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USAID WB/G SO1: EXPANDING ECONOMIC OPPORTUNITIES  
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**Rafah Local Industrial Estate  
Initial Engineering Assessment**

SUBMITTED ON

**AUGUST 2001**

TO THE

**USAID MISSION TO THE WEST BANK AND GAZA**  
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## **1. Introduction**

This report contains the initial engineering assessment of the site allocated for the Local Industrial Estate (LIE) at Rafah area (see Fig. 1). The area proposed for the Rafah Local Industrial Estate (RLIE) is 100 donums. A phase 1 development of 10 donums is considered here, based on discussions with PIEFZA and PRIZIM. The whole 100 donums allocated for RLIE is part of the roughly 1,500 donums that were originally allocated for Rafah Enterprise Park (REP) (see Fig. 2).

The Rafah area has been one of the areas most affected by the Intifada. Moreover, the site lies only 500 meters away from the green line which separates the Gaza Strip from Israel. For the time being, the security situation on site and in surrounding area remains difficult. However, it is hoped that an eventual political settlement will make the development of the RLIE possible.

### **1.1 Visits and contacts**

Universal Group (UG) staff members contacted all parties involved, directly or indirectly, in the project. These parties include:

- PRIZIM
- PIEFZA
- Rafah Municipality
- Al-Shouka Village Council
- Palestinian Water Authority (PWA)
- Palastinian Electricity Distribution Company
- Palestinian Telecommunication Co. (PALTEL)
- The Estate Commissioner Office

UG staff members visited these parties and had held discussions with the officials in charge. The objectives of these visits and discussions have been to get more information about the project, and to solicit the of these parties.

Figure (1) : RLIE Location Map

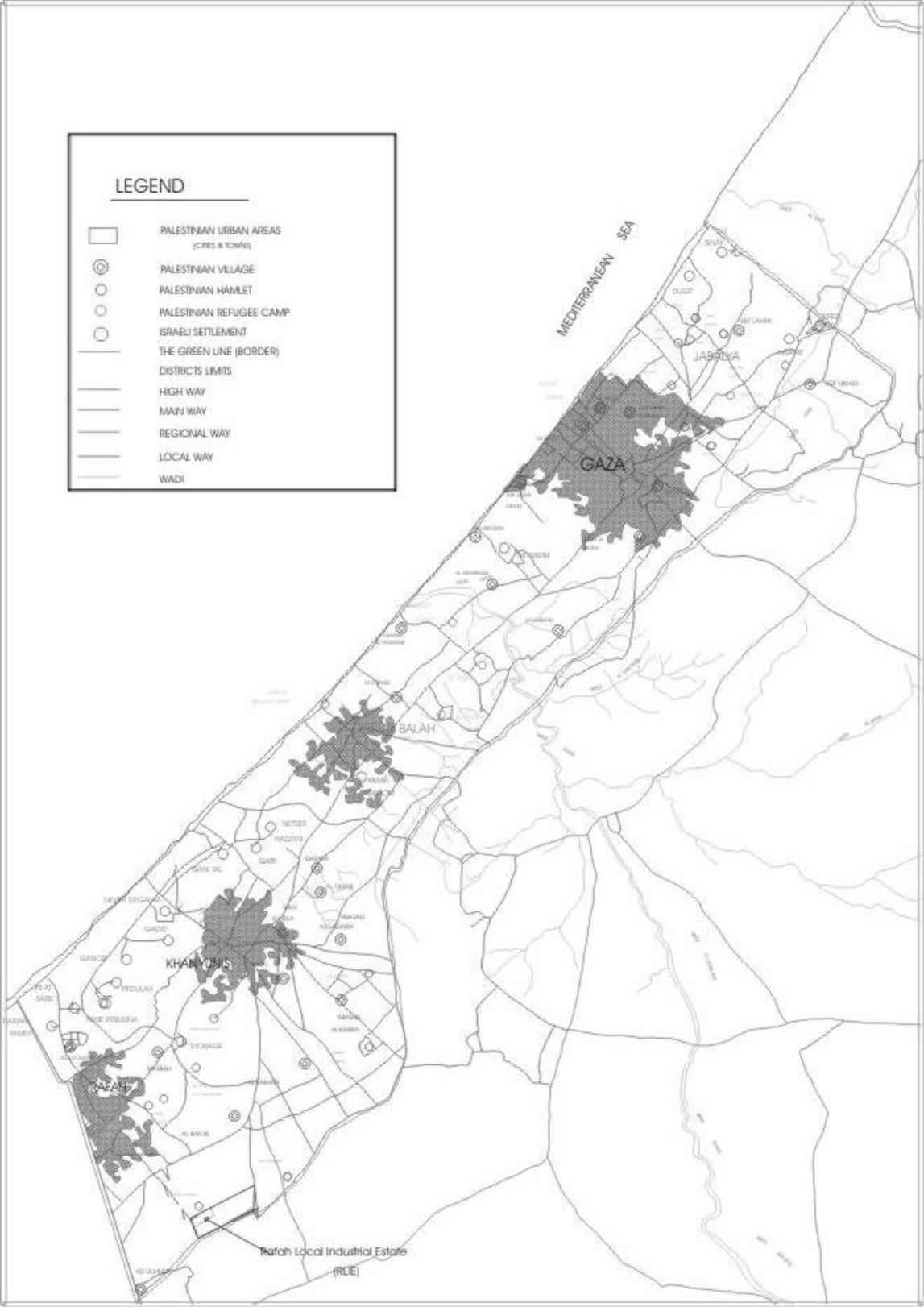
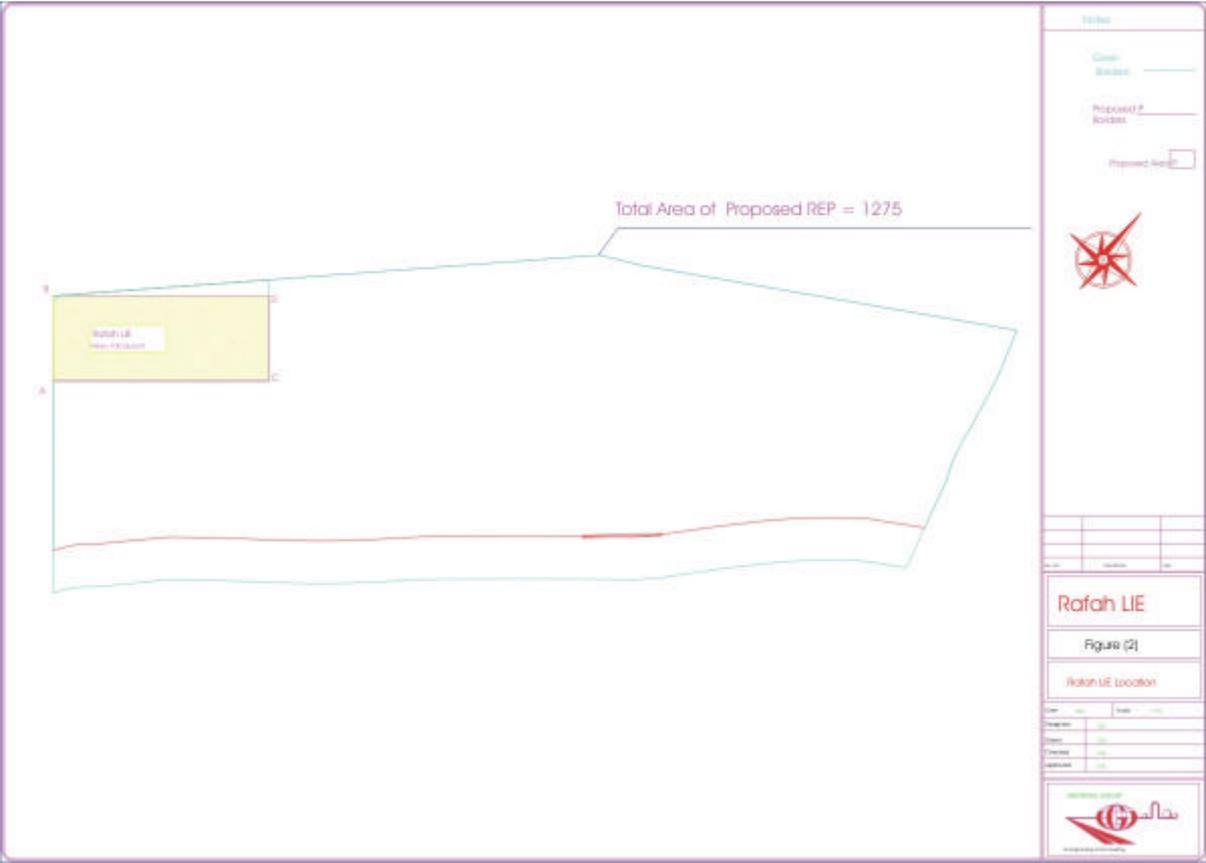


Fig.(1) Rafah LIE LOCATION MAP

Figure (2) : RLIE Location



## **1.2 Site visits**

UG staff members and two officials of PIEFZA made a joint visit to the site, which was cut short due to the security situation. The southern side of the site is 200 meters long. Fig. (3) shows the site map. UG staff members made other visits to the site and the security situation was almost the same.

## **1.3 Contacts with the Estate Commissioner Office**

Several contacts have been made with the Estate commissioner office at the northern governorates of the Palestinian National Authority to get updated information about the lots in the site area. Fig. (4) shows the map of the site area with corresponding lot numbers. Table (1) gives details of the lots related to the site.

Figure (3) : RLIE location

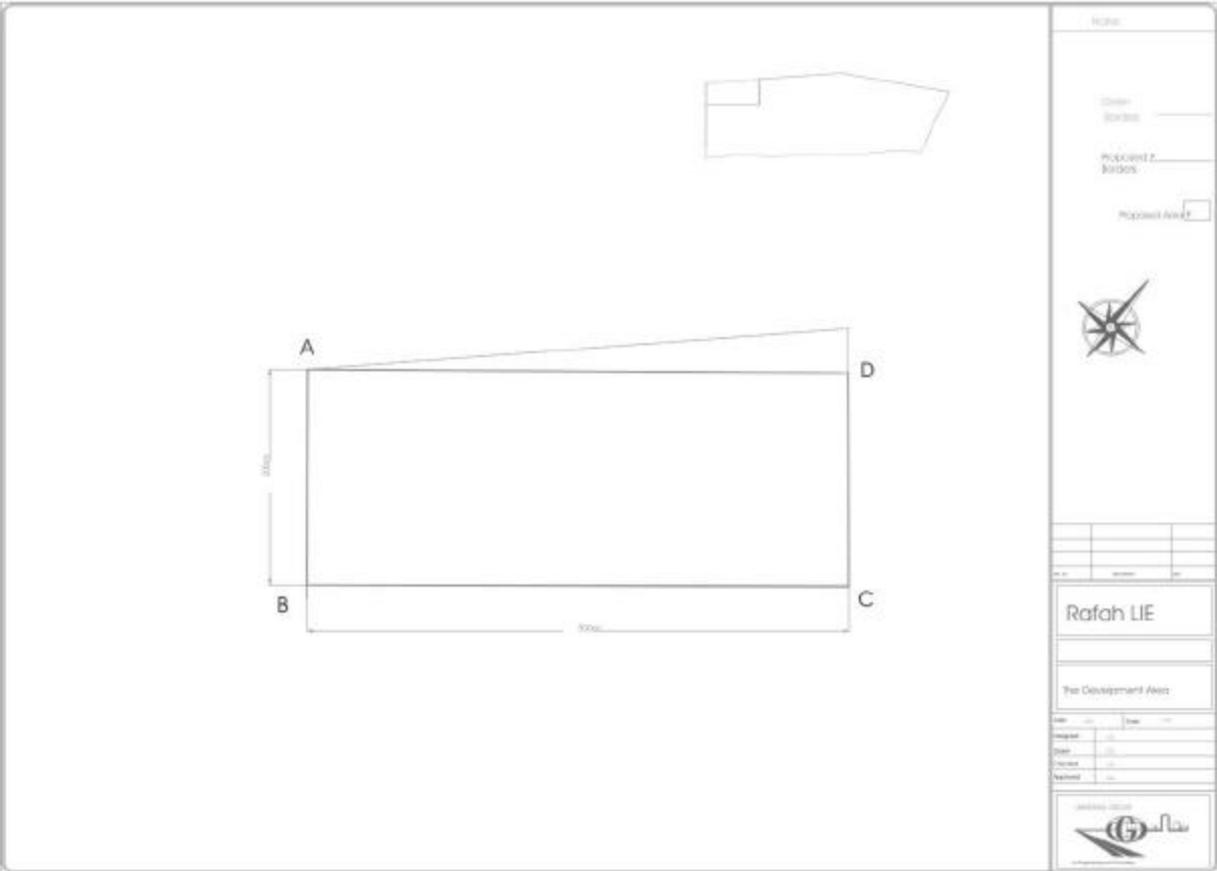
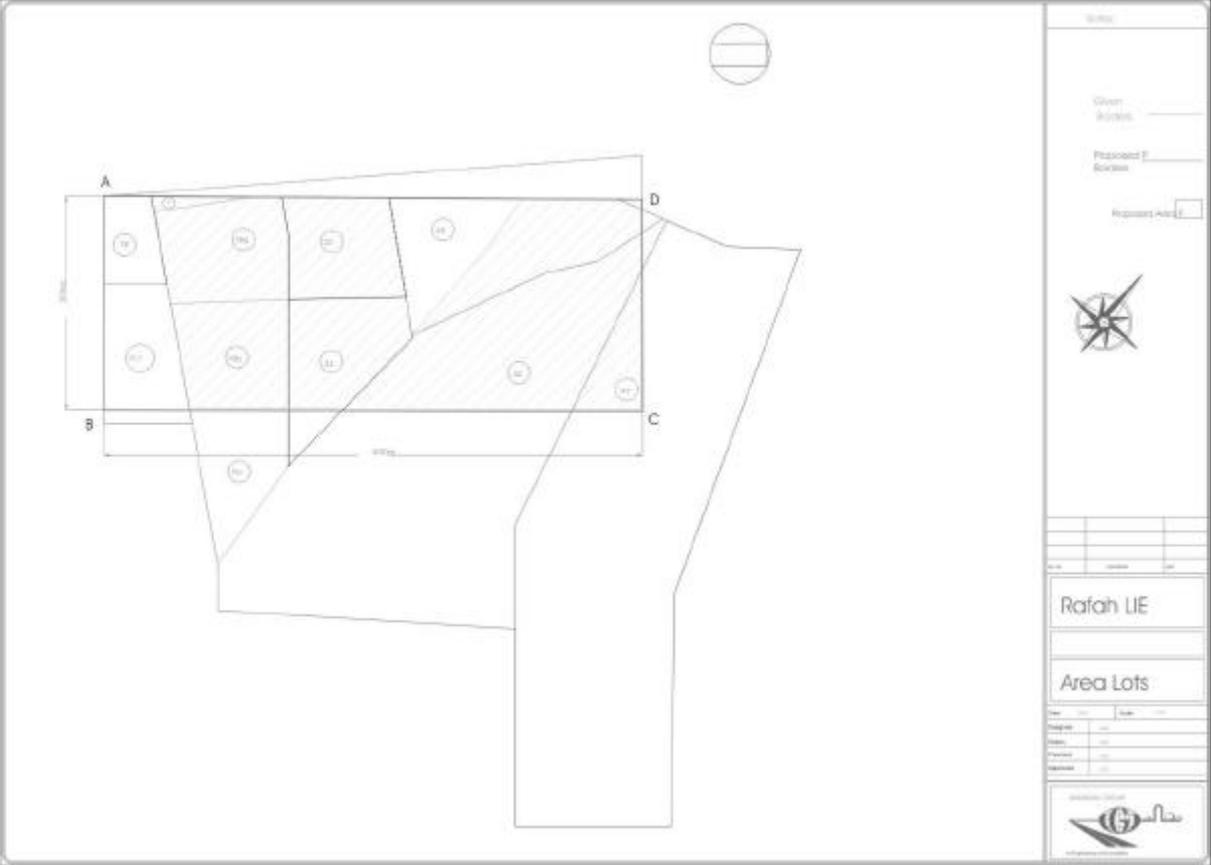


Figure (4) : Area Lots



**Table (1) List of Lots on site and surrounding area**

Serial No.	Lot No.	Area (Dunum)	Associated		Area Associated (Dunum)	Owner	Expropriation Status
			Fully	Partially			
		11.75		P	0.252	Ahmad Abu Snaimah	Not Ready
		4.317	F			Abdel Azziz Al-Shaqaqi	Not Ready
	19/a	10.95	F			Riad Al-Wadiyah	Not Ready
4	19/b	10.19	F			Abdullh Abu Samhadanah	Not Ready
	19/c	8		P	0.313	Kamal Al-Sha'er	Not Ready
		4	F			Ahmed Braik	Ready
		6.57		P	4.5	Hamdan Braik	Ready
		9.79	F			Attiyah Abu Snaimah	Not Ready
		9.81		P	9.81	Mousa Abu Snaimah	Not Ready
		53		P	8.32	Mohammed Abu Snaimah	Not Ready
		90		P	33.094	Audah Al-Dubary	Not Ready
		100		P	4.42	Ahmed Al-Dubary	Not Ready

## 1.4 A visit to Al- Shouka Village Council

UG staff members visited the offices of Al-Shouka Village Council and had discussions with the officials there. The officials raised the issue of the necessity of having a fair compensation against land expropriation. Al-Shouka people are concerned to have this matter settled before beginning construction activities on site.

## 1.5 Contacts with relevant institutions

UG staff members have had many contacts with other relevant institutions such as Rafah Municipality, Gaza Electricity Distribution Company and Palestinian Telecommunication Company (Paltel). Rafah Municipality has been contacted and visited by UG staff members to have more information about the existing utilities and facilities at Rafah city that may have impact on RLIE. Information about future expansion plans for these facilities are also investigated to foresee any possible integration between these plans and RLIE.

Relevant data about electricity supply to RLIE and surrounding area has been discussed with the officials of Gaza Electricity Distribution company. The same was also applicable to the telecommunication issue which was discussed with Palestinian Telecommunication Co. (PALTEL).

## 1.6 Discussions with PIEFZA

Several contacts and discussions have been held with Mr. I. Abu .Ola, Mr. B. Thabet and Mr. A. Naeem. Discussions covered many issues such as:

- Industry types that may be accommodated in RLIE.
- The suitable space sizes to be adopted.
- The road network needed to facilitate the easy transportation from and to RLIE.
- The space to be allocated for the RLIE service building.

## 2. Project Description

### 2.1 Site Description

The 100 donums allocated for Rafah Local Industrial Estate (RLIE) is a part of the approximately 1500 donums that were originally allocated for Rafah Enterprise Park (REP). Fig (1) shows the location of REP. It lies at the southeastern end of Gaza Strip, within the boundaries of Rafah Governorate. It is located about 2 km. off the eastern limits of Rafah city, about 2.5 km. north of the Egyptian borders and extends for about 2 km. along the Green Line.

Fig (2) shows the location of RLIE site with respect to REP site. RLIE occupies the southwestern corner of REP site. This corner has the advantage of being the nearest to the facilities at the Palestinian side and the farthest from the Green Line. Under the new circumstances developed in the last year, the farther from the green line, the better.

RLIE site has an almost rectangular shape of 200x500m. It extends parallel to the Green Line at a 500 m. distance. It is situated about 1.5 km away from Gaza Airport, 2 km. away from Road No4 (Salah El din Road) and about 4 Km. from Al-Awda Entry point at the Egyptian border.

#### 2.1.1 Site Boundaries

Fig (4) shows the exact site boundaries of RLIE. Points A and B which are shown in the map represent the two steel pigs found fixed on site. Table (1) gives details of the land lots that will be (fully or partially) part of RLIE site.

#### 2.1.2 Access to the site

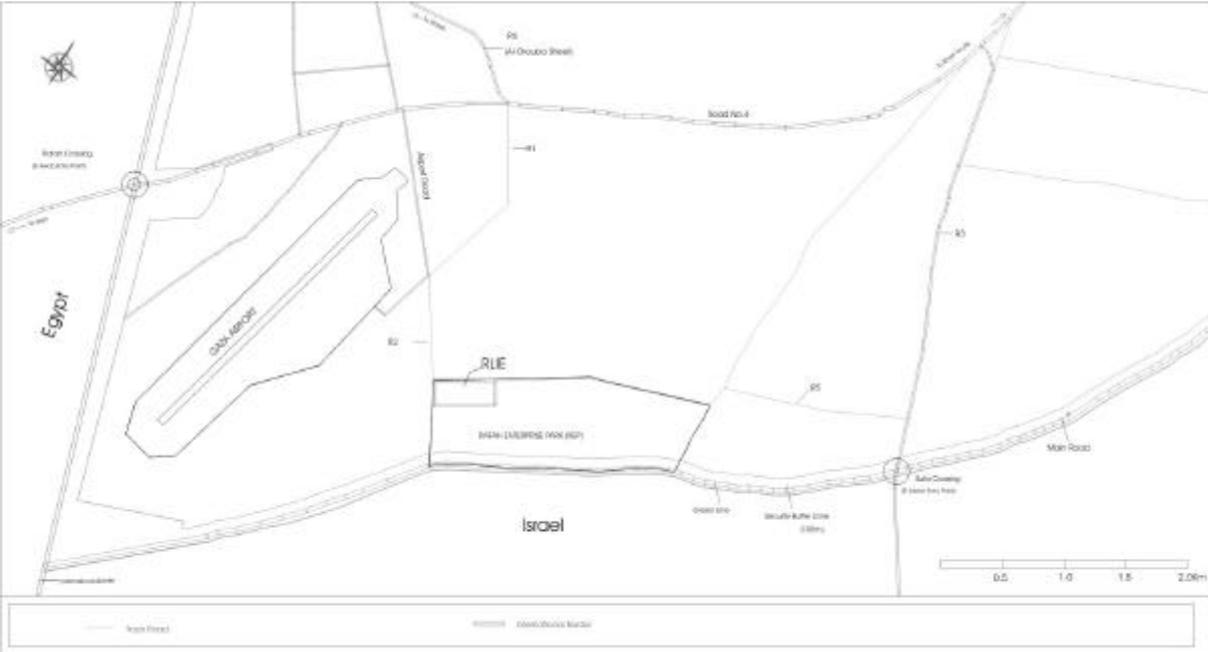
Fig (5) shows RLIE site and the surrounding area. Road R2 is the more convenient and direct existing access to the site. It connects the site with the airport road which extends from Salah El-Deen road to the airport. Right now, the airport road is 1600m long and 12m wide two-way asphaltic road. It is planned to construct a new airport road (R1) that will be a 40 m wide dual carriage-way. The right-of-way for this proposed road has already been cleared. R2 access road is a 6-8 m wide 500 m long unpaved track with very rare traffic.

The road R5 is an another access to the site. It connects the site to road R3 which links Salah El-Deen Road with Sufa crossing. R5 access is a longer and rougher 8m wide unpaved track.

### **2.1.3 Existing Structures on site**

There is no structure as such existed on site. RLIE site is mainly an agricultural area. There is only some almond trees, bushes and vegetable plants.

Fig (5) Access to the Site



Figure(5) Access to the site.

### 2.1.4 Relation with relevant facilities

Fig (6) shows the site of RLIE with the nearby relevant facilities. Table (2) gives the distance between RLIE and other facilities land marks.

**Table (2) Distance from Relevant Facilities**

No.	Location	Distance in Km
1	Rafah Municipality boundary	2
2	Al –Awda International crossing	4
3	Gaza International Airport	1.5
4	Road No.4 (Salah El din Road)	2
5	Sufa Crossing	4
6	Khanyounis Municipality boundary	8
7	Rafah City Center	5

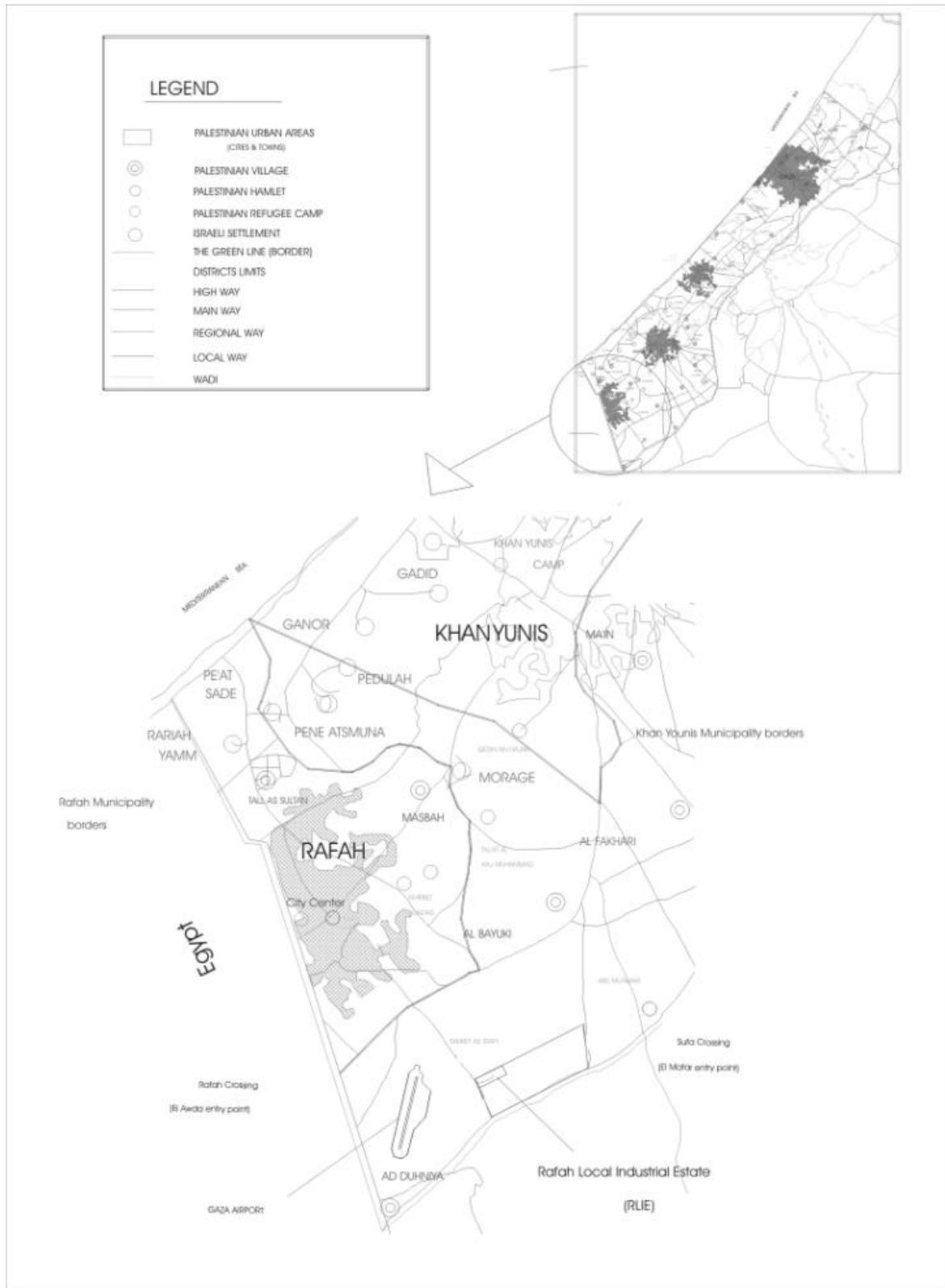
## 2.2 Site Main Attributes

RLIE site is generally a plane area with little obstacles for development. Its topography, soil conditions and hydrological characteristics are fairly typical of Rafah area.

### 2.2.1 Topography

RLIE site is an almost flat area with an average height of 90 m above the mean sea level. The southwestern corner of the site is the highest point and the terrain is mildly sloping down towards the northeastern direction.

**Fig (6) RLIE Relative Facilities**



Figure(6) : RLIE and Relevant Facilities

### **2.2.2 Drainage**

No drainage system is available on the site, however the natural slope may facilitate the storm water drainage and collection. Surface drainage is recommended to the collection point C. as depicted in figure (7). As the site is relatively high and having a mild but distinct slope, there is no chance for overflows from surrounding areas.

### **2.2.3 Soil Conditions**

Fig (8) shows the typical formation of soil on site as indicated by a bore hole. The top soil is a relatively thin silty sand layer (0.5m thick). It is followed by a rather thick sandy clay to clayey sand (SC/CS) layer (7.5 m thick). Again this is followed by a silty sand layer (2m thick) which is resting on a kurkar (sandy stone) base. The top soil has generally the light yellow color.

### **2.2.4 Hydrological Conditions**

The piezometry of the Gaza Strip aquifer is inclined from east to west. The best quality fresh water aquifer lies in northern Gaza Strip. Ground water recharge in the Gaza Strip may vary significantly, depending on the yearly rainfall and the density of paved and under-roof areas. In many places in the Gaza Strip, specially in the south (Rafah and Khan Younis), ground water is not potable. Nitrate and chloride contents are beyond the permissible limits. The ground water table at RLIE site has an average of 74m. below the ground surface. Figure (9) shows the thickness of quaternary deposits.

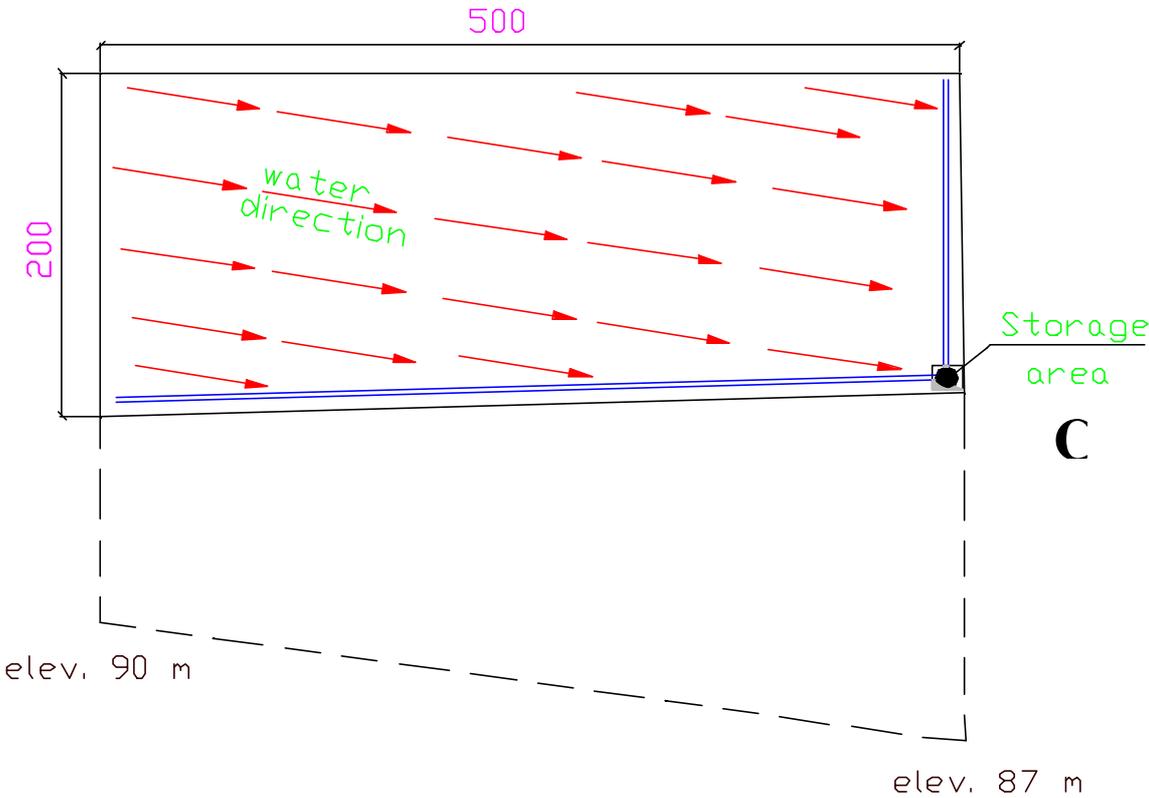
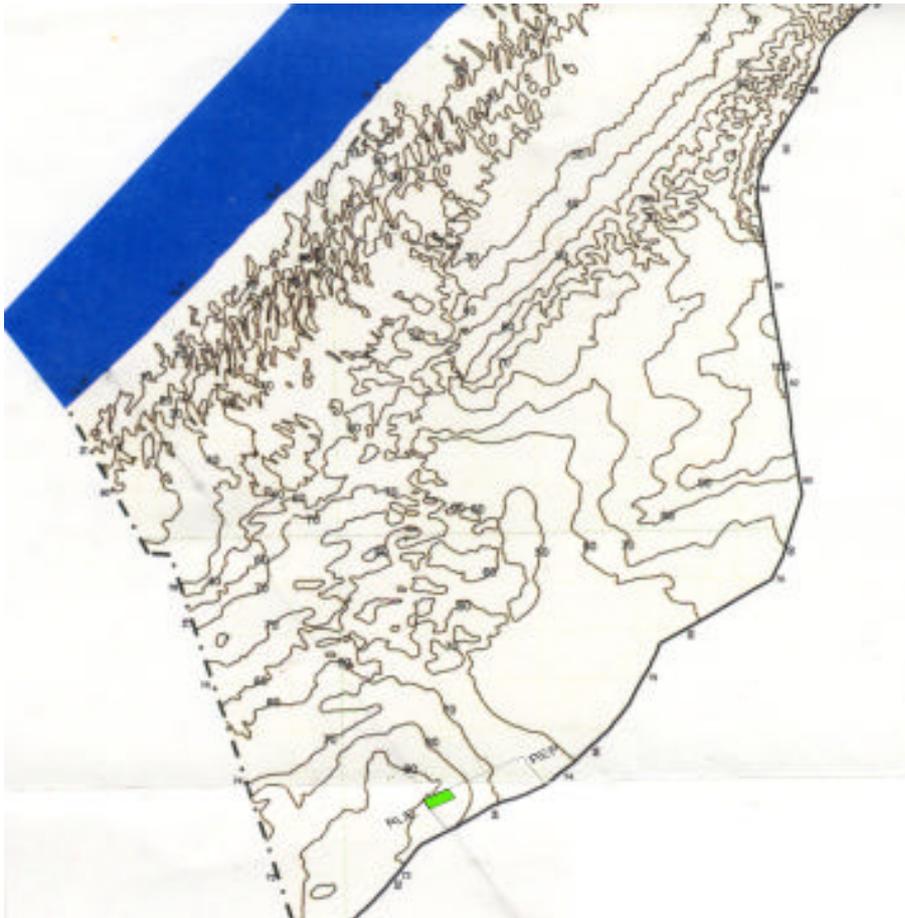
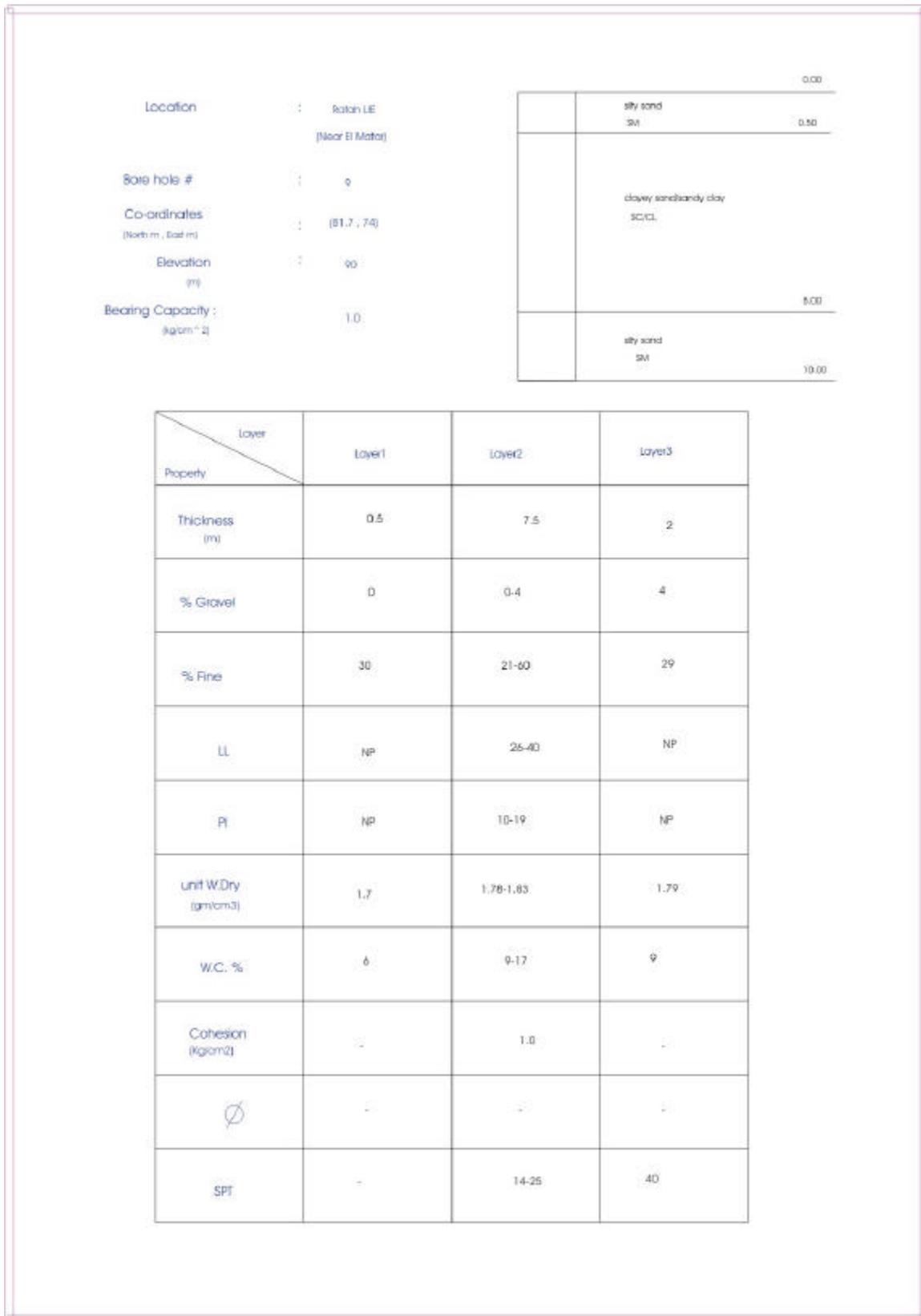


Figure (7) : Drainage Layout

**Fig. 8: Soil Profile**



Fig(8) : Soil Profile

Fig. 9



Figure(9): Depth of quaternary deposits

## 2.3 Available Utilities

There are few utilities available on or nearby RLIE site. These include road network, water supply network, waste water system, electricity, telecommunication, etc. The following subsections give some details for the capacity, quality and reliability of these utilities as well as the nearest connecting points to RLIE site.

### 2.3.1 Road network

The site of RLIE has an easy access to almost all main facilities in the area. It is linked to Gaza Airport, Al-Awda crossing point, Sufa crossing point, proposed Gaza seaport, etc. Fig (10) shows RLIE site and the existing road network. The figure indicates also the planned roads. Table (3) gives details of existing roads in RLIE area.

**Table (3) Road Network Details**

No	Road	Width (m)	Surface Condition	No. of lanes	Condition	Notes
1	Road No. 4	30	Paved	2	Moderate	Proposed to be 53 m wide
2	Sufa Road	12	Paved	2	Moderate	
3	Airport Road	12	Paved	2	Moderate	Proposed to be 24m wide
4	Al Ourouba Road	16	Unpaved track	2	good	Proposed to be 34m wide
5	T1	8	Unpaved track	2	Poor	
6	T2	6-8	Unpaved track	2	V.poor	

### 2.3.2 Water Supply

The potential water supply sources are:

1. The 8" water main pipe from Al Hashash Well feeding Gaza International Airport. The well discharge capacity is 76 m<sup>3</sup>/hr. The proposed connecting point is about 800 m from the site.
2. The 6" water main pipe coming from a new digged well near Murag feeding, Al Bayouk, Al Fukhari and Ashoka areas. The well discharge capacity is 140 m<sup>3</sup>/hr.
3. The proposed connecting point is about 1600 m from the site. This distance may decrease to about 500 m when the planned extension of the line is constructed.
4. The 6" outlet from the Mekorot network which is about 2.5 km distant from the site.

The water quality of the three sources is good.

Figure (11) shows the water supply sources for RLIE.

### 2.3.3 Wastewater System and Solid waste

The site and the surrounding area has no wastewater system. The nearest connection point to the existing Rafah City wastewater network is Jenainah pumping station about 4 km far from the site. It has to be noted that existing system was designed to accommodate the needs of eastern part of Rafah City.

On the other hand, an alternative connection point may be directly to the planned wastewater treatment plant (WWTP) which will be constructed according to the final version of the wastewater master plan dated June,1998.

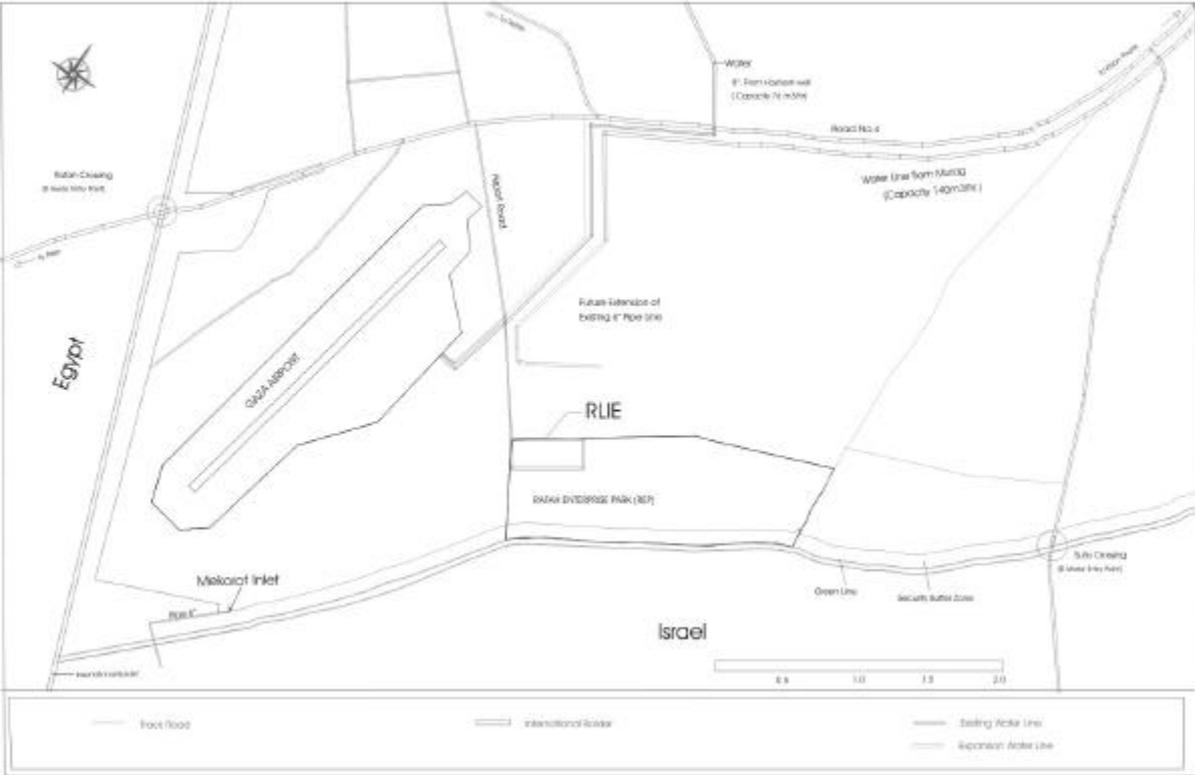
The proposed WWTP will be close to the Green Line north to sofa crossing point about 5 km from the site.

Fig. 10: Road Network



Figure (10) Road network

Fig. 11: Water Supply



As for solid waste, Rafah main land fill is situated about 4.0 km north to the proposed RLIE site. Figure (12) shows the wastewater connecting point as well as Rafah land fill.

#### **2.3.4 Electricity**

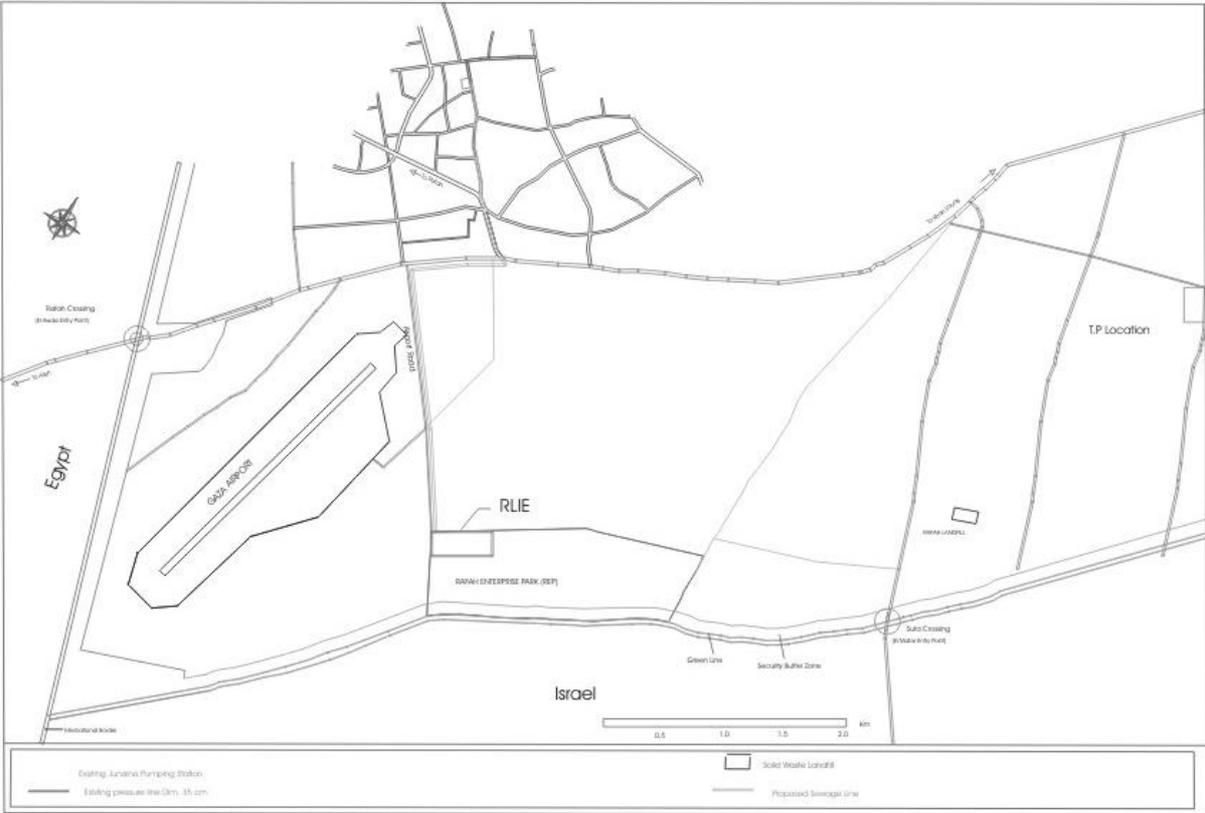
Fig (13) shows the main high tension line that passes near RLIE site. It is only about 200 m off the site. Based on the information given by the Palestinian Energy Authority (PEA), the electricity for Gaza Strip use is mainly supplied from Israel through 9 high-tension lines with 22 KV each. Only one high-tension line supplies Rafah Governorate with maximum permissible load of 11 MW. PEA indicated that the existing high-tension line that feeds Rafah is overloaded and it does not have the capacity to meet any additional demand. However, there is a proposed substation near the crossing point between Salah El Deen and Sofa roads. It is proposed to feed REP area with 2 high tension lines with 24 MW capacity

Considering the prevailing conditions, the electricity supply for RLIE can be provided by an onsite generators. When the proposed substation be functioning, RLIE can be connected to the main Gaza Electricity network. The generators will be then a standby source of energy for RLIE which is needed anyway.

#### **2.3.5 Telecommunication**

Fig (14) shows the existing teloephone line in RLIE area. It indicates the Fiber optic cable that connects Gaza Strip with Israel and abroad. This cable passes through RLIE site with a depth ranging from 1 to 2m under the ground surface.

Fig. 12



Figure(12) Wastewater and Solid waste

Fig. 13

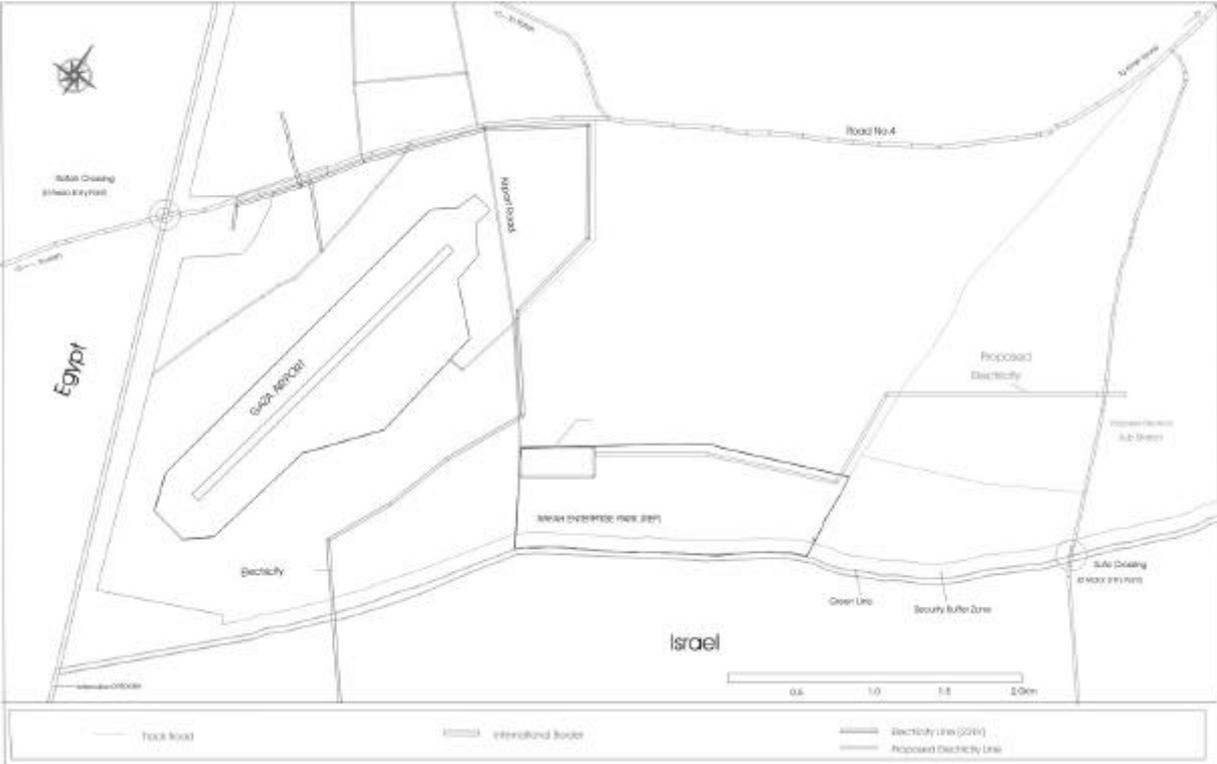
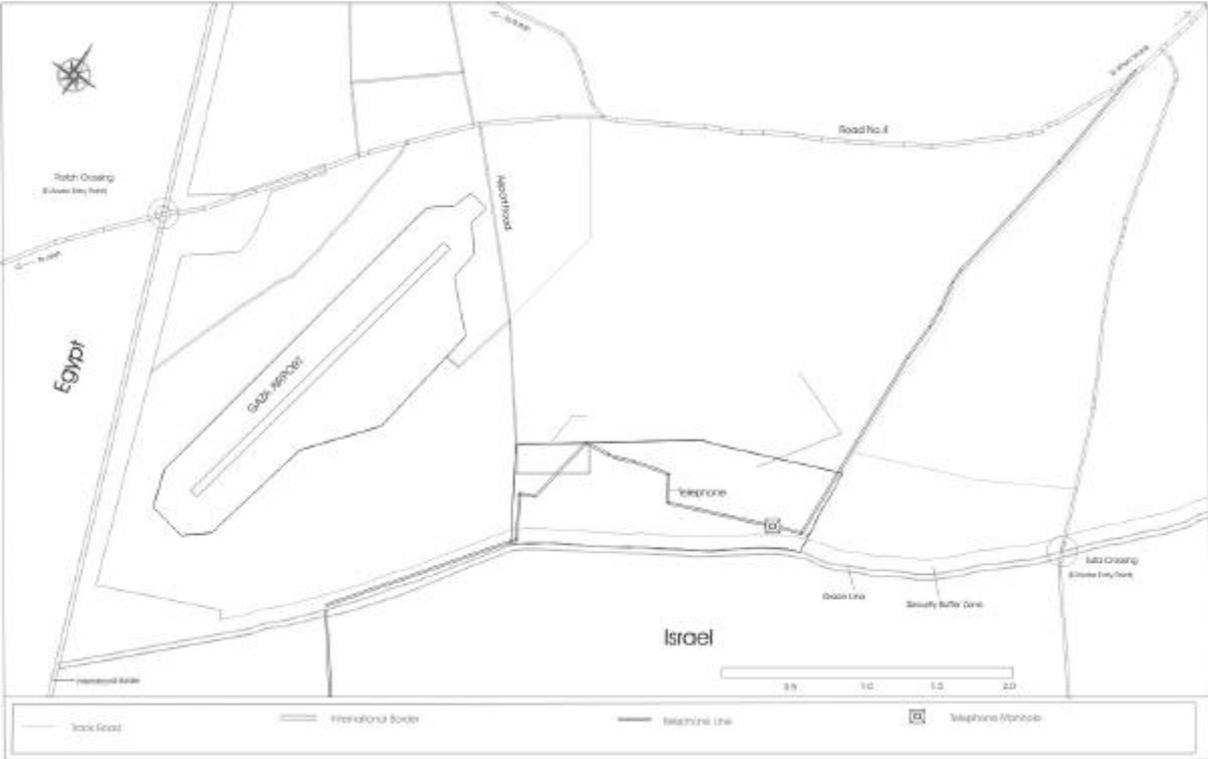


Fig. 14



## 2.4 Initial Development Phase

The area available for development under this project (RLIE) is 100 donums. This area is a part of the about 1500 donums that were originally allocated for the Rafah Enterprise park (REP). In fact the 100 donums of RLIE occupies the south western corner of the REP project.

From the discussions we had with PIEFZA officials, we conclude that it is highly recommended to have RLIE plan matched as much as possible with the proposed master plan of REP, (see Fig 15 ). A main feature of REP master plan is a main road running along the eastern side of RLIE site . Fig (16) shows the general layout of RLIE.

The critical factor in this design is the desire of having the basic size as small as possible which also can be divided easily to accommodate small industries that need areas as small as of 150 m<sup>2</sup> . This will make RLIE attractive for small enterprises and even it may encourage craft shops to move from Rafah city to RLIE.

As for the service building, we prefer to adopt the multi-story solution rather than the scattered services or horizontally extended units. The main idea here is to maximize the land use ratio.

In co-ordination with PIEFZA officials, an area of 10 donums was identified as the initial development phase (IDP) for RLIE. As shown in fig (17) the proposed IDP is located in the south western corner of RLIE. This location allows integration with RLIE as well as with the master plan of REP.

Fig. 15

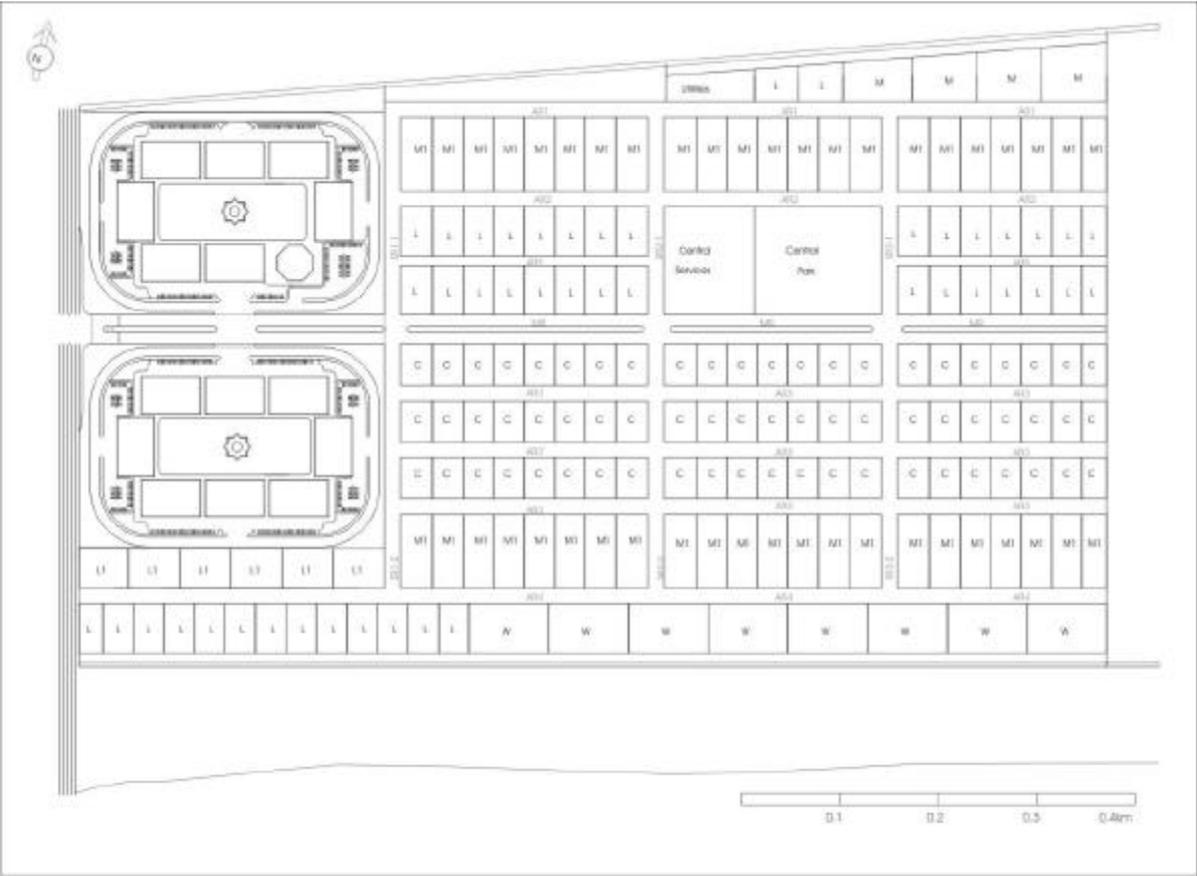


Figure (15) :Master Plan of Rafah Enterprise Park

Fig. 16



Fig. 17



The proposed IDP was chosen to be as near as possible to the existing utilities and infrastructure services while needing minimal site preparation and grading. The proposed location has been chosen to be at the middle of the whole RLIE site at a convenient distance to all factories. It is also not too far from IDP area.

## **2.5 Development Formula**

From the discussions we had with PIEFZA officials, we conclude that they prefer to have the maximum land use in order to have the whole project, as much as possible, financially viable. Yet, providing the necessary provisions for good functioning environment should not be overlooked.

They drew our attention to the necessity of conforming to regulation No.5 for building licensing in industrial area issued by PIEFZA. This regulation restricts the percentage of under roof area to be 80% maximum. It also stipulates that the front setback should be minimum 5m and for side set back to be 2 minimum.

RLIE master plan shown in Fig.(16) yields about 50% land use. The ratio of serviced land to raw land is 67% and the ratio of under roof to serviced area is 75%. We think that these ratios are generally reasonable. Of course, the land use may vary according to the layout adopted. We recommend to go for layouts that yield less land use rather than to go for higher one as the latter may be achieved at the expense of quality.

### **2.5.1 Building Specifications**

Aiming to achieve economic buildings while complying with the minimum technical requirements, It is recommended to use as far as possible locally manufactured materials that comply with to the Palestinian Standards.

The typical building is proposed to be of the following arrangement :

- -Concrete substructures (Foundations, Column necks, Tie beams and subfloor)
- -Concrete columns, beams, lintels, etc.
- -Cement blockwall of outside envelop.
- -Steel structure truss.
- -Corrugated steel sheets for roofing.

Flooring may be made of terrazo tiles and in the place of heavy movement, concrete floor may be used.

Fire protection and fighting provisions are to be considered as well as insulation and storm water collection and disposal systems.

## **2.6 Required Physical Improvement**

### **2.6.1 Site Preparation**

Minumum site grading is supposed to be made for IDP. This is because the area is almost flat as stated in the site description. All the trees and vetigations in the site are to be removed. About 40 cm of the top soil (Man made ground) is to be removed also.

However, some levels adjustment may be needed to gaurantee that the future constructed buildings will be higher than the road level. This adjustment requires about 50cm backfilling with cohesionless soil.

As stated before, a fiber optic telephone cable is existing on the site and it is obvious that it should be relocated.

In order to keep the site privacy and for safety and security requirements, a temporary fence is to be installed around the proposed IDP.

To facilitate the construction operations and handling of materials on site 8m wide and 300m long tracks are to be prepared.

### 2.6.2 Site Access

As described before, the site has an easy access to the relevant facilities and main roads. The needed development is to improve the conditions of the existing roads by increasing the width and paving the unpaved tracks. Before operating the RLIE, it is required to construct R2 road (see Figure 10). This means paving a 12m wide and 500m long road.

### 2.6.3 Utility Connections

#### 2.6.3.1 Water Supply

The estimated water demand for the whole RLIE is about 250m<sup>3</sup>/day while the water demand of IDP is estimated to be about 40 m<sup>3</sup>/day. The proposed water supply system for RLIE consists of water storage facilities in addition to distribution network. A ground storage tank of 1000m<sup>3</sup> capacity and an elevated water tank of 250m<sup>3</sup> capacity are to be used.

As for IDP, multiples of 1.5 to 2.5 m<sup>3</sup> capacity PVC storage tanks may be used for every individual workshop.

- 1 As mentioned before, three potential water supply sources are available :
- 2 The 6" pipe line from Murag well which feeds the three municipal councils Al Bayouk, Al Fukhari and El-shokah. The well capacity is 140 m<sup>3</sup>/h. On the long run, it is expected that the water demand of these three municipal councils will increase and full well capacity will be consumed to meet this increasing demand.
- 3 The 8" line coming from Hashash well and feeding the Air port: For the time being, since the Airport consumption is rather low, it is quite possible to get the water supply from this pipe line. However, for the long run it is expected that the Airport activities will significantly increase and consequently the water consumption will increase leaving no extra water to be used by RLIE
- 4 The 6" out let from Mekorot network:
- 5 It seems that this water supply source is the most suitable and reliable in the long run.

As previously mentioned, the above mentioned sources have good quality potable water.

On the other hand, brackish ground water is available on site. The ground water table is about 80m deep under the ground surface. Depending on the type of industries accommodated, this water source may be utilized.

A 6" diameter UPVC pipe 2.5 Km long is needed to connect RLIE with Mekorot intake . A schematic drawing for the water distribution system is attached in Annex B .

#### 2.6.3.2 Wastewater System:

The estimated wastewater production of RLIE is about 200 m<sup>3</sup>/day, while the estimated wastewater production for IDP is about 35 m<sup>3</sup>/day.

As mentioned before, the RLIE wastewater may be disposed to Rafah city wastewater system through 8" an approximately steel pipe about 4000m long connected to Jenainah Pumping Station.

In case that RLIE will be constructed after the construction of the Southern Wastewater Treatment Plan, RLIE sewage may be disposed directly to the WWTP through 8" steel pipe with about 4500m long.

As for IDP, if budget constraints allows to construct the above mentioned 8" steel pipe, It is preferred to construct it, otherwise local percolation pits may be used.

In RLIE, Stormwater is supposed to be surface drained to some collection areas and then disposed to proposed infiltration basins through stormwater system.

As for IDP, the stormwater will be surface drained and infiltrated in the adjacent areas.

Annex B includes schematic drawings for wastewater and stormwater collection systems

### **2.6.3.3 Electrical Supply**

The estimated electrical power demand of RLIE is about 2 MVA. Three transformer stations 630 KVA capacity each, may be used to supply the required electrical power. Each station contains an electrical generator set 500 KVA capacity in addition to the transformer. The three stations will be connected in a ring system using three core underground 50mm<sup>2</sup> HT cable.

The stations may be feeded with 22 KV HT from the proposed southern substation. The generator sets may be used to supply the required electrical power until the functioning of the southern substation, then they will serve as standby electrical power source.

As for the initial development phase (IDP), the estimated electrical power demand is about 250 KVA. One of the proposed transformer substations may be installed in the initial development phase to supply the (IDP) with the required electrical power. This station may be connected to the existing main HT line of Rafah city that exists near RLIE.

Annex B includes a schematic drawing for the proposed electrical networks for RLIE and IDP respectively.

### **2.6.3.4 Telecommunications**

As stated before, the telephone cable passes through the proposed RLIE. Telecommunications Company (PalTel) is willing to provide the RLIE with the required telephone lines .

As for IDP, PalTel can install one Remote Subscriber Unit (RSU) with a capacity of 500 lines, which is expected to cover the first stage (IDP).

### 3-Cost Estimation

This chapter describes the required cost for the construction of the IDP. It includes the cost estimates for the offsite development infrastructure, the onsite preparation and infrastructure and the construction of the buildings

#### 3-1 Cost Assumptions

The cost estimates are supposed to accounts for local construction materials. The total construction cost was initially calculated then a mark up of 25% to account for design and supervision fees in addition to contingencies, was made. No customs or taxes were considered in the price calculations. The unit price accounted for all the required activities during the construction phase including: environmental mitigation measures, handling and damping of excavated materials. The compensations for land acquisition is stated in a separate item to be handled according to PIEFZA procedures. The cost of workshop buildings are based on an average cost of \$200/m<sup>2</sup>.

#### 3.2 Capital Investment

The capital investment was calculated to account for the following :

- Offsite infrastructure.
- Onsite infrastructure.
- Building cost.
- Compensations for land acquisition.

Table (4) presents the capital investment.

**Table (4) Capital Investment**

No.	Item Description	Cost(US\$)
<b>1</b>	<b>Offsite Infrastructure</b>	
	Roads	89,000
	Water supply	75,000
	Wastewater	240,000
	Telecommunications and Electricity	5,000
	Sub Total	409,000
	Engineering expenses and contingencies (25% of sub total)	102,250
	<b>Grand Total Offsie</b>	<b>511,250</b>
<b>2</b>	<b>Onsite Infrastructure</b>	
	Site Preparation	10,000
	Roads	121,450
	Water supply	24,000
	Stormwater	4,500
	Wastewater	72,230
	Telecommunications	16,200
	Electricity	210,500
	Sub Total	459,280
	Engineering expenses and contingencies (25% of sub total)	114,820
	<b>Grand Total Onsite</b>	<b>574,100</b>
<b>3</b>	<b>Building Cost</b>	1,110,000
	Engineering expenses and contingencies (25% of sub total)	277,500
	<b>Grand Total Building</b>	<b>1,387,500</b>
<b>4</b>	<b>Compensation for land aquisition</b>	<b>85,000</b>
	<b>GRAND TOTAL</b>	<b>2,557,850</b>

### 3.3 Recurrent Costs

The recurrent costs are supposed to include operation and maintenance of :

- Internal Roads
- Electrical Distribution network
- Water Distribution network and facilities
- Sewage system networks and facilities
- Landscaping and exterior yards

It is assumed that at least one crew for maintenance works will be available to perform the required maintenance.

The recurrent cost may be calculated as a percentage of the capital investment. Our estimate ranges between 1 and 5 percent of the capital investment.

Table (5) presents the annual recurrent cost of the various above mentioned items

#### **Cost Estimate Spreadsheet**

Cost Estimate Spreadsheet is attached in Annex A.

**Table (5 ) Annual Recurrent Costs**

<b>No.</b>	<b>Item Description</b>	<b>Recurrent Cost (US\$)</b>
<b>1</b>	<b>Offsite Infrastructure</b>	
	Roads	4,500
	Water	1,125
	Wastewater	7,200
	Telecommunications and Electricity	500
	<b>Sub Total</b>	<b>13,325</b>
<b>2</b>	<b>Onsite Infrastructure</b>	
	Roads	6,000
	Water supply	1,000
	Storwater	500
	Wastewater	3,000
	Telecommunications	250
	Electricity	5,000
	<b>Sub Total</b>	<b>15,750</b>
	<b>GRAND TOTAL</b>	<b>29,075</b>

**Annex A : Cost Estimate Spreadsheet**

<b>ENGINEERING COSTS</b>
<b>SUMMARY OF CAPITAL BUDGET COSTS</b>
<b>OFF SITE COST ESTIMATES FOR LIE</b>

INFRASTRUCTURE	CAPITAL BUDGET COSTS	TOTAL PRICE WITHOUT CUSTOMS OR VAT
Roads	\$89,668	\$93,255
Water	\$70,313	\$73,125
Wate Water	\$225,000	\$234,000
Electricity	\$4,704	\$4,892
Telecommunications	\$4,704	\$4,892
<b>SUBTOTAL 1</b>	<b>\$394,389</b>	<b>\$410,164</b>
CONTINGENCIES 15%	\$59,158	\$61,525
<b>FEES</b>		
Design & Engineering	\$13,606	\$14,151
Supervision/Project Management	\$1,775	\$1,846
Other	\$0	\$0
<b>SUBTOTAL 2</b>	<b>\$15,381</b>	<b>\$15,996</b>
<b>FINAL TOTAL</b>	<b>\$468,928</b>	<b>\$487,685</b>

<b>ENGINEERING COSTS</b>
<b>SUMMARY OF CAPITAL BUDGET COSTS</b>
<b>ON SITE COST ESTIMATES FOR LIE</b>

INFRASTRUCTURE	CAPITAL BUDGET COSTS	TOTAL PRICE WITHOUT CUSTOMS OR VAT
Site Preparation	\$ 31,250	\$ 32,500
Roads	\$ 652,330	\$ 678,423
Water	\$ 93,313	\$ 97,045
Wate Water	\$ 158,438	\$ 164,775
Storm Water	\$ 30,000	\$ 31,200
Electricity	\$ 229,173	\$ 238,340
Telecommunications	\$ 17,272	\$ 17,962
<b>SUBTOTAL 1</b>	<b>\$ 1,211,775</b>	<b>\$ 1,260,246</b>
<b>CONTINGENCIES 15%</b>	<b>\$ 181,766</b>	<b>\$ 189,037</b>
<b>FEES</b>		
Design & Engineering	\$ 41,806	\$ 43,478
Supervision/Project Management	\$ 5,453	\$ 5,671
Other	\$ -	\$ -
<b>SUBTOTAL 2</b>	<b>\$ 47,259</b>	<b>\$ 49,150</b>
<b>FINAL TOTAL</b>	<b>\$1,440,800</b>	<b>\$1,498,432</b>

<b>ENGINEERING COSTS</b>						
<b>OFF SITE INFRASTRUCTURE</b>						
<b>COST ESTIMATE BREAKDOWN</b>						
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)
	<b>Offsite infrastructure</b>					
<b>1</b>	<b>ROADS</b>					
1.1	UNCLASSIFIED EXCAVATION	281	3000	CU.M	\$4.50	\$13,500
1.2	CRUSHED AGGREGATE BASE COURSE	563	1800	CU.M	\$15.00	\$27,000
1.3	BITUMINOUS PRIME COAT	47	6000	SQ.M	\$0.38	\$2,250
1.4	HOT BITUMINOUS CONCRETE WEARING COURSE (5cm)	469	6000	SQ.M	\$3.75	\$22,518
1.5	PAINTED PAVEMENT LINES	42	500	SQ.M	\$4.00	\$2,000
	<b>SUB-TOTAL 1</b>					<b>\$67,268</b>
	<b>LABOUR</b>	<b>1401</b>				<b>\$22,400</b>
	<b>CONTINGENCY</b>					<b>\$13,450</b>
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)
<b>2</b>	<b>WATER</b>					
2.1	PIPE WORKS 6" UPVC Pipe	750	2500	L.M	\$22.50	\$56,250
	<b>SUB-TOTAL 2</b>					<b>\$56,250</b>
	<b>LABOUR</b>	<b>750</b>				<b>\$14,063</b>
	<b>CONTINGENCY</b>					<b>\$10,547</b>
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)
<b>3</b>	<b>WASTE WATER</b>					
3.1	SEWERAGE PIPES 8" Steel Pipe	3750	4000	L.M	\$45.00	\$180,000
	<b>SUB-TOTAL 3</b>					<b>\$180,000</b>
	<b>LABOUR</b>	<b>3750</b>				<b>\$45,000</b>
	<b>CONTINGENCY</b>					<b>\$33,750</b>
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)
<b>4</b>	<b>ELECTRICITY</b>	64		LS		\$4,000
	<b>SUB-TOTAL 4</b>					<b>\$4,000</b>
	<b>LABOUR</b>	<b>64</b>				<b>\$704</b>
	<b>CONTINGENCY</b>					<b>\$706</b>
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)
<b>5</b>	<b>Telecommunication</b>	64		LS		\$4,000
	<b>SUB-TOTAL 5</b>					<b>\$4,000</b>
	<b>LABOUR</b>	<b>64</b>				<b>\$704</b>
	<b>CONTINGENCY</b>					<b>\$706</b>
	<b>GRAND TOTAL OFF SITE</b>					<b>\$453,547</b>

<b>ENGINEERING COSTS</b>
<b>OFF SITE INFRASTRUCTURE</b>
<b>COST ESTIMATE BREAKDOWN</b>

Onsite Works and Building Works						
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)
	<b>SUB-TOTAL 1</b>	521	1	L.S	\$25,000.00	<b>\$25,000</b>
	<b>LABOUR</b>	<b>521</b>				<b>\$6,250</b>
	<b>CONTINGENCY</b>					<b>\$4,688</b>
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)
2.1	UNCLASSIFIED EXCAVATION	469	5000	CU.M	\$4.50	\$22,500
2.2	EMBANKMENT CONSTRUCTION	750	8000	CU.M	\$4.50	\$36,000
2.3	CRUSHED AGGREGATE BASE COURSE	2422	7750	CU.M	\$15.00	\$116,250
2.4	BITUMINOUS PRIME COAT	95	12000	SQ.M	\$0.38	\$4,560
2.5	HOT BITUMINOUS CONCRETE WEARING COURSE (5cm)	938	12000	SQ.M	\$3.75	\$45,000
2.6	PAINTED PAVEMENT LINES	47	750	SQ.M	\$3.00	\$2,250
2.7	PAVEMENT AREA (CONCRETE TILES)	3500	14000	SQ.M	\$12.00	\$168,000
2.8	CONCRETE TILES FOR SIDEWALK	508	3250	SQ.M	\$7.50	\$24,375
2.9	CURB STONE	1465	6250	L.M	\$11.25	\$70,313
	<b>SUB-TOTAL 2</b>					<b>\$489,248</b>
	<b>LABOUR</b>	<b>10193</b>				<b>\$163,083</b>
	<b>CONTINGENCY</b>					<b>\$97,850</b>
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)

ENGINEERING COSTS						
OFF SITE INFRASTRUCTURE						
COST ESTIMATE BREAKDOWN						
<b>3</b>	<b>SEWERAGE WORKS</b>					
3.1	SUPPLYING AND INSTALLING 6" UPVC PIPES FOR FUTURE UNIT CONNECTIONS UP TO 10 M FROM THE MANHOLE. PRICE INCLUDES EXCAVATION, NECESSARY BEDDING, BACKFILLING, PLUG, AND REINSTATEMENT.		195	Connection	\$650.00	\$126,750
<b>SUB-TOTAL 3</b>						<b>\$126,750</b>
<b>LABOUR</b>		<b>2113</b>				<b>\$31,688</b>
<b>CONTINGENCY</b>						<b>\$23,766</b>
<b>ITEM NO.</b>	<b>DESCRIPTION</b>	<b>DAY</b>	<b>QUANTITY</b>	<b>UNIT</b>	<b>UNIT RATE (US\$)</b>	<b>TOTALS (US\$)</b>
<b>4</b>	<b>STORM WATER WORKS</b>					
4.1	SUPPLYING AND INSTALLING 6" UPVC PIPES FOR FUTURE STREET CONNECTIONS UP TO 10 M . PRICE INCLUDES EXCAVATION, NECESSARY BEDDING, BACKFILLING, CATCHBASIN, AND REINSTATEMENT.		24	Connection	\$1,000.00	\$24,000
<b>SUB-TOTAL 4</b>						<b>\$24,000</b>
<b>LABOUR</b>		<b>400</b>				<b>\$6,000</b>
<b>CONTINGENCY</b>						<b>\$4,500</b>
<b>ITEM NO.</b>	<b>DESCRIPTION</b>	<b>DAY</b>	<b>QUANTITY</b>	<b>UNIT</b>	<b>UNIT RATE (US\$)</b>	<b>TOTALS (US\$)</b>
<b>5</b>	<b>WATER WORKS</b>					
5.1	SUPPLYING AND INSTALLING 2" PE PIPES FOR UNIT CONNECTIONS UP TO 10 M FROM THE VALVE. PRICE INCLUDES, PIPES, FITTINGS, EXCAVATION, NECESSARY BEDDING, BACKFILLING, VALVES, AND REINSTATEMENT.		195	Connection	\$350.00	\$68,250
5.2	<b>FIRE HYDRANT</b> DIAMETER 100MM		4	NO.	\$1,600.00	\$6,400
<b>SUB-TOTAL 5</b>						<b>\$74,650</b>
<b>LABOUR</b>		<b>1244</b>				<b>\$18,663</b>
<b>CONTINGENCY</b>						<b>\$13,997</b>

ENGINEERING COSTS						
OFF SITE INFRASTRUCTURE						
COST ESTIMATE BREAKDOWN						
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)
<b>6</b>	<b>TELECOMMUNICATIONS</b>					
<b>6.1</b>	<b>DUCT BANK SYSTEM</b>					
6.1.1	6 X 100MM DUCT BANK COMPLETE INSTALLED	64	140	L.M	\$40.00	\$5,600
6.1.2	2 X 100MM DUCT BANK COMPLETE INSTALLED	58	200	L.M	\$25.00	\$5,000
6.1.3	MANHOLE W/COVERS	48	6	NO.	\$700.00	\$4,200
	<b>SUB-TOTAL 6</b>					<b>\$14,800</b>
	<b>LABOUR</b>	<b>170</b>				<b>\$2,472</b>
	<b>CONTINGENCY</b>					<b>\$2,591</b>
ITEM NO.	DESCRIPTION	DAY	QUANTITY	UNIT	UNIT RATE (US\$)	TOTALS (US\$)
<b>7</b>	<b>ELECTRICAL</b>					
7.1	360KVA TRANSFORMER STATION INCLUDES SWITCHGEAR	690	1	NO.	\$60,000.00	\$60,000
7.2	50KVA GENERATOR SET INCLUDING ATS	575	1	NO.	\$50,000.00	\$50,000
7.3	MEDIUM VOLTAGE CABLE, 3CORE 50MM <sup>2</sup> 18/30 KV	345	400	L.M.	\$75.00	\$30,000
7.4	LOW VOLTAGE ELECTRICAL CABLES 4X50 MM <sup>2</sup>	168	650	L.M	\$22.50	\$14,625
7.5	SUB-DISTRIBUTION BOARD	233	27	NO.	\$750.00	\$20,250
7.6	ROAD LIGHTING SYSTEM	230	1	UNIT	\$20,000.00	\$20,000
	<b>SUB-TOTAL 7</b>					<b>\$194,875</b>
	<b>LABOUR</b>	<b>2241</b>				<b>\$34,298</b>
	<b>CONTINGENCY</b>					<b>\$34,376</b>
	<b>GRAND TOTAL</b>					<b>\$1,847,088</b>

## **COST ESTIMATE BREAKDOWN PROCEDURES**

### **The Grand total was the summation of the following:**

- 1-Subtotal : Which contain only the material prices.
- 2-Labour : Which contain only the Labour prices. These prices were estimated as a percentage of the total item cost as follows:
  - 25% for roads,
  - 20% water, waste water and storm water works.
  - 15% for electrical and telecommunication works.
- 3-Contingencies: Which were estimated as 15% of the summation of the Subtotal plus the labour costs.

### **The Summary of Capital Costs Procedures**

- 1-The capital cost of any item in Infrastructure was the summation of the Subtotal and Labour as well.
- 2-The Contingency were calculated as mentioned above.
- 3- The Fees were calculated as follows:

- Design & Engineering 3% of the summation of the Infrastructure Subtotal plus its Contingencies.
- Supervision/Management 10% of the summation of the Infrastructure Subtotal plus its contingencies.
- Others is Zero.

- 4-The final total of the capital cost equal to the summary of :  
Infrastructure Subtotal 1+ Fees Subtotal 2 + Contingencies 15%
- 5-The Total price is 1.04\* the Capital budget cost (4% increase)

### **Note:**

The Labour Rate in Gaza is approximately 15 US\$ per day while in Nablus it is approximately 20 US\$ per day

Annex B : Schematic Drawings for Utilities

