C Semi-Arid Area
The area is largely arid and unsuitable for agricultural operation. It is further divided into two sub-areas according to the pedological characteristics;

C1 The soil conditions are similar to the area around Irbid. As long as water is made available, farming is possible;

C2 The area is more gravelly than C1 and used mostly for grazing. The land use is expected to be limited to the grazing of sheep and goats in the foreseable future.

13.3.3 Regional Structure of the East Bank

a. Population

13.025 The population of East Bank Jordan numbered 1.95 million in 1975. Its distribution is shown on Table 13.2 and Figure 13.5. The aggregate share of the Governorates of Amman, Irbid and Balqa is 45.3 percent in terms of settled area but as high as 91.9 percent in terms of the population. The population concentration is most pronounced in the Amman Governorate where the density reaches 454 persons per sq. km. The share of the Irbid Governorate is 24 percent for the settled area and 29 percent for the population. Although far behind, its population at 145.2 persons per sq. km is second to Amman. With temperate climate and moderately developed urban facilities without disadvantages of high population concentration, the Irbid Governorate has most favourable residential conditions.

13.026 Table 13.3 shows the population distribution within the Study Area. Irbid Mutserfieh has the largest population of about 300,000, making up 62 percent of the Governorate total. The remaining four Mutserfiehs have a population ranging from 40,000 - 50,000. In terms of density, the Irbid Mutserfieh, where the Municipality of Irbid is located, has the highest figure of 274 persons per sq. km, followed by Jerash and Ajlun (a little over 100 persons per sq. km), Ramtha (90 persons) and Mafraq (25 persons). In other words, three western Mutserfiehs have higher population density, which declines toward the east.

b. Industrial Structure

13.027 The distribution of sectoral activities by governorate is shown in terms of GDP on Table 13.4. The Amman Governorate has the largest share of GDP at 60 percent, followed by the Irbid Governorate with a share of a little over 23 percent. In terms of per capita GDP, Karak as well as Amman have the highest figure of JD 277 to 279, while the Irbid Governorate is the lowest at JD 169. Table 1.6 shows per capita GRDP at market price and Table 13.4 (page XIII-16) shows GDP at factor cost. So that there is little difference in number between these tables because the former includes indirect tax but the latter does not.

13.028 In the primary industry, the Irbid Governorate is predominant, accounting for 44 percent of the East Bank total, followed by 30 percent of Balqa. In the secondary industry, Amman

Table 13.2 Population Distribution of East Bank, Jordan

	Population (persons)	Density (persons/ Km^2	Share (%)	Share in the Total Settled Area (%)
East Bank	1,951,968			
Irbid	563,990	145.2	28.9	23.7
Balqa	129,867	116.4	6.7	6.8
Amman	1,098,477	454.2	56.3	14.8
Karak	108,037	22.3	5.5	27.6
Ma'an	51,597	12.8	2.6	24.6

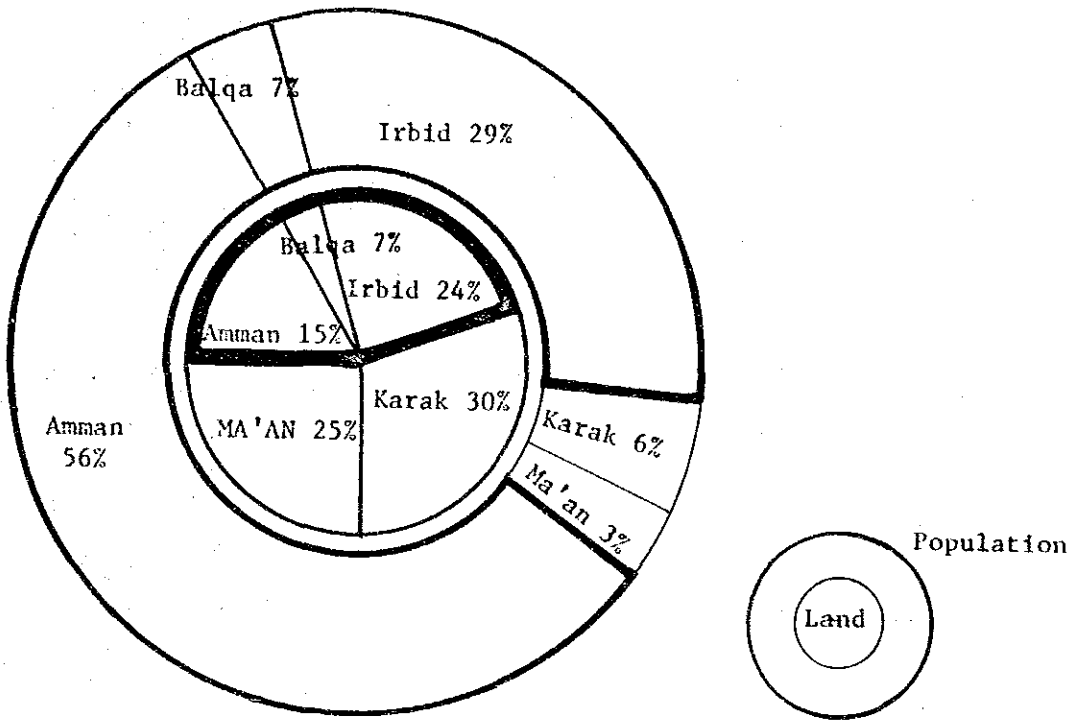
Sources: First Census of Population and Housing 1961, Department of Statistics.

Table 13.3 Population Distribution in the Study Area, 1975

	Population (persons)	Share (%)	Density (persons/Km^2)
Mutserfieh	497,960	100.0	110.8
Irbid	309,122	62.1	274.7
Ajlun	42,232	8.5	102.5
Jerash	50,316	10.1	122.3
Ramtha	42,008	8.4	99.5
Mafraq	54,282	10.9	25.6

Source: Department of Statistics.

Figure 13.5 Percentage Distribution of Population and Settled Area by Governorate



Sources: First Census of Population and Housing 1961, Department of Statistics.

Table 13.4 Distribution of GDP at Factor Cost by Governorate, 1977

(Unit: JD,000 at Current Price)

	East Bank	Irbid	Amman	Balqa	Karak	Ma'an
Primary Industry	41.700	18.200	9.200	8.500	5.200	600
	100%	43.6	22.1	20.4	12.5	1.4
	10.5%	19.7	3.9	30.6	18.1	3.3
Secondary Industry	97.000	9.200	69.000	6.200	10.600	2.000
	100%	9.5	71.1	6.4	10.9	2.1
	24.5%	10.0	29.3	22.3	36.8	17.7
Tertiary Industry	257.200	64.800	157.600	13.100	13.000	8.700
	100%	25.2	61.3	5.1	5.1	3.4
	65.0%	70.3	66.8	47.1	45.1	77.0
Total	395.900	92.200	235.800	27.800	28.800	11.300
	100%	23.3	59.6	7.0	7.3	2.9
	100%	100%	100%	100%	100%	100%
	241.2JD/person	169.1	277.3	224.1	278.6	226.8

Source: Study Team

Notes: 1. Primary Industry: Agriculture, Forestry and Fishery
2. Secondary Industry: Mining, Manufacturing and Construction
3. Tertiary Industry: Electricity, Water supply, Transport, Wholesale, Retail trade, Banking and Finance, Ownership of Dwellings, Public Administration and Defence and Civil Services.

has the highest share of 71 percent, followed by Karak which makes up 11 percent due to the existence of phosphate mining. The Irbid Governorate has a share of a little less than 10 percent, indicating the relative underdevelopment of non-agricultural productive activities. In the tertiary industry, Amman again has the highest share of 61 percent, followed by Irbid with a share of 25 percent. The importance of the tertiary sector in the economy of the Irbid Governorate can be seen in that 70 percent of its GDP accrued from this sector. The governorate which has a higher share is Ma'an where the Port of Aqaba is located.

c. Relative Position of the Study Area

13.029 On the basis of the information supplied from the sectoral studies of this report, the relative positions of the five governorates can be characterized as follows (see Figure 13.6 and its explanation after the figure).

i. Irbid Governorate

13.030 Endowed with favourable climatic conditions, the Governorate is most important for agricultural production and suitable for residential development.

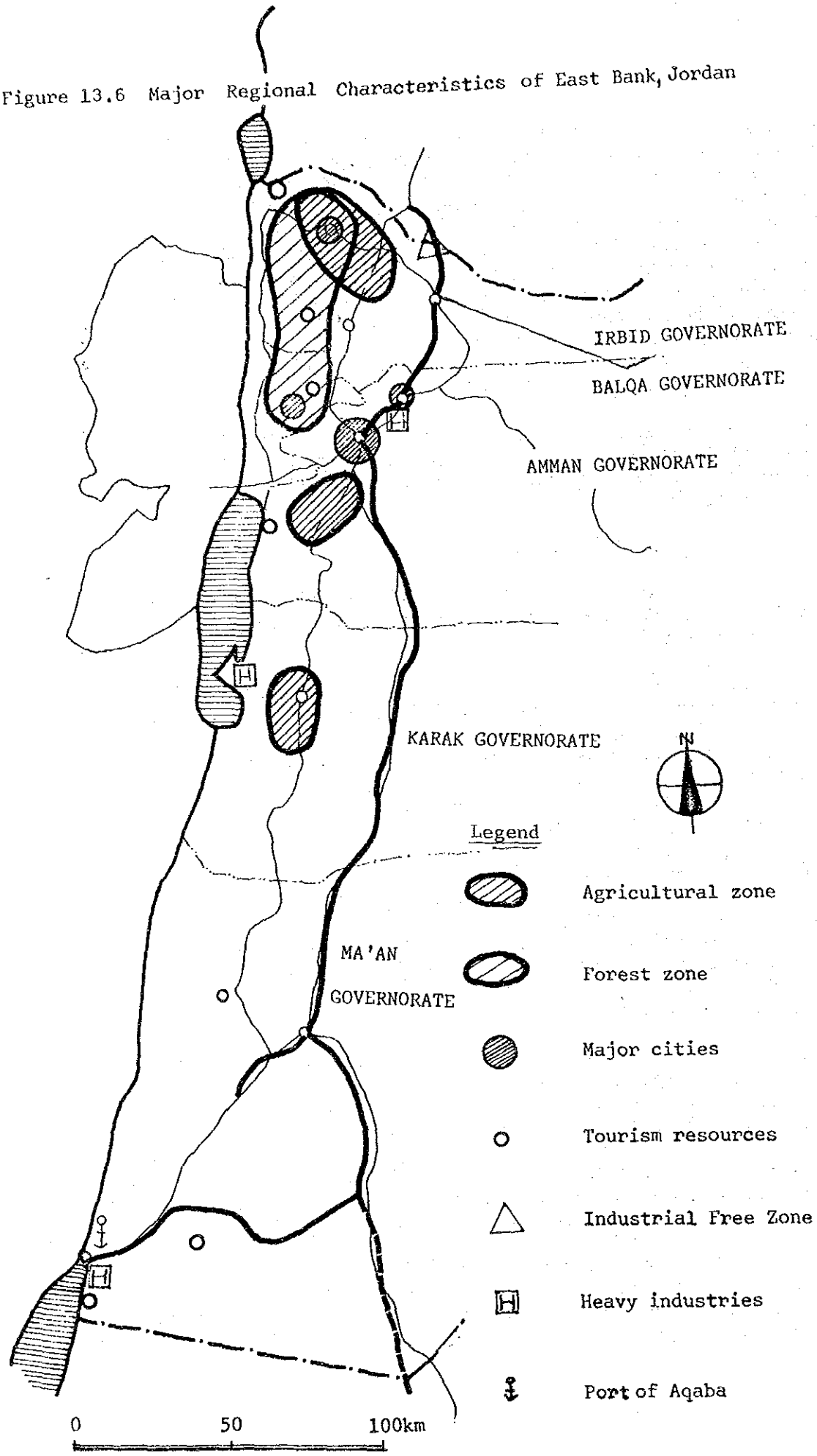
13.031 It is strategically located vis-a-vis the international land transportation network. Considering the proposed Industrial Free Zone and international transportation projects, the Governorate is expected to become more important as a major node in the international transportation network. Hence not only distribution industries, but associated service and manufacturing industries will have great potentials in the future.

13.032 The scheduled construction of Maqarin Dam and other water projects will solve the problem of water supply shortage in urban centers in the Governorate, which are currently dependent on the limited water resources available at Azraq and Dhuleil. Coupled with availability of human resources and abundant land, the increased water supply will greatly contribute to the improvement of the basic conditions necessary for development and investment activities.

13.033 The Yarmouk University which started its enrollment in 1976/77 at its temporary site is expected to have great impact on the Governorate. When the construction of its permanent campus is completed in mid-1980s or the end of 1980s as currently envisaged, a total of 76,000 persons are estimated to be connected with the University. Economic and socio-cultural effects of the University will be enormous and the Study Area will emerge as a major cultural center in the entire Arab region as well as in Jordan.

13.034 Tourism resources and verdant vegetation around Jerash and Ajlun will come to assume far-reaching importance in the future, as the demand for recreational opportunities is expected to expand apace with economic development of the country.

Figure 13.6 Major Regional Characteristics of East Bank, Jordan



Explanation of Figure 13.6 : Regional Characteristics

Governorate	Potentials	Future Development
Irbid	Population 564,000 (28.9%) Rainfall: mostly more than 300mm/year Sufficient supply of water Forest resources Tourism resources Agricultural land Access to international transportation Development Project/program: Yarmouk University Maqarin Dam Jordan Valley	Center for cultural activities with balanced development of sectors.
Balqa	Population 129,800 (6.7%) Rainfalls mostly more than 300mm/year Forest resources/Zai Tourist Park Salt as exurbs to Amman Jordan Valley	Satellite to Amman
Amman	Population 1,098,500 (56.3%) Rainfall mostly less than 300mm/year Currently sufficient supply of water Zarqa: phosphates, oil refinery, power supply and residential facilities Tourism resources/Madaba, Ma'in, Mt.Nebo Export and Improvement of urban facilities, New airport, trade center	Center for international and national commerce and public administration
Karak	Population 103,000 (5.5%) Rainfall 200mm at Karak, less elsewhere Potash, glass, oil shale Karak Castle	
Ma'an	Population 51,600 (2.5%) Rainfall less than 50mm Ground water resources Marine resort, Wadi Rum,Petra Aqaba Port, Phosphates, oil refinery.	Resort Resource-based industry distribution

16.035 In contrast to the Ghor area where intensive irrigated farming is practiced, the Study Area is characterized by rainfed cultivation of cereals and traditional animal husbandry. The large-scale expansion program for olive planting has been launched by the current Five Year Plan and this is expected to remedy to a great extent the instability of income from rainfed cultivation of cereals.

13.036 In summary, the Governorate is expected to transform itself from the area characterized by its largely traditional agriculture and animal husbandry into one of the national importance in its contribution to the secondary and tertiary sector outputs of Jordan.

ii. Balqa Governorate

13.037 The importance of the Governorate is its proximity to Amman. In view of its topographical features and climatic conditions suitable for recreational and residential development, the Governorate will develop as exurbs of the Amman-Zarqa metropolitan area.

iii. Amman Governorate

13.038 The Governorate with more than 50 percent of the total East Bank population is the National center of industrial and commercial activities as well as of public administration. Although the industrial development in the Amman-Zarqa metropolitan area will continue to lead the rest of the country in view of the many planned investment projects, the diseconomy of agglomeration is now beginning to manifest itself. Locally available ground water resources, for instance, have been deteriorating in quality due to the rapidly increased and increasing demand for industrial water. Procurement of additional water for domestic as well as industrial use is expected to become more costly, as it will be necessary to look for water sources farther afield. The expanding demand for housing due to the rapid increase of population has pushed up the land price enormously. The Government has an intention to encourage more even distribution of population and economic activities within the Country. This means that the relative importance of the Amman Governorate is expected to decline as development activities in other regions begin to take effect. However, the Amman Governorate will continue to play the foremost center of public administration and of international as well as national commerce.

iv. Karak Governorate

13.039 The Governorate is poorly endowed with potentials for agriculture, which is currently practiced only on highlands with an altitude of about 1,000 m. The climatic conditions preclude the residential development. The Castle of Karak and Dead Sea are attractive to tourists and the Governorate is endowed with various mineral resources and further exploration is under way. Mining and manufacturing industries based on the locally available mineral resources such as potash, glass and oil shale will have high potentials of development in the Governorate.

v. Ma'an Governorate

13.040 The Governorate is above all the National center for international shipping, on the one hand, and for marine resort, on the other. Except for the area around the Port of Aqaba, however, the climatic and natural conditions in the Governorate are the least favourable for living, as indicated by the very sparse distribution of the current population. Therefore, the development potentials are largely limited to the coastal area which will continue to grow as the center for international marine transportation and resort. In addition, petro-chemical and other resource based industries have potentials, taking advantage of its immediate access to marine transportation.

13.3.4 Present Land Use in Greater Irbid

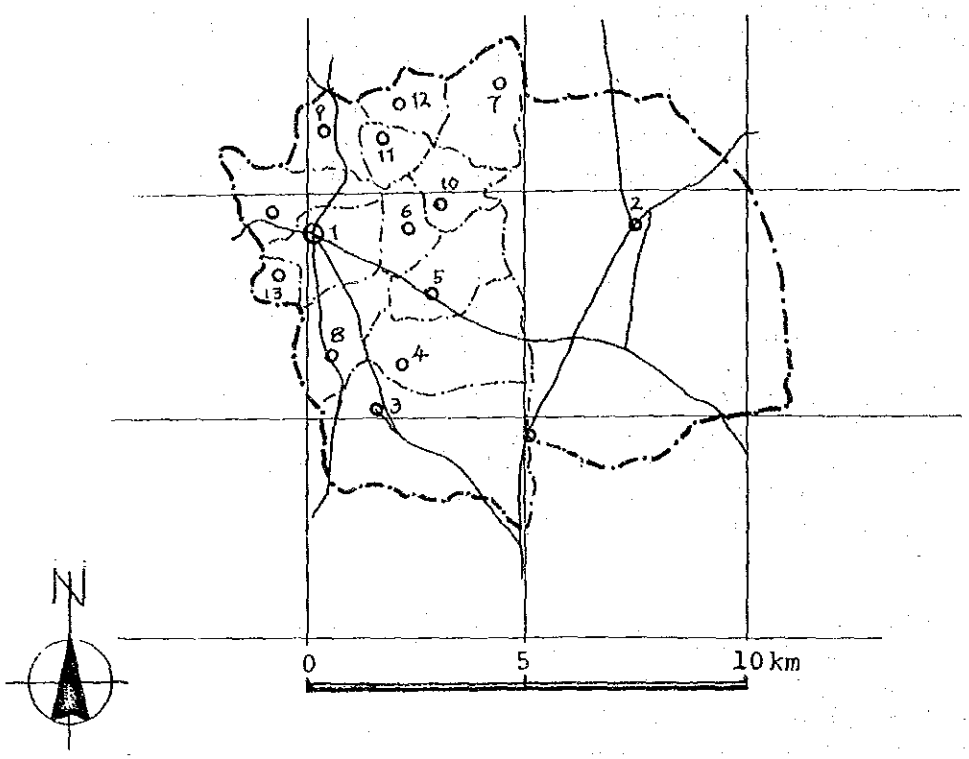
13.041 The Greater Irbid Area is located in the central part of the flat highland where rainfed agriculture predominates. It contains, as shown on Figure 13.7, five municipalities, six villages with councils and one small village without council. The size of the Area is approximately 35,000 ha and the altitude ranges from 500 to 600 m.

13.042 Immediately to the south of the Area rise hills which are part of the Jerash-Ajlun mountain series. Therefore, the southern and western parts of the Greater Irbid Area have higher altitudes, with more area planted to permanent crops or under forests and less area under arable crops, compared to the rest of the Area. The altitude generally lowers in the northern part, as it is connected to the valley formation of the Yarmouk River. Wadi Shallala which flows into the river cuts across between the Municipalities of Irbid and Ramtha, thus precluding the direct connection between these major urban centers. The area around this wadi rolls with steep slopes and is agriculturally barren except in some isolated spots of flat land (Figure 13.8 and 13.9).

13.043 According to the estimates by the Department of Statistics, the population of the Area numbered approximately 200,000 in 1975, with its 60 percent concentrated in the Municipality of Irbid. As shown on Figure 13.7, 90 percent of the Area's population are found in the western half. The eastern half is sparsely populated with its center at Ramtha, and the predominant mode of land use is rainfed agriculture. However, due to the lower precipitation, its southern part contains many stretches of barren land.

13.044 The Municipality of Irbid with a population of about 130,000 in 1975 is the primary urban center in the Study Area as a whole, with its corresponding agglomerations of urban facilities as well as educational and cultural facilities. The Municipality of Ramtha had a population of 24,000 in 1975, or only one-fifth of that of Irbid City. It is strategically located in relation to international traffic with Syria. Immediately to the southeast of the intersection of Irbid-Mafraq Route 16 and Amman-Ramtha Routes 15 and 33 the permanent campus of the Yarmouk University is scheduled to be opened. Once the University starts its full-scale enrollment, it is expected to give great economic as well as socio-cultural impact on the development of the Greater Irbid Area.

Figure 13.7 Administrative Division of Greater Irbid Area, 1978



		Adm. 1/ Status	Population 1975 (1,000 persons)
1	Irbid and El Bariha	M.	128.0
2	Ramtha	M.	24.0
3	Husn	M.	16.8
4	Es Sarih	M.	7.0
5	Hawara	V.C.	4.6
6	Bishra	V.C.	3.4
7	El Mughayir	M.	3.4
8	Aidun	V.C.	3.7
9	Sal	V.C.	2.7
10	Hakama	V.C.	2.3
11	Maru	V.C.	0.8
12	Zabada	V.	0.4
	Total		200.5

Source: Ministry of Interior, Department of Statistics

Notes: 1/ M : Municipality
V.C.: Village with council
V : Village without council

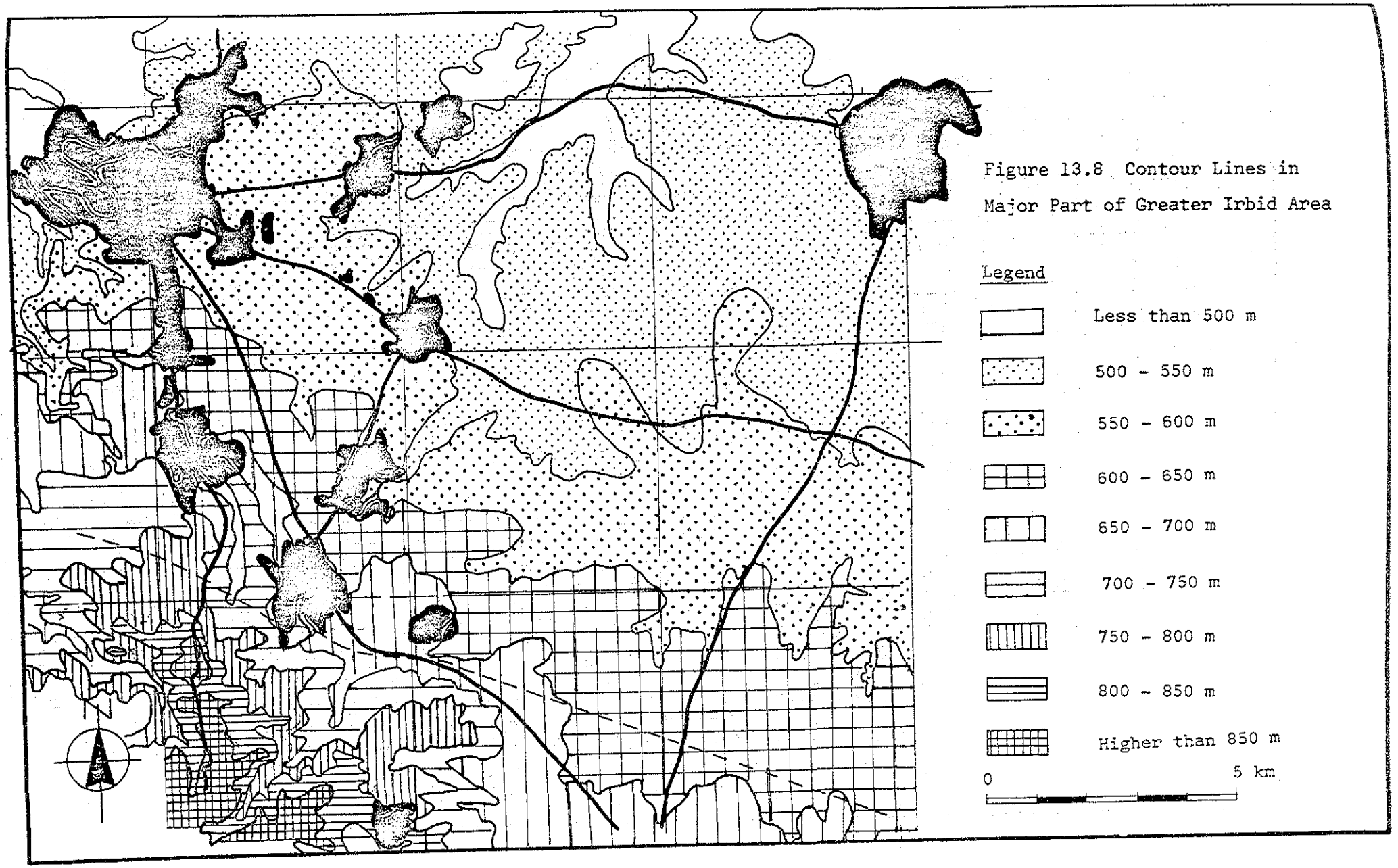


Figure 13.8 Contour Lines in Major Part of Greater Irbid Area

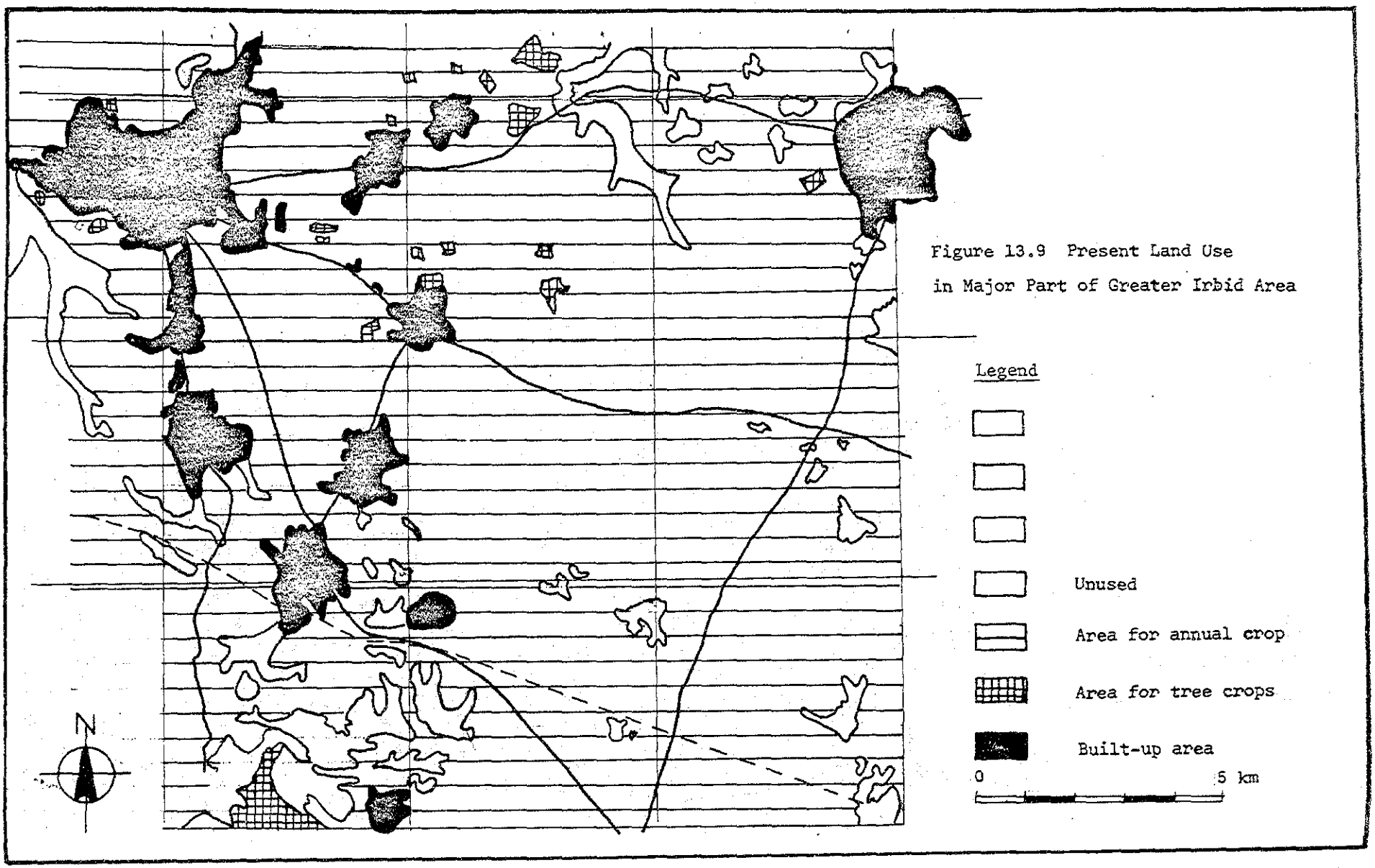


Figure 13.9 Present Land Use in Major Part of Greater Irbid Area

13.4 Land and Soil Conditions in the Study Area

13.4.1 General with Reference to the East Bank

13.045 The areas with an altitude of more than 500 m is collectively named the East Bank Jordan limestone plateau. As seen from the nomenclature, the soils of Jordan are developed on the basis of limestone, except in some eastern parts like Mafraq where basalt lava covers the surface. Rough distribution of soil types in Jordan is described below. 2/

13.046 Red Mediterranean soils are found in the areas with an altitude of 500 to 600 m, mostly in the Governorates of Amman and Irbid. Limestone in Jordan is usually weathered and calcareous, or silt clay. In these areas of generally high precipitation, soils assume a typically reddish brown colour, and rarely contain debris of the original limestone. Where such soil development is very deep, the soils are excellent for agriculture. In relation to the Study Area, well-developed Red Mediterranean soils are found in the area between Irbid and Ramtha.

13.047 Yellow Mediterranean soils are found in parts of the central flat highland areas and of the Jordan Valley. In terms of soil development, the soil series is intermediate between Red Mediterranean and Yellow soils described below. With its good water holding ability, this series is suitable for the cultivation of cereals such as wheat and barley. Yellow Mediterranean soils are found in semi-arid areas in the east, such as western Mafraq. As long as water is made available, agriculture is feasible in these arid areas.

13.048 Yellow soils, or regosols, are commonly found in semi-arid and arid areas of Jordan. The series is made of weathered limestone and chalk and forms calcareous colluvial loess. Yellow soils, mostly found in northeastern Mafraq, cannot sustain vegetation except for a few desert species.

13.049 Gray desert soils cover the entire desert area in the eastern part of Jordan. The series contains many flints, pebbles and boulders and is poor in soil development, allowing only seasonal grazing. In a few places where ground water is available, agriculture is practiced.

13.050 Alluvial soils are found in beds of numerous wadis and flood plains. The series is developed from limestone gravels and can sustain agriculture.

2/ Mainly taken from Oddvar Aresvik,
The Agricultural Development of Jordan.

13.4.2 Evaluation of Land Use Potentials in the Study Area

a. Soils

13.051 The evaluation of soil conditions in the Study Area will be done on the basis of the information from the geological survey conducted in 1968 by Dr. Friedrich Bender, on the one hand, and the land evaluation survey recently completed by the Ministry of Agriculture with FAO assistance, on the other. The former covered the entire Country, while the latter studied approximately 6,000 ha in the area around Irbid and Ramtha. In addition, the results of the field survey on the present land use from July to September of 1978 will be used to establish the criteria for evaluating land use potentials in the Study Area.

13.052 Table 13.5 shows the rough correspondence between the geological classifications by Dr. Bender and the soil evaluation categories used by the FAO/Ministry of Agriculture Team as applied to the Irbid-Ramtha area. Because this will be used to evaluate the potentials of the rest of the Study Area not covered by the FAO/MOA survey, the process of reasoning is explained in more detail below.

13.053 The land evaluation for agricultural use in the FAO/MOA survey is done according to soil texture and structure, depth of top soil, topographical features, presence of gravels and boulders, and level of precipitation. Table 13.6 summarizes the evaluation by soil series which are classified by the respective textural and structural characteristics.

13.054 Of soil series 11, 12, 13, 15 which contain weathered soft limestone, 11 and 13 are Red Mediterranean soils, further distinguished by the absence (11) or presence (13) of gravels, 12 and 15 are brown soils with (15) or without (12) gravels. The soils of this series is clayey and crack on the surface during the dry season. Water retention is therefore relatively low. 31, 32 37 and 38 are classified as either red clayey, brown clayey, or reddish clayey and do not crack when dried. Moisture retention is good. 33 and 39 are classified as brown silty and yellow silty soils. This series is not cracky, but forms crust when dried. The series of 34 and 40 is gray soils and forms extensive surface crust. Water retention is very low.

13.055 Suitability for agriculture is, as shown on Table 13.6, highest for the series 31, 32, 37, 38, while the series 11, 12, 13, 15 is good mostly for annual crops. The series 34 and 40 are largely unsuitable for agricultural exploitation.

13.056 Figure 13.10 shows graphically the process followed to evaluate the entire Study Area as to its suitability for agriculture. As shown on the figure, the soil series with varying agricultural

Table 13.5 Evaluation Criteria of Agricultural Land Use Potentials by Geological Classification

Geological Classification	Suitability for Agriculture
q 5 and C 2 (J)	Good for annual crops
H	Good for annual crops, vines and tree crops
C 2	Good for annual crops and afforestation
C 1 (M)	Good for afforestation (For rainfed areas, especially oak is suitable)
B 5	Usable for annual crops, (Removal of stones and/or desalination necessary)
q 3	Unsuitable for agricultural (Too rocky)
q 1	Usable for annual crops (Removal of stones necessary)
C 1 & C 2,C 2(L) (M.) (K)	Good for afforestation
B	Good for annual crops

Sources: F. Bender, Geological Map of Jordan, 1974, Ministry of Agriculture

Table 13.6 Evaluation Criteria of Agricultural Land Use Potentials by Soil Series

Soil Series	Texture	Swelling and Shrinking	Moisture Retention	Productivity of Annual Crops	Productivity of Fruit Trees	Evaluation
11. 12. 13. 15	Heavier	Slightly larger	Relatively low	Good	Less suitable	II Good
31 32 37 38	Heavier	Smaller	Good	Good	More suitable	Good for I annual and tree crops
33 39	Lighter	Moderate surface crust	Good where top soils are deep	Not very good	Moderate	III Moderate
34 40	Gray desert Soil	Crust	Very low			IV. Bad

Source: FAO/MOA Land Evaluation Survey.

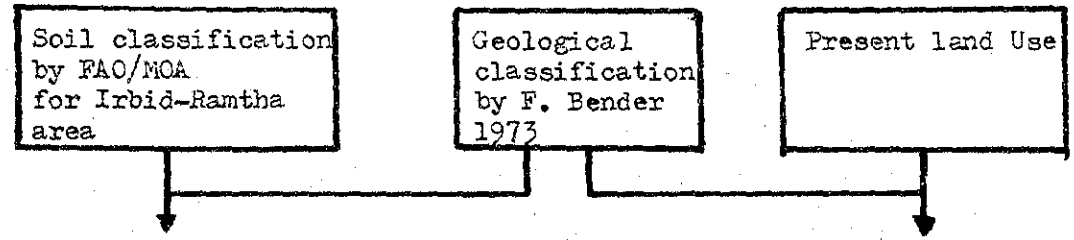
suitability identified by the FAO/MOA survey are matched with the geological classifications from the map prepared by Dr. F. Bender. The results of the field survey on the current land use are also matched with the geological classifications. Assuming that the same correspondence exists between the geological classifications and the suitability for agriculture, or the former and the current land use, the agricultural potentials of the entire Study Area can be identified by the geological classifications. Because the FAO/MOA survey covers only the Irbid-Ramtha area, further adjustment will be made in the next section by taking into account the variations of rainfalls.

13.057 The results of the evaluation based on geological classifications alone are shown at the bottom of Figure 13.10 and Figure 13.11. Brief explanation is in order on each of the geological classifications listed there.

(1) q 5: This geological series is mostly composed of fluviatile deposits and eolian erosion sands, and widely distributed in the Irbid-Ramtha area. According to the FAO/MOA survey, the soil series of 31 is predominant in the q 5 series. The series 31 is red clayey soils with good structure developed on hard limestone associated with small amounts of chert and suitable for both annual and permanent crops. The percentage of land utilization is the highest in q 5. The q 5 series found in the area with higher precipitation is mostly associated with Red Mediterranean soil formation such as around Irbid. In areas with less precipitation like Mafraq, it is generally associated with Yellow soils, which are unsuitable for agriculture.

(2) ff: This geological series is mostly composed of limestone, chalky limestone and cherts and found in the northwestern part of Irbid Mutserfieh and the northern part of Mafraq Mutserfieh. According to the FAO/MOA survey, the soil series 31 is also predominant in the ff series, suggesting agricultural suitability. In the Irbid-Ramtha area, the soil series 91 is also widely distributed largely in the hilly region. This series is defined by the FAO/MOA survey as rocky land with more than 50 percent covered by outcrops of hard limestone bed rock. This indicates that the area is only suitable for afforestation and tree crops. The present land use found in the 91 series consists of vine yards and tree crop plantations in the area with higher precipitation. The series is often associated, however, with Yellow Mediterranean soils in the northern part of Mafraq. With irrigation, the area can be turned into agriculturally productive land.

Figure 13.10 Evaluation Process of Agricultural Land Use Potentials



Correspondence between soil classification and geological classification

	q 5, C_2(H) C_2(J)	ff	C_2'K)
1st priority	good for both tree and annual crops(31)	-ditto- (31)	-ditto- (31)
2nd priority	good for annual crops (11)	(91)	(91)

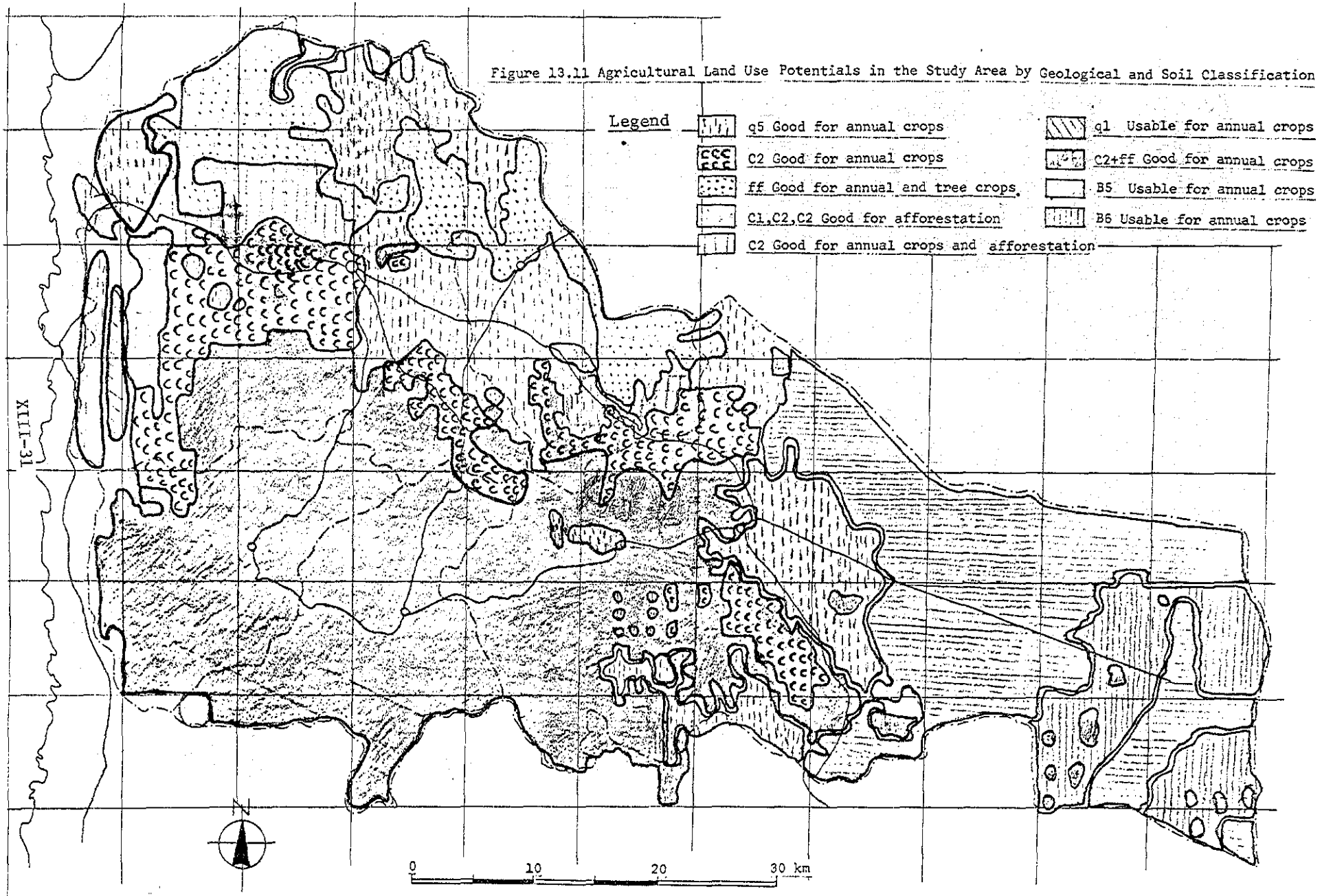
Correspondence between present land use and geological classification

	q 5+C_2(5)	ff, C_2(H)	C_2(K)
1st priority	good for annual crops	good for annual crops	good for annual crops
2nd priority	—	good for vines & tree crops	good for woods and wood scrubs

Basic Relationship between geological classification and **Suitability** to Agriculture

Geological classification	q5 & C_2(J)	ff	C_2 (K)
Suitability for agriculture	good for annual crops	good for annual and tree crops	good for annual crops and afforestation

Figure 13.11 Agricultural Land Use Potentials in the Study Area by Geological and Soil Classification



(3) C2(K): The series is composed of thick-bedded limestones, dolomites and limy marls, and found widely from Jerash and Ajlun in the west to the southern part of Mafraq. In the area covered by the FAO/MOA survey, a little over 10 percent of the total is classified as C2(K), which makes it somewhat difficult to establish firm correspondence between the geological classification with FAO/MOA soil series. On the whole, however, the C2(K) series is found associated with the soil series of 31 and 91. This is, the C2(K) series is generally either suitable for both annual and tree crops or for afforestation and tree crops. The present land use in the Irbid-Ramtha area is mostly agricultural and partly wooded. As for the Study Area as a whole, the proportion of wooded land is larger than the cropped area. In sum, the C2(K) series can be said as fairly suitable for agriculture. However, the series is mostly used for tree crops and forests in the areas with higher precipitation and largely unutilized in the western area with low precipitation due to its difficult terrains with many rocky outcrops.

13.058 Other major geological series found in the Irbid-Ramtha area are C2(H), C2(J), q^3 and B(F). The former two are mainly composed of marls and limestones and similar to C2(K). In fact, they are found next to the C2(K) series. Therefore, the land use potentials of C2(H) and C2(J) are probably similar to C2(K). The q^3 series is composed of landslide talus and fans and found at the mouth of rivers or wadis. B(F) is basalt and suitable for agriculture. However, the series is underutilized in the Irbid-Ramtha area because it contains steep slopes.

13.059 The geological series not found in the Irbid-Ramtha area are B5 (E) and E. The former is composed of basalt and turned into Yellow soils in the arid areas due to rapid weathering. The series is currently used only for grazing. The E series is composed of intermediate effusive rocks and also mostly used for grazing.

b. Precipitation

13.060 According to the FAO/MOA survey, the annual precipitation of 200 mm is minimum for sustaining marginal agricultural operation. For annual and tree crops, the minimum level of required precipitation is 300 mm per annum. It is judged that the areas with annual precipitation of above 500 mm contain few areas unsuitable for agricultural operation.

c. Topographical Conditions

13.061 Evaluation of topographical conditions is done in terms of gradient and the scale is adopted from the FAO/MOA survey. The

assumptions for evaluating agricultural land use potentials are (1) that the cultivation of annual crops does not require irrigation, (2) that tree crops require irrigation in the first year of planting, and (3) that afforestation does not require irrigation. As to the suitability for development, it is assumed that large-scale development requires 50 - 100 ha of flat land, while the requirement of small-scale development is for constructing one to several buildings. The results of the evaluation are shown on Figure 13.12 and Figure 13.13.

13.062 As shown on Figure 13.13, the gradient is generally small in the eastern part of the Study Area and sharper in the western part, especially as it nears the Jordan Valley. The central Irbid area has a gradient of about 0 to 3 percent in the east and 3 to 8 percent in the west, indicating its suitability for various types of development activities. The area around Ajlun and Jerash has a gradient ranging from 8 to 15 percent.

d. Results of Composite Evaluation

13.063 Figure 13.14 shows the composite results of the evaluation on agricultural land use potentials in the Study Area. Classification of grades by mode of land use is done as follows:

(1) Geological Series q5, C2(J), B:
The area with a gradient of 0 - 8 percent is considered suitable for annual crops and graded by the level of annual precipitation as follows:

More than 500 mm	Grade A
300 - 500 mm	B
200 - 300 mm	C
Less than 200 mm	Unsuitable

The area with a gradient of 8 - 15 percent is considered suitable for tree crops and graded as follows:

More than 300 mm	Grade A
200 - 300 mm	B
Less than 200 mm	Unsuitable

(2) Geological Series ff:
The area is considered suitable for tree crops if the gradient is less than 45 percent and graded as follows:

More than 300 mm	Grade A
200 - 300 mm	B
Less than 200 mm	Unsuitable

(3) Geological Series C2(H):
The area is considered suitable for annual crops if the gradient is between 0 - 8 percent and graded as follows:

Figure 13.12 Evaluation Criteria of Land Use Potentials by Gradient

Gradient (%)	Suitability for Agriculture			Suitability for Non-agricultural Development	
	Annual Crops	Tree Crops	Afforestation	Large - scale	Small - scale
A 0 - 3	I	I	I	I	I
B 3 - 8	II	II	II	II	II
C 8 -15	III	III	III	IV	III
D 15 -25	IV	IV	IV		IV
E 25 -45					
F 45 -					

Notes: 1/ I - IV respectively stand for; Best, Good, Not Impossible, and Bad (economically unfeasible).

2/ The gradient is measured by one sq. km.

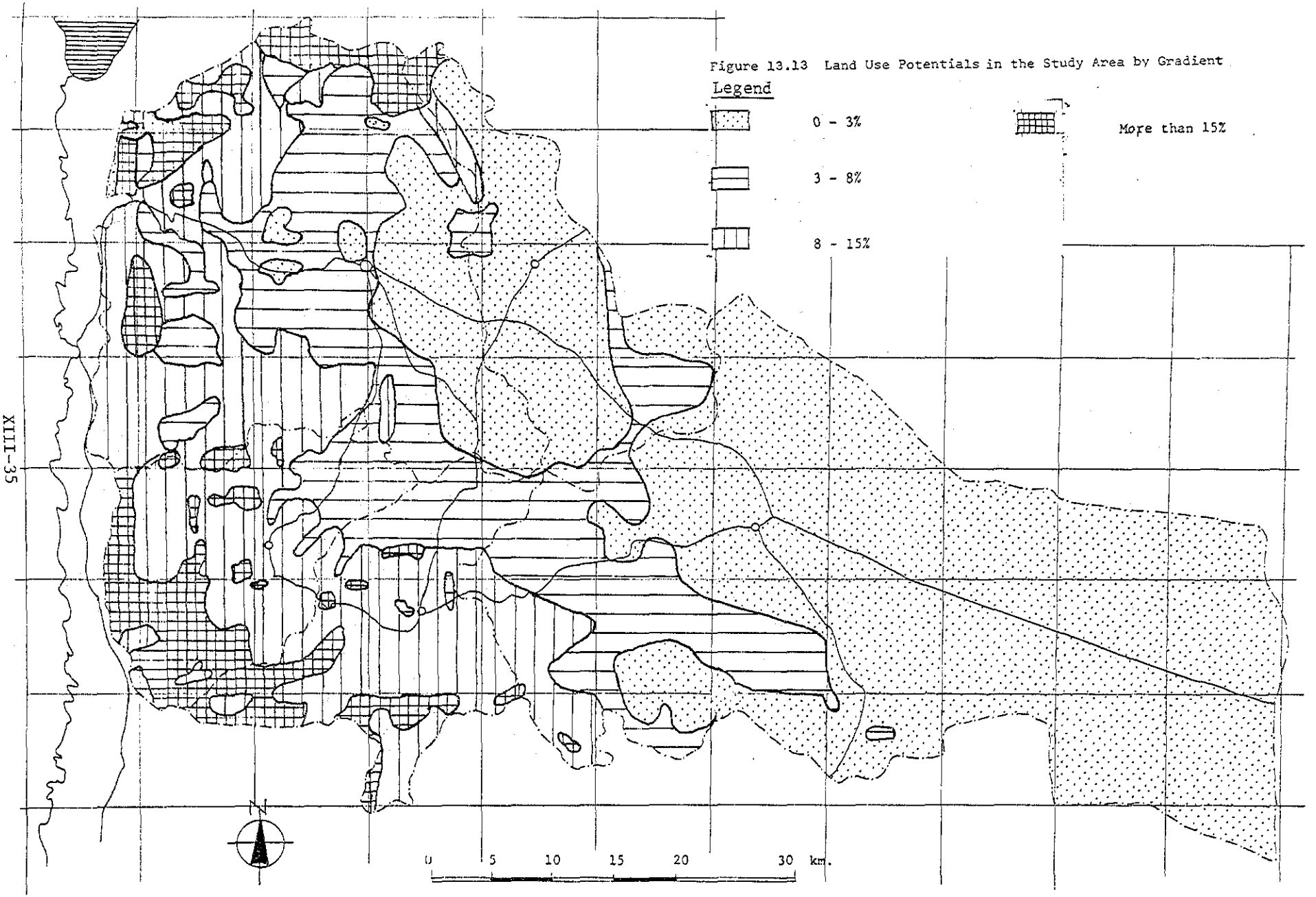


Figure 13.13 Land Use Potentials in the Study Area by Gradient

More than 500 mm	Graded A
300 - 500 mm	B
200 - 300 mm	C

The area with a gradient of above 8 percent is considered suitable for afforestation and graded as follows:

More than 500 mm	Grade A
300 - 500 mm	B
Less than 300 mm	Unsuitable

(4) Geological Series C1(M), C2(K), C2(L):
The area is considered suitable for afforestation for any gradient and graded as follows:

More than 500 mm	Grade A
300 - 500 mm	B
Less than 300 mm	Difficult

(5) Geological Series B5, q^1:
The area with a gradient of 0 - 8 percent is considered suitable for annual crops and graded as follows:

More than 500 mm	Grade A
300 - 500 mm	B

The area with a gradient of more than 8 percent and an annual precipitation of less than 300 mm is unsuitable for agriculture.

(6) Geological Series q3:
The area is unsuitable for agriculture and afforestation.

13.064 From Figure 13.14, it is possible to conclude that the area along the Irbid-Baghdad Routes16 and 30 extending 5 - 10 km from north to south and 50 km from east to west is suitable for annual crops. The grade of suitability is A for the area around Irbid and lowers to B around Ramtha and further east. The area suitable for tree crops is mostly located in Bani Kinana and Kura, and partly near Ramtha. The Jerash-Ajlun area is suitable for afforestation, with Grade A mostly found in the middle of the mountainous area and Grade B in its edges. The area unsuitable for agriculture and afforestation is mostly found concentrated in the southeastern part of Mafraq including Dhuleil and near the eastern boundary of the Study Area.

13.4.3 Identification of Locational Development Potentials

a. General

13.065 Because the population of the Study Area is estimated to grow at 2.4 percent by 1985 and 3.0 percent by 2000 per annum, it is expected that the Area will have increasing needs for development of its respective sectors to provide more employment opportunities.[3/] The specific locational requirements for development vary with

3/ See Section 4.1.4.

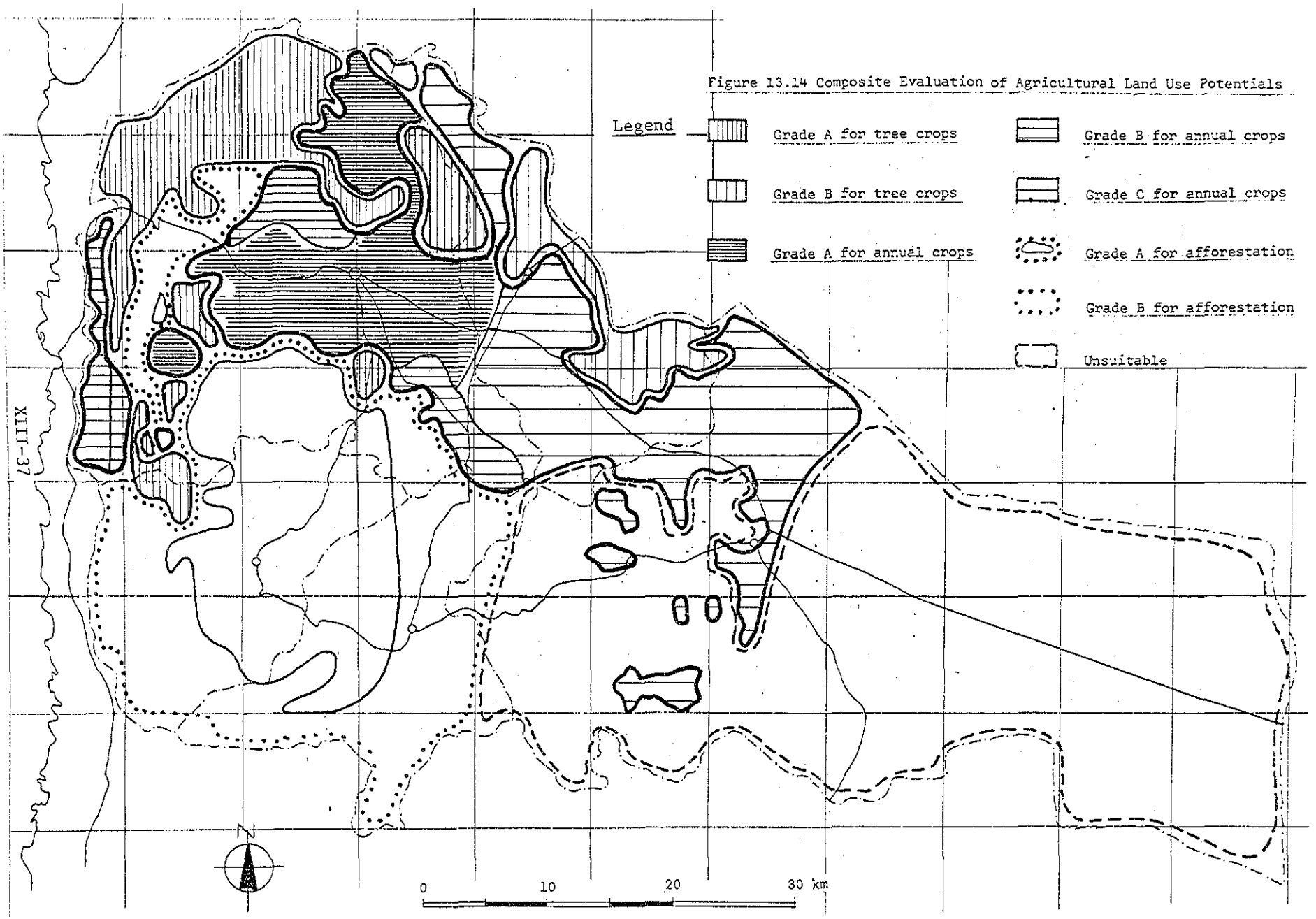


Figure 13.14 Composite Evaluation of Agricultural Land Use Potentials

sectors. Location for agricultural development is largely determined by the given natural conditions such as soil quality, precipitation and water resource availability. Location for industrial and housing development is determined by the availability of manpower and infrastructure such as transportation and public utilities. As for the agricultural sector, the evaluation done in the preceding section indicates the locations for various types of operation. Therefore, the discussion in this section centers on non-agricultural development, specifically manufacturing, distribution and commerce and housing.

13.066 Locational suitability for the non-agricultural development stated above is commonly determined by the availability of open space, transportation means and public utilities such as water and power. In addition, the industrial development depends on the supply of labor, while the housing development demands adequate amenity for prospective residents. The identification of suitable location is therefore done in terms of the availability of these requirements in addition to the physical characteristics of land as already indicated in the preceding section.

b. Evaluation Criteria of Infrastructure

13.067 The following criteria are used for evaluating non-agricultural land use potentials.

(1) Transportation: Because the dominant transportation means in the Study Area is road, suitable location is defined as within a distance of 5 km from the existing and planned trunk roads. The same assumption is applied to the railway, because it will play an important role if or when renovated or expanded.

(2) Labour supply: The largest population agglomeration is found in the Municipality of Irbid, from which, therefore, the largest supply of labor is expected. The criterion for locational suitability is to be within a distance of 15 km from the Municipality, assuming the maximum commuting time of 30 minutes and the use of buses (30 km/ hour).

(3) Public utilities: The availability of water and power is used for evaluation.

(4) Physical conditions: Locational suitability is defined as the gradient of less than 15 percent.

13.068 Figure 13.15 graphically shows the process of evaluation according to the four criteria mentioned above.

Figure 13.15 Evaluation Process of Non-agricultural Land Use Potentials

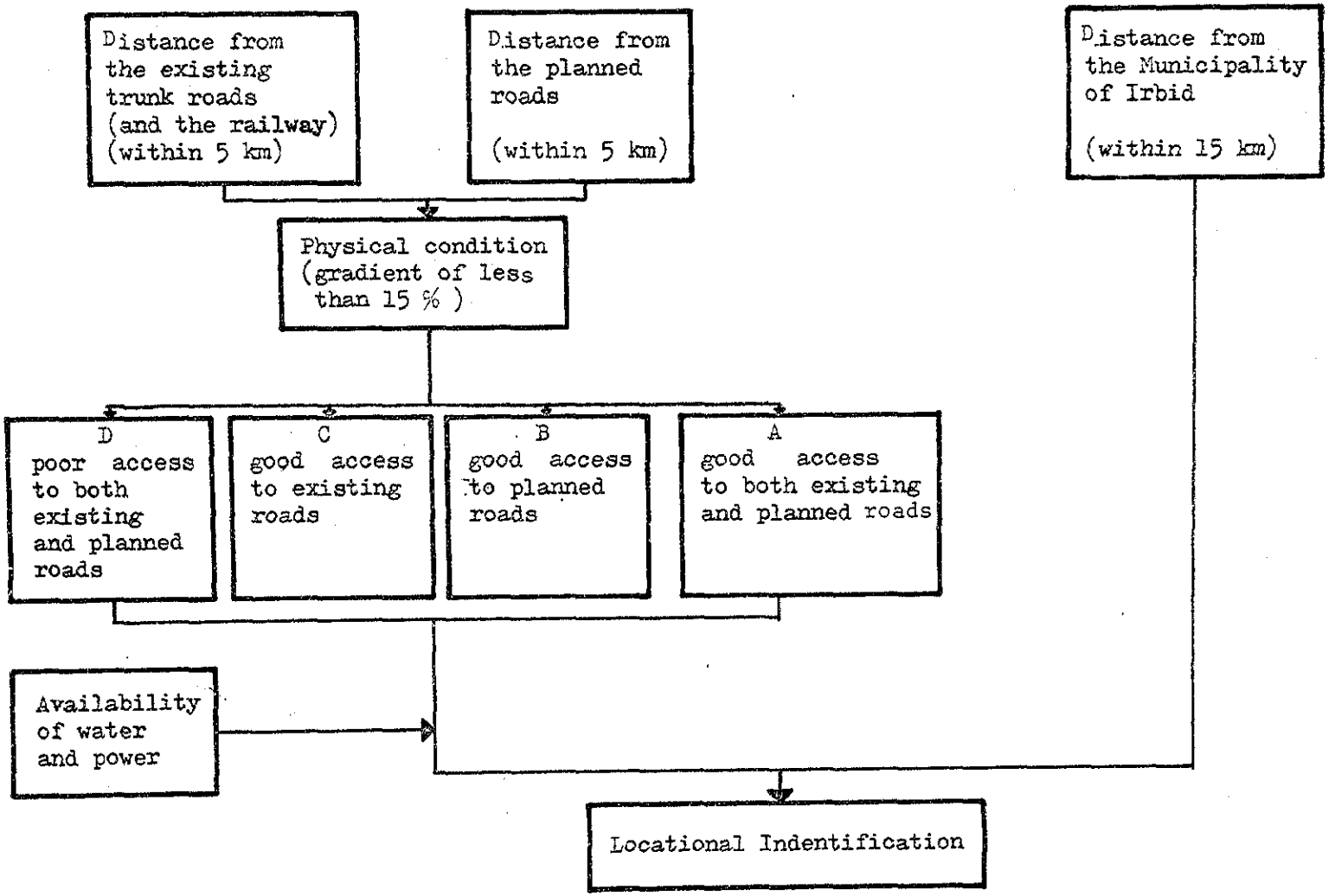


Table 13.7 Evaluation of Non-agricultural Development Suitability

Areas	Major Road Link	Accessibility: Existing Roads	Accessibility: Planned Roads	Railway	Availability: Water	Availability: Power	Distance from Irbid M. 2/	Agricultural Suitability	Evaluation
(1) Irbid West	Irbid-J.Valley (16)	O	△	X	△	△	O	Annual Crops (Grade A)	IV
(2) Irbid East	Irbid-Mafraq(16) Irbid-Amman(11)	O	O	X	O	O	O	Annual Crops (Grade A)	II
(3) Ramtha	JORDAN-SYRIA H.W. 1/	O	△	X	X	O	△	Annual Crops (A & C)	III
(4) Jerash North	Amman-SYRIA (15,33)	O		X	X	X	△	Afforestation (B)	IV
(5) Free Zone	JORDAN-SYRIA H.W.	X	O	O	X	X	X	Tree Crops (A & B)	III
(6) Study Area Center	JORDAN-SYRIA H.W. Irbid-Mafraq(16)	O	O	X	O	O	x	Tree Crops (A & B)	I
(7) Yarmouk University	Irbid-Amman(11) Amman-SYRIA (15,33)	O	O	X	O	O	△	Annual Crops (B & C) Afforestation (B)	I
(8) Jaresh	Amman-SYRIA (15.33) Jaresh-Mafraq(20)	O	O	X	X	X	X	Afforestation (B)	II

(To Continue)

Table 13.7 (Continued)

Areas	Major Road Link	Accessibility Existing Roads	Accessibility Planned Roads	Railway	Availability Water	Availability Power	Distance from Irbid M.	Agricultural Suitability	Evaluation
(9) Mafraq North	Irbid-Mafraq(16)	O	△	O	O	O	X	Annual Crops (C)	II
(10) Mafraq	Irbid-IRAQ(16.30)	O							
	Mafraq-AMMAN(30)	O		O	O	O	X	Annual Crops (C) and Unsuitable	II
	Mafraq-Jerash(20)		O						
(11) H5	Mafraq-IRAQ (30)	O	X	△	O	X	X	Unsuitable	V
(12) Dhuleil	Mafraq-Amman(30)	O	△	△	△	O	X	Unsuitable	V
(13) Balama	Irbid-Amman(11)	X	O	X	X	△	X	Unsuitable	IV

Notes: 1/ H.W. : Highway

2/ Irbid M.: Irbid Municipality

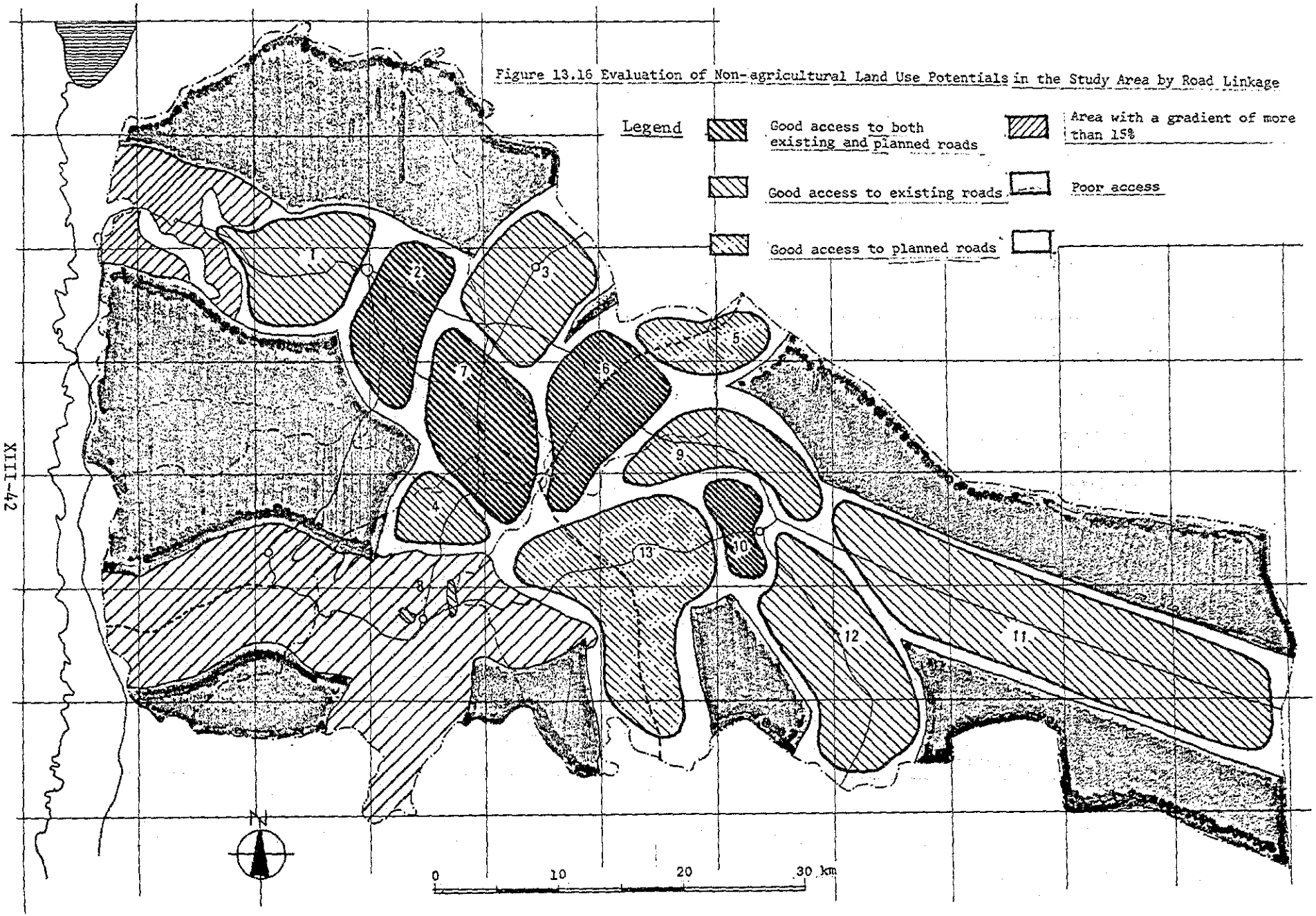


Figure 13.16 Evaluation of Non-agricultural Land Use Potentials in the Study Area by Road Linkage

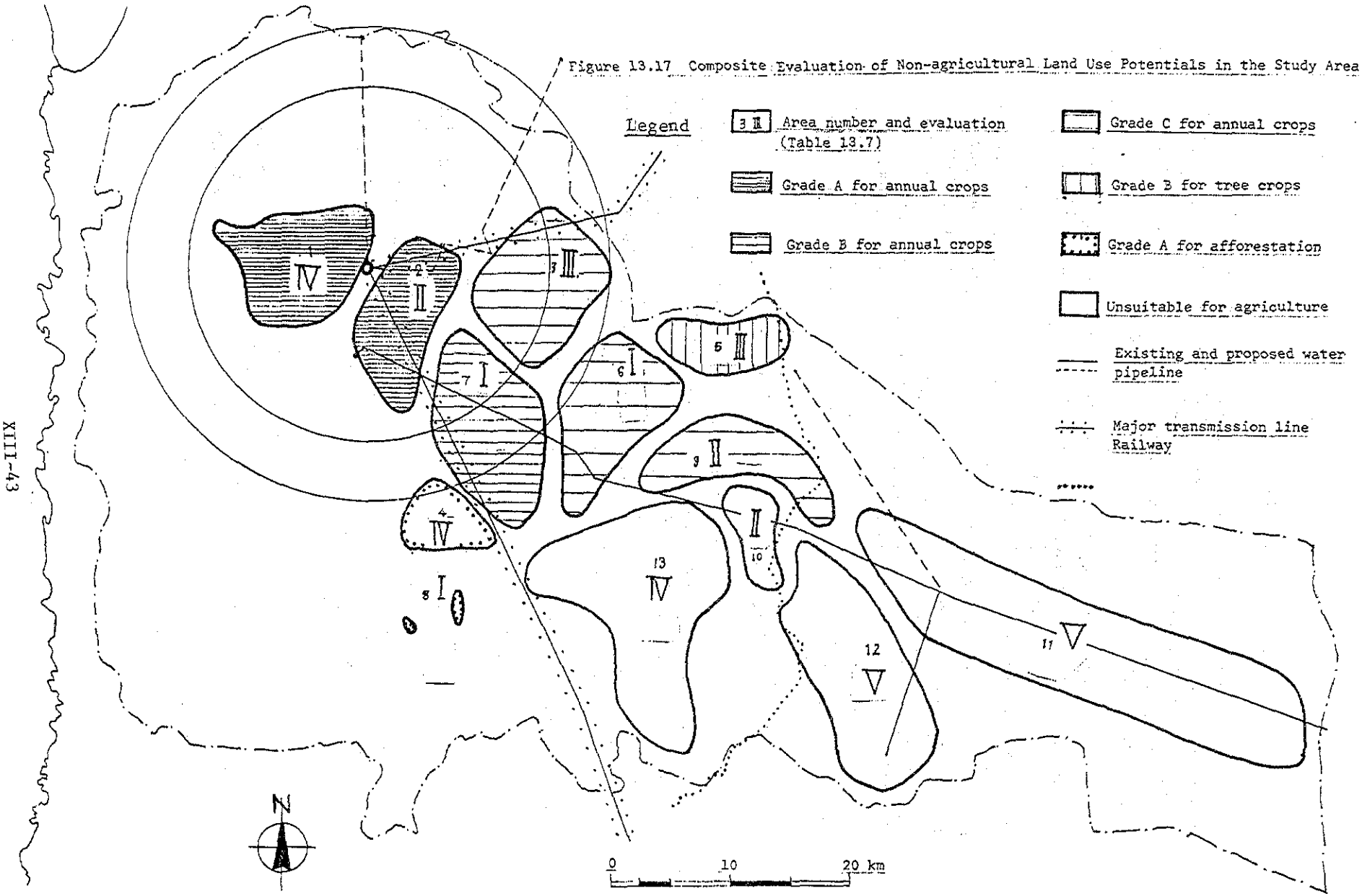


Figure 13.17 Composite Evaluation of Non-agricultural Land Use Potentials in the Study Area

c. Results of Evaluation

13.069 As shown on Table 13.7 and Figure 13.16, the Study Area is divided into 13 sections in accordance with the suitability for non-agricultural development. The agricultural suitability is presented in order to assess the degree of competition expected between agricultural and non-agricultural land uses.

13.070 According to the table, the areas which seem suitable for non-agricultural development are (6) "Study Area Center", (7) "Yarmouk University", (8) "Jerash", and (10) "Mafraq". These areas have better access than elsewhere to the existing and planned roads and to the supply systems of water and electricity and could be developed without affecting the agricultural operations. Of the four areas, Jerash is less endowed with flat land and its access to transportation is limited to the existing Irbid-Amman Routes 15 and 33. Coupled with lesser availability of water and power, its suitability for non-agricultural development will be somewhat limited. The suitability of Mafraq is fairly high, although the greater distance from Irbid and harsher climatic conditions might discourage the development to a certain extent. If the competition with agricultural land use is ignored, Irbid East appears most suitable for non-agricultural development.

13.071 It is possible to conclude that the most suitable areas for non-agricultural development are Study Area Center and Yarmouk University, followed by Irbid East. Mafraq may assume importance in the future. Jerash is suitable for small-scale development, while Industrial Free Zone is suitable for large-scale development which includes extensive infrastructural investment.

13.4.4 Land and Soil Conditions in the Greater Irbid Area

a. General

13.072 Soil conditions in the Greater Irbid Area are on the whole suitable for both annual and tree crops. However, considerable differences exist within the Area according to the level of precipitation. The western half is probably one of the most suitable areas for agriculture in the entire country, while the eastern half is less favored by climate and its suitability for agriculture is uneven.

13.073 The western half of the Greater Irbid Area is not only suitable for agriculture but for non-agricultural development as already indicated in the preceding section. It is therefore important to avoid the competition between agricultural and non-agricultural land use potentials.

b. Evaluation of Land Use Potentials

13.074 As already mentioned in section 13.4.2, the Ministry of agriculture has recently conducted the detailed land evaluation survey for agriculture in the Irbid-Ramtha area. Figure 13.18 shows the composite evaluation of land use potentials in the Greater Irbid Area. The criteria used for evaluation are the same as explained in Section 13.4.2 c.

13.075 As shown on the figure, the central area lying between the Municipalities of Irbid and Ramtha is on the whole suitable for agriculture. Especially around Irbid, land is flat and there is practically no condition unsuitable for agricultural operations. Only in the southern edge, the steeper gradient lowers the suitability to a certain extent. In the intermediate area between the Municipalities of Irbid and Ramtha, the level of annual precipitation is lower ranging from 300 - 400 mm, making the area less suitable for agriculture compared to the Irbid area. The area around Ramtha is even less suitable, because the level of precipitation is lower than 300 mm.

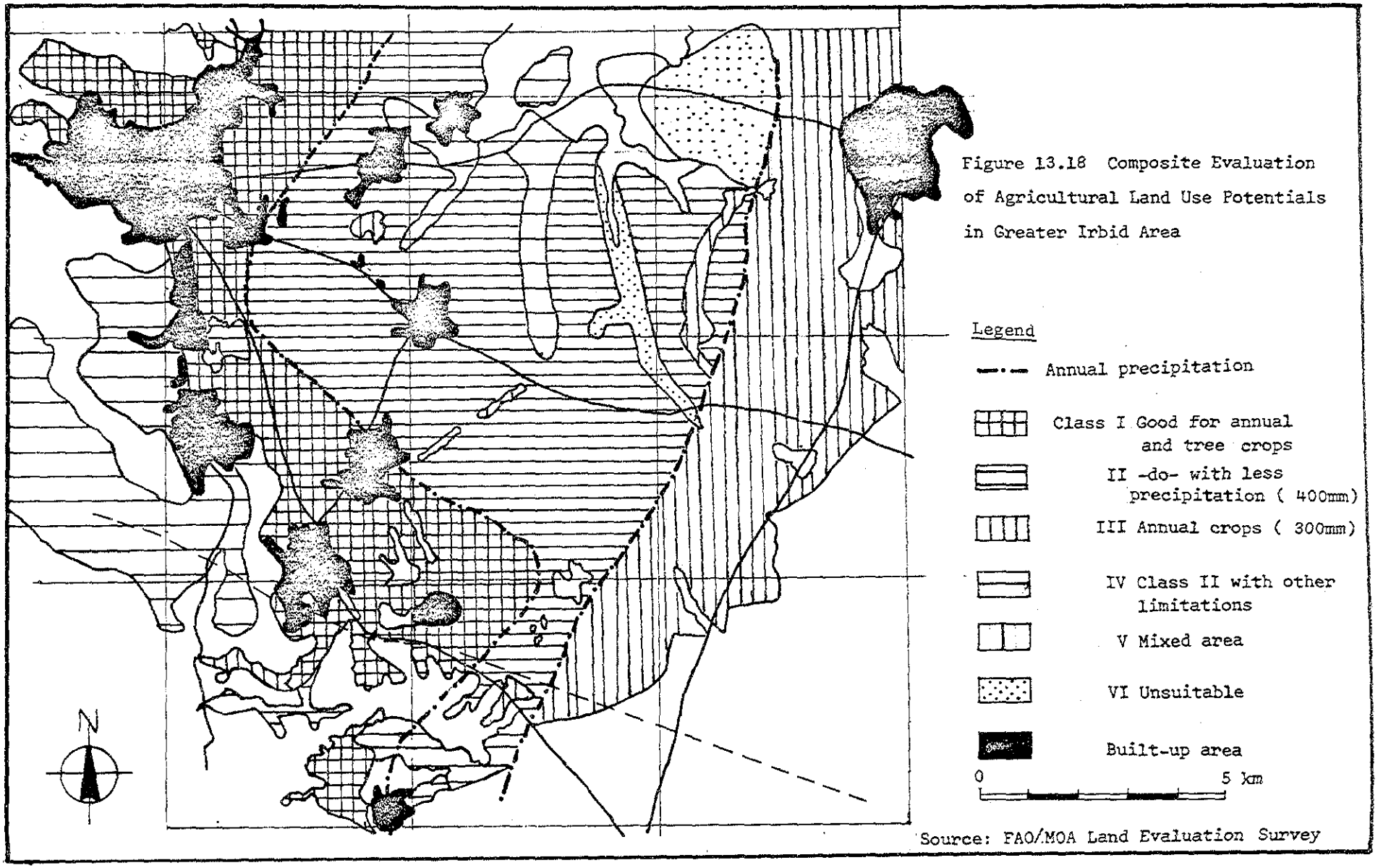


Figure 13.18 Composite Evaluation of Agricultural Land Use Potentials in Greater Irbid Area

Source: FAO/MOA Land Evaluation Survey

13.5 Regional Land Use Planning

13.5.1 Objectives

13.076 The present study aims at showing the direction to which the development should be carried out not only during the next Five-Year Plan period but up to the year 2000. The long-term perspective is chosen, because already planned development projects and many others that will follow will have their effects for long time and should be integrated and consistent with a long-term development strategy.

13.077 Given the inadequate data base and numerous elements of uncertainty involved, it is difficult to predict accurately the future of the Study Area with regard to population, scale of the economy, sectoral development and so forth. Nonetheless, when the future population for the year 2000 is given however tentatively, it is possible to estimate in a broad term the scale of the economy of the Study Area and then the expected demand for land. The broadly estimated demand for land will help frame the identification and implementation of various development projects and programs in accordance with a long-term development strategy.

13.078 Table 13.8 lists the major indicators of the Study Area for the year 2000. Given these assumptions on population size, sectoral composition of labor force and GRDP, it is estimated, for example, that the Study Area will require 5,000 ha for housing, 400 ha for industrial area by the end of the twentieth century. The currently unutilized land will be brought under cultivation, while distribution industries will expand in response to the industrialization and rise in the living standard. The demand for recreational facilities will grow as a consequence of increased leisure time and changes in life style.

13.079 The three important points can be suggested for framing the development activities in the Study Area, by taking account of its relative position and resource endowments vis-a-vis the rest of the Country. They are:

(1) Reservation of agricultural land for the increased production of basic food crops;

(2) Promotion of afforestation for headwater conservation;

(3) Compact development of urban centers and industries.

In the following sections, the perspective land use for the year 2000 will be shown.

Table 13.8 Planning Frame for the Year 2000 in the Study Area

	2000	Notes
Population	1,000,000	Doubled since 1975
GRDP	JD 600 Million	Expansion by 7 times since 1977
Sectoral Employment (% share)		
Primary	10	Reduction by two-thirds since 1975
Secondary	25	Trebled since 1975
(Mining & Manuf.)	(10)	
Tertiary	65	Small increase

13.5.2 Future Regional Structure in the Study Area

13.080 The Study Area is expected to emerge as the foremost cultural center of Jordan with balanced development between primary, secondary and tertiary industries (See Figure 13.6). As shown on Figure 13.19, the rest of the country excluding Amman is largely characterized by a single dominant function in terms of regional role. Amman and the Study Area are, however, expected to have multiple functions.

13.081 Population and sectoral activities are currently concentrated in the western half of the Study Area. Just as the opening of Route 30 between Amman and Mafraq has functioned to increase the regional importance of Mafraq, the future development of the road network will greatly influence the regional structure of the Study Area. Planned construction and expansion of Amman-Irbid Route 11 and international highway routes between Syria, Jordan and Saudi Arabia are the case in point. The routing of these roads and their linkage to the existing transportation network will change the relative importance of the respective road network components and hence of urban centers connected through these roads as shown on Figures 13.20 - 13.23.

13.082 The other planned projects which are expected to alter the regional structure of the Study Area are the Yarmouk University and the Industrial Free Zone. The Yarmouk University will give great developmental impact, if its establishment at the permanent site be integrated with other development efforts. The Industrial Free Zone on the border with Syria is nearly comparable in its planned size and associated expansion of distributional activities to what Jordan as a whole currently possesses. The full-scale

Figure 13.19 Regional Structure of Jordan for the Year 2000

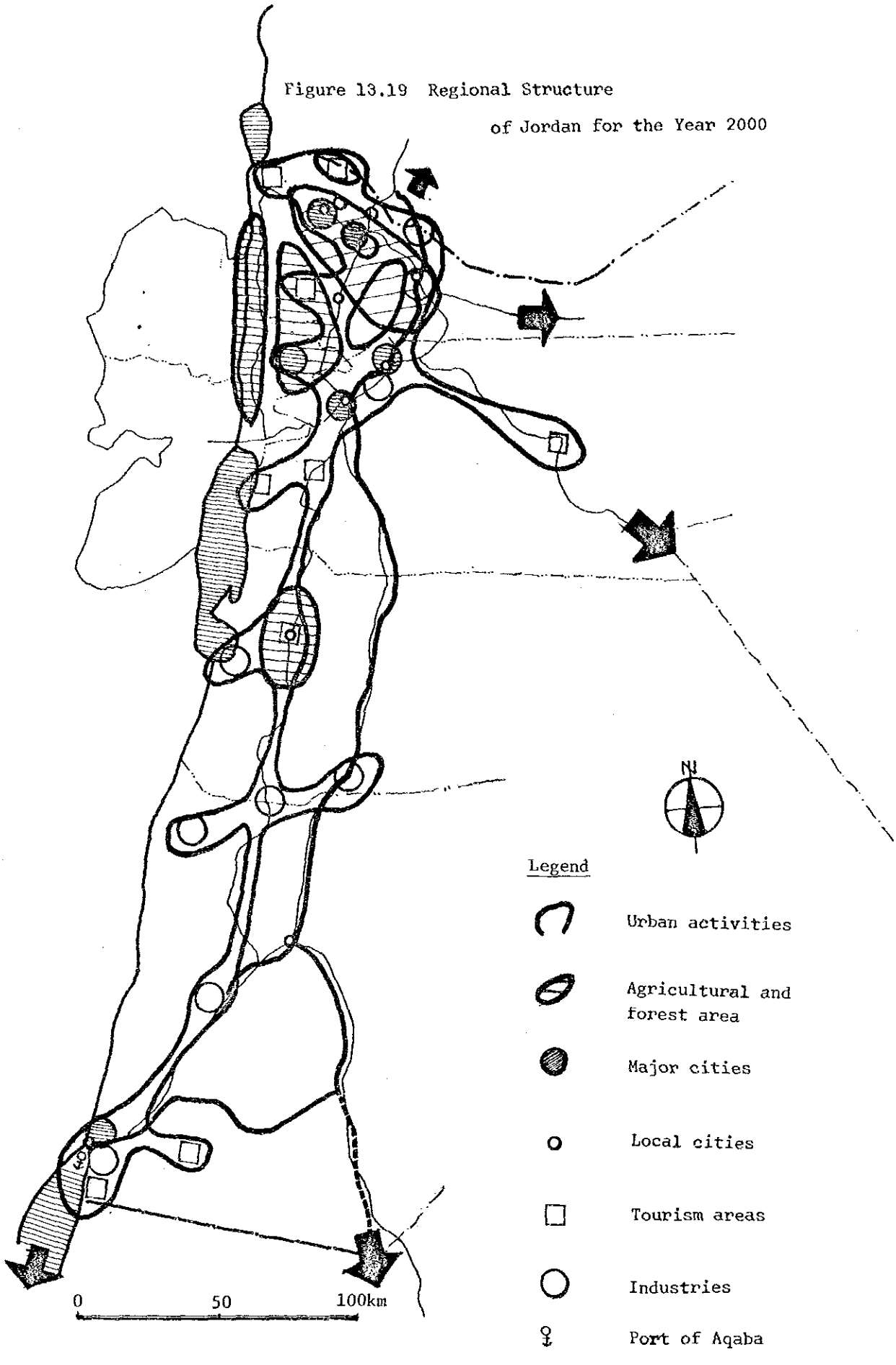
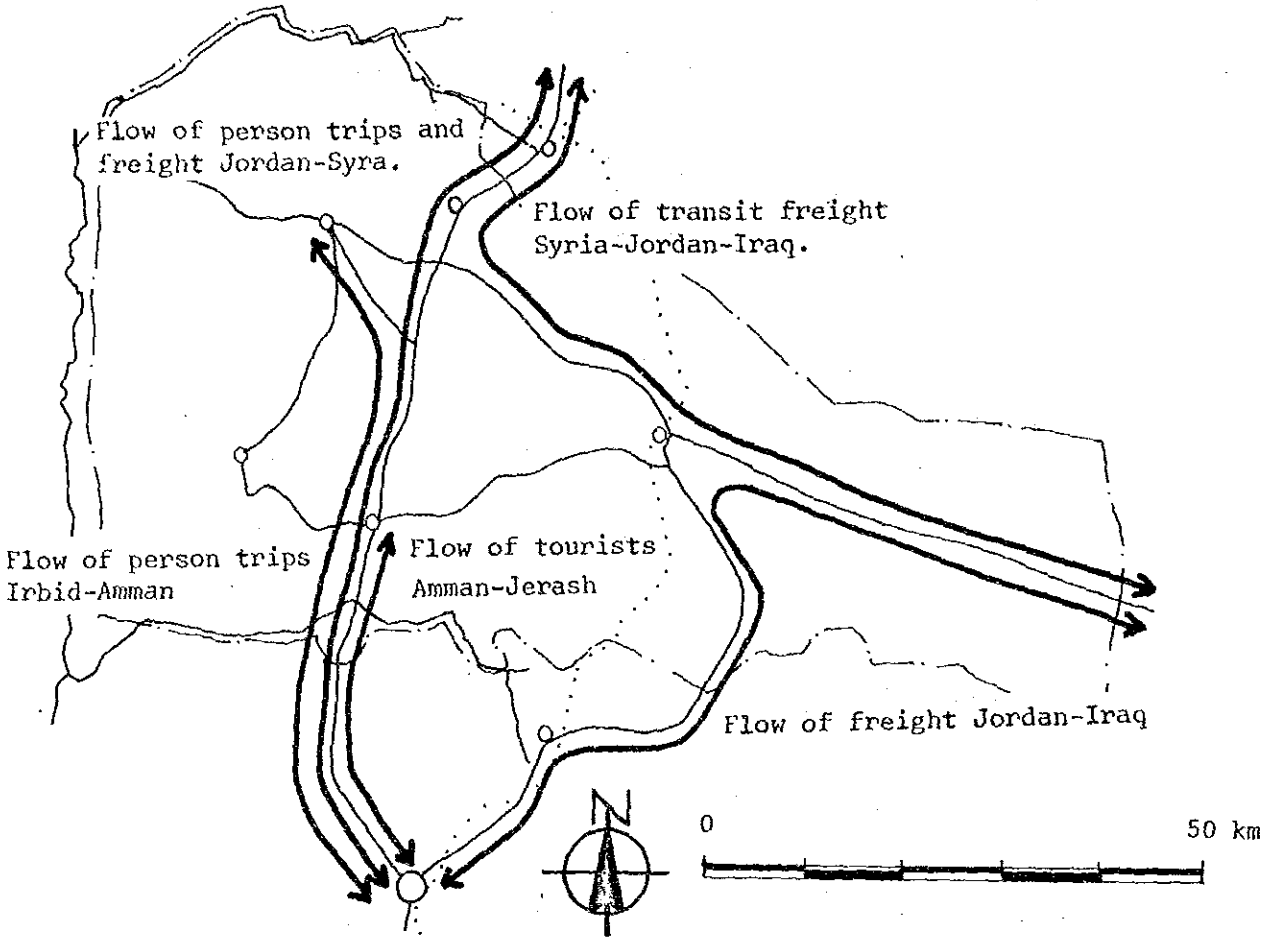


Figure 13.20 Present Road Network and Urban Centers

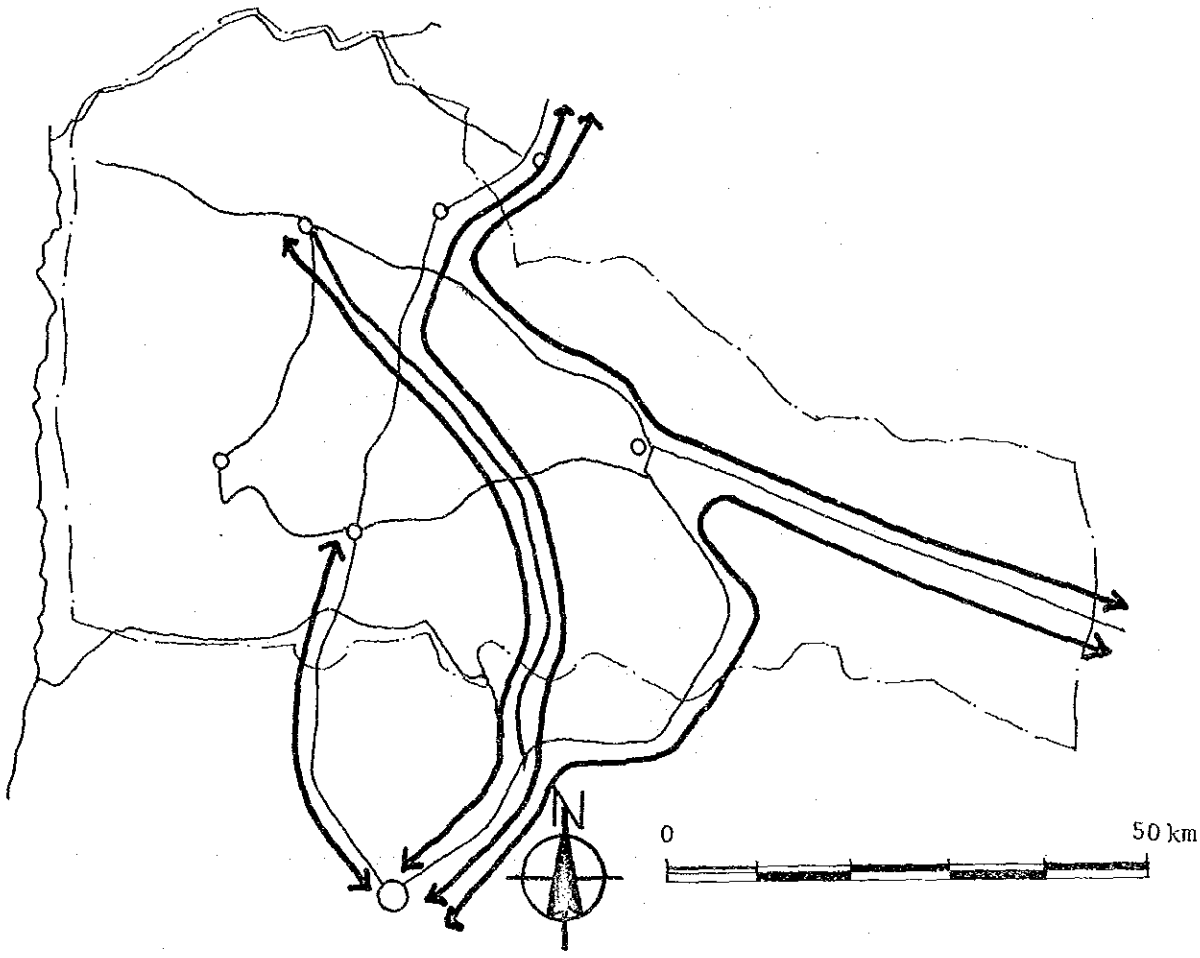


Ramtha: Gateway for freight and person trips to and from Syria

Mafraq: Freight Transit point to and from Iraq and Syria

Jerash: Transit point for person trips between Irbid and Amman

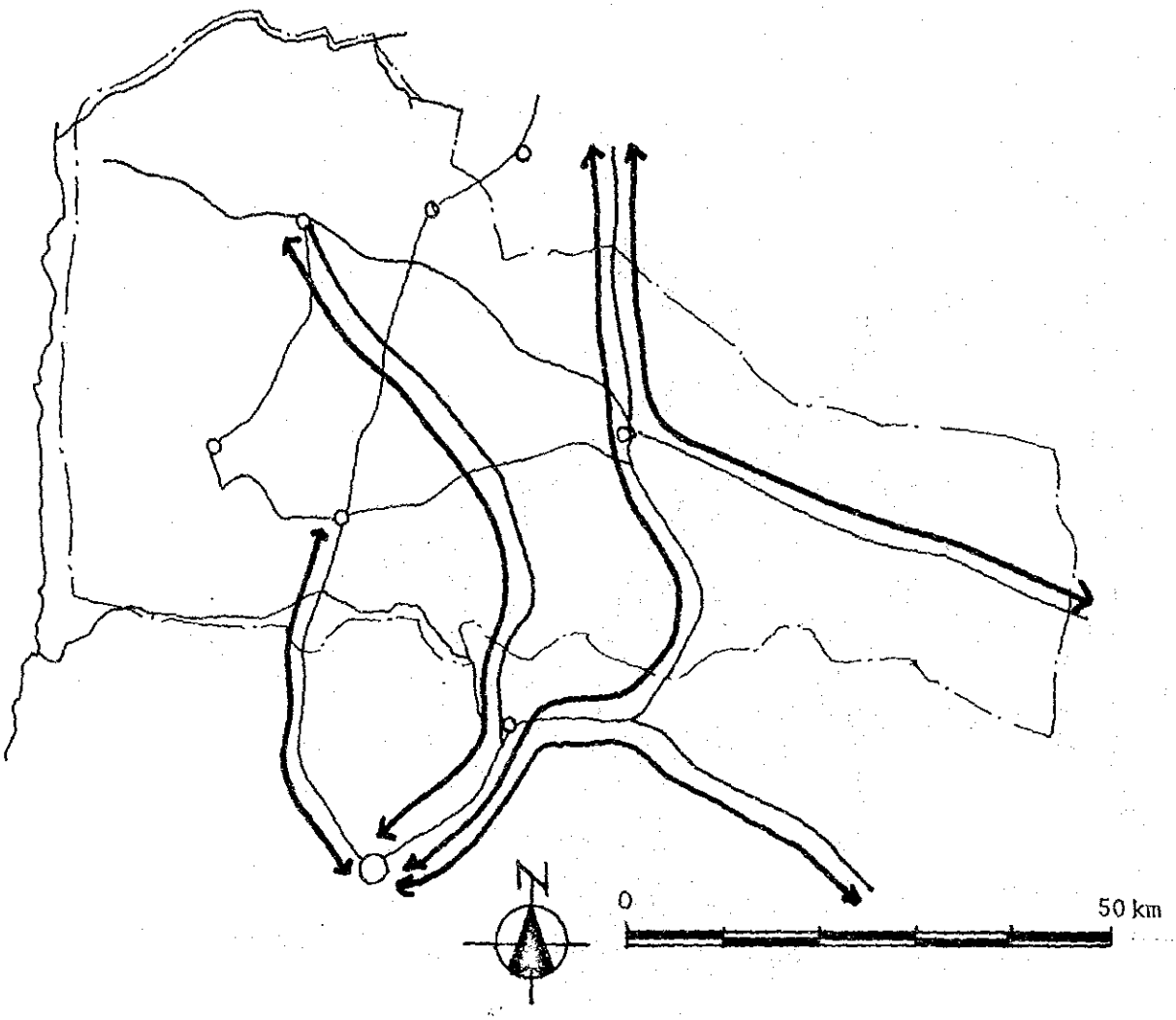
Figure 13.21 Possible Effects of Amman-Irbid Route 11



- Most of the passengers will be diverted to the new route and the existing Irbid-Jerash-Amman Route will be used mainly by tourists visiting Jerash and local people.

- The freight traffic between Amman and Syria will be similarly affected.

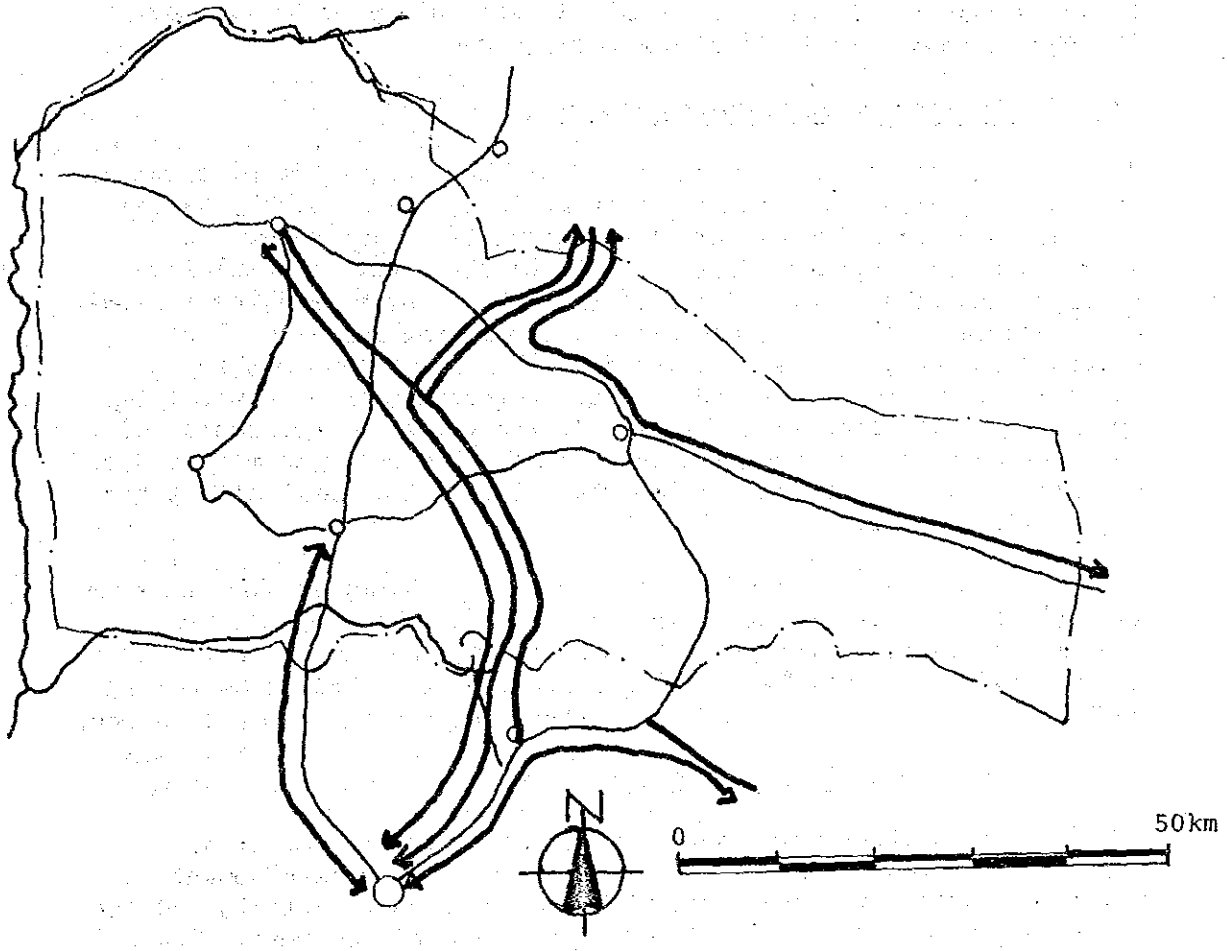
Figure 13.22 Possible Effects if Amman-Azraq-Baghdad Highway



- The importance of Ramtha as transportation node will decline, while that of Mafraq will increase, if the Highway is routed to connect Free Zone and Mafraq.

- By the opening of Amman-Baghdad Highway, the current freight traffic between Jordan and Iraq will pass Azraq and Mafraq will emerge as a transit point for the freight traffic between Syria and Jordan or Iraq.

Figure 13.23 Possible Effects of Jordan-Syria Highway



If the planned Highway is routed to touch the Yarmouk University area, the distributional role of Mafraq will decline, while that of the University will become important.

operation of the Free Zone will thus affect the distribution of manufacturing industries in the Country as a whole. With respect to the Study Area, all of the existing and prospective urban centers will be influenced by the Free Zone. Especially, the Municipalities of Irbid and Mafraq and the Yarmouk University area will receive the greatest impact. Given these possible effects of the already planned big projects, identification of new projects and their locations will have to be made in such a way as to maximize the development potentials of the Study Area.

13.5.3 Alternative Development Patterns

13.083 Regional land use planning for the economic development in the Study Area covering more than 4,000 sq. km naturally varies in accordance with the different selection of urban centers to which major development efforts are to be directed. As explained earlier, the relative positions of the urban centers and the regional structure of the Study Area as a whole in the future will be affected not only by the existing distribution of demographic and industrial agglomerations and of natural resource endowments, but by the possible effects of the already identified big projects and their associated development requirements. Project recommendations of this Study will be another important factor that will affect the regional structure.

13.084 The Study examined in Volume 2 of this Report four alternative patterns of development expected to materialize by the year 2000 in accordance with the different emphasis on the urban centers in the Study Area (Cf. Table 2.6 and Figures 2.1 - 2.4 in Chapter 2, Part II). Brief recounting of these alternative patterns is in order.

a. Decentralized Pattern

13.085 This alternative does not select a limited number of locations as growth centers, but aims to distribute development activities evenly in accordance with the resource endowments and the requirements of specific development projects and programs. The estimated population of about one million will be distributed in line with the expected growths of industrial and infrastructural agglomerations in urban and rural areas. Industrial projects will be selected and located to suit the varying characteristics and needs of the respective urban centers such as Municipalities of Irbid, Ramtha, Mafraq, the Yarmouk University complex, etc. A total of approximately 400 ha will be required for these industrial development projects of varying scale. As for transportation facilities, Route 11 between Amman and Irbid will be completed as currently planned, while the Syria-Jordan International Highway will be routed to connect the Industrial Free Zone with Mafraq. In addition, expansion and improvement will be carried out on road links between Irbid and Maqarin Dam, between Irbid and Hemma, between Irbid, Ajlun and Jerash, between Irbid and the Jordan Valley, etc..

b. Mono-Centric Pattern

13.086 This alternative selects the Municipality of Irbid as the central growth center, and aims at concentrating development activities largely in this location. The demographic and industrial agglomerations in the Municipality will expand in reaps and the nearby centers such as Ramtha and the Yarmouk University area will develop as its satellites. The Industrial Free Zone is not envisaged to give impact on the regional economy. The aggregate spacial needs for housing and industrial projects are about the same as the Decentralized Pattern. As for transportation, a direct road linkage is expected between Irbid and Ramtha in addition to the construction and improvement suggested for the Decentralized Pattern.

c. Duo-Centric Pattern

13.087 This alternative envisages the Yarmouk University complex as another growth center in addition to the Municipality of Irbid. The different and complementary functions are assigned to the two centers. While the Municipality of Irbid will function, as it does now, as the administrative and commercial center for the Study Area, the Yarmouk University area will assume a position of the industrial and distribution center in addition to being the educational and cultural center. The planned Syria-Jordan Highway will be routed to touch the Yarmouk University area to bolster its position. In addition to the establishment of a sizable industrial estate and distribution industries, the Yarmouk University area will require the establishment of a new town and housing site development in order to accommodate for the inflow of population. The population for the year 2000 is likely to exceed one million as this alternative presupposes bigger development outlays. The special requirements for industrial development would be similarly larger than those of the Decentralized and Mono-centric Patterns.

d. Tri-Centric Pattern

13.088 This alternative envisages that the emphasis of development activities will be directed to the eastern half of the Study Area as well in response to the establishment of the Industrial Free Zone and the opening of the Syria-Jordan Highway passing near the Free Zone and Mafraq. In addition to the Municipality of Irbid and the Yarmouk University area, the Municipality of Mafraq will become the third growth center mainly specializing in industrial and distributional functions. The aggregate size of population and industrial development will be close to that of the Duo-Centric Pattern.

13.5.4 Suggested Land Use for the Study Area

13.089 On the basis of the Combined (Decentralized and Duo-Centric) Pattern of development proposed for the Study Area (Figure 3.1 in Chapter 3, Part II), the perspective frame for land use planning is indicated for the Study Area. The following discussion is basically envisaging the land use in the year 2000.

a. Urban Areas

13.090 The foremost growth center is the Greater Irbid Area, where there are two growth cores of Irbid and Yarmouk Complex areas, where most of the expected development activities will be directed. In addition, such urban centers as Mafraq, Jerash, and Ajlun, the areas around Maqarin Dam, Um Qeis and the Industrial Free Zone will serve as secondary growth centers through development activities suitable for their respective characteristics and needs (Figure 13.24).

13.091 Due to the great expansion of population and economic activities expected in the Greater Irbid Area, development requirements of urban facilities will increase in the future. Specifically to accomodate for the inflow of population to the Area, two new towns of about 350 ha each will have to be established by 2000, one at the Municipality of Irbid and the other near the Yarmouk University. Two sites for industrial complexes (preferably as industrial estates) will have to be constructed, also one around the Municipality and the other near Yarmouk University, requiring a space of about 150 ha each. In addition, one small industrial estate of 20 or 30 ha will be established at each of Ramtha, Jerash and Mafraq. These three urban centers will each require a site of about 100 ha for housing development. In aggregate, 400 ha and 3,000 ha will be developed respectively for industrial and housing development by the year 2000.

13.092 For distribution facilities, the Industrial Free Zone will play one of the central roles for international freight traffic. Establishment of a truck terminal now being considered by a private investor at Ramtha will also contribute. In addition, the Greater Irbid Area will need a sizable distribution center to cater to the increased needs for consumer goods and industrial raw materials.

13.093 For tourism, various development activities will be carried out at major sites. Major excavation and/or restoration works are expected for historic ruins at Jerash and Um Qeis, while development of recreational and/or resort facilities will be carried out at Maqarin Dam, Hemma, Dibbin, Mt. Aqra, etc..

b. Rural Areas

13.094 The rural areas where agriculture is the predominant mode of land use are distinguished into three categories, viz., (1) the area primarily for afforestation for the purpose of conservation, (2) the area for agricultural development, and (3) the area currently used only for grazing but usable for agricultural operations.

i. Afforestation Areas

13.095 Areas for afforestation are expected to serve the purposes of (1) general headwater conservation in areas of high precipitation, (2) headwater conservation in the catchment areas upstream of dams,

and (3) improvement of the natural environment for the development of tourism and recreation.

13.096 The two types of afforestation areas are identified, the general afforestation areas serving the first purpose and the intensive afforestation areas for the second and third purposes. The identification is done in some places to expand the already desiganted afforestation areas such as national parks. As shown on Figure 13.24 the general afforestation areas are indicated for Ajlun and Jerash Mutserfieh and the area around Kura. Six intensive afforestation areas are identified, three around Jerash, one each at Deir Abu Said, Hemma, Um Qeis and Maqarin Dam.

ii. Agricultural Promotion Area

13.097 The agricultural promotion area is further divided into (1) the area for tree crops, (2) the area for cereals and (3) the area for mixed cropping including irrigated cultivation of vegetables. The first type is identified at Bani Kinana, while the Irbid-Ramtha area is to promote cereal cultivation. The Mafraq-Dhuleil area is the third type of agricultural promotion area. The experimentation of Jerusalem artichoke is expected in the last area.

iii. Potential Agricultural Area

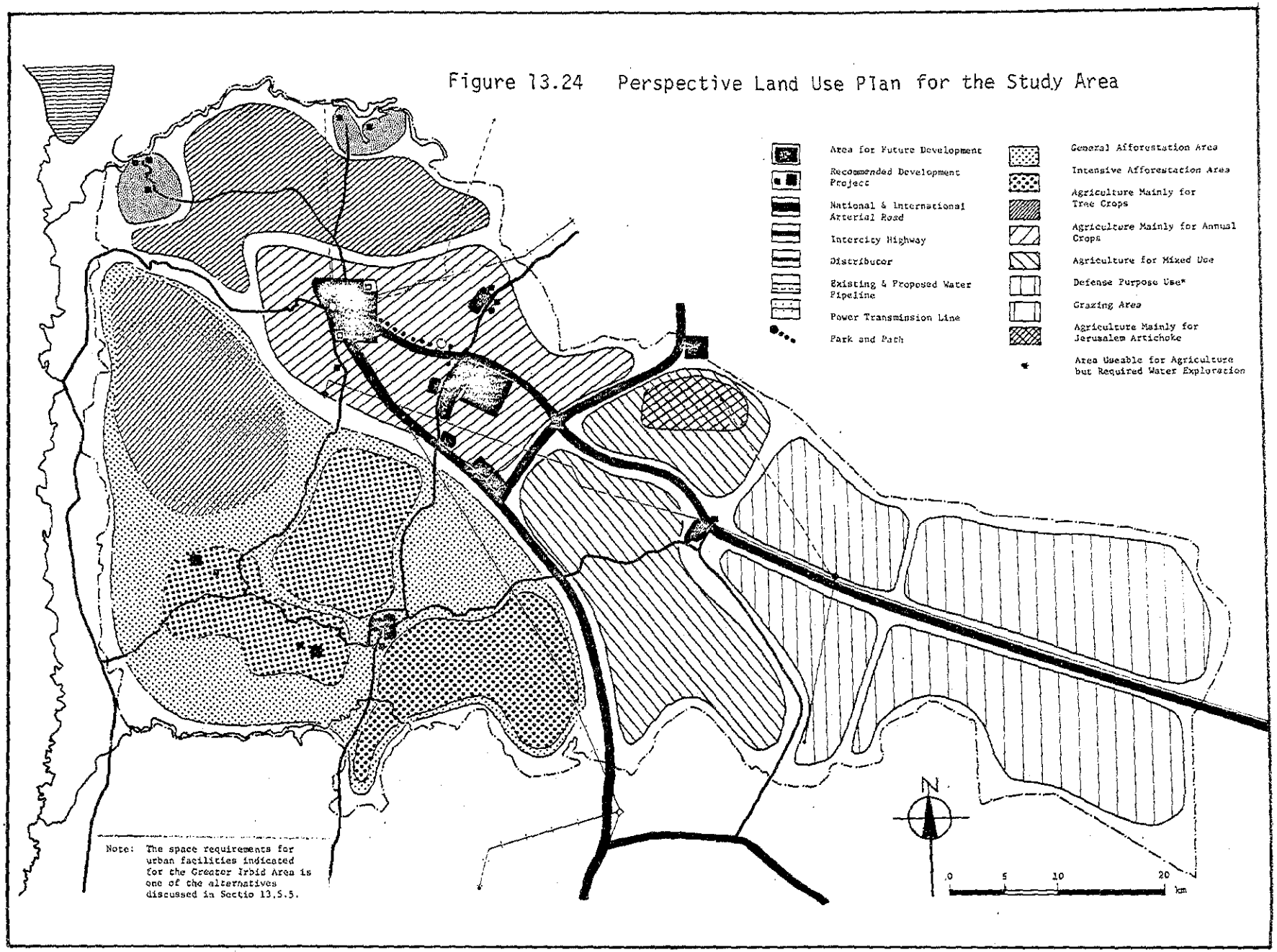
13.098 The area is identified in the eastern part of Mafraq. Soil conditions in this area are generally favorable, but the inavailability of water and the problem of salinity have so far inhibited the expansion of agricultural operations. The extensive presence of gravels and boulders is another limitation. Whether to use this area for agriculture or not will have to wait for further examination.

c. Major Roads

13.099 The trunk roads available in the Study Area are (1) Irbid-Amman Routes 15 and 33, (2) Irbid-Mafraq-Iraq Routes 16 and 30, and (3) Yarmouk University-Free Zone-Syria Route. Four other major roads extends to connect the urban centers to these trunk roads; (4) Irbid-Jordan Valley Route 16 , (5) Irbid-Ajlun-Jerash-Mafraq Route 16 , (6) Syria-Ramtha-Yarmouk University-Jerash-Amman Routes 15 and 33, and (7) Mafraq-Amman Route 30.

13.100 The north-south movement of passengers and freight is expected mostly to be along (1) and (3). The west-east movement will be born by (2) and (4). The current traffic between Jordan and Saudi Arabia is expected to be diverted to the planned Zarqa-Azraq-Saudi Arabia Highway. For the secondary growth centers expected in the north and further northwest of the Study Area, better distributor roads will be extended in addition to (5).

Figure 13.24 Perspective Land Use Plan for the Study Area



13.5.5 Suggested Land Use for the Greater Irbid Area

a. Planning Objectives

13.101 The primary objective is to develop the Area into the growth center with multiple functions of administration, commerce, manufacturing, distribution and cultural activities. To realize this objective, it is requisite to secure, in addition to the scheduled construction of the Yarmouk University, sufficient facilities for housing and recreation for the inhabitants, and sites for industrial establishments and distribution industries. In spacial terms , these facilities must be located in such an integrated way as to maximize their development effects.

13.102 In addition, the Greater Irbid Area is located in the middle of one of the best agricultural areas in Jordan. Therefore, the development activities for the Area will have to be planned and executed in such a way that they will not constrain and be detrimental to the agricultural operations. In other words, urban development projects for the Area must be compactly designed and sprawling must be kept.

13.103 The basic assumptions and estimates used in this section for land use planning in the Greater Irbid Area for the year 2000 are as follows:

Population 500,000

Industrial area ..... 330 ha

Housing area ..... 2,400 ha (new towns 800 ha)

b. Conditions for Land Use Planning

13.104 As mentioned in Chapter V of Part II, the population related to the Yarmouk University is estimated to number approximately 76,000, of which a larger part of 58,000 is expected to reside outside the University campus. These outresidents are likely to live in the Municipality of Irbid which is expected to grow into an approximate size of 300,000 population by the year 2000. A new town which accommodates for some 30,000 of them is proposed near the university campus in Chapter V.

13.105 The establishment of the University is expected to induce a variety of industries related to educational activities such as printing and publishing. The University will also attract other research and educational institutions in its vicinity.

13.106 The Municipalities of Irbid and Ramtha are expected to attract light industries and will have to provide sites for them. Irbid is currently considering the establishment of four small Industrial estates (including the one nearing completion) with an aggregate area of 100 ha.

13.107 The Route 11 currently under construction to connect Irbid and Zarqa will be open by mid-1980s. The route will pass the southern part of the Greater Irbid Area, giving better access to Amman. The area between Irbid and the University along this road will become suitable for establishing distribution industries. The local traffic pattern among Irbid, Ramtha and the University will be unaffected by the opening of this route. The Syria-Jordan International Highway will enter the Irbid Governorate near the planned Industrial Free Zone and connect to the Route 11 somewhere. This is expected to decrease the importance of Ramtha as the gateway city to Syria. The direct road link between Irbid and Ramtha is at present extremely poor, but it will not be very difficult to provide a better road.

c. Development Alternatives

13.108 As mentioned already, the Greater Irbid Area is expected to become the primary growth center of the Study Area. Exact siting of the various proposed development projects within the Greater Irbid Area will require a more detailed urban development study. In this Study, three perspective alternatives are suggested.

i. Concentration in Irbid (Figure 13.25)

13.109 This alternative is to concentrate all the major projects in and near the Municipality of Irbid to maximize the economy of agglomeration. Suggestions are as follows:

(1) Research institutions and education related industries are established in the Municipality.

(2) Approximately 50 percent of the out-residents of the University will be absorbed in a new built-up area of the Municipality.

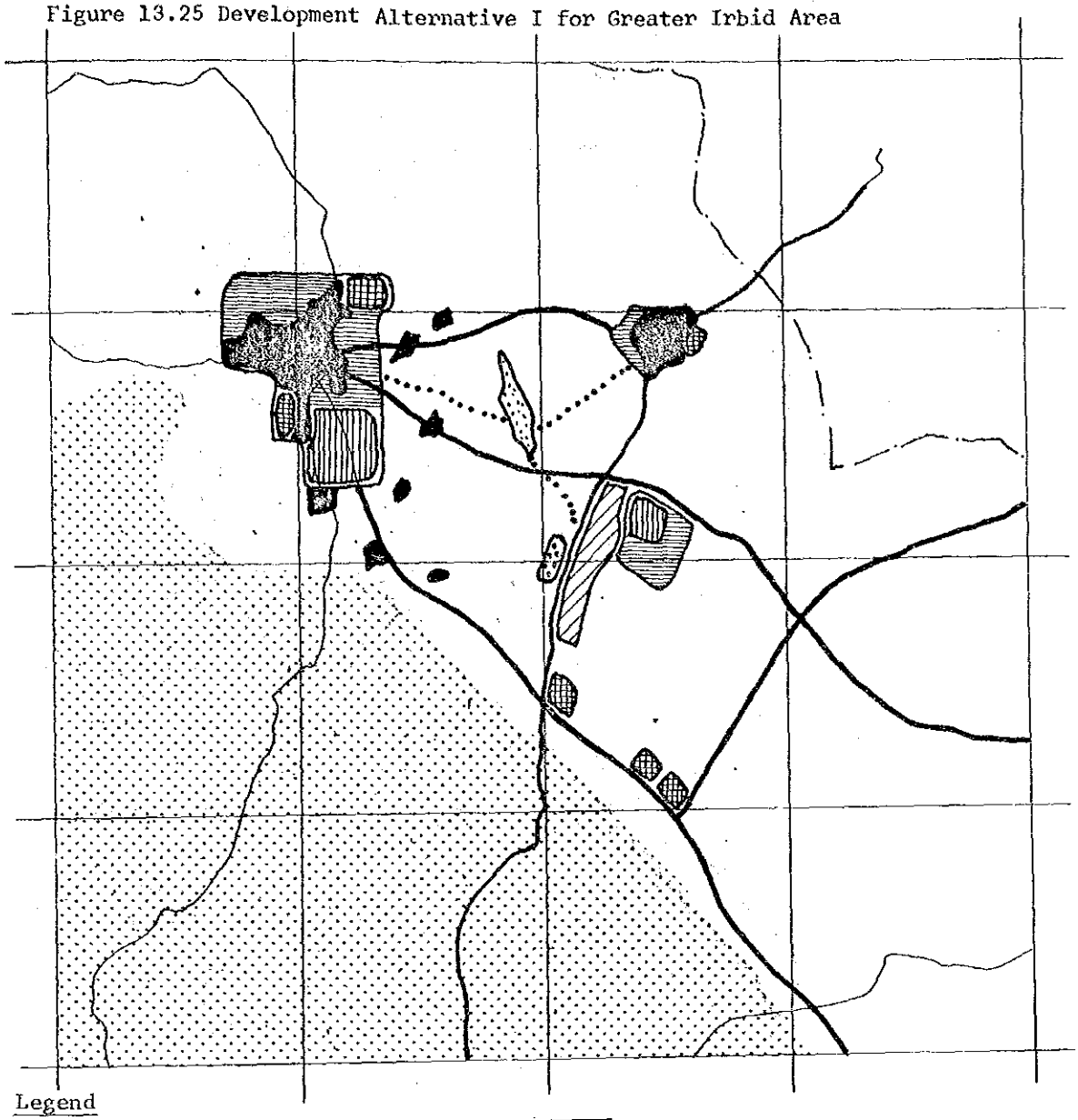
(3) A direct road link will be constructed between Irbid and Ramtha.

(4) A green belt with recreational facilities will be established connecting Irbid, Ramtha and the University to ameliorate the living environment of the residents in these centers.

(5) A distribution center will be established somewhere between Irbid and the University along the Route 11. Considering the access to Syria, it is desirable to establish it close to the University.

(6) An industrial estate will be provided near Irbid, preferably to the east or north because of the wind direction.

Figure 13.25 Development Alternative I for Greater Irbid Area



Legend

- Expected built-up area
- New towns
- Industrial estates and distribution centers
- Built-up area (mid-1970s)
- Yarmouk University
- Recreation area
- MOA experimental station
- Tree crop area
- Annual crop area
- Forested area

N

0 10 20 km

(7) Given these conditions, the population of the Municipality of Irbid will grow to some 400,000 by the year 2000. Of the increase of 250,000, one-third will be absorbed in a new town. The new town will be designed for low-income families with associated recreational and cultural facilities. At the same time, redevelopment of the center of the Municipality will be launched.

ii. Concentration near the University (Figure 13.26)

13.110 The alternative aims at the same objective of maximizing the economy of agglomeration, by concentrating development projects in the area around the University. Major components of this alternative are:

(1) A model new town will be established near the University to house 30,000 of the total university related population.

(2) An industrial estate and the distribution center will be established close to the Route 11.

(3) A site for housing will be developed near the Route 16.

(4) A green belt will be provided extending from the University toward Irbid.

iii. Complementary Concentration in Both Irbid and the University Areas (Figure 13.27)

13.111 This alternative aims to develop two centers by giving them different but complementary urban functions. Major components of this alternative are:

(1) A new town will be established respectively at Irbid and around the University, accommodating for an aggregate total of 60,000 persons.

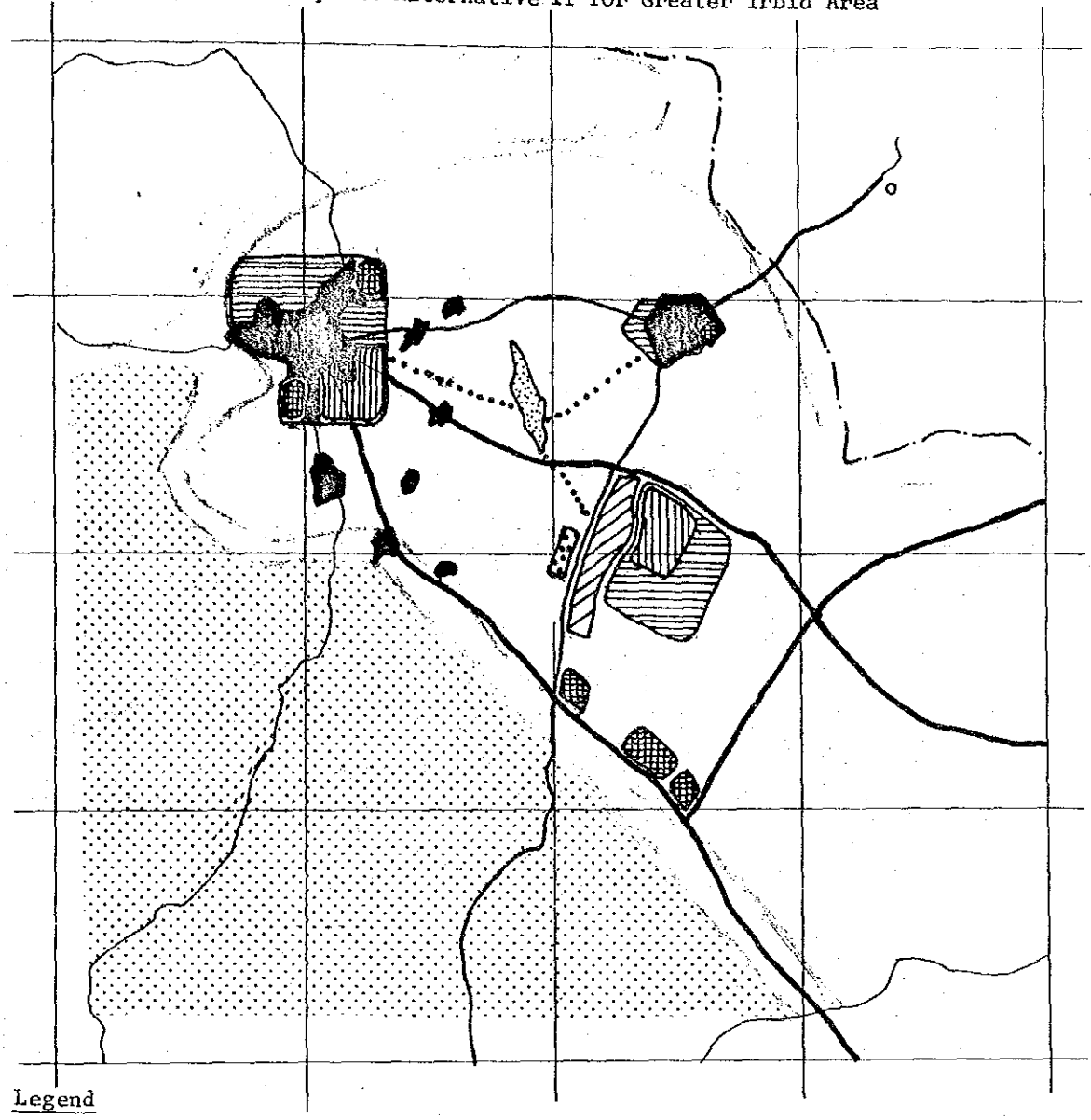
(2) Research institutions and knowledge-intensive industries will be established around the University, while other types of industrial establishments will be accommodated at an industrial estate near Irbid.

(3) A green belt is provided to connect the two new towns.

(4) A distribution center will be established along the Route 11 between Irbid and the University.

13.112 In addition to the alternatives shown above, two other modifications are examined, one which will establish a new town at Ramtha and the other at Hawara located 6 km to the east of the Municipality of Irbid. Ramtha currently has a population of about

Figure 13.26 Development Alternative II for Greater Irbid Area



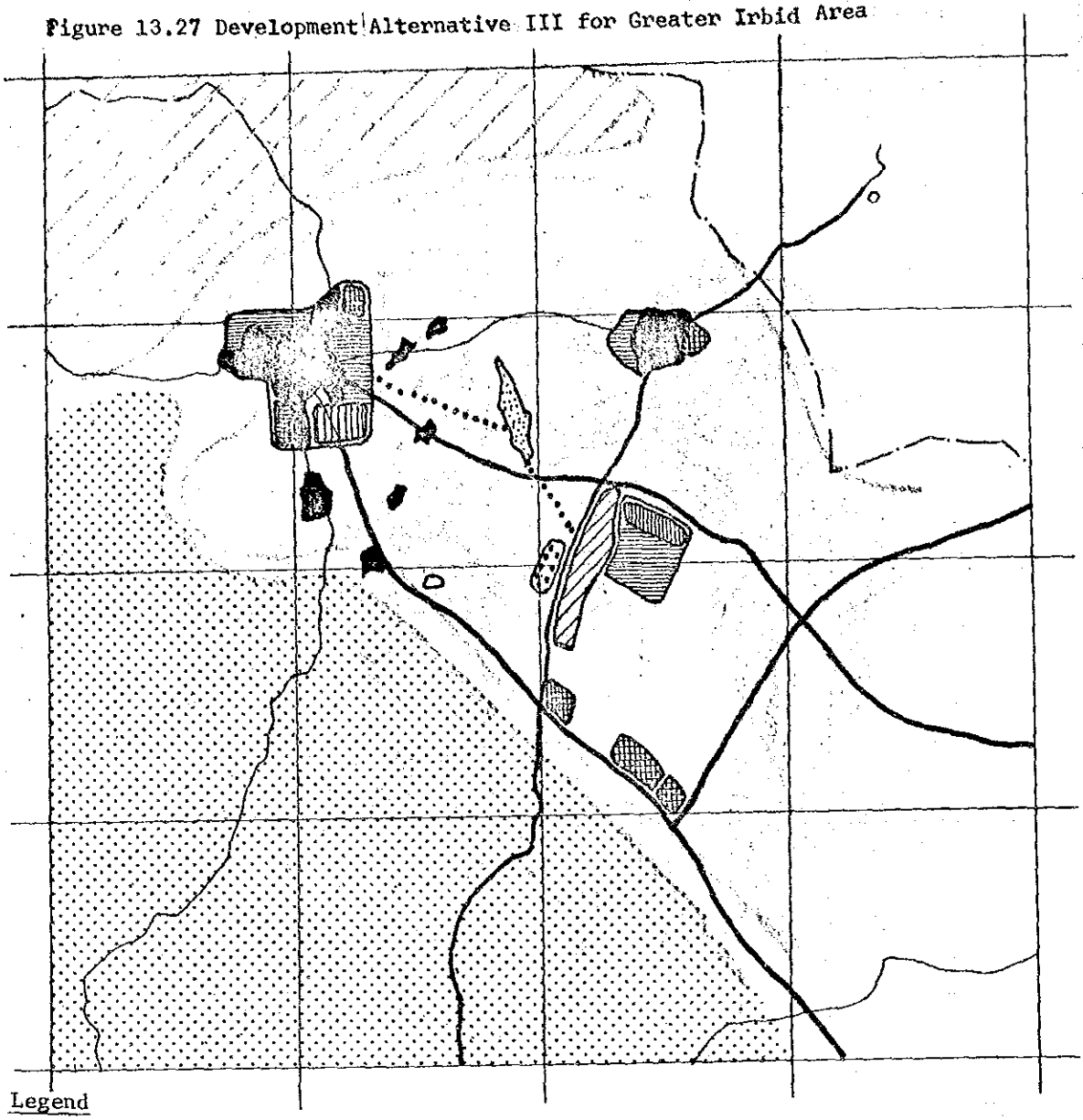
Legend

- Expected built-up area
- New towns
- Industrial estates and distribution centers
- Built-up area (mid-1970s)
- Yarmouk University
- Recreation area
- MOA experimental station
- Tree crop area
- Annual crop area
- Forested area

N

0 10 20 km

Figure 13.27 Development Alternative III for Greater Irbid Area



Legend

- Expected built-up area
- New towns
- Industrial estates and distribution centers
- Built-up area (mid-1970s)
- Yarmouk University
- Recreation area
- MOA experimental station
- Three crop area
- Annual crop area
- Forested area

N

0 10 20 km

25,000 and is poorly provided with urban facilities. Establishment of a new town at Ramtha will serve to improve the living environment of this municipality but it is not a feasible proposal, considering the level of the resource endowments around this town. It is located in a considerable distance from Amman and does not have good access to Irbid. Hawara is a small town located along the Route 16 which connects to Baghdad via Mafraq. The development of a new town at Hawara will assume an appearance that the Municipality of Irbid will grow linearly along the Route 16. However, this modification is untenable in view of the virtual absence of urban facilities and services. Due to its proximity to Irbid, residents are likely to be serviced at the urban facilities available in the latter.

13.5.6 Development of Public Facilities for Rural Areas

a. General

13.113 Public facilities mean in this section those facilities which are established and managed by the Government to give various services to the population for the purpose of improving the living environment (excluding transportation, water, power, etc., which require civil works). Those public facilities can be classified according to the different aspects of the living environment as shown below.

(1) Safety:
police and fire stations and others which serve to protect people from dangers;

(2) Health:
hospitals, clinics and other public health services;

(3) Efficiency:
various government offices, schools, post offices, telephones, day-care centers, etc., which improve the efficiency of social life;

(4) Amenity:
libraries, museums, recreation facilities, etc. which serve to enrich cultural activities.

b. Development Guidelines

13.114 It is desirable to decide on the provisions of public facilities for rural areas on the basis of the following considerations. First, there are different ranks for judging the requirements of public facilities. Facilities like schools are usually provided per certain units of population, e.g. an elementary school per every 10,000 persons, or a secondary school per every 20,000 persons. These criteria for educational facilities are used by the Ministry of Education as a guideline. In terms of world standards, one primary school per 10,000 population is the least requirement. In most cases, more than one school per 10,000 population is required. The variations are determined by the frequencies of utilization per person, the ratio of users per unit population, and/or by service

radii of respective facilities. Therefore, postal services are available by ranked provisions of facilities from the mailing posts to the central post office. Second, public facilities can be provided in accordance with the existing spheres of various activities undertaken by the residents. As shown in the next section, the knowledge of the spheres of activities will make it possible to select most suitable and efficient sites for locating a particular public facility.

c. Spheres of Activity in the Study Area

13.115 A questionaire survey was conducted in the five Mutserfiehs in the Study Area from July to August in 1978. An enquiry was made to the heads of municipalities and village councils concerning the average residents' spheres of movement in relation to schools (elementary to secondary), mosques or churches, clinics and hospitals, and places of employment. The percentage of response was approximately 70 percent and there was no response to the last question on the commuting distance to work places.

13.116 As shown on Figure 13.28, the Study Area can be divided into five spheres of activity, which roughly correspond to five utserfiehs. This primary division indicates the sphere of monthly activity, and its center is where the respective Mutserfieh Office is located. The primary division is further subdivided into several smaller spheres of weekly activity. This secondary sphere reflects the physical conditions of the habitat. In the western hilly areas, people's movement is often hindered by deep valleys and communication routes between communities are provided along the ridges of the hills. This pattern is reflected in the shaping of the spheres of weekly activity. In the sparsely populated eastern part, availability of roads primarily affects the shaping of inter-community linkage.

13.117 On the basis of the survey, the hierarchy of communities by spheres of activity can be indicated as shown on Figure 13.28 and on Table 13.9. Various public facilities can be provided at the listed communities depending on the expected frequency of utilization by the residents. For instance, communities shown with a single circle on the figure should be provided with facilities, the services of which the residents need weekly, while the Municipality of Irbid should be provided with those facilities which the residents resort to only seasonally.

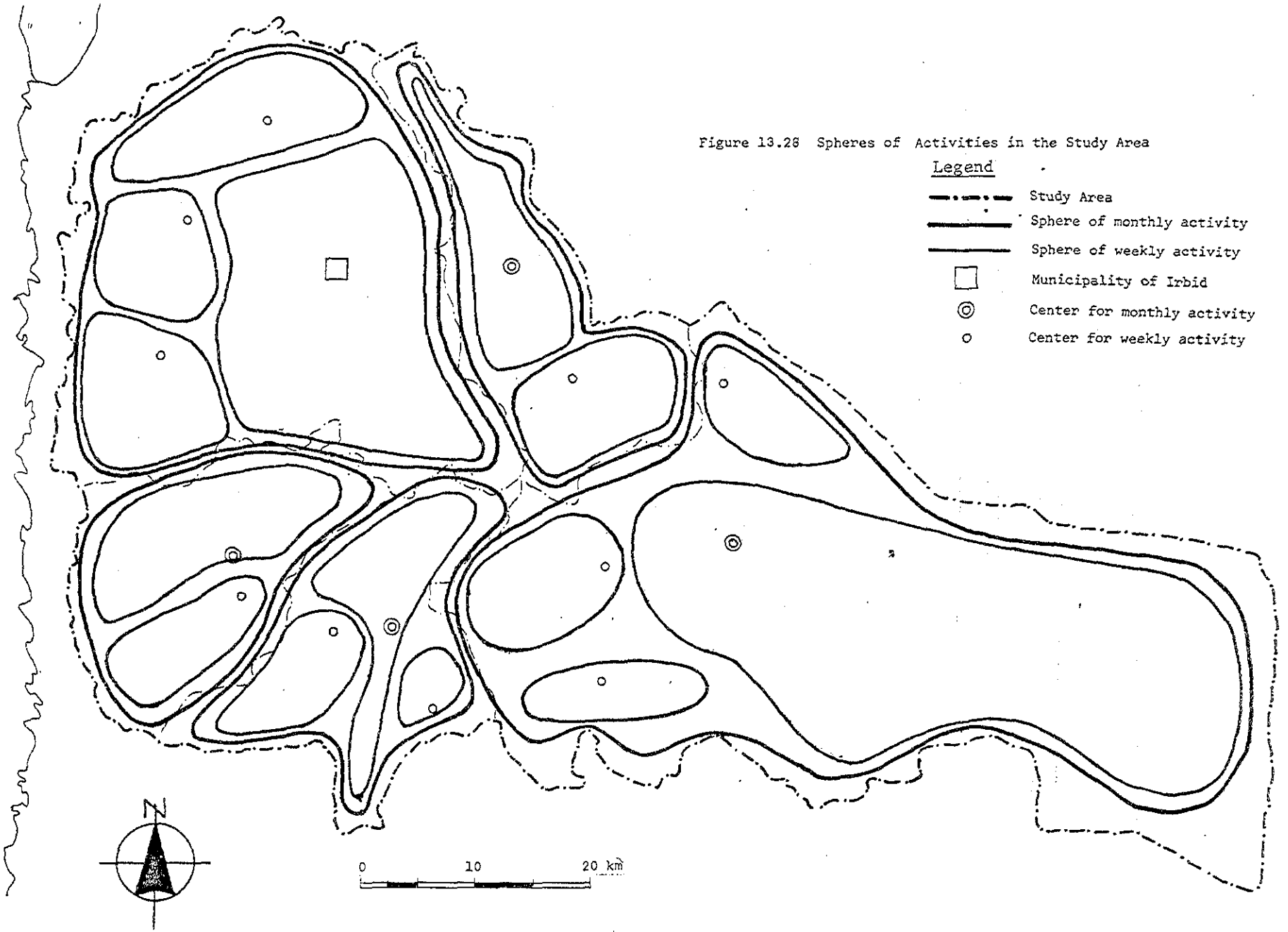


Figure 13.28 Spheres of Activities in the Study Area

Table 13.9 Hierarchy of Centers by Sphere of Activity

Center for Seasonal Activity	Center for Monthly Activity	Center for Weekly Activity
Irbid	Irbid	Irbid Samar Kufr Asad Deir Abu Said
	Ajlun	Ajlun Anjara
	Jerash	Jerash El Kitta El Kufeir
	Ramtha	Ramtha Buweida
	Mafraq	Mafraq Rihaba Bal'ama

13.6 Project Recommendations

13.6.1 Agricultural Land Use

13.118 Agriculture is expected to remain an important productive sector in the economy of the Study Area. The future agricultural policies will have to consider ways to increase the productivity of rainfed cereal cultivation in the Irbid-Ramtha area and to expand agriculture and animal husbandry in the largely unutilized forest areas with due caution paid to the environmental protection.

13.119 According to the Agricultural Census of 1975, the level of utilization in the agricultural area is generally low in the Study Area. To increase the total agricultural production, the area expansion is just as necessary as the improvement of productivity. As proposed in Chapter VI on agriculture of Volume 3, the land reclamation by removing gravels and boulders in high-precipitation areas will greatly contribute to the expansion of land under tree crops. In addition to gravel removal, land terracing will be required in order to prevent erosion. Another major reason for the lower utilization is that service roads are insufficient and poorly developed in the agricultural areas. To provide better access to newly opened land and allow the use of machines, it is recommended to construct better service roads at the ratio of 2 km per square km (for the project cost, see Chapter VI of Volume 3).

13.6.2 Afforestation

13.120 In relation to the ongoing and planned afforestation programs, it is desirable to take the following points into consideration for the purpose of raising the income level of farmers involved in the operation. First, in addition to American pines which have been used for afforestation, nut-bearing trees like almond and carob should be promoted. Second, the controlled provisions of pastures are recommended in the forest areas. In the hilly area extending from Jerash to Ajlun, it is reported that 20 to 30 percent of the newly planted trees are annually eaten up by flocks of sheep and goats. Instead of adopting categorical restrictions against grazing which would be difficult to implement, it is better to provide improved grazing grounds in some restricted places in forested areas, and thereby to protect forest trees in other places (for the project cost, see Chapter VI of Volume 3).

13.121 It is desirable to expand the afforestation efforts into wider areas for the purpose of headwater conservation and of improving the attractiveness of the natural environment in areas where tourism is expected to develop. Specifically, intensive afforestation is recommended in the catchment areas upstream of King Talal Dam and planned Maqarin Dam, and the areas around Hemma, Um Qeis, Maqarin Dam and Rabad Castle as well as Dibbin National Park. Assuming a total aggregate area of 5,000 ha, the cost of such afforestation is estimated to be JD 1 million.

13.122 The ongoing afforestation in the national parks are limited to the small areas immediately around recreational and other park facilities. It is desirable to expand the afforestation area to cover the surrounding areas as a whole for the general headwater conservation purpose.

13.6.3 Land Use Planning

13.123 Construction of private housing has been sprawling outside the built-up areas of many municipalities and larger village communities in the Study Area. In these sprawled areas, supply systems of water and electricity are often extremely inadequate, and the problem of competition between agricultural and non-agricultural land use is becoming serious. One of the causes for disorderly sprawling is that the current urban land use plans do not extend zoning regulations beyond the immediate areas they are intended to cover. It is therefore recommended that the entire Study Area be zoned into three different categories shown below:

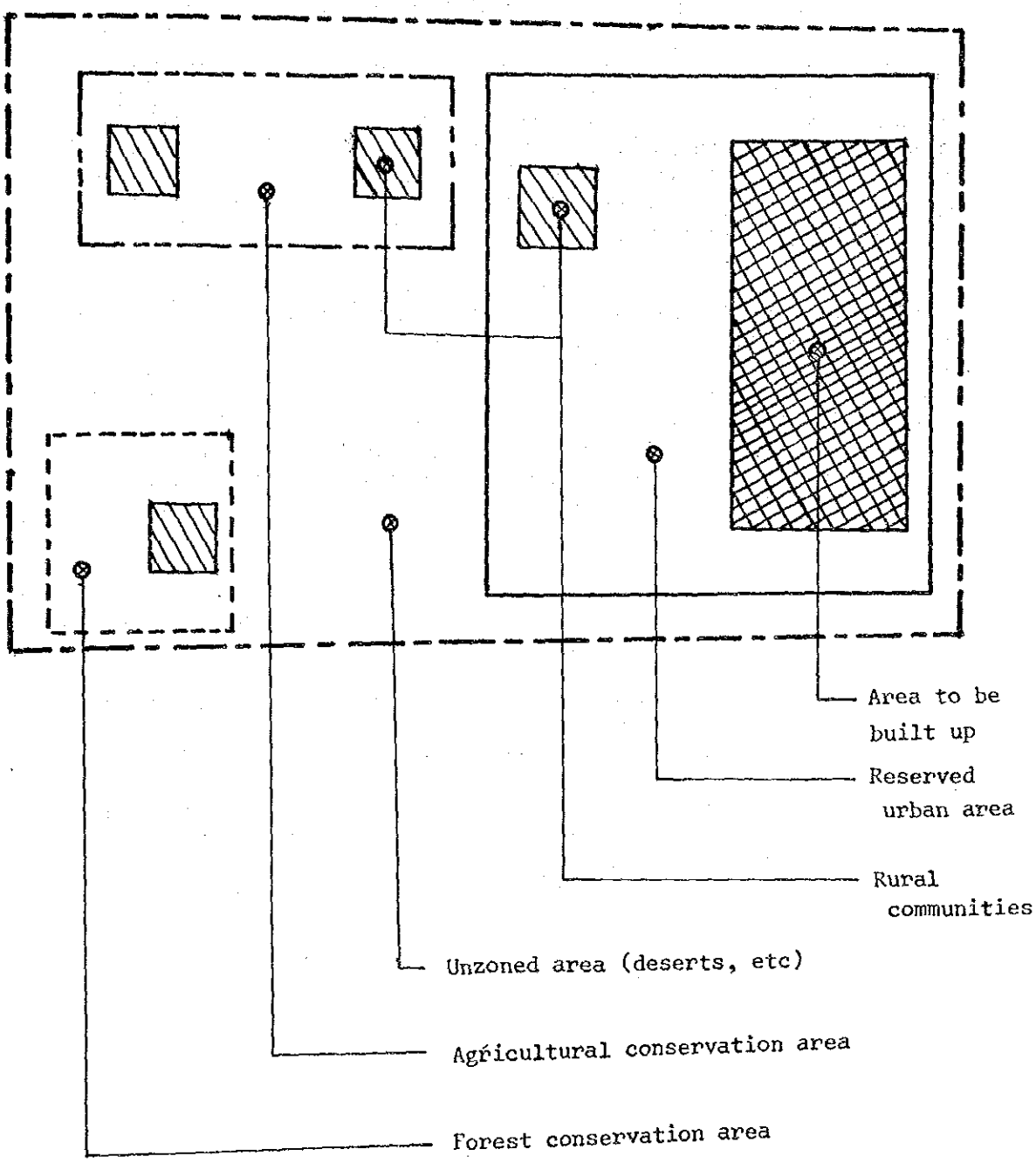
(1) Urban Development Area:
The area is meant for developing such urban facilities as housing, industrial and distribution facilities.

(2) Agriculture Conservation Area:
Housing development should be in principle prohibited in the area. It is necessary, however, to designate special zones for the expected growth of rural communities. It is also necessary to formulate an agricultural land use plan for the area according to the cropping suitability.

(3) Forest Conservation Area:
Housing development should be in principle prohibited in the area. General and intensive afforestation must be undertaken.

13.124 For the urban development area, it is necessary first to distinguish, within a planned area, built-up areas and reserved urban areas (Figure 13.29). Construction works in the built-up areas should be controlled by zoning regulations as currently being done by the town planning law of the respective municipalities. The reserved urban areas are meant to accommodate the future expansion of the respective municipalities and the construction works within the reserved areas should be prohibited for the time being. The reserved areas may overlap the agriculture or forest conservation areas where such is necessitated by local conditions. The redefinition of these two areas of the built-up and reserved areas should be carried out in accordance with the development requirements of the respective municipalities. It is desirable to re-examine this redefinition issue at least every five years.

Figure 13.29 Suggested Model of Land Use Zoning



13.125 Zoning for the rural communities must be determined jointly by the Ministry of Municipal and Rural Affairs and the respective municipal or village councils. Construction works are to be allowed only within the zone specifically designated for construction. The internal zoning is to distinguish only locations for service roads and public facilities and it is unnecessary to specify land uses for the rest of the area. As for the area outside the zone, construction should be prohibited except in such cases when public investment projects require it.

13.126 The introduction of the type of land use control outlined above presupposes revisions of the currently effective land regulation laws. Therefore, it is recommended to undertake following studies to prepare basic data necessary for such revisions.

(1) A study must be conducted in the Municipality of Irbid to clarify the problems of the present land use and zoning regulations. The study is expected to identify appropriate criteria and methods for urban zoning and to propose an alternative zoning plan for the Municipality.

(2) A similar study should be conducted to identify zoning criteria appropriate for rural communities.

(3) On the basis of the outputs from 1) and 2) above, the zoning of the entire municipalities and rural communities should be undertaken in the Study Area.

(4) For the rest of the Area, a study must be undertaken in cooperation with the Ministry of Agriculture in order to identify criteria and methods for zoning different agricultural and non-agricultural uses.

APPENDICES

APPENDIX A

YARMOUK UNIVERSITY

A.1 Location

A.001 The location is approximately 14 km to the east of Irbid. This place was chosen so as to be fair both to those coming from Irbid and those from other cities.

A.2 Departments and Number of Courses

A.002 The first stage: Engineering Department (8 courses) and Medicine (5). The second stage: Agriculture (4). The third stage: Science and Art (totally 18). The total number of departments are 35.

A.3 Site Plan

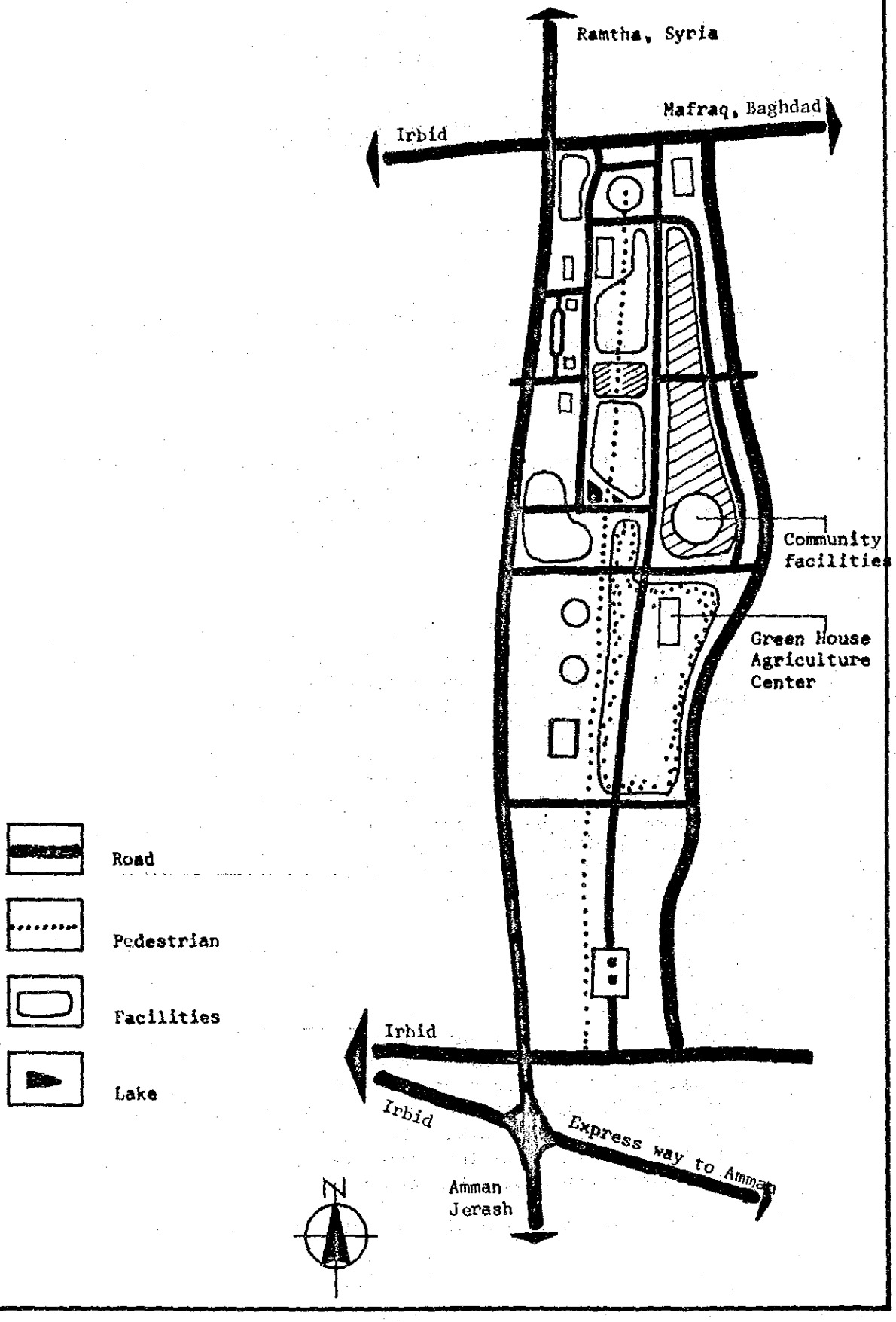
A.003 According to the plan made by K. Tange, there will be a "social axis" from the main gate to the east, and an "academic axis" that will run through the campus perpendicular to the "social axis" (see Figure A.1). The following facilities will be found along the social axis: (from the west) a hotel, a museum, a civic center (for conference etc), office of administration, a square (where the social axis intersects the academic axis), a movie theatre and a student centre (which will include a cafeteria, a restaurant, and a clubhouse etc). The academic axis, on the other hand, will include: (from the north) a sport centre, classroom buildings, an experiment farm, the R.S.S., an astronomical observator and a nuclear laboratory. A residential zone, a farm, and an industrial centre will be located in the north.

A.4 Specifications

A.004 The amount of water required (at the time of completion) is 3,000 m^3/day. It is planned that 2,500 m^3 of this water will come from the Maqarin Dam. Electric power of 28,000 KWH/day will be necessary. Out of this total, 20,000 KWH/day will be used for factories. By utilizing the natural topography, rainwater will be collected at an artificial lake created by constructing a dam. And together with the recycled water the water from the lake will be served for bathrooms, watering and agricultural use.

The cost is JD 100 million based at 1976 prices.

Figure A.1 Conceptual Plan of Yarmouk University



APPENDIX B

CAPITAL EXPENDITURES OF THE CENTRAL GOVERNMENT BY GOVERNORATE AND BY MINISTRY.

B.1 Introduction

B.001 For the development of a region, the capital investment into the region in the future will play a principal role. Hence, it is necessary to estimate the future availability of capital for investment. There are two kinds of capital investment: private and public. Available amount of private investment is hard to be estimated by itself, since it depends on individual decisions of each private industry and we can not control it as a principle. But it could be assumed that the amount of private capital investment will follow the tendency of the public investment. Thus, to know the total amount of capital investment available for a region, it is imperative to know the amount of public capital investment available for the region. At the same time, since we can plan and control it, we have been studying the public investment projects. Thus, we have to know the size of available public capital expenditures to decide the total size of public projects. For these reasons, it is vital to estimate the available amount of public capital expenditures for the region in the future.

B.002 The most typical method being taken for this estimation is projection of past trend, and this also is used in our analysis in Chapter II of Volume 2. In order to provide the basic data for this projection and to know the past performance of the Central Government for the development of each region in the Country, the past capital expenditures by the Central Government is analysed. This Appendix B presents the result of analysis.

B.003 Objectives of this appendix is to estimate the amount of capital investment by the Central Government to each region from 1971 to 1978.

B.2 Method of Estimation

B.004 The Central Government's Budgets from 1971 to 1978 are utilized as principal data sources. In addition, annual financial

reports from the National Planning Council and the Jordan Valley Authority are used to see the detail of the capital investments with foreign assistance.

B.005 The estimation method is simple. All the capital expenditure projects listed in the budgets or annual financial reports of the NPC and the JVA are questioned to officials of the respective agencies to be allocated to any one or any combination of the five Governorates. The capital expenditures which cannot be specified to be allocated to any location are distributed to all five Governorates in proportionate to their population, in order to maintain the intensity of capital expenditure per capita to be unaffected.

B.3 Result

B.006 Results of the analyses are presented in Tables B.1 to B.8 which show the expenditures at current prices. Table B.1 presents the capital expenditures of the Central Government on a whole by Ministry from 1971 to 1978. Tables B.2 to B.6 present the capital expenditures by Governorate. It should be noted that the listing orders of Ministries are different between the B.1 and B.2. Tables B.2, B.3, B.4, B.5, and B.6 present the capital expenditures for the Irbid, Amman, Balqa, Karaq and Ma'an Governorates respectively.

B.007 Table B.7 shows the detail of the capital expenditures by the Ministry of Finance, the National Planning Council, the Jordan Valley Authority and the Ministry of Public Works. These ministries are studied in detail and separately, since they are involved in the foreign assistance money. As for the Ministry of Public Works,it had its own foreign assistance money only in 1971, and only the part of foreign assistance is listed in Table B.7 whereas the restis in Table B.1.

B.008 Table B.8 shows the detail of the capital expenditures by the above four ministries into the five governorates.

Table B.1 Capital Expenditure by Agency, East Bank, 1971 to 1978

(Unit: JD 1,000)

	Preliminary Act.Exp. 1971	1972	1973	1974
1 Min. of Finance(Incl. Loan Repayment)	11,509	13,353	15,016	11,224
2 National Planning Council	3,884	8,816	15,132	28,940
3 Jordan Valley Authority	77	1,122	2,108	1,169
3 Min of Public Works(Foreign Mon.)	357			
4 Min of Agr.	448	739	601	540
5 Min. of Supply	-	-	-	0
6 Natural Res. Auth.(Mining,Dam,Irr.)	1,226	1,166	1,081	1,242
7 Min. of Ind. & Trade	53	3,041	493	80
8 Water Supply Corp.	(See No.6)	0	0	307
9 Min. of Public Works	953	1,236	1,577	1,184
10 Min. of Transport (Air)	16	32	41	0
11 Civil Aviation	263	793	218	334
12 Telecom. Corp.	344	402	755	737
13 Broadcasting	105	284	260	183
14 Television	221	148	161	70
15 Jordan News Agency	-	-	-	69
16 Min. of Tourism & Antiquity	43	45	95	110
17 Antiquity Dept.	30	64	60	56
18 Ministry of Education	297	370	704	1,744
19 Ministry of Health	377	263	225	697
20 Ministry of Communication (Port)	(See No. 12)	(See No.12)	11	8
21 Public Service & Civil Defence	88	211	69	49
22 Min. of Interior	39	88	128	150
23 Min. of Municipal & Rural Aff.	750	162	221	200
24 Min. of Foreign Affair	75	192	177	66
25 Min. of Customs	124	154	93	70
26 Income Tax Dept. & Passport	16	59	14	0
27 Min. of Labor	-	-	3	0
28 Social Affair Department	77	28	55	131
29. Culture & Art Dept.	(0	(6	(14	8
30 Min. of Information	(	(	(	3
31 Youth & Sport Org.	54	84	332	150
32 Land & Survey Dept.	1	33	18	13
33 National Library	-	-	-	-
34 Statistics Dept.	49	3	1	3
35 Meteorology Dept.	-	-	-	48
Sub Total (4-35)	5,649	9,603		
Grand Total (1 to 35)	21,476	32,894	39,661	49,587

(To continue)

Table B.1(Continued)

	Preliminary Actual Expenditure		Estimated Act.	Budget
	1975	1976	1977	1978
1 Min. of Finance(Incl. Loan Repayment)	23,339	21,363	27,495	24,800
2 National Planning Council	43,550	39,862	68,536	100,000
3 Jordan Valley Autho.	2,629	3,072	4,750	7,500
3'Min. of Public Work(Foreign Mon.)				
4 Min. of Agr.	1,337	1,577	1,309	997
5 Min. of Supply	0	4	461	1,812
6 Natural Res. Auth(Mining,Dam,Irr.)	967	729	1,100	1,666
7 Min. of Ind. & Trade	117	122	50	35
8 Water Supply Corp.	1,052	1,600	1,857	1,652
9 Min. of Public Works	2,740	2,369	5,970	7,706
10 Min. of Transport (Air)	0	4,000	8,000	12,000
11 Civil Aviation	1,015	4,266	1,813	600
12 Telecom. Corp.	3,671	4,098	3,635	3,696
13 Broadcasting	217	111	132	70
14 Television	365	374	389	285
15 Jordan News Agency	113	125	60	17
16 Min. of Tourism & Antiquity	105	183	119	175
17 Antiquity Department	160	218	215	305
18 Ministry of Education	3,347	2,621	2,059	1,997
19 Ministry of Health	1,396	511	939	943
20 Ministry of Communication(Port)	40	151	315	291
21 Public Service &Civil Defence	210	115	442	965
22 Min. of Interior	238	160	35	76
23 Min. of Municipal & Rural Affairs	275	265	621	472
24 Min. of Foreign Affairs	537	683	750	70
25 Min. of Customs	126	183	458	197
26 Income Tax Dept & Passport	0	30	0	0
27 Min. of Labor	6	16	50	0
28 Social Affair Department	295	227	330	397
29 Culture & Art Dept	6	0	0	17
30 Min. of Information	45	0	362	935
31 Youth & Sport Org.	340	550	500	400
32 Land & Survey Dept	36	65	61	35
33 National Library	0	0	0	60
34 Statistics Department	53	12	15	70
35 Meteorology Dept	77	82	63	48
Sub Total (4 to 35)				
Grand Total (1 to 35)	88,404	89,744	132,891	170,289

Source: Budget Laws

Table B.2 Capital Expenditure by Agency, Irbid Governorate, 1971 to 1978

(Unit: JD 1,000)

	1971	1972	1973	1974
1 - 3 MOF, NPC, JVA	1,410	2,981	2,261	6,324
4 Min. of Agr.	112	206	147	187
5 Min. of Supply	-	-	-	0
6 Natural Resource Auth.	394	275	277	173
7 Ministry of Ind. & Trade	6	873	128	0
8 Water Supply Corporation	-	0	0	135
9 Min. of Public Works	184	106	138	376
10 Min. of Transport (Air)	8	4	8	0
11 Civil Aviation	8	13	0	0
12 Telecommunication Corp.	98	48	173	175
13 Broadcasting	0	0	0	3
14 Television	0	0	53	0
15 Jordan News Agency	-	-	-	0
16 Ministry of Information	-	-	-	0
17 Ministry of Tourism & Antiquity	18	16	41	61
18 Antiquity Department	7	13	14	16
19 Ministry of Education	101	132	205	449
20 Ministry of Health	57	37	49	143
21 Min. of Communication(Port)	(See 12)	(See 12)	3	2
22 Public Service & Civil Defence	43	38	20	13
23 Ministry of Interior	0	33	11	40
24 Min. of Municipal & Rural Affairs	216	41	59	54
25 Ministry of Foreign Affairs	0	6	0	0
26 Min. of Customs	26	57	47	44
27 Income Tax Dept. & Passport	0	10	0	0
28 Min. of Labor	0	8	3	0
29 Social Affair Dept.	0		15	29
30 Culture & Art Dept.	0	0	2	0
31 Youth & Sport Org.	15	24	66	0
32 Land & Survey Dept.	0	1	0	4
33 National Library	-	-	-	-
34 Statistics Dept.	14	0	0	0
35 Meteorology Dept.		-	-	6
Sub Total (4 to 35)	1,307	1,941	1,459	1,910
Grand Total (1 to 35)	2,717	4,922	3,720	8,234

(To Continue)

Table B.2 (Continued)

	1975	1976	1977	1978
1-3 MOF, NPC, JVA	10,241	11,511	19,367	30,098
4 Min. of Agr.	405	374	337	262
5 Min. of Supply	0	0	53	441
6 Natural Res. Auth.	225	202	286	453
7 Ministry of Ind. & Trade	0	0	0	0
8 Water Supply Corporation	218	558	913	625
9 Min. of Public Works	455	668	2,918	4,016
10 Min. of Transport (Air)	0	0	0	0
11 Civil Aviation	0	0	0	0
12 Telecommunication Corp.	599	519	471	593
13 Broadcasting	0	25	0	0
14 Television	10	0	0	0
15 Jordan News Agency	19	0	0	0
16 Ministry of Information	0	0	362	935
17 Min. of Tourism & Antiquity	35	28	28	18
18 Antiquity Department	39	61	51	86
19 Ministry of Education	864	613	541	517
20 Ministry of Health	470	121	249	396
21 Min. of Communication(Port)	12	40	61	94
22 Public Service & Civil Defence	60	0	118	108
23 Ministry of Interior	88	63	20	23
24 Min. of Municipal & Rural Affairs	85	79	178	135
25 Min. of Foreign Affairs	0	0	128	0
26 Min. of Customs	59	12	23	124
27 Income Tax Dept. & Passport	0	0	0	0
28 Min. of Labor	0	0	0	0
29 Social Affair Dept.	43	7	46	96
30 Cultural & Art Dept.	0	0	0	0
31 Youth & Sport Org.	73	0	0	0
32 Land & Survey Dept.	5	17	10	6
33 National Library	0	0	0	0
34 Statistics Dept.	7	0	0	0
35 Meteorology Dept.	19	22	12	14
Sub Total (4 to 35)	3,790	3,409	6,805	8,942
Grand Total (1 to 35)	14,031	14,920	26,172	39,040

Source: Study Team.

Table B.3 Capital Expenditure by Agency, Amman Governorate, 1971 to 1978

(Unit: JD 1,000)

	1971	1972	1973	1974
1 - 3 MOF, NPC, JVA	4,066	8,636	11,174	23,341
4 Min. of Agr.	254	370	295	254
5 Min. of Supply	-	-	-	0
6 Natural Res. Auth.	554	390	439	338
7 Min. of Ind. & Trade	43	1,685	266	60
8 Water Supply Corp.		0	0	122
9 Min. of Public Works	594	769	742	394
10 Min. of Transport (Air)	6	7	26	0
11 Civil Aviation	202	591	173	240
12 Telecom. Corp.	198	254	436	420
13 Broadcasting	105	284	260	178
14 Television	171	147	95	70
15 Jordan News Agency	-	-	-	69
16 Min. of Information	-	-	-	3
17 Min. of Tourism & Antiquity	21	1	30	20
18 Antiquity Dept.	19	24	38	31
19 Min. of Education	142	174	403	903
20 Min. of Health	292	141	128	274
21 Min. of Communication	(See 12)	(See 12)	7	4
22 Public Service & Civil Defence	2	134	39	29
23 Min. of Interior	3	50	22	60
24 Min. of Municipal & Rural Affairs	420	78	110	103
25 Min. of Foreign Affairs	0	12	0	0
26 Min. of Customs	71	76	23	23
27 Income Tax Dept.	16	43	14	0
28 Min. of Labor	0	(16	0	0
29 Social Affairs Dept	72	(	30	56
30 Cultural & Art Dept	0	6	11	8
31 Youth & Sport Org.	30	47	182	50
32 Land & Survey Dept	1	31	18	8
33 National Library	-	-	-	-
34 Statistics Dept	28	3	1	4
35 Meteorology Dept		-	-	33
Sub Total (4 to 35)	3,244	5,333	3,788	3,754
Grand Total (1 to 35)	7,310	13,969	14,962	27,095

(To Continue)

Table B.3 (Continued)

	1975	1976	1977	1978
1 - 3 MOF, NPC, JVA	24,578	28,112	39,034	52,658
4 Min. of Agr.	586	1,029	702	594
5 Min. of Supply	0	4	380	1,143
6 Natural Res. Auth.	619	377	600	929
7 Min. of Ind. & Trade	87	122	50	35
8 Water Supply Corp.	315	348	437	783
9 Min. of Public Works	1,103	1,136	2,379	2,356
10 Min. of Transport (Air)	0	4,000	8,000	12,000
11 Civil Aviation	484	3,745	1,341	403
12 Telecom. Corp.	1,244	3,020	2,132	1,986
13 Broadcasting	217	86	132	63
14 Television	289	374	389	265
15 Jordan News Agency	84	125	60	17
16 Min. of Information	46	0	0	0
17 Min. of Tourism & Antiquity	0	56	35	95
18 Antiquity Dept	101	125	141	187
19 Ministry of Education	1,705	1,406	1,110	1,135
20 Ministry of Health	659	172	566	398
21 Min. of Communication	22	90	215	118
22 Public Service & Civil Defence	120	115	235	724
23 Ministry of Interior	109	27	0	27
24 Min. of Municipal &Rural Affairs	153	151	350	267
25 Min. of Foriegn Affairs	410	0	466	0
26 Min. of Customs	66	155	226	42
27 Income Tax Dept	0	30	0	0
28 Min. of Labor	0	16	50	0
29 Social Affair Dept	187	120	251	269
30 Cultural & Art Dept	5	0	0	17
31 Youth & Sport Org.	212	550	500	400
32 Land & Survey Dept	28	30	45	26
33 National Library	0	0	0	60
34 Statistics Dept	42	12	15	70
35 Meteorology Dept	38	48	40	24
Sub Total (4 to 35)	8,931	17,469	20,847	24,433
Grand Total (1 to 35)	33,509	45,581	59,881	77,091

Source: Study Team

Table B.4 Capital Expenditure by Agency, Balqa Governorate, 1971 to 1978

(Unit: JD 1,000)

	1971	1972	1973	1974
1 - 3 MOF, NPC, JVA	361	719	499	1,649
4 Min. of Agr.	31	43	59	42
5 Min. of Supply	-	-	-	0
6 Natural Res. Auth.	151	146	169	42
7 Min. of Ind. & Trade	2	211	31	0
8 Water Supply Corp.		0	0	0
9 Min. of Public Works	43	26	121	75
10 Min. of Transport(Air)	1	1	2	0
11 Civil Aviation	2	3	0	0
12 Telecom. Corp.	23	14	35	70
13 Broadcasting	0	0	0	1
14 Television	0	0	6	0
15 Jordan News Agency	-	-	-	0
16 Min. of Information	-	-	-	0
17 Min. of Tourism & Antiquity	1	6	19	15
18 Antiquity Dept.	2	3	3	4
19 Min. of Education	13	35	44	144
20 Min. of Health	14	19	6	69
21 Min. of Communication	(See 12)	(See 12)	1	1
22 Public Service & Civil Def.	43	29	5	3
23 Ministry of Interior	30	2	23	10
24 Min. of Municipal & Rural Affairs	53	10	13	28
25 Min. of Foreign Affairs	0	2	0	0
26 Min. of Customs	0	3	3	1
27 Income Tax Dept.	0	2	0	0
28 Min. of Labor	0	(2	0	0
29 Social Affair Dept.	0	(	4	37
30 Cultural & Art Dept.	0	0	1	0
31 Youth & Sport Org.	4	6	16	0
32 Land & Survey Dept.	0	1	0	1
33 National Library	-	-	-	-
34 Statistics Dept.	4	0	0	0
35 Meteorology Dept.		-	-	2
Sub Total (4 to 35)	417	564	561	545
Grand Total (1 to 35)	778	1,283	1,060	2,194

(To Continue)

Table B.4 (Continued)

	1975	1976	1977	1978
1 - 3 MOF, NPC, JVA	3,352	2,917	4,877	9,128
4 Min. of Agr.	134	54	74	61
5 Min. of Supply	0	0	13	106
6 Natural Res. Auth.	64	73	69	109
7 Min. of Ind. & Trade	0	0	0	0
8 Water Supply Corp	108	290	238	66
9 Min. of Public Works	144	251	146	270
10 Min. of Transport (Air)	0	0	0	0
11 Civil Aviation	0	0	0	0
12 Telecom. Corp.	533	462	693	1,030
13 Broadcasting	0	0	0	0
14 Television	35	0	0	0
15 Jordan News Agency	5	0	0	0
16 Min. of Information	0	0	0	0
17 Min. of Tourism & Antiquity	30	4	3	17
18 Antiquity Dept	9	15	11	15
19 Min. of Education	259	135	172	160
20 Min. of Health	91	183	54	86
21 Min. of Communication	3	10	11	7
22 Public Serv. & Civil Defence	14	0	8	0
23 Ministry of Interior	5	4	0	0
24 Min. of Municipal & Rural Affairs	17	16	43	33
25 Min. of Foreign Affairs	0	0	31	0
26 Min. of Customs	1	3	10	3
27 Income Tax Department	0	0	0	0
28 Min. of Labor	0	0	0	0
29 Social Affair Dept	52	98	29	25
30 Cultural & Art Dept	0	0	0	0
31 Youth & Sport Org.	14	0	0	0
32 Land & Survey Dept	1	7	3	1
33 National Library	0	0	0	0
34 Statistics Dept	2	0	0	0
35 Meteorology Dept	5	5	4	2
Sub Total (4 to 35)	1,526	1,610	1,612	1,991
Grand Total (1 to 35)	4,878	4,527	6,489	11,119

Source: Study Team

Table B.5 Capital Expenditure by Agency, Karak Governorate, 1971 to 1978

(Unit: JD 1,000)

	1971	1972	1973	1974
1 - 3 MOF, NPC, JVA	234	426	1,900	144
4 Min. of Agr.	27	66	62	20
5 Min. of Supply	-	-	-	0
6 Natural Res. Auth.	102	97	162	200
7 Min. of Ind. & Trade	1	151	22	0
8 Water Supply Corp.		0	0	0
9 Min. of Public Works	50	19	65	202
10 Ministry of Transport(Air)	1	1	2	0
11 Civil Aviation	1	2	0	11
12 Telecom. Corp.	16	7	59	18
13 Broadcasting	0	0	0	1
14 Television	25	0	4	0
15 Jordan News Agency	-	-	-	0
16 Ministry of Information	-	-	-	0
17 Min. of Tourism & Antiquity	1	2	3	0
18 Antiquity Dept.	1	22	3	3
19 Ministry of Education	14	20	32	201
20 Ministry of Health	10	6	9	8
21 Min. of Communication	(See 12)	(See 12)	1	0
22 Public Service & Civil Def.	0	7	3	2
23 Ministry of Interior	7	1	25	20
24 Min. of Municipal & Rural Affairs	38	29	9	9
25 Min. of Foreign Affairs	0	1	0	0
26 Min. of Customs	0	2	2	1
27 Income Tax Dept	0	2	0	0
28 Min. of Labor	0	(1	0	0
29 Social Affair Dept	2	(	2	5
30 Cultural & Art Dept	0	0	0	0
31 Youth & Sport Org.	3	4	11	0
32 Land & Survey Dept	0	0	0	1
33 National Library	-	-	-	-
34 Statistics Dept	2	0	0	0
35 Meteorology Dept		-	-	1
Sub Total (4 to 35)	301	440	476	703
Grand Total (1 to 35)	535	866	2,376	2,145

(To Continue)

Table B.5 (Continued)

	1975	1976	1977	1978
1 - 3 MOF, NPC, JVA	5,934	7,717	6,698	11,918
4 Min. of Agr.	166	67	57	45
5 Min. of Supply	0	0	9	76
6 Natural Res. Auth.	37	60	87	78
7 Min. of Ind. & Trade	0	0	0	0
8 Water Supply Corp.	180	202	78	59
9 Min. of Public Works	149	180	349	977
10 Min. of Transport (Air)	0	0	0	0
11 Civil Aviation	0	0	0	8
12 Telecom. Corp.	614	44	105	29
13 Broadcasting	0	0	0	0
14 Television	0	0	0	0
15 Jordan News Agency	3	0	0	0
16 Min. of Information	0	0	0	0
17 Min. of Tourism & Antiquity	39	16	21	7
18 Antiquity Dept.	7	11	7	11
19 Ministry of Education	425	404	195	145
20 Ministry of Health	168	20	39	41
21 Min. of Communication	2	7	8	5
22 Public Serv. &Civil Defence	10	0	42	0
23 Ministry of Interior	34	63	15	1
24 Min. of Municipal & Rural Affairs	12	12	31	23
25 Min. of Foreign Affairs	0	0	22	0
26 Min. of Customs	0	2	0	2
27 Income Tax Dept.	0	0	0	0
28 Min. of Labor	0	0	0	0
29 Social Affair Dept.	8	1	2	4
30 Cultural & Art Dept.	0	0	0	0
31 Youth & Sport Org.	10	0	0	0
32 Land & Survey Dept.	1	6	2	1
33 National Library	0	0	0	0
34 Statistics Dept.	1	0	0	0
35 Meteorology Dept.	3	3	4	7
Sub Total (4 to 35)	1,869	1,098	1,073	1,519
Grand Total (1 to 35)	7,803	8,815	7,771	13,437

Source: Study Team

Table B.6 Capital Expenditure by Agency, Ma'an Governorate, 1971 to 1978

(Unit: JD 1,000)

	1971	1972	1973	1974
1 - 3 MOF, NPC, JVA	461	687	4,613	1,479
4 Min. of Agr.	23	54	37	37
5 Min. of Supply	-	-	-	0
6 Natural Res. Auth.	25	258	34	487
7 Min. of Ind. & Trade	1	90	13	0
8 Water Supply Corp.		0	0	50
9 Min. of Public Works	82	316	510	136
10 Min. of Transport(Air)	0	19	3	0
11 Civil Aviation	50	183	45	83
12 Telecom. Corp.	9	79	52	54
13 Broadcasting	0	0	0	0
14 Television	25	0	2	0
15 Jordan News Agency	-	-	-	0
16 Min. of Information	-	-	-	0
17 Min. of Tourism & Antiquity	2	20	2	13
18 Antiquity Dept.	1	1	2	2
19 Ministry of Education	27	8	20	46
20 Ministry of Health	6	60	33	203
21 Min. of Communication	(See 12)	(See 12)	0	0
22 Public Serv. & Civil Defence	0	4	2	1
23 Ministry of Interior	0	1	48	20
24 Min. of Municipal & Rural Affairs	23	4	31	6
25 Min. of Foreign Affairs	0	1	0	0
26 Min. of Customs	27	16	18	1
27 Income Tax Dept.	0	1	0	0
28 Min. of Labor	0	(1	0	0
29 Social Affair Dept.	3	(	2	3
30 Cultural & Art Dept.	0	0	0	0
31 Youth & Sport Org.	2	3	57	100
32 Land Survey Dept.	0	0	0	0
33 National Library	-	-	-	-
34 Statistics Dept.	1	0	0	0
35 Meteorology Dept.	-	-	-	6
Sub Total (4 to 35)	307	1,119	911	1,248
Grand Total (1 to 35)	768	1,806	5,524	2,727

(To Continue)

Table B.6 (Continued)

	1975	1976	1977	1978
1 - 3 MOF, NPC, JVA	15,211	7,191	19,924	18,699
4 Min. of Agr.	46	53	140	36
5 Min. of Supply	0	0	5	46
6 Natural Res. Auth.	22	18	58	97
7 Min. of Ind. & Trade	0	0	0	0
8 Water Supply Corp.	231	202	190	119
9 Min. of Public Works	889	134	178	88
10 Min. of Transport (Air)	0	0	0	0
11 Civil Aviation	531	521	472	189
12 Telecom. Corp.	681	53	234	57
13 Broadcasting	0	0	0	8
14 Television	31	0	0	20
15 Jordan News Agency	2	0	0	0
16 Min. of Information	0	0	0	0
17 Min. of Tourism & Antiquity	1	78	31	38
18 Antiquity Dept.	4	6	4	7
19 Ministry of Education	94	65	39	41
20 Ministry of Health	8	15	32	22
21 Min. of Communication	1	4	20	67
22 Public Serv. & Civil Defence	6	0	40	133
23 Ministry of Interior	2	3	0	25
24 Min. of Municipal & Rural Affairs	7	7	18	14
25 Min. of Foreign Affairs	0	0	13	0
26 Min. of Customs	0	11	198	26
27 Income Tax Dept.	0	0	0	0
28 Min. of Labor	6	0	0	0
29 Social Affair Dept.	5	1	1	3
30 Cultural & Art Dept.	0	0	0	0
31 Youth & Sport Org.	31	0	0	0
32 Land & Survey Dept.	1	5	1	1
33 National Library	0	0	0	0
34 Statistics Dept.	1	0	0	0
35 Meteorology Dept.	12	4	3	1
Sub Total (4 to 35)	2,612	1,181	1,677	1,038
Grand Total (1 to 35)	17,823	8,372	21,601	19,937

Source: Study Team

Table B.7 Capital Expenditure by Ministry of Finance, NPC & JVA, East Bank, 1971 to 1978

(Unit: JD 1,000)

	Preliminary Actual Expenditures			
	1971	1972	1973	1974
Ministry of Finance	11,509	13,353	15,016	11,224
1. Government Contributions	11,509	13,353	15,016	11,224
a. Repayment of Loans (not capital expenditure)	200 6,179 15	3,595	7,907	7,100
b. Loans & Investments in Quasi Public Bodies	1,925 280	3,393	2,492	3,223
c. Min. of Fin. Capital Exp.	10	116	714	901
d. Current Ex.	2,900	6,250	3,903	0
NPC	3,884	8,876	15,132	28,940
1. Government Contributions	600	750	2,184	8,040
a. Contribution to Projects Financed by Foreign Countries	600	600	1,880	7,190
b. Others	0	150	304	850
2. Foreign Loans & Grants	3,284	8,066	12,948	20,900
a. For Agencies Excl. JVA	2,381	7,082	11,369	17,615
i) Projects Committed	2,261	6,872	10,969	16,040
ii) Projects Expected	0	0	0	1,200
iii) Loans & Investment in Quasi Public Bodies	120	210	400	375
b. For JVA	903	184	1,579	3,285
JVA	77	1,122	2,108	1,169
1. Government Contributions	77	1,122	2,108	1,169
a. Contribution to Projects Financed by Foreign Countries	0	1,084	2,064	1,122
b. Others	77	38	44	47
Min. of Public Work	357			
a. Foreign Money	357	-	-	-
Total	15,827	23,291	32,256	41,333

(To continue)

Table B.7 (Continued)

	Preliminary Actual		Estimated Actual	Budget
	1975	1976	1977	1978
Ministry of Finance	23,339	21,363	27,495	24,800
1. Government Contribution	23,339	21,363	27,495	24,800
a. Repayment of Loans (not capital expenditure)	10,203	6,848	10,880	9,600
b. Loans & Investment in Quasi Public Bodies	10,960	11,927	12,615	8,200
c. Min. of Fin. Capital Exp.	2,176	2,588	4,000	7,000
d. Current Ex.	0	0	0	0
NPC	43,550	39,862	68,536	100,000
1. Government Contributions	13,550	10,000	14,975	15,000
a. Contribution to Projects Financed by Foreign Countries	11,200	7,650	12,600	12,650
b. Others	2,350	2,350	2,375	2,350
2. Foreign Loans & Grants	30,000	29,862	53,561	85,000
a. For Agencies Excl. JVA	26,075	26,600	42,926	70,611
i) Projects Committed	23,340	22,940	38,106	48,261
ii) Projects Expected	2,000	3,000	3,000	20,000
iii) Loans & Investment in Quasi Public Bodies	735	660	1,820	2,350
b. For JVA	3,925	3,262	10,635	14,389
JVA	2,629	3,072	4,750	7,500
1. Government Contributions	2,629	3,072	4,750	7,500
a. Contribution to Projects Financed by Foreign Countries	2,568	3,000	4,678	7,500
b. Others	61	72	72	0
Min. of Public Work				
a. Foreign Money	-	-	-	-
Total	69,518	64,297	100,781	132,300

Source: Budget Laws.

Table B.8 Capital Expenditure by Ministry of Finance, NPC & JVA and by Governorate, 1971 to 1978

(Unit: JD 1,000)

	Preliminary Actual Exp. 1971	1972	1973	1974
Irbid	1,410	2,981	2,261	6,324
1. Ministry of Finance	640	1,014	930	1,231
a. Loans & Investment in Quasi Public Bodies	639	984	723	935
b. Min. of Fin. Capital Exp.	1	30	207	296
2. NPC	642	1,909	1,318	4,863
a. Government Contribution for Projects	150	114	309	1,494
b. Foreign Money for Agencies Excluding JVA	437	1,661	668	3,260
c. Foreign Money for Loan and Investment	35	60	116	109
d. Foreign Money for JVA	20	74	225	0
3. JVA	25	58	13	230
a. Government Contribution	25	58	13	230
4. Min. of Public Works				
a. Foreign Assis. for Capital Exp.	103	-	-	-
Amman	4,066	8,636	11,174	23,341
1. Ministry of Finance	1,243	1,970	1,797	2,242
a. Loans & Investment in Quasi Public Bodies	1,236	1,900	1,396	1,805
b. Min. of Fin. Capital Exp.	7	70	401	437
2. NPC	2,597	5,659	7,295	20,381
a. Government Contribution	301	579	997	5,605
b. Foreign Money for Agencies Excluding JVA	1,366	4,126	4,720	11,281
c. Foreign Money for Loan and Investment	67	118	224	210
d. Foreign Money for JVA	863	836	1,354	3,285
3. JVA	26	1,007	2,082	718
a. Government Contribution	26	1,007	2,082	718
4. Min. of Public Works.				
a. Foreign Assis. for Capital Exp.	200	-	-	-

(To continue)

Table B.8 (Continued)

	Preliminary Actual Exp.		Estimated Actual	Budget
	1975	1976	1977	1978
Irbid	10,241	11,511	19,367	30,098
1. Ministry of Finance	3,809	4,210	4,818	4,408
a. Loans & Investment in Quasi Public Bodies	3,178	3,459	3,658	2,378
b. Min. of Fin. Capital Exp.	631	751	1,160	2,030
2. NPC	4,780	5,067	11,657	20,368
a. Government Contribution for Projects	1,140	812	1,922	1,764
b. Foreign Money for Agencies Excluding JVA	2,002	3,023	4,040	11,946
c. Foreign Money for Loan and Investment	213	191	528	682
d. Foreign Money for JVA	1,425	1,042	5,167	5,976
3. JVA	1,652	2,234	2,892	5,322
a. Government Contribution	1,652	2,234	2,892	5,322
4. Min. of Public Works . a. Foreign Assis. for Capital Exp.	-	-	-	-
Amman	24,578	28,112	39,034	52,658
1. Ministry of Finance	7,356	8,128	9,304	8,512
a. Loans & Investment in Quasi Public Bodies	6,138	6,679	7,064	4,592
b. Min. of Fin. Capital Exp.	1,218	1,449	2,240	3,920
2. NPC	17,156	19,868	29,213	93,833
a. Government Contribution	5,228	5,108	7,270	6,749
b. Foreign Money for Agencies Excluding JVA	9,746	12,660	7,936	35,418
c. Foreign Money for Loan and Investment	412	370	1,019	1,316
d. Foreign Money for JVA	1,770	1,730	2,988	350
3. JVA	66	116	517	313
a. Government Contribution	66	116	517	313
4. Min. of Public Works a. Foreign Assis. for Capital Exp.	-	-	-	-

(To continue)

Table B.8 (Continued)

	Preliminary Actual Exp. 1971	1972	1973	1974
Balqa	361	719	499	1,649
1. Ministry of Finance	155	245	224	281
a. Loans & Investmentin Quasi Public Bodies	154	238	174	226
b. Min. of Fin. Capital Exp.	1	7	50	55
2. NPC	155	417	262	1,147
a. Government Contribution	34	27	113	464
b. Foreign Money for Agencies Excluding JVA	93	301	121	657
c. Foreign Money for Loan and Investment	8	15	28	26
d. Foreign Money for JVA	20	74	0	0
3. JVA	26	57	13	221
a. Government Contribution	26	57	13	221
4. Min. of Public Works a. Foreign Assis. for Capital Exp.	25	-	-	-
Karak	234	426	1,900	1,441
1. Ministry of Finance	110	175	161	200
a. Loans & Investment in Quasi Public Bodies	110	170	125	161
b. Min. of Fin. Capital Exp.	0	5	36	39
2. NPC	106	251	1,739	1,241
a. Government Contribution	25	19	67	336
b. Foreign Money for Agencies Excluding JVA	75	221	1,652	886
c. Foreign Money for Loan and Investment	6	11	20	19
d. Foreign Money for JVA	0	0	0	0
3. JVA	0	0	0	0
a. Government Contribution	0	0	0	0
4. Min. of Public Works a. Foreign Assis. for Capital Exp	18	-	-	-

(To continue)

Table B.8 (Continued)

	Preliminary Actual		Estimated Actual	Budget
	1975	1976	1977	1978
Balga	3,352	2,917	4,877	9,128
1. Ministry of Finance	919	1,016	1,163	1,064
a. Loans & Investment in Quasi Public Bodies	767	835	883	574
b. Min. of Fin.Capital Exp.	152	181	280	490
2. NPC	1,524	1,304	2,718	7,041
a. Government Contribution	275	163	259	333
b. Foreign Money for Agencies Excluding JVA	468	615	359	2,467
c. Foreign Money for Loan and Investment	51	46	127	165
d. Foreign Money for JVA	730	480	1,973	4,076
3. JVA	909	597	996	1,023
a. Government Contribution	909	597	996	1,029
4. Min. of Public Works a. Foreign Assis. for Capital Exp.	-	-	-	-
Karak	5,934	7,717	6,698	11,918
1. Ministry of Finance	657	725	831	760
a. Loans & Investment in Quasi Public Bodies	548	596	631	410
b. Min. of Fin. Capital Exp.	109	129	200	350
2. NPC	5,277	6,867	5,522	10,316
a. Government Contribution	1,942	2,016	2,629	890
b. Foreign Money for Agencies Excluding JVA	3,298	4,808	2,295	5,322
c. Foreign Money for Loan and Investment	37	33	91	118
d. Foreign Money for JVA	0	10	507	3,986
3. JVA	0	125	345	842
a. Government Contribution	0	125	345	842
4. Min. of Public Works a. Foreign Assis. for Capital Exp.	-	-	-	-

(To Continue)

Table B.8 (Continued)

	Preliminary Actual Exp.			
	1971	1972	1973	1974
Ma'an	461	687	4,613	1,479
1. Ministry of Finance	66	105	96	171
a. Loans & Investment in Quasi Public Bodies	66	102	75	97
b. Min. of Fin. Capital Exp.	0	3	21	74
2. NPC	384	582	4,517	1,308
a. Government Contribution	90	11	697	141
b. Foreign Money for Agencies Excluding JVA	290	565	3,808	1,156
c. Foreign Money for Loan and Investment	4	6	12	11
d. Foreign Money for JVA	0	0	0	0
3. JVA	0	0	0	0
a. Government Contribution	0	0	0	0
4. Min. of Public Works				
a. Foreign Assis. for Capital Exp.	11	-	-	-
Total Capital Expenditures	6,532	13,449	20,447	34,234
Non Capital Exp.	9,294	9,845	11,810	7,100
	15,826	23,294	32,257	41,334

APPENDIX C

ICOR CALCULATION

C.1 ICOR Calculation

C.001 In estimating the future Gross Regional Domestic Product of the Study Area, the Incremental Capital Output Ratio (ICOR) was used in this report. The ICOR of the Area was assumed to be the same as that of the Country.

C.002 Overall ICOR for the Country from 1972 to 1977 is defined as follows:

$$\text{ICOR } 1972 - 1977 = \frac{\sum_{t=1972}^{1976} It - \sum_{t=1972}^{1976} Dt}{GDP_{1977} - GDP_{1972}}$$

Where

It = Incremental capital investment in the year t;

Dt = Depreciation of the capital stock in the year t;

GDP_{1977} = Gross Domestic Product in the year 1977.

The incremental capital investment and depreciations are calculated in Table C.1. Inserting figures in the table into the formula (1), we can obtain the following ICORs.

$$\text{ICOR } 1972 - 1977 = \frac{540.9}{470.9 - 370.1}$$

$$= \frac{540.9}{100.8} = 5.37$$

$$\text{ICOR } 1974 - 1977 = \frac{404.1}{125.3} = 3.23$$

$$\text{ICOR } 1975 - 1977 = \frac{312.4}{128.2} = 2.44$$

$$\text{ICOR } 1976 - 1977 = \frac{161.1}{79.7} = 2.02$$

Table C.1 Incremental Capital Investment, East Bank, 1972 to 1976

(Unit: Million JD)

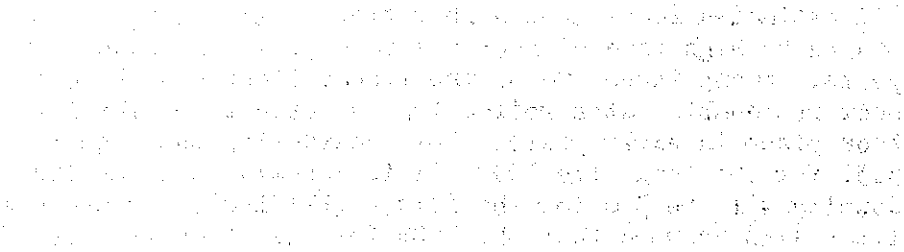
	1972	1973	1974	1975	1976	1977	Total
It	43.5	54.8	74.1	132.0	160.8		
I. Government Capital Exp.	24.6	29.7	40.4	77.6			
(%)	(100)	(100)	(100)	(100)			
a. Gross Domestic Ex. for Fixed Capital Formation	17.4	22.1	30.6	39.8			
b. Foreign Loans for Capital Formation	7.2	7.6	9.8	37.8	20.8 1/		
					138.0		
II. Private Capital Exp.	18.9	25.1	33.7	54.4			
(%)	(76.8)	(84.5)	(83)	(70)			
a. Gross Domestic Ex. for Fixed Capital Formation	18.9	25.1	32.6	48.1			
b. Foreign Loans for Capital Formation	0	0	1.1	6.3	2.00 2/		
Dt	8.1	8.3	8.5	9.0	10.0		
It - Dt	35.4	46.5	65.6	123.0	150.8		
Deflater	55.99	63.17	71.55	81.29	93.62	100.0	
It - Dt. at Constant 1977 Prices	63.2	73.6	91.7	151.3	161.1		540.9

Source: St. Dept, National Account in Jordan 1952 - 1976, 1978, Tables on General Economic Balance

1/ Source: CBJ, Annual Report 1976, 1977

2/ Estimated by assuming 30% of the Gov. Cap. Exp.

All estimated ICORs show high ratios. These high ratios seem to be caused by high rate of increase in capital investment in recent years. Among these ICORs, the recent figures of 2.44 or 2.02 show reasonable rates reflecting the effects of the investment which took place in early years. But considering the high ratio of 5.37 for the long time ICOR, it is assumed that the ICOR of this Country will be 3.0 for the future till 1985. As a concequence, it is also assumed that the ICOR for the Study Area is 3.0.



APPENDIX D

COST BREAKDOWN FOR TOURISM PROJECTS

D.001 The followings are breakdowns and bases of project costs.

Tourism Projects Cost Breakdown

(Unit: JD 1,000 in 1977)

(a)	Jerash Tourism Development	
	1) Public Sector	
	Excavation and restoration	500
	Folklore Village	200
	Routing and Signs	50
	Fencing and Landscaping	50
	(Rerouting Route 15 is put into Chapter X)	
	2) Private Sector	
	Hotel	1,000
	3) Total	1,800
(b)	Dibbin National Park Development	
	1) Public Sector	
	Installation of a Ropeway	150
	Construction of a Stream and Wading Pools	50
	Chalets (JD 10,000 per Chalet)	500
	Botanic Garden	450
	Picnic Areas and Trails	50
	2) Private Sector	NIL
	3) Total	1,200
(c)	Ajlun Tourism Development	
	1) Public Sector	
	Restoration of the Castle	150
	Upgrading of the Access Road to the Castle	30
	Expansion of the Parking Lot	20
	Construction of an Access Road to the Subdivision	40
	Land Subdivision	160
	Construction of Villas (JD 10,000 per Villa)	200

(to be cont'd)

2)	Private Sector	
	Construction of Condominium/Hotel	600
3)	Total	1,200
(d)	Irbid Improvement	
1)	Public Sector	
	Planting Street Trees	140
	Establishment of a Suq	60
2)	Private Sector	
	Hotel	500
3)	Total	700
(e)	Irbid Park System	
1)	Public Sector	
	Construction of Parks and Promenade (JD 20,000 per ha)	3,000
2)	Private Sector	NIL
3)	Total	3,000
(f)	Ramtha Tourism	
1)	Public Sector	
	Planting Street Trees	20
	Construction of a Information Center and Rest House	160
2)	Private Sector	NIL
3)	Total	180
(g)	Forest Parks	
1)	Public Sector	
	Establishment of Parks (JD 10,000 per ha)	1,200
(h)	Um Qeis Excavation and Restoration	
1)	Public Sector	
	Excavation and Restoration	1,600 1/

Note: 1/ The figure was given from Department of Antiquities.

APPENDIX E

SHORT-TERM COLLEGE EDUCATIONS

E.001 In Jordan, it seems that short-term college education extending one-to three-years after graduation of secondary schools are handled by the organizations called Institutes and Intermediate Colleges. About these Institutes and Intermediate Colleges, the Education and Higher Education Committee for the Irbid Region Planning Study of the Jordan Government has the following opinion:

E.002 To achieve the pyramid-structure of the labor powers at their levels of training and number (a ratio of 5:1 between the number of professionals and university graduates of the same speciality), Table E.1 has been constructed. This table shows the expected number of students who may have successfully passed the general secondary study certificate examination in the Irbid Region 1980-1985. It also shows their distribution to Institute and Intermediate College education and to Full University education.

Table E.1 Number of Students Expected to Have Passed the Tawjihi Examination Successfully in the Irbid Region and Their Distribution in Higher Education, 1980 to 1985

Year	Pass			Those Joining Short-Term, College Education			Those Joining Univ. Educ.		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
80/81	3,300	3,000	6,300	2,000	2,300	4,300	1,300	700	2,000
81/82	4,000	3,300	7,300	2,400	2,500	4,900	1,600	800	2,400
82/83	4,700	3,600	8,300	2,700	2,700	5,400	2,000	900	2,900
83/84	5,300	4,000	9,300	3,100	3,000	6,100	2,200	1,000	2,300
84/85	5,800	4,500	10,300	3,300	3,200	6,500	2,500	1,300	3,800

Table E.2 has also been constructed and it shows the names of institutes and colleges, standing and projected, together with their capacities according to sex until 1985.

Table E.2 Names of Institutes and Intermediate Colleges, Including Both Existing and Planned, in the Irbid Region and Annual Capacity According to Sex, 1985

Name of Institute or College	Annual Capacity	
	Male	Female
Hawara	500	-
Ajlun	-	400
Irbid	-	500
Husn Polytechnic	200	-
Interm. College/Yarmouk University	500	300
Grand Total	1,200	1,200

E.003 Looking at Tables E.1 and E.2, it is evident that the capacity of institues and intermediate colleges in 1985 (2,400 male and female students) is considerably less than the figures expected (4,300 students in 1980/81 which will amount to 6,500 in 1984/85). About this, the committee thinks the problem could be solved as follows:

(1) To request Yarmouk University to establish the community college mentioned in Table E.2 and to orientate it towards the different specializations needed by the community, Region, Jordan and Arab World. Also to request Yarmouk University to establish the following institutes and the centres in its academic plan: The Polytechnic Institute of the Faculty of Engineering, the Institute of Auxiliary Medical Professions of the Faculty of Medical Sciences, the Institute of Auxiliary Agricultural and Veterinary Science, the Institute of Secretarial and Intermediate Administrative Sciences of the Department of Administrative Sciences, and the Centre for Laboratory Technicians and the Centre of Languages and Instant Translation of the Faculty of Sciences and Arts.

Until all this is accomplished the students of the region in particular and of Jordan in general will remain deprived of such vocational education so that most of them (as the case is at present) will be forced to seek university

education (4 years) which will mean the continuation of the inflation in the number of holders of university degrees and the shortage of the properly trained skilled working force needed.

(2) The expansion of the Men and Women Teachers Colleges mentioned in Table E.2 in line with the policy of the Ministry of Education in transferring them into Community College offering the different programs necessary for local communities.

It is also possible to double the capacity of these colleges by introducing evening classes, specially after diversifying the programs they offer.