

5-4 Selection and Profiles of the Priority / High Priority Industrial Projects

5-4-1 Selection of Priority / High Priority Projects

(1) Criteria and selected priority projects

In line with the recommended industrial development strategies, candidates for priority projects have been identified as specific measures. The identified projects can be classified into five categories as follows.

- Technology improvement
- Manpower development
- Policy / Institutional / Legal measures
- Promotion / Diversification of industrial activities / locational facilities
- Environmental conservation

These identified industrial projects are assessed about their effects and impacts on the industrial development in the Southern Districts and screened to select priority ones.

The basic principle for setting up the selection criteria for the priority industrial projects is the degree of their contribution to the development of the Southern Districts either as a whole or of each district. Their contribution should include the upgrading of socio-economic conditions of the residents, enhancing the productivity of the small-to-subsistence enterprises as well as enhancing the potential of the target industries. The expected effects or kind/types of contribution of the projects are classified as follows:

Direct effects / Implementability

- (a) Urgency for implementation
- (b) Economic viability
- (c) Social benefits
- (d) Environmental conservation
- (e) Project implementability

Indirect effects

- (f) Regional development effects including the consideration for the distribution of the projects among the 4 governorates
- (g) Multiplier effects among the projects

Items (a) - (e) above with direct impacts are given 10 points each as full score while items, (f) and (g) with indirect impacts are given 5 points each. These projects with the

total score of 45 or above are rated as A and those with total of 40 to 44 are rated as B+. The projects rated as A or B+ are selected as priority projects.

The identified projects are assessed in the light of the criteria and 14 projects given 40 points or above are selected as priority projects as shown in Table 5-3.

(2) Criteria and selected high priority projects

The industrial projects with high potential are selected among 14 priority projects based on the following selection criteria.

- 1) In principle, overall assessment of the projects should be A, i.e., total score of 45 or above.
- 2) Sizable linkage / multiplier effects can be expected among the selected high priority projects.
- 3) The characteristics and scopes of the projects should fit the objective and capacity of the Study.

Accordingly, the following projects are selected as high priority projects.

- Establishment of Southern Region Research and Technology Center
- Establishment of Southern Region Small and Medium Industries Center
- Strengthening of vocational training centers

5-4-2 Profiles of High Priority Projects

(1) Establishment of Southern Region Research and Technology Center (SRRTC)

1) Objectives and scope

In order to develop research for fostering technological strength of small and medium industries in the Southern Districts, establishment of SRRTC is proposed.

Major scope/responsibilities of the center comprise:

- Technical consultation and guidance
- Consigned testing for small and medium industries
- Applied research and development
- Technical training for engineers and technicians in small and medium industries
- Open laboratories
- Coordination with SRSMIC and vocational training centers
- Information network for small and medium industries in the Southern Districts

2) Organization

A new center, SRRTC, should be set up within RSS as an central administration unit, and two local SRRTCs as local centers, with necessary facilities, equipment and experts, should be established under this central center in order to focus on small and medium industries in the Southern Districts. Organization and manpower deployment in each local SRRTC should be as given below.

Name of Division	Director	Manager	Technical Staff / Officer
Technical Consultation & Guidance		1	2
Consigned Testing		*	2
Research & Development		*	*
Technical Training		1	2
Administration		1	2
	Total 1	3	8

Note: Mark* stands for the lecturers/teachers invited from other organization. A manager will be deployed in each division and 2 to 3 technical staff will be in Research & Development Division.

3) Location

A local SRRTC for serving industries in Aqaba and Ma'an should be established within proposed A-2 industrial site and the other local SRRTC for serving industries in Karak and Tafila should be located within Mu'tah University, or at a site adjacent to the university.

(2) Establishment of Southern Region Small and Medium Industries Center (SRSMIC)

1) Objectives and scope

The major objective of SRSMIC is to enhance managerial and technical ability and marketing promotion in small and medium industries. As a result, the center can contribute to increase of the living standard, alleviation of the poverty and development of the small and medium industries in the region. The center should mainly provide seven kinds of services, i.e., (i) industrial extension services, (ii) management consultation, (iii) support of establishment of new small industries, (iv) marketing support, (v) provision of access points to the relevant agencies, (vi) provision of information about the employment in the manufacturing sector, and (vii) provision of other information and strengthening of coordination.

2) Organization

SRSMIC should be established in each governorate in the Southern Districts as branch offices under the Industrial Extension Services (IES) institute, which will be developed by VTC in Amman as the head office of the IES program in the country. This institute should have a management and administration section for the program as a whole.

Each center should have 5 - 6 personnel including extension officers (industrial management expert and industrial engineer), employment experts and supporting members. A example of the distribution of experts is shown below.

- Director / industrial engineer: 1
- Industrial management expert: 1
- Economist / financial expert: 1
- Labor / employment expert: 1
- Supporting staff: 2

3) Location

The Aqaba center should be located at A-2 site of the proposed industrial estate together with the proposed SRRTC. The center of Tafila should be located within the Regional Directorate of VTC in the Southern Districts. The Mu'tah center should be adjacent to the proposed SRRTC and Mu'tah University and the Ma'an center should be established in the center of the municipality.

(3) Strengthening of vocational training centers

1) Objectives and scope

Aiming at the accelerated industrial development of the Southern Districts, it is necessary to produce skilled and semi-skilled laborers by training the young people living in the Southern Districts as well as by upgrading the existing workers' skill levels.

To meet this demand, it is recommended that the following actions be taken to enhance the function of VTC which operates 4 vocational training centers in the Southern Districts.

- (a) To update the instructor's knowledge and skills on recent technology development as well as new teaching methods which are interactive, participatory, problem-solving, and encouraging critical thinking,

- (b) To enhance the research and planning functions to assess the private sector's training needs and design relevant training courses, and
- (c) To institutionalize the regular communication and collaboration with the private sector

2) Organization

Each vocational training center should establish a research and planning unit, and a private sector coordination unit.

5-4-3 Profiles of Priority Projects

(1) Establishment of a community college or a university in Aqaba

1) Objectives and scope

Although Aqaba has the biggest potential to become another industrial center in Jordan, it lacks the higher education institution. To meet the future demand of high-level manpower such as managers and engineers for industrial estates and other industrial complexes in Aqaba, it is urgent to establish a higher education institution in Aqaba.

Based on the needs described above, it is proposed to establish a community college in Aqaba which can be upgraded to a university at the later stage.

The proposed community college should start by offering at least the following programs:

- A) international trade and business
- B) marine science and environmental studies

The proposed full-scale university to be developed at the later stage should offer at least the following programs which include the upgraded programs:

- a) international trade
- b) business administration and management including accounting and auditing
- c) mechanical engineering
- d) industrial management including quality control and productivity enhancement
- e) land and sea transportation including ship-building and transport machinery
- f) environmental protection of ocean resources and eco-tourism development
- g) environmental impact assessment for industrial projects and environmental management and monitoring of industrial waste disposal.

2) Organization

The implementing and management body should be the Ministry of Higher Education.

(2) Establishing Engineering Department in Ma'an Branch of Mu'tah University

1) Objectives and scope

Ma'an needs a higher training institution in the fields of physical distribution, machine engineering and agro-industry. Thus, it is proposed to establish a new Engineering Department in the existing Ma'an Branch of Mu'tah University.

The Engineering Department should consider to provide the following programs:

- a) land transportation and physical distribution system,
- b) mechanical engineering including machine maintenance and repair,
- c) agro-industry including food processing, canned food and dairy products,
and
- d) mining engineering

2) Organization

The implementing and management body should be the Ministry of Higher Education.

(3) Establishment of soft loans for subsistence and small industries

1) Objectives and scope

The objective of this project is to provide soft loans to new business undertakers, subsistence and small and medium industries locating in the Southern Districts and relocation projects of factories into the Southern Districts.

The lending conditions of this soft loan should be, at least, equivalent to or softer than those of "Small Scale Industry and Handicraft (SSIH)" scheme of IDB, considering that the loan is directed to small industries in the less developed Southern Districts.

2) Organization

Industrial Development Bank (IDB) seems to be the most appropriate organization for an implementing and executing agency because it has already implemented SSIH

scheme. Other eligible banks including the Housing Bank should also be involved in the project as intermediary bank due to the limited number of branch offices of IDB in the Southern Districts.

(4) Strengthening of the Investment Promotion Law and JIEC Law

1) Objectives and scope

Foreign direct investment (FDI) in the world increased more than double in the last 6 years from US\$67,526 million (82-87 average) to US\$158,413 million in 1992. However, FDI in Jordan did not increase from 1988 to 1991.

To attract FDI in Jordan as well as to promote domestic and foreign investment in the Southern Districts, the following measures are recommended to be taken.

(a) Tax holiday rather than tax reduction

The Investment Promotion Law provides certain reduction of taxes to eligible industries located in the designated areas for 10 years from start of actual production as given below.

- 25% for projects in the development Zone A
- 50% for projects in the development Zone B
- 75% for projects in the development Zone C

However, in order to strengthen the environment of Jordan, the Southern Districts in particular, for foreign and domestic investors, it is proposed to create a new Zone D where 100% tax exemption is allowed. The new Zone D should cover Karak, Tafila and Ma'an Governorates.

(b) Extension of tax reduction/exemption periods

In accordance with the proposal mentioned above, it is additionally proposed that (i) the tax reduction period by the Investment Promotion Law be extended from 10 years to 15 years through the amendment of the Investment Promotion Law, and (ii) the tax holiday period provided by the Jordan Industrial Estates Corporation Laws should be extended from 2 years to 5 years.

(c) Tax incentives to investment

Tax incentives for investment should be strengthened by introduction of an investment tax credit. The investment tax credit allows investors to claim tax

credit (direct reduction of tax payable) for certain portion of the investment amount. Alternatively, an allowance of tax deduction of certain portion of capital investment amount should be considered.

(d) Accelerated depreciation

Accelerated depreciation should be allowed to specific projects satisfying certain conditions. Accelerated depreciation is one of strong tax incentives, as it allows investors to claim higher depreciation than that of the normal depreciation whereby investors can reduce taxes and lessen investment risk by earlier collection of capital investment.

(e) Double tax treaties

Jordan should have tax treaties with the countries being considered to be significant for Jordan's industrial development such as East Asian countries.

(f) Necessity of further transparency of procedures relating to foreign investments

The "quality" of the foreign investment environment of Jordan, in terms of the legal regime of policies and procedures, is considered to be one of the obstacles for promotion of foreign investment into Jordan. Investment Promotion Corporation (IPC) should have a real and full "One window facility" for appraisal of investment proposals, which is contemplated in the Investment Promotion Law, to overcome this problem.

(g) Tax incentives for promotion of export

Tax concession measures similar to those discussed in the preceding paragraphs, such as tax holidays and investment tax credit should be provided to exporters meeting specific criteria. Tax concession for overseas market development costs, such as allowing double tax deduction of specified export development market expenses, should also be considered.

2) Organization

New legislation and / or amendments of current laws are needed to implement this project. Drafts of the new laws or changes of existing laws should be prepared by the relevant ministries / corporations.

(5) Introduction of Value Added Tax (VAT)

1) Objectives and scope

The General Sales Tax (GST) system which is currently applied in Jordan has a serious defect of "double/repeated taxation." Namely, whenever raw materials or intermediate goods/parts are purchased from outside, the whole sales/purchase amount is subject to GST regardless of some portion of the value having been imposed with GST. This prevents the division of labor and subletting and also causes higher prices of the products.

Recognizing these, the Government is going to introduce VAT in place of GST. The Study Team agrees that VAT should be introduced to replace GST in a medium-term when certain prerequisite conditions, such as establishment of modern accounting standards and maintenance of proper recording of books, are met.

2) Organization

The implementing and management body should be the Ministry of Finance.

(6) Establishment of Southern Region Authority

1) Objectives and scope

The levels of current economic development of the four governorates are alike relative to that of the Amman Capital Region though that of Aqaba seems a little bit higher than the rest of the three. This is the reason why the four governorates in the Southern Districts are taken up as a single area for development.

Since there are no strong economic ties within the Southern Districts at present, the economic gap among the four governorates may widen as development proceeds.

Under the circumstances, it is strongly desirable that the "Southern Region Authority (SRA)" be established to formulate and implement development plans, including the establishment of economic development axes (economic development sub-regions) and construction of infrastructure from the viewpoint of the four governorates in the Southern Districts as a whole.

2) Organization and location

This Authority should be a governmental organization like ARA that is equivalent to the ministries in power and status and should formulate and implement development

plans for the four governorates in line with Jordan's social and economic development policies. Power to be granted to SRA should be similar to that of ARA but the area under its jurisdiction should encompass the whole Southern Districts. For this purpose, a new law should be enacted. The law should empower SRA to secure its own budget for the development in the Southern Districts to achieve a comprehensive and consistent development in the districts including:

- Earnings from leasing or selling of national lands which will be owned by SRA in the four governorates, and
- Government budget.

It is recommended that the proposed SRA be evolved from the existing ARA.

The Head office of SRA should be located in Aqaba and branch offices in the capitals of respective Governorates as well as in Amman.

(7) Strengthening of cooperation between general industrial estates and free zones and study on the appropriateness of transferring the authority over EPZ to JIEC/MOIT from FZC/MOF

1) Objectives and scope

Aiming at promoting the export processing function of the country, the stronger cooperation between the free zones (FZs) under the Free Zones Corporation (FZC) and general industrial estates (GIEs) under the Jordan Industrial Estates Corporation (JIEC) seems to be essential. For this purpose, newly locating GIEs should be located close to / adjacent to FZs though they must be separated by barriers because free zones including EPZs need to check the traffic in and out of the zones.

Functional coordination between the two corporations starting from the planning stage to the operation and management stage should be reinforced. A study may be advisable to be conducted on the appropriateness of transferring the authority over EPZ from FZC/MOF to JIEC/MOIT. Scope of the study for the transferring the authority over EPZs should include:

- Organizations in charge and roles of EPZs in other countries; and
- Comparison of the merits and demerits of the current system and possible new system in the light of accelerating export of the manufactured goods.

2) Organization

The implementing and management body should be JIEC and FZC under the supervision of MOIT and MOF.

(8) JIEC Capacity Building

1) Objectives and scope

The JIEC now operates two IEs, Amman (Sahab) and Irbid (Al Hasan). In addition, JIEC has already purchased the land or started negotiation for land acquisition in some sites for industrial estates. Assuming that four IEs which the Study proposes all be implemented, the JIEC will be managing more than 6 IEs within a long-term frame. Thus, the provision of efficient and environmentally sound IE will be an important task for JIEC from the view point of social and economic need in the country as a whole. Strengthening of JIEC's planning ability is, therefore, needed.

The capacity building of JIEC aims at ; (i) to increase the ability of the industrial estate planning, (ii) to strengthen the ability of investment promotion and (iii) to increase the ability of the environmental management in JIEC.

2) Organization

The implementing and management body is JIEC. Relevant agencies to be coordinated are: MOP, MOIT, MOT, WAJ and the Investment Promotion Corporation for enhancement of planning capacity and strengthening of investment promotion activities; and General Corporation for Environmental Protection (GCEP), MMRA, MOH, the Occupational Safety and Health Institute, WAJ and RSS for strengthening of environment management.

(9) Promotion of industrial location in A-1 as heavy / chemical industrial zone

It is recommended to establish an industrial zone at the designated A-1 area, with 56 km², where heavy / chemical factories should be promoted to be built for the following reasons:

- Huge amount of sea water is available as cooling media.
- Large amount of products can be exported and raw materials can also be imported through the Aqaba Port, as well as through the existing jetties at A-1.
- Manufacturing facilities or infrastructure such as the JPMC fertilizer complex, the NJFC NPK fertilizer plant, the Aqaba Thermal Power Station which are

existing or under construction near the site will encourage introduction of new factories.

The following three factories are recommended to be built as a part of the heavy / chemical factories in the zone, as examples. Needless to say, other categories of heavy / chemical industry also have possibilities to be introduced into this site.

- A Liquefied Natural Gas (LNG) receiving terminal
- A phosphatic fertilizer complex
- Potassium sulfate / di-calcium phosphate complex

Promotion of industrial location in A-1 site will contribute to industrial development in the Southern Districts by generating both direct and indirect job opportunities for Jordanian work force, increasing foreign exchange earnings through product exportation, and spreading effects to the related industry such as those utilize cold energy of LNG effectively.

LNG receiving terminal

1) Objectives and scope

The LNG receiving terminal is planned with a capacity of 2.5 million tons per annum, which includes 2.0 million tons to Israel and the rest 0.5 million tons to Jordan.

Required site area for the LNG receiving terminal varies widely depending not only on a capacity of the LNG receiving terminal, but also on how cold energy should be utilized, the transportation schedule by LNG carriers and requirement of stockpile. The required site area for the project is roughly estimated at the range between 70 to 120ha. The LNG receiving terminal may need US\$ 300 - 500 million for investment, which would be raised by equity by joint venture partners and debt borrowed from international money market.

2) Organization

A joint venture company may be established among Jordanian, Israeli and US private companies.

Phosphatic fertilizer complex

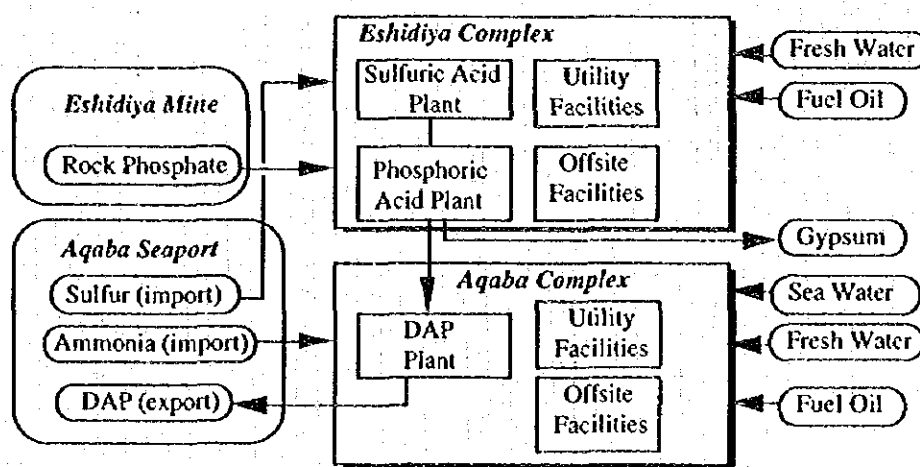
1) Objectives and scope

Objective of the project is to increase value added of rock phosphate available in the Southern Districts.

DAP, which is popular in the world market and has already been produced by JPMC industrial complex in Aqaba, is assumed as a finished product for this project provisionally. It is necessary to decide type of finished products carefully, considering the market status with partners.

The following figure illustrates the recommended structure of the phosphatic fertilizer complex to produce DAP.

Structure of the Phosphatic Fertilizer Complex



Amounts of raw materials and products are estimated as follows;

Raw materials	Rock phosphate	1,500,000 tons per annum
	Ammonia	230,000 tons per annum
	Sulfur	450,000 tons per annum
Product	DAP	1,030,000 tons per annum
By-product	Gypsum	2,570,000 tons per annum

The total required area of the complex is roughly estimated at 20-30ha in Aqaba (A-1) and 40-60ha in Eshidiya except for stacking area for gypsum.

2) Organization

A joint venture company may be set up among JPMC and a Norwegian entity.

The capital cost of the project is roughly estimated at the range of US\$ 300 - 420 million. The required fund may be raised by equity invested by the joint venture partners and debt borrowed from international money market.

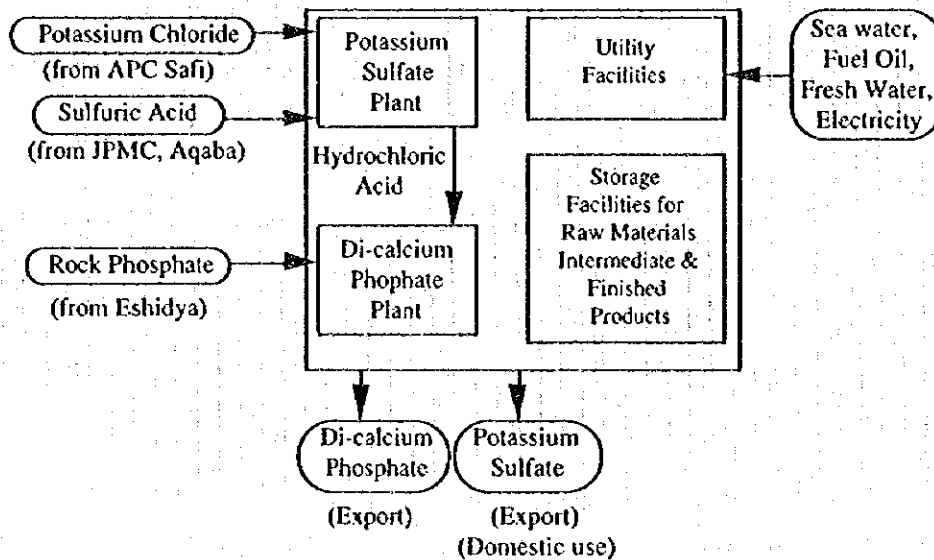
Potassium sulfate / di-calcium phosphate complex

1) Objectives and scope

APC plans to construct a complex for the production of potassium sulfate and di-calcium phosphate using local resources of potassium chloride and rock phosphate as the main raw materials. The complex will manufacture about 75,000 tons per annum of potassium sulfate and 40,800 tons per of di-calcium phosphate.

The following structure is recommended for the potassium sulfate/di-calcium phosphate complex. Required area for the complex is roughly estimated at 5 to 10ha.

Structure of Potassium Sulfate / Di-Calcium Phosphate Complex



2) Organization

A joint venture company may be set up among JODICO and a global company for fertilizer manufacturing, fertilizer dealing, grain dealing, animal feed supplement manufacturing. The fixed investment costs of the complex, interest during construction and working capital are estimated at a total of US\$ 79 million in 1995.

(10) Provision of well-facilitated workshop apartments

1) Objectives and scope

Major objectives of the project are (i) to provide the readily available and fully serviced industrial apartments for the subsistence and small industries located in the Southern Districts within their financial reach, (ii) to lessen pollution such as untreated waste water, noise, smell and vibration in the residential area in the municipality through relocation of existing subsistence and small industries.

The proposed project will provide the following facilities.

- Industrial apartments and warehouse for subsistence and small industries
- Infrastructure such as road, parking lot, water supply system, waste water treatment plant, electric power system, lightning and fence
- Service facilities such as restaurant, shop, community center, mosque

The site area will be several hectares and within the range of 15 - 20-minute time distance from the existing sites in order to encourage smooth relocation. The standard lot size should be around 100 m² and number of lots will be within 200.

The apartments should be located in the vicinity of Karak (additional ones), Tafila, Ma'an and Aqaba municipalities.

2) Organization

The local council (municipality or village) is a key player for this project in terms of implementation and management. JIEC, MOIT, CVDB, the Chambers of Industry / Commerce and other agencies can assist the implementation.

(11) Strengthening of Gulf of Aqaba Environmental Monitoring Program

1) Objectives and scope

The coast line of the Gulf of Aqaba is heavily used by industries and tourists. The World Bank conducted a research on the Gulf of Aqaba Environmental Action Plan (the Action Plan) in 1993 to curtail, contain, and prevent the environmental impacts and threats on the Gulf's natural resources.

In line with the direction suggested by the Action Plan, this priority project aims to establish a concrete environmental monitoring system in the area to provide the data for relevant agencies for better management and control. The project also proposes

an international committee for the environmental management of the Aqaba Gulf to prepare for any scale of environmental disasters. The monitoring program comprises three components as follows:

- a) Effluent discharge monitoring program into the Gulf of Aqaba
 - Design and implementation of a marine water quality monitoring program
 - Ground water monitoring and assessment of the effects of waste water seepage on the quality and level of the ground water table
- b) Air quality monitoring program
 - Design and implementation of an air quality monitoring program
- c) Solid waste management
 - Preparation and implementation of a solid waste management plan

The Joint Committee's suggested objectives should be:

- To develop and direct a bilateral program of prevention of accidental and operational pollution of the marine environment;
- To establish a bilateral emergency response program in case of chemicals or oil-spills in the ports of Eilat and Aqaba;
- To develop a coastal environment management plan based on evaluation of the suitability and sensitivity of resources to impacts of development alternatives;
- To develop and operate monitoring programs of the Gulf environment; and
- To initiate and guide joint environmental and aquaculture research programs in the Gulf of Aqaba.

To achieve these objectives, it is proposed that two layers of committee should be established; one for decision making and one for more practical information exchange and negotiation.

2) Organization

Implementing and management body of the monitoring program should be the ARA Environmental Unit. For the international joint committee, the office of the General Manager of ARA should be responsible for organizing and coordinating the related agencies. When GCEP is fully staffed in the long-term time frame, the environmental database and the operation of monitoring should be transferred to GCEP, or to an environmental section of Aqaba Governorate as a branch of GCEP.

According to the Action Plan, investment requirements for the monitoring program is estimated at US\$ 4.7 million as shown below.

- a) Efficient discharge monitoring program : US\$ 3.3 million

- b) Air quality monitoring program : US\$ 1.0 million
- c) Solid waste management : US\$ 0.4 million

Establishment of the Gulf of Aqaba Environmental Fund may be possible. The fund money can be collected from existing and possible polluting industries and beneficiaries of the good environment of the Gulf of Aqaba, such as tourism industry.

5-5 Selection and Profiles of the Priority Industrial Estates

(1) Evaluation and selection of priority industrial estates

1) Initial environmental examination of the alternative sites

Government of Jordan does not have particular technical guidelines at present. Therefore, guidelines by European Community, World Bank, and JICA have been consulted for format and contents of initial environmental examination of the alternative sites. Twenty-six (26) environmental elements were chosen for screening and scoping of possible environmental impacts.

For the five (5) candidate sites excluding K-1, K-2, K-3, T-2 and A-1, it has been assessed that no significant impacts are expected. With regard to the three (3) sites, significant impacts are possibly expected as follows.

Candidate Sites	Possible Significant Impacts
K-1	<ul style="list-style-type: none"> • Relocation • Damage to economic activities
K-2	<ul style="list-style-type: none"> • Loss of cultivative land • Damage to economic activities
K-3	<ul style="list-style-type: none"> • Loss of access to natural resources • Flora and fauna
T-2	<ul style="list-style-type: none"> • Flora and fauna
A-1	<ul style="list-style-type: none"> • Risk of disasters • Coast and marine environment • Flora and fauna

These impacts are, however, assessed to be neither irreversible nor serious if proper actions and environmental measures are taken. Consequently, no site is eliminated from the candidate list for industrial estate development from environmental viewpoint. The above-mentioned environmental assessment is taken into account in the selection of the priority industrial estate sites.

2) Selection of priority industrial estates

The candidate IE sites identified during the course of the Study are shown in Figure 5-8. All the ten (10) candidate sites are evaluated from the five (5) major factors with allocated scores/weights as given below.

Major Factors	Scores/Weights
• Locational condition	45
• Site conditions	25
Sub-total	70
• Investment demand	
- Jordanian	35
- Foreign	35
Sub-total	70
• Progress of approval procedure and Actions Taken	10
• Special consideration	Prohibitive or recommendable

It is noted that investment demand survey was conducted as a part of the Study for nine countries sampling more than 4,500 enterprises, including Jordan to find out the degree of interest of the potential investors as well as their requirements for the IEs to be established in the Southern Districts. Details are given in Table 5-4 and 5-5.

As given above, equal weight has been given to the sum of the locational and site condition of the candidate sites and to the scale of interest of the Jordanian and foreign potential investors. It should be noted that at the final process, consideration is made for the following aspects.

- Desirable distribution of the priority IEs among the four (4) Governorates,
- Competition among the IEs to attract the investors/enterprises,
- Government policy for the use of the sites,
- Utilization of the existing facilities for the use of the IEs in the long-term perspective from cost minimization view point, and
- Uncertainty of international political environment

Results of the assessment are shown in Tables 5-6 and 5-7.

As seen in the tables, the A-2 site has been ranked the first among the ten (10) and selected as one of the priority sites. Though A-3 is ranked the second, it has been dropped in consideration of the uncertainty in the joint efforts of Jordan and Israel for implementing A-3 or the Special Economic Zone. M-2 is ranked the third and included in the list of priority IEs. Though A-1 is ranked the fourth before special consideration is made, it has been eliminated considering that ARA prefers to develop

it as chemical industrial zone rather than as an industrial estate and that in Aqaba Governorate the A-2 site has already been selected. Considering the high potentiality of Aqaba and adequate demand by the investors, implementation of the A-2 IE should be started during short-term period. Considering the supporting factor of Ma'an for Aqaba and the degree of interest of potential investors, M-2 is recommended to be implemented in the middle term period.

With regard to Karak Governorate, three candidate sites are identified, i.e., K-1, K-2 and K-3 which are ranked tenth, seventh and fifth places, respectively. For K-3 site, land has already been purchased based on high priority placed by GOJ.

According to the investment demand study, demanded factory lot areas for the three sites range between 5.1 ha to 14.6 ha. According to the experience of JIEC, desirous size of the industrial estate should be bigger than 80 ha and should exceed 40 ha at the minimum due mainly to the scale-economy of the required infrastructure and utilities. The estimated sizes of the industrial estates fall behind the minimum figure, 40 ha in gross. Namely, from the financial viewpoint, the three sites seem not viable.

In addition, site reconnaissance revealed that the topography of K-3 site is quite hilly and outcrops of limestone and basalt are prevailing which would necessitate huge volume of cutting and filling at high unit cost though definite conclusion can only be made only after analyzing larger scale topo-map as well as core drilling data of the site. Therefore, the useful development area for K-3 site seems to be limited to around 30 - 40 ha with relatively flat ground.

From the regional point of view, however, construction of an industrial estate in the Governorate might be justifiable. The industrial estate project should play the role of nucleus by generating employment and activating the regional economy by linkage/multiplier effect. In the Southern Districts, the southern-most part, Aqaba, seems to have bigger growth potential with well-developed transport infrastructures as well as water resource endowment relative to Governorates of Karak and Tafila. However, Karak could play key role in the regional development of the upper part of the Southern Districts if proper measures are taken timely including the upgrading of the highway route RN 50 and King's Highway between Karak and Tafila and the industrial infrastructures for technology improvement and manpower training as well as stronger incentives for the investors.

On the condition that all these policies/measures should be taken, it is recommended that the K-3 site be included in the priority list for industrial estate development from the viewpoint of regional development of Karak. Considering time required for the

realization of the measures to reinforce the investment environment in Karak, it is recommended K-3 industrial estate be implemented in the middle-term.

In Tafila Governorate, two candidate sites have been identified which are ranked sixth and eighth place. Of the two, the T-2 site which is ranked lower than T-1, is recommended to be selected considering that existing facilities of the Al Hasa including water wells and housing structures could be utilized for the operation of the industrial estate, after ceasing of mining operation of Al Hasa during 2005 - 2010 period. T-2's implementation, therefore, should be in the long-term period.

(2) Profiles of the priority industrial estates

Characteristics and expected roles of the priority industrial estates in the Southern Districts are as summarized below.

Characteristics and Expected Roles of Proposed Industrial Estates in the Southern Districts

IE	District	Policy Orientation		Capital Orientation		GIE		Gross Area (ha)	Time Frame
		Economic Growth	Regional Development	Foreign	Domestic	Domestic Market-Oriented	Export-Oriented		
A-2	Aqaba	O	-	O	△	-	O	200	Short-term
M-2	Ma'an	O	-	△	O	O	-	80	Middle-term
T-2	Tafila	O	△	△	O	O	-	80	Long-term
K-3	Karak	△	O	O	O	O	-	35	Middle-term

Notes: O Applicable, △ Partially applicable, - Not applicable

Industrial estate sites in Aqaba Governorate, especially, A-2 site, which has the best locational advantages such as a good accessibility to the Aqaba Port and International Airport, is favored by a lot of local and foreign investors. A-2 site is featured to contribute economic growth, and to facilitate export as a gateway to foreign countries including neighbouring Arab, other Middle East, Europe and Asian countries.

M-2 site is featured as an estate for economic growth and mainly for domestic capital. Also M-2 site can accept industries relocated from Amman and Irbid for the purpose of utilizing the locational advantages of center of the Southern Districts and good accessibility to neighbouring Arab countries (Iraq, Saudi Arabia and Kuwait).

Taking economic efficiency into account, the development of T-2 site is expected in a long term to utilize the land of old Al Hasa mine and the existing facilities.

K-3 site is expected to promote regional development in and around Karak Governorate rather than economic growth, to attract of both foreign and domestic capital, and to accept various sizes of factory lots such as large size for foreign investors and medium and small size for local investors.

Table 5-1 Direct Impacts of the Recommended Plan on the Sectors and Regions

Regions	Sectors	All Sectors/Economy	Industrial Sector
Whole Country	<ul style="list-style-type: none"> ○ Introduction of VAT 	<ul style="list-style-type: none"> ○ Introduction of VAT 	<ul style="list-style-type: none"> ○ Strengthening of IPL and JIEC Law ○ Strengthening of the Cooperation between GIEs and FZs ○ JIEC Capacity Building
Southern Districts	<ul style="list-style-type: none"> ○ Establishment of a University in Aqaba ○ Establishment of a Technical College in Ma'an ○ Establishment of SRA ○ Aqaba Gulf Environmental Monitoring Program ◆ Development of Economic Infrastructures 	<ul style="list-style-type: none"> ○ Establishment of SRRTC ○ Establishment of SRSMIC ○ Reinforcement of Vocational Training Centers ○ Establishment of Soft Loans ○ Promotion of Industrial Location in A-1 ○ Provision of Well-Facilitated Workshop Apartments □ A-2 IE □ M-2 IE □ T-2 IE □ K-3 IE ◆ Development Strategy for Chemical Sub-Sector 	<ul style="list-style-type: none"> ○ Establishment of SRRTC ○ Establishment of SRSMIC ○ Reinforcement of Vocational Training Centers ○ Establishment of Soft Loans ○ Promotion of Industrial Location in A-1 ○ Provision of Well-Facilitated Workshop Apartments □ A-2 IE □ M-2 IE □ T-2 IE □ K-3 IE ◆ Development Strategy for Chemical Sub-Sector

Remarks: ○ : Priority Projects, ◎ : High Priority Projects
 □ : Recommended Industrial Estates
 ◆ : Others recommended projects/strategy

Table 5-3 Selection of Priority Projects

Projects	Direct Effects					Indirect Effects			Overall Assessment	Location
	Urgency for Implementation	Economic Viability	Social Benefits	Environmental Conservation	Project Implementability	Regional Development Effect*	Multipier Effects	Total Score		
(1) Technology improvement										
1) Establishment of Southern Region Research and Technology Center	8	7	8	7	8	3	4	45	A	All
2) Establishment of Southern Region Small and Medium Industries Center	8	7	9	8	8	4	4	48	A	All
(2) Human resources development										
3) Establishment of a university in Aqaba	8	8	7	8	7	2	4	44	B*	Aqaba
4) Establishment of an engineering department of Ma'an Branch	7	7	8	7	8	3	3	43	B*	Ma'an
5) Strengthening of vocational training centers	7	7	7	6	7	4	4	42	B*	All
(3) Policy/Institutional/Legal measures										
A: Strengthening of Investment Environment										
6) Establishment of soft loans for subsistence and small enterprises	9	7	9	7	8	5	4	49	A	All
7) Strengthening of the Investment Promotion Law	9	10	6	7	8	5	4	49	A	All
8) Introduction of VAT (Value-added tax)	8	9	7	7	7	4	5	47	A	All
B: Strengthening of Implementing Bodies										
9) Establishment of Southern Region Authority	9	8	8	8	8	5	4	50	A	All
10) Strengthening of the cooperation between the GIE and the FZ and study on the appropriateness of transferring the authority over EPZ to JIEC/MOIT from FZC/MOF										
11) JIEC capacity building	8	9	6	6	7	3	4	43	B*	All
(4) Promotion/Diversification of industrial activities/location facilities										
12) Promotion of industrial location in A-1 as heavy/chemical industrial zone	8	10	8	6	8	2	3	45	A	Aqaba
13) Provision of well-facilitated workshop apartments	8	7	10	7	9	4	2	47	A	All
(5) Environmental conservation										
14) Strengthening of Aqaba Gulf environmental monitoring program	8	8	6	9	7	2	4	44	B*	Aqaba

Remarks: * Including the consideration for the distribution of the projects among the 4 Governorates.

Table 5-4 Demanded Area for Industrial Estates by Total (Local and Foreign) Potential Investors (1/2)

Prefereed District	Candidate Site	Ser.No.	ISIC No.	Description of ISIC	Enterprise Nationality	Existing Location	Estimated Factory Lot Area by Local Demand(ha)	Estimated Factory Lot Area by Foreign Demand(ha)	IE Type	Total Estimated Factory Area(ha)
Karak										
	K-1									
	6017	322	322	Wearing apparel	Israel	-		5.0-10.0	GIE	
	O092	371	371	Iron & Steel casting	Jordan	Karak	0.1-0.2			
	Total						0.1-0.2	5.0-10.0		5.1-10.2
	K-2									
	A109	311	311	Food manufacturing	Jordan	Jerash	1.0-2.0			
	O094	311	311	Food manufacturing	Jordan	Karak	0.1-0.2			
	6017	322	322	Wearing apparel	Israel	-		5.0-10.0	GIE	
	O047	341	341	Paper	Jordan	Karak	0.1-0.2			
	S070	356	356	Plastic products	Jordan	Amman	0.4-0.8			
	O071	369	369	Glass & Non-metal mineral	Jordan	Karak	0.1-0.2			
	A207	371	371	Iron & Steel casting	Jordan	Karak	0.2-0.4			
	O063	371	371	Iron & Steel casting	Jordan	Karak	0.1-0.2			
	O077	371	371	Iron & Steel casting	Jordan	Karak	0.2-0.4			
	O101	371	371	Iron & Steel casting	Jordan	Karak	0.1-0.2			
	Total						2.3-4.6	5.0-10.0		7.3-14.6
	K-3									
	6017	322	322	Wearing apparel	Israel	-		5.0-10.0	GIE	
	A266	351	351	Chemical	Jordan	Irbid	0.2-0.4			
	O098	369	369	Glass & Non-metal mineral	Jordan	Karak	0.1-0.2			
	O090	371	371	Iron & Steel casting	Jordan	Karak	0.5-1.0			
	Total						0.8-1.6	5.0-10.0		5.8-11.6
Tafila										
	T-1									
	A226	331	331	Wood & Cork furniture	Jordan	Tafila	0.1-0.2			
	A231	369	369	Glass & Non-metal mineral	Jordan	Tafila	5.0-10.0			
	A223	371	371	Iron & Steel casting	Jordan	Tafila	0.2-0.4			
	A232	371	371	Iron & Steel casting	Jordan	Tafila	0.2-0.4			
	Total						5.5-11.0	0.0		5.5-11.0
Ma'an										
	M-1									
	6015	384	384	Transport equipment	Israel	-		2.5-5.0	GIE	
	Total						0.0	2.5-5.0		2.5-5.0
	M-2									
	A122	322	322	Wearing apparel	Jordan	Irbid	1.2-2.4			
	A134	323	323	Leather products	Jordan	Irbid	8.0-20.0			
	A247	331	331	Wood & Cork furniture	Jordan	Ma'an	5.0-10.0			
	A005	369	369	Glass & Non-metal mineral	Jordan	Amman	7.0-14.0			
	O045	369	369	Glass & Non-metal mineral	Jordan	Irbid	1.4-2.8			
	6015	384	384	Transport equipment	Israel	-		2.5-5.0	GIE	
	Total						22.6-49.2	2.5-5.0		25.1-54.2
Aqaba										
	A-1									
	7005	311	311	Food manufacturing	Saudi Arabia	-		10.0	GIE	
	6003	322	322	Wearing apparel	Israel	-		0.4-0.8	GIE	
	2022	322	322	Wearing apparel	South Korea	-		0.5-1.0	EPZ	
	8001	356	356	Plastic products	Egypt	-		0.8-1.6	EPZ	
	S099	371	371	Iron & Steel casting	Jordan	Aqaba	0.2-0.4			
	A274	381	381	Fabricated metal	Jordan	Irbid	0.9-1.8			
	4009	382	382	Machinery	U.S.A.	-		35.0-70.0	EPZ	
	A30	384	384	Transport equipment	Israel	-		1.0-2.0	GIE	
	A25	384	384	Transport equipment	Israel	-		5.0-10.0	EPZ	
	A244	951	951	Industrial services	Jordan	Aqaba	0.5-1.0			
	Total						1.6-3.2	52.7-95.4		54.3-98.6

Table 5-5 Demanded Area for Industrial Estates by Total (Local and Foreign) Potential Investors (2/2)

Preferred District	Candidate Site	Site No.	ISIC No.	Description of ISIC	Enterprise Nationality	Existing Location	Estimated Factory Lot Area by Local Demand(ha)	Estimated Factory Lot Area by Foreign Demand(ha)	EE Type	Total Estimated Factory Area(ha)
Aqaba										
A-3										
	A189	311	Food manufacturing	Jordan	Aqaba	0.2-0.4				
	A195	311	Food manufacturing	Jordan	Aqaba	0.1-0.2				
	A196	311	Food manufacturing	Jordan	Aqaba	0.5-1.0				
	S086	311	Food manufacturing	Jordan	Aqaba	0.1-0.2				
	7005	311	Food manufacturing	Saudi Arabia	-			10.0	GIE	
	A197	322	Wearing apparel	Jordan	Aqaba	0.1-0.2				
	A198	322	Wearing apparel	Jordan	Aqaba	0.1-0.2				
	A200	322	Wearing apparel	Jordan	Aqaba	0.1-0.2				
	6003	322	Wearing apparel	Israel	-			0.4-0.8	GIE	
	2022	322	Wearing apparel	South Korea	-			0.5-1.0	EPZ	
	S087	331	Wood & Cork furniture	Jordan	Aqaba	0.2-0.4				
	A185	342	Printing	Jordan	Aqaba	0.5-1.0				
	A202	342	Printing	Jordan	Aqaba	0.1-0.2				
	8001	356	Plastic products	Egypt	-			0.8-1.6	EPZ	
	A150	369	Glass & Non-metal mineral	Jordan	Amman	1.4-2.8				
	A242	369	Glass & Non-metal mineral	Jordan	Aqaba	0.2-0.4				
	S092	369	Glass & Non-metal mineral	Jordan	Aqaba	0.5-1.0				
	A192	381	Fabricated metal	Jordan	Aqaba	0.1-0.2				
	A201	381	Fabricated metal	Jordan	Aqaba	0.1-0.2				
	A241	381	Fabricated metal	Jordan	Aqaba	0.1-0.2				
	A245	381	Fabricated metal	Jordan	Aqaba	0.1-0.2				
	S093	381	Fabricated metal	Jordan	Aqaba	0.1-0.2				
	S094	381	Fabricated metal	Jordan	Aqaba	0.1-0.2				
	S095	381	Fabricated metal	Jordan	Aqaba	0.1-0.2				
	S097	381	Fabricated metal	Jordan	Aqaba	0.1-0.2				
	S098	381	Fabricated metal	Jordan	Aqaba	0.1-0.2				
	O010	381	Fabricated metal	Jordan	Amman	9.0-18.0				
	O012	381	Fabricated metal	Jordan	Amman	4.5 - 9.0				
	4009	382	Machinery	U.S.A.	-			35.0-70.0	EPZ	
	S046	383	Electrical machinery	Jordan	Amman	0.6 - 1.2				
	S067	383	Electrical machinery	Jordan	Amman	3.0 - 6.0				
	A30	384	Transport equipment	Israel	-			1.0-2.0	GIE	
	A25	384	Transport equipment	Israel	-			5.0-10.0	EPZ	
	Total					22.1-44.2		52.7-95.4		74.8-139.6
A-3										
	A117	290	Mining	Jordan	Irbid	1.0-2.0				
	A159	311	Food manufacturing	Jordan	Balqa	1.0-2.0				
	7005	311	Food manufacturing	Saudi Arabia	-			10.0	GIE	
	6003	322	Wearing apparel	Israel	-			0.4-0.8	GIE	
	2022	322	Wearing apparel	South Korea	-			0.5-1.0	EPZ	
	S040	331	Wood & Cork furniture	Jordan	Amman	4.5 - 9.0				
	8001	356	Plastic products	Egypt	-			0.8-1.6	EPZ	
	S090	369	Glass & Non-metal mineral	Jordan	Aqaba	0.2-0.4				
	S091	369	Glass & Non-metal mineral	Jordan	Aqaba	0.5-1.0				
	7002	369	Glass & Non-metal mineral	Saudi Arabia	-			0.2-0.4	EPZ	
	A243	381	Fabricated metal	Jordan	Aqaba	0.5-1.0				
	4009	382	Machinery	U.S.A.	-			35.0-70.0	EPZ	
	A30	384	Transport equipment	Israel	-			1.0-2.0	GIE	
	A25	384	Transport equipment	Israel	-			5.0-10.0	EPZ	
	Total					7.7-15.4		52.9-95.8		60.6-111.2

Table S-6 Assessment of the Candidate IEs (1/2)

Candidate Sites	Function	Locational Conditions										Site Conditions				Sub-total : (1)-(14)	Ranking
		(1) Market Assess (Major Domestic)	(2) Transport : Port	(3) Transport : Highway & Railway	(4) Transport : Airport	(5) Water Supply	(6) Electricity & Telecommunications	(7) Labor Force	(8) Urban/ Education al/ Training Facilities	(9) Environmental Constraint/ Coordination with Urban Planning	(10) Land Ownership	(11) Needs for Resettlement	(12) Land Price	(13) Topography & Geology	(14) Risk of Flash Flood		
K-1	GIE	3	1	3	2	2	3	3	5	3	2	2	5	5	41	10	
K-2	GIE	3	1	3	2	4	4	5	5	2	3	3	5	5	47	9	
K-3	GIE	4	2	4	4	3	2	3	3	5	5	0	5	5	49	7	
T-1	GIE	2	2	4	2	3	2	2	2	5	5	4	4	4	48	8	
T-2	GIE	3	3	5	3	5	2	2	2	4	5	5	4	4	55	4	
M-1	GIE	3	3	4	3	3	3	3	3	5	5	5	5	5	55	4	
M-2	GIE	4	4	5	4	3	3	3	3	5	5	5	4	4	58	3	
A-1	GIE	2	5	5	5	5	4	4	4	3	5	4	1	0	53	6	
A-2	GIE*	3	5	5	5	5	5	5	5	4	5	4	4	3	62	1	
A-3	SEZ	3	5	4	5	5	4	4	4	4	5	4	4	3	59	2	

Remarks: (1) GIE stands for General Industrial Estate and SEZ for Special Economic Zone.

(2) *: Export-oriented GIE

(3) Hatched ones are these selected as priority IE sites.

Table 5-7 Assessment of the Candidate IEs (2/2)

Candidate Sites	Function	Investment Demand (Jordanian Enterprises)		Sub-total: (1)-(16)	Ranking	Progress of Approval Procedure and Actions Taken (17)	Total: (1)-(17)	Ranking	Special Consideration (18)	Priority/ Timing of Implementation		
		(15) Jordanian	(16) Foreign							Short-term : -2000	Middle-term : 2001-2005	Long-term : 2006-2010
K-1	GIE	0	5	46	10	0	46	10	IE development as a core for the regional development			
K-2	GIE	5	5	57	6	0	57	7	IE development as a core for the regional development			
K-3	GIE	0	5	54	9	10	64	5	IE development as a core for the regional development		0	
T-1	GIE	10	0	58	5	5	63	6	Consideration for the distribution of IEs among the Governorates as well as competition to attract investors between IEs in the same Governorate			
T-2	GIE	0	0	55	7	0	55	8	In case Al Hasa mine ceases operation around 2005-2010, their facilities together with land could be utilized			0
M-1	GIE	0	0	55	7	0	55	8	Industrial linkage with Aqaba			
M-2	GIE	35	0	93	3	0	93	3	Industrial linkage with Aqaba			0
A-1	GIE	5	35	93	3	-10	83	4	More appropriate as chemical industrial zone than as IE			
A-2	GIE*	35	35	132	1	5	137	1			0	0
A-3	SEZ	10	35	104	2	0	104	2	Materialization of SEZ heavily depends on the development of the Middle-East peace movement			

Remarks: (1) GIE stands for General Industrial Estate and SEZ for Special Economic Zone.

(2) *: Export-oriented GIE

(3) Hatched ones are these selected as priority IE sites.

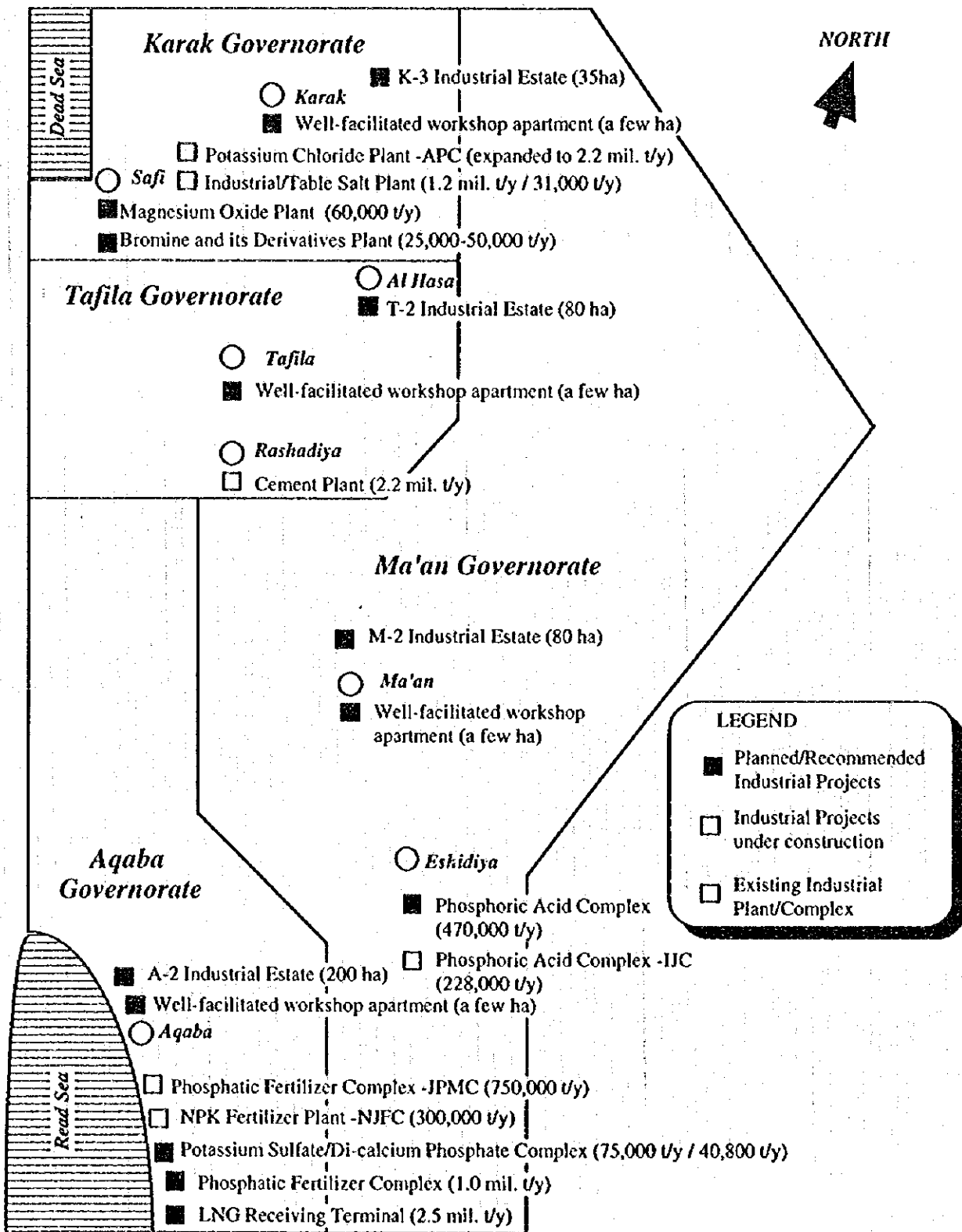


Figure 5-1 Location of Prospective Industries and Industrial Sites in 2010

CATEGORY

LOCATION

		Whole Jordan	Karak	Tafila	Ma'an	Aqaba
Technology Improvement	High Priority Projects					
	Establishment of Southern Region Research and Technology Center (SRRTC)		■			■
	Establishment of Southern Region Small and Medium Industries Center (SRSMIC)		■	■	■	■
	Strengthening of vocational training centers		■	■	■	■
Manpower Development	Priority Projects					
	Establishment of a community college or a university in Aqaba					■
Policy / Institutional / Legal measures	Establishment of an engineering department in Ma'an branch of Mu'tah University				■	
	Establishment of soft loans for subsistence and small industries		■	■	■	■
Strengthening of Investment Environment	Strengthening of the Investment Promotion Law	■				
	Introduction of VAT (value-added tax)	■				
	Establishment of Southern Region Authority		■	■	■	■
Strengthening of Implementation Bodies	Strengthening of the cooperation between the GIE and the FZ and study on the appropriateness of transferring the authority over EPZ to JIEC/MOIT from FZC/MOF	■				
	JIEC Capacity Building	■				
Promotion / Diversification of Industrial Activities	Promotion of industrial location in A-1 as heavy/chemical industrial zone					■
	Provision of well-facilitated workshop apartments		■	■	■	■
Environmental Conservation	Formulation of Aqaba Gulf environmental monitoring program					■

Figure 5-2 Category and Location of High Priority / Priority Projects

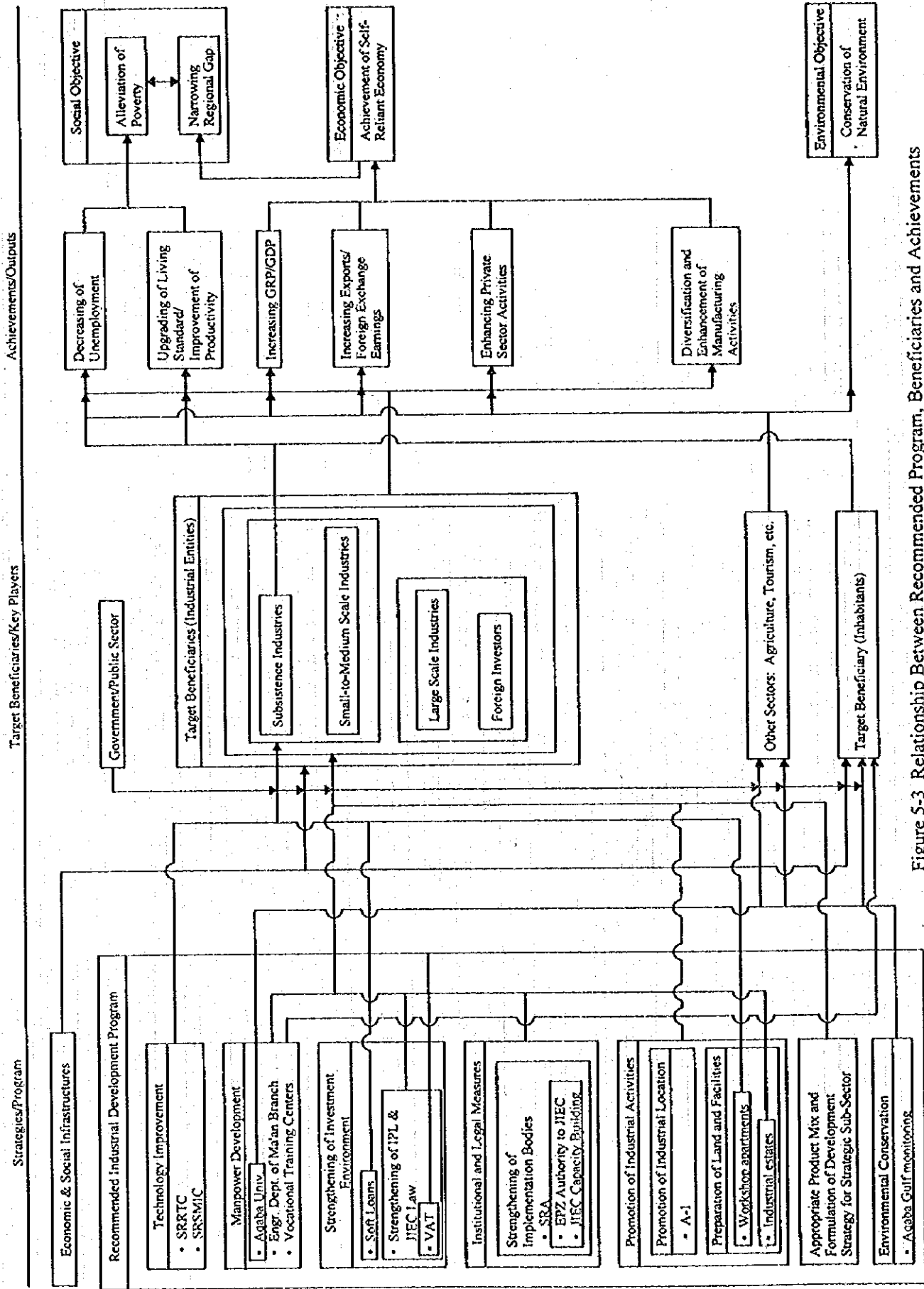


Figure S-3 Relationship Between Recommended Program, Beneficiaries and Achievements

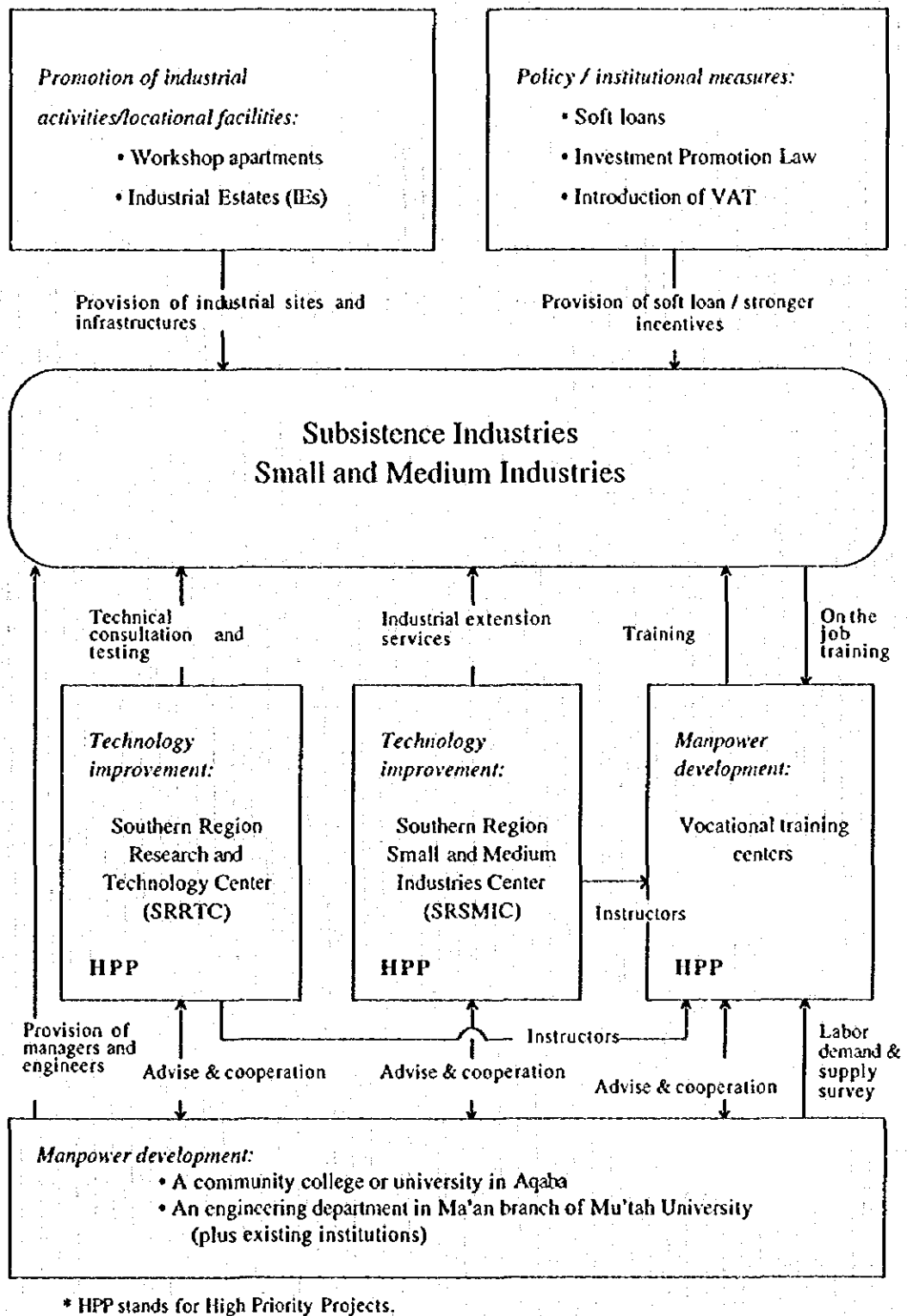


Figure 5-4 Functions of Priority Projects/IEs for Small and Medium Industries

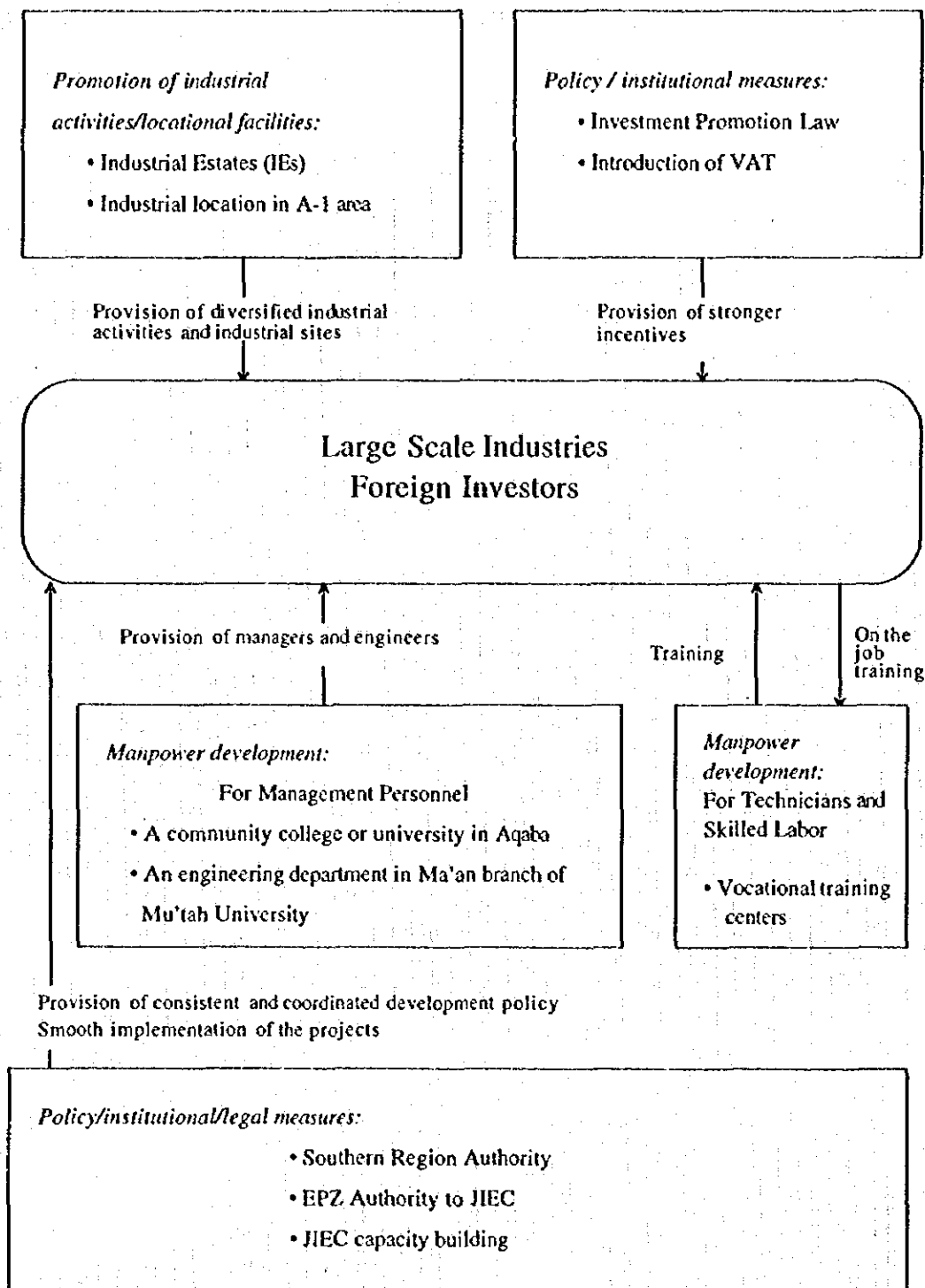


Figure 5-5 Functions of Priority Projects/IEs for Large Scale Industries and Foreign Investors

Programs	Short-Term (<2000)	Medium-Term (2001-2005)	Long-Term (2006-2010)
<p>(1) High Priority Projects</p> <p>1) Establishment of Southern Region Research and Technology Center - Aqaba - Mu'tah</p> <p>2) Establishment of Southern Region Small and Medium Industries Center - Aqaba and Tafila - Mu'tah and Ma'an</p> <p>3) Strengthening of vocational training centers - Karak and Aqaba - Tafila and Ma'an</p> <p>(2) Priority Projects</p> <p>1) Establishment of a college or university in Aqaba</p> <p>2) Establishment of engineering dept. of Ma'an branch of Mu'tah Univ.</p> <p>3) Establishment of soft loans for subsistence and small enterprises</p> <p>4) Strengthening of the Investment Promotion Law and JIEC Law</p> <p>5) Introduction of VAT (Value-added tax)</p> <p>6) Establishment of Southern Region Authority</p> <p>7) Strengthening of the cooperation between the GIE and the FZ and study on the appropriateness of transferring the authority over EPZ to JIEC/MOII from FZC/MOF</p> <p>8) JIEC capacity building</p> <p>9) Promotion of industrial location in A-1 as heavy/chemical industrial zone</p> <p>10) Provision of well-facilitated workshop apartments</p> <p>11) Strengthening of Aqaba Gulf environmental monitoring program</p> <p>(3) Industrial estates</p> <p>1) A-2 site (Aqaba) - Phase 1 - Phase 2 - Phase 3</p> <p>2) M-2 site (Ma'an)</p> <p>3) T-2 Site (Tafila)</p> <p>4) K-3 site (Karak)</p>			

Figure 5-6 Priority Projects' Implementation Schedule

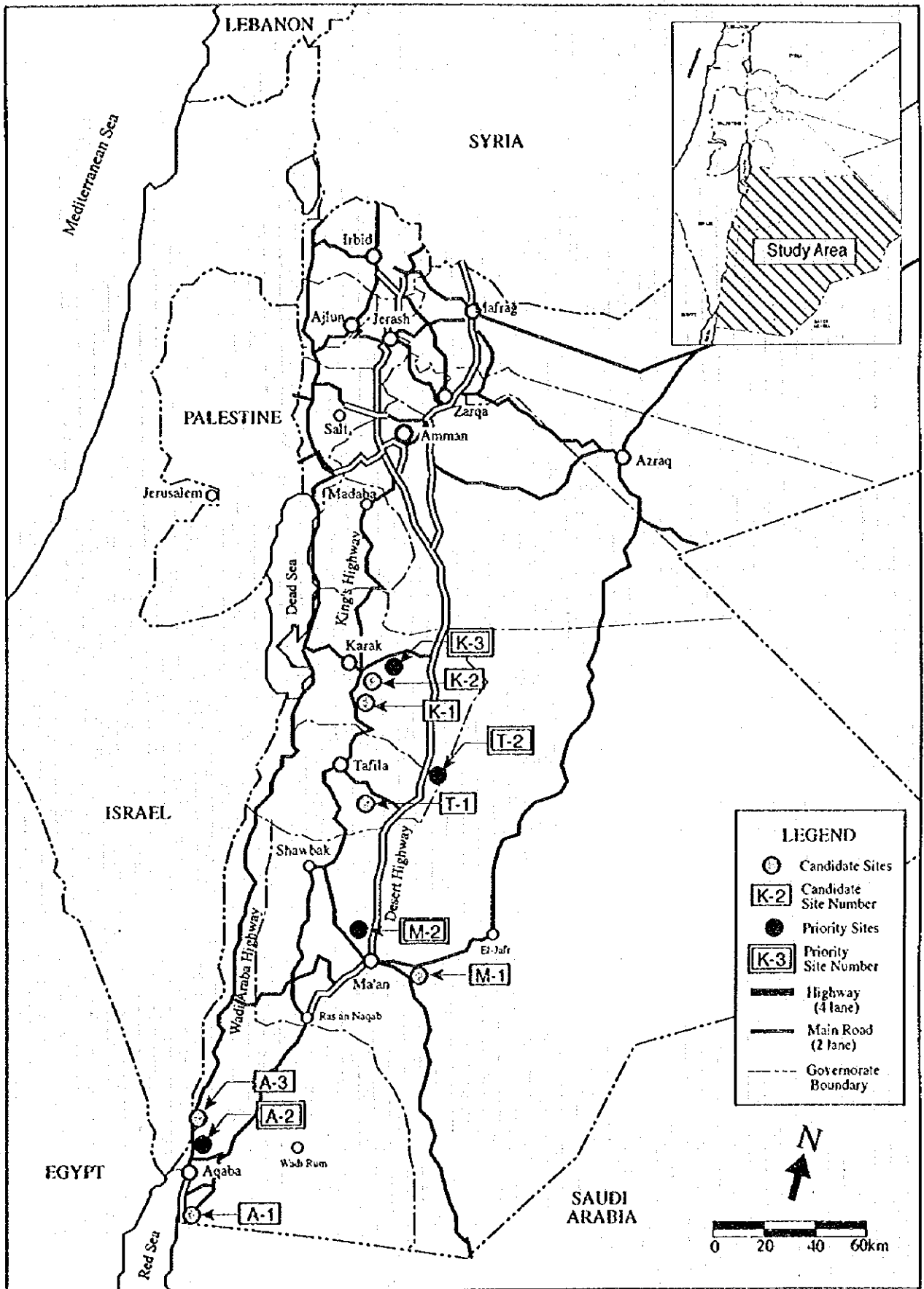
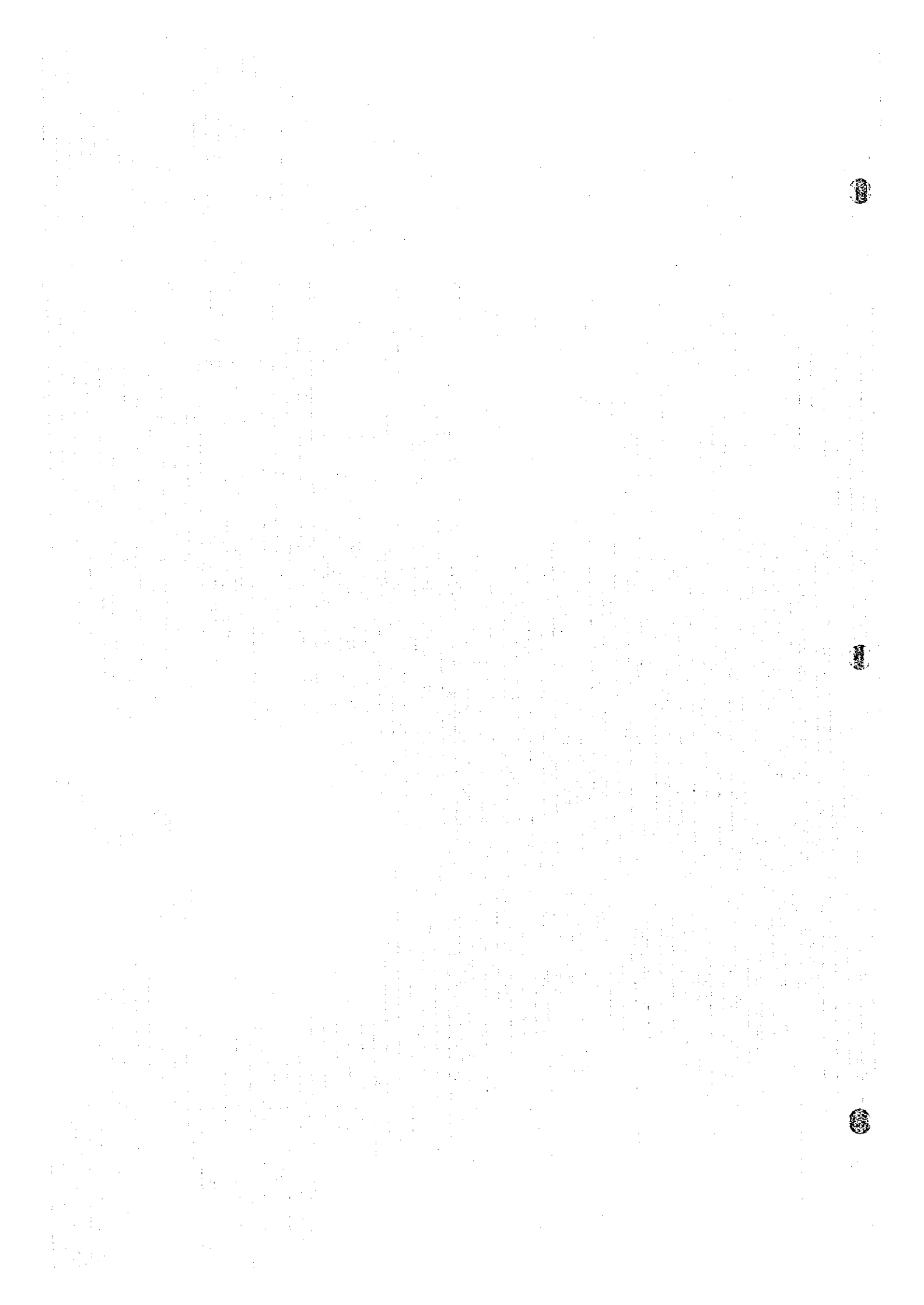


Figure 5-8 Candidate Sites/ Priority Sites for Industrial Estates



VI. DETAILED PROGRAM FOR INDUSTRIAL ESTATE DEVELOPMENT

6-1 Economic-Oriented Industrial Estates

6-1-1 Aqaba Industrial Estate with the Highest Development Potential: A-2

(1) Pre-F/S on the A-2 Industrial Estate (IE)

The A-2 site has been selected as the IE with the highest potential on which a Pre-F/S should be conducted. For this purpose, more detailed study has been conducted for A-2 in addition to these for the other priority sites including:

- Identification of alternative sites for the A-2 IE and conducting comparative study,
- Conducting of topographic survey for the A-2 site, preparing a new topo-map with the scale of 1/5,000 with two meter contour interval,
- Working out an appropriate phased development plan, and
- Conducting detailed financial and economic analysis

The results of the Pre-F/S are given hereunder.

(2) Comparison of alternative locations for the A-2 IE

For the establishment of the A-2 IE, three (3) alternative locations have been chosen considering the requirements for industrial location comprising mainly:

- Access to urban facilities, accumulation and availability of labor force;
- Safety from flash floods;
- Access to the transport facilities, in particular international trading port, major highways and international airport; and
- Site conditions including topography, geology, and current land use.

Three alternative locations: A-2-1, A-2-2 and A-2-3, were chosen accordingly. These locations were assessed and compared in the light of the above-mentioned locational requirements. A-2-1 location was assessed as the best among the three to meet these requirements and selected as the site for the construction of the A-2 IE.

(3) Estimated investment demand and characteristics of the A-2 IE

Investment demand surveys were conducted in Jordan and eight foreign countries (Israel, Saudi Arabia, Egypt, Germany, South Korea, Singapore, Japan, and the U.S.A.). The total area demand was estimated at 74.8 - 139.6 ha as shown in Table 6-1.

Besides Jordan and the eight foreign countries surveyed in the Study, investments can be expected from Iraq, Italy, the U.K., France, the Netherlands, and so on, which are major trading partners of Jordan. Therefore, the overall investment demand is presumed to be higher than these figures.

The investment demand survey revealed that the A-2 IE should have the following characteristics.

- Foreign investors being majority : About 68% of the total area of factory lots is for foreign investors and the rest for local investors.
- Relatively export-oriented : 82% of foreign prospective investors showed an interest in investment within Export Processing Zones or intended to export the major portion of their products. The A-2 IE should, therefore, have an export-oriented function for foreign investors.
- Clean industries : Air polluting industries such as cement and petroleum refining industries are not to be invited, because the A-2 IE is located on the windward side of the center of Aqaba City.
- Assembly and processing type : Assembly type (transport equipment, machinery, electric machinery and fabricated metal) and processing type (food) are expected to be located.

(4) Development area and categories of industries to be located and lot allocation

Considering the limited coverage of the investment demand survey, it was presumed that the area demand for factory lots as identified by the investment demand survey in this Study could be increased. To be on the safe side, 20% of the estimated demand or 25 ha was added in determining the development area of A-2. Consequently, the net development area for the A-2 IE was estimated to be 164.6 ha or 200 ha in gross. Sizing of the factory lots and their numbers were determined based on the requirement of the investors identified through the investment demand survey. Net development area by industrial category and the numbers of allocated lots are given below.

Net Development Area for the A-2 Industrial Estate

Industrial Category	Net Development Area (ha)	Number of Factory Lots
311/312 Food manufacturing	11.8 (7.2%)	5
322 Wearing apparel	5.4 (3.3%)	11
331/332 Wood & cork furniture	0.4 (0.2%)	1
342 Printing	1.2 (0.7%)	2
356 Plastic products	3.2 (1.9%)	8
362/369 Glass & non-metal mineral	4.2 (2.6%)	9
381 Fabricated metal	35.2 (21.4%)	32
382 Machinery	82.0 (49.8%)	41
383 Electric machinery	7.2 (4.4%)	6
384 Transport equipment	14.0 (8.5%)	11
Total	164.6(100.0%)	126

(5) Land use and land preparation

1) Land use plan and road system

Land use plan was prepared considering the followings.

- Total factory lot area of about 160 ha should be provided.
- Total area should be divided into three blocks with about equal size, in compliance with the staged development of three phases
- Utility sites should be allocated at proper locations with adequate land areas.
- Lots for the administration center and other buildings should be allotted.
- Parks and green belts should be allocated.

The proposed land use plan is shown in Table 6-2 and Figure 6-1.

To ensure network efficiency, the road system in the IE will consist of a main road which is connected with the planned access road leading to the Wadi Araba Highway and with the planned Safi Back Road Link, a sub-main road running south from the main road, and a U-shaped collector road connected to the main road and sub-main road. To ensure safety, T-shaped intersections will be employed whenever possible. The road network in the A-2 IE is shown in Figure 6-2.

2) Land preparation plan

The Study Team conducted a topographic survey on an area of some 270 ha and prepared a topographic map of 1/5,000 scale with 2m contour interval. The land preparation plan was formulated based on this map, taking into account the following basic conditions:

- Maximum road gradient should not be greater than 3.5% in consideration of large vehicles.
- Land should be prepared with a gradient of more than 0.5% to ensure self-drainage of rainwater.
- The cut and fill volume should balance each other to minimize the volume of earthworks.

The total cut and fill volume is planned to be 1.4 million cubic meters, as shown below.

	Phase 1	Phase 2	Phase 3	Total
Cut volume	260,000	700,000	440,000	1,400,000
Fill volume	580,000	210,000	610,000	1,400,000

(6) Standard factories and administration center

Standard factories with the following sizes were planned to be constructed for each phase in the A-2 IE.

	Land Area	Floor Area
Phase 1	8.0	4.0
Phase 2	4.0	2.0
Phase 3	4.0	2.0
Total	16.0	8.0

The administration center will have the following facilities.

Industrial Estate Administration Center Facilities Plan

(m²)

		Floor Area		Land Area
Building A	1. Administration building	1,000	}	3,850
Building B ^{/1}	2. Customs office and police station	300		
Building C	3. Business center (bank, post office, etc.)	900	}	3,150
	4. Business center (social security office, employment office, chamber of industry, offices)	1,200		
	5. Restaurants, retail stores	600		
	Sub total	4,000		7,000
Others	6. Clinic			1,000
	7. SRRTC and SRSMIC ^{/2} (including parking lots)			20,000
	8. Parking area, etc.			2,000
	Total	4,000		30,000

Notes: /1 Separation will be provided between the customs office and the police office.

/2 SRRTC stands for Southern Region Research and Technology Center, and SRSMIC for Southern Region Small and Medium Industries Center.

(7) Requirement for utilities/infrastructures

1) Drainage

It was planned that the drainage facilities should be able to drain the rain water with the intensity of 24.4 mm/h with the return period of 10 years.

2) Water supply

The total water demand per day in the IE is estimated based on the total site area and the water demand per site area. The water demand for each site area is the weighted average of the planned site area for each industrial category and unit water consumption.

Taking various data and information including these for the IEs in Asia into consideration, unit water consumption is presumed as below.

Water Demand by Industrial Category

Industrial Category	Factory Lot Area (ha)	Unit Water Demand (m ³ /ha/day)	Water Demand (m ³ /day)
311/312 Food manufacturing	12.0	80	960
322 Wearing apparel	5.5	10	55
331/332 Wood & cork furniture	0.4	25	10
342 Printing	1.2	20	24
356 Plastic products	3.3	40	132
362/369 Glass & non-metal mineral	4.3	181	778
381 Fabricated metal	35.8	66	2,363
382 Machinery	83.5	40	3,340
383 Electric machinery	7.3	20	146
384 Transport equipment	12.6	48	605
Total	165.9	50*	8,295

*: Weighted average of water consumption

A weighted average of water consumption in the A-2 IE is assumed to be 50 m³/ha/day, and the total water demand including the administration center is estimated to be 8,300 m³/day.

3) Sewerage

The wastewater volume is planned to be 8,300 m³/day, which is equivalent to the consumption volume.

4) Electricity

The total power demand for the A-2 IE, is the sum of power demand of the factories, administration center, utility facilities, street lighting and park lighting. The unit electric power demand for the factories is presumed to be 266 kW/ha on the basis of the data for the IEs in the world including Asian countries.

The total power demand was estimated at around 46 MW.

5) Telecommunications

Based on the data for the IEs in the world, the total telecommunication demand of the A-2 IE was estimated to be around 650 lines.

6) Flood prevention

According to "Master Plan on Aqaba Basin - Wide Flood Control Study, March 1987, ARA", the volumes of flash floods from mountains on the southeast side and from mountains on the east side of the A-2 IE are estimated at about 900 m³/sec from the southeast of the Wadi Yutum and 146 m³/sec from the northeast of the Wadi Um Sidra with a 100-year return period, respectively. Facilities for the protection of A-2 IE against these flash floods will be proposed in the Study.

(8) Preliminary design/principal dimensions of the utilities/infrastructures

1) Drainage

The following rainwater draining facility was planned:

- U-section flumes
400 mm x 400 mm - 500 mm x 500 mm, total length 4,330 m
- Concrete pipe
Inner diameter 700 mm - 1000 mm, total length 2,230 m
- Box culvert
1000 mm x 1000 mm - 2000 mm x 2000 mm, total length 4,290 m

2) Water supply

The planned water supply system consists of the following components and dimensions.

- Conveyance pipes
300 mm diameter ductile iron pipe total length 8,200 m
- Reservoir capacity 8,300 m³
- Elevated tank capacity 175 m³
- Distributing pipes /day
50 mm diameter polyethylene pipe total length 340 m
75 mm to 500 mm diameter ductile iron pipe total length 8,520 m

3) Sewerage

The outline of planned facilities of the sewerage system is as follows.

- Sewage treatment plant 8,300 m³/day
- Sewerage pipes
200 mm - 500 mm diameter concrete pipe, total length 8,220 m

4) Electricity

It is planned to install a new transmission line up to the A-2 IE from the existing 132 kV transmission line, branching off at the Aqaba Town A2 Substation (ATA2).

Within the A-2 IE, a new main substation was planned to be constructed and be connected to the double circuit 132 kV new transmission line by two branches. The new main substation will have 2 main transformers of 40 MVA each with a voltage of 132/33 kV. A 33 kV distribution system is planned to be constructed to feed power from the new main substation to the factories and other users located in the A-2 IE.

5) Telecommunications

It was planned to install a new optical fiber cable line to ensure telecommunication service between the Aqaba exchange station and the A-2 IE. A new telephone exchange facility (Remote Line Unit (RLU)) is planned to be installed within the A-2 IE. RLU will be connected to the Aqaba exchange station by an optical fiber cable line. In the IE, some Splice Boxes (SB) will be installed on the sidewalks and connected to the new RLU by metallic telephone cable lines so that subscribers can easily be connected to SB at any time.

6) Flood prevention

To prevent flash floods from flowing into the IE, embankments having the total length of 4,210 m should be built on the east, north and south sides of the IE.

(9) Development phasing and implementation schedule

Considering the time required for the achievement of the Middle East Peace Process and avoiding the risk of over-investment, it is recommended that the A-2 IE be developed in three phases as follows:

Phase	Completion	Operation Start	Gross Area (ha)	Factory Lot Area (ha)
Phase 1	End of 2000	Beginning of 2001	78.9	54.0
Phase 2	End of 2005	Beginning of 2006	62.1	57.6
Phase 3	End of 2010	Beginning of 2011	59.0	54.3
Total			200.0	165.9

With regard to the standard factories, the following schedule was assumed:

	Land Area (ha)	Floor Area (ha)
Phase 1	8.0	4.0
Phase 2	4.0	2.0
Phase 3	4.0	2.0

(10) Investment and operation and maintenance (O&M) costs

1) Investment cost

(a) Assumptions for the investment cost estimate

The investment cost has been estimated based on the following assumptions:

- a) Price level: 1996 prices are used for the estimate.
- b) Foreign exchange rate: JD 1 = US\$1.41 = JY 151 (as of August 1, 1996; Central Bank of Jordan).
- c) Land acquisition cost: Total land acquisition cost is JD 800,000 or JD 0.4/m².
A half of the land acquisition cost (JD 400,000) has been paid in 1996. The remainder will be paid in equal installments over five years from 1997.
- d) Engineering services cost: Engineering services cost includes engineering work such as detailed design and construction supervision. This cost is assumed to be 6.0% of the construction cost, and is divided into 1.2% in local currency portion and 4.8% in foreign currency portion.
- e) Administration cost: Administration cost covers administration work to be done by JIEC staff for the A-2 IE project. This cost is assumed to be JD 200,000 for each phase.
- f) Physical contingency: Physical contingency is assumed to be 15% of the sum of construction cost, engineering services cost, and administration cost.
- g) Tariff: Tariff is assumed to be 50% for all imported capital goods and materials.
- h) Sales tax: Sales tax is assumed to be 10% for imported and locally supplied goods and services.
- i) Sharing of construction cost: The costs of the following facilities should be borne by agencies other than JIEC.
 - Water supply main from the junction between the Desert Highway and Wadi Araba Highway up to the A-2 IE with the total length of 7,240 m and 300 mm diameter.

- Main substation and transmission line up to the A-2 IE with the total length of 6 km.
- Optical fiber cable up to the A-2 IE with the total length of 10 km.

(b) Investment cost estimate

Based on the assumptions explained above, the investment cost of the A-2 IE including standard factories is estimated to be JD 35.40 million, including JD 17.87 million for Phase 1, JD 8.60 million for Phase 2, and JD 8.93 million for Phase 3. The cost for external facilities to be borne by agencies other than JIEC is JD 6.34 million.

Summary of Investment Cost for A-2 IE (Including Tariff and Sales Tax)
(Unit: million JD)

	Phase 1	Phase 2	Phase 3	Total
1. Land acquisition cost	0.80	0.00	0.00	0.80
2. Construction cost	10.53	5.22	5.50	21.25
3. Engineering services cost	0.63	0.31	0.33	1.28
4. Administration cost	0.20	0.20	0.20	0.60
5. Contingency	1.71	0.86	0.90	3.47
Subtotal	13.87	6.60	6.93	27.40
6. Construction cost for standard factory buildings	4.00	2.00	2.00	8.00
I Investment cost for A-2 IE	17.87	8.60	8.93	35.40
II Investment cost for external facilities to be borne by agencies other than JIEC	6.34	0.00	0.00	6.34
Total	24.21	8.60	8.93	41.74

Breakdown of the construction cost is shown below.

Breakdown of A-2 IE Construction Cost (Including Tariff and Sales Tax)

(Unit: million JD)

	Phase 1			Phase 2			Phase 3			Total		
	Local Portion	Foreign Portion	Total	Local Portion	Foreign Portion	Total	Local Portion	Foreign Portion	Total	Local Portion	Foreign Portion	Total
Cut and fill	0.87	0.00	0.87	0.56	0.00	0.56	0.66	0.00	0.66	2.09	0.00	2.09
Earth dikes	0.12	0.00	0.12	0.00	0.00	0.00	0.05	0.00	0.05	0.17	0.00	0.17
Roads	1.34	0.00	1.34	0.17	0.00	0.17	0.18	0.00	0.18	1.69	0.00	1.69
Rainwater and drainage	0.58	0.00	0.58	0.17	0.00	0.17	0.19	0.00	0.19	0.94	0.00	0.94
Water supply	0.51	0.18	0.69	0.03	0.03	0.06	0.03	0.03	0.06	0.57	0.24	0.81
Sewage	1.00	1.46	2.46	0.84	1.45	2.29	0.87	1.40	2.27	2.71	4.31	7.02
Electricity	0.34	2.37	2.71	0.18	1.26	1.44	0.20	1.34	1.54	0.72	4.97	5.69
Telecommunications	0.10	0.23	0.33	0.02	0.03	0.05	0.02	0.03	0.05	0.14	0.29	0.43
Park	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23
Administration center	0.24	0.01	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.01	0.25
Others	0.53	0.42	0.96	0.20	0.28	0.48	0.22	0.28	0.50	0.95	0.98	1.93
Total	5.86	4.67	10.53	2.17	3.05	5.22	2.42	3.08	5.50	10.45	10.80	21.25

The estimated investment cost for the A-2 IE, less tariff, amounts to JD 32.60 million. By phase, the cost is JD 16.47 million for Phase 1, JD 7.92 million for Phase 2, and JD 8.21 million for Phase 3. The investment cost for external facilities to be borne by agencies other JIEC would be JD 4.87 million.

Summary of Investment Cost for A-2 IE (Excluding Tariff, Including Sales Tax)

(Unit: million JD)

Phase	Phase 1	Phase 2	Phase 3	Total
1. Land acquisition cost	0.80	0.00	0.00	0.80
2. Construction cost	9.55	4.75	4.99	19.29
3. Engineering services cost	0.57	0.28	0.30	1.15
4. Administration cost	0.20	0.20	0.20	0.60
5. Contingency	1.55	0.79	0.82	3.16
Subtotal	12.67	6.02	6.31	25.00
6. Construction cost for standard factory buildings	3.80	1.90	1.90	7.60
I Investment cost for A-2 IE	16.47	7.92	8.21	32.60
II Investment cost for external facilities to be borne by agencies other than JIEC	4.87	0.00	0.00	4.87
Total	21.34	7.92	8.21	37.47

A breakdown of the construction cost is shown below.

Breakdown of A-2 IE Construction Cost (Excluding Tariff, Including Sales Tax)

(Unit: million JD)

	Phase 1			Phase 2			Phase 3			Total		
	Local Portion	Foreign Portion	Total	Local Portion	Foreign Portion	Total	Local Portion	Foreign Portion	Total	Local Portion	Foreign Portion	Total
Cut and fill	0.87	0.00	0.87	0.56	0.00	0.56	0.66	0.00	0.66	2.09	0.00	2.09
Earth dikes	0.12	0.00	0.12	0.00	0.00	0.00	0.05	0.00	0.05	0.17	0.00	0.17
Roads	1.34	0.00	1.34	0.17	0.00	0.17	0.18	0.00	0.18	1.69	0.00	1.69
Rainwater and drainage	0.58	0.00	0.58	0.17	0.00	0.17	0.19	0.00	0.19	0.94	0.00	0.94
Water supply	0.51	0.16	0.67	0.03	0.03	0.06	0.03	0.03	0.06	0.57	0.21	0.78
Sewage	1.00	1.46	2.46	0.84	1.45	2.29	0.87	1.40	2.27	2.71	4.31	7.02
Electricity	0.34	1.58	1.92	0.18	0.85	1.03	0.20	0.89	1.09	0.72	3.32	4.04
Telecommunications	0.10	0.15	0.25	0.02	0.02	0.04	0.02	0.02	0.04	0.14	0.19	0.33
Park	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23
Administration center	0.24	0.01	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.01	0.25
Others	0.53	0.34	0.87	0.20	0.23	0.43	0.22	0.23	0.45	0.95	0.80	1.75
Total	5.86	3.69	9.55	2.17	2.58	4.75	2.42	2.57	4.99	10.45	8.84	19.29

2) O&M Cost

O&M cost was estimated in terms of the percentage of the construction cost as follows:

Component	% of Construction Cost
Flush Flood	1.0
Road	2.0
Drainage	1.0
Water supply	3.0
Sewerage	4.0
Electric facility	2.0
Telephone facility	2.0
Parks	2.0
Administration bldg.	1.0

(11) Institutional framework for execution and management of the industrial estate

1) Organization in charge of execution and management

JIEC is regarded as the most appropriate organization for execution of the industrial estate, considering its experiences and achievements in the development of industrial estates.

2) Division of responsibilities and cost sharing

Major task items related to the construction of facilities and their management, and division of responsibilities and cost sharing among relevant organizations are assumed to be shared by JIEC and other relevant agencies as shown in Table 6-3.

(12) Project evaluation

1) Financial evaluation

(a) Methodologies

The financial evaluation of the industrial development of the A-2 IE project was conducted from the point of view of JIEC, the expected executive agency of the project.

The capital cost of the Project was estimated by two ways: one is the cost including both the custom duty and sales tax and another including the sales tax only. This is due to the uncertainty that the custom duty to be levied on imported capital goods may or may not be exempted in the future stage of the project implementation. The FIRR of the project was computed for both the costs and the Sources-and-Uses-of-Funds Statement (Loan Repayability) of the project was prepared based on the former cost only.

Revenues to be accrued to JIEC comprise the revenue from selling and leasing the factory lots and from leasing the floor area of the standard factories to be built in the IE.

The selling price of the factory lots was set at JD25.0 /m² and the lease rate was set at one tenth of the selling price JD2.5 /m²/year in this study, considering the selling price of JD 20.0/m² in the Amman IE in Sahab and the expected locational conditions of A-2 around the year 2000 when the A-2 IE is to be completed, after discussion with JIEC.

(b) FIRR computation

Based on the cost and revenue stated above, the FIRR was calculated. It is noted that all the costs and revenues were estimated at 1996 current price level and the calculated FIRR is, therefore, in real terms.

The result of computation shows a FIRR of 7.8% for the cost including custom duty and sales tax and a FIRR of 9.1% for the cost including sales tax only.

(c) Sensitivity test of FIRRs

A sensitivity test was conducted for the derived two FIRRs by varying both the cost and benefit by 10%. The results are as shown below.

- For cost including custom duty and sales tax

	cost +10%	cost normal	cost -10%
benefit -10%	4.7	6.1	7.8
benefit normal	6.3	7.8	9.5
benefit +10%	7.8	9.3	11.1

- For cost including sales tax only

	cost +10%	cost normal	cost -10%
benefit -10%	5.9	7.4	9.1
benefit normal	7.5	9.1	10.8
benefit +10%	9.1	10.7	12.5

A case without constructing standard factories was compared by a case with standard factories for checking the influence of standard factories on the profitability of industrial estate. The result of the examination is as shown below.

	FIRR(w/c&t)	FIRR(w/t)
With S.Factory	7.8%	9.1%
Without S.Factory	7.2%	8.7%

Remarks: W/c&t: With custom duties and general sales tax.

W/t: With general sales tax and without custom duties.

(d) Sources-and-uses-of-funds statements

The sources-and-uses-of-funds statements were prepared as shown in Table 6-4 for the examination of the loan repayability of the A-2 IE project based on the costs with custom duty and sales tax. The evaluation period was set up to the year when the loan repayment will be completed. All the costs and revenues were

assumed to escalate at an annual rate of 5% for the local currency portion and 2% for the foreign currency portion. The O&M costs were assumed to be escalated by 5% p.a. assuming its majority is expended by local currency.

The sources of funds will be composed of a foreign loan, JIEC's own equity and revenues from the selling and leasing of the factory lots and standard factories. In preparing the said statements, it was assumed that a foreign loan will provide 85% of the total fund requirement including the interest during the grace period and the remaining 15% will be financed by JIEC's own fund. The foreign loan conditions were assumed as stated below:

- Term : 30 years including a grace period of 10 years
- Interest rate : 3.7% per annum

The selling price and lease rate of the factory lots and standard factory were assumed to be raised according to the general inflation rate of 5% per annum as assumed for local goods and services.

According to the table of the statement, the annual loan repayment can be done from the annual lease revenue and the repayment of the foreign loan will be finished in 2042 at the 47th year from the initiation of the A-2 IE project in 1996. As the statement shows at the column of current surplus, it is expected that there will be no years of deficit to JIEC caused by the A-2 IE project within the evaluation period.

(e) Conclusion of financial evaluation

According to the information obtained during the field survey, the lending rate in Jordan ranges from 9.0 to 10.0 % per annum in recent years. This rate could be considered as an indication of the opportunity cost of capital (OCC) in Jordan though the rate is inclusive of the expected inflation rate whereas OCC is in real term. In both cases, FIRR, which are calculated in real term, lie within this range. Together with the strong loan repayability, the A-2 IE project can be said as financially feasible.

2) Economic evaluation

(a) Benefit estimation

The economic evaluation of the A-2 IE project was conducted from the viewpoint of the Jordan's socio-economy as a whole. It was done by means of the following two criteria:

- Willingness -to-pay (WTP) approach
- Gross value added (GVA) approach

In the case of WTP approach, benefit attributable to the implementation of the IE project is calculated by means of the willingness-to-pay of the investors for acquiring the factory lots in the IE which could be measured by the competitive level of selling prices of factory lots. The selling prices of the factory lots should be internationally competitive to attract the foreign enterprises. Considering the current market prices of factory lots in several Asian countries shown in Table 6-5, the WTP index of factory lot in the A-2 IE for foreign investors was assumed at US\$ 35/m² (JD24.8/m²) in this study. The WTP index for Jordanian enterprises was assumed at the same level as that set for the financial evaluation, JD 25/m².

In the GVA approach, the value added generated through the implementation of the IE together with the construction of the factories is considered as economic benefit while on the cost side, the capital cost as well as production costs of the factories are added besides these of the IE.

(b) Economic cost

The economic cost of the A-2 IE project was estimated based on the financial cost including neither custom duty nor sales tax, with the following assumptions:

- The standard conversion factor of 0.9 was assumed in this study, following the practice of the World Bank in Jordan in recent years.
- The wage of unskilled labour was considered to be a half of the prevailing market wage rate since the opportunity cost of unskilled labour is considered low under the current 15% unemployment situation.

In the case of WTP approach, O&M costs for water supply, electricity and sewerage services are not considered because willingness-to-pay of the enterprises in the industrial estate for these services which can be measured in terms of water charges, etc., are not counted in this evaluation.

In this economic evaluation, the costs to be borne by the agencies other than JIEC such as NEPCO and WAJ were included since these are the costs committed to the A-2 IE project from the point of view of the national economy of Jordan.

(c) EIRR computation

In the case of the WTP approach, EIRR was estimated at 13.2% while that of GVA approach was estimated at 14.9%.

(d) Sensitivity test of EIRRs

A sensitivity test was conducted for the two (2) EIRRs computed in this Study by varying both the cost and benefit by 10%. The results are as shown below.

- For EIRR by WTP approach

	cost +10%	cost normal	cost -10%
benefit -10%	9.6	11.2	13.1
benefit normal	11.4	13.1	15.2
benefit +10%	13.1	15.0	17.2

For EIRR by GVA approach

	cost +10%	cost normal	cost -10%
benefit -10%	5.6	10.1	14.9
benefit normal	10.5	14.9	20.0
benefit +10%	14.9	19.5	24.9

(e) Conclusion of economic evaluation

According to the information obtained from reports prepared by the World Bank on development projects in Jordan, the opportunity cost of capital (OCC) in Jordan was estimated to be less than 10% in recent years. Considering this presumed value of OCC, both the two EIRRs computed through different methods in the present Study can be said to prove the economic feasibility of the A-2 IE project.

3) Other socio-economic impacts of the A-2 IE project

Besides the economic benefit which can be expressed in monetary terms, the following socio-economic benefits can be counted.

- During the IE construction period, some 14,000 jobs in total will be created including skilled and unskilled labour. The number of workers to be employed in the A-2 IE when it is fully developed is estimated to be about 17,700.

- Forward and backward linkage effects

The purchase of raw materials and various services to be required in operating factories in the industrial estate will expand the demand for local goods and services in the area. Demand for transportation of the products and the

transport-related repair and maintenance services will be generated in and around the IE.

- Increase in foreign exchange earnings

Being export-oriented IE, sizable foreign exchange earnings are expected which will contribute to the improvement of the trade imbalance of Jordan.

4) Social evaluation

Among the employment created by the A-2 IE project, the number of female employees was calculated at 731. These new employment opportunities in the manufacturing sector will surely promote women's participation in the society.

In Wadi Araba, there are about 5,100 Bedouins and most of them have settled down in six villages. Bedouin families graze livestock around their villages, and about 50-60 Bedouin households come to the A-2 site for grazing. The loss of grazing land by the establishment of the A-2 IE will have minimal impacts, however, to the Bedouin families, considering that the size of the IE is relatively small compared with the whole grazing area, and that ARA has already voiced their intention to provide a village with road, electricity and water supply outside the A-2 IE for the affected Bedouin households.

These days many Bedouin families choose to settle down and look for job opportunities. Employment opportunities to be created by the A-2 IE project might partly be taken by them.

5) Environmental evaluation

Various environmental impacts are expected to be given to the surrounding environment of the A-2 IE. Due mainly to the non-polluting characteristics of the industries to be located in the A-2 IE, no serious impacts are expected. To alleviate and minimize the possible impacts, the following measures are advised to be taken.

Summary of Impact Assessment and Proposed Mitigation Measures

Possible Impacts	Estimated Significance	Conditions, Mitigation Measures
Traffic increase on major roads	Possibly significant at limited locations	<ul style="list-style-type: none"> * Reinforcement of the existing road network including the new and upgraded by-pass roads to reach the A-1 IZ, not via Aqaba City. * Traffic control in the city center * Quantitative assessment and planning of traffic management
Disposal of solid wastes to the Municipal Waste Final Disposal Site	Possibly significant	<ul style="list-style-type: none"> * Preparation of improvement and expansion of the final disposal site * Cooperation of JIEC, ARA, GCEP and RSS in management of hazardous industrial waste * Formulation of a tentative local plan for hazardous waste management
Air pollution, odor, noise, vibration	Minimal	
Ground water and surface water pollution	Minimal	
Loss of flora and fauna	Minimal	

It should be noted, however, detailed environmental assessment be conducted to assess the impacts and to work out executive counter-measures before proceeding to the implementation of the A-2 IE.

6-1-2 Ma'an Industrial Estate: M-2

(1) Estimated investment demand and characteristics of M-2 Industrial Estate

According to the investment demand survey by the Study Team, it was estimated at 25.1 - 54.2 ha of factory lot area will be needed by the investors.

Investment demand survey also revealed that the M-2 IE should have the following characteristics.

- Jordanian investors being majority : About 91% of the total area of factory lots is for Jordanian investors and the rest for foreign investors.
- Clean industries : Industries for the M-2 IE are not categorized as polluting ones.
- Labor intensive and assembly / processing type : Labor intensive type (wearing apparel, leather products) and assembly / processing type (wood & cork furniture, glass & non-metal mineral, transport equipment) are expected to be located.

(2) Development area and categories of industries to be located and lot allocation

It is presumed that about 20% or 9.6 ha of the demanded area can be added to the demand identified by the investment demand survey.

Consequently, the net development area of the M-2 IE is estimated to be about 63.8 ha (gross area : 80 ha) as summarized by industrial category below.

Net Development Area for M-2 Industrial Estate

Industrial Category		Net Development Area(ha)	
Number of Factory Lot			
322	Wearing apparel	2.8 (4.4%)	14
323	Leather Products	25.0(39.2%)	5
331/332	Wood & Cork furniture	10.0(15.7%)	1
362/369	Glass & Non-metal mineral	20.0(31.3%)	18
384	Transport equipment	6.0 (9.4%)	6
Total		63.8(100.0%)	44

(3) Land use and land preparation

Land use of the M-2 IE has been planned following basically the concept similar to that for A-2 IE as shown in Figure 6-3. Planned area distribution of each land use category is shown below.

Land Use Plan of M-2 IE

	Area (ha)	(%)
1. Factory lot	63.8	79.8
2. Road	6.8	8.5
1) Main road (22.0m)	1.3	
2) Collector road (18.0m)	5.5	
3. Utility	2.1	2.6
1) Water supply facility	0.4	
2) Sewage treatment plant	1.2	
3) Electric facility	0	
4) Communication facility	0.5	
4. Administration center	1.4	1.8
5. Park	1.9	2.3
6. Others	4.0	5.0
1) Buffer zone (10.0m)	3.9	
2) Pedestrian (6.0m)	0.1	
Total	80.0	100.0

The land preparation plan is prepared based on the same assumptions as those for the A-2 IE. The cut volume will be 400,000 cubic meters, as shown below.

Earthwork Volume		(m ³)
Earth cut volume	400,000	
Earth fill volume	400,000	

(4) Administration center

The administration center will have the core IE facilities shown below.

Industrial Estate Administration Center Facilities Plan

	Floor Area	Land Area
1. Industrial estate administration building	600	3,500
2. Customs and police stations	120	
3. Business center (e.g., bank, post office)	300	
4. Business center (social security office, employment office, conference rooms, offices)	330	2,000
5. Restaurants, retail stores	250	
Subtotal	1,600	5,500
6. Hospital	-	1,000
7. Other facilities	-	4,500
8. Parking lots	-	3,000
Total	1,600	14,000

(5) Requirement for utilities/infrastructures

1) Drainage

It was planned that the drainage facilities should be able to drain the rain water with the intensity of 7.9 mm/h with the return period of 10 years.

2) Water supply

Using similar method applied to the A-2 IE, it is assumed that the water demand per site area in the M-2 IE will be 70 m³/ha/day, and that the total water demand including the demand for an administration center will be 4,500 m³/day,

3) Sewerage

The planned treated water volume is 4,500 m³ per day, which is equivalent to the consumption volume.

4) Electricity

Estimated on the basis of the unit demand of 268 kW/ha for factories, the total power demand for the M-2 IE would be around 18 MW.

5) Telecommunications

Total telecommunication demand for the M-2 IE was estimated to be around 250 lines.

(6) Preliminary design/principal dimensions of the utilities/infrastructures

1) Drainage

The rainwater draining facility was planned to have the following features:

- U-section flumes (Size 400 mm x 400 mm - 500 mm x 500 mm), total length 4,490 m
- Concrete pipe (700 mm -800 mm in diameter), total length 900 m

2) Water supply

The conveyance pipes, reservoir, elevated tank and distributing pipes were planned with the following dimensions:

- Construction of new well 1
- Conveyance pipes 250 mm diameter cast iron pipe
total length 12,200 m
- Reservoir capacity 4,500 m³
- Elevated tank capacity 95 m³
- Distributing pipes
50 mm - diameter polyethylene pipe total length 110 m
75 mm to 500 mm diameter cast iron pipe total length 3,460 m

3) Sewerage

The treatment system was planned to have the following features:

- Sewage treatment plant 4,500 m³
- Sewerage pipes 200 m to 500 mm diameter concrete pipe
total length 2,990 m

4) Electricity

New 33 kV distribution lines were planned to be installed connecting to 33 kV indoor switchgear at the Ma'an Substation by double circuits. The Ma'an substation should be expanded to have 2 feeders at the existing 33 kV switchgear and the existing two transformers be replaced by two new 63 MVA transformers. A 33 kV distribution system was planned to be constructed to feed power from the new 33 kV distribution line to the factories and users located in the M-2 IE.

5) Telecommunications

It is planned to install new optical fiber cable line to ensure telecommunication service between the Ma'an exchange station and the M-2 IE. A new telephone exchange facility (Remote Line Unit (RLU)) is planned to be installed within the M-2 IE. RLU will be connected to the Ma'an exchange station by an optical fiber cable line.

In the IE, some Splice Boxes (SB) will be installed on the sidewalks and connected to the new RLU by metallic telephone cable lines so that subscribers can easily be connected to SB at any time.

(7) Implementation schedule

The project completion was assumed to be at the end of 2005, and the commission at the beginning of 2006.

(8) Investment cost

The investment cost of the M-2 IE was estimated to be JD 11.69 million. The cost for external facilities to be borne by agencies other than JIEC is JD 3.38 million.

**Summary of Investment Cost for M-2 IE
(Including Tariff and Sales Tax)
(Unit: Million JD)**

	Cost
1. Land acquisition cost	0.12
2. Construction cost	9.30
3. Engineering service cost	0.56
4. Administration cost	0.20
5. Contingency cost	1.51
I. Investment cost for M-2 IE(1+2+3+4+5)	11.69
II. Investment cost for external facilities to be borne by agencies other than JIEC	3.38
Total	15.07

Breakdown of the construction cost is shown below.

**Breakdown of M-2 IE Construction Cost
(Including Tariff and Sales Tax)
(Unit: Million JD)**

	Local Portion	Foreign Portion	Total
Cut and fill	0.60	0.00	0.60
Flash Flood	0.00	0.00	0.00
Road	0.61	0.00	0.61
Drainage	0.15	0.00	0.15
Water supply	0.32	0.13	0.45
Sewerage	1.41	2.34	3.75
Electric facility	0.32	2.09	2.41
Telephone facility	0.09	0.12	0.21
Park	0.13	0.00	0.13
Administration center	0.14	0.01	0.15
Miscellaneous	0.38	0.47	0.85
Total	4.15	5.16	9.30

The investment cost for the M-2 IE, less tariff, falls to JD 10.69 million. The investment cost for external facilities to be borne by agencies other than JIEC would be JD 2.55 million.

**Summary of Investment Cost for M-2 IE
(Excluding Tariff, Including Sales Tax)
(Unit: Million JD)**

	Cost
1. Land acquisition cost	0.12
2. Construction cost	8.48
3. Engineering service cost	0.51
4. Administration cost	0.20
5. Contingency cost	1.38
I. Investment cost for M-2 IE (1+2+3+4+5)	10.69
II. Investment cost for external facilities to be borne by agencies other than JIEC	2.55
Total	13.24

Breakdown of the construction cost is shown below.

**Breakdown of M-2 IE Construction Cost
(Excluding Tariff, Including Sales Tax)
(Unit: Million JD)**

	Local Portion	Foreign Portion	Total
Cut and fill	0.60	0.00	0.60
Flash Flood	0.00	0.00	0.00
Road	0.61	0.00	0.61
Drainage	0.15	0.00	0.15
Water supply	0.32	0.12	0.44
Sewerage	1.41	2.34	3.75
Electric facility	0.32	1.39	1.71
Telephone facility	0.09	0.08	0.17
Park	0.13	0.00	0.13
Administration center	0.14	0.01	0.15
Miscellaneous	0.38	0.39	0.77
Total	4.15	4.33	8.48

(9) Institutional framework for execution and management of the industrial estate

As the execution and management body of the industrial estate, JIEC is regarded to be the most appropriate organization for its experiences and achievement of development of industrial estates.

Division of responsibilities and cost bearing among relevant organizations for major task items related to construction and management of facilities are in a similar way to the

A-2 IE except that roles of ARA in the A-2 IE should be played by relevant utility agencies or local governments.

The indicative number of staff for administration of the estate was estimated to be approximately 20.

(10) Project evaluation

1) Financial and economic evaluation

Considering the locational conditions of the M-2 site as well as the scale of the demand of the potential investors confirmed through the investment demand survey by the Study, the selling price of the factory lots of the M-2 IE was assumed at JD20/m² and leasing rate at JD2.0/m² or 20% less than these set for the A-2 IE.

Calculated FIRR are 1.5% for the cost including custom duty and sales tax and 3.1% for the cost including sales tax only which are below the desirous range from 5 to 10%. The figures would be upgraded to exceed 5% if the benefit is increased by 10% and at the same time the cost is reduced by 10% for the cost including custom duty and sales tax. For the cost including sales tax only, the figure would exceed 5% if the benefit is increased by 10% or the cost is reduced by 10%.

Adopting the selling price set for financial evaluation, i.e., JD20/m² as unit benefit per factory lot, EIRR was calculated at 6.3%, falling in the desirous range from 5 to 10%.

2) Socio-economic and environmental evaluation

When all the lots are either sold or leased to the investors and the factories come into full operation, about 4,530 workers will be employed in the IE, contributing to the upgrading of the socio-economic conditions in the area. From environmental viewpoint, no serious or irreversible impact is expected through the implementation of the M-2 IE project.

3) Overall evaluation

EIRR indicates the possibility of economic feasibility of the M-2 IE project. FIRR could fall in the desirous range if cost is reduced by 10% and benefit is increased by 10%.

It is recommended that detailed analyses be made both on the possibility of construction cost reduction and benefit increase. It is also recommended that the industrial development including the construction of the recommended the A-2 IE in Aqaba be closely monitored and decision be made whether or not the M-2 IE be implemented together with its timing for implementation, considering the function of Ma'an for supporting Aqaba and their close industrial linkage expected in the coming years.

6-1-3 Tafila Industrial Estate: T-2

(1) Estimated investment demand of T-2 Industrial Estate

Taking economic efficiency into account, the development of the T-2 IE is expected in a long term in order to utilize the land of Al Hasa mine and the existing facilities although prospective investors for the T-2 IE is nil at present.

(2) Development area and categories of industries to be located and lot allocation

As for the T-2 IE, industrial categories to be located is proposed on the basis of the following criteria since the prospective investors for the T-2 IE site is zero at present due to the long-term perspective for implementation.

- Appropriate category of industries for the utilization of adequate water and other locational advantages of the T-2 site, and
- Industrial categories to be attracted for the M-2 IE site in consideration of its similar locational conditions as the T-2 IE site.

Consequently, the net development area of the T-2 IE is estimated to be about 67.2 ha (gross area : 80 ha) as shown below.

Net Development Area for T-2 Industrial Estate

Industrial Category		Net Development Area(ha)	
Number of Factory Lot			
311/312	Food manufacturing	6.0 (8.9%)	6
313	Beverage	18.0(26.8%)	6
321	Textile	2.4 (3.6%)	6
322	Wearing apparel	1.2 (1.8%)	6
323	Leather Products	1.2 (1.8%)	6
331/332	Wood & Cork furniture	2.4 (3.6%)	6
351	Chemical	12.0(17.8%)	6
362/369	Glass & Non-metal mineral	18.0(26.8%)	18
384	Transport equipment	6.0 (8.9%)	6
Total		67.2(100.0%)	66

(3) Land use and land preparation

The land use plan for the T-2 IE is illustrated in Figure 6-4 and the planned area distribution of each land category is shown below.

Land Use Plan of T-2 IE

	Area (ha)	(%)
1. Factory lot	67.2	84.0
2. Road	5.3	6.6
1) Main road (22.0m)	1.5	
2) Collector road (18.0m)	3.8	
3. Utility	2.2	2.8
1) Water supply facility	0.4	
2) Sewage treatment plant	1.4	
3) Electric facility	0	
4) Communication facility	0.4	
4. Administration center	1.2	1.5
5. Park	0.9	1.1
6. Others	3.2	4.0
1) Buffer zone (10.0)	3.0	
2) Pedestrian (6.0m)	0.2	
Total	80.0	100.0

The land preparation plan is prepared based on the same assumptions as those for the A-2 IE. The cut volume will be 400,000 cubic meters, as shown below.

Earthwork Volume

	(m ³)
Earth cut volume	400,000
Earth fill volume	400,000

(4) Administration center

The administration center will have the core IE facilities shown below.

Industrial Estate Administration Center Facilities Plan

	Floor Area	Land Area
1. Industrial estate administration building	600	} 3,500
2. Customs and police stations	120	
3. Business center (e.g., bank, post office)	300	
4. Business center (social security office, employment office, conference rooms, offices)	330	} 2,000
5. Restaurants, retail stores	250	
Subtotal	1,600	5,500
6. Hospital	-	1,000
7. Other facilities	-	3,500
8. Parking lots	-	2,000
Total	1,600	12,000

(5) Requirement for utilities/infrastructures

1) Drainage

It was planned that the drainage facilities should be able to drain the rain water with the intensity of 12.8 mm/h with the return period of 10 years.

2) Water supply

Using similar method applied to the A-2 IE, it was assumed that the water demand per site area in the T-2 IE will be 80 m³/ha/day, and that the total water demand including the demand for an administration center will be 5,400 m³/day.

3) Sewerage

The planned treated water volume is 5,400 m³ per day, which is equivalent to the consumption volume.

4) Electricity

Estimated on the basis of the unit demand of 320 kW/ha for factories, the total power demand for the T-2 IE would be around 23 MW.

5) Telecommunications

Total telecommunication demand for the T-2 IE was estimated to be around 320 lines.

(6) Preliminary design/principal dimensions of the utilities/infrastructures

1) Drainage

The rainwater draining facility is planned to have the following features:

- U-section flumes 400 mm x 400 mm - 500 mm x 500 mm, total length 3,370 m
- Concrete pipe Inner diameter 700 mm -900 mm, total length 1,570 m
- Box culvert 1000 mm x 1000 mm, total length 90 m

2) Water supply

The conveyance pipes, reservoir, elevated tank and distributing pipes are planned with the following features:

- Conveyance pipes 250 mm diameter cast iron pipe total length 3,800 m
- Reservoir capacity 5,400 m³
- Elevated tank capacity 115 m³
- Distributing pipes
 - 50 mm diameter polyethylene pipe total length 120 m
 - 75 mm to 500 mm diameter cast iron pipe total length 3,160 m

3) Sewerage

The sewerage system was planned to have the following features:

- Sewage treatment plant 5,400 m³/day
- Sewerage pipes 200 m - 500 mm diameter concrete pipe total length 2,970 m

4) Electricity

New 33 kV distribution lines were planned to be constructed and connected to 33 kV indoor switchgear at the Al Hasa Substation by double circuits. Al Hasa

substation should be expanded to have 2 feeders at the existing 33 kV switchgear and be replaced by the existing two transformers with new 63 MVA transformers. If the T-2 IE is developed after the Al Hasa mine is closed, Al Hasa Substation expansion will not be necessary. A 33 kV distribution system is planned to be constructed to feed power from the new 33 kV distribution lines to the factories and users to be located in the T-2 IE.

5) Telecommunications

It was planned to install new optical fiber cable line to ensure telecommunication service between the Al Hasa RLU station and the T-2 IE. A new telephone exchange facility (Remote Line Unit (RLU)) was planned to be installed within the T-2 IE. RLU will be connected to the Al Hasa RLU station by an optical fiber cable line.

In the IE, some Splice Boxes (SB) will be installed on the sidewalks and connected to the new-RLU by metallic telephone cable lines so that subscribers can easily be connected to SB at any time.

(7) Implementation schedule

The project completion is assumed to be at the end of 2010, and the commission at the beginning of 2011.

(8) Investment cost

The investment cost of the T-2 IE was estimated to be JD 12.94 million. The cost for external facilities to be borne by agencies other than JIEC is JD 2.13 million.

Summary of Investment Cost for T-2 IE (Including Tariff and Sales Tax)

(Unit: Million JD)

	Cost
1. Land acquisition cost	0.12
2. Construction cost	10.33
3. Engineering service cost	0.62
4. Administration cost	0.20
5. Contingency cost	1.67
I. Investment cost for T-2 IE (1+2+3+4+5)	12.94
II. Investment cost for external facilities to be borne by agencies other than JIEC	2.13
Total	15.09

Breakdown of the construction cost is shown below.

**Breakdown of T-2 IE Construction Cost
(Including Tariff and Sales Tax)
(Unit: Million JD)**

	Local Portion	Foreign Portion	Total
Cut and fill	0.60	0.00	0.60
Flash Flood	0.00	0.00	0.00
Road	0.55	0.00	0.55
Drainage	0.21	0.00	0.21
Water supply	0.33	0.11	0.44
Sewerage	1.64	2.81	4.45
Electric facility	0.38	2.30	2.68
Telephone facility	0.10	0.15	0.25
Park	0.06	0.00	0.06
Administration center	0.14	0.01	0.15
Miscellaneous	0.40	0.54	0.94
Total	4.41	5.92	10.33

The investment cost for the T-2 IE, less tariff, falls to JD 11.83 million. The investment cost for external facilities to be borne by agencies other than JIEC would be JD 1.53 million.

**Summary of Investment Cost for T-2 IE
(Excluding Tariff, Including Sales Tax)
(Unit: Million JD)**

	Cost
1. Land acquisition cost	0.12
2. Construction cost	9.42
3. Engineering service cost	0.56
4. Administration cost	0.20
5. Contingency cost	1.53
I. Investment cost for T-2 IE (1+2+3+4+5)	11.83
II. Investment cost for external facilities to be borne by agencies other than JIEC	1.53
Total	13.36

Breakdown of the construction cost is shown below.

Breakdown of T-2 IE Construction Cost
(Excluding Tariff, Including Sales Tax)
(Unit: Million JD)

	Local Portion	Foreign Portion	Total
Cut and fill	0.60	0.00	0.60
Flash Flood	0.00	0.00	0.00
Road	0.55	0.00	0.55
Drainage	0.21	0.00	0.21
Water supply	0.33	0.10	0.43
Sewarage	1.64	2.81	4.45
Electric facility	0.38	1.53	1.91
Telephone facility	0.10	0.10	0.20
Park	0.06	0.00	0.06
Administration center	0.14	0.01	0.15
Miscellaneous	0.40	0.46	0.86
Total	4.41	5.01	9.42

(9) Institutional framework for execution and management of the industrial estate

As the execution and management body of the T-2 IE, JIEC is regarded to be the most appropriate organization for its experiences and achievement of development of IE. Close cooperation between JIEC and Jordan Phosphate Mines Company (JPMC) is indispensable for the utilization of the existing facilities of the Al Hasa mine.

Division of responsibilities and cost bearing among relevant organizations for major task items related to construction and management of facilities are in a similar way to the A-2 IE except that roles of JPMC are important instead of ARA.

The indicative number of staff for administration of the IE is estimated to be approximately 20.

(10) Project evaluation

1) Financial and economic evaluation

Considering the locational conditions of the T-2 site, the selling price of the factory lots was assumed at JD15/m² and the leasing rate at JD1.5/m² or 40% less than these set for the A-2 IE.

Under the above price and leasing rates, no positive FIRR value can be obtained. In the case the same selling and leasing rates are applied to the T-2 IE as these for the A-2, FIRR of 5.2% is obtained for the cost including custom duty and sales tax while 7.0% for the cost including sales tax only. In order to obtain 10% of FIRR, selling

price should be set at JD30.6/m² for the cost including custom duty and sales tax and JD28.1/m² for the cost including sales tax only.

Adopting the selling price set for financial evaluation, i.e., JD15/m² as unit benefit per factory lot, EIRR was calculated at 2.0% which is lower than the desirous range from 5 to 10%.

2) Socio-economic and environmental evaluation

When all the lots are either sold or leased to the investors and the factories come into full operation, about 4,020 workers will be employed in the IE, contributing to the upgrading of the socio-economic conditions in the area. From environmental viewpoint, no serious or irreversible impact is expected through the implementation of the T-2 IE project.

6-2 Karak Industrial Estate for Regional Development: K-3

(1) Estimated investment demand through JICA investment demand survey

According to the investment demand survey by the Study, it was estimated at 5.8 - 11.6 ha of factory lot will be needed by the investors.

Investment demand survey also revealed that the K-3 IE has the following characteristics.

- Foreign investors being majority : About 86% of total area of factory lots is for Foreign investors and the rest for local investors.
- Clean industries : Industries are not polluting ones.
- Labor intensive and assembly / processing type : Labor intensive type (wearing apparel) and assembly / processing type (glass & non-metal mineral, iron & steel casting) are expected to be located.

(2) Role of K-3 development and supporting measures

In the investment demand survey carried out in the Study, demand for the K-3 IE is limited magnitude. However, if substantial measures are taken to upgrade the investment environment both in terms of infrastructure and institutional framework, development of an industrial estate could be an option. Specific measures / actions are suggested hereunder.

1) Upgrading of transport infrastructure

A plan has been formulated for upgrading the road network in Karak Governorate which would provide a better access from Karak City to the Desert Highway as well as to the Amman capital region. The planned road would run partly in parallel with the existing RN 50 and partly utilizing the existing route, with 4 lanes of improved alignment. The project comprises three phases, and is intended to be completed within 5 years. Though the first phase has already been initiated, starting from the junction with the Desert Highway, implementation of the subsequent two phases are waiting for finance arrangement.

It is very much desirable that the road project be completed which would enhance the accessibility of Karak both to Amman and Aqaba and thereby increase the investment demand.

2) Institutional measures

The following institutional measures or provision of additional incentives are advisable to be given to the investors to be located in the K-3 IE.

(a) Low lease rate / selling price

Lease rate / selling price of the factory lots and standard factories for the K-3 IE should be substantially lower than for the IEs in the capital region in order to compensate the inferior locational conditions relative to the capital region.

(b) Initial exemption of lease rate

To help the located enterprises financially during the initial period of their business, lease payment should be exempted for several years.

(c) Exemption of corporate income tax

It has been proposed in the Study that the current income tax exemption period of 2 years be extended to 5 years, which is applicable to the industries (enterprises) located in IEs implemented and managed by JIEC. It is also proposed that under the Investment Promotion Law, Zone D, under which Karak is categorized, should newly be set up where 15 years of tax exemption be provided for the located industries. All these materialized, the industries located in the K-3 IE to be implemented by JIEC would enjoy the 20 years of income tax exemption.

3) Profitability / cost recovery policy

(a) Improvement of profitability of the K-3 IE project

Although stimulating industrial activities are of vital importance for the regional development of Karak, low lease rate / selling price of the factory lots would essentially affect the financial viability of the K-3 IE project. With a view to alleviate it, the following measures might be advisable to be considered.

- a) To construct the external infrastructure / utilities facilities to be provided for the IE at the expense of the Government, and
- b) To exempt the machinery and equipment to be installed in the IE for JIEC from taxes in the similar manner to those for the industries to be located in JIEC's IEs.

(b) Policy measures

It might be an essential condition that JIEC adopt "overall self-supporting policy" rather than self-supporting principle for each IE project.

4) Development condition of the K-3 IE

If the K-3 IE should be materialized, it may be advisable to take consideration for the followings.

- (a) Phased development, keeping in step with the realization of stronger incentives for the investors and improvement of infrastructure, road link in particular,
- (b) Conservation of groundwater environment at Lajun area, and
- (c) Oil shale development at Lajun area

(3) Development area and categories of industries to be located and lot allocation

It is presumed that about 20% or 2.2 ha of the demanded area can be added to the demand identified by the investment demand survey, in consideration of unidentified demand from countries not covered by the survey.

Moreover, in consideration of special incentives granted to the K-3 IE and upgrading the investment environment both in terms of infrastructure and institutional framework, it was assumed that the total net factory lot area would reach 16.0 - 27.6 ha, which is twice

a combined area of the demand identified by the survey and 20% addition for the unidentified demand, namely 8.0 - 13.8 ha.

Consequently, the net development area of the K-3 IE is presumed to be about 28 ha (gross area : 35 ha) as summarized by industrial category below.

Net Development Area for K-3 Industrial Estate

Industrial Category		Net Development Area(ha)	
Number of Factory Lot			
322	Wearing apparel	24.0 (87.0%)	12
351	Chemical	1.2 (4.3%)	6
362/369	Glass & Non-metal mineral	0.4 (1.4%)	2
381	Fabricated metal	2.0 (7.3%)	2
Total		27.6(100.0%)	22

(4) Land use and land preparation

The land use plan for the K-3 IE is illustrated in Figure 6-5 and the planned area distribution of each land use category is shown below.

Land Use Plan of K-3 IE

	Area (ha)	(%)
1. Factory lot	27.6	78.9
2. Road	2.5	7.1
1) Main road (22.0m)	0.8	
2) Collector road (18.0m)	1.7	
3. Utility	1.0	2.9
1) Water supply facility	0.1	
2) Sewage treatment plant	0.5	
3) Electric facility	0	
4) Communication facility	0.4	
4. Administration center	0.6	1.7
5. Park	1.1	3.1
6. Others	2.2	6.3
1) Buffer zone (10.0m)	2.1	
2) Pedestrian (6.0m)	0.1	
Total	35.0	100.0

The land preparation plan is based on the same assumptions as those for the A-2 IE. The cut volume will be 640,000 cubic meters, as shown below.

Earthwork Volume	
	(m ³)
Earth cut volume	640,000
Earth fill volume	640,000

(5) Administration center

The administration center will have the core IE facilities shown below.

Industrial Estate Administration Center Facilities Plan		
	Floor Area	Land Area
1. Industrial estate administration building	200	1,300
2. Customers and police stations	100	
3. Business center (e.g., bank, post office)	150	
4. Business center (social security office, employment office, conference rooms, offices)	150	700
5. Restaurants, retail stores	100	
Sub total	700	2,000
6. Hospital	-	500
7. Other facilities	-	1,500
8. Parking lots	-	1,000
Total	700	5,000

(6) Requirement for utilities/infrastructures

1) Drainage

It was planned that the drainage facilities should be able to drain the rain water with the intensity of 21.0 mm/h with the return period of 10 years.

2) Water supply

Using similar method applied to the A-2 IE, it was assumed that the water demand per site area in the K-3 IE will be 20 m³/ha/day, and that the total water demand including the demand for an administration center will be 560 m³/day.

3) Sewerage

The planned treated water volume is 560 m³ per day, which is equivalent to the consumption volume.

4) Electricity

Estimated on the basis of the unit demand of 320 kW/ha for factories, the total power demand for the K-3 IE would be around 10 MW.

5) Telecommunications

Total telecommunication demand for the K-3 IE was estimated to be around 140 lines.

(7) Preliminary design/principal dimensions of the utilities/infrastructures

1) Drainage

The rainwater draining facility was planned to have the following features:

- U-section flumes (Size 400 mm x 400 mm - 500 mm x 500 mm), total length 880 m
- Concrete pipe (300 mm - 1,000 mm in diameter), total length 540 m
- Box culvert (Size 1000 mm x 1000 mm - 1,500 mm x 1,500 mm), total length 410 m

2) Water supply

The conveyance pipes, reservoir, elevated tank and distributing pipes are planned with the following dimension:

- | | |
|--|--------------------------------|
| - Conveyance pipes | 100 mm diameter cast iron pipe |
| | total length 190 m |
| - Reservoir | 560 m ³ |
| - Elevated reservoir | 15 m ³ |
| - Distributing pipes /day | |
| 50 mm diameter polyethylene pipe | total length 100 m |
| 75 mm - 500 mm diameter cast iron pipe | total length 1,710 m |

3) Sewerage

The sewerage system was planned to have the following features:

- | | |
|--------------------------|---------------------------------------|
| - Sewage treatment plant | 560 m ³ /day |
| - Sewerage pipes | 200 m - 250 mm diameter concrete pipe |
| | total length 960 m |

4) Electricity

The new 33 kV distribution lines were planned to be laid to connect with a 33 kV indoor switchgear at Karak Substation by single circuit. The Karak Substation will be necessary to be expanded to have an additional feeder at the existing 33 kV switch gear. A 33 kV distribution system was planned to be constructed to feed power from the new 33 kV distribution lines to the factories and users to be located in the K-3 IE.

5) Telecommunications

It was planned to install new optical fiber cable line to ensure telecommunication service between the Karak exchange station and the K-3 IE. A new telephone exchange facility (Remote Line Unit (RLU)) was planned to be installed within the K-3 IE. RLU will be connected to the Karak exchange station by an optical fiber cable line.

In the IE, some Splice Boxes (SB) will be installed on the sidewalks and connected to the new RLU by metallic telephone cable lines so that subscribers can easily be connected to SB at any time.

(8) Implementation schedule

The project completion was assumed to be at the end of 2005, and the commission at the beginning of 2006.

(9) Investment cost

The investment cost has been estimated basically following the same assumptions as those for the A-2 IE except the two assumptions given below.

- 1) Earth cutting and filling; Many boulders have been observed in the K-3 IE site necessitating some ripper works, resulting in higher unit cost for cutting and fitting.
- 2) Utilities; Since the area of the K-3 IE is small (35 ha) compared to the A-2 IE and the other two, the per unit construction cost for the utilities should be higher.

The investment cost of the K-3 IE was estimated to be JD 6.29 million. The cost for external facilities to be borne by agencies other than JIEC is JD 1.63 million.

**Summary of Investment Cost for K-3 IE
(Including Tariff and Sales Tax)
(Unit: Million JD)**

	Cost
1. Land acquisition cost	0.05
2. Construction cost	4.93
3. Engineering service cost	0.30
4. Administration cost	0.20
5. Contingency cost	0.81
I. Investment cost for K-3 IE (1+2+3+4+5)	6.29
II. Investment cost for external facilities to be borne by agencies other than JIEC	1.63
Total	7.92

Breakdown of the construction cost is shown below.

**Breakdown of K-3 IE Construction Cost
(Including Tariff and Sales Tax)
(Unit: Million JD)**

	Local Portion	Foreign Portion	Total
Cut and fill	1.60	0.00	1.60
Flash flood	0.00	0.00	0.00
Road	0.28	0.00	0.28
Drainage	0.12	0.00	0.12
Water supply	0.09	0.02	0.11
Sewerage	0.27	0.45	0.72
Electric facility	0.21	1.09	1.30
Telephone facility	0.09	0.13	0.22
Park	0.08	0.00	0.08
Administration center	0.05	0.00	0.05
Miscellaneous	0.28	0.17	0.45
Total	3.07	1.86	4.93

The investment cost for the K-3 IE, less tariff, falls to JD 5.74 million. The investment cost for external facilities to be borne by agencies other than JIEC would be JD 1.19 million.

**Summary of Investment Cost for K-3 IE
(Excluding Tariff, Including Sales Tax)
(Unit: Million JD)**

	Cost
1. Land acquisition cost	0.05
2. Construction cost	4.48
3. Engineering service cost	0.27
4. Administration cost	0.20
5. Contingency cost	0.74
I. Investment cost for K-3 IE (1+2+3+4+5)	5.74
II. Investment cost for external facilities to be borne by agencies other than JIEC	1.19
Total	6.93

Breakdown of the construction cost is shown below.

**Breakdown of K-3 IE Construction Cost
(Excluding Tariff, Including Sales Tax)
(Unit: Million JD)**

	Local Portion	Foreign Portion	Total
Cut and fill	1.60	0.00	1.60
Flash flood	0.00	0.00	0.00
Road	0.28	0.00	0.28
Rainwater and drainage	0.12	0.00	0.12
Water supply	0.09	0.01	0.10
Sewerage	0.27	0.45	0.72
Electric facility	0.21	0.73	0.94
Telephone facility	0.09	0.09	0.18
Park	0.08	0.00	0.08
Administration center	0.05	0.00	0.05
Miscellaneous	0.28	0.13	0.41
Total	3.07	1.41	4.48

(10) Institutional framework for execution and management of the industrial estate

As the execution and management body of the K-3 IE, JIEC is regarded to be the most appropriate organization because of the highly public nature of the IE as an engine to promote industrial development for the region as well as the organization's experiences and achievement of development of IE.

Division of responsibilities and cost bearing for major task items related to construction and management of facilities are regarded to be similar to those of the other planned IEs.

To attract a sufficient number of investors and to successfully operate the IE, support from relevant public organizations is a key.

The indicative number of staff for administration of the IE is estimated to be approximately 10.

(11) Project evaluation

1) Financial and economic evaluation

Considering the locational conditions of the K-3 site, the selling price of the factory lots was assumed at JD15/m² and the leasing rate at JD1.5/m² or 40% less than these set for the A-2 IE.

Under the above price and leasing rates, no positive FIRR value can be obtained. In the case the same selling and leasing rates are applied to the K-3 IE as these for the A-2, FIRR of 2.6% is obtained for the cost including custom duty and sales tax while 4.1% for the cost including sales tax only. In order to obtain 10% of FIRR, selling price should be set at JD35.2/m² for the cost including custom duty and sales tax and JD33.0/m² for the cost including sales tax only.

Adopting the selling price set for financial evaluation, i.e., JD15/m² as unit benefit per factory lot, EIRR was calculated at 0.2% which is much lower than the desirous range from 5 to 10%.

2) Socio-economic and environmental evaluation

When all the lots are either sold or leased to the investors and the factories come into full operation, about 5,360 workers will be employed in the IE, contributing to the upgrading of the socio-economic conditions in the area. From environmental viewpoint, no serious or irreversible impact is expected through the implementation of the K-3 IE project.

Table 6-1 Estimated Area of Investment Demand for A-2 Industrial Estate

Nationality of Enterprises	Ser.No.	ISIC	Description of ISIC	Existing Location	Current Factory Lot Area (ha)	Expected Factory Lot Area (ha)	Expansion Coefficient	Preferred IE Type	Estimated Factory Lot Area (ha)	Number of Factory Lot
Jordan	A189	311	Food manufacturing	Aqaba	0.02	0.2-0.4	1	-	0.2-0.4	1
Jordan	A195	311	Food manufacturing	Aqaba	0.02	less than 0.2	1	-	0.1-0.2	1
Jordan	A196	311	Food manufacturing	Aqaba	0.01	0.5-0.9	1	-	0.5-1.0	1
Jordan	S086	311	Food manufacturing	Aqaba	0.03	less than 0.2	1	-	0.1-0.2	1
Jordan	A197	322	Wearing Apparel	Aqaba	0.01	less than 0.2	1	-	0.1-0.2	1
Jordan	A198	322	Wearing Apparel	Aqaba	0.01	less than 0.2	1	-	0.1-0.2	1
Jordan	A200	322	Wearing Apparel	Aqaba	0.05	less than 0.2	1	-	0.1-0.2	1
Jordan	S087	331	Wood & Cork Furniture	Aqaba	0.04	0.2-0.4	1	-	0.2-0.4	1
Jordan	A185	342	Printing	Aqaba	0.01	0.5-0.9	1	-	0.5-1.0	1
Jordan	A202	342	Printing	Aqaba	0.02	less than 0.2	1	-	0.1-0.2	1
Jordan	A150	369	Glass & Non-Metal Mineral	Amman	0.3	-	7	-	1.4-2.8	7
Jordan	A242	369	Glass & Non-Metal Mineral	Aqaba	0.2	0.2-0.4	1	-	0.2-0.4	1
Jordan	S092	369	Glass & Non-Metal Mineral	Aqaba	0.4	0.5-0.9	1	-	0.5-1.0	1
Jordan	A192	381	Fabricated Metal	Aqaba	0.01	less than 0.2	1	-	0.1-0.2	1
Jordan	A201	381	Fabricated Metal	Aqaba	0.02	less than 0.2	1	-	0.1-0.2	1
Jordan	A241	381	Fabricated Metal	Aqaba	0.06	less than 0.2	1	-	0.1-0.2	1
Jordan	A246	381	Fabricated Metal	Aqaba	0.04	-	1	-	0.1-0.2	1
Jordan	S093	381	Fabricated Metal	Aqaba	0.04	less than 0.2	1	-	0.1-0.2	1
Jordan	S094	381	Fabricated Metal	Aqaba	0.01	less than 0.2	1	-	0.1-0.2	1
Jordan	S095	381	Fabricated Metal	Aqaba	0.02	less than 0.2	1	-	0.1-0.2	1
Jordan	S097	381	Fabricated Metal	Aqaba	0.01	less than 0.2	1	-	0.1-0.2	1
Jordan	S098	381	Fabricated Metal	Aqaba	0.03	less than 0.2	1	-	0.1-0.2	1
Jordan	O010	381	Fabricated Metal	Amman	0.6	1.0-1.9	9	-	9.0-18.0	9
Jordan	O012	381	Fabricated Metal	Amman	0.4	0.5-0.9	9	-	4.5-9.0	9
Jordan	S046	383	Electrical Machinery	Amman	0.3	0.2-0.4	3	-	0.6-1.2	3
Jordan	S067	383	Electrical Machinery	Amman	0.4	1.0-1.9	3	-	3.0-6.0	3
Sub-Total									22.1-44.2	52
Saudi Arabia	7005	311	Food manufacturing	Saudi Arabia	-	more than 100 ha	1	GIE	10.0	1
Israel	6003	322	Wearing apparel	Israel	-	less than 0.2	4	GIE	0.4-0.8	4
Israel	A30	384	Transport equipment	Israel	-	0.2-0.4	5	GIE	1.0-2.0	5
South Korea	2022	322	Wearing apparel	South Korea	-	0.5-0.9	1	EPZ	0.5-1.0	1
Egypt	8001	356	Plastic products	Egypt	-	0.2-0.4	4	EPZ	0.8-1.6	4
U.S.A.	4009	382	Machinery	U.S.A.	-	1.0-1.9	35	EPZ	35.0-70.0	35
Israel	A25	384	Transport equipment	Israel	-	1.0-1.9	5	EPZ	5.0-10.0	5
Sub-Total									52.7-95.4	55
TOTAL									74.8-139.6	107

Table 6-2 Land Use Plan of A-2 IE

	Total		Phase 1 (ha)	Phase 2 (ha)	Phase 3 (ha)	Remarks
	(ha)	(%)				
1. Factory lot	165.9	83.0	54.0	57.6	54.3	
2. Road	17.5	8.8	12.5	2.5	2.5	
1) Main road (40.0m)	4.0		4.0			L=1,000 (Phase-1)
2) Sub-main road (22.0m)	2.2		2.2			L=980 (Phase-1)
3) Collector road (18.0m)	11.3		6.3	2.5	2.5	L=3,500/ 1,400 /1,400 (Phase-1/2/3)
3. Utility	4.1	2.1	4.1			
1) Water supply facility	0.8		0.8			
2) Sewage treatment plant	1.8		1.8			
3) Electric facility	1.0		1.0			
4) Communication facility	0.5		0.5			
4. Administration center	3.0	1.5	3.0			
5. Park	3.3	1.7	3.3			
6. Others	6.2	3.1	2.0	2.0	2.2	
1) Green buffer zone (10.0m)	5.7		1.7	1.9	2.1	L=1,660/ 1,920 /2,070 (Phase-1/2/3)
2) Pedestrian (6.0m)	0.5		0.3	0.1	0.1	L=435/70/180
Total	200.0	100.0	78.9	62.1	59.0	

Table 6-3 Division of Responsibilities and Costs Bearing at A-2 Industrial Estate

	Construction				Operation and Maintenance			
	Execution		Cost bearing		Execution		Cost bearing	
	JIEC	Others	JIEC	Others	JIEC	Others	JIEC	Others
0. Overall management					0		0	
1. Land acquisition	0		0					
2. Land grading/preparation	0		0					
3. Embankment against flash flood	0	-	0	-	0	-	0	-
4. Roads								
4.1. Inside roads	0		0		0		0	
4.2. Access roads	0	-	0	-	0	-	0	-
5. Water supply facilities								
5.1. Tanks, distribution pipes	0		0		0		0	
5.2. Outside lines		*		ARA		WAJ		WAJ
6. Sewerage with sludge site	0		0		0		0	
7. Drainage	0		0		0		0	
8. Solid waste disposal								
8.1. Containers	0		0		0		0	
8.2. Service						Company		Company
9. Electric facilities								
9.1. Distribution system		NEPCO	0			NEPCO		NEPCO
9.2. Main Substation		NEPCO		ARA		NEPCO		NEPCO
9.3. Transmission line		NEPCO		ARA		NEPCO		NEPCO
10. Telephone facilities								
10.1. Inside lines	0		0			TCC		TCC
10.2. Outside lines		TCC		ARA		TCC		TCC
11. Standard factories	0		0		0		0	
12. Administration office	0		0		0		0	
13. Ancillary facilities								
13.1. Police station	0		0 (to be sold)			Police		Police
13.2. Social Security Office	0		0		Lessor		Lessor	
13.3. Post office	0		0		Lessor		Lessor	
13.4. Custom office	0		0 (to be sold)			Custom office		Custom office
13.5. Employment office	0		0		Lessor		Lessor	
13.6. Chamber of industry	0		0		Lessor		Lessor	
13.7. Banks, restaurants, etc.	0		0		Lessor		Lessor	
14. Others								
14.1. Parks	0		0		0		0	
14.2. Sports facilities	0		0		0		0	
14.3. Fence	0		0		0		0	

Notes:

* : Not specified

Company stands for a company for solid waste collection.

NEPCO (National Electric Power Company) is a public share holding company, which will succeed Jordan Electricity Authority (JEA) as from September 1, 1996.

Assumptions:

(a) A gasoline station will be constructed on a plot by a private sector.

(b) The proposed Southern Region Research and Technology Center (SRRTC) and Southern Region Small and Medium industries Center (SRSMIC) will not be constructed by JIEC.

Table 6-4 Sources-and-Uses-of-Funds Statement for A-2 IE Project

Unit: JD 10⁶

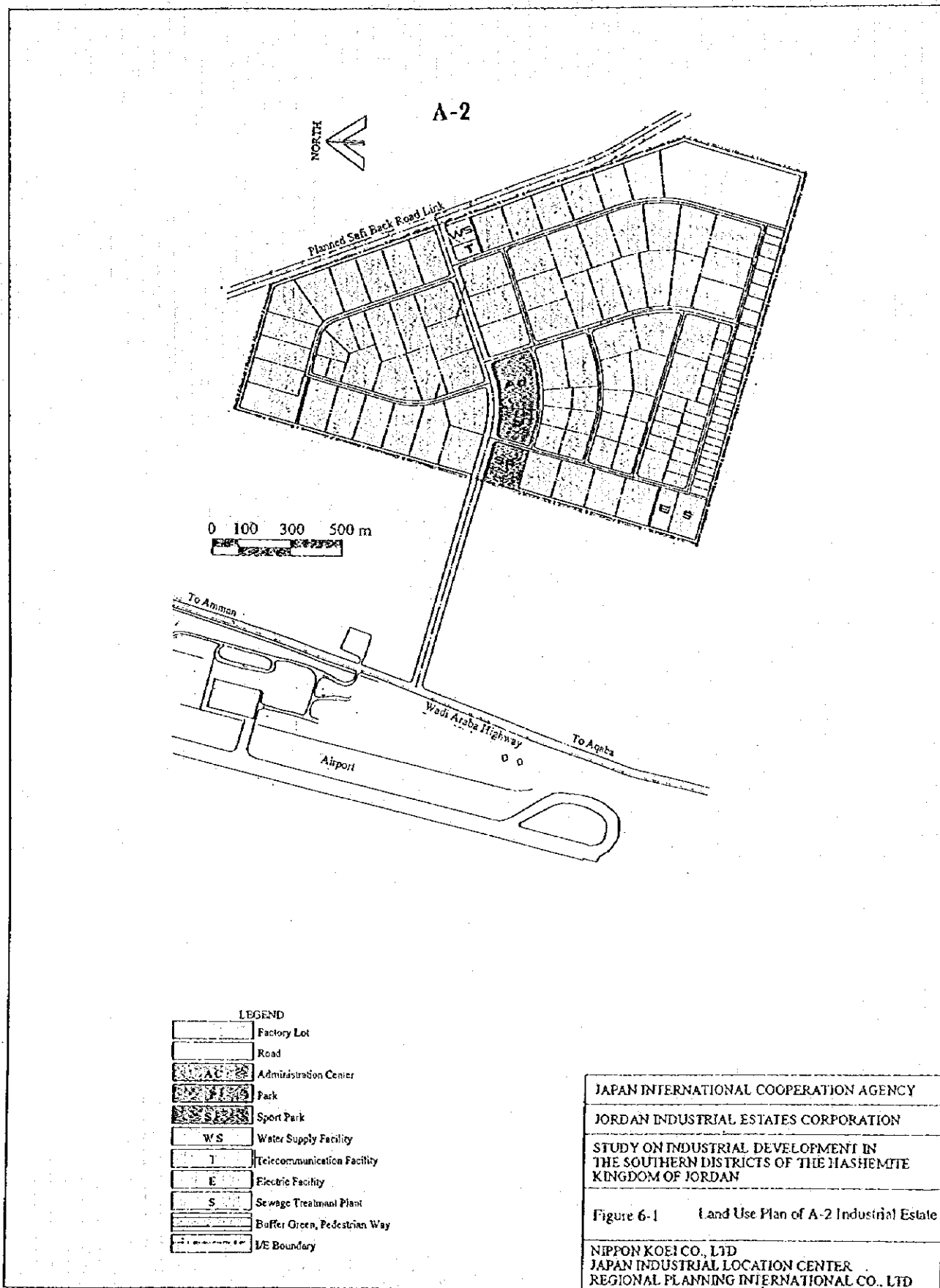
No. Year	Sources of Funds										Uses of Funds															
	Capital Cost					O&M					Borrowing					Other										
	IC	FC	EC	St	FC	IC	FC	EC	St	FC	IC	FC	EC	St	FC	IC	FC	EC	St	FC	IC	FC	EC	St		
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1) Costs are estimated at 1996 prices including custom duty and sales tax.
 2) It is assumed that 85% of the total costs including the interest during construction period is financed by a foreign loan and the remaining 15% by JIEC's own account.
 3) The period of the analysis is set at the year when the foreign loan repayment is finished.
 4) Annual price escalation is assumed at 5% for domestic and 2% for foreign goods and services.
 5) Replacement cost of capital investment is assumed to be financed by JIEC.
 6) O&M costs are inflated by 5% p.a.

Table 6-5 Selling & Leasing Prices of Industrial Estates in Asian Countries

Name of GIE, EPZ	Country	Distance from major city (km)	Total area (ha)	(1995 price)		
				Factory lot area (ha)	Factory lot	
					Sales price (US\$/m ²)	Lease price (US\$/m ² /y)
East Jakarta I.P.	Indonesia	40km(Jakarta)	320	306	60-65	-
MM2100 I.P.	Indonesia	30km(Jakarta)	500	307	65-80	-
Bukit Indah City (SBI Area)	Indonesia	65km(Jakarta)	1,300	1,300	55	5-5.5
Karawang Int'l Industrial City	Indonesia	6km(Karawang)	1,200	296	53-57	0.5
Cresk Industrial Town	Indonesia	18km(Surabaya)	-	150	40	-
Guna Mekar Industrial Town	Indonesia	10km(Sentarang)	-	160	45	-
Kawasan Industrial Medan	Indonesia	27km(Binjai)	-	164	25	-
Pasir Gudang Tambahan	Malaysia	36km(Johor Baru)	-	383	-	4.3-5.2
Masjid Tanah I.E.	Malaysia	32km(Malacca)	-	71	-	2.4
Pulau Indah I.P.	Malaysia	43km(Kuala Lumpur)	-	1,680	-	6.8
Selat Kelang Utara Peringkat III	Malaysia	47km(Kuala Lumpur)	-	418	-	5.6
Pharmaceutical Park	Malaysia	35km(Ipoh)	-	64	-	2.2
Gebeng I.P.	Malaysia	25km(Kuantan)	-	890	-	1.9
Holy Angel I.E.	Philippines	80km(Metro Manila)	52	32	-	2.4
Luisita Industrial Park	Philippines	120km(Metro Manila)	120	-	-	2.4
First Cavite I.E.	Philippines	30km(Makati)	272	-	65	-
Gateway Business Park	Philippines	38km(Metro Manila)	120	-	100	-
Canlubang I.E.- Terelay Phase	Philippines	40km(International Airport)	170	-	56	-
Laguna International I.E.	Philippines	25km(Makati)	117	-	64	-
Kranji	Singapore	25km(Changi Airport)	101	97	-	13-22
Sungei Kadut	Singapore	28km(Changi Airport)	226	-	-	13-15
Woodland East	Singapore	24km(Changi Airport)	193	133	-	13-17
Kallang Basin	Singapore	22km(Changi Airport)	74	-	-	56-62
Loyang	Singapore	2.5km(Changi Airport)	119	-	-	16-23
Saha Rottana Nakon I.E	Thailand	95km(Bangkok)	248	-	37.5	-
Siam Cement Industrial Land	Thailand	86km(Bangkok)	277	-	59.7	-
Bangpakong I.P	Thailand	57km(Bangkok)	260	-	72.5	-
Rayong I.P (GIZ)	Thailand	45km(Chonburi)	78	-	47.3	-
304 I.P	Thailand	140km(Bangkok)	375	-	37.8	-
Kabinburi Industrial Zone	Thailand	95km(Chahoeng Sao)	125	-	27.5	-
Dallian I.E (Phase II)	China	30km(Dallian)	200	140	85	-
Qingdao I.E	China	3km(Qingdao)	660	-	37	-
Amata I.P	Viet Nam	30km(Ho Chi Minh)	700	-	60-65	-
Bien Hoa Industrial Zone II	Viet Nam	40km(Ho Chi Minh)	376	-	90	1.8

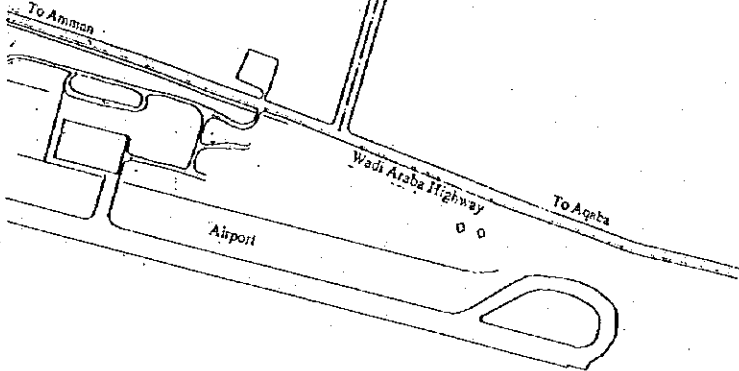
Source: ASEAN CENTRE, Tokyo



NORTH

A-2

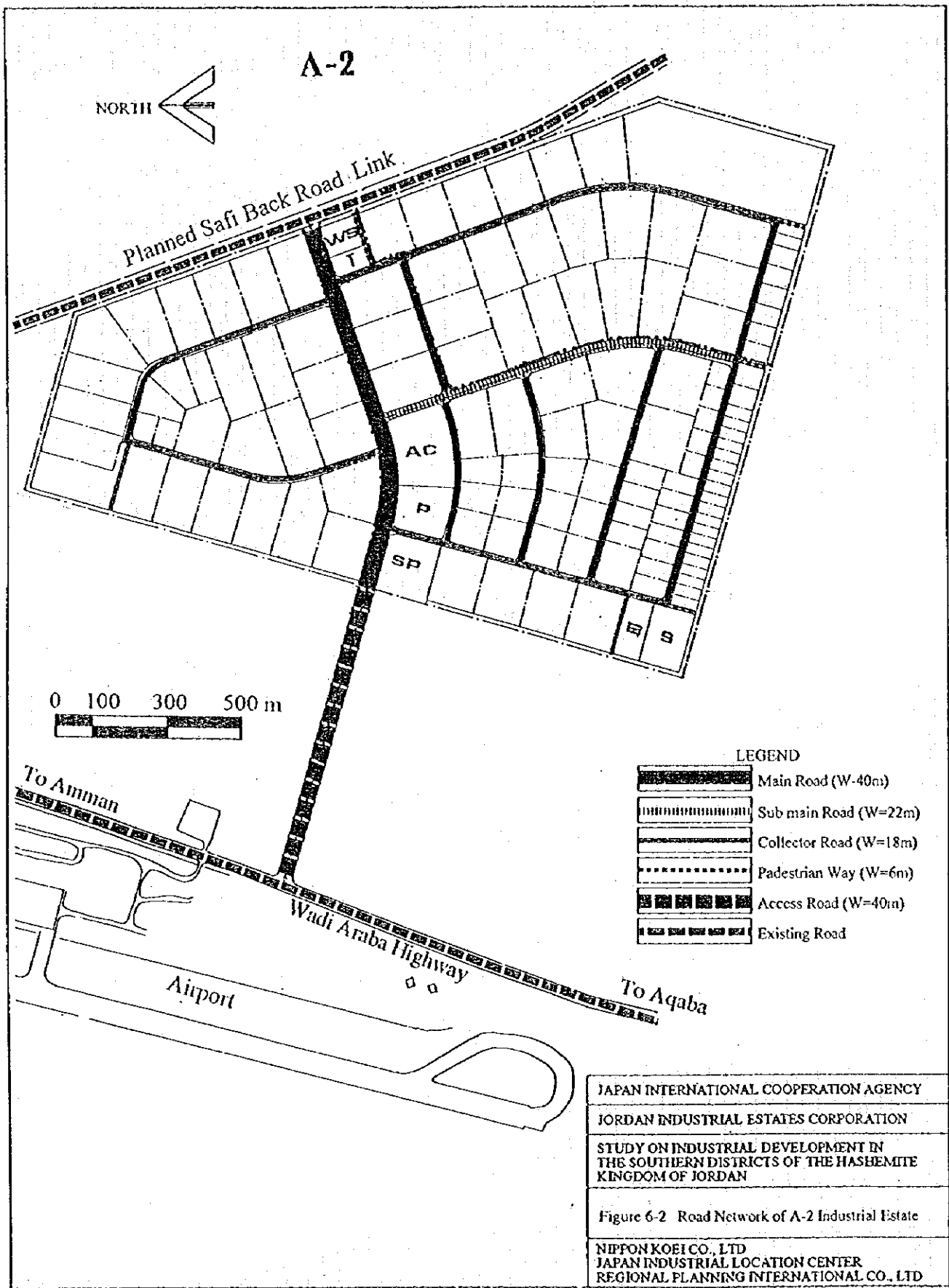
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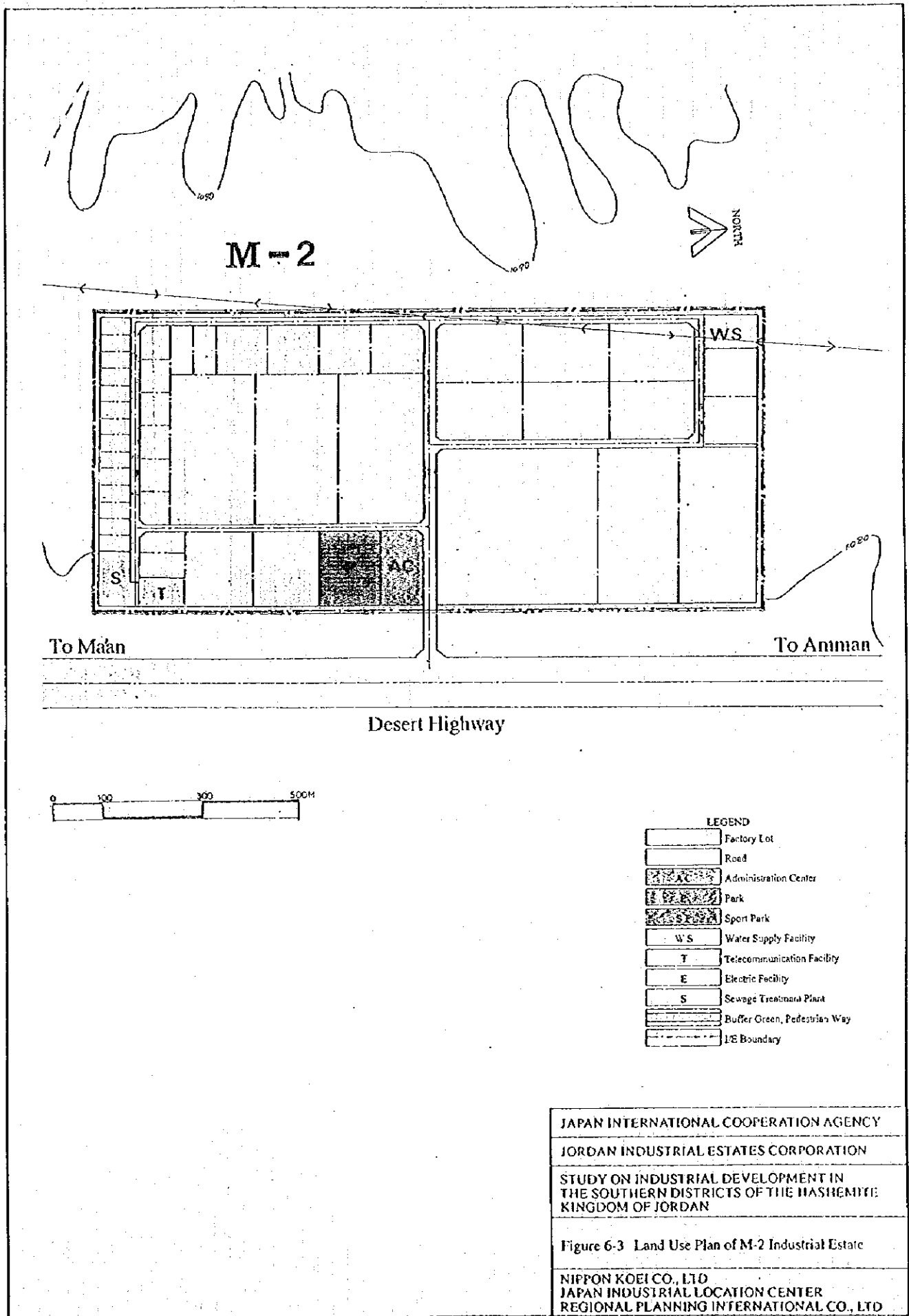


LEGEND

[Symbol]	Factory Lot
[Symbol]	Road
[Symbol]	Administration Center
[Symbol]	Park
[Symbol]	Sport Park
[Symbol]	Water Supply Facility
[Symbol]	Telecommunication Facility
[Symbol]	Electric Facility
[Symbol]	Sewage Treatment Plant
[Symbol]	Buffer Green, Pedestrian Way
[Symbol]	I/E Boundary

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STUDY ON INDUSTRIAL DEVELOPMENT IN THE SOUTHERN DISTRICTS OF THE HASHEMITE KINGDOM OF JORDAN
Figure 6-1 Land Use Plan of A-2 Industrial Estate
NIPPON KOEI CO., LTD JAPAN INDUSTRIAL LOCATION CENTER REGIONAL PLANNING INTERNATIONAL CO., LTD

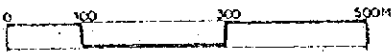
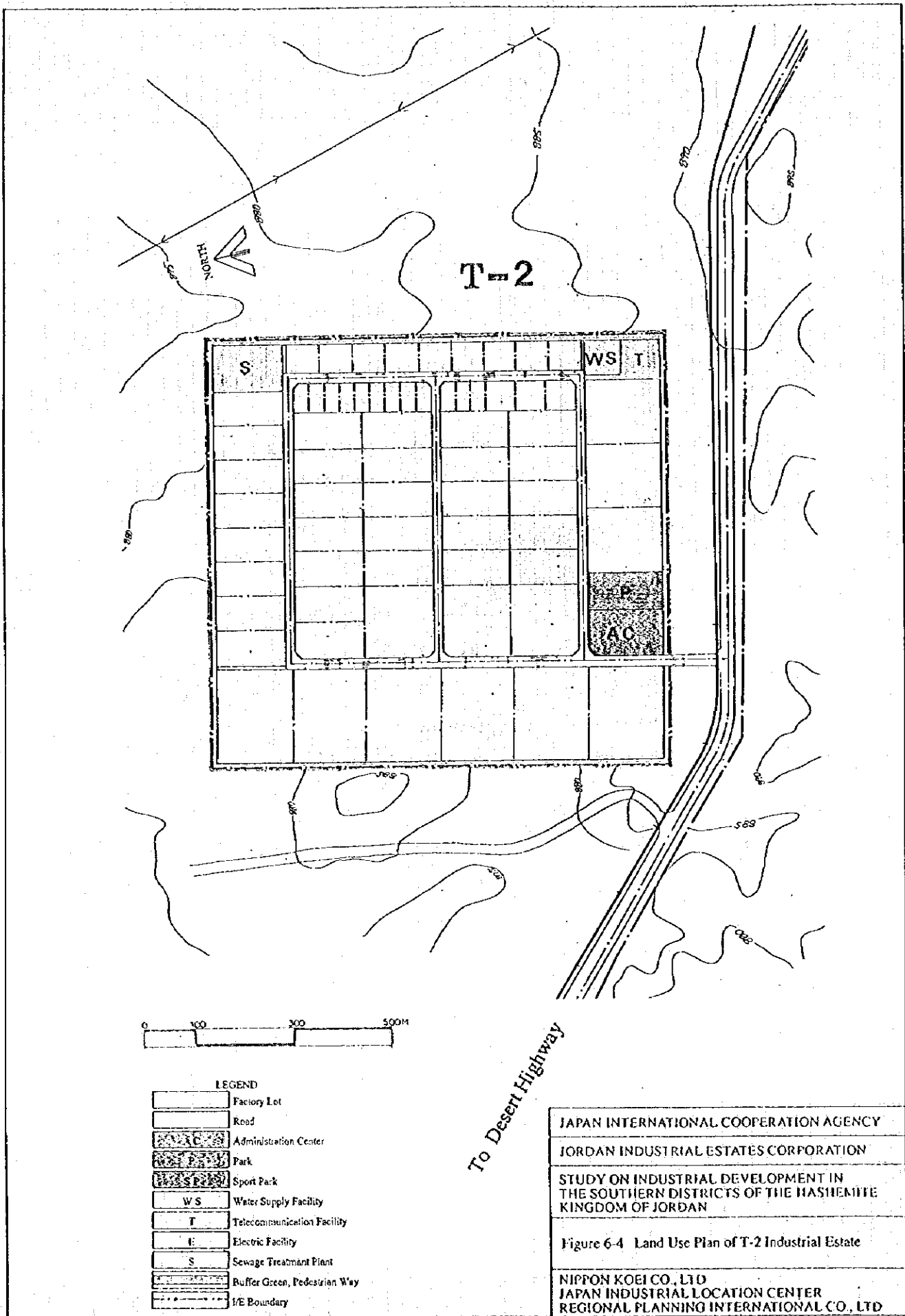




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 KINGDOM OF JORDAN

Figure 6-3 Land Use Plan of M-2 Industrial Estate

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 REGIONAL PLANNING INTERNATIONAL CO., LTD



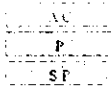
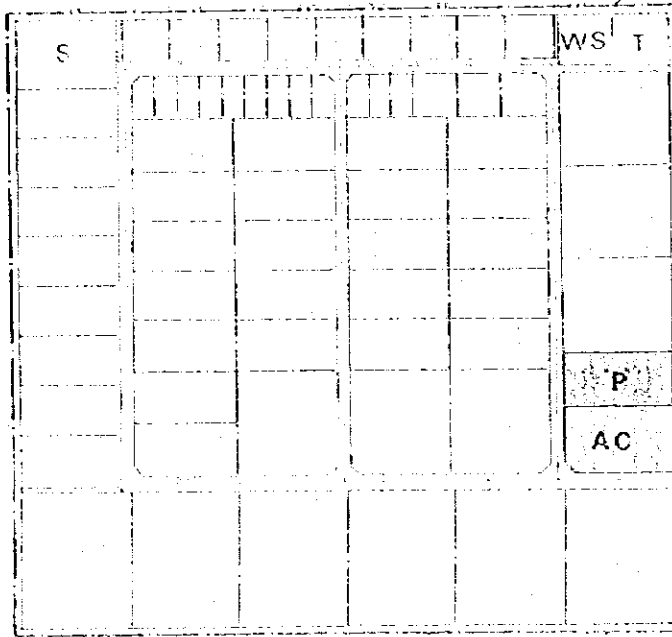
LEGEND

	Factory Lot
	Road
	Administration Center
	Park
	Sport Park
	Water Supply Facility
	Telecommunication Facility
	Electric Facility
	Sewage Treatment Plant
	Buffer Green, Pedestrian Way
	I/E Boundary

To Desert Highway

JAPAN INTERNATIONAL COOPERATION AGENCY
JORDAN INDUSTRIAL ESTATES CORPORATION
STUDY ON INDUSTRIAL DEVELOPMENT IN THE SOUTHERN DISTRICTS OF THE HASHEMITE KINGDOM OF JORDAN
Figure 6-4 Land Use Plan of T-2 Industrial Estate
NIPPON KOEI CO., LTD JAPAN INDUSTRIAL LOCATION CENTER REGIONAL PLANNING INTERNATIONAL CO., LTD

T₁-2

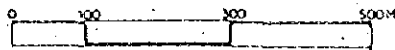
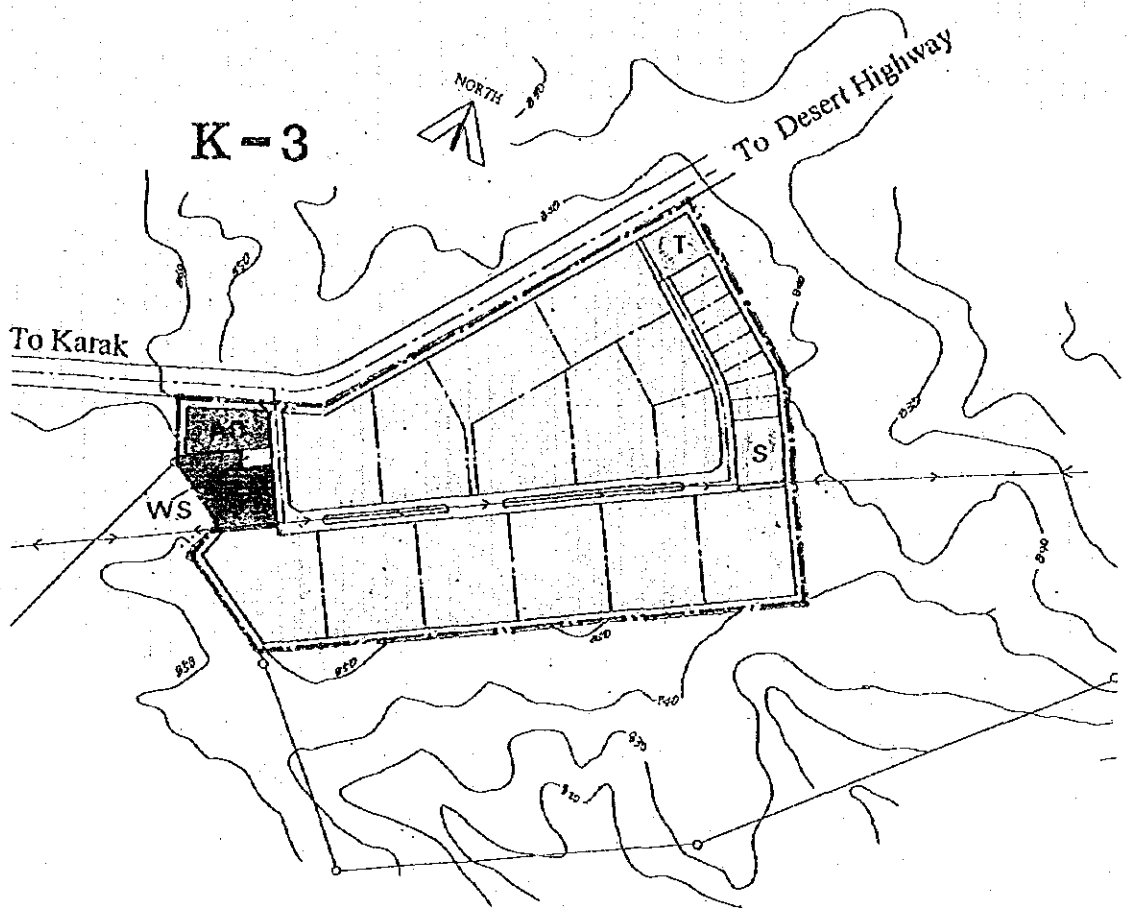


AC - Agricultural
 P - Professional Office
 SP - Single-Family Residential

To Desert Highway

MEMORANDUM FOR THE BOARD OF SUPERVISORS
 SUBJECT: ZONING MAP AMENDMENT
 TO ALLOW INDUSTRIAL DEVELOPMENT
 IN THE T₁-2 ZONING DISTRICT

Figure 6-4. Land Use Plan of T₁-2 Zoned Estate
 NIPPON KOLECO, LTD.
 JAPAN INDUSTRIAL ECONOMIC CENTER
 REGIONAL PLANNING CENTER, INC., LTD.



LEGEND	
[Pattern: Horizontal lines]	Factory Lot
[Pattern: Dashed line]	Road
[Pattern: Stippled]	Administration Center
[Pattern: Cross-hatched]	Park
[Pattern: Diagonal lines]	Sport Park
[Pattern: 'WS' text]	Water Supply Facility
[Pattern: 'T' text]	Telecommunication Facility
[Pattern: 'E' text]	Electric Facility
[Pattern: 'S' text]	Sewage Treatment Plant
[Pattern: Dotted line]	Buffer Green, Pedestrian Way
[Pattern: Dashed line]	U/E Boundary

JAPAN INTERNATIONAL COOPERATION AGENCY

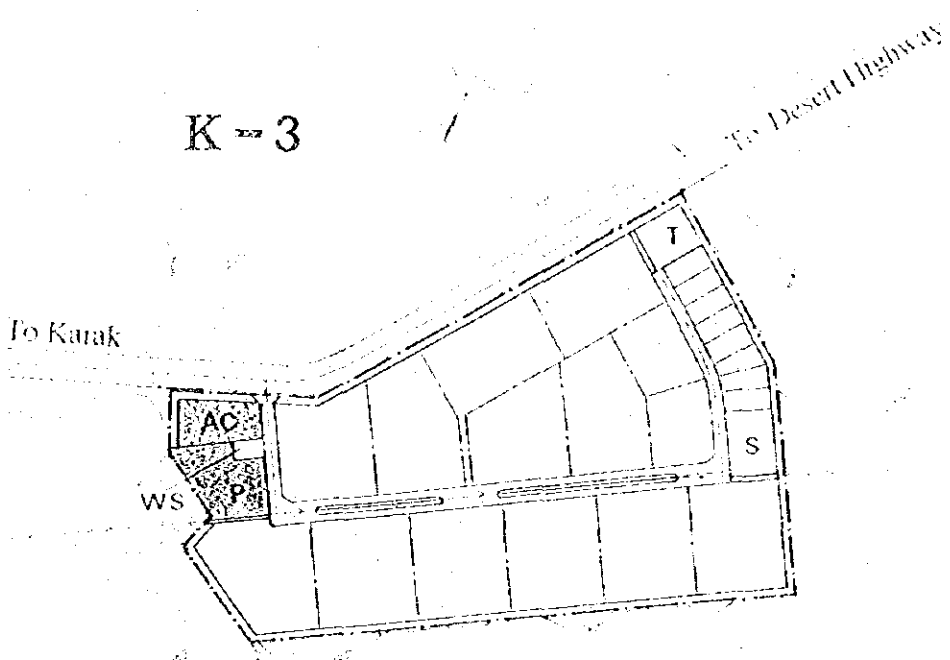
JORDAN INDUSTRIAL ESTATES CORPORATION

STUDY ON INDUSTRIAL DEVELOPMENT IN
THE SOUTHERN DISTRICTS OF THE HASHEMITE
KINGDOM OF JORDAN

Figure 6-5 Land Use Plan of K-3 Industrial Estate

NIPPON KOEI CO., LTD.
JAPAN INDUSTRIAL LOCATION CENTER
REGIONAL PLANNING INTERNATIONAL CO., LTD.

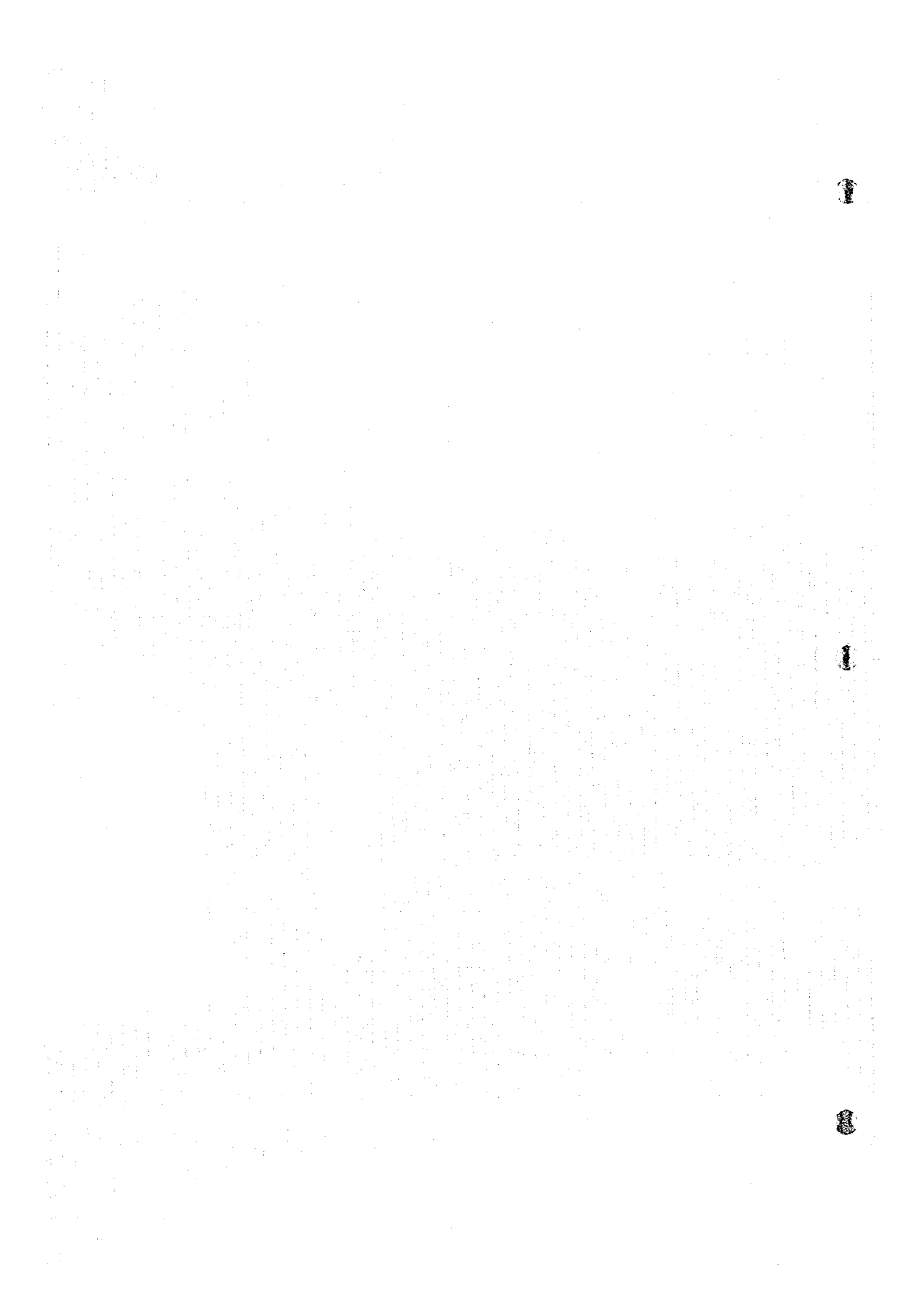
K-3



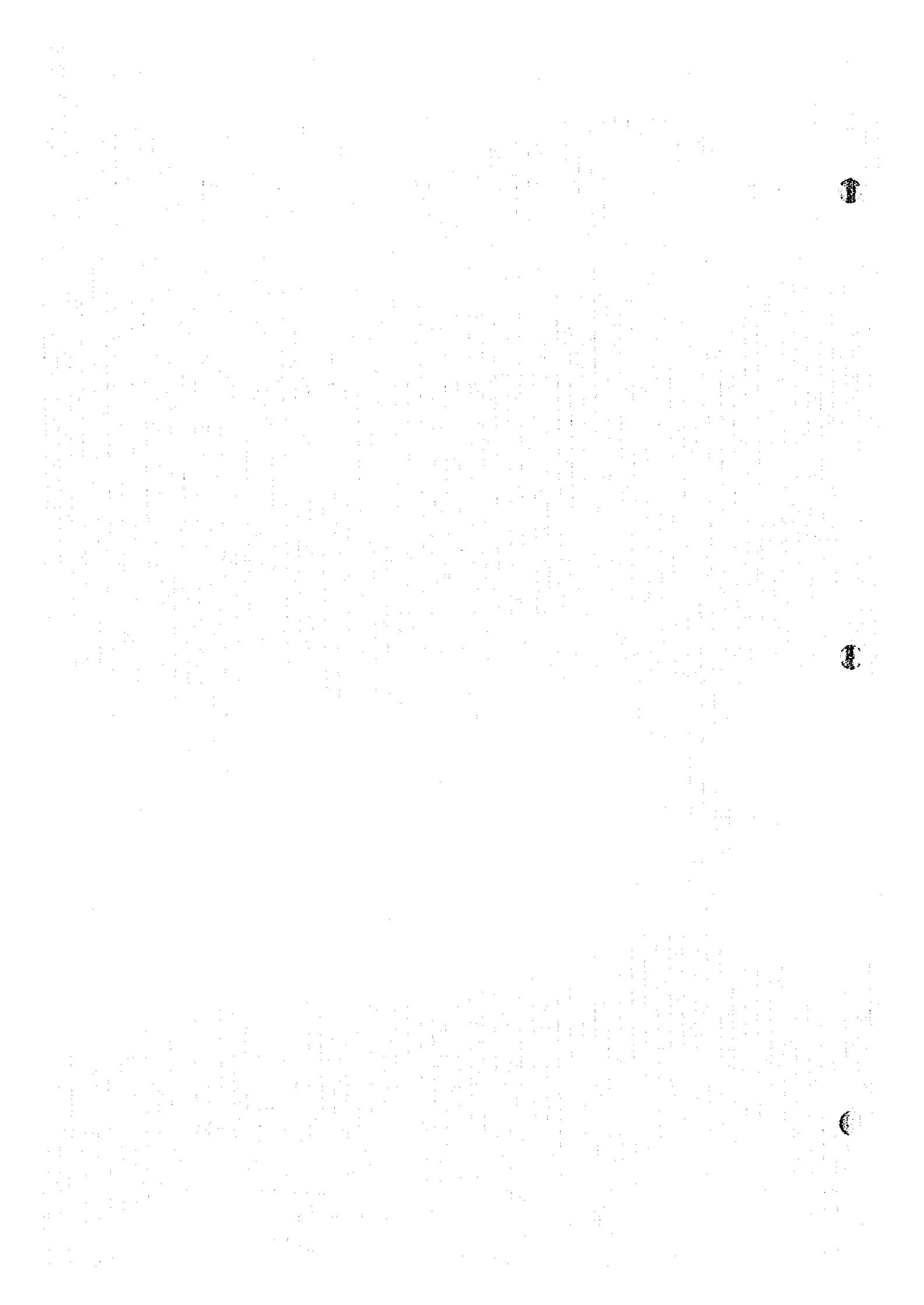
AC	Area
P	Area
SP	Area

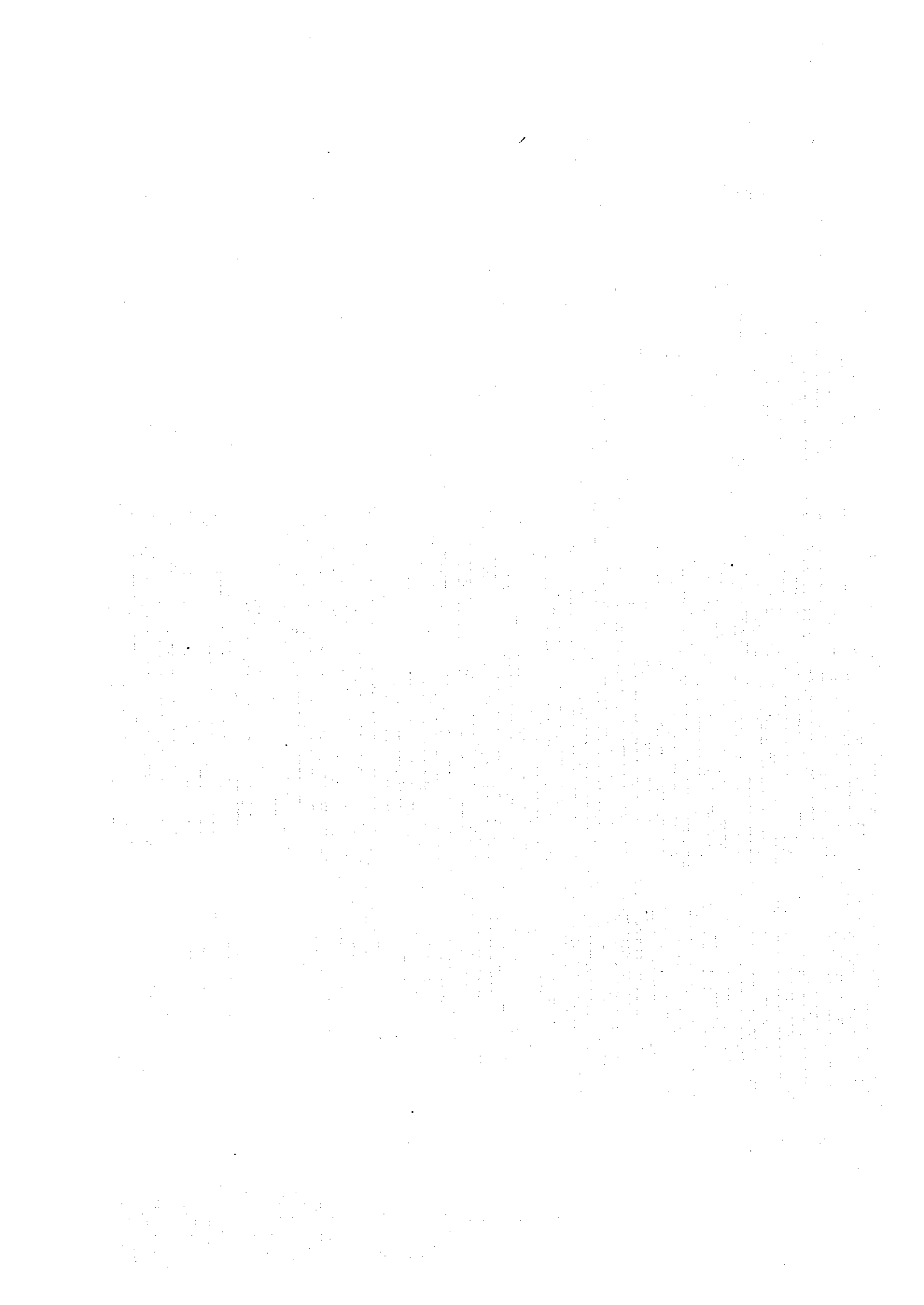
JAPAN INTERNATIONAL CO-OPERATION CENTER
 JORDAN INDUSTRIAL DEVELOPMENT CENTER
 STUDY ON INDUSTRIAL DEVELOPMENT IN
 THE SOUTHERN DESERT OF THE HASANIYAH
 KINGDOM OF JORDAN

Figure 6-5. Land Use Plan of K-3 Industrial Zone
 NIPPON KAI CO., LTD.
 JAPAN INDUSTRIAL EDUCATION CENTER
 REGIONAL PLANNING INTERNATIONAL, INC.









JICA

