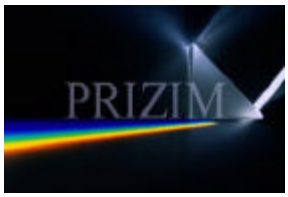

PROMOTING INDUSTRIAL ZONES AND INVESTMENT MOBILIZATION
USAID WB/G SO1: EXPANDING ECONOMIC OPPORTUNITIES
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Rafah Enterprise Park
Environmental Impact Assessment

SUBMITTED ON

DECEMBER 2001

TO THE

USAID MISSION TO THE WEST BANK AND GAZA
MARGOT ELLIS, CTO

BY

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List of Abbreviations

CMWU	Coastal Municipal Water Utility
EHD	Environmental Health Department
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPD	Environmental Planning Directorate
GIE	Gaza Industrial Estate
IEE	Initial Environmental Evaluation
MEnA	Ministry of Environmental Affairs
MOA	Ministry of Agriculture
MOH	Ministry of Health
MOI	Ministry of Industry
MOL	Ministry of Labor
MOLG	Ministry of Local Government
MOPIC	Ministry of Planning and International Cooperation
MOR	Municipality of Rafah
MOT	Ministry of Transport
PCBS	Palestinian Central Bureau of Statistics
PCCS	Palestinian Commercial Services Company
PEPA	Palestinian Environmental Protection Agency
PIEDCO	Palestinian Industrial Estate Development and Management Company
PIEFZA	Palestinian Industrial Estate and Free Zones Authority
PLC	Palestinian Legislative Council
PMU	Project Management Unit
PNA	Palestinian National Authority
PSI	Palestinian Standards Institute
PWA	Palestinian Water Authority
REP	Rafah Enterprise Park
RO	Reverse Osmosis
USAID	United States Association for International Development
WHO	World Health Organization
WWTP	Waste Water Treatment Plant

EXCUTIVE SUMMARY

This Environmental Impact Assessment (EIA) prepared by The Services Group, Inc. (TSG) and the Engineering and Management Consulting Center (EMCC) to satisfy the requirements set by the United States Agency for International Development (USAID), the Ministry of Environmental Affairs (MEnA), and the Palestinian Industrial Estates and Free Zones Authority (PIEFZA). It was also prepared to satisfy the Environmental procedures and the associated Environmental Management Systems.

USAID has retained the services of TSG to conduct a feasibility study for the proposed Enterprise Park project in Rafah, Gaza Strip, including the EIA. The EIA was prepared to describe the existing environmental conditions, the potential impacts of the development, and the mitigation measures required in order to minimize the environmental impact of the development.

Study Objectives

The primary objectives of this study are to ensure that the project will be developed in a manner that does not cause unwarranted adverse impacts to the environment through the following sub-objectives:

- Identify and evaluate the environmental impacts of the proposed project during construction and operation stages.
- Formulate actions and recommendation in order to mitigate any negative environmental impacts including cost and benefit of different options/process adjustments.
- Formulate an environmental monitoring plan needed to monitor the adverse impact of the project and how this monitoring plan will be managed from institutional and financial points of views.

Project Description

The main components of Rafah Enterprise Park are the industrial park, the Enterprise Development Center, the Central Services Area, and the Technical College Campus

Industrial Park

The industrial park will occupy a total area of about 100 hectares. A variety of industries will be accommodated in the industrial park. It is mainly planned to accommodate light and medium industries as explained below:

Medium-Intensity Industries. Typical investments include activities such as manufacturing and assembly of consumer electronics and electrical appliances; food and beverages processing; spare automotive and machine parts and manufacturing of flexible and non-flexible paper packaging.

Light Intensity Industry. Demand by light intensity industries composes the second largest group of activities, which includes apparel assembly, assembly of footwear and leather products, and furniture assembly.

Logistics and Warehousing. Given the REP's strategic location - based on its proximity to the Gaza International Airport, two borders (the Green Line and Egypt), and plans for a harbor only 35 kilometers away – investments in logistics and warehousing facilities will represent a small but important component of overall demand.

Enterprise Development Center (EDC).

EDC is composed of two modules (units) of approximately 7 hectares each. The units are designed to host export oriented, environment friendly industries utilizing high-technology production methods. EDC will be fully serviced with basic infrastructure services such as; electricity, telecommunication, sewage system, water and roads.

Central Services Area

A total area of 10,000m^2 is allocated for public sector facilities such as a clinic, a police center, a fire station and a mosque. This facility is also to include an administration center, banking and other commercial activities to serve the users of the Rafah Enterprise Park.

Technical College Campus

An important component of the Rafah Enterprise Park is the Technical College. A total area of 12.5 hectares is allocated for the location of a Technical College which is envisioned to supply the industrial park businesses with qualified graduates while the Industrial Park will offer training possibilities for the students.

Proposed Site

The proposed site for the Rafah Enterprise Park falls within the jurisdiction of Rafah Governorate, which also includes Rafah City and Rafah Camp. The REP site is located at the southeastern end of Gaza Strip, to the east of Rafah City, at the eastern borders. It is about 5 kilometers far from the Egyptian borders, about 1.5 kilometers from Gaza International Airport and about 8.5 kilometers from the center of Khan Younis City (the second largest city in Gaza Strip). Site alternatives and selection is discussed in detail in Section 2.1.

Duration of Construction and Operation Phase

Construction Phase

The development of the site is assumed to commence upon acquisition of the land by PIEFZA and transfer of it to the developer. Following the transfer of land, the following activities can be executed in parallel:

- Detailed engineering design, and
- Demolition of existing facilities.

The construction sequence is designed to fulfill the demand for space requirements at each stage of development.

- Stage I is estimated to be completed in 5 years. The construction of ancillary buildings is proposed to commence at the same time with the construction of the Industrial Park buildings in Stage I.
- The EDC Unit I will be operational at Year 2 Month 6.
- The offsite infrastructure construction for Stage II starts at the end of Year 3. The construction of Industrial Park buildings for Stage II, however, starts end of Year 4, i.e. a year before Stage I is full.

Operation Phase

Operation phase is 25 years.

Environmental Scoping and Impacts

On April 15, 2000, a scoping meeting was held to gather opinions and concerns regarding the issues and likely impacts that would be associated with REP. The results of this scoping meeting are presented in Appendix A. Based on these results and the experience of the EA team, other potential impact areas and issues were added to those that were identified in the scoping meeting. The resulting set of potential impacts were grouped into five main categories as follows:

- Land use Components
- Physical Resources and Bio-Physical Environment Components
- Economic Components
- Cultural and Heritage Components
- Health Components

Significant environmental issues were identified based on the discussions during that scoping session. Some issues were raised by most of the participants especially Rafah authorities. The following issues can be identified as very significant:

- Land ownership and the needed compensation.
- Direct employment and income and labor market conditions
- Infrastructure requirements and the pressure on the existing facilities
- Water use (sources for water is considered).
- Transportation (Disruptions in traffic flow).
- Public health, health facilities and services
- Air quality (dust and emissions) and noise.
- Soil disturbances and surrounding agriculture

Study Boundaries and Time Horizon

Boundaries

The boundary of the study is proposed as El Shoka Area, which is bounded by road no. 4, the Green Line, Sofa Road and Gaza International Airport. This boundary is valid for most environmental components. Some components were discussed out of this area, i.e. Rafah Governorate, Gaza Strip and in some cases the neighboring countries or the West Bank based on the importance of these components.

Time Horizon of the study

The proposed period to complete the activities of the study is 12 weeks.

Environmental Impacts

Impacts of the project on different environmental components are summarized below:

Population and Housing

In the short-term no potential impact on population and housing is expected. However, in the long-term if the project succeeded, the number of housing units at Al Shoka village is expected to increase and the quality of housing units is expected to improve. Also, due to the improvement of infrastructure associated with the REP, the housing unit pricing will increase as well as the land prices are also expected to increase.

Land Ownership

The construction of the project will cause displacement of many landholders and demolition of few houses built in that area. The impact is socially negative and could be significant unless proper compensation is assured. As far as compensation for land acquisition and demolition of existing facilities, PIEFZA is the responsible agency to settle this issue with the current landholders.

Industry

The strategic location of the REP and the availability of off-site and on-site infrastructure will attract investment in the industrial sector. REP will encourage the introduction of new fields of industry. This will improve the industrial sector in the Gaza Strip as a whole. Generally the project is expected to have long-term positive impact on the industrial sector in the Gaza Strip.

Trade

The trade activity is expected to increase gradually in parallel with the development of the project. This will give a positive impact to the trade industry. The trade industry for both raw materials and industrial products will be developed locally between Gaza and the West Bank. The strategic location of the project site close to the airport and to the borders with Israel and Egypt will enhance the international trade activities.

Recreation and tourism

The proposed area for construction of REP does not have any unique recreational or tourism value, as similar areas are available along the whole eastern boarders of Gaza Strip. The aesthetic value of the proposed REP is very important since it is located in the vicinity of Gaza International Airport. This point have been taken into consideration during planning, thus REP will not have any negative impact regarding this issue.

Agriculture	The loss of agricultural land in that area to the benefit of the industrial sector, which is much more productive, is considered positive if the overall economy is considered. Moreover, loss of similar agricultural land can also be attributed to off-site infrastructure requirements and urban development in the surrounding areas resulting directly from project demands and spin off development. The impacts of this lost agricultural land are long-term, irreversible and relatively minor due to local availability of large areas of land with similar characteristics and the fact that these losses are countered by the economic benefits expected from the development.
Transportation	The transportation activities during both construction and operation phases of REP will increase the traffic in the surrounding roads. Such impact can be easily mitigated with proper road management. Also direct negative impacts may occur as a result of the increase in the risk of accidents.
Groundwater	At the proposed site for REP, the ground water table is located at around 68-88m below land surface. The saturated zone does not exceed few meters overlain by very thick clay layer. Therefore, there are no foreseeable impacts on ground water neither during construction nor during operation phases.
Surface Water	Development of the REP will increase the surface water runoff coefficient in the area due to the construction of new buildings as well as new roads. This will increase the quantity of surface water runoff. If not controlled the runoff will cause a substantial damage to the surrounding agricultural area. Furthermore, runoff water could be polluted from various commercial, domestics and light to medium industrial activities.
Water Use	The construction of the project will increase the demand on the limited water resources in the area, and will increase the pressure on the existing water supply networks. This may reduce the quantity of water available for both domestic and agriculture usage. During operation the demand on water resources will increase in the area, and will increase the pressure on the existing water supply source.

Air quality	Construction activities including earthworks, vehicles and heavy machinery movements are known to generate fugitive dust. The impacts from dust on air quality during construction phase are short term and reversible. Exhaust fumes from trucks and heavy machinery forms another direct negative impact. The proposed industry is a light to medium industry, where very few sources of air pollution due to industrial activities are expected. Development of off-site road network will have positive impacts in reducing the dust levels which is now resulting from vehicle transport over unpaved roads.
Noise	Increased noise levels and vibrations in the area surrounding REP during site preparation and other construction activities are anticipated. The proposed site of REP is considered countryside, far away from populated centers. Thus the impact regarding noise can be considered as insignificant. During operation noise can be attributed to the additional vehicle movements to and from the site and some of the proposed industrial firms such as Furniture Assembly, Spinning and Weaving
Soil and vegetation	Construction activities usually generate dust. This will reduces directly affect the nearby crops as it temporarily photosynthesis and causes flower falling during flowering stage. Impacts on soil quality can be directly attributed to soil contamination from spillage of toxic and hazardous material such as oils, fuels, paints, wood preservatives, in addition to solid and liquid wastes.
Wild life resource	The proposed site for REP has no special importance to most of wild life resources including mammals, birds, reptiles and amphibians. This is due to the fact that these types can be found in any place at the eastern boundaries of Gaza Strip and not limited to the project site. Some of the wild weeds are important and somehow are found in plenty in the project site. These weeds are usually limited to this type of areas and considered as medicinal plants. Matricaria Chamomilla has special importance to the project site and will be affected during construction unless conservation measures are taken.

Labor Market Condition	The REP will have a substantial positive impact on the labor market conditions. This will be through educational and training programs in the proposed incubators in high technology industry and the direct employment of substantial number of workers. The average monthly income for the industrial workers is expected to increase.
Direct employment and income	During construction, substantial number of work opportunities will be created especially in the first phase when off-site and on-site construction activities start. These impacts are considered as positive, significant, and short-term impacts. The total number of direct employment by the end of the first phase is expected to be 7,620 and by the end of the second phase the number is about 18,920.
Indirect employment and income	Indirect employment during construction is limited to transporting facilities, related services and local material supplies such as construction materials. REP is going to generate indirect employment especially those related to transportation and services sectors. These include raw materials and product transport, export and import, banking, and insurance.
Wastewater	Wastewater production will be both domestic and industrial wastewaters. The collected sewage will be pumped out to the planned main treatment plant. The construction of the sewer pipeline will enhance the possibility to construct a sewer system at Al Shoka area. Some industrial wastewater which contains high loads of BOD than the domestic wastewater or which contain pollutants that cannot be handled by domestic wastewater treatment plant, such as toxic material, will have negative impact on treatment processes if not pre-treated to an acceptable level.
Solid and Hazardous Waste	During operation, solid waste production will be limited to domestic waste, which will be dumped at Rafah landfill. In case of hazardous waste it should be dumped at Gaza hazardous waste dump site. This will also have minor negative impact on the existing facilities regarding overloading.

Cultural and Heritage Components

The only cultural site of relative importance to the people of Rafah within the project site is the "MEMORIAL OF EGYPTIAN SOLDIERS" located near the southeastern boundary of REP. Based on the historical resources there are no identified archaeological sites or historical buildings in the project area. During site preparation and earthwork, negative impact to buried and undiscovered archaeological remains are possible.

Public Health

During construction, there will be minor impacts limited to accident risks during construction activities and transporting the construction materials and nuisance due to dust and noise. During the operation phases, the impact of REP depends mainly on the type and density of proposed industries. Negative impacts on workers health may arise due to the exposure to noise, high temperature, uneven lighting, dust, and work accidents.

Mitigation and Recommendations

Impacts during construction are primarily associated with land preparation, earthworks, material transportation and movement of heavy machinery. Such impacts are mostly short-term, local, and caused by the contractor activities in the area and can be mitigated through proper co-ordination with the contractor and the concerned governmental parties.

Impacts during operation phase are primarily associated with land use, transportation, water use, air quality, wastewater discharge, solid and hazardous waste, and public health. Most of these impacts are long-term, and significant unless proper mitigation measures and monitoring plan are implemented.

As far as compensation for land acquisition and demolition of existing facilities, PIEFZA has to settle this issue with the current landholders.

Early measures should be taken through public campaigns with recommendation to utilize the media services for early mitigation of any adverse publicity and misconception.

Recommended planning and implementing of appropriate landscaping program for REP should include consideration of

using existing versus new planting of trees and bushes, in addition to planting a suitable shrubs, trees, and flowers in order to provide an attractive site for workers, visitors, and local residence. Such plants should be adapted to areas with low water and maintenance requirements.

Water demand for REP should be minimized to reduce the pressure on existing resources. Rainwater harvesting, water recycling in some industries, installation of water conserving faucets in showers and bathrooms are strongly recommended.

Toxic or hazardous materials such as lubricants, paints should be handled and stored in sites that are protected from rain, well signed, and secure against vandalism.

Emission of dust and air pollutants should be minimized whenever possible through proper measures such as limiting of traffic speed to 30 km/hour, and using relatively new transportation vehicles with lower emissions.

Appropriate mitigation measures should be taken to reduce and avoid accidents that may impact occupational health and safety on the REP premises.

Employees should be trained on the hazards, precautions and procedures for safe storage, handling and use of all potentially harmful materials relevant to each employee's task and work area.

Environmental Management Plan Cost

The estimated annual cost for the Environmental Management Plan (EMP) is divided into two parts: yearly monitoring of construction activities phase (56,000.0 $US) and yearly monitoring of operation phase (64,000.0 $US). Chapter 6 describes in details the yearly cost of each activity and the implementation schedule of EMP for both construction and operation phase.

Report Outline

Apart from the executive summary this report starts with a general introduction showing the different parties involved in the study and the followed study methodology. Chapter 2 describes the general features of the project and the different infrastructure alternatives. Existing legislative review is presented in Chapter 3. Chapter 4 gives a comprehensive description of the baseline environment for the proposed site. This chapter is followed by impact identification and assessment of the proposed project. The last chapter discusses the proposed mitigation measures and monitoring plan. The appendices at the end of the report contains the details of the scoping statement and the scoping meetings.

Evaluation of the Total Environmental Impact

The assessment values for each environmental issue is calculated and presented in Chapter (5).

The assessment value for both phases, without the project is found as –1068. This value means that, considerable negative impacts are expected if the project is not implemented. The negative impacts will be mainly in both economic and land use components.

The assessment value for both phases, without the project and with the project without considering the mitigation measures are found –1068 and –762 respectively. In other words, the negative environmental impacts for the project are much less than the negative impacts without the projects. This concludes that the construction of the project is crucial for the area.

The assessment values for both phases, with and without considering the mitigation measures are found +1314 and –762, respectively. In other words, the project, if proper mitigation and monitoring measures are considered, will have positive environmental impacts. The positive impacts can be clearly observed in the land use and economic issues.

1 INTRODUCTION

This Environmental Impact Assessment (EIA) prepared by The Services Group, Inc. (TSG) and the Engineering and Management Consulting Center (EMCC) to satisfy the requirements set by the United States Agency for International Development (USAID), the Ministry of Environmental Affairs (MEnA), and the Palestinian Industrial Estates and Free Zones Authority (PIEFZA). It was also prepared to satisfy the Environmental procedures and the associated Environmental Management Systems.

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Previous studies by The Services Group have indicated that there was demand for serviced industrial space in Gaza Strip. Ministry of Industry and Ministry of Planning and International Cooperation had identified an approximately 250ha (2,500 dunums) of land to be designated for mainly industrial uses. PIEFZA refined this area to approximately 165ha (1650 dunums). A second revision was made to conclude the size of the site to approximately 145ha (1450 dunums).

A Scoping Session was held on Tuesday, April 11, 2000 and organized by PIEFZA, TSG, and EMCC to identify the significant environmental issues that has to be taken into consideration during the preparation of the EIA. Based on the scoping session, a scoping statement that outlines the environmental issues and the EIA methodology was prepared. The scoping statement is included as Appendix A of this report.

Based on the issues outlined in the Scoping Statement and the expected methods of construction and operation this EIA was prepared. The EIA provides a full discussion of the significant environmental effects of the proposed Enterprise Park and includes alternatives that would avoid or minimize adverse effects or enhance the quality of the environment. It

also includes a final itemized list and phasing schedule of required mitigating measures.

Study Methodology

The methodology and the study contents are described below:

Data collection

Information on the study area's environmental attributes, infrastructure, transportation links, and utilities has been well documented through various reports produced by MOPIC, PWA, MOLG, and Rafah local authorities. Therefore, data collection requirements for the EIA may be confined to collecting missing information and/or updating information.

Data on water resources, including groundwater, surface water flows and water supplies will be collected from PWA as well as from various other reports addressing these issues. An archaeological survey is required and will provide information on the location and existence of any archaeological sites on the chosen property as well as on or around potential access routes and/or utility lines. A brief ecological survey will also be conducted to gather data on the flora, fauna, and habitats of the area for documentation purposes. Data regarding water requirements, wastewater quantities and qualities, and economic benefits will be taken from the feasibility study being executed in parallel. Any areas where data are insufficient to base analyses and assessment, estimates by experienced professionals in the respective fields will be solicited.

Reference will always be made to local environmental management standards. In case, the local standards are not available the applied standards will be identified.

Analysis of Infrastructure Alternatives

various alternatives will be assessed for items such as providing infrastructure (water, wastewater, electricity, roads, and telecommunications) to the site. Alternatives will be determined in close cooperation with relevant authorities and interested parties as well as with the design and feasibility study teams. However, in general, a subjective approach that utilizes the professional judgment and opinions of experts will form the majority of the assessment and analyses required. The alternatives considered will include:

1. The type of industries and technologies;
2. Supply of materials, goods and services, especially where local suppliers are available;
3. Labor supply and scheduling for construction;
4. Waste management and handling of hazardous materials;
5. Water supply;
6. Power supply;
7. Roads and transportation.

Various alternatives will be compared in terms of potential environmental impacts, capital and operating costs, and suitability under local conditions.

Stakeholder Consultation

Stakeholder consultation will be carried out during the early stages of report preparation. Initial consultation has been done through the scoping session. The study team will continue consulting the relevant stakeholders either individually or through workshop at different stages of the study. The purposes of consultation will be:

1. To inform the public of all issues and concerns related to the project;
2. To specify project performance standards to be met;
3. To collect data, information or local knowledge;
4. To avoid future conflicts with affected or concerned stakeholders; and
5. To mitigate public environmental concerns.

Stakeholders that will be consulted are the following:

1. The site and neighborhood land owners.
2. The Municipality of Rafah.
3. Governorate of Rafah
4. The Palestinian Ministries of:
   - Environment
   - Agriculture
   - Transportation
   - Labor
   - Health
   - Local Government
   - Industry
   - Housing
   - Tourism and Antiquities
5. Palestinian Water Authority
6. Palestinian Energy Authority
7. Civil Aviation Authority
8. NGOs in the region.
9. Other stakeholders that the consultant believes will be affected by the project.

Impact Assessment

The impacts of the project will be described and evaluated for construction, operation and maintenance stages of the project.
The impacts will be indicated and evaluated for each project stage. The total impact values of the project stages will be assessed and compared with the baseline situation. More details are given below.

a) Physical and operational activities and their impacts:

Each stage of the project will be described regarding to its physical and operational activities.

b) Criteria used to describe the impacts:

Reference will always be made to local environmental management standards. In case of lack of relevant domestic legislation regarding any issue, reference will be made to the corresponding internationally applied and accepted standards.

c) Impact description and evaluation:

The estimated or measured impacts will be evaluated according to:

1. The extent of impact in terms of the time of appearance, frequency, duration and geographical scale, and
2. The number of impacts.

The impacts will be described with respect to the current situation, with the consideration of the autonomous development (without the project) in the area. Impacts will be evaluated according to each criterion and presented in tables. Numerical values will be given for the effect measurements. The evaluation procedure is summarized in the following steps:

1) *Effect value* is the amount of effect caused by the project activities on a certain area. For example, if the project offers employment opportunities for 50 persons, the value of effect will be 50 workers. But if the effect value cannot be given

numerically (e.g. cultural property) negative or positive singes give the effect value. For example:

--	Very negative
-	Negative
0	No effect
+	Positive
++	Very positive

2) *Impact value* is a numerical standardized value that represents the impact extent of a certain effect value. In other words, the effect values are translated into impact values. The range of the impact value is from –10 to +10.

3) Criteria weight is the value, which gives the importance of one criterion relative to other criteria. The criteria weight represents the view of the consultants based on their knowledge to the situation of the study area, their discussion and meetings with concerned bodies and agencies. Criteria weight value ranges from 0 to 100 providing that the summation of all criteria weights equals to 100.

4) *Assessment value* of a certain effect is obtained by multiplying the impact value by the criteria weight. The summation of all assessment values gives the total assessment value by which the project will be evaluated

5) Finally, the total assessment value of the project is compared with the assessment value of the existing situation

Environmental management and Monitoring Plan

The study team will develop an environmental management and monitoring plan, which will include feasible and cost effective measures to minimize or mitigate negative impacts. The monitoring plan will describe how and who will carry out the monitoring activities for addressing the negative environmental issues. Minimum Requirements for an Environmental Monitoring and Management Plan will be:

1. Environmental variables to be monitored, and frequency;
2. Reporting to appropriate authorities and local community;
3. Issues/concerns that are to be the subject of the environmental management plan, and reporting requirements to government and the public;
4. Environmental standards and guidelines that will be adopted or required;
5. An analysis of the effect and possible mitigation actions for the surrounding areas and landowners in addition to the site itself;
6. Compensation actions for the affected landowners;
7. Economic evaluation for the mitigation measures wherever possible.

Standards and References

Local Standards and References

- Environmental Law
- The Palestinian Environmental Assessment Policy
- Labor Law
- Antiquities Law
- National Environmental Health Strategy (1999)
- Draft Law on Local Government
- Environmental Manual of GIE
- Treated Wastewater Standards (Draft)
- Quality Standard of Drinking Water (Draft)

International Standards and References

- Israeli Environmental Guidelines for Air Quality

- WHO Guidelines for Drinking Water

2. Project Description and Alternatives

2.1 Site Alternatives

The scarcity of land makes the site selection of an industrial estate is very difficult task. The proposed site is selected based for several reasons,

- The available land satisfies the demand of local markets and.
- The location of the proposed site is very closed to Sufa Cross point, Gaza International Air Port and Rafah (El Awda) Cross Point.
- The selection of site for Rafah Enterprise Park was a result of series of studies and investigations by different institutions and establishments. The following discussion summarizes the site selection process and the historical development of the project:

- In December 1997, the Ministry of Planning and International Cooperation published the "Regional Plan for Gaza Governorates (1998-2015)" which identified an approximately 260 hectares of land between Gaza International Airport and Al Matar entry point (also known as Sufa Crossing) as suitable for industrial purposes.
- In February 1999, Ministry of Industry and PIEFZA initiated a Palestinian-Israeli joint committee to oversee the Industrial Park project.
- In March 1999, a Memorandum of Understanding (MoU) was signed by Minister of Industry, Dr. Sa'adi El-Kronz and Mr. Stef Wertheimer, President of ISCAR Ltd. This MoU defined a working team whose function was to promote an Israeli-Palestinian Industrial and Trade Park project in southern Gaza Strip. It was envisioned that Egypt in the future might develop an industrial area to be integrated to this project. The team determined the guidelines and methodology for advancement of the project.
- In April 1999, PIEFZA has formed a technical team that carried on a pre-feasibility study.
- In August 1999, a Concept Paper that presents the principles regarding establishment of an Israeli-Palestinian Industrial and Commercial Cooperation Zone was prepared.

- In September 1999, The Services Group under contract by USAID carried a survey of sites that are suitable for development of industrial estates in West Bank and Gaza. This study highlighted the location in Rafah as being suitable for industrial estate development.
- In November 1999, a second MoU was signed between Minister of Industry, Dr. Sa'adi El-Krunz, Mr. Stef Wertheimer, Chairman of ISCAR, Mr. Mohamed Rachid, Chairman of Palestinian Commercial Services Company (PCSC), and Mr. Sabeh Massri (on behalf of PIEDCO). The objective of the MoU was to establish a multi-purpose industrial zone.
- In March 2000, The Services Group, contracted by USAID, started the feasibility study for an Industrial Park at Rafah. The proposed site for the Industrial Park was determined by PIEFZA to be about 2700 dunums. However, the location and size of the site was revised twice by PIEFZA to be 1960 and 1475 dunums during the course of the Feasibility Study.

Site Location

The proposed site for Rafah Enterprise Park (REP) is located at the southeastern end of Gaza Strip, to the east of Rafah City, and falls within the jurisdiction of Rafah Governorate. It is located near the eastern borders of the Strip, about 5 kilometers far from the Egyptian borders, about 1.5 kilometers from Gaza International Airport and about 8.5 kilometers from the center of Khan Younis City. Figure 2.1 shows the proposed location of REP.

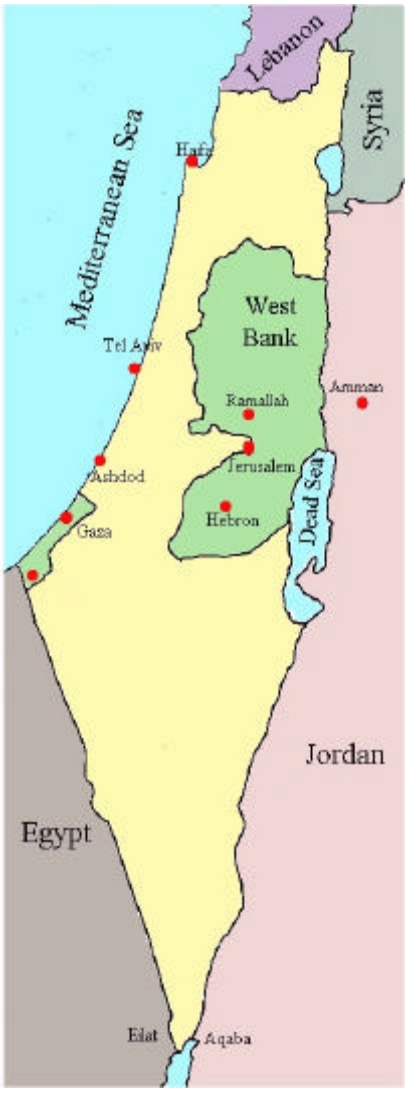

Figure 2.1: Proposed Location of Rafah Enterprise Park

2.2 Main Components of Rafah Enterprise Park

The main components of the Rafah Enterprise Park (REP) as mentioned in the master planning document are the Industrial Park, the Enterprise Development Center, the Central Services Area, and Technical College Campus. Those components are shown in Figure 2.2 and are briefly described below:

The Industrial Park

The industrial park will occupy a total area of about 100 hectares. A variety of industries will be accommodated in the industrial park. It is mainly planned to accommodate light and medium industries as explained below:

Medium-Intensity Industries. Demand by the medium intensity industries is projected as the most significant component of demand during the development of the REP. Typical investments include activities such as manufacturing and assembly of consumer electronics and electrical appliances; food and beverages processing; spare automotive and machine parts and manufacturing of flexible and non-flexible paper packaging.

Light-Intensity Industry. Demand by light intensity industries composes the second largest group of activities, which includes apparel assembly, assembly of footwear and leather products, and furniture assembly.

Logistics and Warehousing. Given the REP strategic location - based on its proximity to the Gaza International Airport, two borders (the Green Line and Egypt), and plans for a harbor only 35 kilometers away – investments in logistics and warehousing facilities will represent a small but important component of the overall demand.

Enterprise Development Center (EDC)

The EDC, given its specific set of entry criteria, will likely attract investments which include a combination of medium- and light-intensity activities. The EDC is composed of two modules (units) of approximately 7 hectares each. The units are designed to host export oriented, environment friendly industries utilizing high-technology production methods. The EDC will be fully serviced with basic infrastructure services such as; electricity, telecommunication, sewage system, water and roads.

Central Services Area

A total area of 10,000 m^2 is allocated for public sector facilities such as a clinic, a police center, a fire station and a mosque. This facility is also to include an administration center, banking and other commercial activities to serve the users of the Rafah Enterprise Park.

Technical College Campus

An important component of the Rafah Enterprise Park is the Technical College. A total area of 12.5 hectares is allocated for the location of a Technical College which is envisioned to supply the industrial park businesses with qualified graduates while the Industrial Park will offer training possibilities for the students.

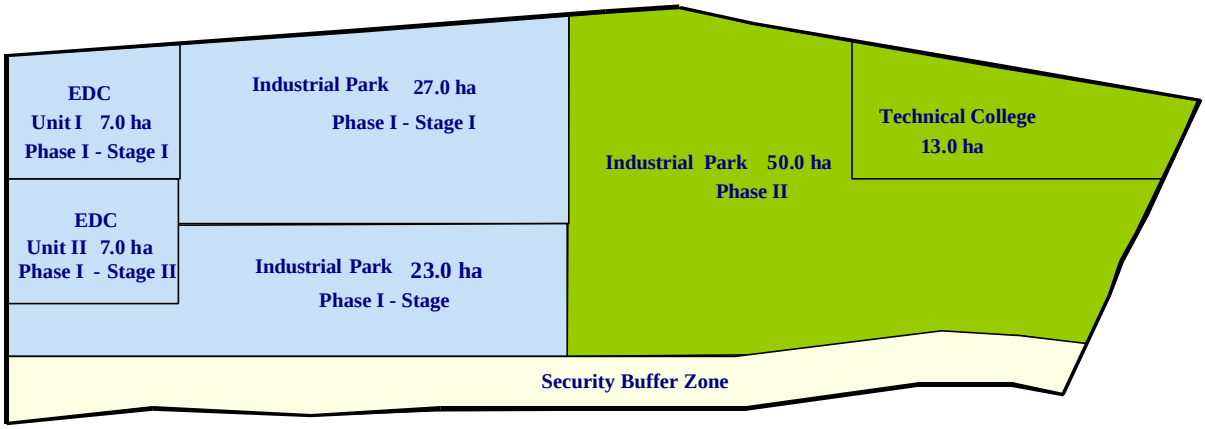

Figure 2.2: Master Plan Components and Phasing

2.3 Project Phasing

The proposed phasing is based on the market demand survey results and considered the demand for a Technical College as expressed by the Ministry of Industry.
Responding to the demand figures presented in the master planning, the implementation of the project is planned to be in two development phases:

First Phase

The first phase is planned to be constructed in two consecutive stages:

- Stage 1: EDC Unit 1 (7.0 hectares) and 27 hectares of the Industrial Park
- Stage 2: EDC Unit 2 (7.0 hectares) and 23 hectares of the Industrial Park

Second Phase

Area for Future Expansion Considering the future expansion needs of the industrial park, 50 hectares for Industrial Park area and 13 hectares for the Technical College comprises the second development phase. In order to maintain integrity of the industrial park, the future expansion area is located adjacent to the planned industrial park.

2.4 Duration of Construction and Operation Phases

Construction:

The development of the site is assumed to commence upon acquisition of the land by PIEFZA and transfer of it to the Developer (Palestinian Industrial Estate Development and Management Company, PIEDCO) and (Palestinian Commercial Services Company, PCCS). Following the transfer of land, the following activities can be executed in parallel:

- Detailed engineering design, and
- Demolition of existing facilities.

The construction sequence is designed to fulfill the demand for space requirements at each stage of development.

- Stage I is estimated to be completed in 5 years. The construction of ancillary buildings is proposed to commence at the same time with the construction of the Industrial Park buildings in Stage I.
- The EDC Unit I will be operational at Year 2 Month 6.
- The offsite infrastructure construction for Stage II starts at the end of Year 3. The construction of Industrial Park buildings for Stage II, however, starts end of Year 4, i.e. a year before Stage I is full.

Operation

Operation phase is 25 years.

2.5 Road Network

Several roads are proposed in the master plan of REP. These roads are necessary to connect the REP with the surroundings as well as with the adjacent facilities. Both offsite and onsite roads are presented in this Section.

Offsite Roads

Several main roads that are necessary to connect the proposed REP with the surrounding area are described below:

The REP Main Access Road (PR1). This is the main entrance to the proposed REP from Road # 4. It is proposed to be 40 m wide, following the approved plan by the Ministry of Local Governments.

Main Entrance Road(PR2). The REP main entrance road connects with the main entrance of the REP. It is of 24m wide and about 1,200m long. The road is planned to have full infrastructure utilities, including wastewater pipelines, water supply, electricity and telephone networks as well as road lighting poles.

The Airport Access Road (PR3). It is proposed to connect the REP with Gaza International Airport. This access road to the Airport is proposed to be 16 m wide. It is about 1,800 m long. The road is planned to have minimum infrastructure utilities, such as lighting poles. The main purpose of this road is to connect the REP with the intended Cargo facility at the Airport

Israeli Industrial Park Access Road (PR4). This is a 24m wide road that continues to the borderline with Israel. It is about 400m long in the Palestinian side. It is anticipated to continue in the Israeli side. The main purpose of this road is to provide a quick and efficient connection with the proposed Israeli Industrial Estate at Kibbutz Kerem Shalom. A new crossing checkpoint with Israel is anticipated at the end of this road.

Sufa Access Road (PR5). This road is planned to connect the REP to the Sufa Crossing to Israel. It starts from the northeastern boundary of the REP, moves to the north and then extends further east to reach the existing Sufa Road. It is proposed to be 24m wide inside the REP, 30 m wide outside the REP. The total length of this road is about 2,100m. It is planned to have full infrastructure utilities, including wastewater pipelines, water supply, electricity and telephone networks, as well as road lighting poles.

Sufa Crossing Road (PR6). This is an important existing road that leads to the Sufa Crossing Checkpoint. Its existing width is only 12m of paved asphalt. The importance of this road is anticipated to increase after the development of the REP. Therefore, the master plan suggests widening this road to have 24m of paved width. It is also suggested to include road lighting poles.

Borderline Road. A future main road is proposed by the Palestinian Ministry of Planning and International Cooperation

(MOPIC). It is to be located within the 100m security buffer zone along the border with Israel. The possibility of implementing this road is not yet certain, and it is not included within the project budget. However, if implemented it will serve the REP and provide an easy access to the anticipated Egyptian Industrial Area.

Israeli Industrial Park Access Road. This is a continuity of the proposed Israeli Industrial Park Access Road in the Palestinian side. It should be constructed following the development of the Industrial Area at the Israeli side.
The proposed offsite roads are presented in Figure 2.3.

Onsite Roads

Three main road categories are planned for onsite roads in REP: main roads, secondary roads and access roads. They are planned in a grid system to provide easy and direct access to all industrial units. The road hierarchy system is selected to provide efficient and economical infrastructure facilities.

Main Roads. The main road is a 30m wide road that passes through the REP site starting form the entrance and ends at the eastern boundary. It is planned to provide easy access to all industrial units and wide enough to accommodate all types of vehicles. Car parking spaces are also provided on both sides of this road.

Secondary Roads. Secondary roads are planned perpendicular to the main road. They are 16m wide.

Access Roads. Access roads are also 16m wide. They provide access to each industrial unit.

The Main onsite road and all Secondary Roads as well as all Access Roads will also be constructed. The construction of all on-site roads is vital in this stage in order to encourage investors and enhance accessibility to the Industrial Park.

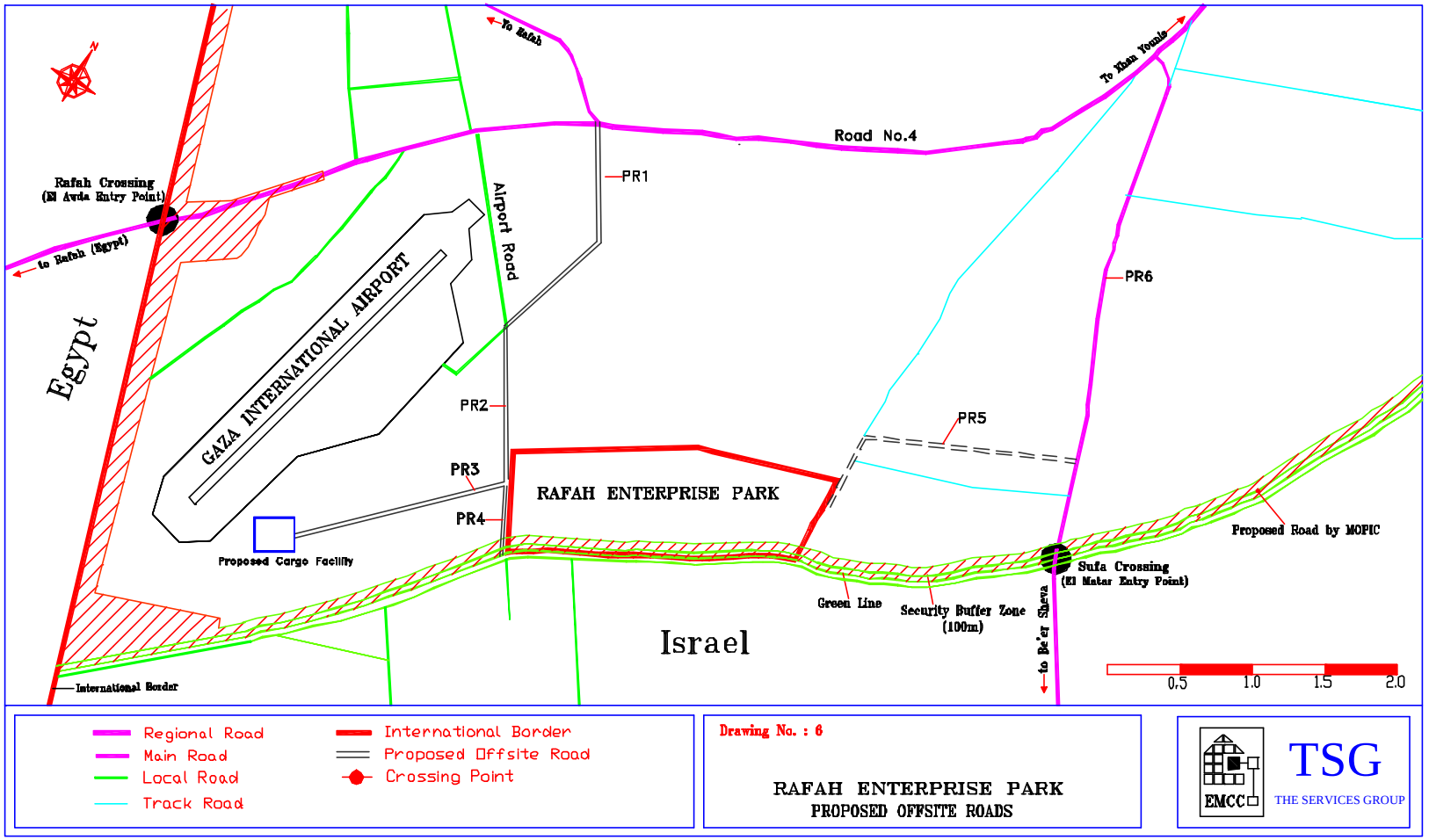

Figure 2.3: Proposed Offsite Roads

2.6 Offsite Water Supplies and Wastewater

Water Demand

For REP, the water demand is estimated as 4.5 m^3/day per dunum of building area for the Industrial Park (IP) and 6 m^3/day per dunum of building area for the Enterprise Development Centers (EDC). Considering that the ratios of the built up to the raw area are 0.45 and 0.25 in the IP and EDC respectively, the estimated demand can be translated to 2.0 and 1.5m^3/day per dunum of raw area for the IP and EDC, respectively. The total demand for the two phases is summarized in Table (2.1).

Table (2.1): Estimated water demand for the REP

	Phase 1			**Phase 2**			**Total Demand m3/day**
	Raw area (dunum)	**Demand rate (m3/day/ dunum)**	**Total demand m3/day**	**Raw area (dunum)**	**Demand rate (m3/day/ dunum)**	**Total demand m3/day**	
EDC	140	1.5	210	-	-	-	210
IP	500	2.0	1000	500	2.0	1000	2000
Technical College				130	1.0	130	130
Total	640		1210	630		1130	2340

Water Supply

For the purpose of evaluating the offsite water supply options, the two phases will be considered separately.

Phase 1 Options

The total daily demand for this phase is a bout 1210m^3 per day. To provide this quantity for the REP, three options are considered:

Option 1:

Digging water well at the western part of Rafah (El Hashash area) with a capacity of 70-80m^3/hr. This option will require the installation of about 11kms of 200mm UPVC pipe from the aforementioned well to the ground reservoir located at the utility area of the REP. The investment cost for this option is summarized in Table 6.8.

Digging the well calls for getting a license from the Regulations and Licensing Department of Palestinian Water Authority. PIEFZA has to apply for digging a well indicating the purpose of using the water in addition to the quantity he

needs. PWA would study the application and specify the exact location and the allowed discharge rate of the proposed well.

Any Developer (Palestinian Industrial Estate Development and Management Company, PIEDCO) and (Palestinian Commercial Services Company, PCCS), farmer or municipality has to cover all construction, operation and maintenance costs, if they are granted a license to dig a well. However, efforts are ongoing for the establishment of the Coastal Water Utility for water and wastewater services. Once this utility becomes operational, it is expected that all the domestic water wells will be taken over by the firm.

To date, there is no unified water tariff system adopted by PWA for the coastal region. However, based on the understanding of the engineering team's understanding of the existing water prices in Gaza Strip for industrial use which vary from 0.7 to 2.5 NIS /m^3, the expected price for water is 2.0 US$ /m^3. This expectation is derived from a study for PWA by LEKA (Lyonnaise Des Eaux Khatib and Alami) which identifies the average water cost in Gaza Strip (0.8 NIS/m^3), the cost of the desalinated sea water (about 3.3 NIS/m^3 at source) and Mekorote price (about 2.1 NIS/m^3).

Option 2: Obtaining water from Mekorote. According to the Concept Paper dated August 5, 1999, Mekorote Company will provide REP with water. Mekorote will incur all the costs of the pipe and fittings' installations inside the Israeli areas. The delivery point of Mekorote water shall be located at the crossing of the main access road to the REP site and the Delimiting Line. From this point, a 200mm UPVC pipe will be connected and installed to the ground reservoir located at REP as in the case of option 1. The total length of this pipe is measured to be 1400m. The current Mekorote water price for the Airport and other bulk consumers is 2.09 NIS/m^3 including VAT. It is estimated that this price will remain valid for REP.

Option 3: Obtaining water from the Airport well through a connection to the existing 200 mm trunk line that transmits water from the well to the Airport. The required connection is about 1400m long with 200 mm UPVC pipe diameter. It should be mentioned that the delivery point where the on site water installations will start, is planned to be at the ground reservoir in the "Utilities" area. Preliminary investigations indicate that

the Airport Authority demanded to provide the well with electricity and a standby submersible pump (Q= 76 m^3, H= 140 m) before this option can be materialized.

The Airport consumption in 1999 was about 70,000m^3/year. This translates to an average daily consumption rate of about 200m^3/day for the airport. This demand can be met by operating the well for three hours a day only. Even if the future demand of the Airport increases to 340m^3/day (as estimated by the Airport officials), both the well and the trunk line will have the additional capacity to supply at least the first phase of the REP. The Airport also reserves the seventh connection on Mekorote pipeline as an emergency source. The cost of each option is presented in Table 2.2.

The evaluation of the three options was based on the Cost, Integration with the second phase, Environmental concerns, and Ease of implementation. Based on these criteria, Option 3 was selected.

Table (2.2): Investment Costs of Options for Offsite Water Supply for Phase 1

	Capital cost			**Operation & Maintenance Cost US$/year**	**Engineering Cost (US$)**
	Description	**Quantity**	**Cost US$**		
Option 1	1-Digging well 80m3/h capacity	1	150,000	25,000	15,000
	2-trunk line 8" UPVC	11,000m	220,000	4400	15,000
	Total option 1		**370,000**		
Option 2	Trunk line 200mm UPVC	1400m	28,000	560	3000
	Total option 2		**28,000**		
Option 3	1-Trunk line 200mm UPVC	1400m	28,000	560	3000
	2- connect the well with electricity	Lump sum	60,000	25,000	
	3-provide standby submersible pump	1	8000		
	Total option 3		**96,000**		

Phase 2 Options

The additional water demand for this phase is about 1130 m^3/day and the total amount for the two phases (1&2) is 2340 m^3/day.

Since this demand is forecasted for the period between the year 2010 and 2020, it might be necessary to handle the water demand issue within the strategic plan for the water supply system in Gaza Strip at that time.

The Gaza Strip Water Supply Master Plan that was prepared for PWA by LEKA (Lyonnaise Des Eaux Khatib and Alami) assumes that drinking water from all sources will be collected in a main carrier which will feed storage reservoirs located all over Gaza Strip. According to this plan, the segment the water reservoir that serves Rafah area will be functional by the year 2010. This reservoir is 2.5 km far from REP. To meet the water demand of REP, construction of 200mm UPVC pipe will be needed from this reservoir to the location of the ground reservoir at the REP site. The capital cost will be US$50,000.

Waste Water System

The generated sewage from REP will be collected by gravity and disposed off at the lowest point at REP area. Assuming that the ratio of the generated sewage is 0.85 of the water consumption, the total estimated amount of sewage is1028 m^3/day for the first phase, and 1989m^3/day when the two phases are totally occupied. The treatment of the collected sewage for the first phase can be made in two different options.

Option 1:

The first option is to construct a treatment plant to serve REP only and the treated sewage can be reused for irrigating the green areas inside REP and or by the farmers who have agricultural land in the vicinity of the REP site. The soil profile of that area indicates that the soil strata are composed of clay layers with very poor infiltration rate, and if any recharging of the aquifer would have to be made, it will need large land area.

The components of this option are the treatment plant, a pumping station for discharging the treated sewage to the reuse locations and a pressure pipe with 8" diameter for restricted irrigation.

The most practical and feasible alternative for the treatment process that fits the small sewage flow is the Sequencing Batch Reactors (SBR). It should be mentioned that this alternative and regardless of the cost issue has potential problems. These problems are mainly the reuse of the treated sewage if the total treated water is not completely consumed by agriculture especially in wet season, sludge treatment and the operation and maintenance of the treatment plant.

Option 2:

This option is pending the operation of Rafah and Khan Younis WWTP. In this option, the collected sewage will be pumped out to the planned main treatment plant 6 km to the north of REP. This WWTP is expected to be constructed in March 2001 and be functioning by mid of 2003. The disposal of the REP sewage entails the construction of sewage pumping station and 7 kms of 200mm UPVC pipe.
The reuse, the sludge treatment and the operation and maintenance for the treatment plant, will no longer be of concern because these matters will be dealt with at the main WWTP.

The capital cost for the two options is summarized in Table 2.3. The disposal of the raw sewage to Rafah and Khan Younis WWTP will entail some fees per cubic meter of sewage.

Table (2.3): Capital Cost for Sewage Disposal Options

Item description	**Option 1 Cost US$**	**Option 2 Cost US$**
1. Treatment plant (1500m3/day)	700,000	-
2. Pumping station for treated sewage Q= 1030m3/day H=30 ms	300,000	-
3. Pumping station for raw sewage Q= 1030 m3/day H=30ms	-	400,000
4. Pressure line 3kms 200mm UPVC for reuse	54,000	-
5. Pressure line 7kms 200mm UPVC for discharging raw sewage.	-	126,000
Total Cost	**1,054,000**	**526,000**

Evidently, the capital cost of Option (2) is about 50% of Option (1). The pumping energy cost will be almost the same in the two options, because both the pumped discharge and the head are almost the same. In option 1, there is still an additional operation and maintenance cost to be considered for the SBR plant. However, the applicability of option 2 is pending the implementation and functioning of Rafah and Khan Younis WWTP.

2.7 Onsite Water Supply and Wastewater

Water supply

The onsite water supply system comprises the construction of ground and elevated tanks, booster pump station and the distribution network. The design of all the components of the water supply system has been based on the following assumptions:

At least one-day storage capacity should be secured. The water that comes to the site regardless of the source has to be collected in the ground reservoir, whilst the booster pump is to discharge the water to the elevated tank. The elevated tank would be high enough to supply the first phase of the REP with water by gravity.

The ground tank would have a capacity to cover the demand of the two phases, but the elevated tank is designed to meet the demand of the first phase. This is because the cost saving if the size of ground tank is reduced with 40% of its original size will be minimal, meanwhile the reduction of the elevated tank size will have considerable implications on the cost.

Ground reservoir with a capacity of 1000m^3 located at the utility area at the highest point. The reservoir is made of reinforced concrete with a circular cross section.

Elevated tank with a capacity of 700m^3 and height of 30 ms located at the utility area. The elevated tank is made of reinforced concrete. The tank has a circular cross section.

Booster pump station with three pumps, two of them can cover the peak demand, and the third is a standby pump. The characteristics of the pumps are; Q= 120 m^3/h, H = 35m. At the first stage, two pumps can be installed and after 4-5 years the third one will be installed.

The water network comprises one main pipe 200 mm in diameter, sub-main pipe 160 mm in diameter and the distribution pipes of 110 mm in diameter.

All the main and distribution network will be installed underground along the roads. The water pipes will be located in the sidewalk with a minimum cover of 0.8m. Regardless of the width of the road, only one pipe in the road shall be installed.

The construction of the distribution network will be made in two stages, but the water tanks and the booster pump station will be constructed in the first stage.

Waste Water

The waste water system comprises the collection network and manholes.. All the pipes shall be installed underground along the roads. Due to the topographical characteristics of the area, the sewage flow shall go into the collection network by gravity. Except the main pipe that conveys the sewage to the WWTP, all the collection pipes are 200mm in diameter.

Electricity

Electrical demand

The demand was based on the knowledge and experience of the engineering team as well as a survey of the electrical consumption of similar industrial activities, in addition to design values used for the industrial estates in the region. In this regard, the electrical consumption in Gaza Industrial Estate, the design values from Israel and Jordan have been studied and evaluated. The following figures have been used:

Lighting: 15 kW/dunum of building area
A/C: 130 kW/dunum of building area
Miscellaneous: 50 kW/dunum of building area
Manufacturing: 100 kW/dunum of building area
Warehouses: 20 kW/dunum of building area

The total electrical demand for the REP is presented in Table (2.4).

Table (2.4): Electrical Demand

	Phase 1			**Phase 2**			**Total Demand KW**
	Building area (dunum)	**Demand rate (KW/ dunum)**	**Total demand KW**	**Building area (dunum)**	**Demand rate (KW/ dunum)**	**Total demand KW**	
EDC	38.25	130	4973	-	-	-	4973
IP	219	70	15330	219	70	15330	30660
Technical College				30	50	1500	1500
Total	257.25		20303	249		16830	37133

Electrical Supply

According to the Palestinian Energy Authority's (PEA) future plan for supplying the southern part of Gaza Strip with electricity, there is a proposed substation close to the road that connects Road No. 4 with Sofa crossing. From this substation, there are five planned high-tension lines to be installed; 1 line to feed the Airport, 2 lines to feed Rafah city and 2 lines (with 24 MW capacity) to feed the REP.

The implementation of this plan is pending the operation of Gaza Power Plant (GPP). It is expected that the first phase of GPP with a capacity of 48 MW will be functioning by the end of 2000. The construction of the southern sub- station is expected to start in mid of 2001 and the construction may last 1.5-2 years.

The electrical demand for phase 1 has been estimated to be 20.3 MW. Until the southern electrical sub- station is being constructed and the two cables that are supposed to be installed for the REP site are in place, two options are seen viable to meet the demand of the first two years.

Option 1:

The Concept Paper dated August 5,1999, the Israeli Electricity Company which currently supplies Gaza Strip with the electricity can be contracted for the first few years to provide REP with electricity. The cost of the entire offsite installations including transforms has been estimated to be about 4 million NIS. In addition to that cost which will be incurred by the Israeli Electricity Company, there is the cost of installing a high tension line with a capacity of 11 MW. This cost would be added to the offsite infrastructure cost.

Option 2:

To provide the electricity through on site diesel generators. For this purpose, the demand of the first two years is estimated to be 4.3 MW. This demand can be met by providing two diesel generators 1.36 Mw capacity each and one generator with 1.7 Mw capacity. The total cost of these generators including accessories is 830,000 US$. The break down of the electricity installations' cost is show in Table (2.5).

Table (2.5): Cost estimate of Diesel generators for the first two years

Description of items	Quantity	Unit rate US$	Total Cost US$
1- 1.36 MW Diesel Generator	2	250,000	500,000
2- 1.7 MW Diesel Generator	1	310,000	310,000
3- Main fuel tank and installation	1	10,000	10,000
4- Civil works	Lump sum	10,000	10,000
Sub- total			830,000
Operation and maintenance/ year			8,300
Engineering			5000

These generators will be working as standby generators when the REP site is connected the southern sub-station.
Having the southern sub-station operating, one high-tension cable with 11 MW capacity should be installed to cover the demand of stage one, which has been estimated to be 10.23 MW. The demand of the second stage is estimated to be 10.1 MW should be covered by installing another cable with 11 MW capacity.

Telecommunications

The only option to provide the REP with telephone lines is from the Palestinian Telecommunication Company (PalTel). As mentioned in section 5.8, the main fiber optic cable that crosses the REP site needs to be re-located in the main road of the REP. The re- location cost is summarized in table (2.6).

Table (2.6): Cost Estimate for Offsite Telecommunication Works

Description of items	Quantity	Unit rate US$	Total US$
1- Installation of fiber optic cable F32	2200	15	33000
2- Installation of 4 ducts 4" PVC	2200	16	35200
3- Installation of manholes	8	1800	14400
4- Joints	5	500	2500
Sub-total			85100
Operation and maintenance			Incurred by PalTel
5- RSU 500 lines	1	80,000	80,000

The estimated no of telephone lines required for the first phase is summarized in Table (2.7).

The installation of one Remote Subscriber Unit (RSU) with a capacity of 500 lines will cover the demand of the first phase. PalTel will incur the cost of installing this unit.
The selected offsite infrastructure options for water, wastewater, electricity and telecommunications are presented in Figure 2.4.

Table (2.7): Demand of Telephone lines

Description of items	No. of telephone lines	Remarks
Stage 1		
EDC	35	4 lines for each building unit + 7 lines for administration building
IP	260	3 lines for each factory +20 lines for central services
Total stage 1	295	
Stage 2		
EDC	32	4 lines for each building unit
IP	192	3 lines for each factory
Total stage 2	224	
Total phase 1	**519**	

Storm Water Drainage

The average annual rainwater at Rafah area is about 150 mm, which is the least rainfall quantity in Gaza Strip. The area of REP is naturally sloping to the east, thus allows the surface drainage of runoff storm water. The design of the vertical profile of the roads shall take into account the surface drainage of the entire area of REP. The strip of 100 m at the eastern boundary of REP that is considered as green area will accommodate the small run off quantity that will be generated from the roofed and paved areas.

The total runoff quantity that can be collected from REP is estimated at 650,000 x 0.65x 10.5/1000 = 4436 m^3.
If this quantity will be drained to the green area at the eastern boundary of REP which has a land area of 100 dunums, then the water depth will be 4.4 cm. Therefore, no special facility will be needed in REP for storm water disposal.

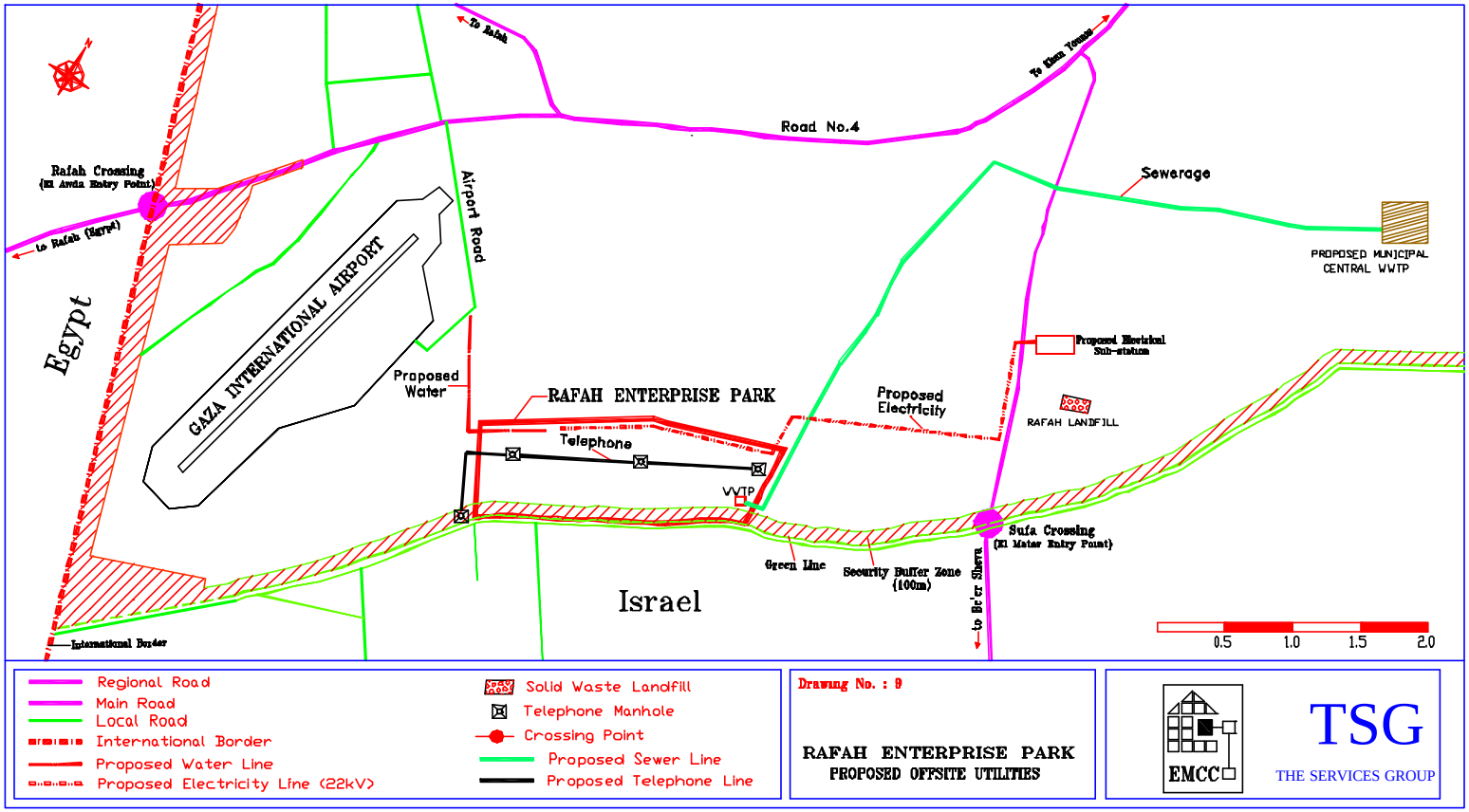

Figure 2.4: Proposed Offsite Infrastructure

3. LEGISLATIVE AND REGULATORY CONSIDERATIONS

3.1 Introduction

Following the autonomy agreement, between the Palestinian Liberation Organization (PLO) and Israel in 1994, the Palestinian National Authority (PNA) was established. In January 1996 the first general election was held to elect the Chairman of the PNA as well as the members of the Palestinian Legislative Council

Until November 1996 the governmental organization basically consists of two levels: central and local levels. In November 1996 a new intermediate level was introduced as Governorate, thus three levels were established: central, regional and local governments. Now, in the Gaza Strip, there are five Governorates: Northern, Gaza, Middle, Khan Younis, and Rafah.

All ministries were announced in 1994 and, since that time, a major effort has been made to consolidate these ministries and to develop administrative capacity.

3.2 Palestinian Institutional Framework

The current institutional framework in relation to the New Industrial Area in Rafah has been reviewed according to the related ministries and governmental and non-governmental organizations. The organization in relation to this subject may be divided into two groups: main organizations and other relevant organizations.

Main Organizations

There are three main organizations that are directly sharing in the planning and environmental studies for the industrial areas. These three organizations are:

Ministry of Environmental Affairs

Before December 1996, the Environmental Planning Directorate (EPD) as part of the Ministry of Planning and International Cooperation (MOPIC) has completed several baseline studies and prepared environmental profiles and plans for the Gaza Strip and West Bank. In December 1996

the Palestinian Environmental Authority (PEnA) was established and EPD became part of PEnA.
In August 1998, a new cabinet was announced. The Ministry of Environmental Affairs (MEnA) was one of the new ministries introduced.

The prime responsibility of MEnA is to promote a sustainable environmental development of the Palestinian society. Its main task is the protection of the environment, including its water, soil, air, natural resources, nature and Biodiversity, and the prevention of public health risks related to environmental issues. The main responsibilities of MEnA are in the field of planning, monitoring, licensing and enforcement:

MEnA is responsible for the development of the environmental policy, legislation and environmental planning. It is also responsible for developing standards, norms and guidelines for creating environmentally sustainable conditions. For a number of standards MEnA has primary responsibility. However, for other categories the primary responsibility is with other agencies.
MEnA has to set the norms and domains to determine which projects shall be subject to environmental impact assessment studies. MEnA chairs the reviewing committee for the approval of the EIA studies.
Monitoring of the physical environment is an important task of MEnA. It also includes the monitoring of the compliance with the environmental laws and regulations, as well as the enforcement by means of putting sanction on violations and transgressions. MEnA can take the initiative to conduct environmental studies and research on all the environmental subjects
It is MEnA's task to monitor the occurrence of environmental pollution, and to prepare and implement contingency plans necessary to combat and reduce environmental pollution.
MEnA is moreover responsible for enhancing the public awareness about environmental issues and for increasing the capacities and skills of the human resources of its own organization through education and training in environmental management.
It is MEnA's task to follow up environmental trans-boundary issues. These issues are mentioned in Oslo agreement.
MEnA does not bear sole responsibility for the environment. Other authorities, ministries and municipalities and the private

sector also bear responsibilities with respect to the environment

Ministry of Industry and PIEFZA

Ministry of Industry has established two departments dealing with the industrial pollution control which are:

Department of Standards; In this department there is an industrial safety unit which is responsible for monitoring wastewater quality and safety aspects inside Factories

Palestinian Industrial Estate and Free Zone Authority (PIEFZA); The decision taken by the Council of Ministers pursuant to the provisions of the law regarding allocation of an industrial estate and/or industrial free zone in Palestine. The industrial estate is an area designated to service one or more beneficiaries for export related activities having special customs and tax provisions guaranteed by this law. The industrial free zone is an area assigned to service one or more beneficiaries for export related activities having special customs and tax provisions guaranteed by law No. 10/1998 regarding industrial estates and industrial free zones.

The manufacturing projects are licensed to work inside an industrial free zone by special certificate issued by PIEFZA under the provisions hereof indicating that a licensed project is entitled to start work in an industrial free zone. PIEFZA shall be concerned with the following tasks as mentioned in the objectives and tasks of PIEFZA of law No. 10/1998:

Preparation of a comprehensive general policy for the establishment and development of industrial estates and industrial free zones in Palestine.

Submission of proposals, plans and recommendations to the Council of Ministers regarding the establishment, development and management of any industrial estate or industrial free zone in Palestine.

Accepting and receiving applications related to the establishment of industrial estates and industrial free zones for industrial projects, and submission thereof to the Council of Ministers coupled with its recommendations.

Study applications submitted by different parties for licenses to work in an industrial estate and/or industrial free zone and grant the industrial free zone certificates to the investors.

Development of industrial estates and industrial free zones, directly or through the Developers (Palestinian Industrial

Estate Development and Management Company, PIEDCO) and (Palestinian Commercial Services Company, PCCS).
Preparation of plans and programs related to the development and growth of industrial estates and industrial free zones.
Establish public facilities required by the industrial estates and industrial free zones, directly or by a third party.
Determine the fees and collection stipulations for services provided by PIEFZA to industrial estates in accordance with the law.
Monitoring performance and development of industrial estates and free industrial zones, and publish reports.
In addition to the previous tasks, PIEFZA shall determine the conditions of the concession deed: term, master lay-out, general specifications of buildings and infrastructure of the industrial estate or industrial free zone, operation and maintenance plan and type of activities and services to be carried out, all in accordance with the regulations and instructions of the concession deed.

Ministry of Local Government

Currently, the local government system of Gaza Strip consists of 16 municipalities, and 5 local councils. Rafah Municipality and Al Shoka local council are responsible in the planning of the new enterprise park in Rafah.

Other Relevant Organizations

Ministry of Planning And International Cooperation

Ministry of Planning and International Cooperation (MOPIC) consists of three general directorates: planning, international cooperation, and administration. The General Directorate of Planning consists of two directorates: Environmental Planning Directorate (EPD) and Physical Planning Directorate. In the past several years, both have completed several baseline studies and prepared environmental profiles and plans for the Gaza Strip and West Bank, with Dutch, German, and Norwegian technical and financial assistance. In December 1996 the Palestinian Environmental Authority (PEnA) was established and EPD becomes part of PEnA. PEnA was merged in MEnA in 1999.

Ministry of Housing

The Ministry of Housing is responsible for all public/government lands. The procedure to confiscate any land necessary for any project should go through the Ministry of Housing.

The Ministry of Transport

The ministry includes the following departments:

- *Traffic Department:* this department is responsible for licensing and testing. It is also responsible for issuing drivers' licenses. The Department also tests the imported spare parts and regulates the work of the driving schools.
- *Department of Vehicle Mechanics and workshops*: this Department regulates car imports, maintenance workshops and equipment.
- *Marine vehicles and marine affairs*: licenses of boats, canoes and ships.
- *Research and Development Department*.
- *Meteorological Department*: this Department functions and responsibilities include:

  - Study atmospheric phenomena and related subjects;
  - Observe and record weather and climate;
  - Prepare and issue weather forecasts, including warnings of severe weather conditions, and
  - Prepare publications about the weather conditions for planning and other purposes.

Palestinian Water Authority

Palestinian Water Authority (PWA) was created as a planning and regulatory body for managing the water resources and wastewater within the Gaza Strip and the West Bank. PWA is not as implementing agency. Currently, technical or specific department within the local council, mainly water department within the local council structure, manages water supply systems and wastewater treatment facilities to the extent they exist within the Gaza strip. Future plans call for the creation of autonomous private sector water supply and sewerage agencies to assume these roles on a fee-per-service basis.

PWA is now in the process of establishing a publicly owned coastal water utility, which would be run as a private company. Once this utility is in operation, it will take over from the technical department within municipalities and local councils.

Ministry of Health

Environmental Health Department (EHD) is a central department in the Ministry of Health. The work on environmental issues is distributed between several governmental and non-governmental institutions. The Department of Environmental Health and the Ministry of Environmental affair are the two main key institutions working on the environmental issues. One of the main objectives of EHD is promote research and information exchange related to health and environment (water, air, hazardous waste, vectors, and toxic materials). The vision of EHD is to reach an environmental health situation that ensures a sustainable development, effective prevention and control of environmental risks and equitable access to healthy environment. EHD has intersectoral relations with:

- Ministry of Environmental Affairs
- Ministry of Industry
- Ministry of Agriculture
- Ministry of Education
- Ministry of Local Governments
- Palestinian Water Authority
- Universities

EHD is responsible for the monitoring and control of industrial activities via inspection and a registration program. For each industrial activity, all required information are registered (e.g. raw materials, processes, products, wastes...etc.). National standards are used as well as regional standards.

EHD is responsible to ensure that the environment in working places is healthy. Pollution emission sources are monitored and controlled. National, regional and international standards are used in evaluating the environmental conditions. Air quality and noise laboratory are not available in the MOH . However, private laboratories can be used to perform air quality and noise test

The Epidemiology Department in the MOH. is responsible to follow up any diseases caused by environmental pollution with full cooperation with the Environmental Health Department. The number of disease cases is registered according to the type of environmental pollution.

The Department of Crafts and Industries Licensing is responsible to evaluate new projects and gives approvals for

these projects through the Central Planning Committee of the MoLG

Ministry of Agriculture

The Ministry of Agriculture is responsible for:

- Achieving the legislation that controls the extension of urban areas at the expense of agricultural areas and ensure sustainable development.
- Establishing methodologies for conservation of biological diversity and for sustainable use of resources by utilizing legislation, rules, procedures, budgetary allocations and other regulatory measures.
- Advancing public awareness concerning the advantages of Biodiversity conservation and sustainable development.
- Indicating the types of crops that can be irrigated by treated wastewater using the international standards.

Ministry of labor

The Department of Occupational Safety is responsible to

- Performing periodical visits to work places and giving instruction regarding workers and equipment safety
- Monitoring chemical, physical and biological impacts on workers, and
- Keeping records and monthly reports on work places in the Gaza Strip

Palestinian Standards Institute

The Palestinian Standards Institute issues standards for all subjects with full coordination with related ministries and governmental and non-governmental organizations.

3.3 Legislation, Policies and Regulatory Standards

A number of draft and adopted laws, standards and policies that are of particular interest to this EIA study have been reviewed. These legislative, policies and regulatory standards are summarized as follows:

Adopted Legislative, Policies and Regulatory Standards:

There are a number of adopted laws related to this project. These laws are reviewed and summarized as follows

During the year 1997 a Draft Environmental Law was prepared and discussed in workshops with different ministries and agencies. Mid 1998 the Palestinian Legislative Council

(PLC) evaluated the Law, and on 28/12/1999 the president approved the law.

Environmental Law is clear in assigning tasks and responsibilities to the Ministry of Environmental Affairs (MEnA) and the other specialized agencies, without creating duplication of tasks, or interfering with each other activities.

Environmental principles from the Environmental Law:

A number of principles and guidelines have been defined in the Environmental Law which form the basis for decisions and structures of the environmental institutions and legislation. These principles are listed in the box below:

- Every individual living in Palestine has the right to a sound and clean environment and to the best possible of health care and social welfare, as well as protection of the country's natural resources, and to the preservation of its historical heritage.
- Every person in Palestine has the right to pursue the enforcement of the right to a clean and healthy environment against any party; he/she may also obtain any official information about the environmental impacts of any planned activity.
- The general public may present advice and consultancy regarding the preparation of national environmental policies, regulations and plans
- Persons responsible for the occurrence of any environmental harm shall bear the cost of removing this harm in a way that reduces the pollution, in addition to the bearing of other compensations.
- Measures to prevent pollution shall be given precedent over measures to control pollution, which shall be used only in cases where pollution prevention measures are not possible or economically not feasible.
- Every person shall be committed to preserving the Palestinian environment and shall work on avoiding any activity that may cause environmental harm"
- The protection of the environment through collective and individual initiatives for volunteer work shall be encouraged through environmental education in schools, universities, institutions and clubs

? An Environmental Authority shall be established which is responsible for the development of Environmental strategies, management plans and monitoring programs that aim at the sound use and conservation of the environmental and natural resources in Palestine.

Scope of the Environmental Law

The Environmental Law describes a wide scope of environmental issues. It contains specific sections with rules and regulations about

- ? Land use
- ? Solid Waste
- ? Hazardous Waste
- ? Pesticides and Fertilizers
- ? Quarrying and mining
- ? Desertification and Land drifting;
- ? Air
- ? Nuisance and Noise
- ? Water environment
- ? Marine environments; and
- ? Natural zones and reserves

The Environmental Law further elaborates on environmental impact assessments (EIA's), environmental monitoring, licensing, inspection, and the setting of sanctions or Penalties on violating the Environmental Law.

System of the Central planning Committee in the Gaza Strip

Central Planning Committee comprises of representatives of all ministries and chaired by the Ministry of Local Government. Although there is one central planning committee for each Governorate (Mohafaza) in the West bank, there is only one central planning committee for all five Governorates in the Gaza Strip. Central Planning Committees would ensure that regional and national level plans are respected.

Although local governments (e.g., Municipalities) can grant construction permits for small-scale projects (e.g., building a house), projects of a public nature or projects with environmental impacts require approval by the Central

Planning Committee. In particular, local planning committees submit the following types of projects for approval by the Central Planning Committee:

- Master plan and detailed land use plans;
- Detailed street plans and changes in land use plans; and
- Industrial zones.

Local planning committees publish preliminary decisions for public comments and appeal over a 60-day period. At the end of this 60-day period, and depending on the public comments received, the Central Planning Committee can issue the final decision.

Land Ownership

If a land is needed for public services, the procedure to repossess the land is as follow

The concern agency has to send an official application to the central planning committee in the ministry of Local Governments describing the situation and the necessity to repossess the land. The committee from its side studies the application and if it is accepted they have to apply to the President asking him to confiscate the land. When the application is accepted by the President, he gives his approval and sends an order to the Ministries of Housing, Justice and Finance to formulate a committee in order to visit the site and estimate the amount of compensation to the owners.

Antiquities Law

The existing law of antiquities is a British Mandate No. 51 for 1929 An antiquity, as defined by this law refer to:

(1) an artifact produced before the year 1700 CE.;
(2) a human-made objective of historical value made after the year 1700.; and declared by the Director of Antiquities Department to be an antiquity; or
(3) a biological fragment dating from before the year 600 CE.

The law set out ownership rights for antiquities, rules for the excavation, sale, collection, export and protection of antiquities, and rules for establishing and protecting “antiquities sites”.

The law also establishes an Archeological Council headed by the Director of Antiquities Departments. Penalties for contravention of the law are also set out.

Ownership of Antiquities and Restriction on Antiquities

Antiquities discovered after this law came into force the property of the British Governor

A person who discovered an antiquity is required to notify the Director of the Antiquities Department.

Department may waive Governor ownership of an antiquity

It is forbidden to take antiquities out of Palestine without the written approval of the Director or British Governor

License to Carry out Excavations

A person must have a license to dig or search in any manner for antiquities

Protection of Sites on Which Antiquities are Discovered

Work on land on which an antiquity has been discovered must be suspended, and the Director must (1) notify the owner or occupier of the land of the conditions by which the works may be continue on the land, or (2) order the work be permanently stopped. Persons damaged by these orders may demand compensation.

The director may declare that an area is an “Antiquity Site”. It is forbidden to make any alternative to such site or to the antiquities therein.

The British Governor is authorized to confiscate any antiquity site for the purpose of conservation research

At Present the Ministry of Tourism and Antiquity has established in 1994 within the PNA and the department of Antiquity within the ministry is responsible for this issue. The department is drafted a Palestinian law of antiquity which is in the PLC since 1996. The department modifies a system now to deal with any Antiquity issue with regard to any project as fellow: The proponent or concerns agency should apply in

written about the project with all data needed. Then the Department will ask the inspection section to carry a survey at that area of the project and reply in written about their finding and opinion.

Labor Law

Labor law No. 16 for the year 1964 is the Palestinian labor law applicable for Gaza Strip Governorates till a comprehensive law for all Palestine is issued and approved by PLC. Labor law is the reference for work and labor regulations and different parties rights. Workers occupational health and safety is presented thoroughly in the labor law in the following Context:

3rd chapter, 1st section contains regulations for workers health and safety. Articles 62 and 63 states that it is necessary to inform the worker about any danger in his duties before starting the work and take the necessary measures on the owner expenses. Article 64 states that workers should not damage or spoil any protection means and has to obey all the instructions related to workers health and safety. Also it is the mandate of labor ministry to monitor factories and penalize the non-compliance.

3rd chapter, 2nd section contains regulations about work accidents and death. any worker who is injured during work is entitled for compensation. Therefore, the employs has to Have employers insurance liability that provides workmen's compensation protection. The labor law also stated the amount of benefits based on the degree of disability, occupational injuries or death. The law required that the employer to provide all necessary first aids to injured workers. Therefore, first aid measures, equipment and medication should be available on site. The law has articles that regulate the number of working hours, wages, and disputes resolutions and workers age.

The law also indicated the role of the Ministry of labor in enforcing the regulations and orders and foresees punishment if violations or failure to correct violations are committed. The law stated the rights of workers for paid vacations and holidays, whether national holidays or workers yearly holidays, the obligatory one day rest through the week pension funds and end of service sawing

A social security law has been prepared by the Ministry of labor and submitted to the Ministry of Justice for review and hearings. The law contains articles stating the right of workers in compensation under injuries or retirement, health insurance, compensation for sick leaves, etc. Regarding property insurance, against natural disasters or fire, there is no article stating obligatory insurance, rather it is optional.

Law No. 11 for the year 1946 deal with factories and industrial establishments. Among its articles, those are relevant to industrial areas.

- Proper ventilation and a clean work place should be provided.
- Proper temperature inside the establishment should be provided.
- Medical observance should be ensured.
- Provide proper protection for machinery to reduce casual injuries.
- Provide proper lights, entrances, exits, escapes, etc.
- Article No. 16 (sections 1,2 and 3), Article No. 17 (sections 1 to 5) and Article No. 18 (sections 1,2,3,4) of part 4 of the 1946 law state that proper protective measures to be taken around conveyer belts and lifting equipment. Fencing and cautionary devices to be installed. The belts and lifts to be tested every six months.
- Article 8 (sections 1,2 and 3) part 3 requires providing proper working temperature.
- Article No. 30 (sections 1,2,3,4 and 5) requests that proper precaution to be taken against dust.
- Articles No. 35 and 37 require providing proper measures against fire.
- Clean drinking and bathing water to be provided
- First aid tools and materials to be provided.
- Training on occupational health and safety procedures to be provided to workers by the employer.

Legislative, Policies and Regulatory Standards:

The Palestinian Environmental Assessment Policy

The Palestinian Environmental Assessment Policy has been drafted by Ministry of Environmental Affairs (MEnA), which have been discussed in April 1999 in two public meetings in both Gaza Strip and the West Bank. In April 2000, the

Palestinian Ministerial Council was approved the Palestinian Environmental Assessment Policy, through resolution No: 27-23/4/2000.

This Policy came out as a result of several consultation meetings organized by MEnA in the West Bank and in the Gaza Strip with participation of different concern ministries and authorities.

The policy consists of two parts:

Part A *The Palestinian Environmental Assessment Policy, which is divided as follows*

Part 1

Article 1: Definitions

Part 2

Article 2: Goals of the Policy
Article 3: Principles Underlying the Policy
Article 4: Development Activities Subject to the Policy
Article 5: Responsibility for Implementation
Article 6: Environmental Assessment Committee

Part 3

Article 7: Environmental Assessment Studies
Article 8: Stakeholder Consultation
Article 9: Trans-boundary Environmental Impacts
Article 10: Objections

Part B *Annexes to the Environmental Assessment Policy*

According to this policy the proponent of any proposed activity should fill in application for Environmental Approval to the Ministry for Environmental Affairs (MEnA). Then MEnA will notify the appropriate permitting authorities that an application for environmental approval has been received and that an EIA is required.

Terms-of-reference (TOR) for an Environmental Impact Assessment (EIA) are prepared by the Authority on the advice of the EA Committee, as required, and in consultation with a proponent. The Authority may require a proponent to carry out scooping studies as part of TOR preparation. From the decision to require an EIA, the Authority shall have a maximum of 21 business days in which to prepare TOR. If

this deadline is not met, the proponent has the right to submit a written complaint to the minister, who must respond in writing within a week from receipt of the complaint.

The TOR specify the minimum scope of any study. The proponent is responsible for defining the full scope of he study and for justifying it in the EIA report.

Stakeholder consultation is mandatory when undertaking an EIA. In consultation with the proponent and the EA Committee, the Authority determines what the minimum requirements for stakeholder consultation should be. It may be required during scooping and terms-of-reference preparation, and during the conduct of the EIA. At minimum, the proponent must meet with the principal stakeholders to inform them about the proposed project and to solicit their views about it. More problematic projects should involve more extensive consultations. The methods and results of these consultations must be documented in the EIA Report.

The proponent submits a draft EIA Report to the Authority, which conducts an initial, internal review to determine if the report contains the minimum requirements, specified in the terms of reference. Once it is satisfied that the minimum requirements have been met, the proponent finalizes the EIA Report and the Authority accepts it for review. The Authority then conducts a detailed technical review of the report with the assistance of the EA Committee. Depending on the complexity and scope of the project, an independent consultant may be retained to review the report and advise the Authority. The Authority staff may also meet with non-governmental stakeholders to verify or extend the stakeholder consultations undertaken by the proponent. The head of the Authority may, if it is considered warranted, require the proponent to hold stakeholder meetings on a project, chaired by the Authority, to solicit further comment on it and on the EIA Report.

When the reviews are completed and consolidated, the Authority meets with the proponent to discuss the EIA Report and, if necessary, require that revisions or additions to the report be made before Environmental Approval is considered further.

Once it has accepted an EIA Report for review, the Authority has a maximum of 28 business days in which to complete the first review, and a maximum of 21 business days for the review of each subsequent revision or addition to the report. If any of these deadlines are not met, the proponent has the right to submit a written complaint to the Minister, who must respond in writing within a week from the receipt of the complaint.

If stakeholder meetings are required to review the project and an EIA Report, the head of the Authority may extend a review deadline to a maximum of 42 business days upon giving notice to the proponent, relevant permitting authorities, and affected parties.

When the Authority's review is complete, the Authority must attest that the EIA Report has been satisfactorily carried out and:

i) Grant Environmental Approval with, if necessary, conditions to be included in subsequent permits; or
ii) Withhold Environmental Approval since the project has unacceptable environmental impacts

The head of the Authority determines what course to follow and advises the proponent and relevant permitting authorities accordingly

The proponent has the right to consider the reasons for the withholding of Environmental Approval, to redesign his project accordingly, and to submit a revised Application for Environmental Approval.

Environmental Approval

Without limiting its content, an Environmental Approval may specify

i) Required measures to mitigate adverse environmental effects or capture potential environmental benefits, including a compliance schedule.
ii) Measures that the proponent must implement in order to comply with relevant standards and requirements; and
iii) Monitoring and reporting duties of the proponent

Within the framework of the proposed policy, wastewater plant (including main sewer) project, an environmental Impact Assessment shall be conducted Flowchart of EA Administrative Procedures is shown below

Trans-boundary Environmental Impact

Development activities within or outside Palestine may have trans-boundary environmental impacts. As required, the Palestinian National Authority, through the Ministry of Environmental Affairs, shall negotiate reciprocal agreements with neighboring jurisdictions to ensure that EA contributes to mitigating such impacts. Such agreements shall be consistent with the principles of the 1991 United Nations "Convention on Environmental Impact Assessment in a Trans-boundary Context", including notification and consultation.

Draft National Environmental Health Strategy (1999)

The department of environmental health (EHD) in the ministry of health at 1998 has formulated a draft environmental health strategy. This strategy explains the current situation of environmental health in Palestine and indicates the strategy and the action plan for the next 5 years (1999-2003). The main subjects tackled in this strategy are:

- Environmental Health Information
- Drinking Water Monitoring and Control
- Wastewater and Solid waste Monitoring and Control
- Air Pollution Control
- Vector Control
- licensing of Crafts and Industries

- Food Safety

Draft Law on Local Government

The Ministry of Local Government (MOLG) has focused its efforts initially on preparing for national, which were successfully held in January 1996. It is also actively developing managerial systems and drafting a new local government law for consideration by the Palestinian Council. It is not yet clear what would be the functions and degree of autonomy of local governments and their relationship to the central government. Two versions of the potential law on local government have been drafted. One would give local governments substantial autonomy, building on the existing situation, while the other would confer heavy control to the central government.

The new law on local government would add the Higher Planning Council to existing local and central planning committees and would define the roles and responsibilities of these three planning bodies:

Local Planning Committee: comprised of the president and members of the Municipal Council.

Central planning Committee: comprised of representatives of all ministries and chaired by the Ministry of Local Government. Although there is one central planning committee for each Governorate (Mohafaza) in the West bank, there is only one central planning committee for all five Governorates in the Gaza Strip; and

Higher Planning Council: comprised of high-level representatives of the various ministries and chaired by the Minister of Local Government.

The Higher Planning Council would be in charge of planning at the national and regional levels. Central Planning Committees would ensure that regional and national level plans are respected.

Although local governments (e.g., Municipalities) can grant construction permits for small-scale projects (e.g., building a house), projects of a public nature or projects with environmental impacts require approval by the Central Planning Committee. In particular, local planning committees

submit the following types of projects for approval by the Central Planning Committee:

- Master plan and detailed land use plans;
- Detailed street plans and changes in land use plans; and
- Industrial zones.

Local planning committees publish preliminary decisions for public comments and appeal over a 60-day period. At the end of this 60-day period, and depending on the public comments received, the Central Planning Committee can issue the final decision.

A new law on Palestinian local authorities was promulgated and signed in 1997. The new law clarifies the roles and responsibilities of local governments in Palestine, including procedures for electing local councils and presidents of local councils, the roles and responsibilities of local councils and the presidents of local councils, and fiscal and financial management. Moreover, the number of municipalities in the Gaza Strip has increased from four municipalities to 17 municipalities.

International and Regional Standards:

Reference will always be made to local environmental management standards. In case, the local standards are not available the applied standards will be identified.

4. BASE LINE ENVIRONMENT

4.1 Land Use

Administrative boundaries, extent and geographic distribution

Gaza Strip is divided into three administrative levels; Governorates, Municipalities and Village Councils. Regarding the first level, Gaza Strip is divided into five Governorates. Rafah Governorate formed the southern part of Gaza strip. It has an area of 60 km^2. The built up area is 10.7 % of the total urban area in Gaza Strip. The Governorate consists of Rafah City and Rafah Camp as urban areas, which have integrated municipal boundaries. Al Bayuk and Mawasi, are considered as rural areas, which have no clear administrative boundaries. The Governorate is divided into 10 quarters as shown in Table (4.1).

Table (4.1): Rafah Governorate Quarters (PCBS) .

No.	Quarter	Population (1997)	%	Area (dunum)
1	Al Mawassi	1,558	1.32	3,395
2	Tal El Sultan	17,111	14.6	4,012
3	City Center	69,181	59.02	2,560
4	Western Rafah	2,138	1.82	2,850
5	El Hashash	500	0.43	2,190
6	El Nakhla	9,036	7.71	2,420
7	Kherbet El Adas	2,350	2	3,023
8	Hai El Salam	3,250	2.68	2,270
9	Hai El Junaina	8,210	7	2,900
10	Al bayuk	3,968	3.39	1,980
11	Israeli Settlement	-	-	2,400
Total		**117,202**	**100%**	**30,000**

Al Shoka is located at the eastern part of Rafah Governorate with a total area about 20,000 dunum. The area includes the Gaza airport and the proposed REP. It bounded by the Israeli boarders from the east, Egypt borders from the south,

Sofa road from the north and road No. 4. To the west as shown in Figure (4.1).

The village council of Al Shoka was initiated as a public committee in July 1996, by May 1999, the Ministry of Local Governorates authorized the village council.

Figure (4.1): Al Shoka village administrative boundary

Urban Development

The regional plan of Gaza strip considered the following aspects in sitting out the urban development of Rafah Governorate.

- The existing urban structure and the important natural resources and landscape areas should be protected.

- The productive agricultural land located in this Governorate should be protected.
- The location of the airport to the east of Rafah City will restrict future urban development.

So most of the growth will be allocated at the urban fringes along the road network in a compact development pattern in order to protect the natural resources in the area. (Regional Plan –MOPIC, 1996).

Population and housing

Population

The 1997 census estimated the total population of the Gaza Strip at about 1,001,120 inhabitants of which 120,246 lives in Rafah Governorate. As for the rest of Gaza Strip, it is assumed that the population growth rate for the first five years will remain at its current rate of about 4% (UNSCO, 1999) while it is expected to decline in the following five years to about 3.7%. The decline is associated with higher costs of living and increased education and awareness levels.

Table 4.2: Distribution of population by area (PCBS)

	Urban	Rural	Refugee	Total
Population	49,843	11,114	59,289	120,246
% Of the Total	41.45%	9.24%	49.31%	100%

The level of urbanization in Rafah Governorate is less than the average of Gaza Strip where about 41.45% of population is living in urban areas, and about 9.24% of population is living in rural areas, while the rest (49.32%) are living in Refugee camps. Al Shoka falls within the rural areas of Rafah Governorate with a total population about 8,500 Capita.

Housing

Housing density measures the number of persons living in one housing unit. It is found that housing density is similar in most areas of the Gaza Strip with slight differences between areas and between urban, rural locations and refugee camps. Table 4.2 shows the housing density and number of housing units in Rafah Governorate. At Al Shoka village there are about 892

houses, the majority are bad quality houses with poor provision of services such as water and electrical supply.

Table 4.3: Housing Density and Number of Housing Units in Rafah Governorate (PCBS).

	Urban	Rural	Refugee
Housing Density	7.58	7.58	7.27
Housing Units	15,854	19,301	24,125

At Al Shoka village, there are about 892 houses, the majority of houses quality are bad with a poor services such as water and electrical supply.

Industry

Existing situation

Large industrial plants are absent in Rafah Governorate as the situation of the Gaza Strip. Small industries such as garages, steel construction, carpeting and citrus packing and processing, are located within the municipality or along the main roads. A total of 430, mainly small-scale industries, have been recorded in Rafah and KhanYunis Governorates. (Regional Plan, MOPIC, 1996).

Industrial output in Gaza contributes by 7.5% to the total GDP. The industrial sector employs 14.7% of Gaza labor force, in which small scale, privately owned enterprises, employing 1-8 employees, dominate. The main industrial sub-sectors, which have the largest number of employees, are Garment and textile, construction and building materials, metal products and food and Beverage. Industrial production is distributed among: the local market, the West Bank and Israeli market, at 74%, 6.5% and 18.5% respectively.

Future Industrial

Development Plans: The needed area for the industrial development has been estimated at 4,809 dunum. The industrial development strategy is in terms of physical planning to locate the planned industrial sites out-side of the urban development areas in open spaces of marginal agricultural value, with low land prices, expansions possibilities, and close to the borders with neighboring countries. To serve these needs the following industrial areas are proposed:

- Gaza Industrial Estate, 487 dunums, is an area under development located East of Gaza City (first phase completed).
- Al-Mansura industrial Area, 863 dunums, is also located east of Gaza City and is the natural expansion of Gaza industrial Estate.
- Eastern Deir al Balah Industrial Area, 740 dunums, located in the middle area of Gaza Governorates, at the eastern border with Israel.
- REP area about 1475 dunums is located in the southern part of Gaza at the eastern borders with Israel. (Regional Plan-MOPIC, 1996).

Trade

Existing situation

The trade sector in Gaza Governorates plays a significant role in Gaza economy and employs 17.5% of the total labor force. The commercial sector is seen by private investors as a low risk sector, and this was especially the case during the Israeli occupation. Nevertheless, this sector has witnessed extreme difficulties and challenges with respect to the movement of goods in and out of Gaza Governorates, which were and still are transported through the Israeli ports and by Israeli agents and middlemen. This sector also lacks necessary services and facilities, such as, trade zones, ports, infrastructure and banking facilities. Israel dominates imports into the PA areas with 82% of the total, which came to USD 2.2 billion in 1996, whereas, the rest of the world including Egypt and Jordan only contributed 18%. The current large commercial activity properties are located at the cities centers and along the main roads.

Future Trade Development Plans

The trade development plan proposes to establish two free trade and export processing zones and two main commercial passages. This will serve the expected trade growth due to increasing local demand and expected industrial growth. The plan is to locate the two free trade and export processing zones adjacent to the two main trade and communication nodes in the region, the proposed harbor and the airport.

The Harbor free Trade and Export Processing zone of 1,700 dunums, located next to Gaza Harbor, designed to handle heavy products for shipment and to service their related industries.
The Airport Free Trade and Export Processing Zone of 1000 dunums, is located next to the airport and close to neighboring countries. It has the flexibility to expand into Ad-dihnhya by approximately 400 dunums. It is designed for light industries and products, which require export by air, or through a regional land transportation network.
Trade with the neighboring countries will continue to be an important component of future trade development. It is therefore, very important to designate special passage with sufficient capacity for commercial activities with neighboring countries.

Al-Montar commercial passage with Israel already exists but does not have enough capacity to serve the present volume of trade with and through Israel. Thus, this passage will be up-graded to match future trade activity requirements and needs.
Al-Awda commercial passage with Egypt already exists but the present volume of trade with Egypt stills at minimal. A special part of this passage will be designated for serving the commercial activities. It will be developed by expanding the terminal, well be equipped and served.

Recreation and tourism

Recreation can be divided into three basic kinds of activities:

- Outdoor activities
- Organized sports activities
- Cultural and environmental activities

The most common outdoor recreation activity in Rafah Governorate is going to the beach. The most frequently used beach is that to the south of Deir al Balah, while the Israeli authority controls the beach of Rafah Governorate.
Other kinds of recreation are not so common for Rafah people. A park was established recently in the city center, but people do not initiate any activities except that they visit it in occasions and mainly in winter when it is too cold to go to the beach.

The existing sport facilities are generally of a poor standard. There are no modern sport centers.
Recreation activities in natural areas are unusual in Rafah Governorate. The main natural areas are the sand dunes and Wadi Gaza area. they are lacking the transportation facilities and organized recreational activities.
Presently there is not any kind of recreation and tourism activities in Al Shoka area.

Agriculture

Agricultural land occupies about 170 (km)2, which is close to 50% of the total area of Gaza. Agriculture is the largest single sector in the economy and contributes to 32% of the economic production. The sector employees approximately 10.8% of the active labor force (PCBS, 1995).
The cultivated agricultural area in Rafah Governorate are about 5040 dunum, of which 2640 dunum is irrigated agricultural and 2400 dunum are rain-fed agricultural. (Technical Atlas, MOPIC, 1997)

Traditionally, agriculture was based on citrus growing and rainfed agriculture. Recently Green Houses have been introduced.

Rain-fed agriculture

The rain-fed areas are located in the eastern and southern parts of Gaza Strip. These areas have no fresh ground water resources and there is less rainfall than in the north. Production in these agricultural areas is gradually declining due to irregular rainfall and loss of interest in traditional methods of agriculture. The project area mainly used by local farmer for rain-fed agriculture. The existing rain-fed cropping pattern in Al Shoka village and REP site consists of trees such as Fogs, Almonds and Dates and Field crops such as cereal and rain-fed vegetables.

Irrigated agriculture

Vegetables are considered to be the main contributor to agricultural production. The total area with vegetable cultivation (irrigated and rainfed) is 50,000 dunums. The cultivation of vegetables is concentrated in the northern area and along the sand dunes. Citrus is the second main crop in Gaza. In 1986 citrus represented 48% of the production, but today it presents only 32%.. It is expected to decline further during the next years. The irrigated agricultural in Al Shoka village is very limited. (Regional Plan –MOPIC, 1996).

Transportation

Existing situation

The road network in the Gaza Strip, totaling about 168 km, consists of a very poorly developed and largely neglected road system that serves the Palestinian population. Agricultural road network does not exist, most areas have only sand tracks which hampers transport. Five border - crossing roads are in service, one to Egypt and four to Israel. The regional road network is mainly running in the North-South direction. The main regional roads are Salah Ed-Deen Road and Road No. 4 supplemented by the access roads to the different cities, villages and terminals. Road No. 4 also includes two roads east of Salah Ed-Deen road up to Al Awda border point with Egypt crossing through Rafah Governorate. Taxies is the only method of transportation exist from and to Al Shoka area,

Future/ongoing plans

The major ongoing plan is upgrading Salah Ad-Deen Road and Road no. 4. The improvement is divided into two phases: phase 1 of 12 km, starting at Beit Lahya junction and ending at port junction. The new road is 4 lanes with a total width of 30 m. this phase is already implemented. Phase 2 with total length about 58 km includes the rest of road No. 4 from the planned port junction to the Egyptian Border, and the section between Beit Lahya and Beit Hanoun checkpoint, with a total length of about 4 km. The design for phase 2 is completed.

Others Major Features

Gaza International Airport

Gaza International Airport is located in Rafah Govenorate. It was completed in 1997. The airport is designed for 250,000 passengers per year, which means approximately a daily traffic of approximately 1000 passenger. This will generate Average Daily Traffic on the access road between 1000 and 2000 vehicles, including staff and passengers. A new access road, of two lanes is connecting the airport to road No. 4 . At present, there are no plans for any kind of public transport to the airport except of the use of taxes.

Gaza port

The new port will be located 4 km down the coast from Gaza City. The site is located near the access road that passes by the Israeli settlement Netzarim. This road is proposed to be the main access road to the port from the regional network. At present Israeli intends to control the use of the port. The first phase is designed to handle 1 million tons of freight with a final capacity of 2.5 million tons. Construction has not yet started. At the present the area of the new port is served by the existing coastal road this road is in poor condition. And will not be capable of serving the growth of heavy freight traffic when the port will be opened. One million tons of freight means 3,500 tons/day, 100-150 trucks/day in both directions. There is obviously a need for new access road connecting the port directly to road No. 4. This road should be in service for the construction phase and the start of the operational phase of the harbor.

Safe passage

At present, Palestine is geographically divided into two regions, Gaza Governorates and West Bank. This situation is causing severe economic, social and administrative constrains. For many reasons, the establishment of this corridor is directly linked to the progression of the peace process. To serve its function as a link between the two regions of the Palestinian area, this corridor, regardless of its mode (highway, superhighway, railway, tunnel, etc.) should be efficiently operated, without any restrictions.

4.2 Physical Resources and Bio-Physical Environment

Climate

Gaza Strip is located between the arid desert climate of the Sinai and the temperate and semi-humid Mediterranean climate along the coast. It has a Mediterranean dry summer, with mild winter. Rafah Governorate is situated in the southern part of the strip. This location makes the climate in Rafah highly effected by the arid desert climate specially the proposed REP area, which is located far away from the coast.

Temperature

Temperature depends on elevation and distance from the sea. Table (4.4) shows the monthly variations in temperature in Rafah Governorate.

Table (4.4): Average monthly, temperature, humidity, and rain (Meteorological Office-Gaza)

Month	Temperature		Humidity	Rainfall
	Max.	Min.		
January	18	7	49% : 72%	60.04
February	20	8	46% : 67%	49.7
March	22	9	45% : 66%	16.8
April	25	12	43% : 53%	12.3
May	22	14	42% : 57%	2.6
June	31	18	45% : 63%	-
July	32	20	45% : 65%	-
August	32	20	48% : 66%	-
September	30	18	50% : 66%	0.2
October	29	16	50% : 67%	8.8
November	25	13	51% : 69%	51.2
December	20	10	52% : 72%	58

Humidity

The relative humidity of the air is highest near the coast and higher at night in summer than in winter. Humidity reaches its daily minimum around noon and a maximum late at night or throughout the night. Generally, for Gaza Strip, in summer the humidity varies between 65% in the daytime to 85% at night, while in winter it varies between 60% in the daytime to 80% at night.

Wind In summer, sea breeze blow all day and land breeze blows at night. The source of prevailing winds in the summer is the northwest. There are clear daily fluctuations in the speed of wind during this period of the year. Wind speed reaches its maximum value at noon period, which is 3.9 m/s and decrease during night. During the winter, most of the wind blow from the southwest with an average speed 4.2 m/s. in summer, strong winds blow regularly at certain hours. Mornings are usually calm in most areas of Gaza Governorates as are nights.

Rainfall

Rainfall normally begins in November, increases in intensity to about January and decrease again to May. Figure (4.2) show the mean annual rainfall at Rafah over the period 1980-1998, which is 233 mm.

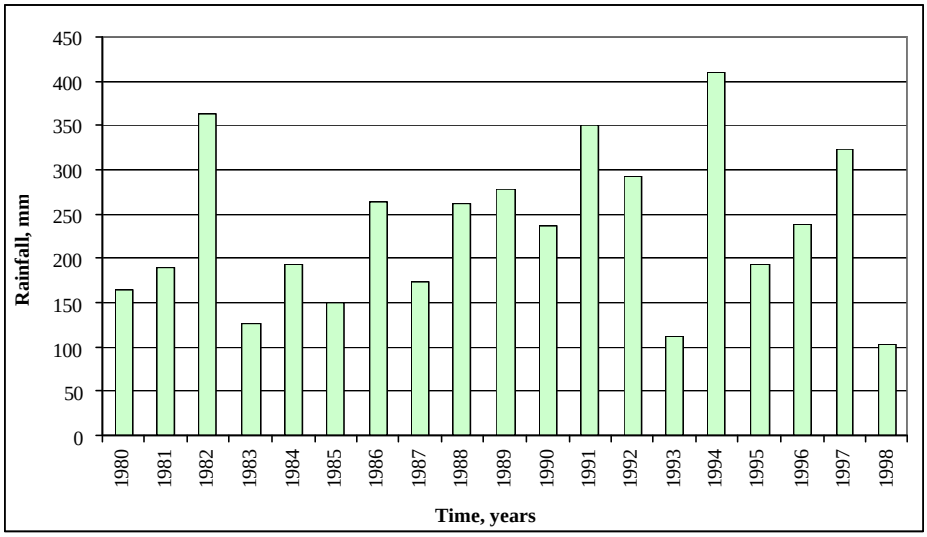

Figure (4.2): Annual Rainfall in Rafah Governorate over period of 1980 to 1998.

Dew

The formation and amount of dew are dependent on meteorological conditions and relative humidity. The distribution of the number of dew is diverse from location to other in the Gaza Strip. Richest in dew is the northwestern Negev, which is close to the proposed site of REP. The mean annual number of dew nights exceeds 250 in this area.

Evaporation

The actual amount of evaporated water greatly depends on the nature of the soil, the vegetation, the availability of soil moisture, and consequently, on the depth of groundwater table. Mean daily evaporation varies from 2.1 to 6.3 mm per day in December and July respectively.

Radiation

There is a distinct yearly fluctuation as usual for the Northern Hemisphere. The mean monthly values during wintertime are about one third of the summer month's values. The total incoming radiation is relatively high, which is a great advantage for agriculture and greenhouse cultivation. The average value of Radiation is about 2200Jule/cm2 during the day for Gaza Strip.

Groundwater hydrology

The coastal aquifer is the main source of water in Gaza strip with a long-term sustainable yield about 60 Mm3/year. The ground water table located at a depth range from few meters at the west to about 70-90 meter at the east from the earth surface.

At the project area the ground water table is located at around 68-88 m. below the land surface. Figure (4.3) shows sections in the aquifer in the southern part of Gaza Strip, which is closed to the Proposed location of Rafah Industrial Estate. The cross section shows that the thickness of the saturated zone does not exceed few meters. Therefore, drilling well in that area is not a viable option from hydrological point of view

Gaza Strip faces sever water quality problem. The water quality of the coastal aquifer underlying Gaza has been deteriorated severely for a number of reasons:

- Over use of fertilizers and pesticides in agriculture, which is finally leached to ground water.
- Wastewater infiltration to ground water from cesspits and leakage of sewer system. Which is responsible for the high nitrate content of the groundwater .
- Seawater intrusion and brine water up coning as a result of over abstraction of groundwater, which caused obvious increase in salinity during the past 10 to 15 years.

Eastern part of Rafah Governorate, including the project site, suffers from extremely poor water quality. The average chloride concentration in the ground water at the project area is more than 500 mg/l and the nitrate concentration is about 250 mg/l, these figures is highly exceeding the WHO recommended standards for potable water quality. This part of Rafah (the airport and the surrounding residential communities) depends on wells drilled at the western side of Rafah for their water source.

Surface water resources

There are no permanent surface water resources in the Gaza Strip like rivers or lakes. Temporary flow of surface runoff due rainfall during the winter is the only source of ephemeral surface water. The possible sources of runoff water are the wadi runoff from a number of small wadis and valleys within the area. The most important one is Wadi Gaza that drains 3500 km^2 of the northern Negav but most of its water is captured at the upstream side. Within Gaza strip, This wadi only carries water for about ten days a year during the intensive rainfall events.

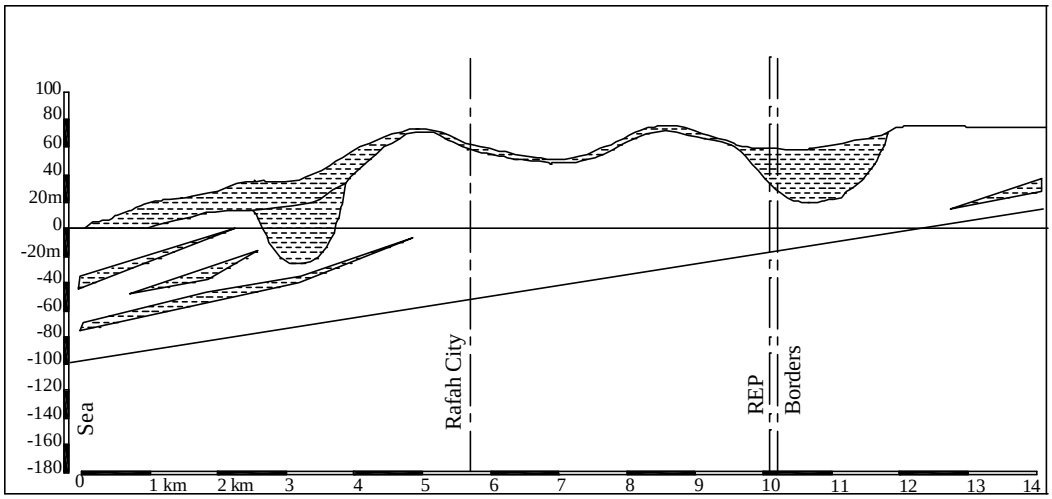

Figure (4.3): Cross section in the aquifer near the REP site (CAMP)

Water use

Based on PWA information, the annual abstraction from the aquifer is approximated at 140 MCM of which 90 MCM used for agriculture. The Municipal and industrial sectors supply is estimated at 55 MCM/year of which 50 MCM comes from the ground water aquifer and 5 MCM purchased from Mekorote Israeli company. The average unaccounted-for-water is estimated at 35%. This makes the average per-capita consumption for Gaza Strip is 81 liter/capita/day for municipal and industrial uses. Industrial consumption is estimated as 7% of the total municipal and industrial consumption.

Air quality and noise

Air quality

Air contains natural contaminants such as, dust particles, carbon monoxide naturally occurring, hydrogen sulfide, and other contaminants. Presently, there is no data available regarding the air quality in the project area. PIEFZA is responsible to conduct measurements of air Contaminants to present the existing situation of air quality in the project area. The measurements should be carried out before the beginning of the construction phase.

After the implementation of the project the concentration of air contaminants should be complying with standards and guidelines that are outlined in the Environmental Manual (EM) of Gaza Industrial Estate. The Environmental manual was prepared by the Ministry of Environmental Affairs (MEnA) in consultation with the Palestinian Industrial Estate and Free Zone Authority (PIEFZA). The allowable pollutant

concentration that is not recommended in the Environmental Manual (EM) will be compared with The Israeli Standard (IS). Table (4.5) shows the recommended values of air pollutants according to EM and IS.

Noise

There are several noise sources due to human activities and nature in the area of the project. The main existing sources of noise are:

- agricultural activities
- nature (wind)

Baseline noise measurements of noise in the project area is not available. According to the Environmental Manual (EM), the recommended noise value for the Industrial area is 75 dB in the daytime and 70 dB in the nighttime.

Table (4.5): The Recommended Standard Values of Air pollutants Concentration (EM and IS)

Pollutant	EM 24-hr average		IS 24-hr average	
	mg/m3	PPM	mg/m3	PPM
Carbon Monoxide, CO	-	-	11000(8-hr)	8.8-(8-hr)
Sulfur Dioxide, SO2	125	-	280	0.098
Nitrogen Oxides, NO2	150	-	560	0.273
Hydrogen Sulfide, H2S	-	-	15	0.010
Particular Matter, SPM	70	-	300- (3-hr)	-

Soil and vegetation

The types and the percents of each soil type in Rafah Governorate are as follows:

- 20% clay 'Alluvial Soil'
- 60% yellow sand and Mawasi 'Loessial Soil'
- 20% sand 'Loess Soil'

The REP is located among the areas classified as being areas of sandy soil mixed with fine dust 'sandy loess soil over loess'. The area is covered with several strata of sandy soil mixed with fine dust carried by winds. Its formation in strata refers to the repeated aeolian sedimentation processes in the area.

The soil type in the area as in the whole Gaza Strip are home to some unique species of fauna and flora, though no scientific studies were conducted to survey or study these wild species.

There is no water resources in the area (wells or surface water), so the crops in this area is rain-fed crops. Literatures told about Flora species are very common but neither the documentation nor the determination of their populations, classification and distribution pattern was well studied. Besides their ecological role as a habitat for some wildlife species, they function as water traps and rain-fed. Vegetation, which is dominant in and around the area, includes the following categories: Wild and fruit trees, wild weeds and agricultural crops. No forests or jungles were seen in the area. On the other hand, some reptiles, mammals and arthropods inhabit this area. Most of these animals will be mentioned later in the wildlife section.

Wildlife resources

Wildlife includes all free ranging vertebrates in their natural surroundings or associated environments. However, other definitions of wildlife are much broader and may include all plants and animals in wild ecosystems. Wildlife has gained a substantial importance due to its valuable benefits and uses. Of these are the commercial, recreational, biological, ecological, scientific, philosophical, educational, aesthetic, and social values.

Wild and fruit trees

Table (4.6) below shows a list of available wild and fruit trees in the proposed REP site.

Table (4.6): Wild and fruit trees in and around the REP site (EMCC)

Scientific name	Common name
Acacia farnesiana	*Sweet Acacia*
Opuntia vulgaris	*Prickly-pear, Barbary fig*
Eucalyptus rostrata	*Gum, Gummi kino, Resina kino*
Ficus carica	*Fig*
Olea europaea	*Olive*
Phoenix dactylifera	*Palm, Date*
Prunus amygdalus or amygdalis	*Almond*
Prunus armeniaca	*Plum tree, Prune tree*
Prunus demostica	*Plum tree, Prune tree*
Prunus persica	*Sloe tree, Black thorn, Bullace*
Ricinus communis	*Gastor oil plant, Palma christi*
Vitis sp.	*Grapes vine*
Vitis vinifera	*Grape vine*

Wild weeds

Following are the list of wild weeds found in the area in and around the project site.

1- Malva sylvestris
2- Ononsis natrix
3- Avena sterilis
4- Asphodelus fistulosus or tenuifolius
5- Stipa lagascae
6- Stipa capensis
7- Ferula communis
8- Cynodon dactylon
9- Cyperus rotundus
10- Urtica polufiera
11- Lamium amplexicaule
12- Cuscuta planiflora
13- Cynara syriaca
14- portulaca oleraceae
15- Nasturium officinalis
16- Artemesia monosperma
17- Artemesia rupestris
18- Artemesia campestris
19- Lamium amplexaule
20- Amaranthus retroflexus
21- Oxalis corniculate
22- Rumex acetosella
23- Convolvulus chondrilloides
24- Convolvulu cataonicus
25- Ziziphus spina-christi
26- Lycium ruthenicum

Medicinal wild weeds

1- Solanum nigrum - This species has the reputation of being very poisonous and use as narcotics to allay pain

2- Datura Stramonium (LINN.) -Antispasmodic, anodyne and narcotic. Its properties are virtually those of hyoscyamine.

3- Xanthium spinosum- A valuable and sure specific in the treatment of hydrophobia. An active styptic, local and general

4 - *Has Antimalarial* Activities and antifungal effects

5- *Tribulus terrestris* - Use as an antiurolithiatic activity, it significantly reduced the weight. For traditional medicine it use, as a diuretic, antiseptic, and anti-inflammatory, for a variety of liver, kidney, and cardiovascular diseases, used too, as a sex enhancer and to treat infertility.

6- Stellaria media - Demulcent, refrigerant. It is held in great repute amongherbalists, used mostly in the form of an ointment

7- *Withania somnifera* - *Reduces* stress & mental fatigue, helps induce & enhance deep sleep, reduces anxiety, reduces Inflammation at body joints

8- *Avena sativa* (LINN.) - Nervine, stimulant, antispasmodic.

9- *Chenopodium ambrosoides* -. produces essential oils used against intestinal parasites (vermifuge).

10- Citrullus colocynthis - use for amenorrhea, ascites, bilious disorders, cancer, fever, jaundice, leukemia, rheumatism, snakebite, tumors (especially of the abdomen), and urogenital disorders.:

11- *Brassica nigra* - Rubefacient, irritant, stimulant, diuretic, emetic, carminative, tonic, used as a chest poultice for bronchitis and colds. This well-known spice has its main use in medicine as a stimulating external application.

12- Anagallis arvensis - Used earlier in folk medicine, now regarded unsafe.

13- *Heliotropium ramosissimum*, used as a mouth wash to relieve sore gums and mouth blisters. Roots are used to alleviate head-aches, rashes and upset stomachs.

14- *Portulaca sativa* - It was highly recommended for many complaints. Il good for strangury, and taken with sugar and honey to afford relief for dry coughs, shortness of breath and immoderate thirst, as well as for external application in inflammation and sores.

15- *Matricaria chamomilla* - Tonic, Stomachic, Anodyne, Antispasmodic, Laxative, Diaphoretic, Analgesic, Carminative, Anti-inflammatory, Sedative.

16- *Anethum graveolens* - For treatment of colic, gas and indigestion.

17- *Fumaria officinalis* - use as a blood detergent. It can be used internally and externally for the treatment of skin problems such as eczema, acne and psoriasis. It used too as a laxative and as a remedy for stomach, liver and gall bladder problems. It can be employed in cases of fluid retention, constipation and to stimulate the flow of

bile. It may also be used as an eyewash to ease conjunctivitis.

18- *Euphorbia peplus or peplis* - used by eclectics and homoeopaths with claims for properties more or less special. It has been used in cholera, diarrhcea and dysentery in the form of an infusion of the leaves, and has been found to contain caoutchouc resin, tannin, and apparently euphorbon. Is said to be a valuable astringent; an infusion may be employed as an injection in the treatment of leucorrhoea.

19- *Artemesia californica* - Unspecified vaginal problems and Wound repair and closure.

20- Artemesia vulgaris - It has stimulant and slightly tonic properties, and is of value as a nervine and emmenagogue, having also diuretic and diaphoretic action.

21- *Artemesia Douglasiana* - Emmenagogue (promotes menstruation). Stimulant and slightly tonic properties. Nervine (valued in palsy, fits, epileptic and similar affection). A diuretic and diaphoretic

22-Urtica urens - regarded in homoeopathy as a useful remedy. Preparations of the herb have astringent properties and act also as a stimulating tonic. It used as anti-asthmatic. It relieve bronchial and asthmatic troubles.Also used as consumption, and it taken as cure for goitre and efficacious in reducing excessive corpulency.

Mammals

Data collected, when interviewing farmers and peoples in and around the site, showed the occurrence of about 7 wild mammals (CLASS MAMMALIA). Many of these animals, mainly rodents (gerbils and mole rats) are harmful and cause problems and damage to agricultural crops as stated by farmers there. However, the main natural enemies for these rodent species are snakes, owls and monitors. These mammals are listed in Table (4.7).

Table (4.7): Mammals in and around the REP site (EMCC)

Scientific Name	Common Name
Lepus capensis	Hare
Erinaceous european	European hedgehog
Canis sp.	Dog
Chiroptera	Bat
Herpestes ichneumon	Mongoose
Meriones tristrami	Gerbil *
Spalax leucodom chrenbergi	Mole rat *

* = Harmful species

Birds

Birds (CLASS AVES) are very sensitive to any change in their habitat or environment. People are not certain about the extinction of certain species of birds from the area but they are sure about the reduction of most of their populations due to many factors. The intensive use of pesticides, over-hunting, noise, and destruction of their habitats are some of these factors. More than 80 bird species are recorded in literature to happen in the Gaza Strip (Abu Shammalah and Baha El-Din, 1999). All recorded species are shown in Table (4.8).

Table (4.8): Birds in the Gaza Strip (EMCC)

R/M*	Scientific Name	Common Name
M	*Anas clypeata*	Shoveler
M	*Anas querquedula*	Garganey
R	*Gallinula chloropus*	Moorhen
R	*Fulica atra*	Coot
M	*Phalacrocorax carbo*	Cormorant
M	*Pelecanus onocrotalus*	White pelican
M	*Ciconia ciconia*	White stork
M	*Puffinus yelkouan*	Mediterranean shearwater
M	*Sterna albifrons*	Little tern
M	*Larus cachinnans*	Yellow-legged gull
M	*Larus ridibundus*	Black-headed gull
M	*Larus genei*	Slender-billed gull
M	*Charadrius alexandrius*	Kentish plover
M	*Charadrius hiaticula*	Ringed plover
M	*Tringa totanus*	Redshank
M	*Calidris minuta*	Little stint
M	*Himantopus himantopus*	Black-necked stilt
M	*Gallinago gallinago*	Snipe
R	*Hoplopterus spinosus*	Spur-winged plover
R	*Burhinus oedicnemus*	Stone curlew
M	*Egretta garzetta*	Little Egret
M	*Ardea cinerea*	Grey heron
R	*Bubulcus ibis*	Cattle egret
M	*Grus grus*	Crane
R	*Halycon smyrnensis*	White-breasted kingfisher
M	*Alcedo atthis*	Common kingfisher
R	*Athene noctua*	Little owl
R	*Tyto alba*	Bran owl
R	*Falco tinnunculus*	Kestrel
M	*Falco subbuteo*	Hooby

R/M*	Scientific Name	Common Name
R	*Buteo buteo*	Common buzzard
M	*Aquila heliaca*	Imperial eagle
R	*Alectoris chukar*	Chukar
M	*Coturnix coturnix*	Quail
M	*Crex crex*	Corncrake
M	*Caprimulgus europaeus*	European nightjar
M	*Streptopelia turtur*	Turtle dove
R	*Streptopelia sengalensis*	Laughing dove
M	*Hirundu rustica*	Barn swallow
R	*Apus apus*	Common swift
R	*Meropus apiaster*	European bee-eater
R	*Upupa epops*	Hoopoe
R	*Pycnonotus xanthopygos*	Yellow-vented bulbul
R	*Parus major*	Great tit
M	*Alauda arvensis*	Sky lark
R	*Galerida cristata*	Crested lark
M	*Calandrella brachydactyla*	Short-toed lark
M	*Anthus cervinus*	Red-throated pipit
M	*Motacilla alba*	White wagtail
M	*Motacilla flava*	Yellow wagtail
M	*Oenanthe hispanica*	Black eared wheateater
M	*Oenanthe oenanthe*	Northern wheateater
R	*Prinia gracilis*	Graceful prinia
R	*Sylvia melanocephala*	Sardinian warbler
M	*Sylvia atricapilla*	Blackcap
M	*Sylvia curruca*	Lesser whitethroat
R	*Arcocephalus scirpaceus*	European reed warbler
M	*Phylloscopus collybita*	Chiffchaff
R	*Passer domesticus*	House sparrow
R	*Passer hispaniolensis*	Spanich sparrow
R	*Turdus merula*	Blackbird
M	*Turdus philomelos*	Song thrush
M	*Luscinia sveciea*	Bluethroat
M	*Cercotrichas galactotes*	Rufous bush robin
M	*Erithacus rubecula*	Robin
M	*Muscicapa striata*	Spotted flycatcher
M	*Phoenicurus ochruros*	Black redstart
M	*Saxicola torquata*	Stonechat
M	*Oriolus oriolus*	Golden oriole
M	*Coracias garrulus*	European roller
M	*Lanius senator*	Woodchat shrike
R	*Lanius meridionalis*	Southern grey shrike
R	*Nectarinia osea*	Palestine sunbird
R	*Dendrocopos syriacus*	Syrian woodbecker

R/M*	Scientific Name	Common Name
R	*Corvus corone*	Hooded crow
M	*Sturnus vulgaris*	Starling
R	*Carduelis carduelis*	Goldfinch
R	*Carduelis chloris*	Greenfinch
M	*Serinus serinus*	European serin
M	*Fringilla coelebs*	Chaffinch

* R= Resident M= Migrant

Reptiles

Reptiles (CLASS REPTILIA) are a characteristic feature of arid and semi-arid lands in spite of their presence in other environments. Many species of snakes are prevalent there. They are known to cause injuries and psychological problems to people, mainly children, when walking with bare feet. In addition, many other reptiles are registered to happen in the area as listed in Table (4.9).

Table (4.9): Reptiles in and around the project site (EMCC)

Scientific Name	Common Name
Vipera palaestinae Naja hagi Elrenis spp.	Snakes
Stenodactylus stenodactylus Ptyodoctylus hasselquistii	Geckos
Varanus griseus	Monitor
Chameleon chameleon	Chameleon
Chalcides sp.	Lizards
Agamma sp.	Agamma
Testudo graeca	Terrestrial turtles

Arthropods

Insects and their relatives (PHYLUM ARTHROPODA) are the most common creatures on Earth. Sometimes, they are very difficult to be recorded due to their high variation and dispersion pattern. Insects are found everywhere in the whole Gaza Strip. They are diverse and could be contained within the following categories:

- Medical insects: these insects may cause health problems to people inhabiting the area e.g. mosquitoes, cockroaches, houseflies, lice and fleas.
- Economic insects such as honeybees: rearing of honeybees has been observed in many localities and contributes much to the people's income.
- Agricultural insect pests: this dangerous sector of insects infests crops and causes intensive and extensive

losses to farmers' economy. Some of insects recorded in the area are the various beetles infesting the stored crops, aphids, crickets, grasshoppers, white ants, …etc.

- Ecologically significant or non-harmful insects such as ants, praying mantis, moths, dragonflies, different species of beetles, …etc.

People inhabiting the agricultural areas usually suffer from the spread of mosquitoes and other harmful insects. Spiders and scorpions are very common and by their biting activity they may contribute much to the problems stated.

Domestic animals

Apart from wildlife, many domestic mammals are commonly seen in or around the project area and the surrounding agricultural fields, these are listed in Table (4.10).

Table (4.10): Domestic animals in the Gaza Strip (EMCC)

Scientific Name	Common Name
Equidae	Donkey
Equidae	Horse
Equidae	Mule
Bovidae	Cow
Bovidae	Sheep and goats
Camelus dromedarius	Camel

4.3 Economic Components

Labor Market Conditions

Labor market indicators for the third quarter of 1999, especially the unemployment rates, vary substantially between the different areas of the Gaza Strip. Total Labor Force Participation Rate (the portion of the working age population that are either working or seeking work) in the Gaza Strip is estimated at about 38.2%. The highest labor force participation rate was registered in Rafah Govenorate at about 39.4%. The third quarter of 1999 average unemployment rate in the Gaza Strip is estimated at about 16.2% (UNSCO, 1999). While in Rafah Governorate it is about 18.6%. . However, some areas in the Gaza Strip still suffer from high rates of unemployment such as Deir Al Balah Govenorate, which also has the highest portion of the population living in refugee camps. Table (4.11) below provides data on the labor market indicators for the different areas of the Gaza Strip.

Table (4.11) shows that the southern area of the Gaza Strip (Deir Al Balah, Khan Younis and Rafah) has much higher unemployment rates than the northern part. This is mainly due to the fact that most construction and industry jobs are located in the north.

Table (4.11): Labor Market Indicators for the Gaza Strip by Governorate, Third Quarter 1999 (PCBS, 1999)

	In Labor Force	Outside Labor Force	In Labor Force		
			Fully Employed	Under employed	Un employed
North Gaza	37.7	62.3	84	1.6	14.4
Gaza	37.6	62.4	86.7	1.3	12
Deir Al Balah	37.9	62.1	76.2	1.1	22.7
Khan Younis	38.9	61.1	80	1.6	18.4
Rafah	39.4	60.6	80.7	0.7	18.6
Average	38.2	61.8	82.5	1.3	16.2

The distribution of the working age (15-55+ years) show that the largest group of the population is that of the age group 15-24 years as indicated in table (4.12) below. The total number of people in this age group is estimated according to PCBs at about 208,762 persons of which about 51,772 are in the labor force. The highest labor force participation rate is seen in the age group of 25-34 years at about 53.5% and 35-44 years at about 54.9%. Furthermore, the highest unemployment rate is found in the age group of 15-24 years (26.4%) which decreases as the age increases.

The sectional distribution of employment provides an understanding of the different types of employment in the Gaza Strip. As shown in Table (4.13), the service branch of the economy employs provides 35% of the jobs in the economy. The Palestinian Authority provides 20% of the jobs in this branch according the UNSCO report. The second largest employing sector of the economy is the agricultural sector in the south and the construction sector in the north. Table (4.13) below provides data on the sectional distribution of employment in the Gaza Strip. Employment in the manufacturing sector is biased towards Gaza city as it employs alone about 20.7%, while it employs 12.3% in the north, 8.6% in Deir Al Balah, 7.5% in Khan Younis and 7.6% in Rafah. Employment in the commerce and transportation sectors does not vary very much between one area and another averaging 12.4% and 4.8% consequently.

Table (4.12): Distribution of Labor Force by Age Group and Employment Status, Third Quarter, 1999 (PCBs, 1999)

Age	Population	Employment Status				LFPR
		Total	Unemployed	Under employed	Fully Employed	
15-24	208,762	100	26.4	1.3	72.3	24.8
25-34	135,742	100	13.7	1.8	84.5	53.5
35-44	89,701	100	12.7	0.9	86.4	54.9
45-54	50,907	100	12.5	0.4	87.1	48.3
55+	61,665	100	8.8	0.9	90.3	16.9
Total	546,777	100	16.2	1.3	82.5	38.2

Table (4.13): Employed Persons in the Gaza Strip by Sector and Governorate, Third Quarter 1999 (PCBs, 1999)

	Total	Rafah	Khan Younis	Deir Al Balah	Gaza	North Gaza
Agriculture	14.4	23.2	27.6	14.2	5.1	11.8
Manufacturing	13.3	7.6	7.5	8.6	20.7	12.3
Construction	19.4	13.4	17.5	18.1	20.0	25.4
Commerce	12.4	12.5	11.1	13.9	13.0	11.3
Transportation	4.8	4.3	4.8	5.7	4.7	4.4
Services	35.7	39.0	31.5	39.5	36.5	34.8
Total	100	100	100	100	100	100

Working time and income

The number of monthly days worked by Gazans in the different sectors of the economy varies between sectors. The average monthly days worked during the second quarter of 1999 is estimated at about 23.6 hours. The highest number of days worked are in the service sector at about 25.5 days followed by the transportation sector at about 24.5 days while the lowest were in the construction sector at about 18.9 days. Table (4.14) shows the average monthly days worked in the different sectors of the economy as well as average daily and monthly nominal wages. Despite the lower number of days worked in the construction sector, it is not the lowest in terms of monthly wage. The lowest monthly wage is in the agricultural sector at about 645 NIS while the highest monthly wage is in the service branch estimated at about 1,515 NIS. This mainly due to the relatively higher wages received by government employees.

Seasonal cycles could have an affect on the number of days worked in each of the sector. The Agriculture and construction sector is highly affected by these cycles. More days work is required in the agricultural sector during the

winter months while more days work are required for the construction sector during the summer months due to increased demand on construction activities during the summer.

Table (4.14): Average Monthly Working Days and Average Daily and Monthly Nominal Wage in New Israeli Shekel, Second Quarter 1999 (PCBs, 1999)

	Average Monthly Days	Average Daily Wage	Average Monthly Wage
Agriculture	20.2	31.9	644.38
Manufacturing	20.3	38.4	779.52
Construction	18.9	44.7	844.83
Commerce	22.9	36.0	824.40
Transportation	24.5	48.0	1,176.0
Services	25.5	59.4	1,514.7
Average	23.6	51.9	1,224.84

Indirect/induced economic development opportunities

Indirect or induced economic development opportunities are referred to activities or opportunities that may start or develop as a result of existence of this particular project. These include but not limited to the following:

- Part of Gaza Port activities
- Export/import activities
- Gaza air port activities
- Free trade zone
- Advertising and publishing
- Stock and storage
- Services

Supplies, material, and services

Thermal energy

Heavy fuel oil (HFO) — There is no heavy fuel oil production or even importation in Palestine. Permits of importation for HFO have so far never been requested to Israel.

Diesel oil — Diesel oil is readily available in Palestine and imported from Israel, at the high price of 1.3 NIS or 0.325 US$ per liter. No discounted prices are granted for industrial use.

Gas — The planned power station near Gaza will be operated with natural gas, which is supposed to come from Egypt. Egypt

plans to export gas to Israel and Palestine via a pipeline linking Port Said with Beirut and Saida via the Gaza Strip, known as the "Peace Line".

Electrical energy

The actual electricity demand in Palestine is around 90 to 100 MW according to the Ministry of Planning. Most of the electricity is provided by Israel at a cost of US$ 0.10 / kWh, or 100 US$ / MWh. There is no differentiation for low and peak hours; no discounted rate is awarded to industry at the present time. The Palestine power generation and distribution network is an integral part of the Israeli network.

East Jerusalem Electric Company buys and distributes electricity to Palestinians in East Jerusalem and its concession the West Bank. Some Palestinian municipalities, including Nablus and Jenin, generate their own electricity from small power plants.

ENRON from the USA (acting as general contractor) and ABB (as equipment supplier) will be building a 140 MW gas-turbine power plant near Gaza. According to ABB, they have ordered three generators. The generators are scheduled to go on stream by mid-2000. ENRON sources confirmed completion by the end of August 2000.

Plans already include a mid-term expansion of installed capacity. When the planned power station starts operating, prices for electrical energy will probably be lowered, but no information was available at the time of the study regarding the expected price of electricity.

Infrastructure

The existing infrastructure in the area of Al Shoka where the Rafah Industrial Estate (REP) is proposed can be described as follows:

Water supply

Currently, the area of Al Shoka does not have a municipal water network. The residents of that area are being supplied with water from Makarot (an Israeli water supply company).

Makarot has a 6" pipe at El Dehnia area, which lies 2.5 km to the south of the proposed REP site. This pipe is tapped with 7 connections; each of them is 2? in

diameter. A water meter is also connected on each one of the 7 connections.

In addition to Gaza International Airport, there are 6 bulk consumers and each one has his own pipe line and distribution system through which the bulk consumer sells the water to El Shoka residents. In 1999, the total consumption of the 7 bulk consumers was a bout 573,500m^3/year.

Recently, a water production well was drilled at the western part of Rafah City in El Hashash area 11km to the west of the Airport. A trunk line, 8? in diameter, was installed to connect the well with the Airport. Both the well and the trunk line have been allocated for the use of the Airport only. The well pump has a capacity of discharging 76m3/ hr at 140m3 head.

Given that the Airport Consumption in 1999 was about 70,000m3/ year, it is obvious that the average daily Consumption of the Airport is about 200 m3/day. This demand can be met by operating the well for three hours only. This means that both the well and the trunk line have additional capacity to supply at least the first phase of the REP if the Airport Authority agrees to do that .On the other hand the Airport still reserves the seventh connection on Makarot pipeline as an emergency source.

Based on the hydrological cross sections that pass through the intended area, there is almost no aquifer, and if any aquifer is found, it doesn't have the capacity to discharge sustainable water flow.

Waste water Al Shoka area including the intended REP as well as the neighboring areas is not served with a conventional sewage system. In the city of Rafah, which is the closest urban center to the REP, only 35 percent of the people are served with sanitation system.

The collected sewage from Rafah is discharged to a treatment plant at Tel- Sultan Area 9 km from the REP site. The daily influent that comes to Rafah WWTP is about 5000 m3/day and according to PWA, the WWTP is now overloaded.

Recently, the Palestinian Water Authority (PWA) has launched a program to construct a new WWTP for both Khan Younis and Rafah. According to this program, the selection of international consultant should be carried out by September

2000, and the construction works are expected to start in March 2001.

The first phase of this proposed WWTP would have a capacity of 30,000 – 40,000 m3/day. The proposed site for the new WWTP is 6km to the north of the REP site. The ground elevation of the WWTP site varies from 60 to 70 above MSL.

Roads The main road leading to the area is Road No. 4 (Salah El Din Street). This road passes through Gaza strip from Beit Hanoun (Eris) crossing in the north to El Karma crossing at the international borders with Egypt. This road is 30m wide. The main acces road to the Gaza International Airport (GIA) branches from the southern end of Road No. 4. The main access road to the Gaza International Airport is also the existing access road to the proposed REP. It is now about 12m wide, however it is planned to be 24m. Another important road is the Sofa Crossing Access road. This road is located to north of the proposed REP site. It is 12m wide and leads to a commercial crossing checkpoint to Israel.

The only paved road that leads to the proposed site for the REP in the GIA main access road. All other roads are unpaved narrow roads. Local farmers mainly use these roads. The Ministry of local Governorates issued an approved road plan for the internal roads in Al Shoka Village in March 1997. Figure (4.4) shows a map of these roads. They are mainly grid roads with widths that range between 16m to 40m. 8 km of which is under design and fund is available from CARE and Agricultural Relief Committees.

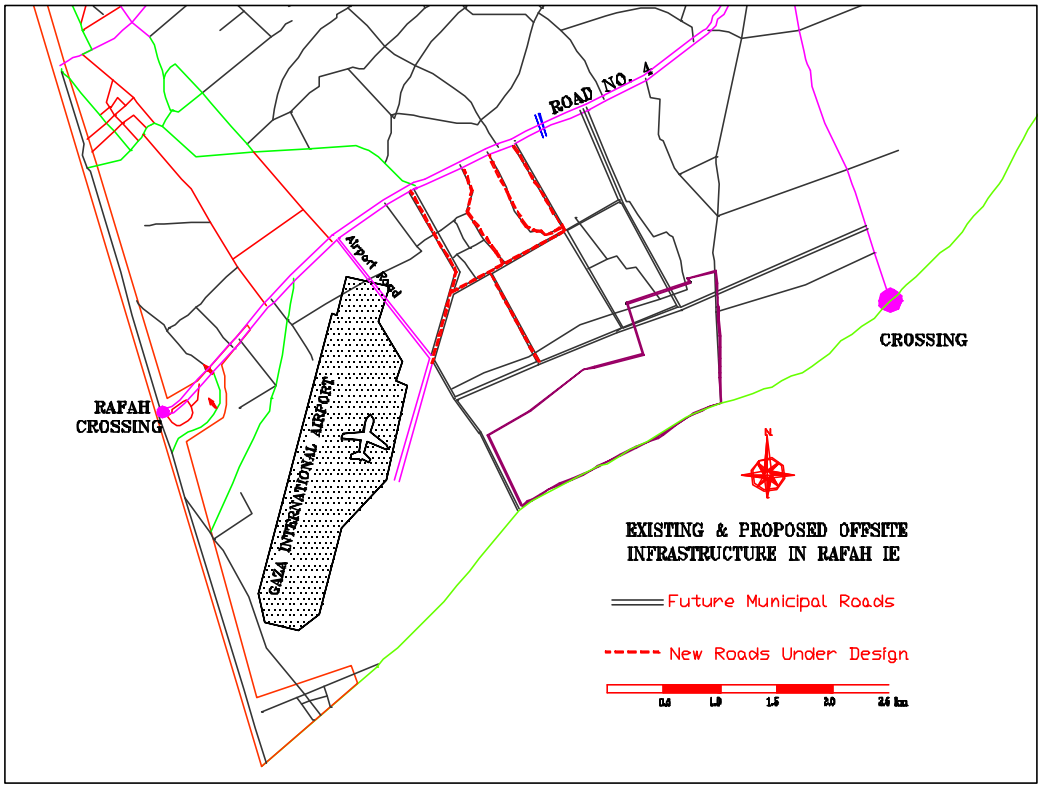

Figure (4.4) Roads in Al Shoka village

Solid Waste In Gaza Strip, there are three land fill sites for Gaza city, the Middle Area and Khan Younis and Rafah, in addition to one damping site serving the northern Governorate.

The nearest land fill site to El Shuka I.E. is that site which serves Rafah governorate. This site is 4.5 km to the north of the proposed I.E. site. Rafah landfill site has been used since March 1999 for a domestic solid waste and the expected capacity of the site is equivalent to 6-7 years of solid waste disposal. The monthly solid waste disposal into the site is estimated with 3,000 ton. The site can be accessed through Sofa Road, which is 12 m paved road.

The site has a potential to be expanded in the future and the Municipality of Rafah has a reserved land of 10 dunums area.

In Gaza City, there is a hazardous solid waste landfill, which serves the whole Gaza strip.

Telecommunications

Based on the Telecommunication company information, there is a main fiber optic cable that passes a long the border with Israel. Additionally, there is a telephone manhole almost in the middle of the intended REP land from which the demand of the REP can be met.

4.4 Cultural and Heritage Components

An archaeological field survey to identify any archaeological remains in the area might be affected by the project was conducted in addition to a literary survey related to the area, including any publications on archaeological survey or any expected results of archaeological excavations probably carried out in the project site. The books of traveler, geographer or historians may paid a visit to this area are essential resources for the literary survey. Meetings with local peoples, who are one of the most important sources of the field information, were conducted. Based on the previous the following was found:

- There are no archaeological sites or historical buildings identified in the REP area.
- The field survey in the project area did not identify any archaeological remains.
- No archaeological excavations carried out in the area.
- The project area includes a monument indicating the site where a number of Egyptians soldiers were killed and lay buried since the Arab-Israel war of 1967. This cemetery has a very important national and historical value.

4.5 Public Health and Safety

Public health risks are related to risks generated by any facility related to the operation of the project those may include:

- Risk of accidents by related transportation facilities.
- Additional noise generated by transport facilities.
- Dust and air pollution.

Certain local and international standards regarding to accidents and emissions has to satisfied. The reference will be made for the Labor law No. 16 for the year 1964

(Palestinian labor law) and Law No. 11 for the year 1946 which deal with factories and industrial establishments.

5. IMPACT IDENTIFICATION

The scope of this environmental assessment is to assess the impacts of the proposed Rafah Enterprise Park (REP). On April 15, 2000, a scoping meeting was held to gather opinions and concerns regarding the issues and likely impacts that would be associated with REP. The results of this scoping meeting including issue scoping are presented in Appendix A. Based on these results and the experience of the EA team, other potential impact areas and issues were added to those that were identified in the scoping meeting. The resulting set of potential impacts were grouped into five main categories as follows:

- Land use Components
- Physical Resources and Bio-Physical Environment Components
- Economic Components
- Cultural and Heritage Components
- Health Components

5.1 Assessment Methodology

The impacts of the project will be described and evaluated for construction and operation stages of the project.
The total impact values of the project stages will be assessed and compared with the baseline situation. More details are given below.

a) Physical and operational activities and their impacts:

Each stage of the project will be described regarding to its physical and operational activities.

b) Criteria used to describe the impacts:

Reference will always be made to local environmental management standards. In case, the local standards are not available the applied standards will be identified.

c) Impact description and evaluation:

The estimated or measured impacts will be evaluated according to:

1. The extent of impact in terms of the time of appearance, frequency, duration and geographical scale, and
2. The number of impacts.

The impacts will be described with respect to the current situation, with the consideration of the autonomous development (without the project) in the area. Impacts will be evaluated according to each criterion and presented in tables. Numerical values will be given for the effect measurements. The evaluation procedure is summarized in the following steps:

1) Effect value is the amount of effect caused by the project activities on a certain area. For example, if the project offers employment opportunities for 50 persons, the value of effect will be 50 workers. But if the effect value cannot be given numerically (e.g. cultural property) negative or positive singes give the effect value. For example:

--	Very negative
-	Negative
0	No effect
+	Positive
++	Very positive and

2) Impact value is a numerical standardized value that represents the impact extent of a certain effect value. In other words, the effect values are translated into impact values. The range of the impact value is from –10 to +10.

3) Criteria weight is the value, which gives the importance of one criterion relative to other criteria. The criteria weight represents the view of the consultants based on their knowledge to the situation of the study area, their discussion and meetings with concerned bodies and agencies. Criteria weight value ranges from 0 to 100 providing that the summation of all criteria weights equals to 100.

4) Assessment value of a certain effect is obtained by multiplying the impact value by the criteria weight. The summation of all assessment values gives the total assessment value by which the project will be evaluated

5) Finally, the total assessment value of the project is compared with the assessment value of the existing situation

The assessment results according to the above methodology are presented at the end of this chapter.

5.2 Land Use Components

Population and Housing

Population

Construction activities of the proposed project have no impacts on population. During operation, short-term impacts are negligible. Long term impact may include increase in population in the vicinity of the REP, especially Al Shoka village. With the operation of the REP, infrastructure facilities will improve in the surrounding areas attracting people to reside in the area. Workers if they have permanent jobs at REP would prefer to live nearby, most probably by renting houses. The significance of such impact is much related to the success of the REP in the initial phases.

Housing

Construction of the first phase of REP has no impact on housing activities. On the other hand, in the construction of subsequent phases, few existing houses are expected to be demolished by project expansion. During operation, the expected impact is some how related to the impact on population. As discussed above, At the short-term no potential impact on housing is expected. At the long-term if the project succeeded, the number of housing units at Al Shoka village is expected to increase and the quality of housing units will improve. Also, due to the improvement of infrastructure associated with REP, the housing unit pricing will increase and the land prices will also increase. Since substantial part of worker families will favor to live close to the REP. The total number of housing units needed to accommodate the workers

will be about 150 for the first phase and about 380 by the end of the second phase.

Land Ownership

The land ownership in the REP site is characterized as governmental land, but locals have been using this land for tens of years for their agricultural activities and to a little extent for their residence. Those people consider this land as their own property. Construction of the project will cause displacement of many landholders and demolition of few houses built in that area. The impact is socially negative and could be significant unless proper compensation is assured. As far as compensation for land acquisition and demolition of existing facilities, PIEFZA will settle this issue with the current landholders.

Industry

The construction industry in the Gaza strip will benefit from the project construction especially if the project is going to be constructed by local companies. The local construction material factories (blocks, ready mix concrete, steel) will benefit from the project construction. Generally there will be a positive short-term impact on the construction industry within the Gaza Strip.

The strategic location of the REP and the availability of off-site and on-site infrastructure will attract investment in the industrial sector. REP will encourage the introduction of new field of industry. This will improve the industrial sector in the Gaza Strip as a whole. Generally the project is expected to have long-term positive impact on the industrial sector in the Gaza Strip.

Trade

The impact of construction stage on the trade sector will be very minimal and limited to construction materials which is available in the local market.

The trade activity is expected to increase gradually in parallel with the development of the project. This will give a positive impact to trade industry. The trade industry for both raw materials and industrial products will be developed locally between Gaza and the West Bank. The strategic location of the project site close to the airport and to the borders with Israel and Egypt will enhance the international trade activities.

In the long term, REP along with the planned similar activities in Israel and Egypt will enhance the concept of having a Free Trade Zone. REP can be an integral part of the Free Trade Zone and thus, be online with the MOPIC Regional Plan concepts.

The operation of the REP will enhance the local community trade activities at Al Shoka village to satisfy the basic needs of workers.

Recreation and tourism

Construction activities of REP are not expected to have any impact on recreational and tourism activities. The proposed area for construction of REP does not have any unique recreational or tourism value, as similar areas are available along the whole eastern boarders of Gaza Strip. The aesthetic value of the proposed REP is very important since it is located in the vicinity of Gaza International Airport. This point have been taken into consideration during planning, thus REP will not have any negative impact regarding this issue.

Agriculture

The proposed site is located in an area characterized by low value agricultural land cultivated mainly by rain-fed crops. Furthermore, water resources in the area are extremely scarce. Thus, the loss of such area to industrial sector, which is much more productive, is considered positive if overall economy is considered. Moreover, loss of similar agricultural land can also be attributed to off-site infrastructure requirements and urban development in the surrounding areas resulting directly from project demands and spin off development. The impacts of this lost agricultural land are long-term, irreversible and relatively minor due to local availability of large areas of land with similar characteristics and the fact that these losses are countered by the economic benefits expected from the development.

Transportation

The transportation of construction materials, labors and heavy machinery to the project site will increase the traffic in the surrounding roads, mainly road # 4 and the airport entrance road. If proper traffic control is not maintained during the construction, traffic jam is expected in these roads. This impact will be short term and minimal and can be easily mitigated. Also direct negative impacts may occur as a result of the increase the risk of accidents. The impact from traffic related accidents could be significant in case of the occurrence of fetal accidents.

The master plan of REP suggested three main offsite roads to be developed in order to connect the proposed REP with the surrounding area. These are the REP main access road,

main entrance road, and the airport access road. Development of these roads will improve the transportation infrastructure in the area. On the other hand, traffic congestion at REP entrances is expected to occur due to the proximity of the site to the airport. Traffic congestion and risk of accidents poses potential negative impacts related to safety and workers health.

5.3 Physical Resources and Bio-Physical Environment

Groundwater

At the proposed site for REP, the ground water table is located at around 68-88m below land surface. The saturated zone does not exceed few meters overlain by very thick clay layer. Therefore, there are no foreseeable impacts on ground water neither during construction nor during operation phases.

Surface Water

There are no foreseeable impacts on surface water during construction phase.

The industrial estate will increase the surface water runoff coefficient in the area due to the construction of new buildings as well as new roads. The coefficient will increase from 0.2 for agricultural land to 0.65 for developed area. This will increase the quantity of surface water runoff. REP peak runoff could increase from about 1302 m^3/hour to about 4230 m3/hour after the first phase, from 2350 m3/hour to 7650 m3/hour after the second phase, and from 3465 m3/hour to 11260 m3/hour after the third phase. If not controlled the runoff will cause a substantial damage to the surrounding agricultural area. Furthermore, runoff water could be polluted from various commercial, domestics and light to medium industrial activities.

Water Use

The construction of the project will increase the demand on the limited water resources in the area, and will increase the pressure on the existing water supply networks. This may reduce the quantity of water available for both domestic and agriculture usage.

During operation the demand on water resources will increase in the area, and will increase the pressure on the existing water supply source. According to the master plan, the water demand for the first phase is expected to be about 1210 m3/day, which will be satisfied form the existing Makarot 6"

pipeline. This will reduce temporarily the quantity of water that is available for domestic use until the construction of the water supply national carrier, which is not likely to happen before 2010.

The total water demand for the second and third phases is expected to be about 2340 m3/day and 4125 m3/day respectively. This demand will be satisfied from the water national carrier. By that time impact on water availability will be negligible since the regional distribution system for the whole Gaza Strip becomes operational.

Air quality

Construction Phase

Construction activities including earthworks, vehicles and heavy machinery movements are known to generate fugitive dust. Most of the strong winds come from the northwest during summer and southwest during winter. This will carry dust particles away from the adjacent residential area (Al Shoka village). Agricultural crops cultivated north of the area could be slightly affected as discussed in Section 5.2.5. The impacts from dust on air quality during construction phase are short term and reversible.

An increase in air pollutants during the construction as a result of exhaust fumes from trucks and heavy machinery is another direct negative impact. The increase in the concentrations of air pollutants (SOx, NOx and Suspended Particulate) may adversely impact construction worker health (asthma incidents and respiratory tract problems). This local, short-term and reversible impact can be considered insignificant due to limited emission and dispersion effect and direction of winds in the area.

Operation Phase

The proposed industry is a light to medium industry, where very few sources of air pollution due to industrial activities are expected. Trucks transporting raw materials and products from and in to the site generate dust , SOx and NOx which will negatively affect the air quality.
Development of off-site road network will have positive impacts in reducing the dust levels which is now resulting from vehicle transport over unpaved roads. This impact is

considered as an indirect, local, and long-term positive impact.

Noise

Construction Phase

Increased noise levels and vibrations in the area surrounding REP during site preparation and other construction activities are anticipated. Earthworks, transportation of material, construction of buildings and operation of heavy machinery are expected sources of noise and vibration. The proposed site of REP is considered countryside, far away from populated centers. Thus the impact regarding noise can be considered as insignificant, local, short-term, and reversible.

Operation Phase

The main sources of noise are:

- The additional vehicles movement to and from the site.
- Some of the proposed industrial firms such as Furniture assembly, Spinning and weaving could be substantial sources for indoor noise.

There are no data available on the noise level in the proposed location. Currently, the proposed location of the project is a quiet countryside. Noise level is relatively low and can be estimated in the range of 45 dB to 55 dB. In most factories, noise level of 85 dB is common.

Soil and vegetation

Construction Phase

During construction, excavation and back-filling activities and trucks movement usually generates dust. The prevailing winds may carry the suspended matters southeast or northeast in summer and winter, respectively. This will directly affect the nearby crops as it reduces temporarily photosynthesis and causes flower falling during flowering stage.

Impacts on soil quality can be directly attributed to soil contamination from spillage of toxic and hazardous material such as oils , fuels, paints, wood preservatives, in addition to solid and liquid wastes. During the rainy season, storm water runoff can carry such pollutants from the construction site, expanding the area of soil contamination beyond the site. Such impacts can be characterized as local, short term, and depending on the types of pollutants and the level of contamination, the impact can be reversible or irreversible. In

general, excavation may cause disturbance to the soil stability and vegetation in the area.

Operation Phase

In case that off-site roads are not paved, trucks movement from and into the site will affect badly the surrounding crops and trees, which ultimately affect the crop yield. The effect is due to the generated dust, which can cause the followings:

- Reduces the green area available for photosynthesis.
- Minor reduction to the voids available for respiration.
- Causes flower falling during the flowering stage.
- Affect the cross pollination process

Wild life resource

The proposed site for REP has no special importance to most of wild life resources including mammals, birds, reptiles and amphibians. This is due to the fact that these types can be found in any place at the eastern boundaries of Gaza Strip and not limited to the project site. Thus impact on such types is minimal. The same applies to most of the wild weeds. Some of the wild weeds are important and somehow are found in plenty in the project site. These weeds are usually limited to this type of areas and considered as medicinal plants. Those are listed below:

- Matricaria Chamomilla,
- Tribulus Terrestris,
- Anethum Graveolens,
- Fumaria Officinalis,
- Euphorbia Peplus,
- Artemesia Vulgaris, and
- Withania Somnifera.

The first one has special importance to the project site and will be affected during construction unless conservation measures are taken.

5.4 Economic Components

Labor Market Condition

Construction of REP will have positive impact resulting from short-term employment for construction workers and an increased opportunity for local construction related

businesses and service providers. Construction activities will continue with the construction of different phases of the project. Substantial contribution to the labor force in the construction sector is expected.

The REP will have a substantial positive impact on the labor market conditions. This will be through educational and training programs in the proposed incubators in high technology industry and the direct employment of substantial number of workers. This will positively affect the employment rate in Rafah Governorate in particular and Gaza Strip in general. The average monthly income for the industrial workers is expected to increase form about 800 NIS/month to about 1000 NIS/month (250 US$/month) in the Rafah Governorates. If the project succeeds it will encourage investments, which then will have pronounced impact on the overall development.

Direct employment and income

Direct employment is related to those involved in the construction activities and to managerial staff, engineers, technicians, workers, drivers involved in the construction and operation activities.

During construction, substantial number of work opportunities will be created especially in the first phase when off-site and on-site construction activities start. These impacts are considered as positive, significant, and short-term impacts.

The total number of direct employment by the end of the first phase is expected to be 7,620 and by the end of the second phase the number is about 18,920. The number of direct employment for each year of REP life is shown in Table (5.1). The expected operation start year is the year 2003.

Table (5.1). The accumulative direct employment for REP

Year	No. of employees	Year	No. of employees
2003	1153	2011	13099
2004	2305	2012	14689
2005	3458	2013	15956
2006	4720	2014	16965
2007	6104	2015	17770
2008	7600	2016	18412
2009	9281	2017	18923
2010	11102	2018	18923

Indirect employment and income

Indirect employment is related to the followings:

- Activities related to; Airport, cross point boundary, the new seaport including loading, unloading, registration, taxes, etc.
- Activities related to supporting industries, such as raw material producers, paper factories, etc.
- External financial Auditor offices.
- Distributors/agents
- Advertising and publishing

Indirect employment during construction is limited to transporting facilities related services and local material supplies such as construction materials.

REP is going to generate indirect employment especially those are related to transportation and services sectors. These include raw materials and product transport, export and import, banking, and insurance. Furthermore, development of REP will accelerate the development of the surrounding areas. Some commercial activities will be developed to serve the needs of the workers, drivers and others. The expected total number of indirect employees is about 11172 job by the end of the first phase and about 25721 job by the end of the second phase. The expected number of indirect employment for each year of operation is shown in Table (5.2).

Table (5.2). The accumulative indirect employment for REP

Year	No. of employees	Year	No. of employees
2003	1682	2011	19109
2004	3364	2012	21120
2005	5047	2013	22628
2006	6897	2014	23759
2007	8933	2015	24607
2008	11172	2016	25244
2009	13635	2017	25721
2010	16270	2018	25721

Indirect/induced Economic Development Opportunities

Indirect or induced economic development opportunities also are referred to activities or opportunities that may start or develop as a result of the existence of this particular project. These include but not limited to the following:

- Part of Gaza Airport, borders crossing points and seaport activities.
- Export/import activities
- Advertising and publishing
- Stock and storage
- Services

If the project succeeds it will encourage investments, which then will have pronounced impact on the overall development. Such impacts are characterized as positive, long-term, and significant.

Supplies, material, and services

Generally, utilizing local services and material will have a positive impact on the local market. Local supplies, material, and services will be used as long as it is locally available. The followings will be considered as local alternatives:

- During construction phase all the necessary workmanship, building material, and building equipment will be supplied locally.
- For material and equipment transport, local facilities will be used.

Infrastructure

Water Supply

The area is not served with municipal water supply network. The residents of the nearby village (Al Shoka) are being supplied with water from Mekorote (Israeli water company) and local agricultural wells.
During construction the water demand will be limited to construction activities and will be supplied from existing Mekorote connections. Thus, there will be little impact on the existing water supply.

According to the master plan, for the first phase option 3 was selected. This includes obtaining water from the Airport well through a connection to the existing 200-mm trunk line that transmits water from the well to the Airport. The required connection is about 1400m long with 200mm UPVC pipe diameter. The average daily consumption for the airport is about 200m3/day. This demand can be met by operating the

well for three hours a day only. Both the well and the trunk line will have the additional capacity to supply at least the first phase of the REP. By the start of the second phase, the north-south carrier will be in operation and will satisfy the demand of REP. Impact on water supply infrastructure will be positive as the nearby areas can benefit from the proposed facilities and achieve more reliable water supply system. This impact can be characterized as positive, long-term, and local impact.

Waste Water

Al Shoka area as well as the neighboring area is not served with a conventional sewage systems. The wastewater system required for the project will only entail domestic type wastewater. If any industries produce non-domestic type wastewater, pre- treatment will be required.

During construction, the sewage production will be limited to domestic waste of labor. This can be handled through construction of septic tank and using vacuum truck from time to time to dispose it to appropriate place.

During operation, wastewater production will be both domestic and industrial wastewaters. The total expected amount of sewage is 1028m^3/day for the first phase, and 1989m3/day when the two phases are totally occupied. According to the master plan, the collected sewage will be pumped out to the planned main treatment plant 6 km to the north of REP. This WWTP is expected to be constructed in March 2001 and to be functioning by mid of 2003. The disposal of the REP sewage entails the construction of sewage pumping station and 7 kms of 200mm UPVC pipe. However, the applicability of this option is pending the implementation and functioning of Rafah and Khan Younis WWTP. The construction of the sewer pipeline will enhance the possibility to construct a sewer system at Al Shoka area. This impact can be characterized as positive, long-term, and local impact. Some industrial wastewater which contains high loads of BOD than the domestic wastewater or which contain pollutants that cannot be handled by domestic wastewater treatment plant, such as toxic material, will have negative impact on treatment processes if not pre-treated to an acceptable level.

Solid and Hazardous Waste

The nearest landfill site to the project area is Rafah land fill, it is located at about 4.5 km to the north of the proposed project site. In Gaza city, there is a hazardous solid waste landfill, which serves the whole Gaza Strip.

During construction, solid waste production will be limited to construction waste such as, timber, excavation materials, etc. It will be dumped at Rafah landfill. This will have minor negative impact on the existing facilities regarding overloading.

During operation, solid waste production will be limited to domestic waste, which will be dumped at Rafah landfill. In case of hazardous waste it should be dumped at Gaza hazardous waste. This will also have minor negative impact on the existing facilities regarding overloading.

Electrical Supply

According to the master plan, the Israeli Electricity Company, which currently supplies Gaza Strip with electricity, can be contracted for the first few years to provide REP with electricity. Having the Gaza Power Plant and the southern sub-station operating, one high-tension cable with 11MW capacity should be installed to cover the demand of stage one, which has been estimated to be 10.23MW. The demand of the second stage is estimated to be 10.1MW should be covered by installing another cable with 11MW capacity. Development of such facility in the area will have a significant positive impact on the development of the surrounding areas both at short-term and long-term.

Telecommunication

According to the master plan, the only option to provide the REP with telephone lines is from the Palestinian Telecommunication Company (PalTel), the main fiber optic cable that crosses the REP site needs to be re-located in the main road of the REP. The installation of one Remote Subscriber Unit (RSU) with a capacity of 500 lines will cover the demand of the first phase. Development of such facility in the area will have a significant positive impact on the development of the surrounding areas both at short-term and long-term.

5.5 Cultural and Heritage Components

The only cultural site of relative importance to the people of Rafah within the project site is the "MEMORIAL OF EGYPTIAN SOLDIERS" located near the southeastern boundary of REP. Based on the historical resources there are no identified archaeological sites or historical buildings in the project area.

The memorial site is not related to the exact location where it is placed. Thus, during construction, the site could be shifted to a suitable place within the REP. There is also a potential to damage potential buried archaeological remains. During site preparation and earthwork, negative impact to buried and undiscovered archaeological remains are possible. This impact can be characterized as local and insignificant as there are no surface indications of any possible remains.

During operation there are no foreseeable impacts on cultural and heritage resources.

5.6 Public Health

During construction, there will be minor impacts limited to accident risks during construction activities and transporting the construction materials and nuisance due to dust and noise. These impacts can be characterized as local, direct, short-term and mostly insignificant.

During the operation phases, the impact of REP depends mainly on the type and density of proposed industries. Negative impacts on workers health may arise due to the exposure to noise, high temperature, uneven lighting, dust, and work accidents. The nature of these potential impacts is summarized as follows:

- Exposure to high level of noise, above 85 dB, will negatively affect the Auditory Sensation. Hearing Loss, Cardiac Disorder, Arterio Sclerosis, and Hyper-cholestrolemia, and Nervous System Disorder may be long term health impact of high noise levels. Higher level of noise can cause eardrum rapture and/or exhaustion of inner ear nerve fibers.
- Exposure to high temperature initially causes heat exhaustion, Pyrexia, confusion, and Hyper-sweating,

which ultimately causes Loss of Consciousness. Since the proposed industries are only medium to light type such impacts will be minimal.

- If there is no sufficient lighting accidents may occur. Uneven distribution of light may cause Eye Exhaustion (Asthenupea) and blurring of vision.
- Respiration of fine particles, specifically those too small to be stopped by our bodies' natural traps and defense mechanisms has been shown to be associated with a host of respiratory problems and diseases in humans. And to include increases in related mortality (National Academy of Sciences, 1979; Perera and Ahmed, 1979). The particles emitted, which have a diameter less than 2 µm, are respirable into the gas-blood region of the lung (Costner and Thornton, 1989; Montague, 1989).
- Worker will be exposed to accident risk resulting from dynamic/moving parts of the plant such as transferring belts, loading/unloading machines, and grinding mill. Also electric shocks and fire accidents may take place.

5.7 Summary and Results

The assessment process mainly consists of the following steps:

- Impact identification for each environmental issue and sub-issue.
- Determination of effect value and impact value.
- Weight assignment to reflect the relative importance of each issue with respect to others.
- Evaluation of the total environmental impact.

Impact Identification

Impact identification sheets (one for construction phase and the other for operation phase) were designed. The sheets aimed to attach values to the effects and impacts of different environmental issues with and without project construction and with and without considering the mitigation measures. The impact values range form –10 to +10.

The sheets were distributed to experts representing different fields related to the study. The experts attached effect value and Impact value for their related environmental issues.

The results of impact identification process for the construction phase are shown in Table (5.3). The results show that in case of considering the mitigation measures the impact total value will be -3, while if the mitigation measures are excluded, the impact total value will be -51.

The results of impact identification process for the operation phase are shown in Table (5.4). The results show that in case of considering the mitigation measures the impact total value will be +42, while if the mitigation measures are excluded the impact total value will be -6.

The total impact values of the project for the two phases, with and without considering the mitigation measures, are shown in Table (5.5). In case of not considering the proposed mitigation measures a large negative environmental impact will be resulted form the project. The proposed mitigation measures will eliminate/reduce the major negative impacts.

Weight Assignment

Experts representing different fields related to the study such as ecology, archeology, land use, socio-economy, water and environment participated in assigning weight for different issues.
Also people from different ministries such as Ministries of Health, Labor, Local Governorate, Agriculture, and Palestinian Water Authority have been consulted to explain the importance of each group with respect to other.

Finally the average weights were calculated and considered as shown in Table (5.5).

Evaluation of the Total Environmental Impact

The assessment values for each environmental issue is calculated and presented in Table (5.5).

The assessment value for both phases, without the project is found –1068. This value mean that, a considerable negative impacts are expected if the project is not implemented. The negative impact will be mainly in both economic and land use components.

The assessment value for both phases, without the project and with the project without considering the mitigation measures are found –762 and –1068 respectively. In other words, the negative environmental impacts for the project are much less the negative impacts without the projects. This concludes that the construction of the project is crucial for the area.
The assessment values for both phases, with and without considering the mitigation measures are found +1314 and –762, respectively. In other words, the project, if proper mitigation and monitoring measures are considered, will have positive environmental impacts. The positive impacts can be clearly observed in the land use and economic issues.

5.8 Transboundary Impact Assessment

Rafah Enterprise Park is located adjacent to the Green Line or boundary with Israel. The proposed industries in Rafah Enterprise Park will be mainly light to medium industries (Hi-Tec and clean industries), no heavy industries will be allowed. Therefore, no negative impacts are expected, as industries will not be characterized by any remarkable air emissions of toxic compounds or pollutants to the atmosphere.

Based on a previous study (Transboundary Environmental Impact Assessment) for Gaza Industrial Estate "GIE", the study discussed impacts which may affect the Israeli side due to the planned activities in GIE. The study showed that the impacts on the Israeli side are minimal. By the same property of position and industries type in Rafah Enterprise Park and Gaza Industrial Estate, the expected impacts will be minimal, similar to the GIE. However, a detailed study of transboundary environmental impacts will be arranged between MEnA and PIEFZA in the future required in order to describe the current environmental conditions within the area of interest with specific reference to the physical (topography, geology, hydrogeology and groundwater quality, surface water, ambient air quality, noise, road transportation) and biological environment (identification of flora and fauna, sensitive and protected areas), identify issues of concern, and eliminate consideration of impacts unrelated to the identified area of interest.

Table (5.3): Impact identification – Construction phase.

	Issue	Sub-Issue	Without the project		With the project			
					Excluding mitigation		Including mitigation	
			Effect value (+++ to ---)	Impact value (-10 to +10)	Effect value (+++ to ---)	Impact value (-10 to +10)	Effect value (+++ to ---)	Impact value (-10 to +10)
Land Use Components	Population and housing	Population	0	0	0	0	0	0
		Housing	0	0	-	-3	+	3
		Land ownership	0	0	--	-6	0	0
	Industry		--	-6	++	6	++	3
	Trade		-	-3	+	3	+	3
	Recreation and tourism		0	0	-	-3	0	0
	Agriculture		0	0	--	-6	-	-3
	Transportation				--	-6	-	-3
Sub-total				**-9**		**-15**		**3**
Physical Resources and Bio-Physical Environment	Ground water		0	0	0	0	0	0
	Surface water		0	0	--	-6	-	-3
	water use		0	0	--	-6	-`	-3
	Air quality and noise	Air quality	0	0	---	-9	-	-3
		Noise	0	0	--	-6	-	-3
	Soil and vegetation		0	0	---	-9	-	-3
	Wild life resource		0	0	--	-6	-	-3
Sub-total				**0**		**-42**		**-18**
Economic Components	Labor market conditions		-	-3	+	3	+	3
	Direct employment and income		-	-3	+++	9	++	6
	Indirect employment and income		-	-3	+	3	+	3

Table (5.3): Impact identification – Construction phase.

	Issue	Sub-Issue	Without the project		With the project			
					Excluding mitigation		Including mitigation	
			Effect value (+++ to ---)	Impact value (-10 to +10)	Effect value (+++ to ---)	Impact value (-10 to +10)	Effect value (+++ to ---)	Impact value (-10 to +10)
	Indirect/induced economic developments		-	-3	+	3	+	3
	Supplies, material, and services		0	0	+	3	+	3
	Infrastructure	Water supply	0	0	0	0	0	0
		Wastewater	0	0	0	0	0	0
		Solid and hazardous waste	0	0	-	-3	0	0
		Electrical supply	0	0	0	0	0	0
		Telecommunication	0	0	0	0	0	0
Sub-total				**-12**		**18**		**18**
Cultural and Heritage Components			0	0	--	**-6**	-	**-3**
Public Health			0	0	--	**-6**	-	**-3**
Total				**-21**		**-51**		**-3**

key

+++ very much positive ++ very positive + positive 0 normal

--- very much negative -- very negative - negative

Table (5.4): Impact identification – operation phase.

	Issue	Sub-Issue	Without the project		With the project			
					Excluding mitigation		Including mitigation	
			Effect value (+++ to ---)	Impact value (-10 to +10)	Effect value (+++ to ---)	Impact value (-10 to +10)	Effect value (+++ to ---)	Impact value (-10 to +10)
Land Use Components	Population and housing	Population	0	0	+	3	+	3
		Housing	0	0	+	3	+	3
		Land ownership	0	0	--	-6	-	-3
	Industry		--	-6	+++	9	+++	9
	Trade		-	-3	+++	9	+++	9
	Recreation and tourism		0	0	0	0	0	0
	Agriculture		0	0	--	-6	-	-3
	Transportation				---	-9	-	-3
Sub-total				-9		3		15
Physical Resources and Bio-Physical Environment	Ground water		0	0	0	0	0	0
	Surface water		0	0	---	-9	-	-3
	water use		0	0	--	-6	-	-3
	Air quality and noise	Air quality	0	0	---	-9	-	-3
		Noise	0	0	--	-6	-	-3
	Soil and vegetation		0	0	---	-9	-	-3
	Wild life resource		0	0	-	-3	-	-3
Sub-total				0		-42		-18
Economic Components	Labor market conditions		-	-3	+++	9	+++	9
	Direct employment and income		-	-3	+++	9	+++	9

Table (5.4): Impact identification – operation phase.

	Issue	Sub-Issue	Without the project		With the project			
					Excluding mitigation		Including mitigation	
			Effect value (+++ to ---)	Impact value (-10 to +10)	Effect value (+++ to ---)	Impact value (-10 to +10)	Effect value (+++ to ---)	Impact value (-10 to +10)
	Indirect employment and income		-	-3	+++	9	+++	9
	Indirect/induced economic developments		-	-3	+++	9	+++	9
	Supplies, material, and services		0	0	+	3	+	3
	Infrastructure	Water supply	0	0	+	3	+	3
		Wastewater	0	0	-	-3	+	3
		Solid and hazardous waste	0	0	-	-3	-	-3
		Electrical supply	0	0	+	3	+	3
		Telecommunication	0	0	+	3	+	3
Sub-total				-12		42		48
Cultural and Heritage Components								
Public Health								
Total				-21		-6		42

key

+++ very much positive ++ very positive + positive 0 normal

--- very much negative -- very negative - negative

Table (5.5) Total Impact Values of the project

Sub group	Without project			With the project					
	Construction	Operation	Total	Without Mitigation			With mitigation		
				Construction	Operation	Total	Construction	operation	Total
Land use components	-9	-9	-18	-15	3	-12	3	15	18
Physical and Bio-physical components	0	0	0	-42	-42	-84	-18	-18	-36
Economic components	-12	-12	-24	18	42	60	18	48	66
Cultural and heritage	0	0	0	-6	0	-6	-3	0	-3
Public health	0	0	0	-6	-9	-15	-3	-3	-6
Total	**-21**	**-21**	**-42**	**-51**	**-6**	**-57**	**-3**	**42**	**39**

Table (5.6). Total Assessment Value of the Project

Sub group	Weight value	Without the project		With the project			
				Without Mitigation		With mitigation	
		Impact value	Assessment value	Impact value	Assessment value	Impact value	Assessment value
Land use components	22	-18	-396	-12	-264	18	396
Physical and Bio-physical components	22	0	0	-84	-1848	-36	-792
Economic components	28	-24	-672	60	1680	66	1848
Cultural and heritage	10	0	0	-6	-60	-3	-30
Public health	18	0	0	-15	-270	-6	-108
Total	**100**	**-42**	**-1068**	**-57**	**-762**	**39**	**1314**

6. MITIGATION MEASURES AND MONITORING PLAN

6.1 Mitigation Measures

Construction Phase

As identified earlier in chapter 5, impacts during construction are primarily associated with land preparation, earthworks, material transportation and movement of heavy machinery. Such impacts are mostly short-term, local, and caused by the contractor activities in the area and can be mitigated through proper co-ordination with the contractor and the concerned governmental parties.

Operation Phase

Impacts during operation phase are primarily associated with land use, transportation, water use, air quality, wastewater discharge, solid and hazardous waste, and public health. Most of these impacts are long-term, and significant unless proper mitigation measures and monitoring plan are implemented.

The Proposed mitigation measures during construction and operation phase are outlined in Table 6.1 .

6.2 MONITORING PLAN

The Environmental Monitoring plan sets out a framework for monitoring the environmental resources at the REP. An environmental standard for air emission and wastewater should comply with the standards and guidelines that are outlined in the Environmental Manual (EM) of Gaza Industrial Estate. The Environmental manual was prepared by the Ministry of Environmental Affairs (MEnA) in consultation with the Palestinian Industrial Estate and Free Zone Authority (PIEFZA).

To ensure that the environmental conditions within REP site are in accordance with standards set by PIEFZA and MEnA regulations, monitoring should be carried out in order to cover:

- Quantities and characteristics of liquid, solid and gaseous emissions.
- Handling, treatment and/or disposal methods of liquid and solid waste.

- Effect of waste disposal on the environment.
- Effect of REP activities on the available water resources
- Effects of REP activities on ambient air quality within the boundaries of the REP and its surroundings.
- Noise levels within the boundaries of REP and its immediate surroundings.
- Implementation of landscaping and other measures are recommended.

In addition, the designated authority responsible for monitoring and enforcing the various environmental issues as related to the project activities as outlined in Table 6-1 is proposed.

6.3 Potential Environmental Impacts, Mitigation measures and Monitoring Plan

In order to implement sufficient and adequate EMP in terms of Projects monitoring, reporting and project Supervision, the following actions are recommended:

- Site-specific environmental screening and review process conducted at least two times each year for a random selected projects.
- Prepare a progress report two addressing environmental issues, status of mitigation measures taken and recommendations.
- Progress on mitigation measures will be included in regular supervision reports

The project activities during both construction and opearion phase should be subjected to site specific environmental assessment and review process. Environmental mitigation and monitoring actions are presented in a simple matrix format. This includes identifying the issues, mitigation measures, responsibility for carrying out the mitigation measures, environmental monitoring, and responsibility for carrying out the monitoring actions. Table 6.1 handles these issues in more details.

6.4 EMP Cost Estimate and Schedule

The estimated annual cost for the Environmental Management Plan (EMP) is divided into two parts: yearly monitoring of construction activities phase (56,000.0 $US) and yearly monitoring of operation phase (64,000.0 $US). Table (6.2) lists the main components of EMP and the related cost.

A schedule for the implementation of the various activities of the Environmental Management plan is prepared and shows the activities duration and timing of the proposed periodic assessments. Table (6.3) shows the schedule of the project's major activities during the proposed period of the project Phases.

Here is a brief description of the responsibilities of the agencies that will manage, develop, monitor the activities in Rafah Enterprise Park during the different stages; planning, design, construction and operation. There are mainly three agencies; PIEFZA, the Developer (Palestinian Industrial Estate Development and Management Company, PIEDCO) and (Palestinian Commercial Services Company, PCCS) and the Operator.

PIEFZA

PIEFZA is the responsible agency for the following:

- Allocation the boundaries of the industrial areas and negotiations with the governmental bodies and local administrator agencies in Rafah Region.
- Compensation for land and for landholders acquisition.
- Commission a consultant to prepare the Feasibility Studies and related Environmental Assessment Studies during the planning stage.
- Commission a local consultant firms to conduct the auditing for the facilities in the enterprise park or to carry out the environmental measurements for the different environmental components (water quality, wastewater treatment, air pollutants and noise).
- Monitoring the activities in the industrial area during design, construction and operation stages of the development.

Developer
(Palestinian Industrial Estate Development and Management Company, PIEDCO) and (Palestinian Commercial Services Company, PCCS)

The Developer (PIEDCO & PCCS) is responsible for the following:

- Design and construct the different facilities inside the industrial area.
- Design and construct all the infrastructure components inside and offside the industrial estate.
- Implement the required steps and activities to facilitate the work and the development progress in the area.

- Follow up the environmental management plan and all the legislation that are related to the construction activities inside the area.

Operator

The operator is responsible for the following:

- Managing the area in cooperation with PIEFZA during the operation stage.
- Implementation of the environmental management plan and the included mitigation measures during the operation stage.
- Coordination with factory owners to ensure the sound environmental management plan.

For Rafah Enterprise Park, PIEFZA may commission one company to develop and operate the area at the same time.

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures.

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
Land Use	Disturb of aesthetic features	Ensure aesthetic view of the REP	PIEFZA (PIEDCO & PCCS)	Design and Construction	Before construction, landscape plans should be reviewed and approved	PIEFZA
	Land acquisition	Compensation for land and for landholders acquisition	PIEFZA	Before and during Construction		
	Loss of vegetation	Design of landscaping around the facility and planting of some vegetation	(PIEDCO & PCCS)	Design, construction and operation	Check proper implementation before hand over process	PIEFZA
	Localized disturbance of surrounding areas	Proper construction management, and reshape the site conditions	(PIEDCO & PCCS)	Construction	Check the site before hand over process	PIEFZA
	Planting of trees and bushes, shrubs, trees, and flowers	Planning and implementing of appropriate landscaping program	(PIEDCO & PCCS)	Construction and Operation	Check the site before hand over process	PIEFZA

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
Physical Resources and Biophysical Components	Construction work conducted during rainy season may cause problems to construction activities	Consider and direct runoff flows that could hinder construction activities Placement of stockpiles for protection	(PIEDCO & PCCS)	Construction	Monitoring and approved of Construction Management Plan	PIEFZA
	Runoff carry off loose materials	Excavated material should be kept away from low areas to minimize erosion and subsequent deposition downstream	(PIEDCO & PCCS)	Construction	Monitoring and treatment of any potential damage to surrounding soil structure	PIEFZA
	Pressure on existing water supply	Proper water management plan should be implemented Tankers available offside water supply Runoff water should be collected in a suitable storm drainage system and used for landscape irrigation or cleaning activities. Offsite and onsite design should be integrated	(PIEDCO & PCCS) Operator	Construction and operation	Monitoring Water Consumption Review and approve the water management plan	MOR PWA MOR PWA
		Water recycling may be implemented in some industries				

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
		Installation of water conserving faucets in showers and bathrooms are strongly recommended				
	Emission of dust and particulate matters	Measures for dust reduction before construction of any new establishment Disposal management Limiting of traffic speed to 30 km/hour in the construction sites.	(PIEDCO & PCCS) Operator	Construction Operation	Review and approve the construction management plan Identify dumping sites for construction waste prior to construction Monthly dust monitoring especially along access roads should be implemented	PIEFZA MEnA MOR PIEFZA PIEFZA
		Covering stockpiles (onsite and during transportation) of fine materials Spraying water on vehicles tracks				
	Air pollutants generated by traffic and construction activities	Using relatively new construction and transportation vehicles with lower emissions	(PIEDCO & PCCS) Operator	Construction and operation	Monthly air quality monitoring program	PIEFZA
		Control the air pollutants of the power generators				

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
		Incorporation of absorption systems such as flue-gas de-sulfurisation system for SO2 control Particulate emissions control unit such as scrubbers, cyclones, fabrics, or electric precipitators				
	Noise-generating	Ensure that noisy activities occur during daytime and not during holidays or late night times Installation of the noise insulating material Planting a belt of trees, bushes and shrubs around the facilities	(PIEDCO & PCCS) Operator	Construction Operation	Methods of noise reduction should be reviewed and evaluated before construction	MOR PIEFZA MEnA
	Impact on nearby vegetation	Dust generating activities such as excavations and back-filling should be avoided during flowering period of the plants (April and May) as much as possible	(PIEDCO & PCCS)	Construction	At the beginning of construction soil excavation and back-filling plan should be reviewed and evaluated	PIEFZA MEnA

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
	Destroy of some wild weeds especially "Matricaria Chamomilla"	Important weeds could be transferred to other surrounding places	(PIEDCO & PCCS)	Construction	Management Plan should be prepared for dealing with important weeds.	MOA MEnA
	Wide disturbance to the whole site and the surrounding areas					
Economic components	The proposed projects have positive impacts on most of the economic components	Local facilities, supplies, labors, services should be used as much as possible	PIEFZA (PIEDCO & PCCS) Operator	Construction and operation	At regular basis proper septic tanks and sanitary service (WC's) should be visually checked for availability and suitability.	PIEFZA MEnA MOH MOR
					A check for the contractor plan for methods of wastewater disposal should be made.	
					At regular basis solid waste dumping practice should be monitored	

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
Cultural and Heritage	During earthworks and excavations if buried archaeological remains are discovered	Construction activities have to be suspended Appropriate measures during construction activities around the memorial site of the Egyptian soldiers during the construction of second phase. Plant a belt of trees and grass.	(PIEDCO & PCCS)	Construction	Work should be stopped immediately and MOTA should be informed to take the necessary action	MOTA
Public Health and Safety Components	Toxic and hazardous materials should be safely handled and stored Flammable and explosive materials should be: Properly stored	Protected from direct heat and sun Located in areas where fire-fighting facilities are provided	(PIEDCO & PCCS) Operator	Construction Operation	Approved method of storage before construction	PIEFZA/ MOL MEnA

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
		Workers should be provided with proper sanitation and supplies Workers should also use protective clothing such as hard hats, gloves, boots, ear protectors in noisy areas of healthy water First aid material and personnel with first aid training should always be present			Check for compliance of insurance and occupational health requirements and regulations Regular visual check should be made for first aid materials availability, safety measures regarding handling and storage of hazardous materials and adequate clean water supply and sanitation facilities availability, workers use of proper clothing, hard hats, gloves and boots	PIEFZA/ MOL MEnA
	Risk of accidents and injuries	Follow safety instructions, worker should wear proper clothing A first aid station with trained staff, which is able to coordinate with local hospitals in case of emergencies	(PIEDCO & PCCS) Operator	Construction Operation	Check safety compliance Check should be made for the each establishment of interims insurance and occupational health requirements and regulations	PIEFZA/ MOL

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
Health		General Measures: Sanitary facilities will be provided with employees encouraged to wash frequently, particularly those exposed to dust or chemicals. Protective creams will be also provided. Emergency eyewashes and showers located in product handling areas and laboratory facilities Workers exposed to heat should drink water with salt to reduce hyper-sweating and should wear heat isolation dress The work place should have proper ventilation to refresh oxygen and reduce temperature. Openings should from more than 30% of the side areas Installation of suction fans with filters at minimum height of 3.5 meters from the ground	Operator	Operation	General Mitigation monitoring measures and methods: Regular monitoring of wastewater at discharge points for metals, greases, suspended solids and BOD levels Workers should perform comprehensive clinical examination before joining the work. This should include chest x-ray, ophthalmic, urine, blood, cardiac, and blood pressure examination. Each factory should conduct regular full health examination for workers every year Regular dust and air quality monitoring program is recommended, the program should be conducted twice a year at the remote areas loading places, and along the main roads	PIEFZA Preventive medicine department in the MOH Preventive medicine department in the MOH and MOL

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
		Employees will be trained on the hazards, precautions and procedures for safe storage, handling and use of all potentially harmful materials relevant to each employee's task and work area. Operation instruction of each machine should be written clearly. Personnel will be trained in Environmental Health and Safety matters including accident prevention, safe lifting practices, safe chemical handling practices, proper control and maintenance of equipment and facilities. Emergency response training will be required including emergency/fire drills.		Operation		
		Warning signs and instructions in case of emergencies should be properly displayed Sufficient lighting should be provided especially in storage areas				

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
		Other requirements of Palestinian Labor Law especially regarding safety should be applied Electric equipment should be earthen and well insulated, and a safety program should be established for maintenance work Requirements of Civil Defense should also be applied. Fire fighting tools such as fire hoses, fire hydrants, water storage specified for fire fighting, and individual fire extinguishers should be considered during the design and implementation		Operation		

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
Fire Protection and Safety		Fire prevention systems and secondary containment should be provided for fuel storage areas A fire evacuation plan should be in place		Operation	Records of significant environmental matters such as monitoring data, accidents and occupational illnesses, environmental discharges, fires or other emergencies will be maintained Annual Environmental Health and Safety (EH&S) report to be provided to relevant institution. There will be one individual who will be responsible for EH&S. This individual will be responsible for environmental communications i.e. preparation of the annual EH&S report, and health and safety training for workers	

Table: 6.1 Potential Environmental Impacts and Proposed Mitigation Measures (Continued).

Environmental Component	Potential Impacts	Mitigation Measures	Responsibility for Execution	When required	Mitigation Monitoring Measures & Methods	Monitoring and Enforcement Responsibility
General	Traffic accidents and congestion	Appropriate traffic planning: Setting up detours, Preferred routes and appropriate times for transportation			Check on contractors identification of safety access roads	
		Development of proposed off-site road networks	(PIEDCO & PCCS) Operator			MOLG/ MOT
		Speed limitation and traffic lights at intersections		Construction Operation		
		Hiring of experienced drivers				
		Use of well-maintained and serviced vehicles for transportation			Periodical Checks for Vehicles	MOT POLICE
	Negative publicity and misconceptions	Public campaigns		Design Construction Operation		
		Utilize the media services for early mitigation of any adverse publicity and misconception.				

Table 6.2: EMP Yearly Cost Estimates

	Components of EMP	Construction Phase					Operation Phase				
		Qty.	Unit Rate $	Cost in Thousands US$/Year			Qty.	Unit Rate $	Cost in Thousands US$/Year		
				Local	Foreign	Total			Local	Foreign	Total
1	Environmental Expert Hired	6MM	$1500/MM	9.0	0.0	9.0	6MM	$1500/MM	9.0	0.0	9.0
2	Capacity Building and Training										
a)	On-the-job training for MEnA and PIEFZA staff (1 month each)	2	10,000.0	10.0	10.0	20.0	1	1,0000.0	0.0	10.0	10.0
b)	Seminars and workshops for MEnA and PIEFZA staff (1 Week each)	2	4,000.0	2.0	6.0	8.0	2	4,000.0	2.0	6.0	8.0
c)	Compliance monitoring by MEnA/ PIEFZA, per annum Miscellaneous			3.0	0.0	3.0			3.0	0.0	3.0
3	Environmental Auditing and Assessment of the Environmental issues (early)	1	4,000.0	4.0	0.0	4.0	1	4,000.0	4.0	0.0	4.0
4	Contingency budget for archaeological chance find support from Palestinian Department of Archeology			2.0	0.0	2.0	Only for Construction				
5	Monthly Monitoring of Water quality	For Operation Only					12	250.0	3.0	0.0	3.0
6	Monthly Monitoring Waste water quality	For Operation Only					12	250.0	3.0	0.0	3.0
7	Air pollution monitoring (monthly monitoring and twice a year monitoring)	12	500.0	6.0	0.0	6.0	12	1,750.0	21.0	0.0	21.0
8	Miscellaneous			2.0	2.0	4.0			1.0	2.0	3.0
	TOTAL			**39.0**	**17.0**	**56.0**			**47.0**	**17.0**	**64.0**

Table 6.3: Tentative EMP Yearly Implementation Schedule

	Components of EMP	Yearly Monitoring Plan																								
		Construction Phase												Operation Phase												
													Notes													
1	Environmental Expert Hired																									
2	Capacity Building and Training																									
a)	On-the-job training for MEnA and PIEFZA staff (1 month each)												For the first year of construction only													One every tw years
b)	Seminars and workshops for MEnA and PIEFZA staff (1 Week each)												Twice a year													Twice a yea
c)	Compliance monitoring by MEnA/ PIEFZA, per annum Miscellaneous																									
3	Environmental Auditing and Assessment of the Environmental issues (early)																									
4	Contingency budget for archaeological chance find support from Palestinian Department of Archeology																									
5	Monthly Monitoring of Water quality																									
6	Monthly Monitoring Waste water quality																									
7	Air pollution monitoring (monthly monitoring and twice a year monitoring)																									

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ANNEXES

Annex A

Final Scooping Statement

Annex B

Scoping of Meeting

Annex C
Terms of References

Annex D
Consultant Team

RAFAH ENTERPRISE PARK
FEASIBILITY STUDY

Funded by United States Agency for International Development

SCOPING STATEMENT

ENVIRONMENTAL IMPACT ASSESSMENT
RAFAH ENTERPRISE PARK

RAFAH, GAZA STRIP

TSG - SITE (Supporting Investment, Trade, and Employment) Project

CONTRACT No. 294-C-00-98-00110-00

May 2000

EMCC

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This report was prepared by Engineering & Management Consulting Center, subcontractor for The Services Group, Inc., the prime contractor to the United States Agency for International Development for Rafah Enterprise Park Feasibility Study in Gaza Strip.

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1 PROJECT BRIEF

This scoping statement is based on the environmental Scoping Session held on Tuesday, April 11, 2000 and organized by Palestinian Industrial Estates and Free Zones Authority (PIEFZA), The Services Group, Inc. (TSG), and Engineering and Management Consulting Center (EMCC), and prepared to satisfy the requirements set by United States Agency for International Development (USAID), Ministry of Environmental Affairs (MEnA), and PIEFZA environmental procedures and the associated Environmental Management Systems.
A brief description of the proposed project and its alternatives in addition to the methodology used for the Environmental Impact Assessment (EIA) and Scoping are presented in this report.

1.1 Introduction

Previous studies by The Services Group have indicated that there was demand for serviced industrial space in Gaza Strip. Ministry of Industry and Ministry of Planning and International Cooperation had identified an approximately 250ha (2500 dunums) of land to be designated for mainly industrial uses. PIEFZA refined this area to approximately 165ha (1650 dunums). A second revision was made to conclude the size of the site to approximately 145ha (1450 dunums).
USAID has retained the services of TSG to conduct a feasibility study for the proposed Enterprise Park project, including the EIA. The EIA will be prepared to describe the existing environmental conditions, potential impacts of the development, and mitigation measures required to minimize the environmental impact of the development.
Scoping is a process through which preliminary and significant issues are identified for the purpose of consideration in an EIA. Addressing every conceivable environmental issue in an environmental impact assessment is difficult and impractical. Therefore, significant issues must be identified early in the process to focus the subsequent work in the assessment stage. This report presents the environmental Scoping Statement for the preparation of EIA for the proposed Enterprise Park at Rafah in Gaza Strip.

1.2 Project Description

This section of the report provides a preliminary description of the project that includes the site and location, demands for space and types of industries, the expected economic benefits and the utility and infrastructure requirements of successful development of the proposed Enterprise Park.

1.2.1 The Site

The proposed site for the Enterprise Park is located at the extreme Southeast of Gaza Strip to the east of Rafah City. The site is about 5 kilometers from the Egyptian border, almost adjacent to the Green Line (100meters away) and about 1.5 kilometers from Gaza International Airport. The closest sizable urban settlement to REP is the city of Rafah about 8.5 kilometers to the west of the proposed site.
A prefeasibility study was carried on by PIEFZA for the Enterprise Park. The site is currently in the ownership of private landholders. The Palestinian Authority has declared the transfer of the land from agricultural usage to industrial usage in March 1999. The Ministry of Industry is at the process of finalizing the land ownership transfer from the private landholders to Palestinian Authority.
The site is open and clear, ready for industrial development. It is located in an area that is defined to be suitable for industrial development by PIEFZA, MOI, and MOPIC, and is relatively close to the cities of Rafah and Khan Younis. Conditions on site are suitable for the development of industrial buildings. Figure 1 presents the location of the selected site for Rafah Enterprise Park

The Rafah EP is composed of Enterprise Development Center (about 14ha) and an Industrial Park (about 50ha) and will be implemented in a single phase to cover an approximate area of 62ha. However, the adjacent areas of land are reserved for future expansion of the Industrial Park (about an additional 50ha), and a technical college campus (about 15ha). Currently, part of the area is used for small agricultural activities.

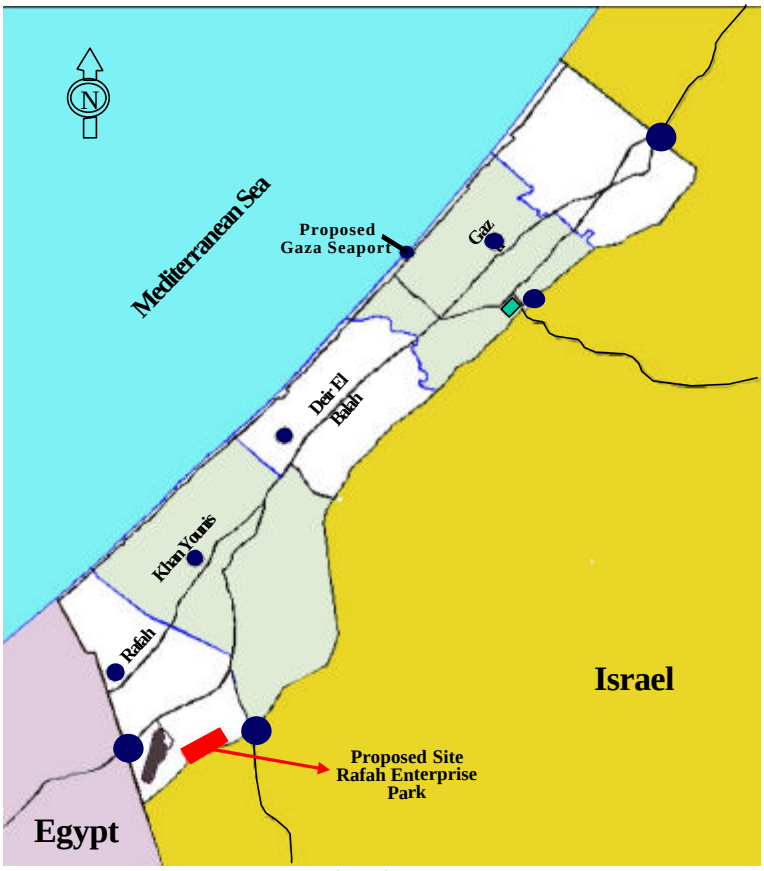

Figure 1: Location of Rafah Enterprise Park

1.2.2 Demand for Industrial Space

Preliminary indications are showing that the demand for land for light manufacturing in Gaza will range between 45ha to 120ha over the next 20 years, depending on the economic and political developments in the region. The feasibility study will test a model that combines an Enterprise Development Center (approximately 14ha) and an Industrial Park (approximately 50ha). Preliminary investigations indicate that such space is likely to be filled over the course of 8 to 10 years. It is expected that a variety of light to medium industries could develop in the proposed Enterprise Park. The following is a preliminary list of potential industries:

1. Electronics and Assembly: computer and consumer electronics assembly for regional market.
2. Electrical Goods: Assembly of white goods for the regional market.
3. Furniture: wood furniture for export, playground furniture (plastic & metal); office furniture (for Israeli market), metal and wood furniture for office and home usage.
4. Food & Beverages: Processing of local and Israeli food products for export, including such items as confectioneries, baby food, processed agricultural products (tomato-based, herbs & spices, citrus products, etc.), as well as packaging for exports.
5. Packaging Materials (Paper & Plastic): export-quality paperboard and plastic packaging, including folding cartons for automatic filling, microwave-proof packaging.
6. Other Rubber & Plastic Products: For regional markets - Conveyor belts, automotive spare parts, adhesives.
7. Warehousing: Storage, bulk breaking, and distribution of imported goods, inventory management; and export staging (may entail some repacking activities)
8. Apparel and Other Sewn Goods: Production of apparel, children's knitwear, socks, men's' wear & women's wear, luggage, leather goods, sewn toys from imported raw and intermediate materials.
9. Other Products: All for export - Children's toys (e.g. educational games, interactive games), bath and skincare products, candles, bandages for medical purposes, fiberglass (structural) products

1.2.3 Utilities Overview

The utilities and infrastructure requirements of the proposed Enterprise Park include the provision of water, wastewater, solid waste, roads, electricity, and telecommunication systems supply. The existing infrastructure in the area of El Shoka where the Rafah Enterprise Park (REP) is proposed can be described as follows:

Water supply

Currently, the area of El Shoka does not have a municipal water network. The residents of the area are being supplied with water from Mekorote (Israeli water supply company). Mekorote has a 6" pipe at El Dehnia area, which lies 2.5 km to the south of the proposed REP site. This pipe is tapped with 7 connections; each of them is 2" in diameter. A water meter is also connected on each one of the 7 connections. One connection is designated for the use of Gaza International Airport (GIA), which the Airport currently reserves as an emergency source. In addition to GIA, there are 6 other bulk consumers each with own pipeline and distribution system through which the bulk consumer sells water to El Shoka residents. In 1999, the total consumption of the 7 bulk consumers was a bout 573,500 m^3/year.

Recently, a water well was drilled at the western part of Rafah City in El Hashash area 11km to the west of the Airport. A trunk line, 8" in diameter, was installed to connect the well with the Airport. Both the well and the trunk line have been allocated for the use of the Airport only. The well pump has a capacity of discharging 76m^3/hr at 140m^3 head. Given the Airport consumption in 1999 at about 70,000m^3/year, the average daily consumption of the Airport is calculated to be about 200m^3/day. This demand can be met by operating the well for three hours only. This means that both the well and the trunk line have the capacity to supply at least the first phase of the REP upon agreement of the Airport Authority.

Wastewater

Currently, El Shoka area, including the intended location for REP as well as the neighboring areas, is not served with a conventional sewage system. In the city of Rafah, which is the closest urban center to the REP, only 35 percent of the residents are served with sanitation system. The collected sewage from Rafah is discharged to a treatment plant at Tel-Sultan Area, 9 km away from the REP site. The daily influent that is received by the Rafah Waste Water Treatment Plant (WWTP) is about 5000 m^3/day and according to the Palestinian Water Authority (PWA), the WWTP is now overloaded.

Recently, the PWA has launched a program to construct a new WWTP to serve both Khan Younis and Rafah. According to this program, the selection of international consultant should be carried out by September 2000, and the construction works are expected to start in March 2001. The first phase of this proposed WWTP would have a capacity of 30,000 – 40,000 m^3/day. The proposed location for the new WWTP is 6km to the north of the REP site. The ground elevation of the WWTP site varies from 60 to 70 meters above sea level. The wastewater system planned for REP will only entail domestic-type wastewater. If any industries produce non-domestic-type wastewater, individual pre-treatment will be required.

Roads

The main road leading to the area is Road No. 4 (Salah El Din Street). This road passes through Gaza strip from Beit Hanoun (Erez) crossing in the north to El Karma crossing at the international borders with Egypt. This road is 30m wide. The main access road to the GIA branches off from the southern end of Road No. 4 and is also the existing access road to the proposed REP. It is currently about 12m wide, however it is planned to be enlarged to 24m by the Ministry of Local Governorates. Another important road is the Sofa Crossing access road. This road is located to north of the proposed REP site. It is 12m wide and leads to a commercial crossing checkpoint to Israel.

The only paved road that leads to the proposed site for the REP is the Gaza International Airport main access road. All other roads are unpaved narrow roads. These roads are mainly used by local farmers. The Ministry of Local Governorates (MoLG) issued an approved road plan for the internal roads in El Shoka Village in March 1997. Figure 2 shows a map of these roads. They are mainly grid roads with widths that range from 16m to 40m. 8 km of these grid roads is being designed and funding is made available by CARE and Agricultural Relief Committees.

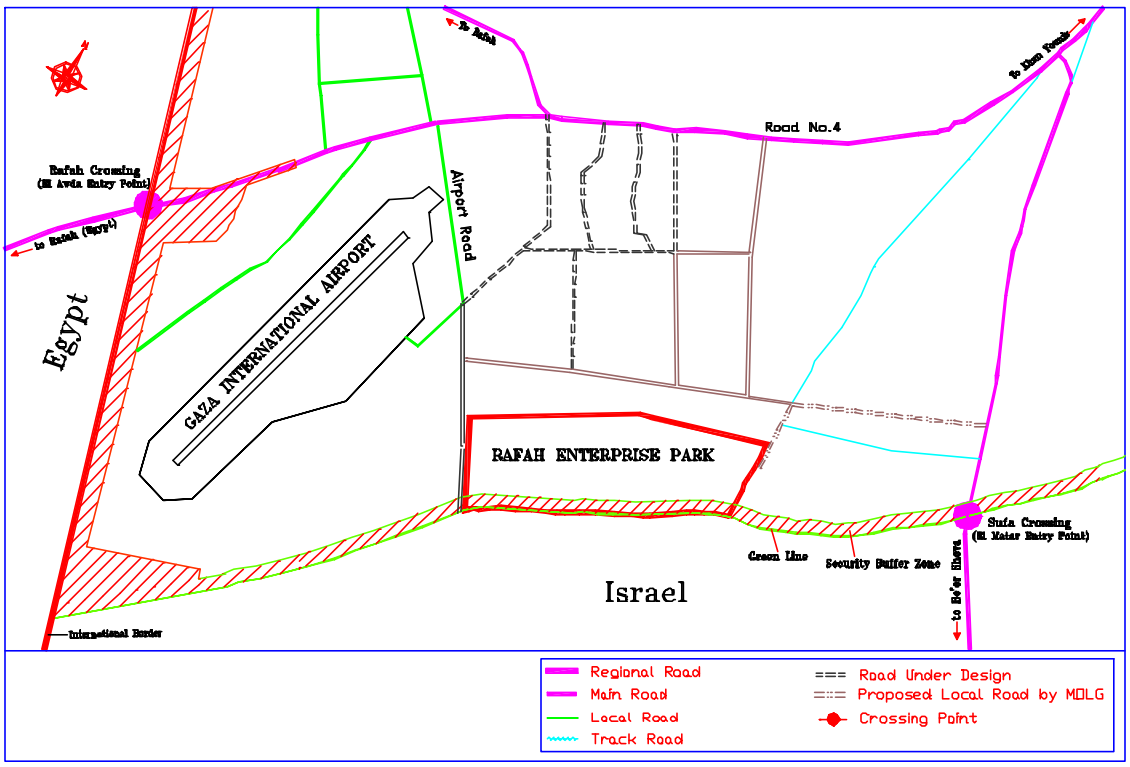

Figure 2: Proposed Roads by MoLG

Solid Waste

In Gaza Strip, there are three landfill sites: one for Gaza city, one that serves Middle Area, Khan Younis and Rafah Governorates, and one dumping site serving the Northern Governorate. The nearest landfill site to REP, located 4.5 km to the north of the proposed REP site, is the site that serves Rafah Governorate. Rafah landfill site has been used since March 1999 for domestic solid waste and the expected capacity of the site is equivalent to 6-7 years of solid waste disposal. The monthly solid waste disposal into the site is estimated to be 3,000tons. The site can be accessed through Sofa Road, a 12 m width paved road. The site has a potential to be expanded in the future and the Municipality of Rafah has reserved 10 dunums of land for that purpose. In Gaza City, there is a hazardous solid waste landfill, which serves the whole Gaza strip.

Telecommunications

Based on the Palestinian Telecommunication Company information, there is a main fiber optic cable that connects all Gaza Strip with Israel and abroad. The fiber optic cable passes through the proposed site of the REP. The route of this cable is shown in Figure 3. The depth of the cable ranges from a minimum of 1 m to a maximum of 2 ms. To avoid damaging the cable during the construction works, the cable should be re-routed. There are two possible routes; the first is to install it along the Delimiting line with Israel, and the second is to install it in the main road of the REP. The segment of the cable that needs re-location is 2200m. Additionally, there is an existing telephone manhole located within the REP site. The new location of the manhole will take into account the future supply of the REP with telephone lines.

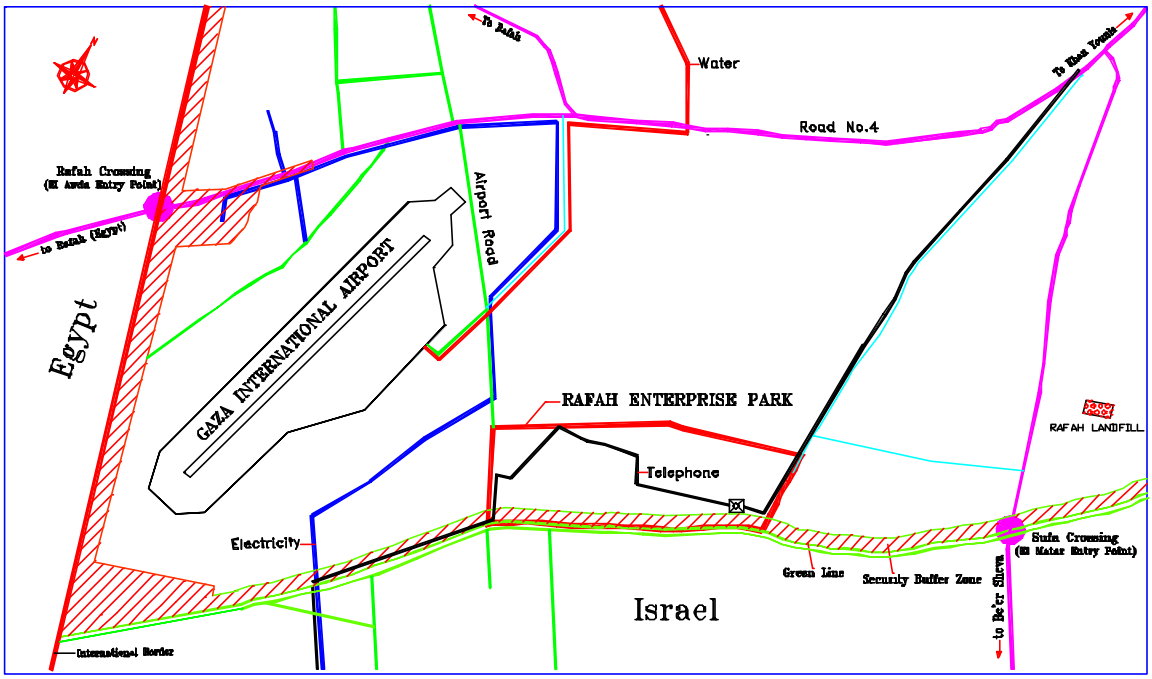

Figure 3: Existing Telecommunications Network

1.3 Proposed Environmental Assessment

This section describes the proposed EIA, which includes the regulations to be followed, a brief description of the proposed methodology for Scoping as well as that proposed for the EIA.

1.3.1 Environmental Scoping Session and Statement

The first element of the EIA is a preliminary identification of significant issues related to the proposed project and preparation of the Scoping Session. Persons having expertise or interest related to the environmental aspects of the proposed Enterprise Park have participated in the Scoping Session. A prescoping brief was distributed prior to Scoping Session. In addition to PIEFZA, TSG, USAID and EMCC representatives, the following institutions' representatives participated in the Scoping session:

Ministry of Environmental Affairs
Rafah Municipality
Civil Aviation Authority
Ministry of Planning and International Cooperation (MOPIC)
Ministry of Agriculture
Rafah Governorate
Ministry of Tourism
Gaza Islamic University

A complete list of participants at the scooping sessions is presented in Annex B of this report.

1.3.2 Environmental Assessment

The EIA will provide a full discussion of the significant environmental effects of the proposed Enterprise Park. The EIA will also include alternatives that would avoid or minimize adverse effects or enhance the quality of the environment so that the expected benefits of the industrial estate can be weighed against potential adverse impacts on the environment or any irreversible or irretrievable commitment of resources. The EIA will be based on the issues as they are outlined in the Scoping Statement and the expected methods of construction and operation.

1.3.3 Mitigating Measures

A final itemized list and phasing schedule of required mitigating measures will be prepared. This will be integrated as an input to the phased development cost schedule that will be prepared under the feasibility study for REP.

2 ISSUES SCOPING

2.1 Preliminary Environmental Issues

The preliminary environmental issues presented below are those discussed during Scoping Session:

2.1.1 Land Use Components

Population and housing

There are no housing activities in the proposed site. Land ownership and compensation issues are considered very significant by most of the attendees of the scoping session. EIA should address the following issues:

1. The demographic map of the area;
2. The expected demographic changes in the map as a result of the project;
3. The housing needs to accommodate population increases
4. The socio-economical impacts of the population increase and a new housing; and
5. Compensation to landowners and other mitigation measure.

Land use

The regional plan for the area prepared by MOPIC and Rafah Municipality plans should be taken into consideration in preparing the planning and the EIA. The possibility for airport expansion is also raised. The followings are considered significant:

1) Existing land use
2) Future plans regarding airport expansion and municipal planned cemetery.
3) Project impact and mitigation measures

Recreation and tourism

The proposed site has minimal value for recreational or tourism activities. But, since it is very close to the airport, aesthetics issue is important. The following may be briefly discussed:

1. The impacts of the project on the recreational and tourism activities in the area; and
2. The role of the project to conserve the resources of such activities and measures to enhance them.

Transportation

Disruptions in traffic flow, especially during construction, may result from the movement of heavy machinery, transportation of construction materials and labor, and any excavations that cross roads. Traffic congestion, safety risks, and potential obstruction of airport and industrial traffic may result. These points should be considered in detail in EIA:

1. The expected traffic increase and routes to accommodate such increase;
2. The parking policy in the project area;
3. Map of the transportation system inside and outside REP during the different project phases; and
4. Measures to mitigate congestion, air pollution, accidents and to case transportation.

2.1.2 Physical and Bio-physical Resources Components

Groundwater hydrology and quality

In the proposed site, groundwater aquifer is few meters thin and the water table is very deep. Also the groundwater quality in the area is very poor regarding salinity. Impacts on ground water do not seem significant. The following should be briefly considered:

1. The geology and hydrology of the area including the infiltration rates, outcrops, and aquifer type, and water table.
2. Existing groundwater quality and the required treatment.
3. Negative impacts on the groundwater and their mitigation measures; and
4. The monitoring system that will be established.

Surface water hydrology and quality

There is no surface water in the area and the annual rainfall is very low. Thus, impacts will be limited to the generated runoff and drainage, which will be minimal. The following should be briefly considered:

1. The maximum annual rainfall
2. The natural drainage system in the area
3. The runoff collection system to be established
4. Possible sources of pollution
5. The mitigation measures to be adopted
6. The monitoring plan

Water resources and uses

Gaza Strip in general and Rafah area in particular suffer from water scarcity. Water demand for the project and the sources for that water are considered to be a very important issue by Municipality of Rafah. The EIA should concentrate on the following:

1. The available water resources and uses scheme;
2. The safe yield of such resources;
3. The expected project's water consumption and its impacts on the resources and other users; and
4. Measures to mitigate such impacts.

Air Quality

Dust generated mainly during construction from excavations, transportation, loading and unloading of construction materials, and movement of heavy machinery is expected. Emissions generated from machinery, transportation and operation of generators/compressors/boilers are expected and may reduce air quality. The followings should be considered in the EIA:

1. Possible release of air pollutants as a result of certain industries
2. The expected quantities of air pollutants/dust and their cumulative effects;
3. The wind directions and the boundaries of their negative impacts;
4. The standards to be adopted;
5. Source reduction and other mitigation measures; and
6. The monitoring system to be adopted.

Soil and vegetation

Potential soil disturbances that may result from construction activities include reduced soil stability, loss of soil structure, and soil erosion. Measures to protect surrounding agriculture especially during construction are important. EIA should include the following:

1. The presence of endangered species in the area (some wild weeds) and measures to conserve them;
2. Possible negative impacts on the surrounding forestry and measures to conserve and enhance them;
3. Soil erosion especially during construction and mitigation measures required; and
4. Vegetation conservation plan

Wild life

Gaza Strip is located along a major migratory bird route. Construction activities may affect natural habitats and associated species. The selected site, however, is not expected to contain rich floral and faunal diversity. The following should be briefly considered:

1. The native fauna
2. The endangered wildlife in the area;
3. Sources of disturbance to the habitat;
4. Mitigation measures required; and
5. Plans to enhance the surrounding wildlife habitat.

2.1.3 Economic Components

Direct employment and income and labor market conditions
Employment generation is expected during both construction and operation of the proposed project. The impact on local employment may differ from that on employment in general. As a result of employment and other economic benefits expected from the project, the standards of living and property values are likely to be affected. An influx of people resulting from the establishment of an industrial estate may provide indirect benefits as well as indirectly place additional pressure on local utilities and services as a result of the proposed project. These points should be considered in details in the EIA:

1. The project's impact on employment and income;
2. Measures to enhance the employment and income rates;
3. The impacts on local communities; and
4. Possible mitigation measures of any negative impacts on local communities.

Sources of supplies, materials, and services.
The following points should be briefly discussed in the EIA:

1. The nature of such sources;
2 The impact of such sources on the project, local communities, and the Palestinian economy;
3 Measures to mitigate such impacts; and
4 Plans policies to insure sustainable Palestinian source

Wastewater
Wastewater collection, treatment, and reuse are considered important issues. The type of the wastewater and the required pre-treatment in case of hazardous waste (if any) are very important issues raised by the Municipality of Rafah. The followings are considered significant:

1. Industrial and sewage water collection and treatment systems and technologies that will be established;
2. Who will be served by the proposed systems;
3. Measures for source reduction;
4. Treated waste water reuse; and
5. The possible impacts of wastewater collection, treatment and reuse or disposal and their mitigation measures.

Solid and hazardous wastes
The following issues should be considered:

1. The solid and hazardous wastes management systems that will be suggested for the project;
2. Assessment of needs for equipment and facilities;
3. Measures for prevention and source reduction;
4. Possible environmental impacts of handling and disposal of such wastes; and
5. Mitigation measures.

Other infrastructure
This was raised as an important issue since the area is not currently served by any infrastructure facility. The project may affect the future plans for water, power, and road development. The following should be considered in details in the EIA:

1. The project infrastructure, its development requirements and cost;
2. The environmental features as part of the project infrastructure;
3. The capacity of the proposed infrastructure to handle the project activities; and
4. The possible impacts of the development of the infrastructure and their mitigation measures.

2.1.4 Cultural and Heritage Components

Historic and Archeological sites and landscape features

Based on the scoping session and the available information, the area is not important from archeological point of view, but during construction care should be taken in case of any findings. EIA should briefly address the following:

1. In case of the presence of any archeological and historical site and landscape features in the area, a plan for conservation of such sites should be suggested; and
2. The plan should suggest also the coherence of the project landscaping with these sites and possible social and economic impact.

2.1.5 Public health, health facilities and services

Excessive noise, dust, vibration levels, and disposal of wastes can pose an occupational health and safety hazard. There is also the risk of injury and accidents to the public as well as to workers during construction and operation as a result of operating heavy machinery and transportation among others. The followings are considered significant:

1. The possible health impacts on workers, beneficiaries and the surrounding communities;
2. Accidents and health risks assessment;
3. Health facilities and services to serve both the IE and the neighboring communities;
4. The health monitoring plan;
5. Other mitigation measures to avoid health risks and accidents.
6. Safety regarding air flights

2.2 Significant Environmental Issues

During the scoping session, discussions were made by the attendees, but there was no evaluation done for each issue. Significant environmental issues can be identified based on the discussions during that session. Some issues were raised by most of the participants especially Rafah authorities. The following issues can be identified as very significant:

1. Land ownership and the needed compensation.
2. Direct employment and income and labor market conditions
3. Infrastructure requirements and the pressure on the existing facilities
4. Water use (sources for water are considered).
5. Transportation (Disruptions in traffic flow).
6. Public health, health facilities and services
7. Air quality (dust and emissions) and noise.
8. Soil disturbances and surrounding agriculture

3 PROPOSED EIA METHODOLOGY

The methodology and the study contents are described below:

3.1 Data collection

Information on the study area's environmental attributes, infrastructure, transportation links, and utilities has been well documented through various reports produced by MOPIC, PWA, MOLG, and Rafah local authorities. Therefore, data collection requirements for the EIA may be confined to collecting missing information and/or updating information.

Data on water resources, including groundwater, surface water flows and water supplies will be collected from PWA as well as from various other reports addressing these issues. An archaeological survey is required and will provide information on the location and existence of any archaeological sites on the chosen property as

well as on or around potential access routes and/or utility lines. A brief ecological survey will also be conducted to gather data on the flora, fauna, and habitats of the area for documentation purposes. Data regarding water requirements, wastewater quantities and qualities, and economic benefits will be taken from the feasibility study being executed in parallel. Any areas where data are insufficient to base analyses and assessment, estimates by experienced professionals in the respective fields will be solicited.

Reference will always be made to local environmental management standards. In case of lack of relevant domestic legislation regarding any issue, reference will be made to the corresponding internationally applied and accepted standards. In any issue if we refer to a certain international standards, the same standards will be first applied for other issues in case of lack of local standards.

3.2 Analysis of alternatives to the proposed project

Various alternatives will be assessed for items such as providing infrastructure (water, wastewater, electricity, roads, and telecommunications) to the site. Alternatives will be determined in close cooperation with relevant authorities and interested parties as well as with the design and feasibility study teams. However, in general, a subjective approach that utilizes the professional judgment and opinions of experts will form the majority of the assessment and analyses required. The alternatives considered will include:

1. The type of industries and technologies;
2. Supply of materials, goods and services, especially where local suppliers are available;
3. Labor supply and scheduling for construction;
4. Waste management and handling of hazardous materials;
5. Water supply;
6. Power supply;
7. Roads and transportation.

Various alternatives will be compared in terms of potential environmental impacts, capital and operating costs, and suitability under local conditions.

3.3 Stakeholder consultation

Stakeholder consultation will be carried out during the early stages of report preparation. Initial consultation has been done through the scoping session. The study team will continue consulting the relevant stakeholders either individually or through workshop at different stages of the study. The purposes of consultation will be:

1. To inform the public of all issues and concerns related to the project;
2. To specify project performance standards to be met;
3. To collect data, information or local knowledge;
4. To avoid future conflicts with affected or concerned stakeholders; and
5. To mitigate public environmental concerns.

Stakeholders that will be consulted are the following:

1. The site and neighborhood land owners.
2. The Municipality of Rafah.
3. Governorate of Rafah
4. The Palestinian Ministries of:

• Environment
• Agriculture
• Transportation
• Labor
• Health
• Local Government
• Industry
• Housing
• Tourism and Antiquities

5. Palestinian Water Authority

6. Palestinian Energy Authority
7. Civil Aviation Authority
8. NGOs in the region.
9. Other stakeholders that the consultant believes will be affected by the project.

3.4 Impact Assessment

The impacts of the project will be described and evaluated for construction, operation and maintenance stages of the project.

The impacts will be indicated and evaluated for each project stage. First, the physical and operational activities and their possible impacts will be discussed. Second, the criteria that are used to describe the impacts will be identified and presented. Finally, the estimated or measured impacts will be described and evaluated. The total impact values of the project stages will be assessed and compared with the existing situation. More details are given below.

a) Physical and operational activities and their impacts :

Each stage of the project will be described regarding to its physical and operational activities.

b) Criteria used to describe the impacts:

Reference will always be made to local environmental management standards. In case of lack of relevant domestic legislation regarding any issue, reference will be made to the corresponding internationally applied and accepted standards.

c) Impact description and evaluation:

The estimated or measured impacts will be evaluated according to:

1. The extent of impact in terms of the time of appearance, frequency, duration and geographical scale, and
2. The number of impacts.

The impacts will be described with respect to the current situation, with the consideration of the autonomous development (without the project) in the area. Impacts will be evaluated according to each criterion and presented in tables. Numerical values will be given for the effect measurements. The evaluation procedure is summarized in the following steps:

1) *Effect value* is the amount of effect caused by the project activities on a certain area. For example, if the project offers employment opportunities for 50 persons, the value of effect will be 50 workers. But if the effect value cannot be given numerically (e.g. cultural property) negative or positive singes give the effect value. For example:
   - -- Very negative.
   - - Negative.
   - 0 No effect
   - + Positive
   - ++ Very positive and

2) *Impact value* is a numerical standardized value that represents the impact extent of a certain effect value. In other words, the effect values are translated into impact values. The range of the impact value is from –10 to +10.

3) Criteria weight is the value, which gives the importance of one criterion relative to other criteria. The criteria weight represents the view of the consultants based on their knowledge to the situation of the study area, their discussion and meetings with concerned bodies and agencies. Criteria weight value ranges from 0 to 100 providing that the summation of all criteria weights equals to 100.

4) *Assessment value* of a certain effect is obtained by multiplying the impact value by the criteria weight. The summation of all assessment values gives the total assessment value by which the project will be evaluated (see Table (1).

5) Finally, the total assessment value of the project is compared with the assessment value of the existing situation

Table (1): Assessment Sheet.

Issue	A	B	C = (A x B)
	Impact value (-10 to +10)	**Weight value (0 to 100)**	**Assessment value**
lANDUSE			
PHYSICAL			
ECONOMIC			
CULTURAL			
HEALTH			
Total		**100**	

3.5 Development of an environmental management and monitoring plan

The study team will develop an environmental management and monitoring plan, which will include feasible and cost effective measures to minimize or mitigate negative impacts. The monitoring plan will describe how and who will carry out the monitoring activities for addressing the negative environmental issues. Minimum Requirements for an Environmental Monitoring and Management Plan will be:

1. Environmental variables to be monitored, and frequency;
2. Reporting to appropriate authorities and local community;
3. Issues/concerns that are to be the subject of the environmental management plan, and reporting requirements to government and the public;
4. Environmental standards and guidelines that will be adopted or required;
5. An analysis of the effect and possible mitigation actions for the surrounding areas and landowners in addition to the site itself;
6. Compensation actions for the affected landowners;
7. Economic evaluation for the mitigation measures wherever possible.

3.6 Disciplines Required

The following specialists are required to carry on and finalize the EIA:

Project Manager	*Ecologist*	*Environmental Engineer*
Socio-Economist	*Archeologist*	*Noise and vibration specialist*

4 PROPOSED TABLE OF CONTENTS OF EIA REPORT

5. TIME SCHEDULE

The proposed time schedule for the study is illustrated in Figure (2) below.

FIGURE 2: ACTIVITIES SCHEDULE FOR ENVIRONMENTAL ASSESSMENT

ACTIVITY	DURATION	Week 1	2	3	4	5	6	7	8
Data collection (reviews, surveys, interviews, field survey)	2 weeks	■	■						
Description of the proposed project	1 week		■						
Scoping session and determination of issues to be analyzed	1 week			■					
Inter-Agency coordination / consultation	4 weeks					⟷			
Description of the environment (baseline)	3 weeks			■	■	■			
Determination of the potential impacts	3 weeks					■	■	■	
Development of an environmental management and monitoring plan	2 weeks						■	■	
Preparation of Deliverables	6 weeks			■	■	■	■	■	■

6. ENVIRONMENTAL SCOPING SESSION AGENDA

AGENDA

Scoping Session for EIA

Rafah Enterprise Park

Date: Tuesday, April 11,2000

Time: 01:00 p.m. - 02:45 p.m.

1-	Opening by PIEFZA, TSG, EMCC	01:00 – 01:15
2-	Introduction and Project Description	01:15 – 01:30
3-	Environmental Assessment	01:30 - 01:50
4-	Stakeholders Discussion	01:50 – 02:40
5-	Ending	02:40 – 02:45

7. LIST OF PARTICIPANTS

No	Name	Institution	Position	Tel – Fax email
1	Ibraheam Abo Mour	Rafah Governorate	Financial Department Representative	2316870/1
2	Mariam Qudairr	USAID	Engineer	050 551922 - 2848817
3	Abdul Rahman Naim	PIEFZA	Rafah Area Manager	2843353
4	Salem Ayed El Madhoon	Rafah Governorate	Assistant Director	2136870
5	Abdel Rahman Shtayeh	PIEFZA	Director	02-296035 Piefza@palnet.com
6	Ali Barhoum	Rafah Municipality	General Director	2135242 – 2135196
7	Dr. Adwan Ahmed	Rafah Governorate	Engineer	2136870
8	Ismail Abu Shehada	PIEFZA	Director General	2843353
9	Dr. Moain Sadeq	Ministry of Tourism	General Director	2829461/62
10	Ahmad Omran	Civil Aviation Authority	General Director	2135686 Tel/fax
11	Saleh Ibrahim	Civil Aviation Authority	Flight Safety Department Expert	2135686
12	Monther Khodari	Civil Aviation Authority	Flight Safety Department Director	2135686
13	Emad El Masri	PIEFZA	Director	2843353
14	Can Tutuncu	TSG	Engineer, Staff Consultant	(1-703-528 7444) fax (1-703-522-2329)
15	Ashraf Ghneim	Rafah Municipality	Director, Water & Wastewater dept.	2135242-2135023 fax 2135921
16	Yehia Abu Obaid	Rafah Municipality	Deputy Director, Water & Wastewater dept.	2135242 fax 2135921
17	Dr. Rifat Rustom	EMCC	Vice President	2828218 Emcc_gaza@hotmail.com
18	Dr. Yahya Sarraj	EMCC	Vice President	2828218 Emcc_gaza@hotmail.com
19	Jose M. Ceron	TSG	Consultant	2434556
20	Sawsan El Masri	PIEFZA	Civil Engineer	2843363
21	Baker Thabet	PIEFZA	Engineer	2843353
22	Sahar El-Khazender	MOPIC	Industry & Trade Planing Unit Manager	SaharMahrous@hotmail.com
23	Sanaa Ashour	MOPIC	Deputy Director PDP	Sanaa99@yahoo.com
24	Atah Abu – Karsh	M.O. Agriculture	Deputy Minister	2826370

PART1

MINUTES OF MEETING

SCOPING SESSION 1

Scoping Session for EIA
Rafah Enterprise Park
Minutes of Meeting

Date: **April 11, 2000**
Time: **1:00 p.m. – 3:15 p.m.**
Place: **Meeting room at PIEFZA, Gaza**

The meeting started with a short opening speech given by Mr. Ismail Abu Shehada, Director General of PIEFZA and Mr. Can Tutuncu, staff consultant of TSG. EMCC gave a detailed presentation covering the description of the project as well as the objectives of this scoping session and the Environmental Impact Assessment (EIA). EMCC also described the suggested components that should be covered by the EIA. The presentation was followed by on open discussion. The following are the main points raised by stakeholders as recorded during the scoping session. The name and position of each speaker in noted.

Mr. Ismail Abu Shehada, Director General, PIEFZA

- PIEFZA and the occupiers of the area met before the scoping session and they agreed on the following:
    - PIEFZA should deal with the issue in different way than what happened with the airport case.
    - PIEFZA will obtain the land
    - Residents rights should be conserved
- PIEFZA has the following criteria to accept industries:
    - Job creation.
    - Less consumption of water
- Industries utilizing high technology processes and environmentally clean are the targeted for REP.

Mr. Can Tutuncu, TSG

- Brief description of project, TSG and its relation with USAID and EMCC.
- Mainly light and medium intensity industries targeted for REP
- No heavy intensity industries will be allowed
- Clean environment is aimed
- Proposed project area is around 600 dunums over 20 years period.

Ali Barhoum, Municipality of Rafah, General Director

- Concerned about the solid and liquid waste expected to be generated by the industrial area.
- Asked about the responsibility of the manufactures in this regard.
- Stressed that hazardous waste should be separated and mentioned that currently there is no separation between normal and hazardous waste in Rafah, including Municipality of Rafah (MOR) and the airport.

Abdel Rahman Naim, PIEFZA, Rafah Area Manager

- Assured MOR that the proposed Industrial Estate will follow the relevant laws issued by MEnA, and that there will be continuous monitoring of all wastes produced.
- If MOR does not have the capacity to deal with some of the wastes, it will be moved to other places where it is possible to deal with it.

Eng. Sahar El Khuzendar, MOPIC, Industry and Trade Planning Unit

- Briefed the stakeholders on the development of the project.
- In 1996, 6500 dunums were approved by the Central Committee to be industrial area.
- The area was reduced to 2700 dunums in 1997 but the Central Committee did not yet give the approval.
- One Asphalt factory and two concrete factories have been licensed in a place that is not very far from the area under consideration. Impact of these factories on the project must be considered.
- Asked for information to be passed to the Central Committee to give them guidance on the factories that are allowed to operate and to be licensed in the REP.

Eng. Mariam Qudair, USAID

- Inquired about the effect of Sofa crossing that deals with aggregates imported from Israel and the dust produced by that on the new project.

Abdel Rahman Naim, PIEFZA

- Replied, Sofa is more than 2 km far from the project area and little effect is expected.

Can Tutuncu, TSG

- Asked about the definition and purpose of the area designated by MOPIC as free trade zone.

Eng. Sahar El Khuzendar

- Replied, the free trade zone is a general area. No detailed plans are yet produced.
- Added, there is now a decision to assign 400 dunums to the north (close to road no. 4) as a residential area. It is to be given to the land occupiers whose land were taken by the airport.

Ibrahim Abu Mour, M.O.R, Finance Department

- Inquired about the utilization plans for the remaining area after the REP project is implemented.

Attah Abu Karsh, Ministry of Agriculture, Minister Deputy

- MOA considers the project area as cultivated land.
- There is a need to have 85000 dunums of citrus in the Gaza Strip. Now there are only 34000 dunums. 16000 dunums of the Gaza City are expected to be converted into residential areas. The production now is only 30,000 tons of citrus.
- MOA supported the Industrial Area but not at the expense of the cultivated land.
- The Industrial Area must be common among Palestine, Egypt & Israel where land to be designated from each country.

Ahmed Omran, Civil Aviation, Director General

- Referred to the problem with procedure of land acquisition and compensation in the case of the airport.
- Suggested planning for the area to stay as clean as possible as not to affect the safety of flights.
- Suggested starting the first phase as far as possible from the airport to allow for the possible expansion of the airport.
- Gaza airport did not yet get the international license. Therefore, it is very important not to allow heavy industries in the area. This might complicate the licensing of the airport.
- Preferred to continue coordination with the airport authorities and to get a copy of the master plan when ready.

Can Tutuncu:

- The current study does not cover the complete area (as shown by MOPIC). The main concern is on the 65-70 hectares that will be selected for the development during this next 10-20 years.
- About the possible expansion of the airport, he mentioned that in a meeting with the chairman of the Civil Aviation Authority, it was made clear that the expansion of the airport is planned within the current area designated for the air port.
- Heights of buildings in the Rafah REP will be limited to one story for most buildings. Only few buildings will be more than one story, mainly for administration.
- EMCC is aware that they should consult and will coordinate with the airport authority.

Ashraf Ghneim, Rafah Municipality, Director of water and wastewater Department.

- Stressed that the REP. should have an independent source of water.
- Suggested desalinating the saline water.
- There are some wild plants that should be preserved such as chamomile and yansoon.

Atah Abu Karsh

- Why not take water from the good source of water to the west of Rafah (above 10km far)

Saleh Ibrahim, Civil Aviation, Expert/ops

- Fire fighting system should be available in the REP.

Eng. Imad El Masri, PIEFZA

- For the source of water, the trend now is for desalination.
- The experience in the Gaza Industrial Estate (GIE) is good
  - Maximum recovery of water is 80% with 20% brine water.
  - How to get red of the 20% brine is still a concern.
  - Consumption of water in GIE (area 480 dunums) 7800 m^3 /year of drinking water while 13, 000 m^3 / year of brackish water.
  - Wastewater production is about 1000 m^3 / month needs treatment plant.
  - Where the treated wastewater will be dumped?

Yehia Abu Obaid, M.O.R., Deputy director of water and waste water.

- The area assigned for each factory or producer should be enough to contain a pre treatment plant for wastewater.
- There should be specifications for the quality of wastewater produced.

Dr. Rifat Rustom , EMCC

- Target industries are not expected to be of industries that consume high quantities of water.

Salem El Mahamoum, Rafah Governorate.

- There are 100 dunums of the area, which have been assigned as a cemetery for Rafah. This should be taken into consideration.

PART 2

MINUTES OF MEETING

SCOPING SESSION (2)

Scoping Session (2)
Rafah Enterprise Park
Minutes of Meeting

The meeting was held at PIEFZA, Gaza on Wednesday 26 April 2000 at 12:00 P.M.

Participants:

TSG : Mr. Jose Ceron
EMCC : Dr. Attia Mousa
: Dr. Rifat Rustom
: Dr. Yahya Sarraj
: Eng. Salah Taha
MEnA: Dr. Mohammed Abu Shammalah
PIEFZA: Eng. Ismail Abu Shehada
: Mr. Abdul Rahman Naeem
: Eng. Mahmoud Irheem

Topic to be discussed: Discuss MEnA's Terms of Reference (TOR) for REP

Proceedings:

Eng. Abu Shehada (PIEFZA)

- Introduction about the project and the need to satisfy MEnA's requirements, as they are the official body responsible for licensing and approval.

Dr. Sarraj (EMCC)
Covered the same material presented in the previous Scoping session.

- Project description, location, area, etc.
- Target industries
- Map of Gaza Strip and Arial Map of the area

Dr. Rustom (EMCC)

- Objectives of the Environmental Assessment
- Environmental Assessment components
- Objective of Scoping session
- Proposed elements of Environmental Assessment

Dr. Abu Shammalah (MEnA)

- MEnA is the main official authority that is responsible for regulations and issuing the TOR of EIA of Industrial Estates.

Mr. Jose Ceron (TSG)

- There are three organizations that should be involved in the decision about the area and the regulations that regards the approval of the environmental Assessment of the Rafah EP, these organizations are, MEnA, PIEFZA, and Rafah Municipality.

Dr. Abu Shammalah (MEnA)

- MEnA reviewed the TOR of TSG, the statements that agree with the MEnA's TOR and regulations is included in MEnA's TOR, the statements that do not agree with MEnA's TOR have to be discussed and corrected.
- All issues included in the MEnA's TOR satisfy the Palestinian Environmental Law and Policy.
- The Environmental Management Plan is very important to the Industrial Estate as whole and to all industrial facilities included in the area.

Mr. Naeem (PIEFZA)

- Requested EMCC to involve PIEFZA when meeting with local residents of the area.

Dr. Abu Shammalah (MEnA)

- The proposed industries in REP will be high technology industries with less pollution and negative impacts, not as with Gaza Industrial Estate, which include mix industries.

Eng. Abu Shehada (PIEFZA)

- The licensing will be given only to the high technology and clean industries.

Discussion on the Valued Environmental Components Mentioned in MEnA's TOR

- Biophysical Resources and land use components
- Aquatic resources and use
- Recreation and tourism resources and use.
- Forest resources and use to be omitted
- Add land use as new component

- Economic Components
- Sources of supplies, materials and services
- Transportation requirements
- Infrastructure development requirements and costs.

- Social Components
- Land and water use, shall be included in the study
- Some items are repeated in different categories in the study, (physical, social etc.), these items will be discussed in details if they are significant, if the items are not significant they shall be addressed in general.

- Gender Equity
- Mention that the Palestinian Labor Law will be enforced to provide equal opportunities to all genders.

- Health Components
- Include supply of health facilities and services. "Putting a clinic center and ambulance for emergency".
- All elements that are not significant shall be addressed in general.

- Demographic profile
    - Compensation.

- Population increases and housing needs.
- General description of the existing and expected future situation.

· Wild Life, Fauna and Flora
  - It is not included in the Terms of Reference of TSG, it should be discussed in the study in details.

· Air Pollutants
  - Generally, pollutants shall not exceed the allowable level.
  - Follow the standard.
  - Although certain industries produce minimum pollution, however, the activities in the industrial area due to traffic movement and other activities may cause cumulative effects.

· Alternatives to be considered
  - EIA should be carried out for the whole area.
  - Alternative sites: only one site to be considered.
  - Siting, Zoning, Phasing.

· Other Important Issues
  - Movement from and to the proposed area in future (general).
  - Mitigation measures should be explained in details with recommendations and suggestions from EMCC team.
  - List of industries that may be contained in the area as mentioned in the master plan.

· Trans-boundary Effects
  - PIEFZA will check with the Israeli Authority if the study is needed and will inform TSG and EMCC.
  - PIEFZA will propose to the Israeli Authority to apply the same monitoring measures as in the case of GIE.

Summary

- ***It is agreed that MEnA will revise its TOR and will send it to PIEFZA f consideration.***
- ***PIEFZA requested to review and approve the Scoping Statement.***

Consultant Team

Title	Name
1. Project Manager	Dr. Attia Mousa
2. Geotechnical Engineer	Dr. Rifat Rustom
3. Ecologist	Abboud Y. El Kishawi
4. Archeologist	Dr. Moein Sadeq
5. Environmental Engineer	Said Ghabayen
6. Socio-economist	Rami Al Wehidi
7. Architect and Planner Engineer	Dr. Rasem Khamaiseh Dr. Ahmed A. Al-haija
8. Transportation Engineer	Dr. Yahya Al Sarraj
9. Infrastructure Engineer	Rifat Diab
10. Cost Engineer	Zuhdy Al Ghureiz
Supporting Staff	
11. Salah Taha	
12. Omar Ouda	
13. Farid El Qiq	
14. Jameel Al Banna	
15. Majed Awad	