101.4	96.7	92.0	87.4	82.7	-
Total Charges	236.0	417.4	522.0	516.3	539.3	559.1	566.5	483.8
E. Owner operated farm cash balance after charges	559.6	583.6	778.0	783.7	1061.7	1240.9	1451.85	1534.55
F. Sharecropper operated farm cash balance after charges. 2)	279.8	291.8	389.0	396.85	530.85	620.45	725.92	767.27

1) See details in Table 6 Annex 1

2) Assumed at 50% of owner operated farm
net returns.

3) Farm-gate prices exclusive of marketing
charges and fees.

Zarqa Triangle Irrigation Project - Jordan
Valley

Sprinkler Irrigation Project Rate of Return
(in thousand JD)

YEAR	Productive Investments	Annual Costs	Incremental Agricultural Benefits	Balance
1	(336.200)	2.50	0	(338.700)
2	(672.400)	8.00	44.506	(635.894)
3	(672.400)	11.55	81.642	(602.308)
4		11.55	81.642	70.092
5		11.55	181.792	170.242
6		11.55	318.090	306.540
7		11.55	406.266	384.716
8		11.55	442.266	430.716
9	(195.000)	11.55	442.266	235.716
10		11.55	442.266	430.716
11		11.55	442.266	430.716
12		11.55	442.266	430.716
13		11.55	442.266	430.716
14		11.55	442.266	430.716
15		11.55	475.871	464.321
16		11.55	475.871	464.321
17		11.55	475.871	464.321
18	(195.000)	11.55	475.871	269.321
19		11.55	475.871	464.321
20		11.55	475.871	464.321

Rate of Return is 17.6%.

Zarqa Triangle Irrigation Project - Jordan Valley
Sprinkler Irrigation Project Rate of Return
(in thousand JD)

Year	Productive Investments	Annual Costs	Incremental Agricultural Benefits	Balance
1	(336.200)	2.50	0	(338.700)
2	(672.400)	8.00	42.500	(637.900)
3	(672.400)	11.55	75.600	(608.350)
4		11.55	75.600	64.050
5		11.55	175.600	164.050
6		11.55	305.300	293.750
7		11.55	395.200	383.650
8		11.55	410.070	398.520
9	(195.000)	11.55	410.070	203.520
10		11.55	410.070	398.520
11		11.55	410.070	398.520
12		11.55	410.070	398.520
13		11.55	410.070	398.520
14		11.55	410.070	398.520
15		11.55	410.070	398.520
16		11.55	437.995	426.445
17		11.55	437.995	426.445
18	(195.000)	11.55	437.995	231.445
19		11.55	437.995	426.445
20		11.55	437.995	426.445

Rate of Return is 17.4%

Annex II Exhibit 9 - Benefit Cost and IRR if Project Begins on Time
 page 1

Year	Net Input	Net Output	PV 10%	IRR% 12%	IRR 13%
1	\$ 2,007,725	\$ 0	\$ -1,825,022	\$ -1,792,497	\$ -1,776,636
2	3,352,629	0	-2,770,613	-2,672,381	-2,625,444
3		197,915	148,739	140,856	137,155
4		197,915	135,176	125,775	121,381
5		506,915	314,744	287,624	275,102
6		302,688	170,837	153,342	145,381
7		1,185,479	608,269	536,192	503,829
8		1,231,427	574,461	492,250	463,140
9		1,231,427	522,125	440,053	409,819
10		1,231,427	474,715	396,396	362,655
11		1,231,427	431,492	353,912	320,910
12		1,231,427	392,333	315,987	284,090
13		1,231,427	356,621	282,120	251,334
14		1,231,427	324,235	251,950	222,396
15		1,231,427	295,419	224,858	196,782
16		1,317,715	286,735	214,919	186,325
17		1,317,715	260,644	191,858	164,978
18		712,715	128,146	92,653	78,968
19		1,317,715	215,446	152,987	129,136
20		1,317,715	195,812	136,515	114,246
Total	\$ 5,360,354	\$18,225,903	\$1,240,314	\$ 325,369	\$- 34,453

PV 10 %

Net Benefits = \$5,835,949

Net Costs = 4,595,635

B/C = 1.2698

IRR = 12 + .01 $\frac{325,369}{359,822}$

12 + .01(.904) = 12.9%

Annex II Exhibit 9 - Benefit Cost and IRR if Project Delayed 1 Year

Page 2

<u>YEAR</u>	<u>NET INPUT</u>	<u>NEW OUTPUT</u>	<u>PV 10%</u>	<u>IRR% 11%</u>	<u>IRR 12%</u>
1	\$ -2,007,725	\$ 0	\$ -1,825,022	\$ -1,808,759	\$ -1,792,497
2	-3,483,954	0	2,879,130	2,827,577	-2,777,060
3		95,635	71,851	69,919	68,064
4		197,915	135,176	130,367	125,775
5		197,915	122,885	117,443	112,185
6		98,085	55,359	52,436	49,690
7		907,688	465,735	437,143	410,547
8		1,185,479	553,026	514,379	478,696
9		1,231,427	522,125	481,365	444,052
10		1,231,427	474,715	433,585	396,396
11		1,231,427	431,492	390,607	353,912
12		1,231,427	392,333	351,941	315,987
13		1,231,427	356,621	317,092	282,120
14		1,231,427	324,235	285,568	251,950
15		1,231,427	295,419	257,368	224,858
16		1,231,427	267,958	231,755	200,846
17		1,317,715	260,644	223,484	191,859
18		712,715	128,146	108,903	92,653
19		1,317,715	215,446	131,318	152,987
		<u>1,317,715</u>	<u>195,812</u>	<u>163,397</u>	<u>136,515</u>
Total	5,491,679	18,225,903	564,817	+ 61,734	-280,465

t Benefits = 5,268,978

t Costs = 4,704,161

C = 1.120

R = 11.18 %

= 11 + .01 61,734

342,199

= 11 + .01 x .18

CHECKLIST OF STATUTORY CRITERIA
DEVELOPMENT LOAN FUND

The following abbreviations are used in the checklist:

FAA - Foreign Assistance Act of 1961, as amended, incorporating amendments effected by the Foreign Assistance Act of 1972.

App. - Foreign Assistance and Related Agencies Appropriations Act, 1969.

MMA - Merchant Marine Act of 1936, as amended.

I. FULFILLMENT OF STATUTORY OBJECTIVES

A. Needs which the Loan is Addressing

1. FAA Section 103. Discuss the extent to which the loan will alleviate starvation, hunger and malnutrition, and will provide basic services to poor people enhancing their capacity for self-help.

The loan will finance an integral element of the Government's plan for increasing agricultural production through development of the Jordan Valley. See Part I, Section I.E. and the Summary and Recommendations of the Capital Assistance Paper.

2. FAA Section 104. Discuss the extent to which the loan will increase the opportunities and motivation for family planning; will reduce the rate of population growth; will prevent and combat disease; and will help provide health services for the great majority of the population.

Not applicable.

3. FAA Section 105. Discuss the extent to which the loan will reduce illiteracy, extend basic education, and increase manpower training in skills related to development.

Not applicable.

4. FAA Section 106. Discuss the extent to which the loan will help solve economic and social development problems in fields such as transportation, power, industry, urban development, and export development.

Not applicable.

5. FAA Section 107. Discuss the extent to which the loan will support the general economy of the recipient country; or will support development programs conducted by private or international organizations.

Not applicable.

B. Use of Loan Funds

1. FAA Section 109. Have the funds with which the loan is to be made been authorized for an account different from the account from which the loan is to be made? (i.e., have the funds been transferred from another account?). If so, (a) do the funds so transferred exceed 15% of the total funds made available for the account from which the funds were transferred? (b) do the total funds so transferred exceed 25% of the funds made available for the account pursuant to which the loan is to be made? (c) has a determination been made that such a transfer is necessary? (d) has the authority of Sections 610(a) or 614(a) of the FAA been used to effect the transfer of funds?

No such transfer has occurred.

2. FAA Section 110. Has the intended recipient country provided satisfactory assurances that it will provide at least 25% of the costs of the entire program, project or activity with respect to which such assistance is to be furnished under Sections 103 - 107 of the FAA?

Yes. The GOJ application for the loan so stated the intent to provide at least 25% of of the cost of the project. The loan agreement will require such a contribution.

3. FAA Section 111. Discuss the extent to which the loan will strengthen the participation of the urban and rural poor in their country's development, and will assist in the development of cooperatives which will enable and encourage greater numbers of poor people to help themselves toward a better life.

The objective of the Three-Year Plan is to enhance the standard of living of the population now residing in the Valley and to permit the fullest development of the agricultural potential of the Valley. This project is an integral component of the Plan. Law No. 12 for 1968, which will be applicable to the Project Area, provides for a land distribution plan in favor of small farmers. See Part II, Section III.A. of the Capital Assistance Paper.

4. FAA Section 112. Will any part of the loan be used to conduct any police training or related program (other than assistance rendered under Section 515(c) of the Omnibus Crime Control and Safe Streets Act of 1968 or with respect to any authority of the Drug Enforcement Administration or the FBI) in a foreign country?

No. The use of funds will be restricted by the Loan Agreement solely for the purpose of financing irrigation facilities for the Zarqa Triangle.

5. FAA Section 113. Describe the extent to which the programs, projects or activities to be financed under the loan give particular attention to the integration of women into the national economy of the recipient country.

The Project^{1/} does not give particular attention to the integration of women into the national economy of Jordan.

6. FAA Section 114. Will any part of the loan be used to pay for the performance of abortions as a method of family planning or to motivate or coerce any person to practice abortions?

No. The Loan Agreement will restrict the use of funds for the financing of irrigation facilities for the area of the Zarqa Triangle.

II. COUNTRY PERFORMANCE

A. Progress Towards Country Goals

1. FAA Sec. 201(b) (5), 201(b) (7), 201(b) (8), 208. Discuss the extent to which the country is:

(a) Making appropriate efforts to increase food production and improve means for food storage and distribution.

The GOJ is giving priority attention to projects which aim at increasing food production and improving means for storage and distribution. This Project will directly increase food production. For details, see Part II, Section 1 of the Capital Assistance Paper. Food storage and distribution activities are included under the 3 year plan.

When used in this statutory checklist the word "Project" refers to the Zarqa Triangle Irrigation Project to be financed by this Loan.

(b) Creating a favorable climate for foreign and domestic private enterprise and investment.

The GOJ is encouraging domestic and foreign private investment in Three-Year Development Plan projects, of which this Project is an integral part. 44% private investment participation is projected for the Three-Year Development Plan. In addition, U.S. and foreign hotel chains are planning construction of new facilities in Amman, Aqaba, the Jordan Valley and in other places of historical interest to promote tourism.

(c) Increasing the people's role in the developmental process

Law No. 12 for the year 1968, which will be applicable to this Project area, provides for a land distribution plan which favors small farmers. This plan is used in other areas to favor small farmers. For details see Part II, Section III.A. of the Capital Assistance Paper.

(d) Allocating expenditures to development rather than to unnecessary military purposes or intervention in other free countries' affairs.

The GOJ is reducing the percentage of budget expenditures to military purposes. The GOJ still perceives continuing external threats to its security necessitating expenditure allocations to defense purposes. It has increased its budget allocation for development and capital expenditures to 26%.

(e) Willing to contribute funds to the project or program.

The GOJ will contribute at least 25% of the costs of this Project. An appropriate provision will be included in the Loan Agreement.

(f) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangement; and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.

The GOJ has made significant economic, social and political reforms. Its land tenure reform law, Law No. 12 of 1968, which will be applicable to the Project area, favors individual freedom, initiative, and private enterprise by encouraging resettlement of small farmers, many of whom are presently refugees. For details, see Part II.

Annex V of the Capital Assistance Paper.

(g) Responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

The GOJ is responding to the vital economic, political, and social concerns of its people, and it is demonstrating a clear determination to take effective self-help measures to increase the standard of living of all its people. This Project is part of the Rehabilitation and Development Plan of the Jordan Valley. For details, see Part II, Section I.E. of the Capital Assistance Paper.

B. Relations with the United States

1. FAA Sec. 620(c). Is the government indebted to any U.S. citizen for goods or services furnished or ordered where:
(a) such a citizen has exhausted available legal remedies, including arbitration, or (b) the debt is not denied or contested by the government, or (c) the indebtedness arises under such government's, or a predecessor's unconditional guarantee?

No such situation exists at this time.

2. FAA Sec. 620 (d). If the loan is intended for construction or operation of any productive enterprise that will compete with U.S. enterprise, has the country agreed that it will establish appropriate procedures to prevent export to the U.S. of more than 20% of its enterprise's annual production during the life of the loan?

The loan is not intended to finance construction or operation of a productive enterprise.

3. FAA Sec. 620 (e) (1). Has the country's government, or any agency or subdivision thereof, (a) nationalized or expropriated property owned by U.S. citizens or by any business entity not less than 50% beneficially owned by U.S. citizens, (b) taken steps to repudiate or nullify existing contracts or agreements with such citizens or entity, or (c) imposed or enforced discriminatory taxes or other exactions, or restrictive maintenance or operation conditions? If so, and more than six months has elapsed since such occurrence, identify the document indicating that the government, or appropriate agency or subdivision thereof, has taken appropriate steps to discharge its obligations under international law toward such citizen or entity? If less than six months has elapsed, what steps if any has it taken to discharge its obligations?

No such action has been taken by GOJ.

4. FAA Sec. 620 (j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction by mob action of U.S. property, and failed to take appropriate measures to prevent a recurrence and to provide adequate compensation for such damage or destruction?

The GOJ has neither permitted such action nor failed to take adequate measures to prevent such action.

5. FAA Sec.620(l). Has the government instituted an investment guaranty program under FAA Sec.221(b)(1) for the specific risks of inconvertibility and expropriation or confiscation?

Yes.

6. FAA Sec. 620(o). Fisherman's Protective Act of 1954, as amended, Section 5. Has the country seized, or imposed any penalty or sanction against, any U. S. fishing activities in international waters? If, as a result of a seizure, the U.S.G. has made reimbursement under the provisions of the Fisherman's Protective Act and such amount has not been paid in full by the seizing country, identify the documentation which describes how the withholding of assistance under the FAA has been or will be accomplished.

No.

7. FAA Sec.620(q). Has the country been in default, during a period in excess of six months, in payment to the U.S. on any FAA loan?

The GOJ has not been in default in payment to the U.S. on any FAA loan.

8. FAA Sec.620(t). Have diplomatic relations between the country and the U.S. been severed? If so, have they been renewed?

The GOJ has not severed diplomatic relations with the United States.

C. Relations with Other Nations
and the U.N.

1. FAA Sec.620(i). Has the country been officially represented at any international conference when that representation included planning activities involving insurrection or subversion directed against the U.S. or countries receiving U.S. assistance?

The GOJ participates in a pro forma manner in Arab conferences concerning strategy and the Arab states' conflict with Israel, but it is not actively coordinating any aggressive military action with other Arab countries or any activities involving insurrection or subversion against the U.S. or any country receiving U.S. assistance.

2. FAA Sec.620(a), 620(n)
Has the country sold, furnished, or permitted ships or aircraft under its registry to carry to Cuba or North Vietnam items of economic, military, or other assistance?

No.

3. FAA Sec.620(u); App. 107
What is the status of the country's U.N. dues, assessments, or other obligations? Does the loan agreement bar any use of funds to pay U.N. assessments, dues, or arrearages?

The GOJ is not delinquent in any obligations to the United Nations. Use of the loan funds to pay U.N. assessments, dues or arrearages will not be permitted under the loan agreement.

Military Situation

1. FAA Sec.620(i). Has the country engaged in or prepared for aggressive military efforts directed against the U.S. or countries receiving U.S. assistance?

The GOJ participated with other Arab states in military operation against Israel in the 1967 Arab-Israeli war. Since that time, the GOJ has maintained a peaceful stance vis-a-vis Israel, and it has taken steps to deny the use of its territory to commandos for incursions into Israel. Although the Jordanian army assisted in the defense of Syria against counter-attacking Israeli forces in October 1973, Jordan has not and is not engaging in or preparing for aggressive military efforts against the U.S. or any country receiving U.S. assistance.

2. FAA Sec. 620(s). What is (a) the percentage of the country's budget devoted to military purposes, (b) the degree to which the country's foreign exchange resources used to acquire military equipment, and (c) the amount spent by the country for the purchase of sophisticated weapons systems? (d) Is the country diverting development assistance to military expenditures? (e) Is the country diverting its own resources to unnecessary military expenditures?

(a) The GOJ allocated 39% of its 1973 budget to military purposes, both to prevent internal threats and for defense purposes. (b) The degree to which Jordan's foreign exchange resources are used to acquire military equipment is unknown. (c) The GOJ has no sophisticated weapons systems and is not spending any amount to acquire such systems. (d) The GOJ is not diverting development assistance to military expenditures. (e) Considering Jordan's military requirements for both internal and external security, it is our judgement that the GOJ is not diverting its own resources to unnecessary military expenditures.

I. CONDITION OF THE LOAN

A. General Soundness

-- Interest and Repayment

1. FAA Sec. 201(d), 201(b) (2).

Is the rate of interest excessive or unreasonable for the borrower? Are there reasonable prospects for repayment? What is the grace period interest rate; the following period interest rate? Is the rate of interest higher than the country's applicable legal rate of interest?

The rate of interest is neither excessive nor unreasonable for the GOJ and there are reasonable prospects for repayment. The loan terms are 40 years, 10-year grace period, 2% interest during the grace period and 3% thereafter on the unpaid balance. The rate of interest is not higher than the country's applicable legal rate of interest.

-- Financing

1. FAA Sec. 201(b)(1). To what extent can financing on reasonable terms be obtained from other free-world sources, including private sources within the U.S.?

This irrigation project is part of rehabilitation and development plan of the Jordan Valley financed, in large part, by Kuwait, the Federal Republic of Germany, UNDP, United Kingdom, The International Bank for Reconstruction and Development, the GOJ and the U.S. For details on this financing and other free world financing for other GOJ projects and programs, see Part II, Sec. I.E. of the Capital Assistance Paper.

-- Economic and Technical Soundness

1. FAA Sec.201(b)(2), 201(e).

The activity's economic and technical soundness to undertake loan; does the loan application, together with information and assurances, indicate that funds will be used in an economically and technically sound manner?

The Jordan Valley Commission has both the economic and technical expertise to execute the loan. The planned project is both economically and technically sound. For details, see Part I Sections II and III of the Capital Assistance Paper.

2. FAA Sec.611(a)(1). Have engineering, financial, and other plans necessary to carry out assistance, and a reasonably firm estimate of the cost of assistance to the U.S., been completed?

Yes. Completed plans have been reviewed by the U.S. and have been found satisfactory. A reasonably firm cost estimate of \$4.5 million to the U.S. has been completed. These are discussed in detail throughout the Capital Assistance Paper.

3. FAA Sec.611(b); App.Sec.101.

If the loan or grant is for a water or related land-resource construction project or program, do plans include a cost-benefit computation? Does the project or program meet the relevant U.S. construction standards and criteria used in determining feasibility?

Yes. The plans include a positive cost benefit computation. The Project meets relevant U.S. construction standards, and criteria used in determining feasibility.

4. FAA Sec.611(e). If this is a Capital Assistance Project with U.S. financing in excess of \$1 million, has the principal A.I.D. officer in the country certified as to the country's capability effectively to maintain and utilize the project?

Yes. The principal A.I.D. officer's certification as to the GOJ's capability to maintain effectively and utilize the Project is attached as Annex I to the Capital Assistance Paper.

B. Relation to Achievement of
Country and Regional Goals

-- Country Goals

1. FAA Secs.207, 281(a).

Describe this loan's
relation to:

a. Institutions needed
for a democratic society
and to assure maximum
participation on the part
of the people in the task
of economic development.

b. Enabling the country
to meet its food needs, both
from its own resources
and through development,
with U.S. help, of infras-
tructure to support
increased agricultural
productivity.

c. Meeting increasing
need for trained man-
power.

d. Developing programs
to meet public health needs.

Law No.12 of 1968, which will be
applicable to the Project area
requires the Jordan Valley Commission
to appropriate all irrigated land in
the area and to redistribute it to
the people to assure maximum
participation in the task of
economic development.

The Project will directly assist in
enabling the GOJ to meet its food
needs from its own resources. As
a result of this Project additional
land will be available for agricul-
tural production.

This Project will be implemented
by the Jordan Valley Commission
thereby providing development
activity for Jordan's trained
manpower. In addition, trained
manpower will be necessary to
maintain the Project facilities.

The Project will help meet public
health needs by increasing the
availability of fruits and vege-
tables to the population thereby
providing a more balanced diet.

- e. Assisting other important economic, political, and social development activities, including industrial development; growth of free labor unions; cooperatives and voluntary agencies; improvement of transportation and communication systems; capabilities for planning and public administration; urban development; and modernization of existing laws.
2. FAA Sec.201(b)(4). Describe the activity's consistency with and relationship to other development activities, and its contribution to realizable long-range objectives.
3. FAA Sec.201(b)(9). How will the activity to be financed contribute to the achievement of self-sustaining growth?
4. FAA Sec.201(f). If this is a project loan, describe how such project will promote the country's economic development, taking into account the country's human and material resource requirements and the relationship between ultimate objectives of the project and overall economic development

This project is an integral part of the Three-Year Development Plan which is designed to meet these important development goals in a coordinated manner. For details, see Part II Section I.E. of the Capital Assistance Paper.

The Project is an integral part of a GOJ program to develop fully the Jordan Valley, and it will significantly contribute to realizable agricultural objectives in this region. For details, See Part II Section I.E. of the Capital Assistance Paper.

The farms to be irrigated by the Project will produce crops for domestic consumption and export both of which contribute to the achievement of self-sustaining growth.

The construction of the Project will provide new jobs for the Jordanian labor force and will develop vast acreage of hitherto unproductive land. For details see Part II, Section I.E. of the Capital Assistance Paper.

5. FAA Sec.201(b)(3). In what ways does the activity give reasonable promise of contributing to development of economic resources, or to increase of productive capacities?

6. FAA Sec.281(b). How does the program under which assistance is provided recognize the particular needs, desires, and capacities of the country's people; utilize the country's intellectual resources to encourage institutional development; and support civic education and training in skills required for effective participation in political processes.

7. FAA Sec.601(a). How will this loan encourage the country's efforts 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?

The Project contributes to the development of the Jordan Valley Commission and increases in productive capacity of the region serves. For details, see Part II, Section I, E of the Capital Assistance Paper, and summary and recommendation No.5.

The Project will provide opportunities for small farmers, for whole salers, for retail merchants and for the trucking industry; it will help develop the Jordan Valley Commission and the Natural Resources Authority.

(a) The Project will generate crops for export as well as domestic consumption. (b) it will favor small farmers who work their own land. (c) Farmers will use cooperatives, credit unions and other such organizations to help finance private enterprise. (d) The breakup of large absentee land holdings will be required by Law No. 12 of 1968. (e) This project is a technical improvement in agriculture, which will benefit ancillary commerce and industry. (f) The project will have no direct impact on free labor unions.

8. FAA Sec. 202(a). Indicate the amount of money under the loan which is: going directly to private enterprise; going to intermediate credit institutions or other borrowers for use by private enterprise; being used to finance imports from private sources; or otherwise being used to finance procurements from private sources.

The total amount of the loan will be used to finance procurement from private sources.

9. FAA Sec. 611(a)(2). What legislative action is required within the recipient country? What is the basis for a reasonable anticipation that such action will be completed in time to permit orderly accomplishment of purposes of loan?

No. legislative action is required within Jordan.

-- Regional Goals

1. FAA Section 619. If this loan is assisting a newly independent country, to what extent do the circumstances permit such assistance to be furnished through multilateral organizations or plans?

Jordan is not a newly independent country.

2. FAA Section 209. If this loan is directed at a problem or an opportunity that is regional in nature, how does assistance under this loan encourage a regional development program? What multilateral assistance is presently being furnished to the country?

The Project is an integral part of the development of the entire Jordan Valley which is to be financed, in large part, by the Kuwaiti Development Fund, UNDP, Federal Republic of Germany, IHRD, the United Kingdom and A.I.D. on a multilateral basis. For details on this assistance, see Part II, Section I, E of the Capital Assistance Paper.

C. Relation to U.S. Economy

-- Employment, Balance of Payments,
Private Enterprise

1. FAA Sections 201(b)(6);

What are the possible effects on this loan on U.S. economy, with special reference to areas of substantial labor surplus? Describe the extent to which assistance is constituted of U.S. commodities and services, furnished in a manner consistent with improving the U.S. balance of payments position.

The goods and services financed by this loan will be obtained from A.I.D. Geographic Code 911 (Selected Free World) sources plus Jordan. U.S. firms will be given opportunity to bid on all aspects of the Project.

2. FAA Sections 612(b),(d), 636(h). What steps have been taken to assure that, to the maximum extent possible, foreign currencies owned by the U.S. and local currencies contributed by the country are utilized to meet the cost of contractual and other services, and that U.S. owned foreign currencies are utilized in lieu of dollars?

Jordan is not an excess currency country, and thus the U.S. has no foreign currency to use in lieu of dollars. The GOJ may not have sufficient dinars to undertake all local cost financing but it will participate as extensively as it can in funding the Project. For details see Part II, Section II.D. of the Capital Assistance Paper.

3. FAA Section 601(d); App. 108
If this loan is for a capital project, to what extent has the Agency encouraged utilization of engineering and professional services of U.S. firms and their affiliates? If the loan is to be used to finance direct costs for construction, will any of the contractors be persons other than qualified nationals of the country or qualified citizens of the U.S.? If so, has the required waiver been obtained?

The loan will be administered under the Capital Project Guidelines which contain the necessary encouragement provisions and determinations. Appropriate provisions will be in the loan agreement.

4. FAA Section 608(a). Provide information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items.

The loan agreement will contain appropriate provisions to encourage the use of U.S. Government excess property.

5. FAA Section 602. What efforts have been made to assist U.S. small business to participate equitably in the furnishing of commodities and services financed by this loan?

The loan agreement and implementation letters will contain appropriate provisions to permit participation of U.S. small business.

6. FAA Section 621. If the loan provides technical assistance, how is private enterprise on a contract basis utilized? If the facilities of other Federal agencies will be utilized, in what ways are they particularly suitable, are they competitive with private enterprise (if so, explain); and how can they be made available without undue interference with domestic programs?

Private enterprise on a contract basis will be used to provide technical assistance in connection with the capital project through the use of the Capital Project Guidelines. An appropriate provision will be included in the loan agreement. The facilities of other Federal agencies will not be used.

7. FAA Section 611(c). If this loan involves a contract for construction that obligates in excess of \$100,000, will it be on a competitive basis? If not, are there factors which make it impracticable?

Appropriate provisions of the Capital Project Guidelines will be applied to this Project.

8. FAA Section 601(b). Describe the totality of effort by the President in host country to encourage and facilitate participation of private enterprise in achieving the purposes of the Act.

Private enterprise is being utilized to the maximum extent practicable under this loan.

-- Procurement

1. FAA Sec.604(a). Will commodity procurement be restricted to U.S. except as otherwise determined by the President?

Yes. Procurement is limited to A.I.D. Geographic Code 941 (Selected Free World) sources, plus Jordan, as determined by the Administrator.

2. FAA Sec.604(b). Will any part of this loan be used for bulk commodity procurement at adjusted prices higher than the market price prevailing in the U.S. at time of purchase?

No. An appropriate provision will be included in the loan agreement.

3. FAA Sec.604(e). Will any part of this loan be used for procurement of any agricultural commodity or product thereof outside the U.S. when the domestic price of such commodity is less than parity?

No part of this loan will be used for procurement of agricultural commodities.

4. FAA Sec.604(f). Will the Agency receive the necessary pre-payment certifications from suppliers under a commodity import program agreement as to description and condition of commodities, and on the basis of such, determine eligibility and suitability for financing.

The loan will not involve a commodity import program.

D. Other Requirements

1. FAA Sec.201(b). Is the country among the 20 countries in which development loan funds may be used to make loans in this fiscal year?

Yes.

2. App. 105. Does the loan agreement provide, with respect to capital projects, for U.S. approval of contract terms and firms?

Yes. An appropriate provision will be in the loan agreement.

3. FAA Sec.620(k). If the loan is for construction of a productive enterprise, with respect to which the aggregate value of assistance to be furnished will exceed \$100 million, what preparation has been made to obtain the expressed approval of the Congress?

The loan is not for construction of a productive enterprise with respect to which the aggregate value of assistance will exceed \$100 million.

4. FAA Sec. 620(b) 620(f). Has the President determined that the country is not dominated or controlled by the international Communist movement? If the country is a Communist country (including, but not limited to, the countries listed in FAA Sec.620(f) and the loan is intended for economic assistance, have the findings required by FAA Sec.620(f) been made and reported to the Congress?

Jordan is not dominated or controlled by the international Communist movement.

5. FAA Sec. 620(h). What steps have been taken to insure that the loan will not be used in a manner which, contrary to the best interest of the United States, promotes or assists the foreign aid projects of the Communist-bloc countries?

The loan agreement will contain a provision covering this requirement.

6. App. Sec. 109. Will any funds be used to finance procurement of iron and steel products for use in Vietnam other than as contemplated by Sec 109? No.

7. FAA Sec.636(i). Will any part of this loan be used in financing non U.S.-manufactured automobiles? If so, has the required waiver been obtained? No.

8. FAA Secs. 620(a)(1) and (2), 620(p), (620(v)). Will any assistance be furnished or funds made available to the Government of Cuba, the United Arab Republic, or the Government of Greece? No.

9. FAA Sec.620(g). Will any part of this loan be used to compensate owners for expropriated or nationalized property? If any assistance has been used for such purpose in the past, has appropriate reimbursement been made to the U.S. for sums diverted?

No. The loan agreement will contain a provision limiting use of the funds to the procurement of goods and services required for the Project. No assistance has been used for any such purposes in the past.

10. FAA Sec.201(f). If this is a project loan, what provisions have been made for appropriate participation by the recipient country's private enterprise?

Private enterprise in Jordan will be used quite extensively.

11. App. Sec. 103. Does the loan agreement bar any use of funds to pay pensions, etc., for persons who are serving or who have served in the recipient country's armed forces?

Yes. The loan agreement will contain a provision limiting the use of the funds to procurement of goods and services required for the Project.

12. FAA Sec. 901(b). Does the loan agreement provide, for compliance with U.S. shipping requirements, that at least 50% of the gross tonnage of all commodities procured from the United States and financed with funds made available under this loan (computed separately by geographic area for dry bulk carriers, dry cargo liners, and tankers) be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates for U.S. flag vessels?

Yes. An appropriate provision will be included in the loan agreement.

13. FAA Sec. 481. Has the President determined that the recipient country has failed to take adequate steps to prevent narcotic drugs produced or procured in, or transported through, such country from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents or from entering the United States unlawfully?

No. The President has made no such determination.

14. App. Sec. 110. Is the loan being used to transfer funds to world lending institutions under FAA Secs. 209(d) and 251(h)?

No.

15. App. Sec. 601. Are any of these funds being used for publicity or propaganda within the United States?

No.

16. FAA Sec. 612(d). Will provision be made for placing marine insurance in the U.S. if the recipient country discriminates against any marine insurance company authorized to do business in the U.S.?

Yes. An appropriate provision will be included in the loan agreement.

17. Section 29 of PL 93 - 189 (FAA of 1973). Is there a military base located in the recipient country which base was constructed or is being maintained or operated with funds furnished by the U.S. and in which U.S. personnel carry out military operations? If so, has a determination been made that the government of such recipient country has, consistent with security, authorized access, on a regular basis to bona fide news media correspondents of the U.S. to such military base? There are no such bases in Jordan
18. Section 30 and 31 of PL 93 - 189 (FAA of 1973). Will any part of the loan be used to finance directly or indirectly military or paramilitary operations by the U.S. or by foreign forces in or over Laos, Cambodia, North Vietnam, South Vietnam, or Thailand? No.
19. Section 37 of PL 93 - 189 (FAA of 1973); App. Sec.111. Will any part of this loan be used to aid or assist generally or in the reconstruction of North Vietnam? No.
20. FAA Section 640(c). Will a grant be made to the recipient country to pay all or part of such shipping differential as is determined by the Secretary of Commerce to exist between U.S. foreign flag vessel charter or freight rates? No.
21. App. Sec.104. Will any of the funds appropriated for this project be used to make a payment on any procurement contract to which the U.S. is a party and which does not contain a termination for convenience (to the U.S.) provision in it? No.
22. App. Sec.106. Has it been determined that not more than \$12,000,000 has been used during fiscal year 1974 in carrying out research under FAA Sec.241? Yes. Such a determination has been made

23. App. Sec.112. Will any of the funds appropriated or local currencies generated as a result of AID assistance be used for support of police or prison construction and administration in South Vietnam or for support of police training of South Vietnamese? No.

24. App. Sec.113. Have excess foreign currencies on deposit with the U.S. Treasury been used to underwrite local costs of U.S. foreign assistance programs in the recipient country, if available? Jordan is not an excess foreign currency country.

25. App. Sec.114. Have the House and Senate Committees on Appropriations been notified five days in advance of the availability of funds for the purposes of this project? Yes

26. App. Sec.604. Will any of the funds appropriated for this project be used to furnish petroleum fuels produced in the continental United States to Southeast Asia for use by non-U.S. nationals. No.

Environmental Analysis
Zarqa Triangle Irrigation Project - Jordan

May 15, 1974

Environmental Analysis
Zarga Triangle Irrigation Project - Jordan

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Map

Environmental Analysis
Zarqa Triangle Irrigation Project - Jordan

I. Project Analysis

The general project analysis has been prepared by the Office of Capital and Commercial Development of the Bureau for Supporting Assistance in conjunction with other AID offices and representatives of the Government of Jordan.

In accordance with M.C. 1214.1, II.C.3. and II.C.8., the environmental analysis was prepared as a joint effort of the AID Office of Engineering, AID Bureau for Supporting Assistance (Environmental Affairs Officer and Office of Capital and Commercial Development), and members of the Jordan Valley Commission. All the persons contributing to the report are familiar with the Jordan Valley area from the different standpoints necessary to evaluate the environmental impact. The environmental aspects of the analysis were prepared by a team of specialists on environmental effects of irrigation: Doctors Everett C. Carter, Yaron M. Sternberg, and Jerome W. Hall, Department of Civil Engineering, College of Engineering, University of Maryland.

II. Environmental Aspects

A. Project Description

1. Location and General Situation

The general area included in the Jordan Three-Year Plan (1973-1975) is comprised of all lands situated on the East Bank of the Jordan River between Lake Tiberias and the Dead Sea. (See Map.) The valley is approximately 65 miles (104 km) long, 2.5 to 10 miles (4 to 16 km) wide, and ranges in elevation from 656 feet (200 m) to 1312 feet (400 m) below sea level).

2. Existing Irrigation Development

The existing East Ghor system consists of the following physical features:

a. An intake works on the Yarmouk River for diversion of water into the East Ghor Canal.

b. A 10 foot (3 m) diameter tunnel, approximately 0.6 mile (1 km) in length, to carry the flow of the canal from the Yarmouk River to the Jordan River Valley.

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- c. East Ghor Canal, concrete-lined, capacity at intake approximately 706 cfs (20 cms), 48 miles (78 km) in length. Of this length 5 miles (8 km) has been completed in recent years.
- d. Wadi Ziglab Reservoir, capacity 3490 ac.ft. (4.3 mcm).
- e. Wadi Shueib Reservoir, capacity 1875 ac.ft. (2.3 mcm).
- f. Wadi Kafrein Reservoir, capacity 3490 ac.ft. (4.3 mcm).
- g. Laterals and distribution systems which presently serve an area of approximately 30,700 acres (124,400 dunums).

3. Irrigation Work Currently Under Construction

Irrigation development work currently under construction or in the bidding stage is as follows:

a. King Talal Dam

This dam, which was designed by ENERGOPROJEKT and is currently under construction by a Yugoslavian contractor, is located on the Zarqa River approximately 10.5 miles (17 km) upstream from the point where the river is crossed by the East Ghor Canal. The estimated cost of this structure is \$27.4 million (JD 9.8 million).

While the dam is a key feature in the Zarqa Triangle Project, it is not being financed by the proceeds of the A.I.D. loan. Financing is being provided jointly by the Governments of Jordan and Kuwait.

The dam will have the following characteristics:

<u>Item</u>	<u>Size</u>
Height	303 ft. (92.5 m)
Crest length	1278 ft. (390 m)
Spillway capacity	104,000 cfs. (2,950 cms)
Freeboard	6.5 ft. (2 m)
Storage capacity	32,400 ac.ft. (40 mcm)

b. Extension of East Ghor Canal

This work, which is currently at the bidding stage and is being financed by A.I.D. Loan 278-H-009, is comprised of the

following elements:

- (1) Eleven mile (18 km) extension of existing concrete-lined East Ghor Canal.
- (2) Diversion structure and carrier canal to deliver water from the Zarqa River to the East Ghor Canal system.
- (3) Sprinkler irrigation system for the irrigation of 8,650 acres (35,000 dunums) of new farmland.
- (4) Land levelling of 3,210 acres (13,000 dunums) of new land adjacent to the recently completed 5 mile (8 km) extension to the East Ghor Main Canal.

4. New Irrigation Development (Zarqa Triangle)

a. New Development

The new irrigation development to be financed under the terms of this loan is briefly described as follows:

- (1) Diversion structure on Zarqa River to deliver water to the Zarqa North main supply line.
- (2) Zarqa Project North - 2,630 acres (10,520 dunums) of sprinkler irrigation located north of the Zarqa River, adjacent to and above the existing East Ghor Canal.
- (3) Zarqa Project South - 123 acres (500 dunums) of sprinkler irrigation located south of the Zarqa River, adjacent to and above the existing East Ghor Canal. This land is situated in three pockets formed by loops in the river course and is bounded by the hills on the south. This portion of the project will receive its water supply by an extension of the pipeline which serves the north project area mentioned in 4.a.(1) and 4.a.(2) above.
- (4) Zarqa Zor - 965 acres (3,900 dunums) of sprinkler irrigation located between the Zarqa River and the Jordan River in the incised gorge. This area will receive its water from a pipeline which will be fed by the existing East Ghor Canal. The takeoff for the pipeline will be located approximately 1 km north of the village of Muthallath El Arda.

B. Environmental Impacts in Area of Impoundment

1. General: Although the dam and reservoir are not part of this project, the ecological impacts of the dam are investigated because of possible indirect effect or secondary impact on the Zarqa River project.

Environmental Analysis - Zarqa Triangle

2. Disturbance of the Natural State of the Area: The average annual base flow of the Zarqa River is 44,000 ac.ft., and the total average annual flow is 69,000 ac.ft., with a maximum of 120,000 ac.ft. (p 10-Ref 1). Throughout the dry season, only small volumes of water flow in the river while the larger flows take place during the winter or wet months. The reservoir will be filled with flood water and the regulated releases during the dry season will augment the base flow of the river. Only a small portion of the cultivated land will be submerged; the basic scenery of the terrain will change slightly by the addition of the new reservoir. The reservoir will not significantly affect any current wildlife or fish as fishing is not practiced on the Zarqa River. The likelihood that the new body of water will become the breeding ground for mosquitoes and bilharzia is small because of the expected large fluctuations in the water level. The reservoir will be full in the spring and almost empty in late summer. Likewise, no significant number of people are expected to reside in the vicinity of the reservoir, thus further reducing the likelihood of a health hazard.

Only a small modification of the microclimate in the vicinity of the dam can be expected; mainly an increase in the humidity and slightly cooler temperatures. Pan evaporation data indicate (p 10-Ref 9, II) that 5-6 feet of water per year can be expected to be lost by evaporation. The temperature of the water behind the dam will tend to be stratified; cooler water will be found in the bottom and warmer water on top. The colder water will not affect the planned crops since the temperature of the water will increase as the water is released from the reservoir and moves through the river and the canal to the irrigation site.

3. Erosion, Sedimentation and Groundwater Seepage: The geology of the dam site indicates (p 10-Ref 5, III) that no slides or erosion are expected behind the dam. Incoming water (flood water) carries a significant amount of sediment; the average annual suspended load has been estimated at 1.31 million tons or 1380 ac.ft. (p 10-Ref 5, II). Unless some steps are taken to reduce the amount of sediment, the reservoir will lose its storage capacity in less than 25 years. Means to reduce the sediment load have been outlined (p 10-Ref 5, II). If the program outlined in the above reference is followed, the amount of suspended load can be significantly reduced. However, the complete elimination of sediment is an impossibility. It is doubtful if any conservation measure on the immediate and upstream reaches of the watershed would have taken place without the construction of the dam. Thus, the construction of the dam will result in a benefit from a soil conservation point of view by controlling the erosion that takes place at the present time. Some groundwater seepage (p 10-Ref 5, VI) under the dam can be expected. The anticipated seepage rates are small and the seepage will probably end up in the channel of the river to augment the base flow of the Zarqa River.

4. Wildlife/Fish Production: At the present time there is no commercial or sports fishing on the Zarqa River. The salinity level of

the Zarqa River is 850 micromohs/cm (p 10-Ref 1) and is classified by the USDA as highly saline. Winter flows are invariably lower in salt content and are of better quality than the summer base flow. Because almost all of the storage in the reservoir is going to be used during the summer months, it is unlikely that fish will be stocked in the reservoir. It is anticipated that at the end of the summer months the reservoir will be nearly empty.

Because only a small reach of the Zarqa River (p 10-Ref 5, VI) will be submerged, the effect on wildlife will be negligible. The dam is not expected to serve as a recreation area and thus no damage to any existing wilderness can be expected.

C. Environmental Impacts Downstream from the Dam

1. River Channel

a. General: The physical characteristics of the downstream portion of the Zarqa River will not be significantly altered. The construction of the dam will result in two hydrologic changes: (a) the downstream hydrograph will be modified, and (b) the quality of the water, its temperature and sediment transport characteristics will be changed. These results are discussed below.

b. Modification of the downstream hydrograph: The construction of King Talal Dam will reduce some peak flow discharges but will not completely eliminate the flood hazards now present. As mentioned earlier, the storage provided by the dam is only about 2/3 of the total average annual flow. Once the reservoir is filled, subsequent storms will be channeled through the emergency spillway to the downstream side of the dam. Thus, during some seasons only partial minimization of floods will be offered by the dam. Because some floods will be contained in the reservoir channel, scouring will be reduced. Also, in order to avoid silting of the reservoir, regulated flow with sediments will be released from the dam. Thus, it would seem that the reduction in scouring and the added sediment will tend to reduce the channel capacity. However, the dam cannot act as storage for all floods, and scouring can be expected from those floods which will be discharged through the emergency spillway. Therefore, it is our opinion that the effects of reduced scouring and release of sediments from the reservoir will be offset by flood flows not stored in the reservoir with no significant net effect on the downstream physical characteristics of the Zarqa River.

The regulated released flow will increase the base flow of the river. At the present, the quality of the base flow is low (p 10-Ref 10, II); by mixing this low quality water with higher quality water derived from winter storms and stored in the reservoir, a higher quality irrigation water can be expected. Evaporation will tend to slightly lower the

Environmental Analysis - Zarqa Triangle

quality of the water stored in the reservoir, but in spite of this the quality of the released water will be superior to the present base flow.

The increased base flow will enhance the opportunity for groundwater recharge of better quality than at the present. The increase in base flow will not weaken the banks and cause slumping as the river will not flow full (p 10-Ref 5, VI).

2. Dead Sea: The uncontrolled flows of the Zarqa River end up at the Dead Sea. Altering the pattern of flow of the river will have no effect on the fauna or flora of the lower reaches of the Jordan River or the Dead Sea; the salinity of the Dead Sea is too high to sustain any fish population.

D. Environmental Impacts in areas of Project Water Use

1. General: The proposed pipeline system and the availability of water for irrigation will change the natural state of the project area. At the present time no intensive agriculture is practiced in the area due to lack of water. The availability of water will change the landscape of the land from semibarren desert to a "green" area.

2. Development of Irrigated Farming: The proposed irrigation will bring some 15,020 dunums into production. The main crops will be vegetables such as tomatoes, eggplants, etc. and field crops such as wheat, alfalfa, etc. The environment for the plants in the project area will be altered; native plants will be replaced by commercial crops and new species of weeds would probably be introduced to the area. Because the proposed project area is small compared to the remaining uncultivated surrounding area, the loss of native plants is considered minor. Weeds are always present in intensively cultivated areas because of the optimum conditions for growth. Control of the anticipated weed population is not considered a problem.

At the present time, the area supports only a very limited population of wildlife. The proposed project will increase the feeding areas for birds and may also encourage the expansion of other wildlife species. It is anticipated that some changes will take place in the insect population. At the present time the only flowing watercourses in close vicinity to the project area are the Jordan River and the Zarqa River. The proposed sprinkler irrigation systems and wet fields will allow the breeding of various insects that at the present are confined mainly to the immediate vicinity of the Jordan River. Also, the new crops to be introduced into the area may allow the breeding and development of insects which are either not present in the area at this time or are present in limited numbers. Intensive agriculture may also introduce new plant diseases to the area. (p 10-Ref 10, I)

Plant diseases and insects are common whenever intensive agriculture is practiced. The short-range solution would be judicious use of suitable insecticides, pesticides and other chemicals to control the spread and damage of the insects and diseases. The recommended long-range solution is to develop crops that are resistant to various diseases.

3. Changes in the Microclimate: The proposed irrigation will slightly alter the microclimate in the area. In particular, the humidity in the irrigated area will be increased during the irrigation season, which will cause a slight decrease in the ambient temperatures. The increased humidity will have an encouraging effect on the diseases and insect population of the area, as was previously discussed.

No changes in the rainfall patterns are expected due to the development of the new irrigated areas, because the rainy season is in the winter and the irrigated area is small in comparison to the rest of the watershed.

An increase in the levels of groundwater due to recharge from the proposed irrigation can be expected. In some areas, the higher water table may create poorly drained and salinized conditions.

At the present time the water table in the area is about 15-45 feet below the ground surface, generally following the topography. (p 10-Ref 10, II). A rise in the water table in the Northeast Ghor has been observed in a number of locations. Subsurface drainage systems have been installed in these areas and seem to function satisfactorily. The long-range effects of a high water table can result in land taken out of production due to salt deposits. The proposed irrigation water is considered as medium salinity according to USDA standards. As evaporation from the soil takes place, water moves up to the soil surface and evaporates while the salts are left to accumulate on the soil surface. The water table buildup and the possible consequence of salt accumulation is a long-range problem; the effects will be noticeable only after a few years of operation. It is therefore recommended that a system of observation wells be installed in areas where water table buildup is likely to occur. These wells should be monitored on a regular basis; and in the event that a rise in the water table due to irrigation is noticed, a subsurface drainage system should be installed.

It is likely that a rise in the water table will occur, and funds should be set aside for both installation and monitoring of observation wells and construction of the subsurface system.

Irrigation in the project area will be accomplished by sprinklers. No irrigation return system is proposed, as runoff will be kept to a minimum by specifying application rates less than or equal to the infiltration rates of the soils in the project area. It is anticipated that because of the use of various agricultural chemicals in addition to plant and animal wastes, the level of pollution of the existing groundwater will increase. The groundwater movement in the project area is from east to

Environmental Analysis - Zarqa Triangle

west (p 10-Ref 10, II) discharging into the Jordan River. It is anticipated that groundwater pollutants that are not adsorbed to the soil matrix will be transported to the Jordan River. Although the level of pollution of the Jordan River may experience a moderate increase, no adverse effects are expected as the present salinity levels of the river are high and water from the river (in the vicinity of the project area) is not used for irrigation or domestic purposes. The Jordan River discharges into the Dead Sea, located about 35 kilometers south of the project area.

E. Socio-Cultural Aspects

1. Land Use: Land use will continue in its traditional pattern--that is, the best land utilized for agriculture, with non-arable land employed for settlement, utility, or service purposes. As public land becomes available under the new irrigation schemes, emphasis is being placed on maximum distribution to resident owners. Various methods to accomplish this are now under study as the value of equitable distribution to political stability, community cohesion, and quality of life is understood by the Jordan Government. The areas that are now under limited cultivation will not be changed appreciably, resulting in little or no dislocation of settlers. Relocation may take place, but it will be because of the effects of improved settlement conditions.

2. Village Settlement Program: In concord with the extension of irrigation and reclamation of new farmland, the Government of Jordan has instituted a program for improvement of existing villages and construction of new settlements. There will be 33 of these in the valley when the program is complete. Under the thoughtful plan that has now been developed, each village will have housing designed in keeping with the cultural and social traditions of the inhabitants plus the needed community facilities such as schools, clinics, marketplace, and administrative centers. Utilities, water, and electricity are to be provided, and a start is to be made toward an overall sanitary waste collection and disposal system. It is understood that this program will only be realized over a long period, but the foundations are being made in such way that orderly progress can be achieved.

3. Road System: All plans in the valley--settlement or agriculture--are related to the principal North-South Valley Road. This road is to be considered under another ongoing program. This will improve movement between villages and between villages and farms, making it possible for settlers to deliver crops to market and to have easy personal communication within the region.

Paving the road will materially improve the air quality by reducing the dust level. Noise, although not an important factor, will affect the settlers less because of the well-studied placement of settlements to main highway.

Environmental Analysis - Zarqa Triangle

Safety should be materially improved because of road and shoulder widening and by proper location of village access roads to main highway. Internal street systems in villages have been kept to a minimum to reduce amount of vehicular traffic in habitable areas.

4. Potable Water: Potable water is a source of continuing concern. There is a use of canal water now for domestic purposes, and it can be expected to continue. However, as the settlement program goes forward, water supplies from protected wells and closed delivery systems will become available. The establishment of regional health centers and village clinics will be used as a focus for health and sanitary education. It is expected that this will ultimately lead to an understanding of the need for use of uncontaminated water and some discipline towards limiting pollution.

5. Quality of Visual Satisfaction (Esthetics): This is always a highly personal matter. But impact of this irrigation system with its accompanying settlement and road programs should certainly change the present outlook from brown to green with a cohesive pattern of settlements that should be a pleasant change from the present haphazard scene.

6. Health Hazards: Bilharzia is not endemic to Jordan although it is present in neighboring countries. The principal snail host present in Egypt and Iraq prefers still water or flowing water with a velocity of less than one foot per second. Because the design velocities in the main canal are in excess of the above limiting value, it is unlikely that bilharzia will be a serious problem. Older irrigation systems in the area (north of the project area) which also obtain their water from the East Ghor canal have not reported any problems due to snails. Water in the canals may become the breeding areas for malaria vectors. Although Jordan has a history of malaria endemicity, malaria is now under tight control. The same program which has been successfully applied to other areas in Jordan should be applied to the project area if malaria vectors become a problem. Because spray irrigation rather than flooding is planned, no areas of stagnant water are anticipated.

F. Summary of Environmental Aspects

1. Climatological modifications - Very small and almost negligible effects.

2. Insects and plant diseases as well as possible new diseases to man - Although this is an unknown quantity, the use of insecticides and proper monitoring by the Agricultural Research Extension Service and the Jordan health agency should minimize these effects.

3. Changes in the water table and soil salinity - This requires careful supervision and monitoring in order to reduce possible severe impacts--leading to taking land out of production. The observation wells

recommended in Section II.D.3. should be sufficient for the monitoring activity. An attempt to reduce the magnitude of the increased salinity should be made by education of the farm operators, particularly on leaching techniques and frequency.

4. Dislocation of settlers will be negligible, and improvement to quality of life should be considerable.

G. References Related to Environmental Aspects

1. AID Capital Assistance Paper, Jordan Zarqa River Project, East Ghor Canal Extension, 1973.
2. American Friends of the Middle East, The Jordan Water Problem, 1964.
3. Bradley, Edward, Ground Water Work in Jordan, 1960.
4. DeBruyn, David, Drainage Report No. 2, East Ghor Project, 1971.
5. Energoprojekt, Zarqa River Project Feasibility Study, Vol. I-VII, 1971..
6. Hunting Technical Services Ltd., Mujib and Southern Ghors Irrigation Project, Updated Report, 1973.
7. Jordan Valley Commission, North East Ghor Irrigation and Rural Development Project, 1973.
8. NEDECO, Jordan Valley Project, Design of Irrigation and Drainage Network, 1973.
9. NEDECO, Jordan Valley Project, Agro- and Socio-Economic Studies, State Report, 1966.
10. NEDECO, Jordan Valley Project, Agro- and Socio-Economic Study, Final Report, Vol. I-IV, 1969.
11. PADCO, Settlement Planning and Housing Recommendations for the East Ghor Valley; ,November 1973.

III. Alternatives

In reviewing various projects for their value, it was decided that irrigation in the Jordan Valley is urgently needed and that no alternative project would provide better economic improvement and quality of life to the residents of this valley.

An alternative method of obtaining irrigation water was discussed in the early planning stages of the project: utilization of groundwater. However, it was determined that, although irrigation from wells had been used for limited farming, there is not enough groundwater for the larger-scale irrigation projected. The watersheds of the Yarmouk and Zarqa Rivers plus twelve main wadis will provide the water needed, leaving the groundwater for human and animal consumption.

IV. Reasons for Recommended Project Design and Environmental Measures Recommended

The choice of detailed project design was dictated by geographic and geological conditions and follows in principle the design of the irrigation system constructed at an earlier date. This earlier system has proved to be satisfactory. Basic engineering factors incorporated into the design follow generally accepted U.S. irrigation standards for both hydraulic calculation and structural details. One basic change that has been made is substitution of sprinklers in place of open ditches. While this was not done for basically environmental reasons, the fact that sprinklers will provide more effective and controllable irrigation will reflect a general improvement to the valley's environment. Measures to observe and determine the level of salinity in groundwater and to control sediment inflow into the reservoir have been recommended to the Government of Jordan for incorporation into their operating plans.

V. Effects of Special Measures on Costs of the Project

The only feature incorporated for environmental reasons is noted in II.D.3., wells or other systems for observing and measuring salinity of groundwater. The introduction of these devices would have no appreciable effect in cost of the project.

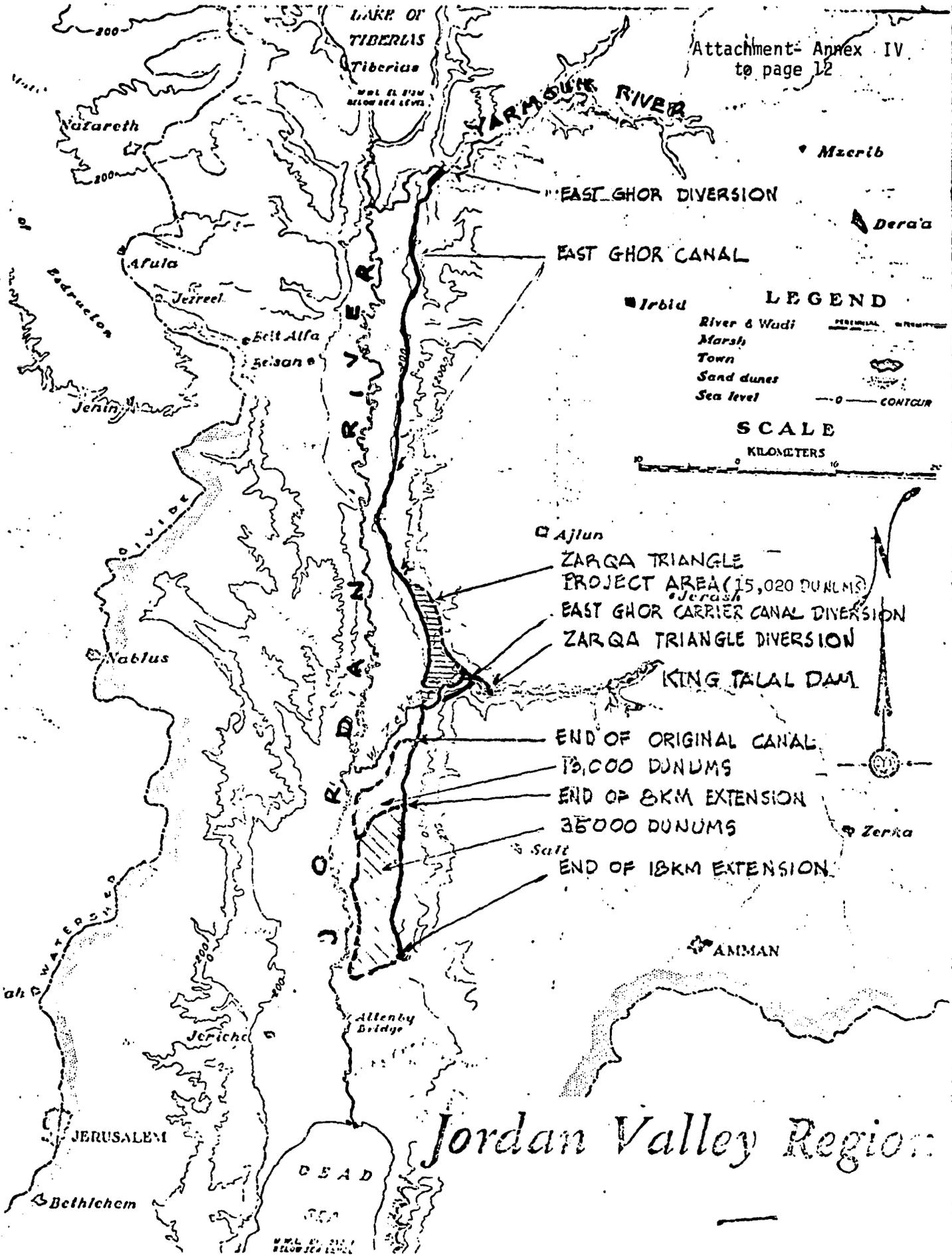
Environmental Analysis - Zarqa Triangle

VI. Environmental Aspects in Relation to Overall Cost/Benefit Analysis

As there are no discernible environmental drawbacks to the project and the cost/benefit ratio was positive using all other factors, no attempt was made to include a factor for environmental impact in the cost/benefit calculations.

Attachment:
Map

May 15, 1974



Jordan Valley Region

LAND DISTRIBUTION

The initial pattern of land distribution was set in Law 14 of 1959. Since that time there have been periodic adjustments and changes -- the most recent being in Law 12 of 1968. The current pattern is contained in Article XX of Law 12 and is as follows:

ARTICLE XX

"The Authority shall designate the farm units in the project area as follows:

(A) In determining the size and layout of irrigated farm units, the minimum size of a unit shall be approximately (30) dunums of class 3, and the maximum size of a farm unit shall be (200) dunums under irrigation. Under no circumstances may any farm unit be divided or parcelled into several units the size of which is less than the minimum fixed in this Paragraph.

(B) If the holder has lands of thirty dunums or more in the project area, the Authority shall allot to him lands in the project area according to the following formula and, if possible, shall consider him to have priority in the unit in which he has land not less than 20 percent of the size of the new unit:

<u>No. of Irrigable Dunums Held Prior to the Project</u>	<u>No. of Irrigable Dunums To Be Allotted to Holder</u>
30 - 50	To Be allotted in full.
51 - 100	Fifty dunums shall be allotted, plus 25 percent of area exceeding 50 dunums.
100 - 500	Sixty-two dunums shall be allotted plus 17 percent of area exceeding 100 dunums.
1001 and above	Two-Hundred dunums shall be allotted. As regards lands which are wholly or partially planted with trees, the Authority may, with the approval of the Council of Ministers, not be bound by the provisions of this Article in connection with areas which should be allotted to holder or holders as necessitated by the interests of the project.

The provision of this Article shall apply to all allotments effected under the East Ghor Canal Law No. 13 for the Year 1960 if allotments to each holder exceed 200 dunums and if this excess does not conflict with the technical division of allotted farm units.

(C) If the holder was holding less than 30 dunums, the Authority, if possible, may sell or lease to him additional land provided that the area of the unit allotted to him shall not be less than 30 dunums approximately if the unit is from classes 1 or 2 and not less than 50 dunums approximately if it is from class 3.

(D) The area of each unit sold or leased by the Authority to an individual or family shall not exceed the following:

1. Lands from classes 1 or 2 about 30 dunums.
2. Lands from class 3 about 50 dunums except according to a decision to be taken by the Authority.

In case the classes of land in one single unit differ, a dunum of classes 1 and 2 shall be considered equivalent to a dunum and seven-tenths of a dunum of class 3.

(E) For the purpose of organizing farm units to conform with the lateral and distribution systems and to avoid establishment of units of irregular shapes, the Vice President may in each case, with the approval of the Authority's Board, not adhere to the area limits of the unit in difficult technical cases.

(F) In case of the death of a holder or a sub-lessee, his rights in the farm unit shall revert to his heirs provided that the area of any farm unit is not thereby reduced to less than the minimum limit provided for under this Law.

(G) If the holder does not apply within the specified period for allotment of farm units to him, the Authority may not comply with the provisions of Para (B) of this Article and may take whatever action it deems appropriate concerning allotment or otherwise. Decisions taken in all cases provided for in Article VIII of East Ghor Canal Law No. 13 for the Year 1960, shall be considered final and sound."

The priorities for allocations of land are contained in Article XXIII, Section (F) of Law 12 of 1968. Section (F) is reproduced below:

"(F) The Farmers Section Committee shall select the farm family for settlement on irrigable lands within the project area or any other irrigation project area provided that priority of selection should be as follows:

First Priority - Holders who themselves exploit their lands in the project area.

Second Priority - Professional farmers residing in the project area.

Third Priority - Professional farmers from district inhabitants.

Fourth Priority - Professional farmers from inhabitants of other districts.

Fifth Priority - Holders who utilize their lands by lease or share cropping within the project area."

It should be noted from the above that absentee landowners have the lowest priority in allocation of land.

Under the laws then in effect for the original irrigation project (similar to Law 12) the Authority did allocate all of the area of the project -- approximately 117,000 dunums.

DRAFT

ANNEX VI

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

Page 1 of 3 Pages

A. I. D. Loan No. 278-H-011

CAPITAL ASSISTANCE LOAN AUTHORIZATION

Provided from: Development Loan Funds

Jordan: Zarqa Triangle Irrigation Project

Pursuant to the authority vested in the Assistant Administrator for Supporting Assistance of the Agency for International Development ("A.I.D.") by the Foreign Assistance Act of 1961, as amended, (the "Act") and the delegations of authority issued thereunder, I hereby authorize the establishment of a loan pursuant to Part I, Chapter 1, Section 103 and Chapter 2, Title I, the Development Loan Fund, to the Government of the Hashemite Kingdom of Jordan ("Borrower") of not to exceed four million five hundred thousand dollars (\$4,500,000) to assist in financing certain foreign exchange and local currency costs of goods and services for the construction of the Zarqa Triangle Irrigation Project, subject to the following terms and conditions:

1. Interest Rate and Terms of Repayment.

Borrower shall repay the loan to A.I.D. in forty (40) years, including a grace period not to exceed ten (10) years. Borrower shall pay interest on the unrepaid principal and any interest due and unpaid thereon at the rate of (a) two percent (2%) per annum during the grace period and (b) three percent (3%) per annum thereafter.

2. Currency of Repayment.

Repayment of the loan and payment of interest shall be made in United States Dollars.

3. Other Terms and Conditions.

(a) Goods and services financed under the loan shall have their source and origin in A.I.D. Geographic Code 941 countries plus Jordan.

(b) The loan agreement shall provide that prior to the first disbursement under the loan, Borrower shall submit, or cause to be submitted, the following in form and substance satisfactory to A.I.D.:

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- (1) An Agreement executed by the Jordan Valley Commission and the Natural Resources Authority setting forth the precise duties, relationships, and responsibilities of each party in the execution of the Project;
 - (2) Evidence that the provisions of Law No.12 for the year 1968, or a substantially similar law, apply to the area to be irrigated by the Zarqa Triangle Irrigation Project;
 - (3) A definitive construction schedule for the Project, established by the Jordan Valley Commission, that is coordinated with the construction schedule of the Yarmouk-Dead Sea Road Project so that the irrigation pipes for the Zarqa Triangle Irrigation Project are installed under the highway prior to road construction in the relevant areas;
 - (4) Evidence that the Borrower has obtained all rights of way necessary for temporary detours and permanent construction of transmission lines and farm access roads beside the water distribution system.
 - (5) Such other conditions as A.I.D. may deem advisable.
- (c) The loan agreement shall contain the following special covenants by Borrower:
- (1) Any United States dollars utilized under the loan to finance local currency costs shall be made available to the Borrower or its designee through appropriate procedures.
 - (2) Borrower shall maintain the Project and shall make adequate provision in its annual budget for that purpose. Such amount shall be in addition to those amounts Borrower provides in its budget annually for the maintenance and upkeep of other irrigation facilities in Jordan.
 - (3) The Government of Jordan will finance at least twenty-five per cent (25%) of the costs of the Project

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(4) Such additional covenants as A.I.D. may deem advisable.

(d) The loan agreement shall include such other terms and conditions as A.I.D. may deem advisable.

Assistant Administrator
Bureau for Supporting Assistance

Date