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

B #

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

JORDAN - ZARKA RIVER PROJECT

EAST GHOR CANAL EXTENSION

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UNITED STATES GOVERNMENT

Memorandum

TO : Mr. Arthur Handly, PPC/DPR

DATE: February 8, 1973

FROM : Frank Collins, Jr.
SA/TCD/CCD

SUBJECT: Zarqa River Complex - East Ghor Canal Extension Project

In the final approval process for the East Ghor Canal Extension Project it has been decided to reduce the amount of the loan to $10,000,000. It has also been determined that we will not seek the Administrator's approval of a source waiver for engineering services and construction supervision as outlined in the fourth, fifth and sixth sentences in para VI B of the loan paper.

You may wish to inform the DLSC members of this change in AID's position.

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

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AID-DLC/P-1059

January 26, 1973

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Jordan - Zarqa River Project
East Ghor Canal Extension

Attached for your review are the recommendations for authorization of a loan in an amount not to exceed $11,000,000 to the Government of Jordan to provide financing of the dollar and local currency costs of the irrigation network (the East Ghor Canal Extension) associated with the Zarqa River Project.

This loan proposal is scheduled for consideration by the Development Loan Staff Committee at a meeting on Wednesday, January 31, 1973.

Rachel R. Agee
Secretary
Development Loan Committee

Attachments:
Summary and Recommendations
Project Analysis
ANNEXES

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AID-DLC/P-1059
January 26, 1973

JORDAN - EAST GHOR CANAL EXTENSION AND ASSOCIATED WORKS

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ZARQA RIVER PROJECT - EAST GHOR CANAL EXTENSION

SUMMARY AND RECOMMENDATIONS:

1. BORROWER:

Borrower is the Hashemite Kingdom of Jordan and the loan will be implemented by the Jordan Valley Commission acting on behalf of the Borrower.

2. LOAN:

(a) Amount - Up to $11.0 million.

(b) Terms - To be repaid in 40 years after first disbursement including a ten-year grace period. Interest on outstanding principal will be 2 percent per annum during the grace period and 3 percent per annum thereafter.

3. PROJECT COST: The total project will cost approximately $38.4 million. The equivalent of $15.3 million has been made available as a loan from the Kuwaiti Fund for Arab Economic Development and will be utilized along with funds made available by the Government of Jordan for the construction of the Dam. With an AID loan of $11.0 million a balance of approximately $12.1 million will be financed by the Government of Jordan.

4. DESCRIPTION OF THE PROJECT: The total project consists of a Dam on the Zarqa River, a carrier canal to deliver water from the river to the East Ghor Canal, an 11-mile extension of the East Ghor Canal, the construction of laterals for the extended canal as well as some laterals related to an earlier 5-mile extension and necessary land leveling associated with both the 5-mile and 11-mile extensions of the canal. The extended irrigation network will provide irrigation for approximately 12,000 acres of additional farmland in the Jordan Valley.

5. PURPOSE OF THE LOAN:

To provide financing of the dollar and local currency costs of the irrigation network (the East Ghor Canal Extension) associated with the Zarqa River Project.

6. BACKGROUND OF ACTIVITY:

Since 1955 AID has been involved in activities related to the development of agriculture in the Jordan Valley, including the financing of the construction of the original portion of the East Ghor Canal. With the decision on the part of the GOJ to proceed with a project to better utilize the waters of the Zarqa River it is now possible to once again consider our association with development work in the Jordan Valley.

7. EXPORT-IMPORT BANK INTEREST:

The Export-Import Bank has indicated it has no interest in this project.

8. MISSION VIEWS:

The Mission endorses the proposed loan. Attached as Annex I is the Foreign Assistance Act, Section 611(e) determination.

9. STATUTORY CRITERIA:

Satisfied -- See Annex II.

10. ISSUES:

None.

11. RECOMMENDATIONS:

That a loan of up to $11.0 million to the Hashemite Kingdom of Jordan be authorized in accordance with the terms and conditions set forth in the proposed authorization in Annex III.

AID-DLC/P-1059
January 26, 1973

JORDAN

I. Background:

A. General Description of the Project Area:

The Jordan Valley lies in the most westernly part of the Hashemite Kingdom of Jordan and extends from Lake Tiberias (sea of Galilee) to the Dead Sea. The Valley is approximately 65 miles long and 2 1/2 to 10 miles wide. The floor of the valley consists of east and west terraces separated by the Jordan River and its flood plain. The terraces are referred to in Jordan as the Ghor and the flood plain as the Zor. The valley narrows considerably midway between Lake Tiberias and the Dead Sea. South of this narrow area the Ghor widens significantly on both sides of the river while to the north the widening is largely on the western bank.

The climate in the valley is predominately Mediterranean with local modifications resulting from topography and the closeness to the desert on the east. The summers are hot and dry while the winters are only moderately cold and wet. The mean monthly temperature is lowest in January when it drops to about 15 degrees Centigrade or 59 degrees Fahrenheit.

The Jordan River rising out of Lake Tiberias flows to the Dead Sea following a meandering course and dividing the valley into two approximately even strips. (For the purpose of this paper we are concerned only with the eastern half of the valley referred to as the East Bank and more specifically with the East Ghor.)

The principal water resources of the Jordan Valley are the surface waters of the rivers and wadis which flow into it. Flowing into the Jordan River from the east is water from a considerable network of rivers and wadis. Of these the most important is the Yarmouk River whose drainage area lies mostly in Syria and which enters the valley at the northern end. The second major water source is the Zarqa River whose drainage area lies almost entirely in Jordan and which enters the valley approximately 24 miles north of the Dead Sea. Due to high salinity the Jordan River, itself, is not suitable as a source of water for irrigation.

This project is related to the utilization of the presently uncontrolled waters of the Zarqa River to augment the flows of the Yarmouk River in the existing East Ghor Canal and thus make possible the extension of the East Ghor Canal by approximately 11 miles and the irrigation of an additional 12,000 acres of the East Ghor lying below the canal.

The Jordan Valley is the single best agricultural asset of Jordan and its continued development can both reduce the current substanial imports of agricultural products as well as increase the exports

of specialized agricultural products to Jordan's immediate neighbors and to Europe during the winter months.

B. Project History:

Initial work on a project to develop the irrigation potential of the East Ghor began with the "Yarmouk-Jordan Valley Master Plan Report" of 1955 (Michael Baker, Jr. and Harza Engineering Company) which recommended as Stage I the original portion of the East Ghor irrigation project. The Stage I system was designed to irrigate approximately 30,000 acres from the unregulated flow of the Yarmouk River plus six smaller perennial streams. The project included a tunnel and main canal totaling approximately 43 miles in length and a distribution system of 250 miles of small concrete lined laterals to provide delivery of measured quantities of water to some 3,450 farm units. This initial construction for the main canal was financed by AID as were various technical assistance inputs necessary to the total project. AID inputs totaled slightly over $12 million while the Government of Jordan contributed in cash and in kind, the equivalent of $9 million. Prior to the Arab/Israeli War of June 1967, a study of "pre and post Canal" indicated that the net income per acre in the project area rose from $24.64 (JD8.8) in 1959-60 to $152.32 (JD54.4) in 1965-66 and that the gross agricultural income reached a high of $5.9 million in 1965-66.

The work which AID was involved with was substantially completed in 1966 and since that time the GOJ has constructed an additional five miles of the main canal. Land leveling work required in connection with this five-mile extension has not yet been undertaken and will be part of the total project discussed in this paper.

Other donors from time to time have been active in various phases of work in the Jordan Valley. Some of the existing elements of the East Ghor irrigation system have been financed with U.K. assistance and technical assistance projects related to agriculture have been financed by the UNDP.

C. Borrower and Implementing Agency:

The borrower will be the Hashemite Kingdom of Jordan and the implementing agency will be the Jordan Valley Commission. The Commission was established by Royal Decree in the fall of 1972 with the function of preparing and implementing the plan for development of the Jordan Valley. The Commission is specifically charged with negotiation with donor countries and agencies and to ensure coordinated project preparation and implementation. The Commission is headed by H.E. Omar Abdallah currently Minister of Agriculture.

Since 1959 a series of laws have set up the framework for the development of the East Ghor. All the basic laws share the same major features relating to the delineation of the project area that is being (or will be) irrigated by the East Ghor Canal and the authorization

of the East Ghor Canal Authority, its successor, the National Resources Authority and the most recent entity, the Jordan Valley Commission, (See Annex IV for organization of the Commission) to develop the area and to assign water allocation to it. The authorization extends also to dividing the area into farm units; to limiting the size of farm units and the setting of a system of priorities for selection of holders. The legal framework also authorizes the establishment of committees of of evaluation and appeal in connection with land and other rights to be surrendered by farm landowners and of the new land units and water rights to be assigned to new holders; to determine the manner of settlement of accounts between the Authority and new holders; and generally to operate the Project.

The present Head of the Jordan Valley Commission has been associated with the work of the various organizations mentioned above for many years and is highly respected as an administrator.

D. Relationship to AID Interests -- Strategy in Jordan:

Jordan depends primarily on agricultural commodities and services which provide, with the help of foreign aid, a per capita income of about $286 per year. The country's dry climate and rocky terrain limit agricultural production and the small industrial sector accounts for less than 10 percent of the Gross National Product.

Prior to the 1967 war with Israel, Jordan had 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 Palestinean 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 its 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 had rebuilt its planning capability and had adopted a nation-wide development strategy so that individual projects could be reviewed within an overall context.

Heeding the 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 which was held in Jordan in November. We 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, including representatives from the International Bank for Reconstruction and Development, the United Kingdom and the Federal Republic of Germany, were impressed with the plan and indicated that they would recommend that their governments and institutions provide development assistance to Jordan in support of the plan.

We were, of course, unable to assess the Jordanian planning capability or to focus on possible projects for US developmental assistance until the plan was completed. Given the importance to the US of renewed economic development in Jordan and the commendable nature of the Jordanian planning effort, we have since concluded that US support in FY 1973 is warranted.

II. Technical Analysis:

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 Figure 1) 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.

c. East Ghor Canal, concrete-lined, capacity at intake approximately 706 cfs (20 cms) 48 miles (78km) 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. New Irrigation Development:

The construction work envisaged under this project includes the following:

a. Rumeimin (King Talal) Dam:

This dam (currently under construction) is located on the Zarqa River approximately 4 miles (6.5 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 (JD9.8 million).

While the dam is a key feature in the present project it will not be financed by the proceeds of the AID loan. Financing is being provided jointly by the Governments of Jordan and Kuwait.

The dam will have the following characteristics:

Item	Size
Height	303 ft. (92.5 m)
Crest length	1278 ft. (390 m)
Spillway capacity	104,000 cfs. (2950 cms)
Freeboard	6.5 ft. (2 m)
Storage capacity	32,400 ac.ft. (40 mcm)

The dam will be an earth fill embankment having a clay central core with filter zones, supporting shells of random fill and dumped rip-rap protection of the upstream dam face. Within the zones of clay core and adjacent filters the overburden will be removed and a cut-off trench excavated down to the rock. The core will be keyed into the cut-off trench. Crushed sandstone and alluvial sandy gravel deposit will be used for the filter zones and random fill material will be excavated from the spillway channel.

The foundation treatment will be adjusted to the rock into which the dam is founded. In the part which belongs to the Zarqa formation having generally favorable permeability characteristics, the planned clay-cement grout curtain will be placed to a depth of 98 feet (30 m). In the zone of poorly cemented Kurnub sandstones the essential problem is the permeability of the rock and its susceptability to piping. Several measures are planned with a view to decreasing the exit gradients and washing out of material. A concrete diaphram is to be provided at the left abutment and well drainage will be executed from the galleries. Because of the steep bank the diaphram will be constructed by tunneling. The aim of the diaphram is to reduce the exit gradients in case of failure of the drainage system. The function of the drainage wells is to collect, without washing out of the sandstones, the seepage water

and to prevent its upward movement and its resurgence at the ground surface.

On the right abutment the problem is more acute owing to the greater depth of the sandstone. Besides the measures described for the left bank it is also planned to construct filters over the sandstone toward the downstream toe of the dam. In addition, at the contact of the downstream dam shell with the sandstone, a drainage carpet will be constructed.

It should be mentioned that no important fault intersects the dam foundation and this constitutes an important advantage for the site selected (Rumeimin downstream). There is every reason to believe that with cut-off excavations, foundation grouting and drainage galleries, a completely satisfactory earth-fill dam can be constructed.

b. Zarqa River Diversion and Carrier Canal:

The diversion for the carrier canal will be located on the Zarqa River approximately 2.8 miles (4.5 km) downstream from the Rumeimin Dam which is currently under construction. This site is approximately 0.6 mile (1 km) downstream from the existing Deir Alla diversion. The purpose of the carrier canal, length 1.5 miles (2.5 km), is to deliver regulated releases of the Zarqa River into the East Ghor Canal. The capacity of the carrier canal is 265 cfs. (7.5 cms).

c. Extension of East Ghor Main Canal:

Under the present project the main canal will be extended southward from Station 78 to Station 96, a distance of approximately 11.2 miles (18 kms). Its initial capacity will be 388 cfs. (11 cms).

The main canal is laid out to run south from the end of the recently constructed 5 mile (8 km) extension, along the boundary of the Ghor for about 10 miles (16 kms) and then through the Ghor another 1.2 miles (2 km) toward the Dead Sea. The first several miles cross rough terrain similar to that encountered in the 5 mile (8 km) extension, with many difficult wadi crossings. The latter part is through relatively flat land. This 11.2 mile (18 km) concrete-lined extension is the end of the present project. However, it is planned to ultimately extend the canal on southward for an additional distance of 12.7 miles (20.4 kms) terminating near the Dead Sea. This final canal extension will not be undertaken until the proposed Khalid Bin Al Walid Dam on the Yarmouk River is constructed. The Yarmouk storage, 162,000 ac.ft. (200 mcm) will provide the water necessary for ultimate project development.

The slope of the canal in the location which is to be built now is 0.0002 and the shape in most reaches is trapezoidal with side slopes of 1 1/2 horizontal and 1 vertical. The freeboard with

respect to the concrete lining is 1 foot (0.3 m) and 3.6 feet (1.1 m) with respect to the top of the canal embankment. In steep, rocky stretches a reinforced rectangular section is specified. The position of the cross section with respect to the natural ground was established as a compromise between balancing cut and fill and the desirability of having the water line below and the undisturbed ground, and still controlling the irrigable area.

Whenever the main canal had to cross a major wadi and the choice of a culvert was ruled out because of excessive backfill, related costs and complications, a choice was made between a flume and an inverted siphon. A decision was made after due consideration of costs, structural problems and the aspect of safety from enemy attack and sabotage. Overchutes and wasteways have been specified, as required, along the canal.

d. Lateral Network:

The project area, located on the Southeast bank of the Jordan River, is composed of Ghor, Zor and Wadi lands (these physiographic provinces are described under Section II-C "Geology"). Based on the location and method of water delivery these lands may be divided into several sub-areas as follows:

(1) Ghor Lands:

(a) above East Ghor Canal extension irrigated by pumping from the main canal (3 areas);

(b) above East Ghor Canal extension irrigated by water taken directly from side wadis (3 areas);

(c) below East Ghor Canal extension irrigated by gravity with water distributed by concrete-lined canals with takeouts from the main canal.

(2) Zor Lands:

(a) Northern area irrigated from Zarqa Canal which has its turnout upstream from beginning of the present project;

(b) Several smaller areas located in the southern part supplied by pipelines from the system of the Ghor area.

East area is divided into Headgate Units which in turn are divided into individual farm plots. Generally all available flows, augmented by storage releases when necessary, would be diverted into the main canal. From the main canal water flows into the secondary canals or is pumped into secondary pressure lines. From the secondary canals water is turned out into the Headgate Units where it is distributed by.

tertiary and quarternary canals. At night the flows are stored in night storage reservoirs. For wadi areas the flows are used before getting into the main canal. Except in the Zor, where pipes are used for distribution, the farm distribution system is based entirely on the use of trapezoidal concrete-lined canals.

The lateral network includes the following:

(1) Area above Main Canal (Pumping and Wadi Areas):

(a) Secondaries:

89,600 feet (27,250 m) canal with cross sections from 12" x 12" (30 cm x 30 cm) to 16" x 33" (40 cm x 85 cm).

(b) Tertiaries and Quarternaries 282,000 feet (85,900 m) canal with cross sections from 12" x 12" (30 cm x 30 cm) to 12" x 16" (30 cm x 40 cm).

(2) Area Below Main Canal (Ghor):

(a) Secondaries - 109,500 feet (33,400 cm) canal with cross sections from 12" x 12" (30 cm x 30 cm) to 16" x 24" (40 cm x 60 cm).

(b) Tertiaries and Quarternaries 1,305,000 feet (398,450 cm) canal with cross sections from 12" x 12" (30 cm x 30 cm) to 12" x 20" (30 cm x 50 cm).

e. Land Levelling:

The land levelling requirements of a given farm plot are a function of its natural slope and the desired slope after grading operations. Each of the accepted methods of irrigation has a range of slope and cross slope that is associated with a high degree of irrigation efficiency. It is sometimes not possible to obtain optimum land levelling conditions either because of the high cost of earth moving or because of the shallowness of the soil which does not allow excessive cuts. Under such conditions the field is divided into several sub-planes, separated by terrace drops, and each smaller area is graded to the desired slope.

The NEDECO preliminary design report (October 1970) gives the following table showing four classifications of project lands according to the estimated volume of levelling required:

Land Type	Average Cut		Area	
	cu yd/ac.	cm/dunum	acres	dunums
1	5	15	6,520	26,408
2	16	45	12,930	52,409
3	26	80	13,500	54,604
4	453	140	3,670	14,864
		Total	36,620	148,285

The land levelling to be accomplished under the AID-financed portion of the project includes 3,210 acres (13,000 dunums) adjacent to the previously completed 5 mile (8 km) main canal extension and 8,650 acres (35,000 dunums) adjacent to the 11.2 mile (18 km) proposed canal extension.

f. Night Storage Reservoirs:

In order to reduce the danger of water-logging, to increase crop yields and to achieve a higher irrigation efficiency, it has been decided to eliminate night irrigation by the provision of night storage reservoirs. The location of each reservoir has been selected so that it can be filled by turnouts from the main canal and yet have its discharge dominate the area below it. The capacity of each reservoir has been made so that it can hold the 10-hour night flow during the peak period for the area benefitting from it. This includes the area it dominates plus areas that might also fall above its water elevation but whose night flows it also stores.

The sizes of the reservoirs are based on a 5 foot (1.5 m) depth of useful storage and a 1.6 foot (0.5 m) freeboard. The sideslopes are 1.5 horizontal and 1 vertical. The orientation and shape are influenced by the particular topography, but in general, are 2 x 1 rectangular shape, with the length along the gentler slope recommended. The sides of the reservoirs will be constructed with a concrete lining approximately 3 inches (8 cm) in thickness.

At first the reservoir bottoms will be unlined and they will be tested for infiltration. If infiltration is not sufficiently reduced by silting, concrete lining of the bottoms will be undertaken.

The night storage reservoirs are located as follows:

Number	Location
30	Ghor Area
8	Pumping Area
10	Zor Area
48 Total	

Their capacities vary from 0.8 ac.ft. (972 cm) to 22.9 ac.ft. (28,227 cm).

B. 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 rainfall decreases from 15.8 inches (400 mm) at the southern end of Lake Tiberias to less than 3.9 inches (100 mm) in the extreme south of the valley near the Dead Sea. 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.

C. Geology:

The formation of the Jordan Rift Valley started in the early Miocene Epoch, Tertiary Period, of the Cenozoic Era. It was caused by down-faulting, coinciding with uplifting and tilting of the eastern plateau and folding of the western plateau. These tectonic movements continued through the Pliocene Epoc of the Tertiary Period and the Pleistocene Epoc of the Quaternary Period.

During the Pliocene Age it is believed that two lake basins existed in the valley, a northern basin and a southern basin, separated by the Qarn El Amer Ridge.

The Pleistocene Age was characterized, in this part of the world, by a series of alternating pluvial and interpluvial periods -- depending on the period the valley was occuppied by one or several lakes.

As time passed the filling of the rift valley started with sedimentary freshwater limestones, sandstones and clays, the deposits being more calcareous toward the south. Overlying these freshwater deposits are the Lisan marls, deposited during the Middle Pleistocene. Physiographically the Jordan Valley can be divided into:

1. The Uplands bordering the actual valley;

2. The Ghor, a terrace 98-196 feet (30-60 m) above the present level of the Jordan River, sloping downwards from the foothills to the Katar. The Ghor terrace has an average slope of 1-3 percent and is 1.2-2.5 miles (2-4 km) wide in the north. Farther south, the valley opens up to both sides; here the Ghor is about 2.5-3.7 miles (4-6 km) wide and may be sub-divided into the Upper Ghor, the Central Ghor and the Lower Ghor respectively from the foothills down to the Katar;

3. The Katar, a 'bad land' zone, forming the transition between the Ghor and the Zor;

4. The Zor, the present flood plain of the Jordan River.

During the last interpluvial period in the upper Pleistocene, the so-called "Lisan Lake" started to retreat under the influence of

continued evaporation and lowering of the hydrostatic level (Dead Sea level). The retreat was in stages, forming many new shore lines in the process. In the last stage the Jordan River evolved. The River subsequently cut through the Lisan formation and gradually worked its way backwards towards the north. With the widening of the flood plain, the Zor came into being. The Lisan Lake deposits, emerging as a terrace above the river level, were covered in later periods by fluviatile-colluvial sediments originating from the bordering uplands. This terrace is referred to as the Ghor. Runoff from the Ghor terrace eroded the Ghor-Zor transition zone, giving it its present bad land appearance (the Katar).

D. Soils and Land Classification:

A soils survey and land classification exercise was undertaken by Baker-Harza in 1953-54. US 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 (Lacustrine, Fluviatile and Alluvial) were further differentiated into 27 types. The land classified and mapped in the more recent survey is summarized below:

Class No.	Description	Area Acres	Area Dunums
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	10,750	43,540
	Total Suited	90,860	367,950
	Total Unsuited	77,600	314,180
	Grand Total	168,460	682,130

E. 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, watermellons 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 present cropping pattern (intensities) and those anticipated for future years 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).

Crop	Present	1975	1980	1990	2000
Vegetables	64.0%	56.1%	56.1%	56.2%	56.2%
Fruit	10.5	7.6	9.2	10.0	13.8
Cereals	32.3	47.0	44.6	37.4	18.8
Fodder	--	2.8	7.0	16.3	30.8
Total Intensity	106.8%	113.5%	116.9%	119.9%	119.6%

F. Water Resources:

1. Hydrology:

The principal water resources of the project area are the surface flows of the Jordan River and its tributories. 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 in also 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:

Stream	Drainage Area		Total Annual Flow					
			AVERAGE		MAXIMUM		MINIMUM	
	sq. mi.	sq. km.	m ac.ft.	mcm	m ac.ft.	mcm	m ac.ft.	mcm
Yarmouk	2,630	6,805	.356	438	.705	870	.235	290
Zarqa	1,330	3,440	.069	85	.120	148	.023	29
Side Wadis	446	1,156	.091	112	.139	172	.035	43
Total	4,406	11,401	0.516	635	0.964	1,190	0.293	312

The total annual base flows are as given below:

Stream	Total Annual Flow					
	AVERAGE		MAXIMUM		MINIMUM	
	m ac.ft.	mcm	m ac.ft.	mcm	m ac.ft.	mcm
Yarmouk	--	--	--	--	--	--
Zarqa	.044	54	.080	99	.023	28
Side Wadis	.079	98	.118	146	.035	43
Total	0.123	152	0.198	245	0.058	71

The maximum monthly flow (about one-fourth of the annual total) on the Yarmouk and Zarqa Rivers occurs in the month of February. On Wadis Arab and Ziglab the maximum flow occurs in January and in the other wadis in March.

According to the Jordan Valley Three-Year Plan the required irrigation water can be drawn from the following sources:

		m ac.ft	mcm
(a)	Uncontrolled flows of Yarmouk River	0.235	290 (min.)
(b)	Uncontrolled flows of side wadis	0.035	43 (min.)
(c)	Controlled flows of Ziglab, Zarqa, Shueib and Kafrein	0.039	48
(d)	Ground Water	0.008	10
	Total Available Annually	0.317	391

2. 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 from the principal tributaries are as follows:

a. Yarmouk River upstream from Khalid Bin Al Walid Dam site: 420-720 micromhos/cm.

b. Springs below the dam site: 1700-2400 micromhos/cm.

c. Yarmouk River below the springs: 530-820 micromhos/cm.

d. Zarqa River: 850 micromhos/cm.

e. Other side wadis: 400-500 micromhos/cm.

According to USDA standards water having a conductivity 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/cm 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.

3. 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 any reservoir would not exceed 0.5 percent of the total storage capacity.

The ENERGOPROJEKT Report (1971) gives the following values for suspended load, based on measurements made in 1963-64 and 1968-69, for the Zarqa River:

Dam Site	Average Annual Suspended Load (Million tons)	Average Annual Suspended Load ac.ft.	mcm
Rumeimin	1.31	1,380	1.70
Mastaba	0.60	623	0.77

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

4. 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. The estimated cost of this work is $895,000 (JD318,347) and funding 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.

5. 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 $702,500 (JD250,000) will not be chargeable to the AID loan.

6. 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 studies entailed the use of a pressure supply tunnel, a short surface penstock and a powerhouse located immediately downstream from the Runemin Dam.

This plan was designed on the basis of an installed discharge of 265 cfs (7.5 cms) which is equal to the maximum discharge of the main irrigation canal. The guaranteed power was determined as the minimum discharge needed for the irrigation system, i.e., 26 cfs (0.74 cms) assuming eight hours per day of operation.

The following table shows the basic statistics relative to that scheme:

Gross Head	316 ft. (96.5 m)
Installed Power	5000 kw
Guaranteed Power	1590 kw
Average Output per Year	15.8 million kwh
*Relative Power Value	1.34

*NOTE: If the relative power valve is less than unity, the construction and operation costs of the considered hydro plant would exceed the savings to be gained over a thermal plant and the hydro is not economically feasible.

In order to secure the best economic benefits it is proposed that the hydro-power station be used as a "peaking plant," in conjunction with thermal plants with an estimated period of operation from 6-8 hours per day. A decision has been made not to construct the hydroelectric features of the dam during the initial construction phase. This portion may be constructed later, if funds become available.

7. Water Requirements:

The Jordan Valley Three-Year Plan gives the following tabulations of existing and proposed irrigated areas:

Description	Existing Irrigation		New Irrigation		Total	
	acres	(dunums)	acres	(dunums)	acres	(dunums)
Existing East Ghor	27,400	111,000	--	--	27,400	111,000
N.E. Ghor Side Wadis	2,005	8,137	6,030	24,410	8,035	32,547
*Zarqa River Project	--	--	11,900	48,171	11,900	48,171
Shueib, Kafrein, Hisban Complex	1,300	5,260	1,950	7,890	3,250	13,150
Total	30,705	124,397	19,880	80,471	50,585	204,868

*See next page.

*NOTE: AID loan funds will be used to finance irrigation facilities for only 11,900 acres (48,171 dunums). The balance of new irrigation 7,980 acres (32,300 dunums) will be developed by the Government of Jordan using funds from other sources.

The ENERGOPROJEKT Study gives a slightly higher total, i.e., 53,600 acres (217,231 dunums).

The NEDECO Report (1969) gives unit diversion requirements for various irrigation efficiencies as follows:

Year	Unit Diversion Requirement					
	60% Eff.		65% Eff.		70% Eff.	
	ac.ft/ac	cm/dunums	ac.ft/ac	cm/dunum	ac.ft/ac	cm/dunum
1975	2.16	139.2	2.84	866.9	2.64	805.0
1980	3.62	1102.2	3.33	1017.5	3.09	944.7
1990	4.02	1223.9	3.69	1129.8	3.44	1049.0
2000	4.48	1368.5	4.13	1263.2	3.85	1173.0

Multiplying the maximum unit diversion 4.48 ac.ft./ac (1368.5 cm/d) by the maximum irrigated area 53,600 acres (217,231 dunums) gives a total annual diversion requirement of 241,000 ac.ft. (297 mcm). Since this requirement is well below the available supply 317,000 ac.ft. (391 mcm) it appears that there is sufficient water to meet the full demands for 30,705 acres (124,397 dunums) of existing irrigation plus that needed for 19,880 acres (80,471 dunums) of new land as well.

G. Cost Estimates:

The following table shows a breakdown of estimated costs for the project:

No.	Item	Cost (Millions)			
		JD	Dollars	JD	Dollars
1.	King Talal Dam (Rumeimin)			9.8	27.4
2.	Irrigation System				
	Diversion Structure and Carrier Canal	0.251	0.706		
	Main Canal Extension (18 km)	0.950	2.673		
	Irrigation Network-laterals, land levelling and night storage reservoirs for 12,000 acres (48,000 dunums)	1.685	4.719		
	Contingencies (25%)	0.718	2.020		
	Engineering Fees (11%)	0.313	0.880	3.9	11.0
	Total			13.7	38.4

Notes: Item No. 1 $27.4 million (JD9.8 million) to be financed jointly by Governments of Jordan and Kuwait.

Item No. 2 $11.0 million (JD3.9 million) to be financed by AID loan.

H. Construction Schedule:

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

Event	Estimated Completion Date
King Talal Dam and Appurtenant Works	Oct. 1974
River Diversion Structure and Carrier Canal	Apr. 1974
Land Levelling and Night Storage Reservoirs adjacent to 5 mile (8 km) extension of Main Canal	Dec. 1973
Extension of Main Canal 11.2 miles (18 km)	Sept. 1974
Distribution System, Land Levelling and Night Storage Reservoirs adjacent to 11.2 mile (18 km) Main Canal Extension	Sept. 1974

I. Management:

The management and operation of the project will be the responsibility of the Jordan Valley Commission. The organization of that entity is discussed in Annex IV.

J. Technical Soundness:

The AID Project Engineer has reviewed all available engineering data, feasibility reports and the Government of Jordan's Three-Year Plan for the rehabilitation and development of the Jordan Valley, which includes the proposed work, and finds the technical requirements 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 to the US Government are adequate to meet the applicable requirements of Section 611 of the Foreign Assistance Act.

III. Economic Analysis:

A. Agriculture and the Jordanian Economy:

Agricultural production constitutes approximately 16 percent of the Jordanian gross domestic product ($90.2 million of $541.2 million). The agricultural section also comprises the largest group both of exports and of imports ($10.3 million and $56.4 million, respectively). Of particular interest, fruits and vegtables are the products most efficiently

grown in the Jordan Valley hothouse and constitute the largest group of agricultural imports in 1971; this group of products also is potentially the greatest foreign exchange earner for Jordan.

Although there has been constant improvement in agricultural productivity during the past decade, instability created by the Arab/Israeli War of 1967 has created some uncertainity in markets; approximately one-third of Jordan's tomato crop rotted on the vines last year because a closed frontier with Syria deprived Jordan of a traditional winter market. Recent accommodations between Jordan and Syria should eliminate these impediments to agricultural trading.

B. Irrigation:

The proposed Zarqa Irrigation Project is a continuation of Jordan Valley development which AID has supported since 1959. It would make possible use of regulated waters to bring new land into cultivation and to shift to much more valuable crops. It also makes possible cultivation during seasons when market demand and prices for particular crops are highest. In addition to higher yields per acre, the irrigated land will support more farmers and workers per acre than without irrigation.

An earlier Jordan Valley irrigation project supported by AID in 1959-63 irrigated 30,000 acres by channeling water from the Yarmouk River into a canal system ending just north of the Zarqa River. This project cost $21 million ($700 per acre). Its immediate benefit to farmers in the irrigated area was a 400 percent increase in net yield (from about $24 per acre in 1959 to $121 in 1964-65 the first growing season after completion). There was a further 25 percent increase in yields (to $152 per acre) in 1965-66 before the 1967 war disrupted production. Farmers are now returning to this area, and the irrigation works are largely intact despite considerable destruction of machinery and buildings.

C. Benefit/Cost Ratio:

The proposed extension of the irrigation system south of the Zarqa River will provide water to approximately 12,000 acres. The total project cost is estimated at $38.4 million (about $3,200 per acre) of which the AID portion is $11 million (about $920 per acre). All of these costs are, for purposes of conservative benefit/cost comparison, attributed to irrigation. Some flood mitigation will also be provided initially and, ultimately, the dam and related works could be modified to serve small electric power development.

The yield per acre in the newly irrigated area should increase from a scant $2 to approximately $450 per acre per year by 1976 because much more valuable fruit and vegetable crops will be made possible by irrigation. This estimate is supported by studies conducted by a

Yugoslav firm (ENERGOPROJEKT) and a Dutch firm (NEDECO) using crop forecasts considered conservative by AID and the IBRD. Price variations are considerable from month to month through the year, but prices of irrigated crops have held fairly constant from year to year in the 1950's and 1960's (period of the Yugoslav and Dutch studies). Some market loss might occur if neighboring countries also increase irrigation, but any loss on this account would be more than offset as exports to the European market are opened up.

Operation costs, but not social costs (housing, etc.) were considered. On this basis and applying a 6 percent discount (interest) rate, the total present worth of benefits is $80 million ($6.720 per acre). Annual equivalent benefits are $425 per acre. The benefit/cost ratio is 2.04 to 1.

D. Economic Benefits:

The two primary economic benefits accruing from the extension of the East Ghor Canal and Associated Works is a significant reduction of agricultural imports and creation of a substantial net export in fruits and vegetables. Depending on the exact cropping pattern and the degree of mechanization, 5,000 to 17,000 people would earn their livelihood in the area to be irrigated. The economic priority of this project is dictated by lack of alternatives. No other development project currently considered economically viable will have as positive an effect on Jordan's balance of trade or will create as many permanent jobs as the proposed extension of the East Ghor Irrigation Canal.

IV. Financial Analysis:

A. Financial Requirements:

The overall cost of the Zarqa Irrigation Project is currently estimated to be $38.4 million (JD13.7 million). Of this amount, $27.4 million is required for construction of the King Talal Dam on the Zarqa River and $11.0 million for the irrigation works. It is proposed that the US lend the Government of Jordan adequate funds for the construction of the canal and associated irrigation works, and that Kuwait and the Government of Jordan split the cost of the dam, approximately 60/40 percent respectively.

B. Financial Plan:

Through the end of CY 1972, $5.3 million will have been spent for engineering, site preparation and construction of the King Talal Dam which will regulate the Zarqa River. Of this amount Kuwait supplied $2.8 million and GOJ the remaining $2.5 million.

Of the approximately $33.1 million required for completion of the project it is anticipated that the Kuwait Loan Fund will contribute

approximately $12.5 million in CY 1973-74 and the GOJ will put up $4.8 million each year in local currency. During this period the proceeds of the proposed US loan to Jordan, ($11.0 million), should be made available to meet the cost of construction of the canal and the associated irrigation works.

It should be noted that the US contribution to the overall project is less than that of either Kuwait or the Government of Jordan.

C. Capacity of the Borrower to Service External Debt:

The Government of Jordan has consistently met its obligation to support bilateral and multilateral development projects and has serviced its external debt (including to AID) on schedule. Total GOJ external debt service is currently only $10.47 million annually. However this relatively favorable position has been maintained in recent years only by grant foreign assistance to overcome severe trade deficits since the 1967 war.

The trade imbalance has averaged $143.8 million annually for the past five years. These deficits are substantial for a country with a $550 million gross domestic product. There was some improvement in exports in the latter half of 1972. Other improvements may follow the recent reopening of the Syrian frontier, but the trade deficit remains a serious problem.

Analysis of Jordanian trade indicates that much of it (about 19 percent of imports and 45 percent of exports in 1971) is in the food category. The proposed project would enable Jordan to depend less on imports and to expand exports of virtually all of the crops to be increased. Assuming conservatively that only half of this production would help reduce trade deficits, about $2.5 million of annual improvement in debt service capacity would begin in 1976 against a peak (after the ten-year grace period) of debt service increase attributable to the project (including service on the Kuwaiti loan)of $1.6 million.

D. Availability of Other Sources of Financing:

The largest single contributor to this project is the Kuwait Loan Fund. Other potential donors have periodically expressed passing interest in the Zarqa project, but all of them are currently studying other potential development investments.

The Export-Import Bank is not interested in this project.

V. Other Considerations:

A. Impact on the US Economy and Balance of Payments:

This ($11.0 million) loan will finance both dollar-purchased services and commodities and local currency for services and commodities

Purchased in Jordan. It is estimated that approximately 60 percent of the loan funds will be used to cover the foreign exchange costs of construction contract and for imported commodities needed for the project and that the remaining 40 percent will finance local currency costs.

AID procurement procedures will apply to all procurement of goods and services financed by this loan. US suppliers of goods and services will have ample opportunity to bid. The relatively small sums involved will have little net effect on the US balance of payments. The completed project will not produce goods that substitute for US exports or result in exports to the United States so that there will be no adverse impact on US labor or agriculture.

B. Effect on Private Enterprise:

AID procurement procedures encouraging privately-owned enterprises to supply goods and services to the project will be followed. In addition, the project will provide opportunities for three times as many people to operate small farms and businesses as are normally on the land. The farm production will require processing and packaging as well as transportation to markets and agro-service business will be required to serve the farmers both with the goods such as fertilizer and pesticides and sales and repair services for farm equipment. Small merchants will be needed to supply the household needs of farm and other families.

C. Impact on the Environment:

See Annex V for a statement on the environmental impact.

VI. Implementation:

A. Financing Procedures:

Construction contracting and commodity procurement will be subject to AID Capital Project guidelines. The eligible sources of commodities and services will be those countries covered by AID Georgraphic Code 941 plus Jordan itself.

B. Engineering Design and Supervision of Construction:

The design of the irrigation network to be financed has been done by Netherlands Engineering Consultants (NEDECO) and Dar Al-Handasah, Consulting Engineers, Beirut. It is anticipated that they will continue to serve as the Engineer for supervision of construction. It is not practical to change engineers at this stage of project development. Financing of those costs chargeable to NEDECO will require a waiver. Authorization of this loan will constitute a source waiver for the services contract with NEDECO, the Hague, the Netherlands of approximately

$1,100,000. That portion of the costs attributable to Dar Al-Handasan would be eligible without waiver as Lebanon is an eligible source under AID Geographic Code 941.

C. Land Distribution and Tenure Arrangements:

The Government of Jordan, through the Jordan Valley Commission, will be expected to carry out the same land distribution and tenure process that was applied in the earlier East Ghor Canal Project area and which is now contained in Law No. 12 for the year 1968. An appropriate condition precedent will be included in the loan agreement requiring that Law No. 12, or a substantially similar law apply to the project, and a covenant will be included assuring implementation of the law. (See Annex VI for a description of the land distribution criteria and priorities.)

D. Water-Use Charges:

Water charges in the existing irrigation area are currently one fil (JD.001) per cubic meter for the first 2,000 cubic meters and two fils (JD.002) per cubic meter thereafter. While this charge has been reasonably adequate to cover the costs of administration of the existing project, it is clear that in the long term these charges must be increased to generate the cash flow required for a viable self-supporting project. ENERGOPROJEKT in its study of the Zarqa River Project has proposed a gradually increasing water-use charge over an eight-year period following the completion of the irrigation works. Government of Jordan officials have stated in discussions with AID representatives that they recognize the need to raise water-use charges, and propose to do so in general conformity with the recommendations of the ENERGOPROJEKT study, taking into consideration the actual ability of the farmers to pay.

VII. ISSUES:

None.

ANNEX I

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

AMMAN — JORDAN

وكالة الولايات المتحدة للانماء الدولي

عمان — الاردن

AID-DLC/P-1059
January 26, 1973

OFFICE OF THE DIRECTOR

مكتب المدير

CERTIFICATION

IN

COMPLIANCE WITH SECTION 611 (e) of Foreign Assistance Act

I, William D. Wolle, Acting Director 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 utilize the capital assistance to be provided by the Zarqa River Project, East Ghor Canal Extension Loan.

William D. Wolle
Acting Director
USAID/Jordan

DATE: January 13, 1973

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. COUNTRY PERFORMANCE

A. Progress Towards Country Goals

1. FAA §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 Project1/ will directly increase food production. For details, see Section III A-B of the Capital Assistance Paper.
(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.

1/ When used in this statutory checklist the word "Project" refers to the East Ghor Canal Extension Project to be financed by this Loan.

(c) Increasing the people's role in the developmental process.	Law No. 12 for the year 1968, which will be applicable to this Project, provides for a land distribution plan which favors small farmers. This plan is used in other areas to favor small farmers. For details, see Annex VI to 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 participate extensively in the related Zarqa River Project, to the extent of $13.1 million. For details see Section IV A-B of the Capital Assistance Paper.
(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 this Project, favors individual freedom, initiative, and private enterprise by encouraging resettlement of small farmers, many of whom are presently refugees. For details, see Annex VI to 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 standards of living of all its people.

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B. Relations with the United States

1. FAA §620(c). Is the government indebted to any U.S. citizen for goods or services furnished or ordered where: (a) such 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 §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 productive enterprise to be constructed by this loan - both the irrigation works and the farms to to be irrigated - will not compete with U.S. enterprise.

3. FAA §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 the GOJ.

4. FAA §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 permit such action.

5. FAA §620(l). Has the government instituted an investment guaranty program under FAA §221(b)(1) for the specific risks of inconvertibility and expropriation or confiscation?	Yes.
6. FAA §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 vessel on account of its 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 §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 §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 §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 military action with other Arab countries.
2. FAA §§ 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 §§ 620(u); App. 108. 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.

D. Military Situation

1. FAA §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.

2. FAA §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 has 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 judgment that the GOJ is not diverting its own resources to unnecessary military expenditures.

II. CONDITION OF THE LOAN

A. General Soundness

-- Interest and Repayment

1. FAA §§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 §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 a complex dam and irrigation project, the Zarqa River Project, financed, in large part, by Kuwait. For details on this financing and on other free-world financing for other GOJ projects and programs, see Section IV of the Capital Assistance Paper.

Economic and Technical Soundness

1. FAA §§ 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. For details, see Annex IV to the Capital Assistance Paper. The planned project is both economically and technically sound. For details, see Section III of the Capital Assistance Paper.
2. FAA §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 $11,000,000 to the U.S. has been completed. These are discussed in detail throughout the Capital Assistance Paper.
3. FAA §611(b); App. §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 cost-benefit computation which demonstrates that the Project meets relevant U.S. construction standards and criteria. For details, see Section III C of the Capital Assistance Paper.
4. FAA §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 in attached as Annex I to the Capital Assistance Paper.

B. Relation to Achievement of Country and Regional Goals

Country Goals

1. FAA §§ 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.	Law No. 12 of 1968 which will be applicable to the Project requires the Jordan Valley Commission to appropriate all irrigated land in the Project area and to redistribute it to the people to assure maximum participation 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 infrastructure to support increased agricultural productivity.	The Project will directly assist in enabling the GOJ to meet its food needs from its own resources and will strive through the Jordan Valley Commission, which plans further activities to increase agricultural productivity.
c. Meeting increasing need for trained manpower.	The training and technical expertise from U.S. and other suppliers will help to meet Jordan's need for trained manpower in the agricultural sector, in irrigation, and in the administration of water resources.
d. Developing programs to meet public health needs.	The Project will indirectly help meet public health needs by placing refugees in productive enterprise and thus eliminating overcrowding refugee situations.

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.	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 detail, see Sections I A-B of the Capital Assistance Paper.
2. FAA §201(b)(4). Describe the activity's consistency with and relationship to other development activities, and its contribution to realizable long-range objectives.	The Project is the second of a three point program to develop fully the Jordan Valley, and it will significantly contribute to realizable agricultural objectives in this region. For detail, see Sections I B and D of the Capital Assistance Paper.
3. FAA §201(b)(9). How will the activity to be financed contribute to the achievement of self-sustaining growth?	The farms to be irrigated by the Project will produce crops for domestic consumption and for export as well, both of which contribute to the achievement of self-sustaining growth.
4. FAA §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.	The Project will provide new jobs and will develop vast acreage of hitherto unproductive land. For details, see Sections I D and III D of the Capital Assistance Paper.

5. FAA §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?	The Project contributes to the development of the Jordan Valley Commission and increase productive capacities in the region served. For details, see Section III of the Capital Assistance Paper.
6. FAA §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.	The Project will provide opportunities for small farmers, for wholesalers, for retail merchants and for the trucking industry; it will help develop the Jordan Valley Commission and will encourage the development of that organization.
7. FAA §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?	(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 §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 §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. However, administrative action by the National Resources Authority or the Council of Ministers may be necessary to apply Law No. 12 For the Year 1968 to the Project. The application of this law is a condition precedent to the loan.
Regional Goals	
1. FAA §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 §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. It is financed, in large part, by the Duwaiti Development Fund, and A.I.D. on a multilateral basis. For details on this assistance, see Section IV B of the Capital Assistance Paper.

C. Relation to U.S. Economy

Employment, Balance of Payments, Private Enterprise

1. FAA §§201(b)(6); 102, Fifth. What are the possible effects of 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 941 (Selected Free World) sources plus Jordan. U.S. firms will be given an opportunity to bid on all aspects of the Project.

2. FAA §§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 does not have sufficient dinars to undertake all local cost financing but it will participate as extensively as it can in funding the Zarqa River Project. For details, see Section IV of the Capital Assistance Paper.

3. FAA §601(d); App. 109. 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 §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 §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 will contain an appropriate provision, and an implementation letter will further assure participation of U.S. small business.
6. FAA§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 encouraged 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. If the facilities of other Federal agencies are used, it will be because they are not competitive with private enterprise and they will be made available only in such a way so as not to interfere with domestic programs.
7. FAA §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 incorporated by reference into the loan agreement.
8. FAA §601(b). Describe the totality of effort by the President in host country to encourage and facilitate participation in 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 §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 §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 §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 §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 §201(b). Is the country amont the 20 countries in which development loan funds may be used to make loans in this fiscal year?	Yes.

2. App. 106. 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 §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 express 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. The aggregate value of the entire Zarqa River Project does not exceed $40 million, and the value of assistance will not exceed $30 million.
4. FAA §§ 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 §620(f)) and the loan is intended for economic assistance, have the findings required by FAA §620(f) been made and reported to the Congress?	Jordan is not dominated or controlled by the international Communist movement.
5. FAA §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. §110. Will any funds be used to finance procurement of iron and steel products for use in Vietnam other than as contemplated by §110?	No.
7. FAA §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. The loan agreement will require an appropriate restriction.
8. FAA §§ 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 §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 §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. §104. 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. MMA §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. App. §102. Have obligations for engineering and architectural fees and services over $25,000 on any one project been reported to Congress bi-annually?	Obligations for engineering and architectural fees and services over $25,000 will be reported to Congress bi-annually.

14. FAA §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.
15. App. §111. Is the loan being used to transfer funds to world lending institutions under FAA §§209(d) and 251(h)?	No.
16. App. §501. Are any of these funds being used for publicity or propaganda within the United States?	No.
17. FAA §604(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.

AID-DLC/P-1059
January 26, 1973

ANNEX III

CAPITAL ASSISTANCE LOAN AUTHORIZATION

Provided from: Development Loan Funds
Jordan: East Ghor Canal Extension Project Loan

Pursuant of the authority vested in the Administrator 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 2, Title I, the Development Loan Fund, to the Government of the Hashemite Kingdom of Jordan ("Borrower") of not to exceed eleven million dollars ($11,000,000) to assist in financing the foreign exchange and local currency costs of goods and services for the construction of the East Ghor Canal Extension Project, which is closely associated with the Zarqa River 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 accrued 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 contain the following conditions precedent to disbursement:

(1) 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 East Ghor Canal Extension Project;

(2) evidence of the availability of Jordanian currencies other than this loan necessary for the construction and operation of the Zarqa River Project;

(3) evidence that the Kuwaiti Fund for Arab Economic Development shall provide an amount approximately equivalent to $15.3 million or more (including prior disbursements), and that this amount shall be allocated for construction of portions of the Zarqa River Project other than the East Ghor Canal Extension Project;

(4) such other conditions as A.I.D. may deem advisable.

(c) The loan agreement shall contain the following special covenants by Borrower:

(1) Borrower shall construct the Zarqa River Project in substantially the same form as shown in the Rehabilitation and Development Plan of the Jordan Valley (East Bank) 1973-1975, or in such similar form as A.I.D. may agree to in writing.

(2) Borrower shall carry out the acquisition (Article XIX) and distribution (Article XX)

provisions of Law No. 12 For The Year 1968, or whatever substantially similar provisions which apply to the area to be irrigated by the East Ghor Canal Extension Project.

(3) such additional covenants as A.I.D. may deem advisable.

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

ORGANIZATION OF THE JORDAN VALLEY COMMISSION

A. Jordan Valley Commission:

The Commission will be constituted within the administrative machinery of the Government of Jordan and will be organized as shown on the attached chart. It will be entrusted with the following functions:

(i) Define the detailed scope of work for each element of the Plan.

(ii) Lay down realistic deadlines for project preparation.

(iii) Define package projects and assign priorities.

(iv) Contact and negotiate with donor countries and agencies.

(v) Control the financing of the various elements of the Plan at all stages.

(vi) Coordinate the work of various concerned Ministries, Departments and Corporations.

(vii) Take active measures to ensure coordinated project preparation and implementation.

The budget of the Commission will be part of the National Planning Council (NPC) development budget which, in turn, is part of the Government budget, and will consist of internal and external financial resources earmarked for the Jordan Valley Plan. Appropriated funds will be expended by the Commission through the Administration and Finance Department at NPC.

The Commission will have special powers to discharge its functions effectively and expeditiously, and will maintain close working relations with NPC and the Project Operations Status Information Center (POSIC) at the Royal Scientific Society. It will also maintain liaison with local governments in the Jordan Valley.

The Commission will exercise, inter alia, the following powers:

(i) Selection of personnel required for the above organizational positions from various governmental agencies, to ensure suitable fulfillment of its functions.

(ii) Approval of appointment of Project Directors in the concerned Ministries, Departments, and Corporations.

(iii) Financial and audit control of expenditures.

(iv) Approval of plans of operations and any amendments or modifications thereto.

(v) Any other powers necessary to ensure effective and timely discharge of its functions.

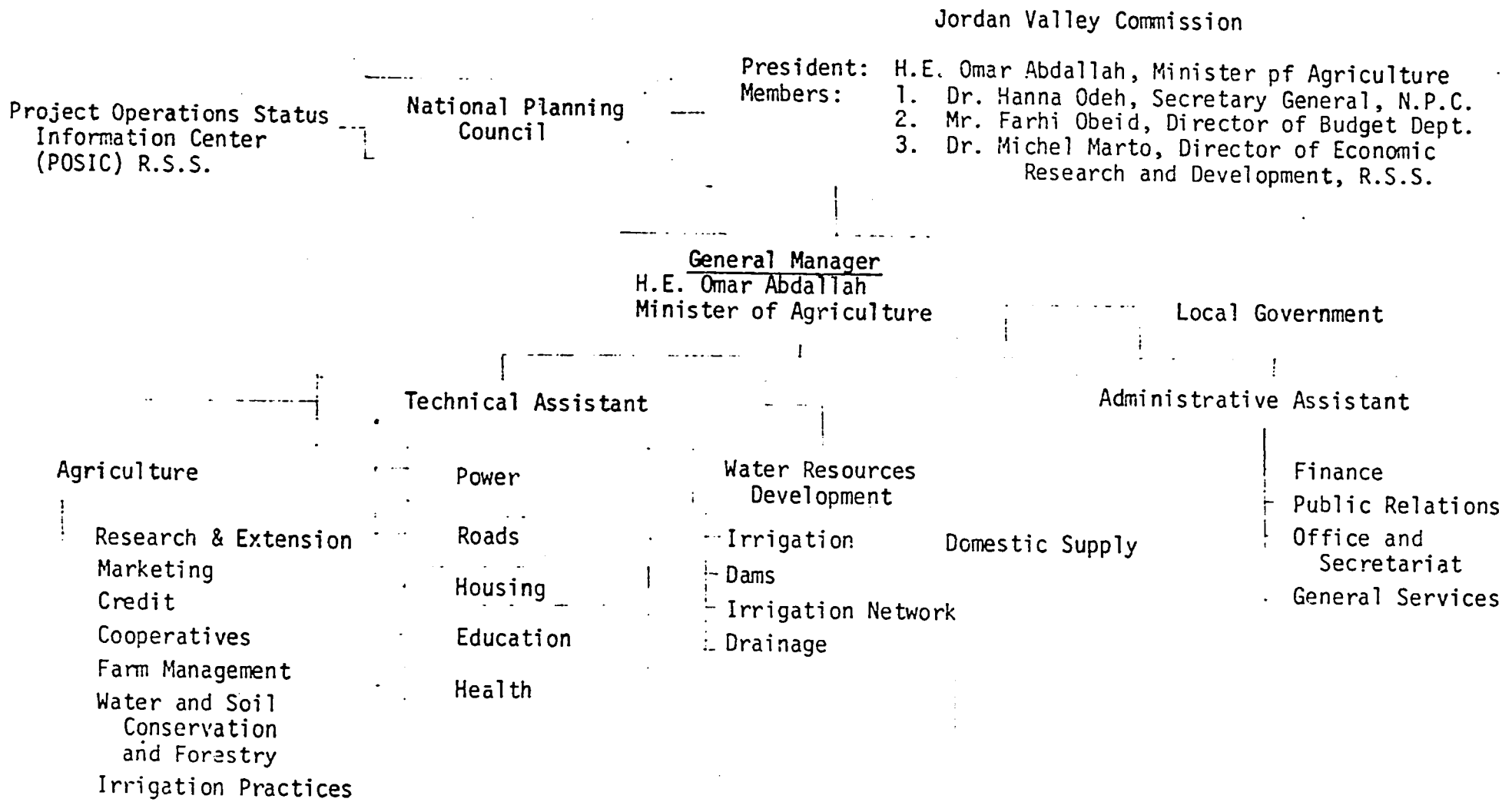
B. Project Directors:

With approval of the Commission, Project Directors will be appointed in all Governmental agencies concerned with projects preparation and implementation. The staff working with these directors will, as far as possible, be assigned or delegated from within the existing personnel of the operating agencies.

The scope of work for project preparation, which will be prepared by the Commission as its primary function, will be passed on to the concerned Ministries, Departments, and Corporations. The scope of work will lay down the required standards as well as the dates of completion of project preparation; the former to meet the requirements of the financing agencies and the latter to coordinate the various activities and to synchronize their progress.

In coordination with the Commission, Project Directors at the different Ministries will program their works. Those phases for which consultants or contractors have to be employed will be identified, and the necessary agreements concluded. While the financing of project preparation and implementation will be controlled by the Commission, all the executive functions will rest with the Project Directors who will remain under the administrative control of their own Ministries.

ORGANIZATION CHART - JORDAN VALLEY COMMISSION



ENVIRONMENTAL IMPACT

This project is being undertaken to extend an irrigation system that has been in operation for a number of years. Most beneficial and detrimental effects on the environment are manifest in the existing adjacent system. In addition, Jordanian and international studies have analyzed those characteristics of the project area which differ from existing irrigation system.

The project area includes a water collection area (dam, reservoir, and watershed area) and a water distribution system of approximately 18 kilometers of trunk canal with suitable lateral distribution canals and some piping. The design for all of the system has been prepared with full knowledge of the operational characteristics and environmental implications revealed by the existing system. Only the water distribution system will be financed by the US, but the impact on the environment of the total system has been taken into consideration.

In brief, the environmental implications of irrigation in the area tend to be far more beneficial than harmful. What now is largely wasteland can be turned into an agreeable, habitable and productive environment. Improvement can also be made in the quality of Zarqa River water by mixing it with less saline water to make it useful for irrigation of general crops.

Section II F of the loan paper indicates that sedimentation effects will not be adverse and that flood control effects will be beneficial. Drainage problems were observed in the existing irrigation system; corrective action has been developed and will be carried out by the Jordan Valley Commission. It is expected that, as drainage problems develop in the new irrigation area, the Commission would take similar corrective action.

In the new irrigation area, date palm plantings are expected to produce a beneficial micro-climatic effect: shading laborers in the fields, reducing evapo-transpiration of irrigation water and serving as wind protection. This beneficial effect will increase over time as the trees mature.

Discharges of water into the Jordan River and thence the Dead Sea will not create a hazard to marine life which is virtually non-existent. Increased saline discharges into the Dead Sea will not adversely affect its already extreme salinity. Some addition of fish production may result if night storage works are used as fish ponds.

Population dislocation effects will be minimal as the reservoir area contains fewer than 200 inhabitants who are semi-nomadic. The increased population of the irrigated area will place some additional burden on public services and utilities, but the balanced developmental approach of the Jordan Valley Commission and the international donor

community are addressing such matters as housing, urban amenities, and transport and utilities.

Although health problems have not arisen to any significant extent in the previously irrigated area, care will have to be taken in land levelling and irrigation to minimize increase in insect and snail vectors. An effective anti-malaria campaign is already underway in the Jordan Valley with good results. Care will have to be exercised to avert schistosomiasis hazards should snail hosts become a problem. Health problems have not been significantly increased by the existing irrigation system. The balanced development approach in the Jordan Valley should continue to deal with health as well as the other requirements of the population.

Present designs also include features which incorporate all generally accepted measures for personal safety of the public.

Although all foreseen environmental problems have been addressed in the planning process, the existance of a standing development authority for the Jordan Valley affords additional assurance that if further environmental problems arise, there will be a mechanism to make corrections. In addition, AID will assure that engineering and construction contracts financed under the loan require that contractors utilize the latest criteria and methods for construction to incorporate environmental protection measures in the project.

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:

No. of Irrigable Dunums Held Prior to the Project	No. of Irrigable Dunums To Be Allotted to Holder
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.

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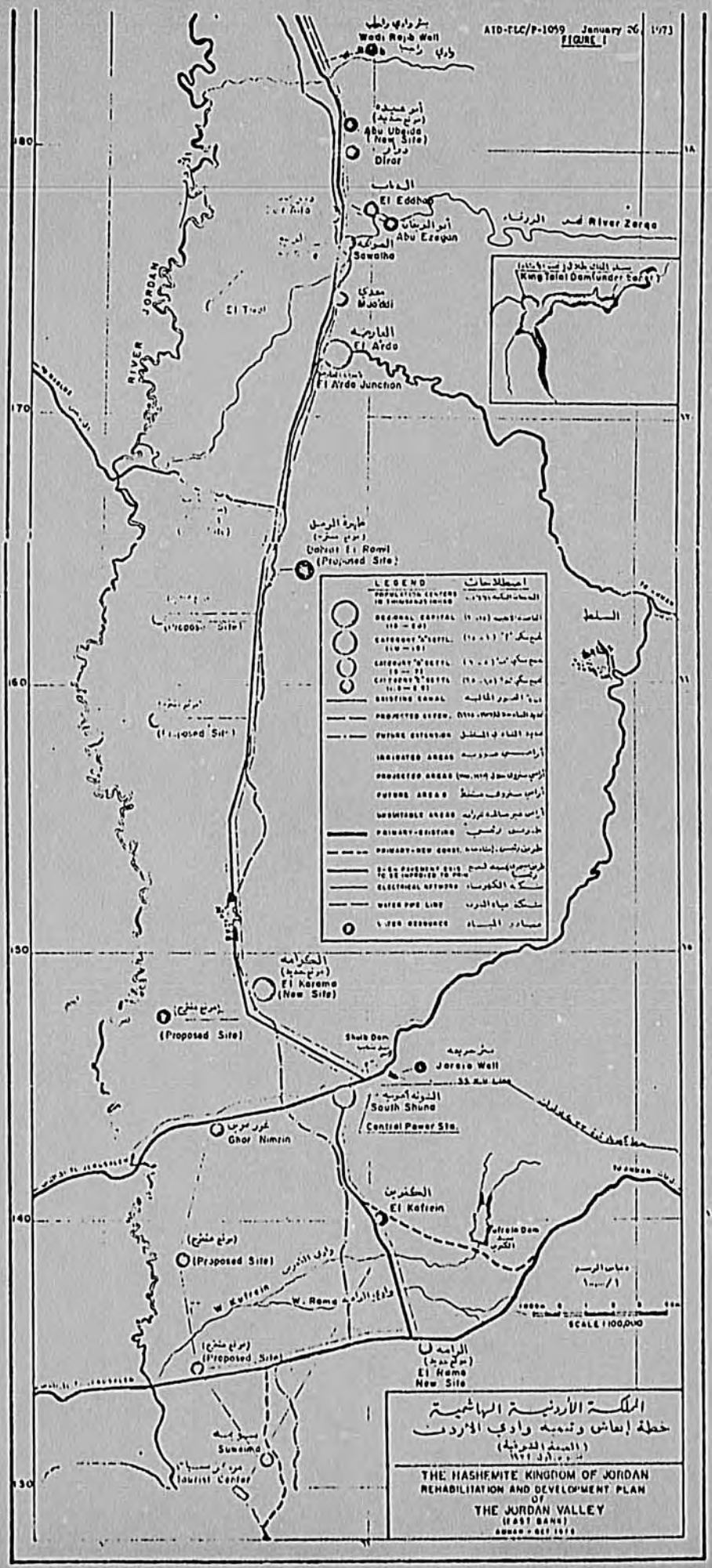
Third Priority - Professional farmers from district inhabitants.

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.


AID-TLC/P-1059 January 26, 1973
FIGURE I
Wadi Rajib Well
Abu Ubeida (New Site)
Dirar
El Eddhab
Abu Ezeqan
Sawalha
Mu'ad'di
El Arda
El Arda Junction
River Zarqa
King Talal Dam (under Const.)
RIVER JORDAN
Dahret El Romi (Proposed Site)
LEGEND
El Karama (New Site)
(Proposed Site)
Shuib Dam
Jarash Well
South Shuna
Central Power Sta.
Ghor Nimrin
El Kafrein
Kafrein Dam
(Proposed Site)
W. Kafrein
W. Rama
SCALE 1:100,000
El Rama New Site
Sweima
Tourist Center
المملكة الأردنية الهاشمية
خطة إنعاش وتنمية وادي الأردن
THE HASHEMITE KINGDOM OF JORDAN
REHABILITATION AND DEVELOPMENT PLAN
OF
THE JORDAN VALLEY
(EAST BANK)

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AID-DLC/P-1059
January 26, 1973

ZARQA RIVER PROJECT - EAST GHOR CANAL EXTENSION

SUMMARY AND RECOMMENDATIONS:

1. BORROWER:

Borrower is the Hashemite Kingdom of Jordan and the loan will be implemented by the Jordan Valley Commission acting on behalf of the Borrower.

2. LOAN:

(a) Amount - Up to $11.0 million.

(b) Terms - To be repaid in 40 years after first disbursement including a ten-year grace period. Interest on outstanding principal will be 2 percent per annum during the grace period and 3 percent per annum thereafter.

3. PROJECT COST: The total project will cost approximately $38.4 million. The equivalent of $15.3 million has been made available as a loan from the Kuwaiti Fund for Arab Economic Development and will be utilized along with funds made available by the Government of Jordan for the construction of the Dam. With an AID loan of $11.0 million a balance of approximately $12.1 million will be financed by the Government of Jordan.

4. DESCRIPTION OF THE PROJECT: The total project consists of a Dam on the Zarqa River, a carrier canal to deliver water from the river to the East Ghor Canal, an 11-mile extension of the East Ghor Canal, the construction of laterals for the extended canal as well as some laterals related to an earlier 5-mile extension and necessary land leveling associated with both the 5-mile and 11-mile extensions of the canal. The extended irrigation network will provide irrigation for approximately 12,000 acres of additional farmland in the Jordan Valley.

5. PURPOSE OF THE LOAN:

To provide financing of the dollar and local currency costs of the irrigation network (the East Ghor Canal Extension) associated with the Zarqa River Project.

6. BACKGROUND OF ACTIVITY:

Since 1955 AID has been involved in activities related to the development of agriculture in the Jordan Valley, including the financing of the construction of the original portion of the East Ghor Canal. With the decision on the part of the GOJ to proceed with a project to better utilize the waters of the Zarqa River it is now possible to once again consider our association with development work in the Jordan Valley.

7. EXPORT-IMPORT BANK INTEREST:

The Export-Import Bank has indicated it has no interest in this project.

8. MISSION VIEWS:

The Mission endorses the proposed loan. Attached as Annex I is the Foreign Assistance Act, Section 611(e) determination.

9. STATUTORY CRITERIA:

Satisfied -- See Annex II.

10. ISSUES:

None.

11. RECOMMENDATIONS:

That a loan of up to $11.0 million to the Hashemite Kingdom of Jordan be authorized in accordance with the terms and conditions set forth in the proposed authorization in Annex III.

AID-DLC/P-1059
January 26, 1973

JORDAN

I. Background:

A. General Description of the Project Area:

The Jordan Valley lies in the most westernly part of the Hasnemite Kingdom of Jordan and extends from Lake Tiberias (sea of Galilee) to the Dead Sea. The Valley is approximately 65 miles long and 2 1/2 to 10 miles wide. The floor of the valley consists of east and west terraces separated by the Jordan River and its flood plain. The terraces are referred to in Jordan as the Ghor and the flood plain as the Zor. The valley narrows considerably midway between Lake Tiberias and the Dead Sea. South of this narrow area the Ghor widens significantly on both sides of the river while to the north the widening is largely on the western bank.

The climate in the valley is predominately Mediterranean with local modifications resulting from topography and the closeness to the desert on the east. The summers are hot and dry while the winters are only moderately cold and wet. The mean monthly temperature is lowest in January when it drops to about 15 degrees Centigrade or 59 degrees Fahrenheit.

The Jordan River rising out of Lake Tiberias flows to the Dead Sea following a meandering course and dividing the valley into two approximately even strips. (For the purpose of this paper we are concerned only with the eastern half of the valley referred to as the East Bank and more specifically with the East Ghor.)

The principal water resources of the Jordan Valley are the surface waters of the rivers and wadis which flow into it. Flowing into the Jordan River from the east is water from a considerable network of rivers and wadis. Of these the most important is the Yarmouk River whose drainage area lies mostly in Syria and which enters the valley at the northern end. The second major water source is the Zarqa River whose drainage area lies almost entirely in Jordan and which enters the valley approximately 24 miles north of the Dead Sea. Due to high salinity the Jordan River, itself, is not suitable as a source of water for irrigation.

This project is related to the utilization of the presently uncontrolled waters of the Zarqa River to augment the flows of the Yarmouk River in the existing East Ghor Canal and thus make possible the extension of the East Ghor Canal by approximately 11 miles and the irrigation of an additional 12,000 acres of the East Ghor lying below the canal.

The Jordan Valley is the single best agricultural asset of Jordan and its continued development can both reduce the current substanial imports of agricultural products as well as increase the exports

of specialized agricultural products to Jordan's immediate neighbors and to Europe during the winter months.

B. Project History:

Initial work on a project to develop the irrigation potential of the East Ghor began with the "Yarmouk-Jordan Valley Master Plan Report" of 1955 (Michael Baker, Jr. and Harza Engineering Company) which recommended as Stage I the original portion of the East Ghor irrigation project. The Stage I system was designed to irrigate approximately 30,000 acres from the unregulated flow of the Yarmouk River plus six smaller perennial streams. The project included a tunnel and main canal totaling approximately 43 miles in length and a distribution system of 250 miles of small concrete lined laterals to provide delivery of measured quantities of water to some 3,450 farm units. This initial construction for the main canal was financed by AID as were various technical assistance inputs necessary to the total project. AID inputs totaled slightly over $12 million while the Government of Jordan contributed in cash and in kind, the equivalent of $9 million. Prior to the Arab/Israeli War of June 1967, a study of "pre and post Canal" indicated that the net income per acre in the project area rose from $24.64 (JD8.8) in 1959-60 to $152.32 (JD54.4) in 1965-66 and that the gross agricultural income reached a high of $5.9 million in 1965-66.

The work which AID was involved with was substantially completed in 1966 and since that time the GOJ has constructed an additional five miles of the main canal. Land leveling work required in connection with this five-mile extension has not yet been undertaken and will be part of the total project discussed in this paper.

Other donors from time to time have been active in various phases of work in the Jordan Valley. Some of the existing elements of the East Ghor irrigation system have been financed with U.K. assistance and technical assistance projects related to agriculture have been financed by the UNDP.

C. Borrower and Implementing Agency:

The borrower will be the Hashemite Kingdom of Jordan and the implementing agency will be the Jordan Valley Commission. The Commission was established by Royal Decree in the fall of 1972 with the function of preparing and implementing the plan for development of the Jordan Valley. The Commission is specifically charged with negotiation with donor countries and agencies and to ensure coordinated project preparation and implementation. The Commission is headed by H.E. Omar Abdallah currently Minister of Agriculture.

Since 1959 a series of laws have set up the framework for the development of the East Ghor. All the basic laws share the same major features relating to the delineation of the project area that is being (or will be) irrigated by the East Ghor Canal and the authorization

of the East Ghor Canal Authority, its successor, the National Resources Authority and the most recent entity, the Jordan Valley Commission, (See Annex IV for organization of the Commission) to develop the area and to assign water allocation to it. The authorization extends also to dividing the area into farm units; to limiting the size of farm units and the setting of a system of priorities for selection of holders. The legal framework also authorizes the establishment of committees of of evaluation and appeal in connection with land and other rights to be surrendered by farm landowners and of the new land units and water rights to be assigned to new holders; to determine the manner of settlement of accounts between the Authority and new holders; and generally to operate the Project.

The present Head of the Jordan Valley Commission has been associated with the work of the various organizations mentioned above for many years and is highly respected as an administrator.

D. Relationship to AID Interests -- Strategy in Jordan:

Jordan depends primarily on agricultural commodities and services which provide, with the help of foreign aid, a per capita income of about $286 per year. The country's dry climate and rocky terrain limit agricultural production and the small industrial sector accounts for less than 10 percent of the Gross National Product.

Prior to the 1967 war with Israel, Jordan had 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 Palestinean 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 its 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 had rebuilt its planning capability and had adopted a nation-wide development strategy so that individual projects could be reviewed within an overall context.

Heeding the 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 which was held in Jordan in November. We reviewed the plan carefully and found it to be a sound and reasonable framework for Jordan's

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development efforts over the next few years. Other participants at the Conference, including representatives from the International Bank for Reconstruction and Development, the United Kingdom and the Federal Republic of Germany, were impressed with the plan and indicated that they would recommend that their governments and institutions provide development assistance to Jordan in support of the plan.

We were, of course, unable to assess the Jordanian planning capability or to focus on possible projects for US developmental assistance until the plan was completed. Given the importance to the US of renewed economic development in Jordan and the commendable nature of the Jordanian planning effort, we have since concluded that US support in FY 1973 is warranted.

II. Technical Analysis:

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 Figure 1) 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.

c. East Ghor Canal, concrete-lined, capacity at intake approximately 706 cfs (20 cms) 48 miles (78km) 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. New Irrigation Development:

The construction work envisaged under this project includes the following:

a. Rumeimin (King Talal) Dam:

This dam (currently under construction) is located on the Zarqa River approximately 4 miles (6.5 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 (JD9.8 million).

While the dam is a key feature in the present project it will not be financed by the proceeds of the AID loan. Financing is being provided jointly by the Governments of Jordan and Kuwait.

The dam will have the following characteristics:

Item	Size
Height	303 ft. (92.5 m)
Crest length	1278 ft. (390 m)
Spillway capacity	104,000 cfs. (2950 cms)
Freeboard	6.5 ft. (2 m)
Storage capacity	32,400 ac.ft. (40 mcm)

The dam will be an earth fill embankment having a clay central core with filter zones, supporting shells of random fill and dumped rip-rap protection of the upstream dam face. Within the zones of clay core and adjacent filters the overburden will be removed and a cut-off trench excavated down to the rock. The core will be keyed into the cut-off trench. Crushed sandstone and alluvial sandy gravel deposit will be used for the filter zones and random fill material will be excavated from the spillway channel.

The foundation treatment will be adjusted to the rock into which the dam is founded. In the part which belongs to the Zarqa formation having generally favorable permeability characteristics, the planned clay-cement grout curtain will be placed to a depth of 98 feet (30 m). In the zone of poorly cemented Kurnub sandstones the essential problem is the permeability of the rock and its susceptability to piping. Several measures are planned with a view to decreasing the exit gradients and washing out of material. A concrete diaphram is to be provided at the left abutment and well drainage will be executed from the galleries. Because of the steep bank the diaphram will be constructed by tunneling. The aim of the diaphram is to reduce the exit gradients in case of failure of the drainage system. The function of the drainage wells is to collect, without washing out of the sandstones, the seepage water

and to prevent its upward movement and its resurgence at the ground surface.

On the right abutment the problem is more acute owing to the greater depth of the sandstone. Besides the measures described for the left bank it is also planned to construct filters over the sandstone toward the downstream toe of the dam. In addition, at the contact of the downstream dam shell with the sandstone, a drainage carpet will be constructed.

It should be mentioned that no important fault intersects the dam foundation and this constitutes an important advantage for the site selected (Rumeimin downstream). There is every reason to believe that with cut-off excavations, foundation grouting and drainage galleries, a completely satisfactory earth-fill dam can be constructed.

b. Zarqa River Diversion and Carrier Canal:

The diversion for the carrier canal will be located on the Zarqa River approximately 2.8 miles (4.5 km) downstream from the Rumeimin Dam which is currently under construction. This site is approximately 0.6 mile (1 km) downstream from the existing Deir Alla diversion. The purpose of the carrier canal, length 1.5 miles (2.5 km), is to deliver regulated releases of the Zarqa River into the East Ghor Canal. The capacity of the carrier canal is 265 cfs. (7.5 cms).

c. Extension of East Ghor Main Canal:

Under the present project the main canal will be extended southward from Station 78 to Station 96, a distance of approximately 11.2 miles (18 kms). Its initial capacity will be 388 cfs. (11 cms).

The main canal is laid out to run south from the end of the recently constructed 5 mile (8 km) extension, along the boundary of the Ghor for about 10 miles (16 kms) and then through the Ghor another 1.2 miles (2 km) toward the Dead Sea. The first several miles cross rough terrain similar to that encountered in the 5 mile (8 km) extension, with many difficult wadi crossings. The latter part is through relatively flat land. This 11.2 mile (18 km) concrete-lined extension is the end of the present project. However, it is planned to ultimately extend the canal on southward for an additional distance of 12.7 miles (20.4 kms) terminating near the Dead Sea. This final canal extension will not be undertaken until the proposed Khalid Bin Al Walid Dam on the Yarmouk River is constructed. The Yarmouk storage, 162,000 ac.ft. (200 mcm) will provide the water necessary for ultimate project development.

The slope of the canal in the location which is to be built now is 0.0002 and the shape in most reaches is trapezoidal with side slopes of 1 1/2 horizontal and 1 vertical. The freeboard with

respect to the concrete lining is 1 foot (0.3 m) and 3.6 feet (1.1 m) with respect to the top of the canal embankment. In steep, rocky stretches a reinforced rectangular section is specified. The position of the cross section with respect to the natural ground was established as a compromise between balancing cut and fill and the desirability of having the water line below and the undisturbed ground, and still controlling the irrigable area.

Whenever the main canal had to cross a major wadi and the choice of a culvert was ruled out because of excessive backfill, related costs and complications, a choice was made between a flume and an inverted siphon. A decision was made after due consideration of costs, structural problems and the aspect of safety from enemy attack and sabotage. Overchutes and wasteways have been specified, as required, along the canal.

d. Lateral Network:

The project area, located on the Southeast bank of the Jordan River, is composed of Ghor, Zor and Wadi lands (these physiographic provinces are described under Section II-C "Geology"). Based on the location and method of water delivery these lands may be divided into several sub-areas as follows:

(1) Ghor Lands:

(a) above East Ghor Canal extension irrigated by pumping from the main canal (3 areas);

(b) above East Ghor Canal extension irrigated by water taken directly from side wadis (3 areas);

(c) below East Ghor Canal extension irrigated by gravity with water distributed by concrete-lined canals with takeouts from the main canal.

(2) Zor Lands:

(a) Northern area irrigated from Zarqa Canal which has its turnout upstream from beginning of the present project;

(b) Several smaller areas located in the southern part supplied by pipelines from the system of the Ghor area.

East area is divided into Headgate Units which in turn are divided into individual farm plots. Generally all available flows, augmented by storage releases when necessary, would be diverted into the main canal. From the main canal water flows into the secondary canals or is pumped into secondary pressure lines. From the secondary canals water is turned out into the Headgate Units where it is distributed by

tertiary and quarternary canals. At night the flows are stored in night storage reservoirs. For wadi areas the flows are used before getting into the main canal. Except in the Zor, where pipes are used for distribution, the farm distribution system is based entirely on the use of trapezoidal concrete-lined canals.

The lateral network includes the following:

(1) Area above Main Canal (Pumping and Wadi Areas):

(a) Secondaries:

89,600 feet (27,250 m) canal with cross sections from 12" x 12" (30 cm x 30 cm) to 16" x 33" (40 cm x 85 cm).

(b) Tertiaries and Quarternaries 282,000 feet (85,900 m) canal with cross sections from 12" x 12" (30 cm x 30 cm) to 12" x 16" (30 cm x 40 cm).

(2) Area Below Main Canal (Ghor):

(a) Secondaries - 109,500 feet (33,400 cm) canal with cross sections from 12" x 12" (30 cm x 30 cm) to 16" x 24" (40 cm x 60 cm).

(b) Tertiaries and Quarternaries 1,305,000 feet (398,450 cm) canal with cross sections from 12" x 12" (30 cm x 30 cm) to 12" x 20" (30 cm x 50 cm).

e. Land Levelling:

The land levelling requirements of a given farm plot are a function of its natural slope and the desired slope after grading operations. Each of the accepted methods of irrigation has a range of slope and cross slope that is associated with a high degree of irrigation efficiency. It is sometimes not possible to obtain optimum land levelling conditions either because of the high cost of earth moving or because of the shallowness of the soil which does not allow excessive cuts. Under such conditions the field is divided into several sub-planes, separated by terrace drops, and each smaller area is graded to the desired slope.

The NEDECO preliminary design report (October 1970) gives the following table showing four classifications of project lands according to the estimated volume of levelling required:

Land Type	Average Cut		Area	
	cu yd/ac.	cm/dunum	acres	dunums
1	5	15	6,520	26,408
2	15	45	12,930	52,409
3	26	80	13,500	54,604
4	453	140	3,670	14,864
		Total	36,620	148,285

The land levelling to be accomplished under the AID-financed portion of the project includes 3,210 acres (13,000 dunums) adjacent to the previously completed 5 mile (8 km) main canal extension and 8,650 acres (35,000 dunums) adjacent to the 11.2 mile (18 km) proposed canal extension.

f. Night Storage Reservoirs:

In order to reduce the danger of water-logging, to increase crop yields and to achieve a higher irrigation efficiency, it has been decided to eliminate night irrigation by the provision of night storage reservoirs. The location of each reservoir has been selected so that it can be filled by turnouts from the main canal and yet have its discharge dominate the area below it. The capacity of each reservoir has been made so that it can hold the 10-hour night flow during the peak period for the area benefitting from it. This includes the area it dominates plus areas that might also fall above its water elevation but whose night flows it also stores.

The sizes of the reservoirs are based on a 5 foot (1.5 m) depth of useful storage and a 1.6 foot (0.5 m) freeboard. The sideslopes are 1.5 horizontal and 1 vertical. The orientation and shape are influenced by the particular topography, but in general, are 2 x 1 rectangular shape, with the length along the gentler slope recommended. The sides of the reservoirs will be constructed with a concrete lining approximately 3 inches (8 cm) in thickness.

At first the reservoir bottoms will be unlined and they will be tested for infiltration. If infiltration is not sufficiently reduced by silting, concrete lining of the bottoms will be undertaken.

The night storage reservoirs are located as follows:

Number	Location
30	Ghor Area
8	Pumping Area
10	Zor Area
48 Total	

Their capacities vary from 0.8 ac.ft. (972 cm) to 22.9 ac.ft. (28,227 cm).

B. 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 rainfall decreases from 15.8 inches (400 mm) at the southern end of Lake Tiberias to less than 3.9 inches (100 mm) in the extreme south of the valley near the Dead Sea. 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.

C. Geology:

The formation of the Jordan Rift Valley started in the early Miocene Epoch, Tertiary Period, of the Cenozoic Era. It was caused by down-faulting, coinciding with uplifting and tilting of the eastern plateau and folding of the western plateau. These tectonic movements continued through the Pliocene Epoc of the Tertiary Period and the Pleistocene Epoc of the Quaternary Period.

During the Pliocene Age it is believed that two lake basins existed in the valley, a northern basin and a southern basin, separated by the Qarn El Amer Ridge.

The Pleistocene Age was characterized, in this part of the world, by a series of alternating pluvial and interpluvial periods -- depending on the period the valley was occuppied by one or several lakes.

As time passed the filling of the rift valley started with sedimentary freshwater limestones, sandstones and clays, the deposits being more calcareous toward the south. Overlying these freshwater deposits are the Lisan marls, deposited during the Middle Pleistocene. Physiographically the Jordan Valley can be divided into:

1. The Uplands bordering the actual valley;

2. The Ghor, a terrace 98-196 feet (30-60 m) above the present level of the Jordan River, sloping downwards from the foothills to the Katar. The Ghor terrace has an average slope of 1-3 percent and is 1.2-2.5 miles (2-4 km) wide in the north. Farther south, the valley opens up to both sides; here the Ghor is about 2.5-3.7 miles (4-6 km) wide and may be sub-divided into the Upper Ghor, the Central Ghor and the Lower Ghor respectively from the foothills down to the Katar;

3. The Katar, a 'bad land' zone, forming the transition between the Ghor and the Zor;

4. The Zor, the present flood plain of the Jordan River.

During the last interpluvial period in the upper Pleistocene, the so-called "Lisan Lake" started to retreat under the influence of

continued evaporation and lowering of the hydrostatic level (Dead Sea level). The retreat was in stages, forming many new shore lines in the process. In the last stage the Jordan River evolved. The River subsequently cut through the Lisan formation and gradually worked its way backwards towards the north. With the widening of the flood plain, the Zor came into being. The Lisan Lake deposits, emerging as a terrace above the river level, were covered in later periods by fluviatile-colluvial sediments originating from the bordering uplands. This terrace is referred to as the Ghor. Runoff from the Ghor terrace eroded the Ghor-Zor transition zone, giving it its present bad land appearance (the Katar).

D. Soils and Land Classification:

A soils survey and land classification exercise was undertaken by Baker-Harza in 1953-54. US 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 (Lacustrine, Fluviatile and Alluvial) were further differentiated into 27 types. The land classified and mapped in the more recent survey is summarized below:

Class No.	Description	Area Acres	Area Dunums
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	10,750	43,540
	Total Suited	90,860	367,950
	Total Unsuited	77,600	314,180
	Grand Total	168,460	682,130

E. 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, watermellons 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 present cropping pattern (intensities) and those anticipated for future years 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).

Crop	Present	1975	1980	1990	2000
Vegetables	64.0%	56.1%	56.1%	56.2%	56.2%
Fruit	10.5	7.6	9.2	10.0	13.8
Cereals	32.3	47.0	44.6	37.4	18.8
Fodder	--	2.8	7.0	16.3	30.8
Total Intensity	106.8%	113.5%	116.9%	119.9%	119.6%

F. Water Resources:

1. Hydrology:

The principal water resources of the project area are the surface flows of the Jordan River and its tributories. 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 in also 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:

Stream	Drainage Area		Total Annual Flow					
			AVERAGE		MAXIMUM		MINIMUM	
	sq. mi.	sq. km.	m ac.ft.	mcm	m ac.ft.	mcm	m ac.ft.	mcm
Yarmouk	2,630	6,805	.356	438	.705	870	.235	290
Zarqa	1,330	3,440	.069	85	.120	148	.023	29
Side Wadis	446	1,156	.091	112	.139	172	.035	43
Total	4,406	11,401	0.516	635	0.964	1,190	0.293	312

The total annual base flows are as given below:

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Stream		Total Annual Flow AVERAGE m ac.ft.	AVERAGE mcm	MAXIMUM m ac.ft.	MAXIMUM mcm	MINIMUM m ac.ft.	MINIMUM mcm
Yarmouk		--	--	--	--	--	--
Zarqa		.044	54	.080	99	.023	28
Side Wadis		.079	98	.118	146	.035	43
	Total	0.123	152	0.198	245	0.058	71

The maximum monthly flow (about one-fourth of the annual total) on the Yarmouk and Zarqa Rivers occurs in the month of February. On Wadis Arab and Ziglab the maximum flow occurs in January and in the other wadis in March.

According to the Jordan Valley Three-Year Plan the required irrigation water can be drawn from the following sources:

		m ac.ft	mcm
(a)	Uncontrolled flows of Yarmouk River	0.235	290 (min.)
(b)	Uncontrolled flows of side wadis	0.035	43 (min.)
(c)	Controlled flows of Ziglab, Zarqa, Shueib and Kafrein	0.039	48
(d)	Ground Water	0.008	10
	Total Available Annually	0.317	391

2. 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 from the principal tributaries are as follows:

a. Yarmouk River upstream from Khalid Bin Al Walid Dam site: 420-720 micromhos/cm.

b. Springs below the dam site: 1700-2400 micromhos/cm.

c. Yarmouk River below the springs: 530-820 micromhos/cm.

d. Zarqa River: 850 micromhos/cm.

e. Other side wadis: 400-500 micromhos/cm.

According to USDA standards water having a conductivity 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/cm 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.

3. 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 any reservoir would not exceed 0.5 percent of the total storage capacity.

The ENERGOPROJEKT Report (1971) gives the following values for suspended load, based on measurements made in 1963-64 and 1968-69, for the Zarqa River:

Dam Site	Average Annual Suspended Load (Million tons)	Average Annual Suspended Load ac.ft.	mcm
Rumeimin	1.31	1,380	1.70
Mastaba	0.60	623	0.77

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

4. 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. The estimated cost of this work is $895,000 (JD318,347) and funding 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.

5. 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 $702,500 (JD250,000) will not be chargeable to the AID loan.

6. 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 studies entailed the use of a pressure supply tunnel, a short surface penstock and a powerhouse located immediately downstream from the Runemin Dam.

This plan was designed on the basis of an installed discharge of 265 cfs (7.5 cms) which is equal to the maximum discharge of the main irrigation canal. The guaranteed power was determined as the minimum discharge needed for the irrigation system, i.e., 26 cfs (0.74 cms) assuming eight hours per day of operation.

The following table shows the basic statistics relative to that scheme:

Gross Head	316 ft. (96.5 m)
Installed Power	5000 kw
Guaranteed Power	1590 kw
Average Output per Year	15.8 million kwh
*Relative Power Value	1.34

*NOTE: If the relative power valve is less than unity, the construction and operation costs of the considered hydro plant would exceed the savings to be gained over a thermal plant and the hydro is not economically feasible.

In order to secure the best economic benefits it is proposed that the hydro-power station be used as a "peaking plant," in conjunction with thermal plants with an estimated period of operation from 6-8 hours per day. A decision has been made not to construct the hydroelectric features of the dam during the initial construction phase. This portion may be constructed later, if funds become available.

7. Water Requirements:

The Jordan Valley Three-Year Plan gives the following tabulations of existing and proposed irrigated areas:

Description	Existing Irrigation		New Irrigation		Total	
	acres	(dunums)	acres	(dunums)	acres	(dunums)
Existing East Ghor	27,400	111,000	--	--	27,400	111,000
N.E. Ghor Side Wadis	2,005	8,137	6,030	24,410	8,035	32,547
*Zarqa River Project	--	--	11,900	48,171	11,900	48,171
Shueib, Kafrein, Hisban Complex	1,300	5,260	1,950	7,890	3,250	13,150
Total	30,705	124,397	19,880	80,471	50,585	204,868

*See next page.

*NOTE: AID loan funds will be used to finance irrigation facilities for only 11,900 acres (48,171 dunums). The balance of new irrigation 7,980 acres (32,300 dunums) will be developed by the Government of Jordan using funds from other sources.

The ENERGOPROJEKT Study gives a slightly higher total, i.e., 53,600 acres (217,231 dunums).

The NEDECO Report (1969) gives unit diversion requirements for various irrigation efficiencies as follows:

Year	Unit Diversion Requirement					
	60% Eff.		65% Eff.		70% Eff.	
	ac.ft/ac	cm/dunums	ac.ft/ac	cm/dunum	ac.ft/ac	cm/dunum
1975	2.16	139.2	2.84	866.9	2.64	805.0
1980	3.62	1102.2	3.33	1017.5	3.09	944.7
1990	4.02	1220.9	3.69	1129.8	3.44	1049.0
2000	4.48	1368.5	4.13	1263.2	3.85	1173.0

Multiplying the maximum unit diversion 4.48 ac.ft./ac (1368.5 cm/d) by the maximum irrigated area 53,600 acres (217,231 dunums) gives a total annual diversion requirement of 241,000 ac.ft. (297 mcm). Since this requirement is well below the available supply 317,000 ac.ft. (391 mcm) it appears that there is sufficient water to meet the full demands for 30,705 acres (124,397 dunums) of existing irrigation plus that needed for 19,880 acres (80,471 dunums) of new land as well.

G. Cost Estimates:

The following table shows a breakdown of estimated costs for the project:

No.	Item	Cost (Millions)			
		JD	Dollars	JD	Dollars
1.	King Talal Dam (Rumeimin)			9.8	27.4
2.	Irrigation System				
	Diversion Structure and Carrier Canal	0.251	0.706		
	Main Canal Extension (18 km)	0.950	2.673		
	Irrigation Network-laterals, land levelling and night storage reservoirs for 12,000 acres (48,000 dunums)	1.685	4.719		
	Contingencies (25%)	0.718	2.020		
	Engineering Fees (11%)	0.313	0.880	3.9	11.0
	Total			13.7	38.4

Notes: Item No. 1 $27.4 million (JD9.8 million) to be financed jointly by Governments of Jordan and Kuwait.

Item No. 2 $11.0 million (JD3.9 million) to be financed by AID loan.

H. Construction Schedule:

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

Event	Estimated Completion Date
King Talal Dam and Appurtenant Works	Oct. 1974
River Diversion Structure and Carrier Canal	Apr. 1974
Land Levelling and Night Storage Reservoirs adjacent to 5 mile (8 km) extension of Main Canal	Dec. 1973
Extension of Main Canal 11.2 miles (18 km)	Sept. 1974
Distribution System, Land Levelling and Night Storage Reservoirs adjacent to 11.2 mile (18 km) Main Canal Extension	Sept. 1974

I. Management:

The management and operation of the project will be the responsibility of the Jordan Valley Commission. The organization of that entity is discussed in Annex IV.

J. Technical Soundness:

The AID Project Engineer has reviewed all available engineering data, feasibility reports and the Government of Jordan's Three-Year Plan for the rehabilitation and development of the Jordan Valley, which includes the proposed work, and finds the technical requirements 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 to the US Government are adequate to meet the applicable requirements of Section 611 of the Foreign Assistance Act.

III. Economic Analysis:

A. Agriculture and the Jordanian Economy:

Agricultural production constitutes approximately 16 percent of the Jordanian gross domestic product ($90.2 million of $541.2 million). The agricultural section also comprises the largest group both of exports and of imports ($10.3 million and $56.4 million, respectively). Of particular interest, fruits and vegtables are the products most efficiently

grown in the Jordan Valley hothouse and constitute the largest group of agricultural imports in 1971; this group of products also is potentially the greatest foreign exchange earner for Jordan.

Although there has been constant improvement in agricultural productivity during the past decade, instability created by the Arab/Israeli War of 1967 has created some uncertainity in markets; approximately one-third of Jordan's tomato crop rotted on the vines last year because a closed frontier with Syria deprived Jordan of a traditional winter market. Recent accommodations between Jordan and Syria should eliminate these impediments to agricultural trading.

B. Irrigation:

The proposed Zarqa Irrigation Project is a continuation of Jordan Valley development which AID has supported since 1959. It would make possible use of regulated waters to bring new land into cultivation and to shift to much more valuable crops. It also makes possible cultivation during seasons when market demand and prices for particular crops are highest. In addition to higher yields per acre, the irrigated land will support more farmers and workers per acre than without irrigation.

An earlier Jordan Valley irrigation project supported by AID in 1959-63 irrigated 30,000 acres by channeling water from the Yarmouk River into a canal system ending just north of the Zarqa River. This project cost $21 million ($700 per acre). Its immediate benefit to farmers in the irrigated area was a 400 percent increase in net yield (from about $24 per acre in 1959 to $121 in 1964-65 the first growing season after completion). There was a further 25 percent increase in yields (to $152 per acre) in 1965-66 before the 1967 war disrupted production. Farmers are now returning to this area, and the irrigation works are largely intact despite considerable destruction of machinery and buildings.

C. Benefit/Cost Ratio:

The proposed extension of the irrigation system south of the Zarqa River will provide water to approximately 12,000 acres. The total project cost is estimated at $38.4 million (about $3,200 per acre) of which the AID portion is $11 million (about $920 per acre). All of these costs are, for purposes of conservative benefit/cost comparison, attributed to irrigation. Some flood mitigation will also be provided initially and, ultimately, the dam and related works could be modified to serve small electric power development.

The yield per acre in the newly irrigated area should increase from a scant $2 to approximately $450 per acre per year by 1976 because much more valuable fruit and vegetable crops will be made possible by irrigation. This estimate is supported by studies conducted by a

Yugoslav firm (ENERGOPROJEKT) and a Dutch firm (NEDECO) using crop forecasts considered conservative by AID and the IBRD. Price variations are considerable from month to month through the year, but prices of irrigated crops have held fairly constant from year to year in the 1950's and 1960's (period of the Yugoslav and Dutch studies). Some market loss might occur if neighboring countries also increase irrigation, but any loss on this account would be more than offset as exports to the European market are opened up.

Operation costs, but not social costs (housing, etc.) were considered. On this basis and applying a 6 percent discount (interest) rate, the total present worth of benefits is $80 million ($6.720 per acre). Annual equivalent benefits are $425 per acre. The benefit/cost ratio is 2.04 to 1.

D. Economic Benefits:

The two primary economic benefits accruing from the extension of the East Ghor Canal and Associated Works is a significant reduction of agricultural imports and creation of a substantial net export in fruits and vegetables. Depending on the exact cropping pattern and the degree of mechanization, 5,000 to 17,000 people would earn their livelihood in the area to be irrigated. The economic priority of this project is dictated by lack of alternatives. No other development project currently considered economically viable will have as positive an effect on Jordan's balance of trade or will create as many permanent jobs as the proposed extension of the East Ghor Irrigation Canal.

IV. Financial Analysis:

A. Financial Requirements:

The overall cost of the Zarqa Irrigation Project is currently estimated to be $38.4 million (JD13.7 million). Of this amount, $27.4 million is required for construction of the King Talal Dam on the Zarqa River and $11.0 million for the irrigation works. It is proposed that the US lend the Government of Jordan adequate funds for the construction of the canal and associated irrigation works, and that Kuwait and the Government of Jordan split the cost of the dam, approximately 60/40 percent respectively.

B. Financial Plan:

Through the end of CY 1972, $5.3 million will have been spent for engineering, site preparation and construction of the King Talal Dam which will regulate the Zarqa River. Of this amount Kuwait supplied $2.8 million and GOJ the remaining $2.5 million.

Of the approximately $33.1 million required for completion of the project it is anticipated that the Kuwait Loan Fund will contribute

approximately $12.5 million in CY 1973-74 and the GOJ will put up $4.8 million each year in local currency. During this period the proceeds of the proposed US loan to Jordan, ($11.0 million), should be made available to meet the cost of construction of the canal and the associated irrigation works.

It should be noted that the US contribution to the overall project is less than that of either Kuwait or the Government of Jordan.

C. Capacity of the Borrower to Service External Debt:

The Government of Jordan has consistently met its obligation to support bilateral and multilateral development projects and has serviced its external debt (including to AID) on schedule. Total GOJ external debt service is currently only $10.47 million annually. However this relatively favorable position has been maintained in recent years only by grant foreign assistance to overcome severe trade deficits since the 1967 war.

The trade imbalance has averaged $143.8 million annually for the past five years. These deficits are substantial for a country with a $550 million gross domestic product. There was some improvement in exports in the latter half of 1972. Other improvements may follow the recent reopening of the Syrian frontier, but the trade deficit remains a serious problem.

Analysis of Jordanian trade indicates that much of it (about 19 percent of imports and 45 percent of exports in 1971) is in the food category. The proposed project would enable Jordan to depend less on imports and to expand exports of virtually all of the crops to be increased. Assuming conservatively that only half of this production would help reduce trade deficits, about $2.5 million of annual improvement in debt service capacity would begin in 1976 against a peak (after the ten-year grace period) of debt service increase attributable to the project (including service on the Kuwaiti loan)of $1.6 million.

D. Availability of Other Sources of Financing:

The largest single contributor to this project is the Kuwait Loan Fund. Other potential donors have periodically expressed passing interest in the Zarqa project, but all of them are currently studying other potential development investments.

The Export-Import Bank is not interested in this project.

V. Other Considerations:

A. Impact on the US Economy and Balance of Payments:

This ($11.0 million) loan will finance both dollar-purchased services and commodities and local currency for services and commodities