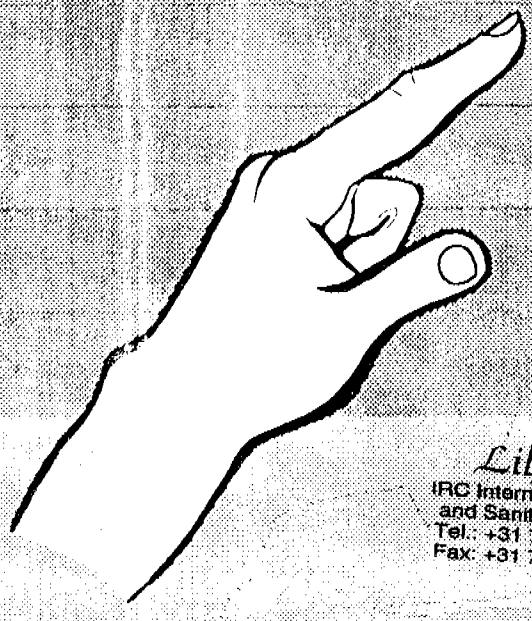
[illegible]nal Water Supply and Sanitation Project in Beni Suef

Meeting for Water Supply Resources Management

Water is life



[illegible] Students Club

REGIONAL WATER SUPPLY AND SANITATION PROJECT IN BENI SUEF GOVERNORATE (RWSSP)

MEETING FOR WATER RESOURCES MANAGEMENT

19.05.1997

Beni Suef Sport Club

Chairman: Mr. Hossien Samy Dawoud

PROGRAM

10.00 OPENING SEREMONY
(National Director Mr. Houssein Abdel Qawi)

10.15 BACKGROUND AND PURPOSE OF THE MEETING
(Mr. Hossien Samy Dawoud/Project coordinator)

10.30 SUMMARY OF EXISTING WATER SUPPLY AND SANITATION PLANS AVAILABLE

Existing situation. General description of each plan. Comparison of the plans. Conclusions. (Dr. Hosseiny)

11.30 SUMMARY OF POPULATION AND WATER CONSUMPTION FORECASTS

Different population forecasts. Different water consumption forecasts. Conclusions.(Dr. Hosseiny)

12.30 TEE, COFFEE AND SNACKS

13.00 WATER RESOURCES

Different water resources and capacity available.
Protection of water resources. Conclusions. (Mr. Ashraf Farouk)

13.45 WATER QUALITY

General information about water quality. Summary of water quality analysis. Conclusions.
(Ms. Dina Omar)

14.15 GENERAL DISCUSSION
(Chairman Mr. Hossien Samy Dawoud)

14.45 SUMMARY AND RECOMMENDATIONS
(Mr. Hossien Samy Dawoud)

15.15 CLOSING THE MEETING
(National Director Mr. Houssein Abdel Qawi)

15.30 LUNCH

LIST OF PARTICIPANTS

Representative of Nopwasd/Cairo. Mr. Ameel Hana Takla

Representative of Ministry of Planning/El Menia. Mr. Hamed Gade Hassan

Representative of Beni Suef Governorate
- Chairman of Transition Committee of EGA. Mr. Houssein Abdel Qawi
- Director of Housing Department. Mr. Hassan El Banna
- Mr. Mohamed Said

Representatives of three markazes

- Chief of Beba Markaz Mr. Mohamed Taher
- Chief of El Fashn Markaz Mr. Mohamed Tawfeek
- Chief of Sumusta Markaz Mr. Ibraheem Mohamed
- Utility Engineer of Beba Ms. Amira Ibraheem Ismaeel
- Utility Engineer of El Fashn Mr. Adel Abdala Metry
- Utility Engineer of Sumusta Mr. Ahmed Abdel Waheb

Representatives of the Water Project

- Mr. Hossien Dawoud
- Mr. Hassan Abdel Atty
- Dr. Mohamed El Hosseiny
- Mr. Ashraf Farouk
- Mr. Anwar Manaf
- Mr. Adel Abu Taleb
- Ms. Dina Omar
- Mr. Pentti Ruohonen
- Mr. Heimo Ojanen
- Mr. Jukka Leppanen

BACKGROUND AND PURPOSE OF THE MEETING

According to the Project Document and Workplan 1997 the project is preparing a Sector Plan for Water Supply and Sanitation in Sumusta, Beba and El Fashn markazes. The Sector Plan consists of the Water Resources Study and Physical Development Plan for Water Supply and Sanitation.

Water Resources Study consists of the inventory of the ground water and surface water resources including water quality, monitoring program for the future and recommendations for utilization of the water resources. The on going study was started last year.

The purpose of the Physical Development Plan is to find the most economic and sustainable solutions for Water Supply and Sanitation Systems in the project area. Practically it means studying alternative solutions and optimum utilization of the surface and ground water resources (based on the Water Resources Study) taking into account both implementation and operation and maintenance cost. Final output of the plan will be a phased implementation plan with cost estimates for Water Supply and Sanitation.

The collection of basic information for the Physical Development Plan was started late 1996. The existing situation of the Water Supply and Sanitation systems was checked and tentative ideas for developing Water Supply and Sanitation were given. The collection of basic data is still going on.

During the collection of basic information from the different authorities it was found that there are several different plans available for the development of Water Supply and Sanitation. Nopwasd has prepared in 1992 a Regional Plan for the Water Supply Network in Beni Suef governorate (Utilities Consulting Engineering). Water Supply Project for Beba and El Fashn cities and subsidiaries has been prepared in 1992-1995 by Nopwasd (Utilities Consulting Engineering). The Governorate of Beni Suef has prepared in 1993 a report "Needs Assessment and Strategic Planning for Water Supply and Sanitation" (Dr. Zaher Abdulla Consultant).

Waste Water Project for three cities, Sumusta, Beba and El Fashn was prepared in 1995 by Nopwasd and Arab Contracting Company (Dr. Zaher Abdulla Consultant). Nopwasd has been preparing a National Plan for Water Supply and Sanitation for the whole country. The governorate of Beni Suef has given several comments for it. The governorate has prepared in 1996 also Five Year's plan for Water Supply and Sanitation. Ministry of Planning has prepared in 1995-1996 a National Project for developing North Upper Egypt Region, which includes also Water Supply and Sanitation.

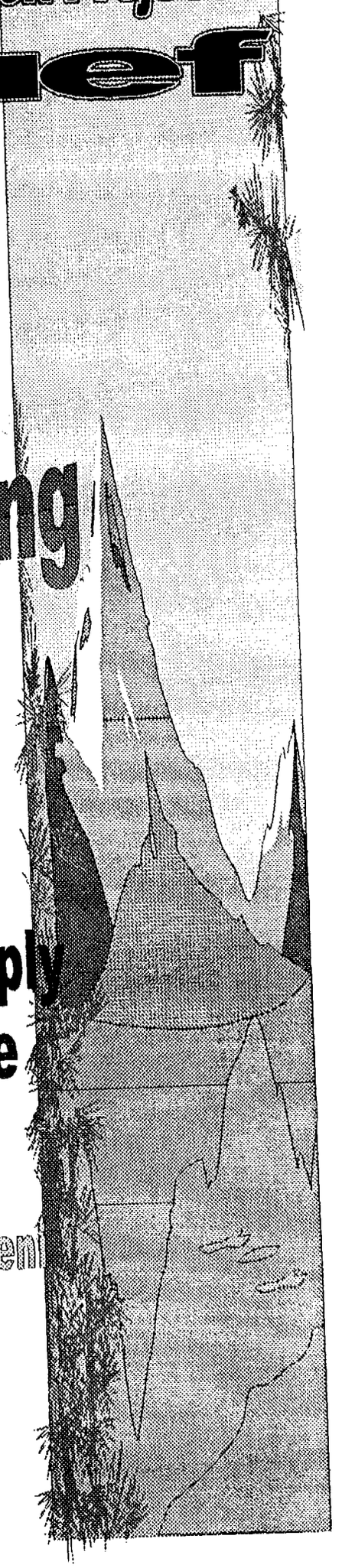
After the comparison of the above plans we found that there are many differences between the plans, e.g. target years and coverage of the plans are different. The most remarkable differences, however, are in the water consumption forecasts, especially water consumption per capita.

Referring to above it was found necessary to arrange a meeting and to invite all relevant authorities to discuss on these issues.

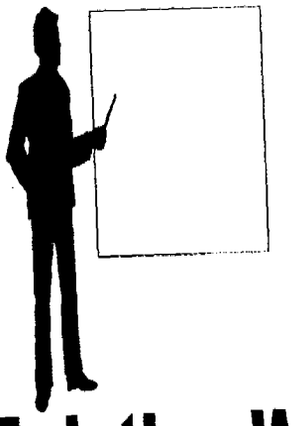
The objectives of the meeting are as follows:

- to explain the targets of the Sector Plan to be prepared by the Project (given above)
- to give short summary of Water Resources Study and Water Quality Monitoring Program prepared by the Project.
- to give short summary of the existing plans available
- to share suggestions and opinions
- to make conclusions for formulating the Sector Plan.

Regional Water Supply And Sanitation Project in Beni Suef



Water Resources Management Meeting



Summary of Existing Water Supply and Sanitation Plans Available

Presentation by Dr. Mohammed El-Houssieni
Sector Plan Expert

MAY 97

REGIONAL PROJECT FOR WATER SUPPLY & SANITATION IN BENI SUEF

SUMMARY OF EXISTING WATER SUPPLY and WASTE WATER PLANS AVAILABLE

CONTENTS

REGIONAL PROJECT FOR WATER SUPPLY & SANITATION IN BENI SUEF

SUMMARY OF EXISTING WATER SUPPLY and WASTE WATER PLANS AVAILABLE

1- Introduction

1-1- Importance of Planning

In the past the water supply projects were established only in urban zones due to the needs of the inhabited area depending on the utility engineer idea. There were no plans or strategy for the extensions and the new needs. With the population increase and the more interest in raising the level of living in the rural areas, the need to plan for water supply had appeared. Now, after the increase of the care for supplying good quality and high quantity of water for both urban and rural areas the planning have been transmitted from local level to the regional level to minimize the cost and increase the benefits from the natural sources for each region. In Egypt, during the last ten years several plans have been made on regional meanings and on national concepts.

The planning is very important for the following reasons:-

* Optimizing the project cost to get minimum cost with maximum service coverage and highest possible level of service.
* Determination for future needs from funds according to proposed execution program.
* Illustrating the level of service and the percentage of coverage within the project period and determining the project end period with illustrating the stages of construction and the when there will be need for extension or modified plan.

In Beni Suef from 1990 till now several plans have been prepared for water supply and sanitation plans by several authorities. These plans will be illustrated hereafter in this report with comparison between them, discussion for the differences and explanation for the beneficial use for them to the RWSSP project and to the governorate.

1-2- Existing Situation

1-2-1 Water Supply Sector

The existing situation for water supply sector in Beni Suef governorate could be illustrated in table (1). There are also two new constructed surface water supply plants each of 200 l/s capacity (17280 m3/d) one for Beba markaz and the other for El Fashen markaz. When they enters the service the production capacity will increase by 34560 m3/d that will make the available existing water production capacity **83350** m3/d to serve the three markazes in the project area.

Table (1) Existing Situation for Water Supply Sector

Markaz		Big SW	Comp.SW	Comp.GW	GW	Total
Sumusta	Urban	-	3176m3/d	-	432m3/d	3608m3/d
	Rural	-	1588m3/d	588m3/d	3857m3/d	6033m3/d
	Total	-	4764m3/d	588m3/d	4289m3/d	9641m3/d
Fashen	Urban	2953m3/d	266m3/d	-	7601m3/d	10820m3/d
	Rural	-	3132m3/d	-	2556m3/d	5698m3/d
	Total	2953m3/d	3398m3/d	-	10157m3/d	16508m3/d
Beba	Urban	4387m3/d	784m3/d	-	6912m3/d	12083m3/d
	Rural	-	1117m3/d	-	9441m3/d	10558m3/d
	Total	4387m3/d	1901m3/d	-	16353m3/d	22641m3/d
Total	Urban	7340m3/d	4226m3/d	-	14945m3/d	26511m3/d
	Rural	-	5837m3/d	588m3/d	15854m3/d	22289m3/d
	Total	7340m3/d	10063m3/d	588m3/d	30799m3/d	48790m3/d

It can be seen that the existing water production will be almost increased by 80% of its capacity after the entrance for the new two conventional surface water plants to the service.

In the other hand, the ground water production wells work now for less than 10 hours/day with production capacity 25 l/s / well. If the working hours increased to 16 hours /day and the production capacity increased to 50 l/s this will increase the GW production capacity to be 120000 m3/day which could raise the existing capacity to about 168000 m3/d

The existing theoretical needs according to NOPWASD National plan is 74000 m3/d and according to governorate comments it is 113000 m3/d.

1-2-2 WasteWater Sector

Till now, there is no centralized sewerage system in the project area. However, there are now three projects under construction for sewerage systems and treatment

cover the three cities (Urban zones only) through NOPWASD plans prepared by Dr. Zaher Consulting office.
The situation is now that all areas are served by on- site disposal systems as cesspools, vaults, septic tanks and latrines.

2- Available Plans

2-1- Regional Master Plan 1992

2-1-1- Water Supply

The project was designed by Utilities Consultant for NOPWASD to serve the whole governorate. It consists of three 400l/s with 200 l/s only at first phase each of conventional surface water treatment plant and there networks that cover the whole governorate. The Beba city plant covers Beba markaz, Ehnasia city plant covers Ehnasia, parts from Sumusta and Nasser markazes and El Fashen city plant covers El Fashen and part from Sumusta Markazes. Table (2) illustrates the proposed capacities for producing water by this plan and figure (1) shows the plan layout.

Actually , there was no information about the used design criteria for this plan.

2-1-2- Waste Water Works

At the same time NOPWASD contracted Dr. Zaher consulting office to design and prepare the sewerage systems for the three cities of Beba, Sumusta and El Fashen with one treatment plant for each. The proposed treatment plants and sewerage systems are still under construction now. The plan was first made to serve the cities only but due to another plan prepared by NOPWASD in 1995 some villages were included to the treatment plants of the cities through separated sewerage systems.

Table (3) illustrates the capacities and service percentage for this plans and figure (2) shows the plan layout.

2-2- Needs Assessments and Strategic Plan 1993 By Dr. Zaher Consultant.

2-2-1- Water Supply

The project was designed by Dr. Zaher Consultant for the governorate through LDII project to serve the whole governorate rural areas only. The plan depends mainly on surface water source using conventional plants for west bank of river Nile and compact units for

east bank. The distribution had been made by clustering network as El Fashen plant will serve both Sumusta and El Fashen Markazes and Beba plant will serve Beba markaz. The Ground water considered only as standby when problems appeared. Table (2) illustrates the proposed capacities for producing water by this plan and figure (3) shows the plan layout.

Actually , the centralized system need high control level and may be complicated.

2-2-2- Waste Water Works

The study also proposed here clustering systems for wastewater treatment by using one central treatment plant serving circle of 5 km radius for both urban and rural areas. Western parts of the project area are partly proposed to be connected to the desert treatment plant in the western side of Baher Youssef canal. Wastewater from eastern desert areas are proposed to be disposed by vacuum trucks in eastern desert treatment plants.

Table (3) illustrates the capacities and service percentage for this plans and figure (4) shows the plan layout.

2-3- Draft National Project 1995 By NOPWASD.

2-3-1- Water Supply

The project which was prepared by NOPWASD to serve the whole governorate, depends mainly on the surface water source with little use for ground water source and centralized systems for water distribution. The extension of the three plants Beba, El Fashen and Masaret Nasan will be made after year 2000. The use of ground water 4 additional ground water plants will be added.

Also increasing the actual capacity for the existing ground water sites will take place by increasing operation pumping hours. The condition is that the salinity for ground water should not exceed 1000 mg/l and minimum depth is 40 meter to prevent contamination. Table (2) illustrates the proposed capacities for producing water by this plan.

2-3-2- Waste Water Works

NOPWASD plan for wastewater is to cover 80 % of water supply. Two WWTP for each Markaz were planned, the first phase which are already under construction will cover only the three cities

and its subsidiaries in the rural zones. The second phase will cover the rest of rural areas. The used treatment were the high rate trickling filter procedure for the first phase plants and it is not chosen yet for the second phase.

In all cases it was recommended to reuse treated wastewater for trees plantation in desert areas.

Table (3) illustrates the capacities and service percentage for this plans.

2-4- Governorate Comments On NOPWASD National project 1996.

2-4-1- Water Supply

The governorate comments on NOPWASD plan could be summarized on the wish for increasing the design population at year 2030 by 20% to meet the calculations of the Central Agency for general Mobilization and Statistics. Also the increase of water consumption for urban areas by 20% and for rural areas by 40 to 50% with the same ideas about service procedure except some more additional production wells in the existing and new sites. Also increasing the available capacity is proposed through the water loss decrease program.

Table (2) illustrates the proposed capacities for producing water by this plan.

2-4-2- Waste Water Works

The same comments for water supply are also affecting the wastewater projects. The same ideas of NOPWASD National plan about service procedure are applied with using vacuum trucks for rural areas as temporary solution till the execution of centralized collection system.

Table (3) illustrates the capacities and service percentage for this plans.

2-5- National Project 1996 by Ministry of Planning.

2-5-1- Water Supply

The plan covers three governorates of El Fayoum, Beni Suef and El Minia. In general it depends mainly on NOPWASD National Plan (item 2-3) with some modification in population and water

consumption. Table (2) illustrates the proposed capacities for producing water by this plan.

Actually , there was no detailed information about the final shape of this plan on the markaz level till now.

2-5-2- Waste Water Works

The proposal for wastewater works is also similar to NOPWASD National plan. Also no detailed information is available till now on the markaz level. Table (3) illustrates the capacities and service percentage for this plans.

2-6- Five Years Plan 1996 By EGA.

2-6-1- Water Supply

The EGA had prepared its five years plan according to the country system. The plan concentrates on rehabilitation and upgrading of existing ground water sites constructing new first phase 200 l/s surface water plant for Sumusta and completion of the second phase of the Beba and El Fashen cities surface water treatment plants to duplicate there capacities from 200 to 400 l/s. Table (2) illustrates the proposed capacities for producing water by this plan.

2-6-2- Waste Water Works

The EGA had prepared its five years plan according to the country system. The plan concentrates on completion of the first phase of the cities waste water treatment plants and cities sewerage systems with new construction for sewerage systems for some cities subsidiaries villages joining the cities treatment plants

Table (3) illustrates the capacities and service percentage for this plans.

3- Discussion and Conclusion

3-1- Comparison Between the Several Plans.

3-1-1- Water Supply Works

The following table no. (2) illustrates the comparison between each plan for the three Markazes of the project zone. The comparison for the source type, the capacities and the new projects for the year 2020 planning phase.

Table (2) Comparison For Water Supply Works

PLAN	SERVED MARKAZES							
	BEBA		SUMUSTA		EL FASHEN		Total	
	Project	Cap.	Project	Cap.	Project	Cap.	Project	Cap.
Regional M.P.	1 SW 400 l/s	34560 m3/d	-	13825 m3/d	1 SW 400 l/s	20735 m3/d	2 SW 800l/s	69120 m3/d
Needs Ass. and Strategic P.	1 SW 400 l/s	34560 m3/d	-	13825 m3/d	1 SW 400 l/s	20735 m3/d	2 SW 800 l/s	69120 m3/d
NOPWASD National P.	1 GW 50l/s	2880 m3/d	3 GW 50l/s	8640 m3/d	1CSW 30l/s	2000 m3/d	1 CSW 30 l/s+ 4 GW 200 l/s	13520 m3/d
Governorate Comments On N. P.	1 SW 200 l/s+ 10 GW 50 l/s	46080 m3/d	1 SW200 l/s+ 5 GW 50 l/s	31680 m3/d	1 SW 200 l/s+ 13 GW 50 l/s	54720 m3/d	3 SW 600 l/s+28 GW 1400 l/s	132480 m3/d
National Project by Planning Ministry	SW + GW	34560 m3/d	GW	28800 m3/d	SW + GW	34560 m3/d	2 SW + GW	97920 m3/d
EGA five years plan	2 SW 240 l/s+ 1 GW 50l/s+ 1 CSW 30 l/s	25616 m3/d	1 SW200 l/s+ 5 GW 50 l/s	31680 m3/d	1 SW 200 l/s +5GW 50l/s	31680 m3/d	4 SW 640 l/s+ 1 CSW 30 l/s+ 11 GW 550 l/s	88976 m3/d

* SW = Surface Water T.P. * GW = Ground Water Site * CSW = Compact Unit

N.B. For both EGA five years plan and Governorate comments on NOPWASD plan an additional water will be available due to decrease water loss.

Also for the last four plans there is a SW TP of 200 l/s under construction in both Beba and El Fashen plants .

Table (2-b) illustrates the costs of the plans for the first phase planning period up to year 2020 according to 1995 prices (first impelimentation phase 1997-2002).

Table (2-b) Cost Estimate for Water Supply Projects

Plan	Investement Costs in Millions							
	New Wells	Beba New SWTP	Fashen New SWTP	Sumusta New SWTP	Beba and Fashen Old SWTP	Compact Units	Main Pipe Lines	Total
NOPWASD N.P.	0.4	-	-	-	-	1.2	1.1	2.7
Gov. Comm.	2.8	15	15	35	-	1.2	12	81
Five Years Plan	1.3	15	15	35	14	1.2	4.3	86

N.B.

* The cost of the pipelines in the Governorate Comments is a rough estimation based on the cost of the whole governorate.
* All cost estimates have been taken from the basic data of the governorate and should be checked later.

3-1-2- WasteWater Works

The following table no. (3) illustrates the comparison between each plan for the three Markazes of the project zone. The comparison for the the capacities and the new projects.

Table (3) Comparison For Waste Water Works

PLAN	SERVED MARKAZES							
	BEBA		SUMUSTA		EL FASHEN		Total	
	Project	Cap.	Project	Cap.	Project	Cap.	Project	Cap.
Regional M.P.	1TP	20000 m3/d	1TP	10000 m3/d	1TP	20000 m3/d	3TP	50000 m3/d
Needs Ass. and Strategic P.	1TP	26180 m3/d	1TP	23590 m3/d	2 TP	47090 m3/d	4 TP	97260 m3/d
NOPWASD National P.	2 TP	45000 m3/d	2TP	25000 m3/d	2 TP	40000 m3/d	6TP	110000 m3/d
Governorate Comments On N. P.	3TP	40000 m3/d	2TP	20000 m3/d	3TP	40000 m3/d	8 TP	100000 m3/d
National Project by Planning Ministry	1 TP	20000 m3/d	1 TP	10000 m3/d	1TP	20000 m3/d	3 TP	50000 m3/d
EGA five years plan	3TP	40000 m3/d	2TP	20000 m3/d	3TP	40000 m3/d	8TP	100000 m3/d

N.B.

-For the sewerage systems for the cities all plans will complete it and the needs assessment plan serve only rural areas also the rest plans serves some village vary between 7 villages per plant with National plan up to the whole Markazes villages with Governorate comments on National plan.

- The capacity of the under construction plants in Beba, El Fashen and Sumusta is included in the table except Needs Assessment plan.

3-2- General Remarks and Discussions.

3-2-1- Water Supply

All plans presented here have different bases for population and water consumption but also all of them are concentrating on the same strategy for

centralized water supply system with different degrees of centralization so that some are talking about three plants for the whole governorate and other specify one or two surface water plant for each markaz with served zone for each plant variable. Also some plans canceled the depending on ground water source and some concentrate on it with increasing the existing wells working hours and constructing new wells but in all plans the depend is mainly on the surface water. Any way there is no any plan to use ground water with treatment for its quality.

The NOPWASD National plan seems to be more practical with the design basis and it also dealed with the increase of the running hours for the existing wells which is acceptable. In the other hand, the governorate comments on it and the Five years plan of EGA look to be more acceptable for dealing with groundwater resource and also concentrating on loss reduction in network.

The cost required for water supply works as illustrated in table (2-b) shows big difference between NOPWASD plan and Governorate Plans due to the lating of surface water treatment plants to the second phase that will serve after year 2020 and also the small mainlines required in this plan than the other plans.

3-2-2 Waste Water Works

The plans presented here has very low level for the whole future picture of the sanitation and wastewater works except what illustrated by the Needs Assessment plan for rural areas and also but with low presentation on how and where the National plan of NOPWASD had covered the rural areas. The other plans did not go deep enough on how the system will work.

Also the Governorate Comments and The Five years plan had covered the rural areas but without any presentation or specifying for the sewerage system proposed or for the plants sites. Priority has been given to the most populated villages in the Five Years plan. Governorate Comments has given priority to four villages whose have the high ground water table.

3-3- Conclusion.

3-3-1 Water Supply

a- The variation in total required quantities between all plans is the result for the difference in the design bases only. In the other hand the coverage for eastern part of the river Nile is very weal and needs more details specially from the National plan and the five years plan.

b- The depend on ground water source should be increased with concentration on two items :-

* The possibility of doubling the existing production by increase the running hours of the existing wells up to 16 hours/day as minimum.

* The choosing of new sites should be according to the advice of the ground water study made by the project with also the correct and well construction method, depth and size.

c- The plan should cover both east and west sides of the river.

d- The plan should think about mixing between surface and ground water for increase the total capacity of the water resource of acceptable quality with low cost and in a short time.

e- The design basis should be reviewed and chosen according to the real needs and demands of the water consumption taking into consideration the human actual needs, the industrial future plans and the Egyptian actual average in both urban and rural areas.

f- The use of all available facilities is one of the strong points for any plan.

3-3-2 Waste Water Works

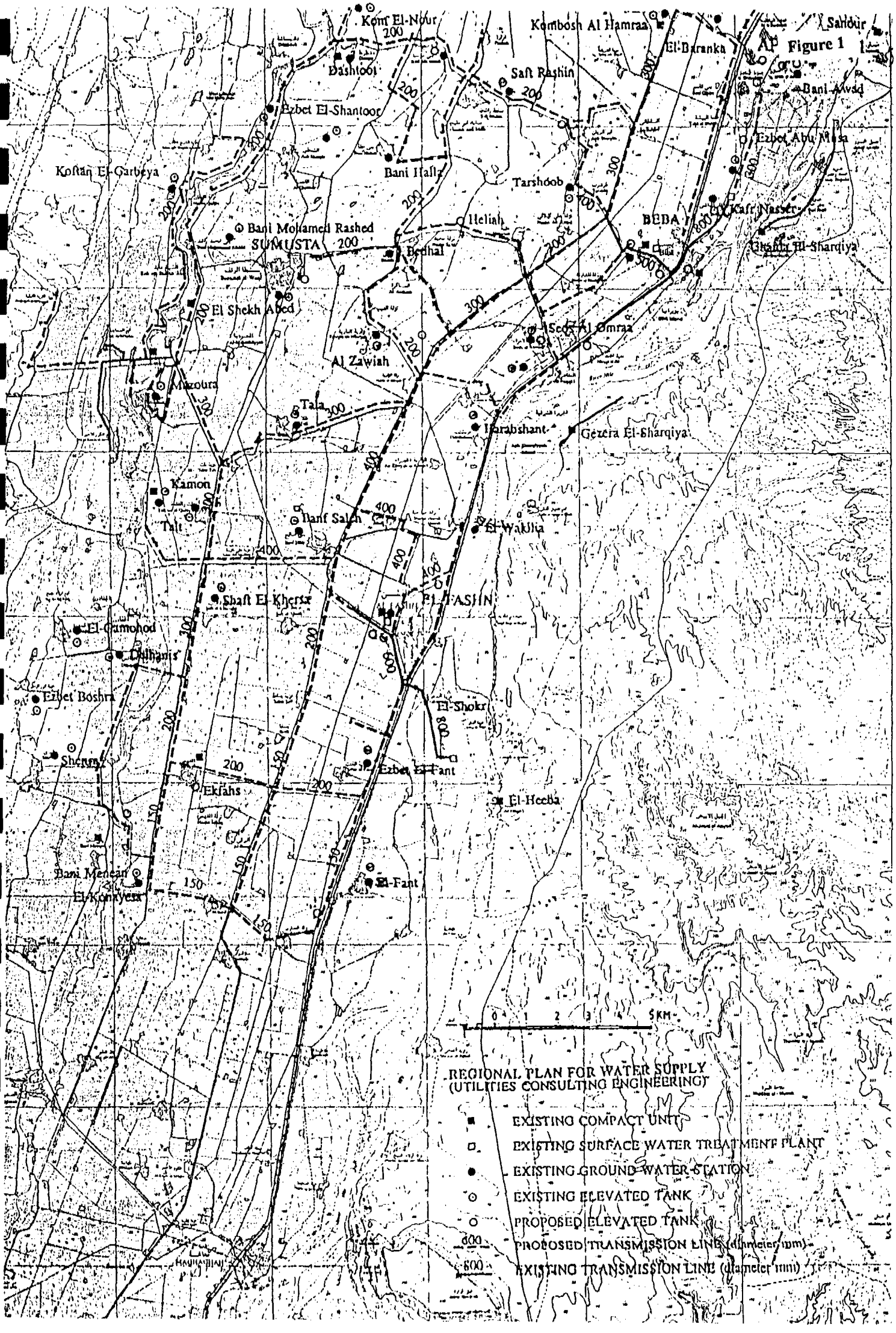
a- The need for thinking about the collection system in the rural areas is a must taking into considerations the untraditional collection systems for lowering the required costs and or the possibilities for depending on the on-site sanitation specially for small villages and desert villages as proposed by the Needs Assessment plan.

b- The plan should coordinate with the water supply plan for coverage zones to prevent future sanitation problems.

c- The most of the presented plans depends on centralized system which may decrease the total cost but need more operation training which is a must for future high needs.

d- In spite of big variations in water supply total requirements but all plans were very near in the values of wastewater capacities projects due to concentration on urban and its surrounding rural areas only.

e- The detailed comparison of the capacities and service areas for different plans is not possible because there is not enough information available.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Ezbet El-Shantoor
Ezbet Abu Musa
Koftan El-Garbeya
Bani Hafiz
Tarshoob
Kafr Nasser
Heliah
BEBA
Bani Mohamed Rashed
SUMUSTA
Bedhal
Ghanta El-Sharqiya
El Shekh Abed
Al Zawiah
Mazoura
Tala
Gezera El-Sharqiya
Kamon
Talt
Ibrahim Salah
El-Wakilia
Shaft El-Khersa
EL-FASIN
El-Gamohod
Dalhamis
Ezbet Boshra
El-Shokr
Sherbaz
Ezbet El-Fant
Ekfahs
El-Heeba
Bani Mehean
El-Konayesa
El-Fant
0 1 2 3 4 5 KM
REGIONAL PLAN FOR WATER SUPPLY
(UTILITIES CONSULTING ENGINEERING)
EXISTING COMPACT UNIT
EXISTING SURFACE WATER TREATMENT PLANT
EXISTING GROUND WATER STATION
EXISTING ELEVATED TANK
PROPOSED ELEVATED TANK
PROPOSED TRANSMISSION LINE (diameter mm)
EXISTING TRANSMISSION LINE (diameter mm)

AP Figure 1

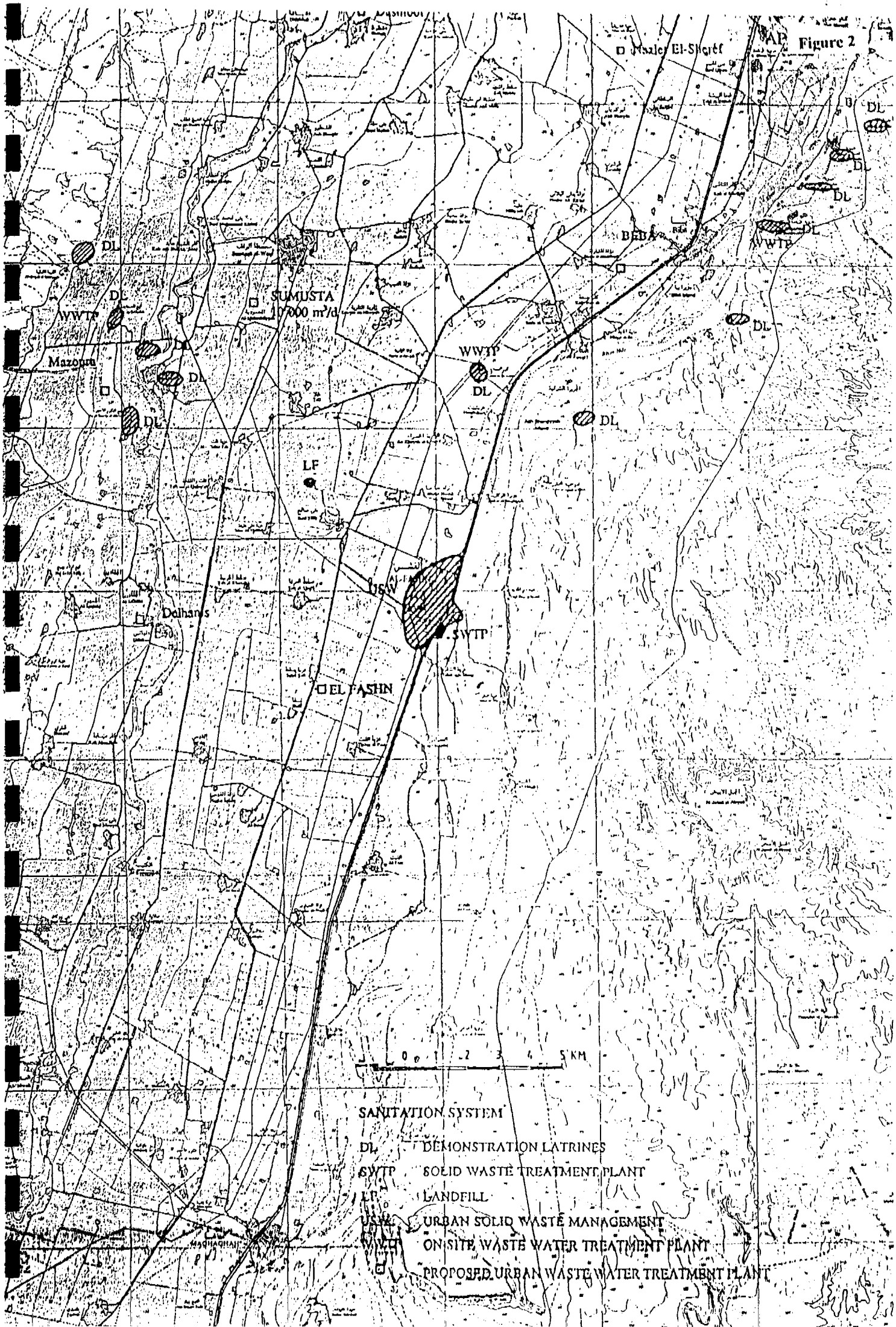
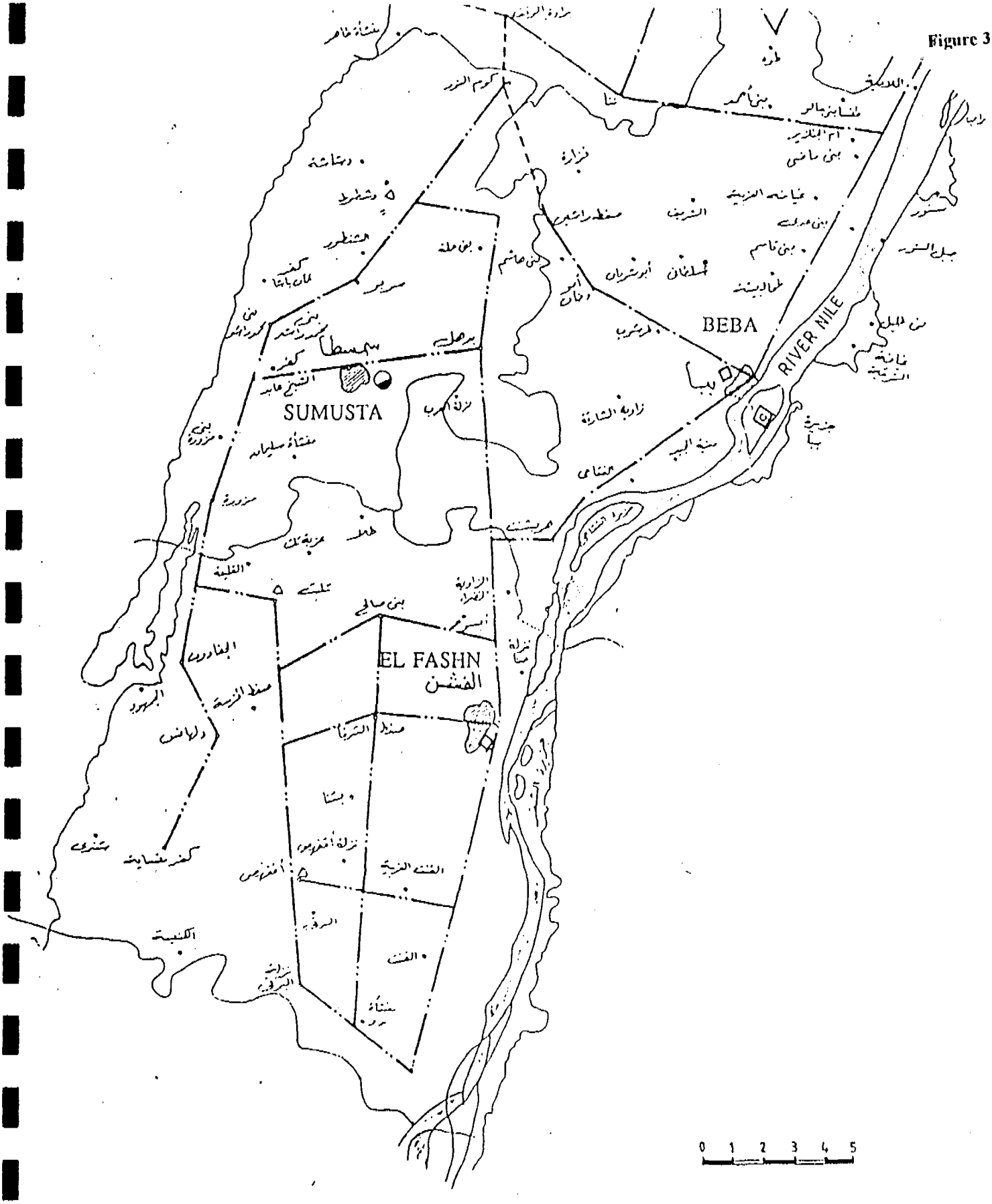


Figure 2
Mazoun
SUMUSTA
10'000 m³/d
WWTP
DL
LF
USW
SWTP
Dalhanis
EL FASHN
BEBA
0 1 2 3 4 5 KM
SANITATION SYSTEM
DL DEMONSTRATION LATRINES
SWTP SOLID WASTE TREATMENT PLANT
LF LANDFILL
USWM URBAN SOLID WASTE MANAGEMENT
WWTP ON SITE WASTE WATER TREATMENT PLANT
PROPOSED URBAN WASTE WATER TREATMENT PLANT

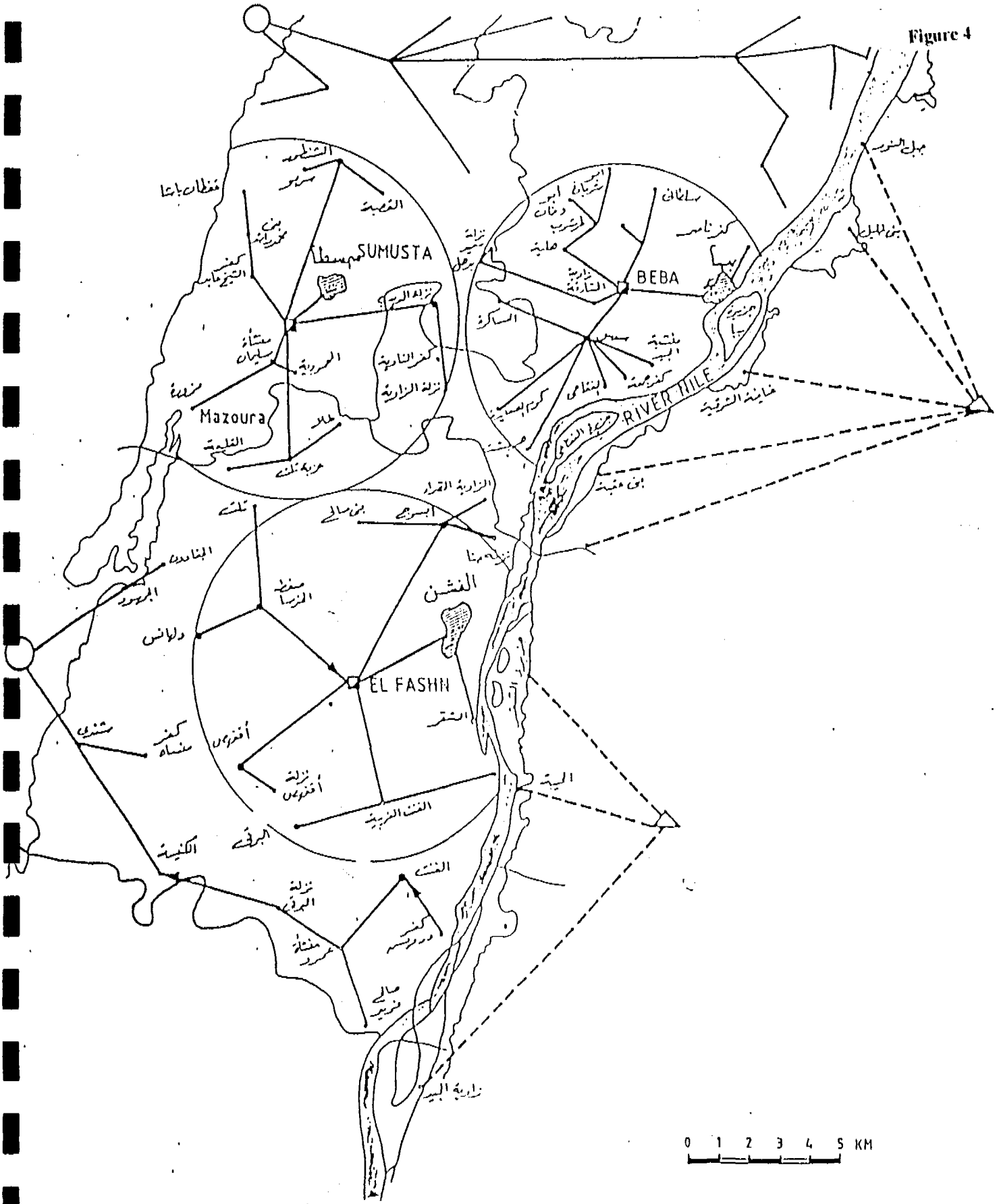
Figure 3



PROPOSED PLAN FOR WATER SUPPLY
(NEEDS ASSESSMENT AND STRATEGIC PLANNING)

- WATER TREATMENT PLANT UNDER CONSTRUCTION
- EXISTING COMPACT UNIT
- PROPOSED ALTERNATIVE WATER TREATMENT PLANT
- PROPOSED TRANSMISSION LINE FROM BEBA
- PROPOSED TRANSMISSION LINE FROM EL FASHN

Figure 4

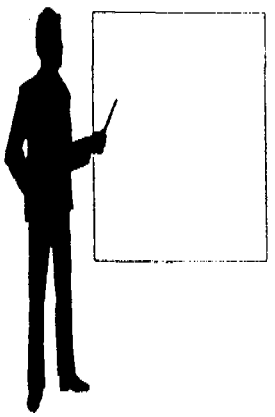


PROPOSED PLAN FOR SANITATION
(NEEDS ASSESSMENT AND STRATEGIC PLANNING)

- PROPOSED CITY WASTE WATER TREATMENT PLANT
- PROPOSED DESERT WASTE WATER TREATMENT PLANT
- PROPOSED TRUNK SEWER
- PROPOSED PUMPING STATION
- TRANSPORT WAY FOR EVACUATION TANK TRUCK
- BOUNDARY OF SERVICE AREA

Regional Water Supply And Sanitation Project in Beni Suef

Water Resources Management Meeting



Summary of Population and Water Consumption Forecasts

Presentation by Dr. Mohammed El-Houssieni
Sector Plan Expert

MAY 97

REGIONAL PROJECT FOR WATER SUPPLY & SANITATION IN BENI SUEF

SUMMARY OF POPULATION and WATER CONSUMPTION FORECASTS

CONTENTS

REGIONAL PROJECT FOR WATER SUPPLY & SANITATION IN BENI SUEF

SUMMARY OF POPULATION and WATER CONSUMPTION FORECASTS

1- Introduction

1-1- Population Prediction Methods

The population prediction is an essential element in all planning and utilities engineering projects. The prediction of population depends on the applications of probability methods. But in all cases it should be depends on the latest census and - if available - all the previous censuses.

The most often used methods for population prediction are:-

* Arithmetic method :-

Which depends on that the relation between population and time is linear relation using the equation of

$$P_n = P_0 + K_a (t_n - t_o) \quad \text{.....(1)}$$

Where Pn = future population at year n
Po = Present population at year o
tn = Year of future
to = Year of present
Ka = Constant = relation line slope between population and time.

* Geometric Method:-

Which depends on that the relation between population and time is exponential relation using the equation of

$$eP_n = eP_0 + K_g(t_n - t_o) \quad \text{.....(1)}$$

Where Pn = future population at year n
Po = Present population at year o
tn = Year of future
to = Year of present
Kg = Constant = relation line slope between logarithm of population and time.

* Annual Rate of increase:-

Which depends on that the population increased with time by annual fixed ratio using the equation

$$P_n = P_0 (1 + X/100)^{(n-to)} \quad \text{.....(1)}$$

Where Pn = future population at year n
Po = Present population at year o
tn = Year of future
to = Year of present
x = Constant = Annual population increase percentage ratio.

* Graphical Extension Method:-

Which depends on the extending the population - time curve on its slight direction with conditions of no reflection in the extended curve, no broken lines and no noticeable changes in the direction.

* Graphical Comparison Method:-

Which depends on the extending the population - time curve according to the guiding of the curve of another bigger area with similar conditions Using the same procedure of population increase with time.

In most planning and design projects in Egypt they could do one of the following procedures:-

* All methods may be used and there average be taken as future population.
* All methods may be used and took the medium value of result.
* All methods may be used and the average of the lower two is taken.
* All methods may be used and the average of the heighest two is taken.
* All methods may be used and the average of medium three is taken.
* Applying the graphical methods only and took their average result.
* Applying the mathematical methods only and use the average result.
* Applying the annual rate of increase with fixed value for the study period only.
* Applying the annual rate of increase only with decreasing its value every 10 years.

The use of any way depends only on the consultant and sometimes on the TOR of the study. In all cases, the results of population predication are estimated values and no one can not say that it are wrong.

1-2- Water Consumption Estimation

The water consumption estimation is an essential element in all designs and planning of utilities engineering projects. The estimation of water consumption value depends on several factors. These factors are:-

* The standard of living.
* Population habits.
* Consumption types (industrial, domestic, public, commercial)

* Continuity of water supply and good pressure.
* Presence of good wastewater collection system.
* Level of service in houses.
* Quality of water.
* The status of network.
* The cost of water and the method of fees collection.
* The average income rates for the consumers.

According to these factors and due to the Egyptian circumstances several studies had been made in several projects and concluded by two systems for modular design and planning using fixed numbers for water supply as shown in tables (1 and 2).

Table (1) The information about the water consumption for cities and villages due to standard of living and service.

GRADE NO.	COMMUNITY TYPE	POPULATION THOUSANDS CAPITA	WATER SERVICE %	WATER N L/C/D
A	BIG INDUSTRIAL CITY	>2 000	> 80	250-350
B	MID.INDUSTRIAL CITY	500 - 2000	70-80	250-300
C	MID.TOURISTIC CITY	300 - 1000	>75	250-300
D	CITY	300 - 1300	>70	250
E	BIG TOWN	100 - 800	>70	200-250
F	TOWN	100 - 500	>70	180-220
G	SMALL TOWN	< 250	>70	150-180
H	BIG VILLAGE	>50	>75	100-150
I	BIG VILLAGE	>50	<50	60-80
J	VILLAGE	10-50	>75	80-120
K	VILLAGE	10-50	<50	50-80
L	VILLAGE	10-50	-	20-40
M	SMALL VILLAGE	<10	>75	80-100
N	SMALL VILLAGE	<10	<50	40-80
O	SMALL VILLAGE	<10	-	20-30

This classification had been prepared according to WWISP I project funded by USAID at 1992, Also some modifications had been added according to the author personal experience during his working in LDII project.

Table (2) Another classification had also been made by some foreign studies during 1985-1990 in Egypt

Grade No.	Community Type	Level of water service	water on l/c/d
1	Cairo and Alex	complete Bathrooms and big industries with complete network	>300
2	big cities	complete bathrooms with some industrial activity with complete network	250-300
3	secondary cities	complete bathrooms with small industries with complete network	220-270
4	big towns	complete bathrooms with complete network	200-230
5	town	bathrooms and with 80% complete network	180-220
6	small town	bathrooms with 50% network	120-150
7	big village	bathrooms with more than 75% network	120-150
8	village	more than one tap in house with network for >50%	80-120
9	village	more than one tap in house with network for <50%	80-100
10	village	only one tape in house	60-80
11	village	with hand pump	40-60
12	village	with no direct connection (public Tapes)	20-30

It is also known that the constructing of new wastewater collection system increased the water consumption in the served community by ratio varied between **20 -30 %** than before.

Also several design schools increase the water consumption with population increase in the community with time using several probabilities

methods. The most used one is that **the water consumption rate of increase is 10% of the population rate of increase.**

1-3- Existing Situation

The existing situation for population and water consumption is presented here after in table (3).

Table (3) Existing Situation for Water Supply Sector

Markaz		Population (1986) in Capita	Population (1995) in Capita	Water Consumption L / Cap. / day	Remarks
Sumusta	Urban	22693	29617	114	
	Rural	96887	122314	95	
	Total	119580	151931	98.7	
Fashen	Urban	43347	55279	280	
	Rural	166564	209314	52	
	Total	209911	264593	99.6	
Beba	Urban	40668	49370	312	
	Rural	168642	216318	71	
	Total	209310	265688	115.8	
Total	Urban	106708	134266	255.1	
	Rural	432093	547946	69.1	
	Total	538801	682212	105.7	

N.B.

* Population in the previous table is according to the information center in the governorate.
* Water consumption is according to the records of the local units (partly estimated and partly metered).
* Special study was carried out in private houses in Sumusta Markaz in 1994, the water consumption had been found to vary between 40 -60 l/c/d.

2- Population Forecasts

2-1- Comparison Between the Plans.

The following table no. (4) illustrates the comparison between the population in each plan for the three Markazes of the project zone. The comparison for the present year of each study and the target year 2020 of planning phase (first phase for most plans).

Table (4) Comparison For Population

PLAN	Year	Population (Capita)							
		BEBA		SUMUSTA		EL FASHEN		Total	
		Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Regional M.P.	1992 / 2010	not available exact figures							
Needs Ass. and Stratigic P.	1992	203738	47717	113689	26627	196004	50861	513431	125205
	2020	429577	100612	239717	56142	413276	107239	1082570	263993
NOPWASD National P.	1995	204747	48231	114914	26913	198117	51408	517778	126552
	2020	328832	77461	184557	43224	318184	82564	831573	203249
Governorate Comments	1995	216318	49370	122314	29617	209314	55279	547946	134266
	2020	382201	80537	220199	28000	361158	99535	963558	208072
National P. by Plan. M.	1995 / 2017	not available exact figures in the markaz level							
EGA five years plan	1995	216318	49370	122314	29617	209314	55279	547946	134266
	2020	382201	80537	220199	28000	361158	99535	963558	208072

2-2- General Remarks and Discussions.

The Population in the Needs Assessment and Strategic plan study had been calculated according to fixed annual rate of increase equal to 2.7% constant for the study period till year 2020 as it was the 1986 census result value. This achieved the highest values for future population for both urban and rural areas at year 2020. The difference between the National Plan of NOPWASD and the Governorate plans (comments or five years plans) for the 1995 population is about 6 % and became 15% at year 2020.

In all cases the population prediction is not essentially taken by any method but the results of 1996 census could be a guide for the annual rate of increase of population between 1986 and 1996 censuses and could be used for predicting the 2020 population.

2-3- Conclusion.

2-3- Conclusion.

The Governorate estimating numbers based on the records of the information center for population could be the suitable for the water supply and sanitation sector planning specially if they meet the results of the 1996 census.

3- Water Consumption Forecasts

3-1- Comparison Between the Plans.

The following table no. (5) illustrates the comparison between the Water Consumption in each plan for the three Markazes of the project zone at the target year 2020 of planning phase.

Table (5) Comparison For Water Consumption at

PLAN		BEBA		SUMUSTA		EL FASHEN		Total	
		Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Regional	L/c/d	80	150	80	150	80	150	80	150
M.P.	M3/d	Exact figures are not available for markaz level							
Needs Ass.	L/c/d	125	180	125	180	125	180	125	180
andStratigic P.	M3/d	75600		29980		49250		154830	
NOPWASD	L/c/d	100-125	215	100-125	215	100-125	215	100-125	215
National P.	M3/d	49896		29601		54193		133690	
Governorate	L/c/d	200	250	200	250	200	250	200	250
Comments	M3/d	76440	20134	44040	14500	72232	24884	192712	59518
National P.	L/c/d	200	240	200	240	200	240	200	240
by Plan. M.	M3/d	77000		43800		76800		197600	
EGA five	L/c/d	200	250	200	250	200	250	200	250
years plan	M3/d	76440	20134	44040	14500	72232	24884	192712	59518

3-2- General Remarks and Discussions.

The previous table illustrated that both Governorate plans (Comments on N.P. and Five years plan) and also the Ministry of Planning National Project are sharing in high values for water consumption. The chosen values for both rural and urban areas have not been chosen according to any remarkable reason as big industry or population habits. Comparing with the tables (1 & 2) which are normally used in Egypt, the values used with the Needs Assessment and also with NOPWASD National plan seem to be more

practical and logical with the conditions of the Governorate case for both cities and villages where there is no big industry consumes with big amount of water and there is no very high standard of living for most rural and urban areas specially in the project area.

3-3- Conclusion.

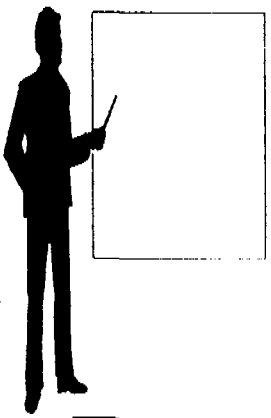
The values chosen by NOPWASD National Plan for water consumption in both urban and rural areas are proposed to be the best values for design and planning purposes due to the governorate conditions and circumstances.

The values are:-

* 125 liters / capita / day for rural areas.
* 215 liters /capita /day for urban areas.

Regional Water Supply And Sanitation Project in Beni Suef

Water Resources Management Meeting



W a te r Resources

Presentation by: Ashraf Farouk
Ground Water Investigation Expert

MAY 97

CONTENTS

1. BACKGROUND

The surface water system of the project area consists of the regime of the River Nile and its secondary irrigation canals (Ibrahimiya and Bahr Youssef). The ground water resources are located in a relatively thick water bearing sedimentary section (aquifer) covering the whole project area. There is an interrelationship between surface water and ground water. The water bearing layer (aquifer) is recharged by leakage from the irrigation canals and by deep percolation of the excess irrigation water. However, during the winter draught season, these canals receive ground water from the aquifer. This is obvious from the recorded local fluctuation of both surface water and ground water (**fig.1**). Thus surface water and ground water are not separate i.e. what is surface water at certain point may become ground water at another and may emerge again as surface water at third point (**fig.2**). The geological formation filtrate and eliminate most of the polluting components of the surface water.

So, the importance of ground water as a resource for domestic use is evident as it is less subjected to pollution and has more or less constant quality and temperature. The development of ground water resources need special attention as they have great advantages due to the flexibility and low costs of production and their high reliability.

Surface water and ground water resources inventory studies have been prepared and implemented by RWS&SP staff along the study area (Sumusta, Beba, and El Fashen).

2. DESCRIPTION OF THE STUDY AREA

2.1 LOCATION OF THE STUDY AREA

The study area is located between Beba and El Fashen markaz approximately between longitudes 30° 30' and 31° E and latitudes 28° 46' and 28° 56' . It is lies approximately on the level 38.4 m above the main see level. It is covers an area of about 800 Km^2 . the area are bounded by river Nile from the east and the new reclaimed land from the west, Beba markaz from the north and El Fashen markaz from the south, (**fig. 3**).

2.2. MORPHOLOGY

The water bearing geological formations and their structural features along the project area define the quantitative (aquifer potential), qualitative (suitability of the ground water for different purposes) and hydraulic (ground water movement) properties of the aquifer.

The Nile Valley which is a low area in the Eocene limestone plateau. This valley is filled with Pleistocene sandy gravel and Holocene silt deposits which cover the area between Nile and the eastern reclaimed area as shown in (**fig .4**).

The average slope of the flood plains from south to north is about 0.1 m/km . The Nile runs along the eastern portion of its valley, so that the cultivable lands on the west of the river are generally much wider than those on the east. The cliffs on the east side of the valley are higher than those on the west side. Many islands have been developing in the river during braiding processes.

The morphological features and the geological structures (faults, joints and unconformaty) along the study area are represented in geological cross section (**fig 5**) :

i. The young alluvial plains of the Nile which cover the central part of the study area and consists of Holocene silty clay (50 - 10,000 years old).
ii. Sand dune accumulations exist in the western side of the Nile valley disconnecting the cultivated lands from desert with 5 m average level from ground surface and consists of Recent well sorted sand (0-500 years old).
iii. The old river deposits which consists of Pleistocene sand gravel with thin lenses of clay which outcrops along the western boundary of the project area (3 M years old).
iv. The middle Eocene limestone plateau and their sloping boundaries which croup out along the western part of the study area (20 M years old).

3. SURFACE WATER RESOURCES STUDY

3.1. SURFACE WATER SYSTEM

The surface water system of the study area consists of the Nile, the irrigation canals and the agriculture drains.

The width of River Nile ranges from 500 m to 1000 m. The River cuts completely through the surfacial semipervious layer of fine clayey sands.

El Ibrahimiya canal starts from the River Nile at the upstream portion of the Assiut barrage and ends downstream at El . Aiaat town. The length of the canal is 268 km.

Bahr Youssef gets its water from El Ibrahimiya canal at the upstream portion of the Dairut barrage. Bahr Youssef functioned as a branch of the Nile until the year 1869 when El Ibrahimiyia canal

was dug. Since that time it has derived its water from El.Ibrahimiyia canal. The canal has secondary branches in the study area .

The main drains in the study area are; El.Mohait El.Gharbi drain, Mazoura El- Bahary and Mazoura El Qabely intercepted drains. The main water streams along the study area are presented in (**fig.6**).

3.2. SURFACE WATER QUALITY

The evaluation of surface water quality took place along the project area through the following steps:

i. Collection of the available surface water quality results and data from different sources. (NRI- Cairo, DRI-Cairo, Sanitary lab.-Beni Suef etc...)
ii. Implementation of random sampling program along the study area.
iii. Implementation of the preliminary monitoring program in certain points along the study area according to certain criteria .
iv. Representation and analysis of the collected data from these sampling programs .

Each of the three streams in the project area have different water quality. The water quality information of these streams is summarized in (**table 1**).

Table 1. Water quality summary of the main streams

Prop. /Stream	River Nile	Ibrahemiya Canal	Bahr Youssef
T.D.S. (ppm)	170 - 200	170 - 270	210 - 300
T. Hardness (ppm)	100 -135	100 - 140	140 - 160
Contaminates	- Algae. -Coliform bacteria. -Oil nest.	- Algae. - Coliform bacteria. - Nile Rose. - NH_3^-, NO_2^-.	- Algae. - Coliform. - Nile rose . - NH_3^-, NO_2^- - Fe++, Mn++
Suitability for domestic use	- It needs simple treatment	- It needs more treatment for domestic use.	- Need many steps of treatment for domestic use.

3.3. CONCLUSIONS

- The chemical water quality of the Nile follow WHO recommendation and Egyptian Standards but the physical, bacteriological and biological quality do not meet the local or international standards.

- The main contaminates in El Ibrahemiya canal are caused by the accumulation of water plants (Nile Rose) and animals remains, industrial outfalls, sewage outfalls, oil nests and algae. These contaminates decrease the water quality and increase the cost of treatment .

- Beside the pervious contaminates the minor metals (Fe++ & Mn++) of a relatively high content are detected during the monitoring program in some locations along Bahr Youssef, for instance beside El Sheik Abed C.U. intake (Fe++ is 0.75 ppm and Mn++ is 0.25). That is due to the high content of these elements as ore minerals in the soil of this area and also due to the sewage outlets which are distributed along the sides of Bahr Youssef

4. GROUND WATER RESOURCES

The surface water is generally easy to harness, but its availability varies with the season. Especially the draught and flood seasons are problematic. Surface water is easily subjected to contamination. Ground water on the other hand is obtainable and has steady quality along the year. The use of groundwater contribute to keeping the subsoil water level within reasonable limits. This leads to decrease of the soil water evaporation, decrease of the ground water salinity and improved water quality.

4.1. WATER BEARING SEDIMENTS (AQUIFERS)

In the study area, two types of aquifers with the same age are recorded. The semi confined aquifer type which occupy the flood plain of the Nile Valley is covered by semi permeable layer of mud and underlain by a virtually impermeable Pliocene clay. The stratigraphic column of the study area is shown in (**fig. 7**) .

The other aquifer is located outside the flood plain, where the Nile mud is absent (Including the reclaimed area), the aquiis generally unconfined. A strip of fine grain sediments (sand dune) separates the two aquifers (El.Kufug formation).

The water bearing beds have wide geographical distribution along the study area. They are composed mainly of sandstones, sands, gravels and clay, which are related to the Pliocene, Pleistocene and Holocene ages. There is hydraulic connection between this aquifer and the surface water of the River Nile, irrigation canals and the occasional water runoff of the desert wades.

Towards the valley slopes (west direction) the aquifer becomes gradually thinner and bounded by faults.(RIGW, 1993). The

maximum thickness of the aquifer (240 m) attains in the central part of the valley (latitude 28° 30') and decreases towards the north reaching 100 (latitude 29°00') (**Arabian Western Geophysics & La Champagne General De Geophysics. 1992**). But the maximum thickness along the study area at the central part is 180 m. (RIGW, 1989), (**fig. 8**) show the thickness contour map of the study area.

The quantity and quality of the water in this aquifer are largely affected by the infiltration and evaporation rates, which in turn depend on the variations of thickness and facies of aeration zone (recharge area) in the western high land.

Geophysical surveys as well as the boreholes data indicate a rather shape of the aquifer in the reclaimed desert areas. In average, the thickness of the aquifer in these areas ranges from locally 20 m in the northern part and central part, to more than 50 m in the southern part. However, locally rather large deviations from these average values may occur. **(RIGW.1989).** Generally, the geometry of the aquifer is characterized by steep inclination near the valley slopes and with infinite extension in north-south direction, while it is limited from the east and west by the edge of the plateau Eocene limestone. The geologic relationship between aquifer units is represented in (**fig. 5**)

4.2. UTILIZATION OF GROUND WATER

The ground water along the study area is generally of suitable quality for domestic and irrigation purposes (except in the western sector, the central sector requires further studies and special arrangements) (RIGW. 1990).

In Beni Suef area the ground water abstraction was estimated, based on the inventory of 1984 for all purposes with $68x10^3$ m^3/day, while the total abstracted ground water from the aquifer during 1990 is $196x10^3$ m^3/day for irrigation, industrial and domestic purposes .

In Beni Suef governorate about 600, 000 citizen depend on ground water for their domestic uses, the ground water extraction for this use is about $41x10^3$ m^3/day.

The groundwater balance along the study area has been studied and calculated (Hydrogeological and hydrtogeochmical investigation along Beni Suef, Master thesis by A . F. Ewiss, 1992- Cairo University). From the calculation of that study it can be concluded that only insignificant percentage of the available groundwater potential is used along the study area. Evident benefits as cost savings and environmental improvement will be gained by increasing the abstraction and use of ground water in large quantities for different purposes where the ground water quality is acceptable.

4.3. GROUND WATER QUALITY

Based on results of ground water sampling program, data representation and analysis, the study area was divided to four sectors which have different ground water quality. The ground water suitability for domestic use along the study area are represented in (fig. 9). The ground water quality in the four sectors is summarized in table 2.

Table 2. Summary of ground water quality in different sectors.

Prop. / Sector	Sector 1	Sector 2	Sector 3	Sector 4
Location	- Between the Nile and w. El Ibrahemiya Canal.	- Between w. bank of Ibrah-emiya canal and Bahr Youssef.	- Adjacent to the north part of the western bank of Bahr Youssef.	- Occupy the western part of the study area.
T.D.S. (ppm)	300 - 600	800 - 1600	480 - 500	1600 - 5000
T. Hardness (ppm)	75-350	400-600	120 -220	400 - 1800
Fe++ (ppm)	0.0-0.1	0.5 - 2	0.0 - 0.4	0.5 - 2.6
Mn++ (ppm)	0.2-0.4	0.3 - 1.3	0.16 - 0.3	0.1 - 0.4
Suitability for d-omestic use	-Suitable	-Needs mixing with surface water	- Suitable	- Not suitable

The T.D.S, T. Hardness, Fe++ and Mn++ distribution along the study area are presented in contour maps (**fig. 10, 11, 12, 13**).

4.4. CONCLUSIONS

- The physical and the chemical quality of the ground water of sector 1 follow the Egyptian standards, the water type is fresh water and it is suitable for domestic use.

- Ground water of sector 2 characterize by relatively high Mn++ and Fe ++ especially in Sumusta city and surroundings. The reasons for the high concentration are :

  * dense agricultural drain system (El Mohiet) in the central sector (Sector 2).
  * ionic exchange between clay lenses and ground water.
  * presence of iron and manganese ores in the soil as thin interbeds.
  * presence of deep sanitary drain wells, (**fig 14**) .

The water type of this sector is passably brackish, need simple technique for iron & manganese removal and surface water mixing to

reduce the T.D.S. and T. Hardness values to be suitable for domestic use.

- Ground water of sector 3 (El Gendi, Nossier, Koftan) is of good quality and it is suitable for domestic purposes.

- Ground water in sector 4 is brackish to slightly salty and it is not suitable for domestic uses.

- T.D.S. and total hardness and degree of contamination increase to the western direction. The increase in Cl- , SO-- content in the central sector indicate dense drain effect and the increase of Na+ indicate the effect of clay lenses which intercalate with sand and gravel of the aquifer.

5. MONITORING PROGRAM

The water quality study program was planned and implemented in Beni Suef to determine the quality of the water resources and their degree of pollution along the project area .

Group of ground and surface water samples were collected in August 1996 from experimental and production wells drilled in the study area, mainly in Sumusta district. The ground water samples were collected from different depths between 36 m to 71 m and the surface water samples were collected from Nile, Ibrahemiya canal, branch canals, Bahr Youssef and some drains.

5.1. SAMPLING LOCATIONS

The preliminary monitoring program include 15 locations for ground water sampling and 20 locations for surface water sampling, (**fig. 15, 16**) show the sampling locations.

For the Selection of these locations the following factors were taken into consideration :

i. Type, design and depth of the well.
ii. The presence of cess pools near the sampling locations.
iii. The density of population
iv. The relative locations of industrial areas..
v. The distance between sampling points not exceed 20 km.

5.2. PROGRAM OBJECTIVES

The main objectives of monitoring program are:

i. Monitoring of the quality of water resources and follow up of changes and the important indications of these changes.

ii. Identify and follow up of the pollution sources, quantitative and qualitative detection of pollutants .

iii. Analytical follow up of the different water bearing levels of the Quaternary aquifer to choose the best depths for abstraction water of good quality and to prevent contamination from the other unfavorable levels.

iv. Analytical follow up of the water quality in the River Nile and irrigation canals in the governorate in the areas that are subjected to pollution.

v. Determine seasonal variations of the water quality in the Nile and the main canals.

5.3. SAMPLING FREQUENCY

The collection of samples is planned to take place three times per year as follows:

i. In January : during low level (draught season) of water in the River Nile.

ii. In May : this period represent the medium stage between high and low water level in the Nile.

iii. In August : during the high water level in the Nile or flood time.

6. PROTECTION OF THE WATER RESOURCES

6.1. GROUND WATER CONTAMINATION

The sources for contamination of the Quaternary aquifer are:

i. Flood irrigation in the new reclaimed area feeds a lot of salty water towards the Nile from the reclaimed area , sprinkler or drip irrigation would solve this problem.

ii. Implementation of many deep drain wells along the study area. These wells consists of a deep well, closed septic tank and filtration chamber field with gravel. The sanitary remains are collected into the subsurface tank while, the liquid passes to the well directly with out any oxidation process as shown in (fig. 14)

iii. Using a great amount of fertilizers .

vi. Very bad waste water systems in villages (vault). The constructed vaults are not isolated with coating material like bitumen or epoxy.

6.2. GROUND WATER PROTECTION

The Quaternary aquifer is polluted in particular zones and not throughout the formation. Thus the technique of drilling, design and development of the wells along this aquifer play an important role in the protection of the wells from contamination.

The protection against contamination starts from the right location, suitable design and technique of drilling.

The area of study is divided into four sectors which have different water quality and aquifer thickness. Each of them need a specified well design different from the other sector. The difference of good and poor well design is presented in (fig. **17a** and **17b**)

6.3. SURFACE WATER CONTAMINATION

Beni Suef governorate faces a rapidly increasing deterioration of its surface water resources. The sources of contamination to these resources are increasing due to the following :

i. Untreated or poorly treated urban and industrial effluent is increasing.
ii. Soil salinization and water logging .
iii. Increasing suffer from eutrophication, increase of weeds.
iv. Accumulation of pesticides.
v. Accumulation of the animal and plant remains behind the barrels barriers which offer a very suitable environment to bacteria and algae increase.
vi. Accumulation of the oil nests which result from industrial drainage.

6.4. PROTECTION OF THE SURFACE WATER RESOURCES

To protect the surface water resources from contamination the following should take place:

i. Application of the law 48 regarding water pollution.
ii. Removing of the barrels barriers which usually locate behind water station intakes to other places to prevent the area of the intake from plant and animals remains.
iii. Treat the industrial and the waste effluent.
iv. Treat the waste remains from houses.
v. Continuos removing of the Nile rose plant from the water ways.
v. Stop flood irrigation method and use sprinkler or drip irrigation methods specially in the new reclaimed area.
vi. Continuos monitoring of the surface water quality to detect any change by pollution at least at water station intakes.

7. CONCLUSIONS AND RECOMMENDATIONS

- The groundwater potential of the area offer possibilities for further utilization of ground water. There is enough groundwater in the area for pumping in large quantities. The water quality sets limitations to the use of ground water for domestic purposes. The water quality sectors 1 and 3 defined in (**fig. 9**) have very good groundwater quality. Groundwater in sector 2 can be utilize to a limited extend and the groundwater in sector 4 can not be used.

- The aquifer in the study area specially in sector 2 and in whole governorate needs more test drillings and water quality monitoring to determine the locations and depths of good groundwater quality, suitable for domestic use. The use of suitable drilling techniques and proper borehole designs are needed to abstract the water from the horizons that have better quality.

- It is recommendable to increase abstraction of the groundwater form the aquifer to improve the ground water quality and to keep the subsoil water at deeper level. Careful and detailed hydrogeological & quality studies should be done during planned pumping from the 63 wells in area west Bahr Youssef (FAO project). The irrigation drainage system in the new reclaimed area should be improved to reduce the soil salinization.

- The test of mixing of ground water with surface water to improve its quality and to make it suitable for domestic uses show promising results. This alternative needs to be further studied.

- The measures should be done for protection of ground and surface water resources as proposed in chapters 6.2 and 6.4 . Continuous removing of Nile rose and animal remains from water ways is needed. It is highly recommendable to change the technique of irrigation from flood irrigation to sprinkler or drip irrigation well decrease soil salinity and the aquifer contamination.

- Further education of the population regarding the waste and wastewater handling

- It is vital to monitor continuously both the surface ground water quality and levels in the study area and in the governorate according to regular monitoring program. This will enable to detect in advance any undesirable conditions.

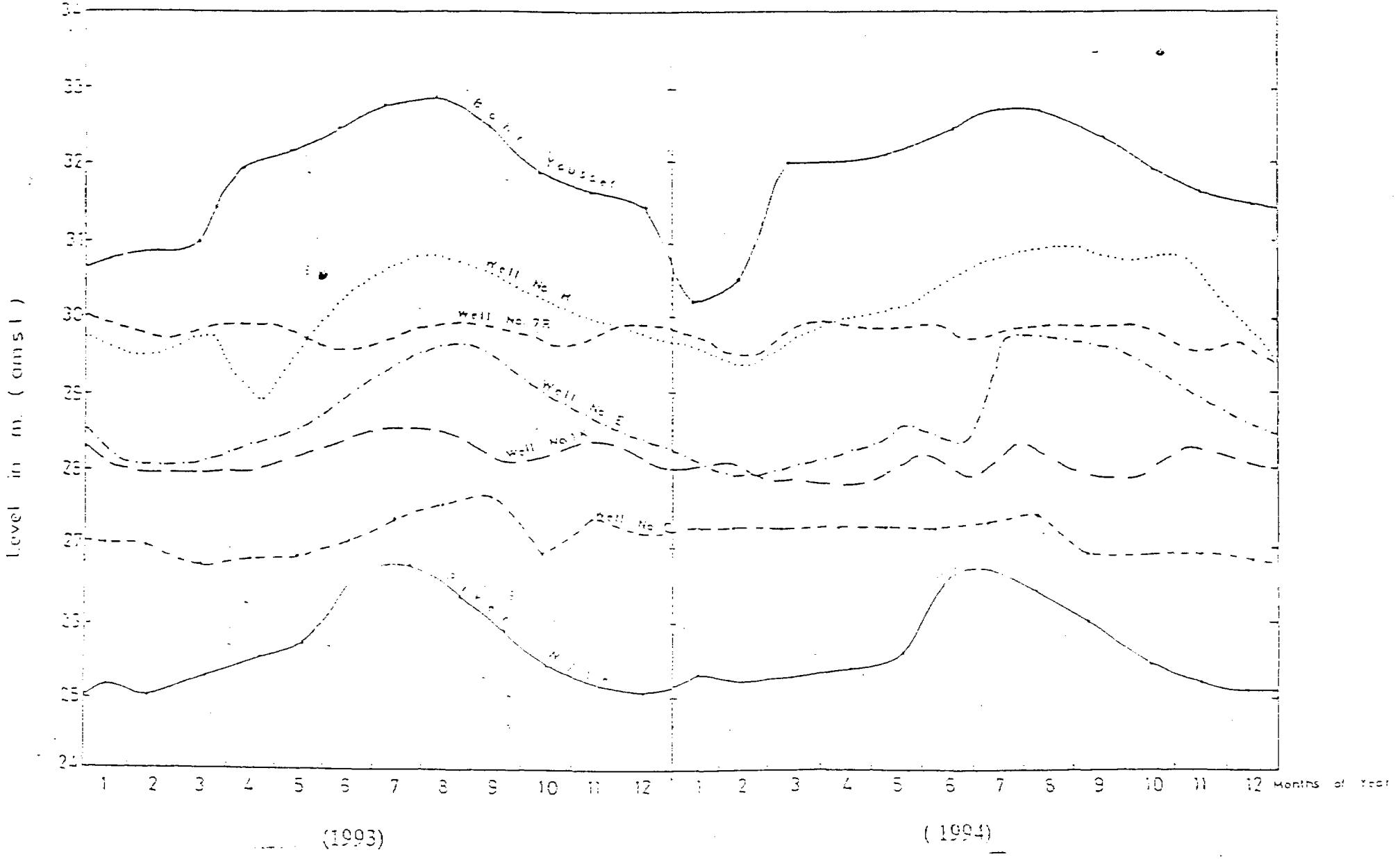


Fig (1) Fluctuation In the Groundwater And Surface Water In The Study Area

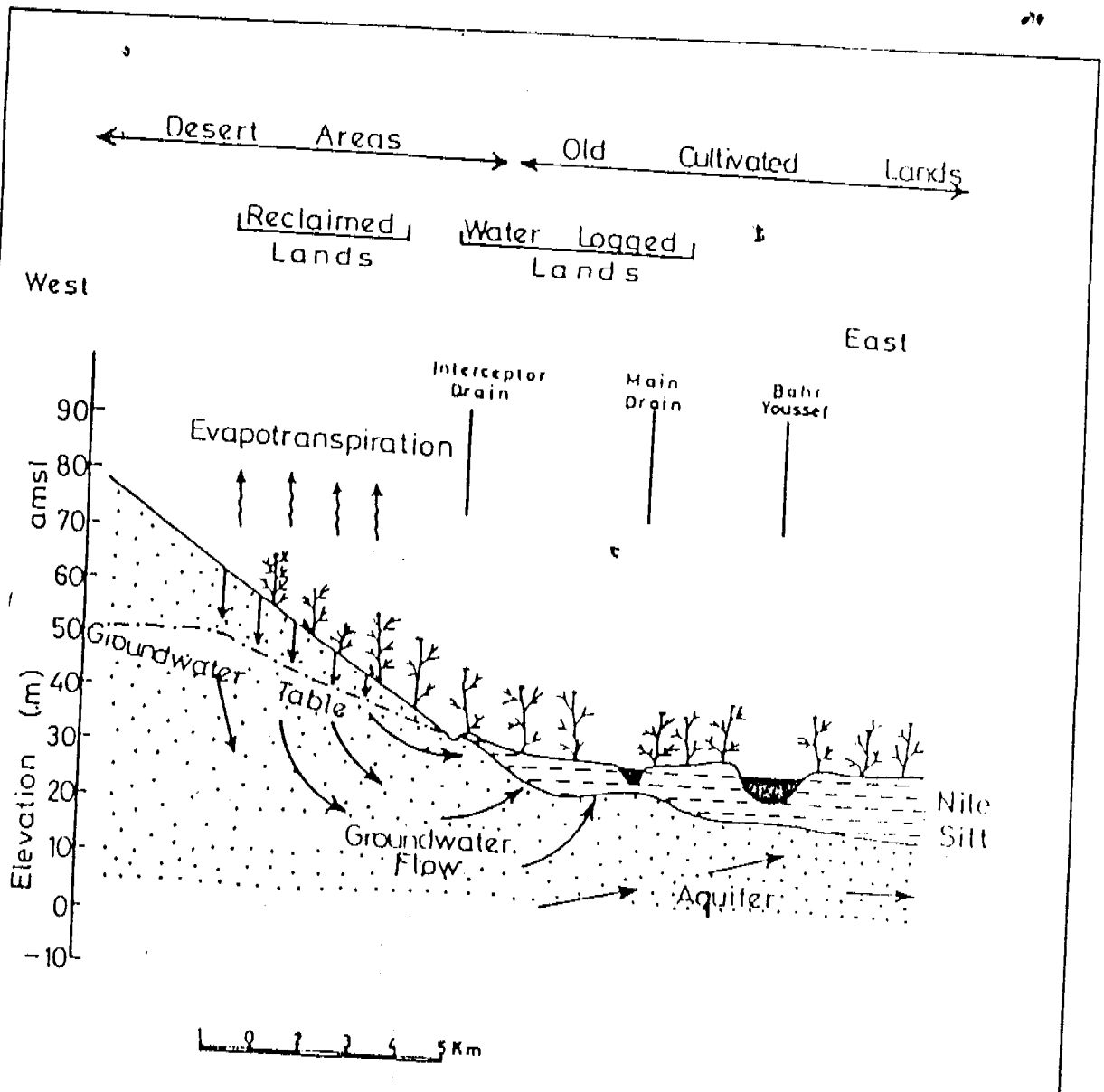
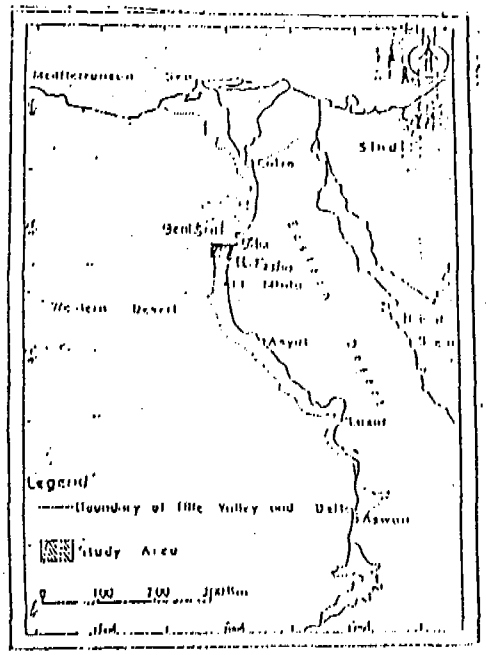


Fig (2) The Relation Between Surface And Ground Water along The study area

(After RIGW, 1989)



Fig(1)Location Map

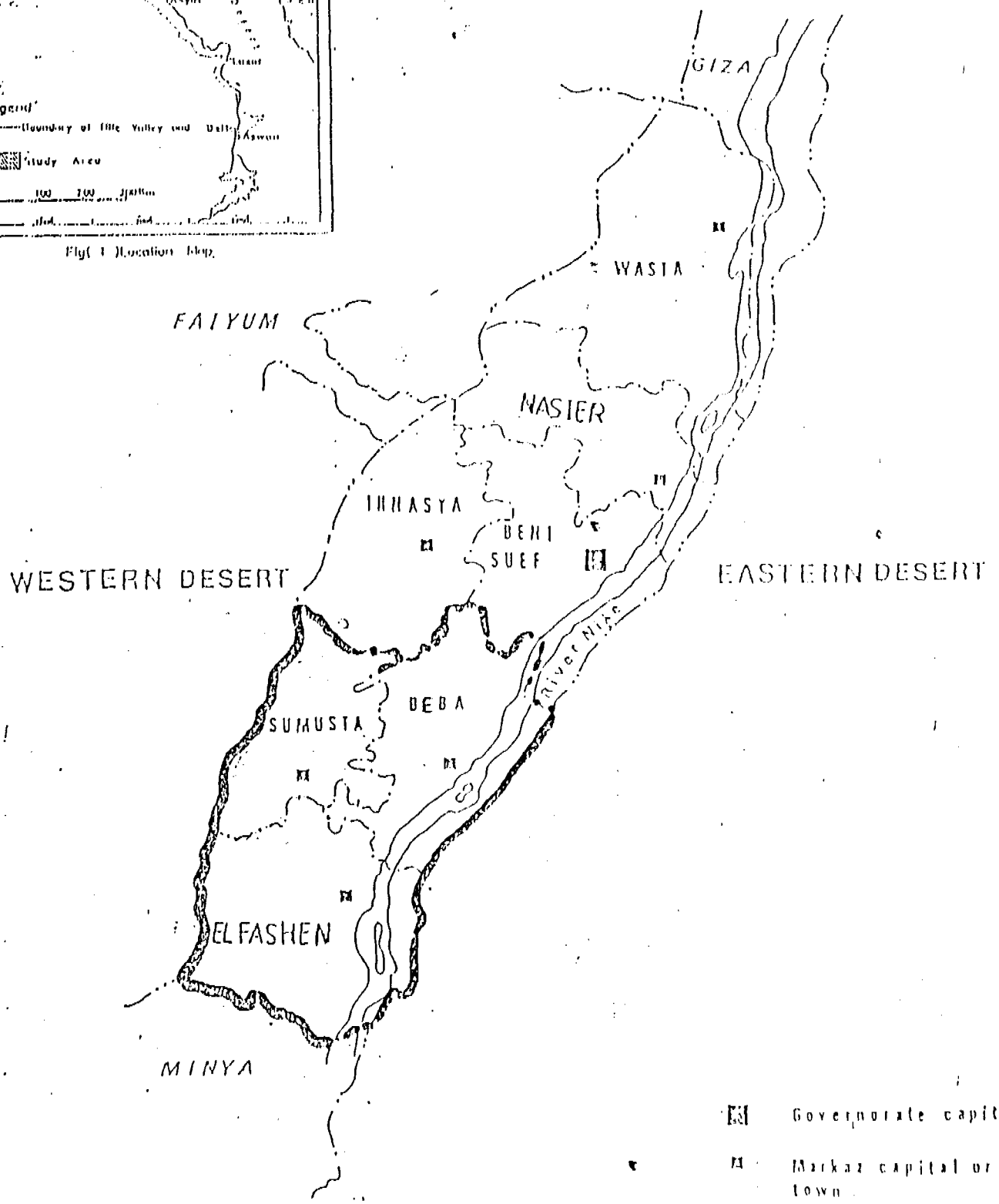


Fig (3) The Boundary Of The Study Area

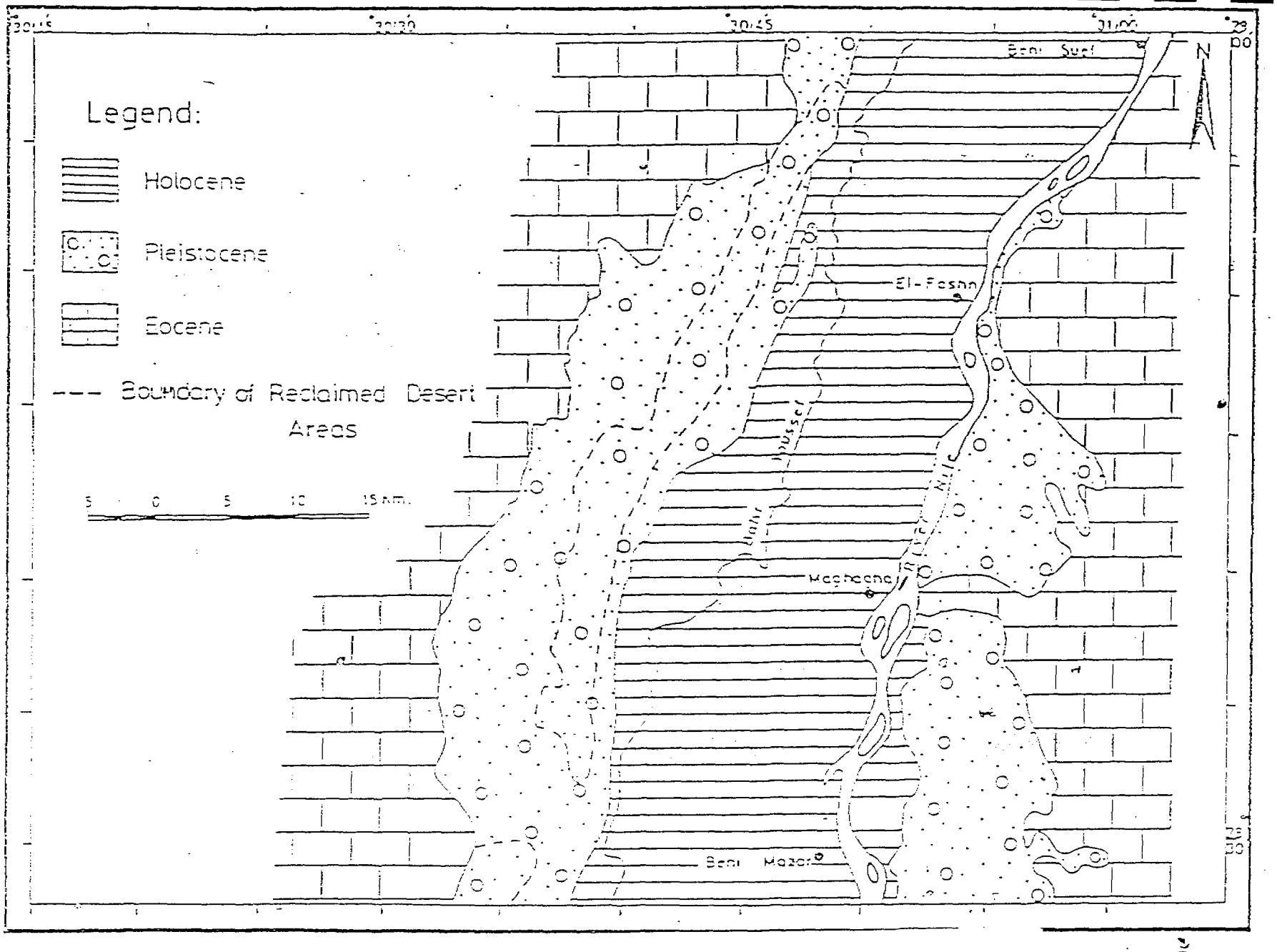


Fig (4) Geomorphlogical Map Of The Study Area

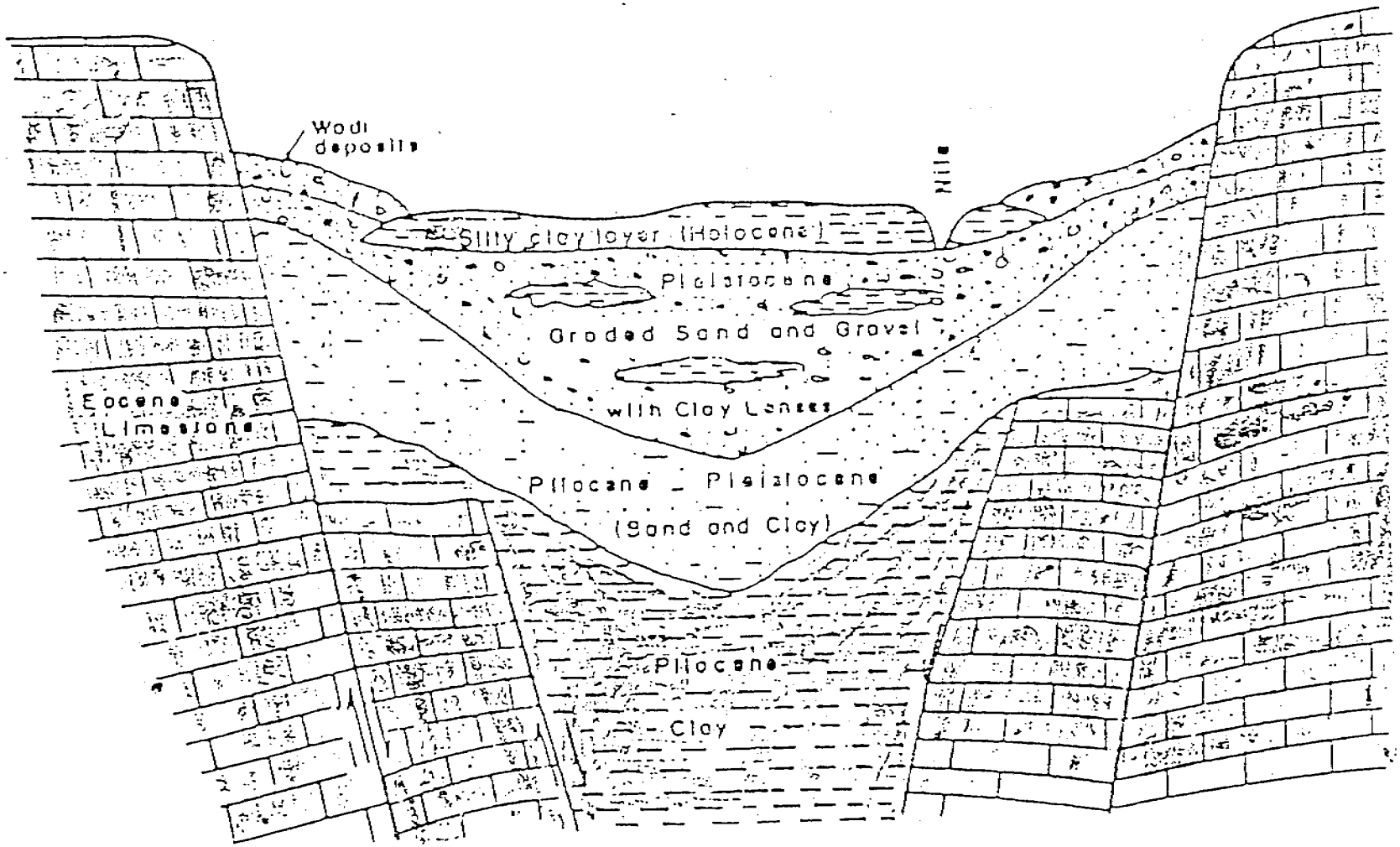


Fig (5) Representative Geological Cross Section Of The Study Area.

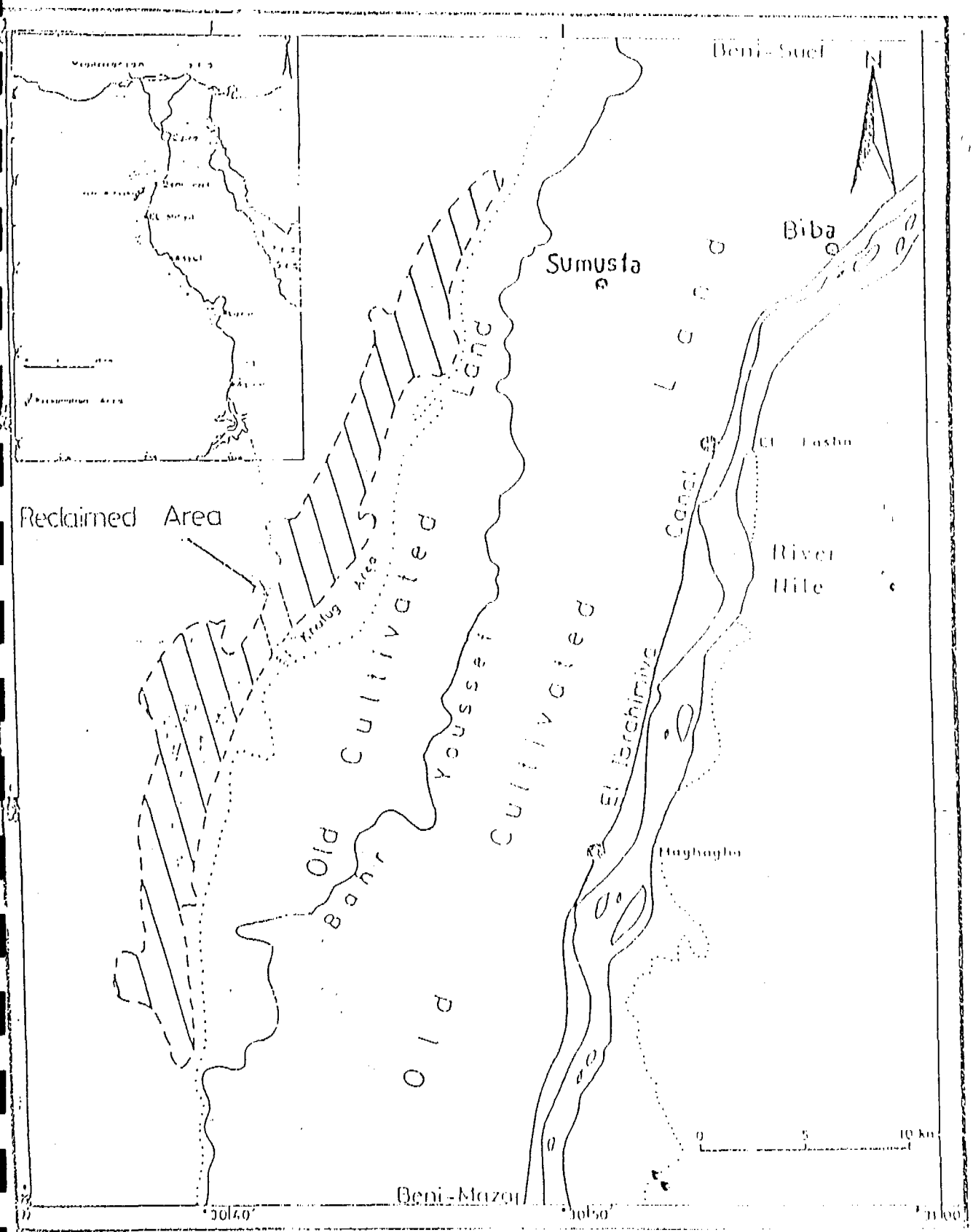


Fig (6) Main Water Streams Along The Study

(Modified after RIGW , 1989)

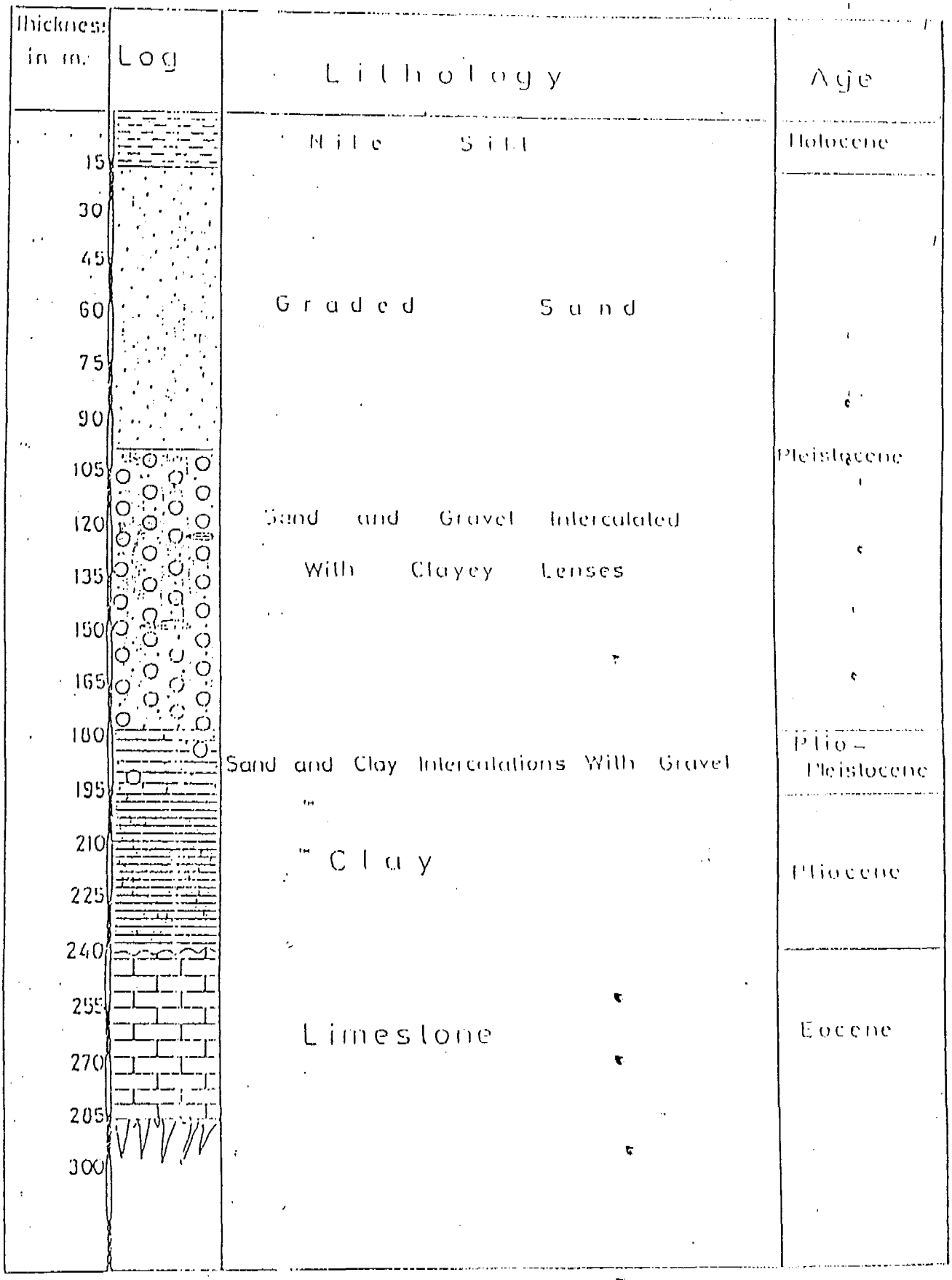


Fig (7) Generalize Stratigraphic Column Of The Study Area.

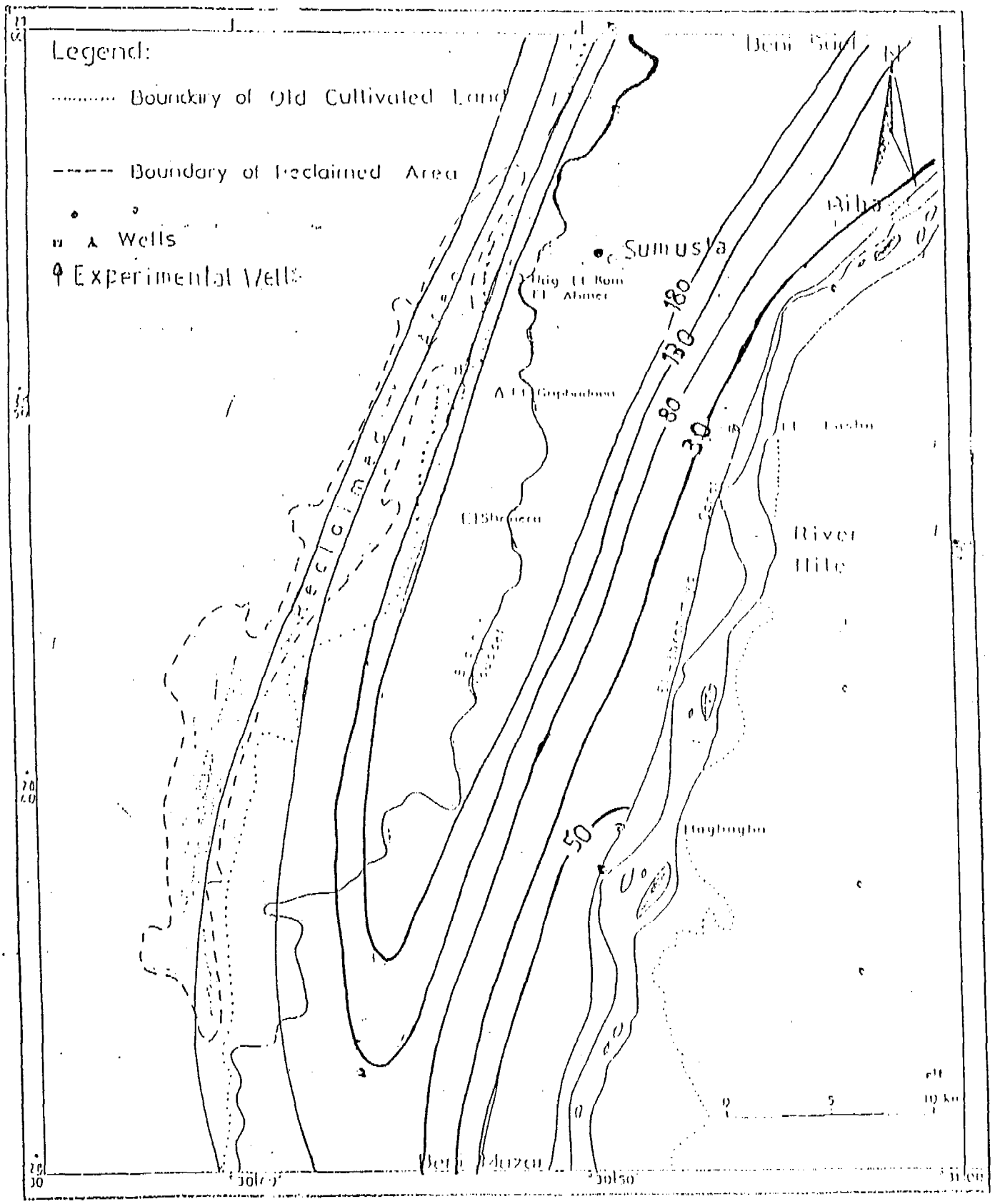


Fig (8) Thickness Contour Map Of The Water bearing Formation.

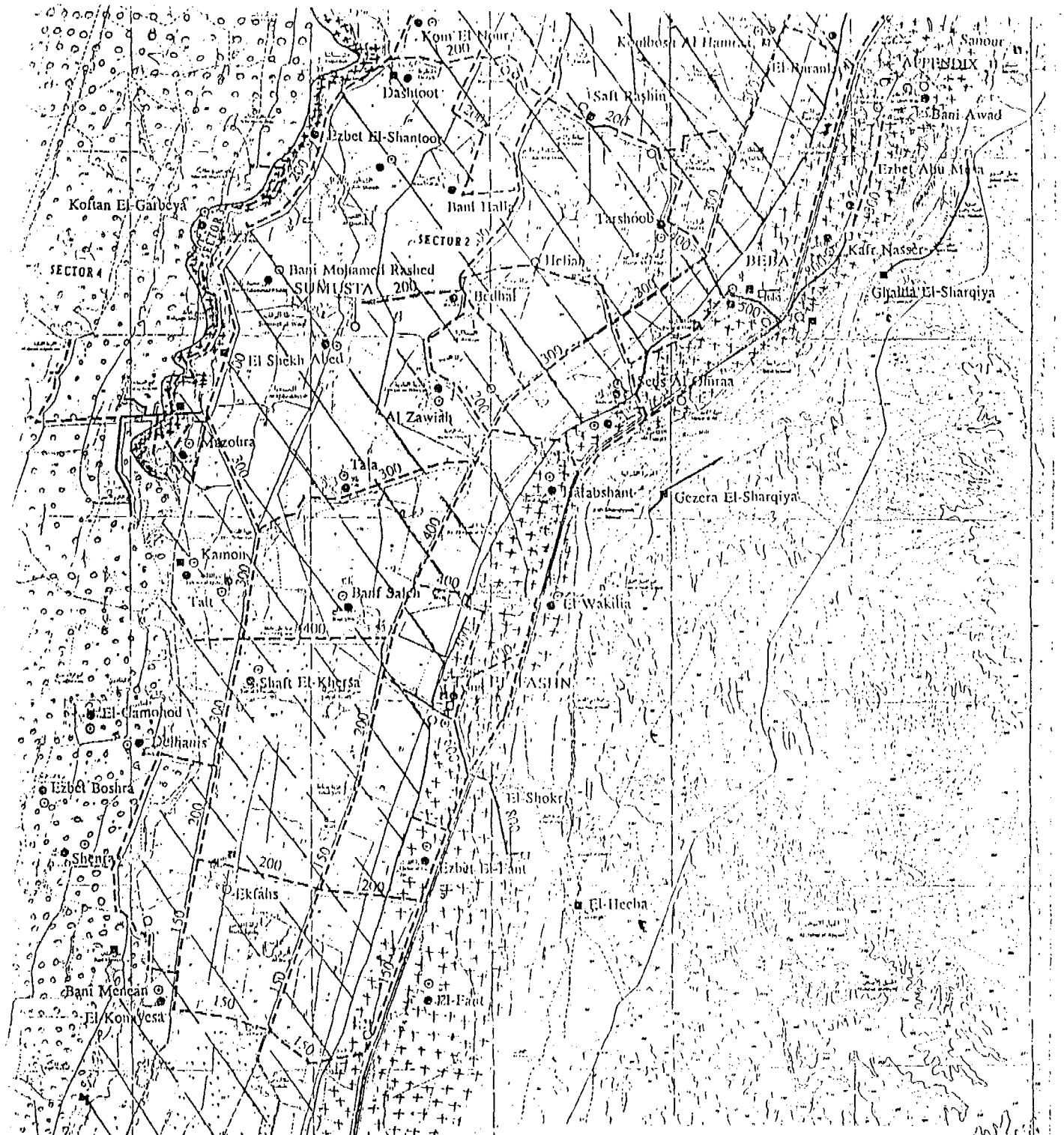


Fig (9)

SUITABILITY OF THE GROUND WATER ALONG THE STUDY AREA

(ACCORDING TO THE EGYPTIAN STANDARDS 1995)

LEGEND

	GOOD POTABLE
	FAIRLY FRESH TO PASSABLY BRACKISH
	DEFINITELY BRACKISH TO SLIGHTLY SALINE

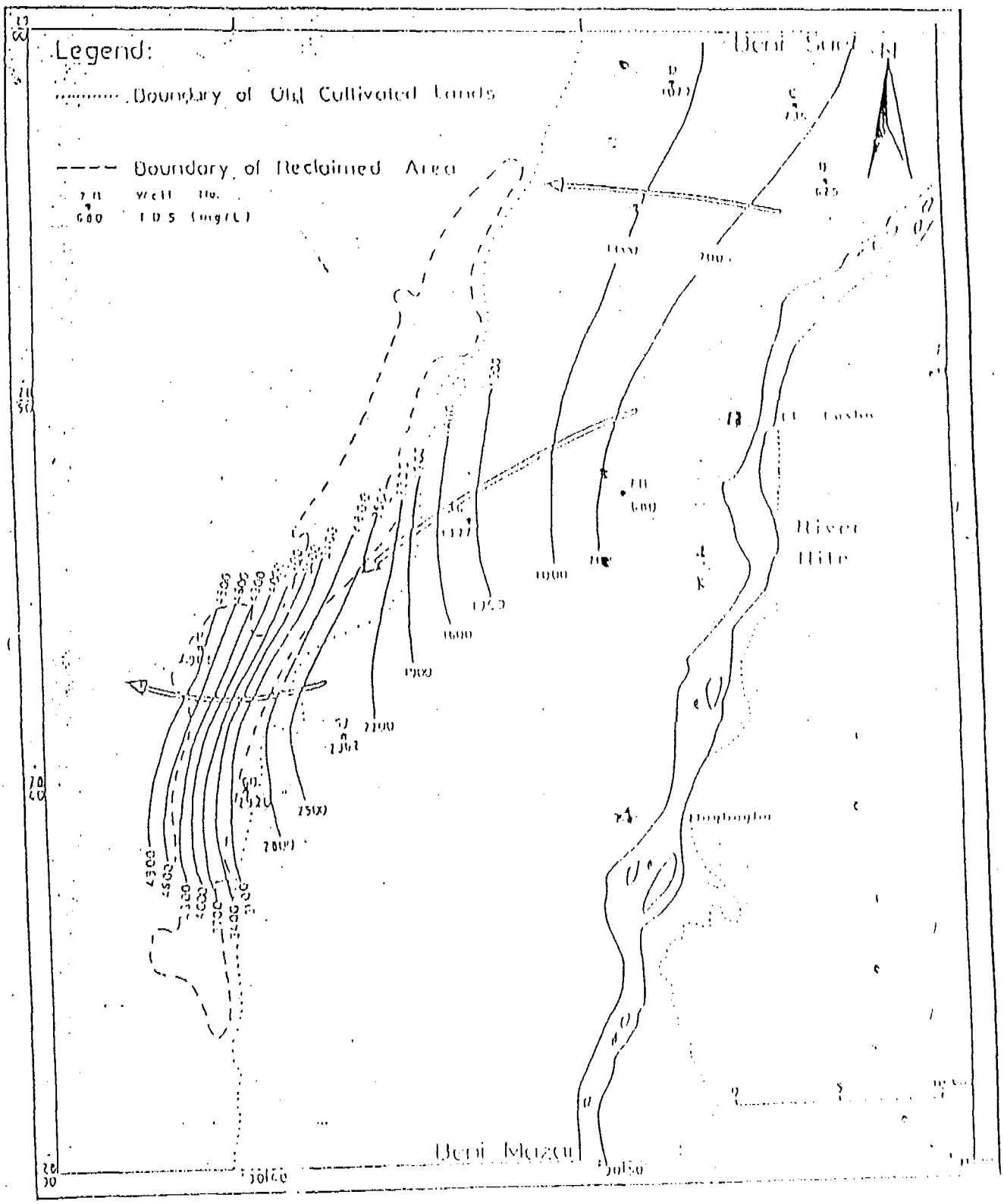


Fig (10) Contour Map Of The Total Salinity Distribution

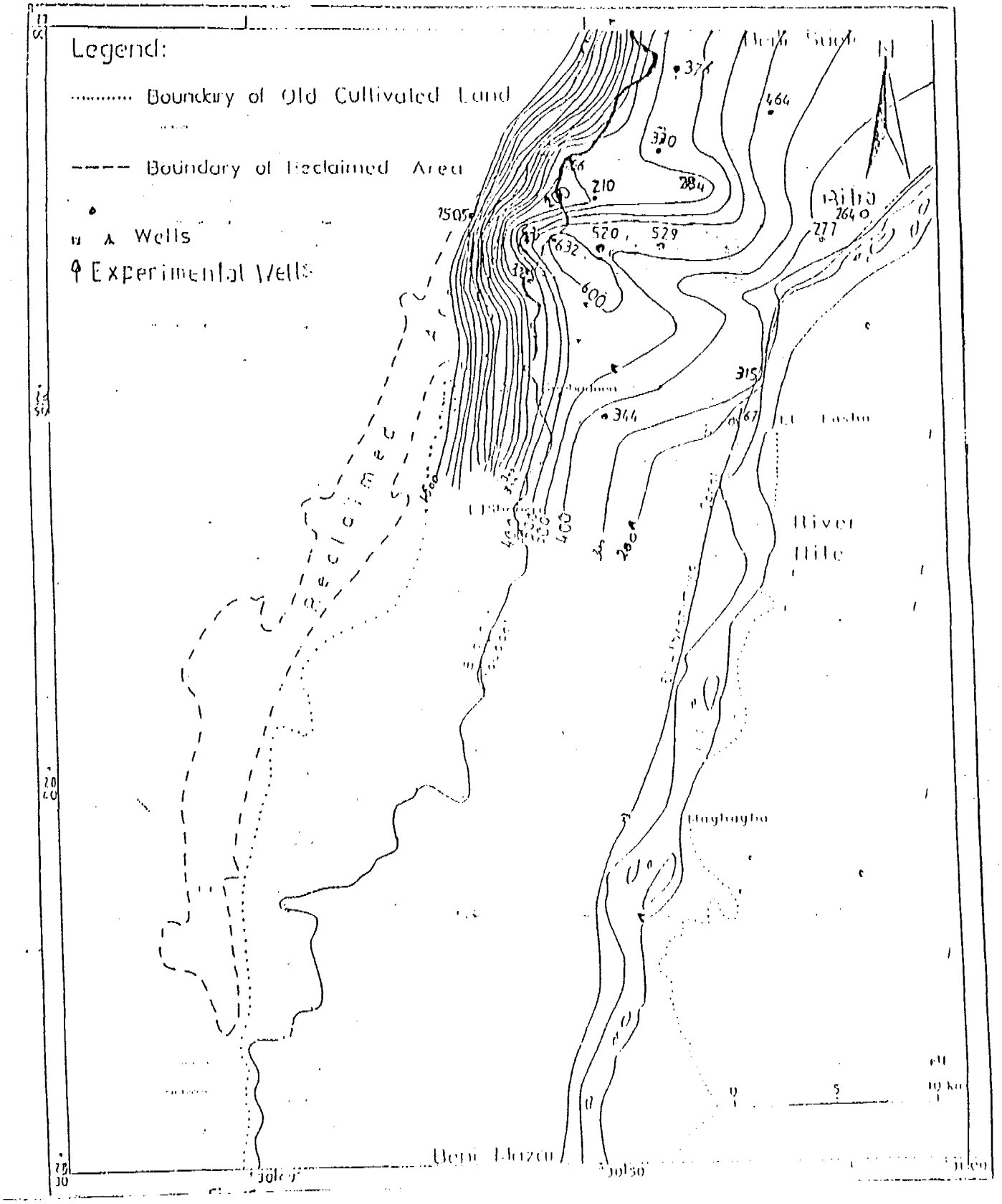


Fig (11) T. Hardness Contour Map. 1996

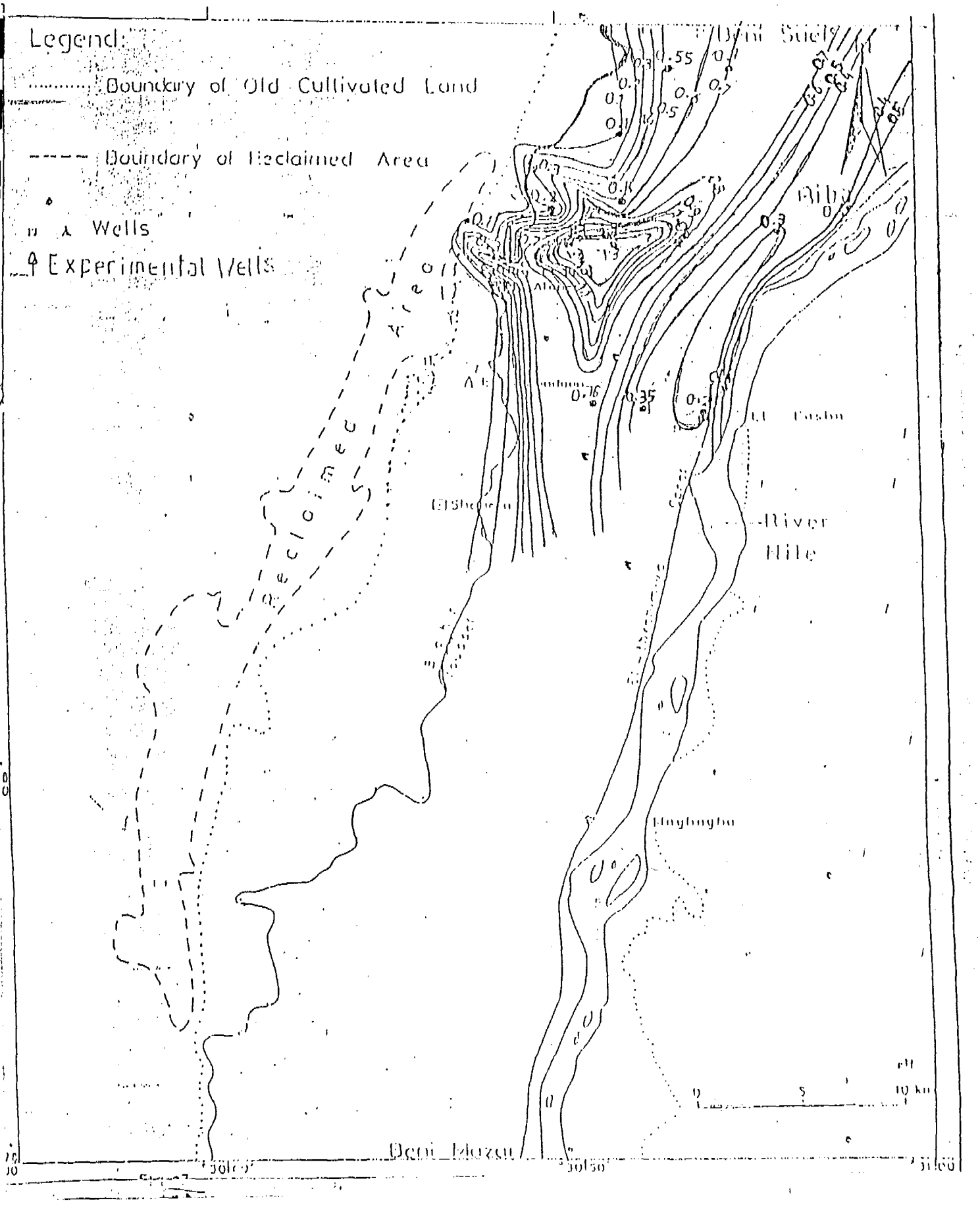


Fig (12) Manganese Distribution Contour Map Along The Study Area

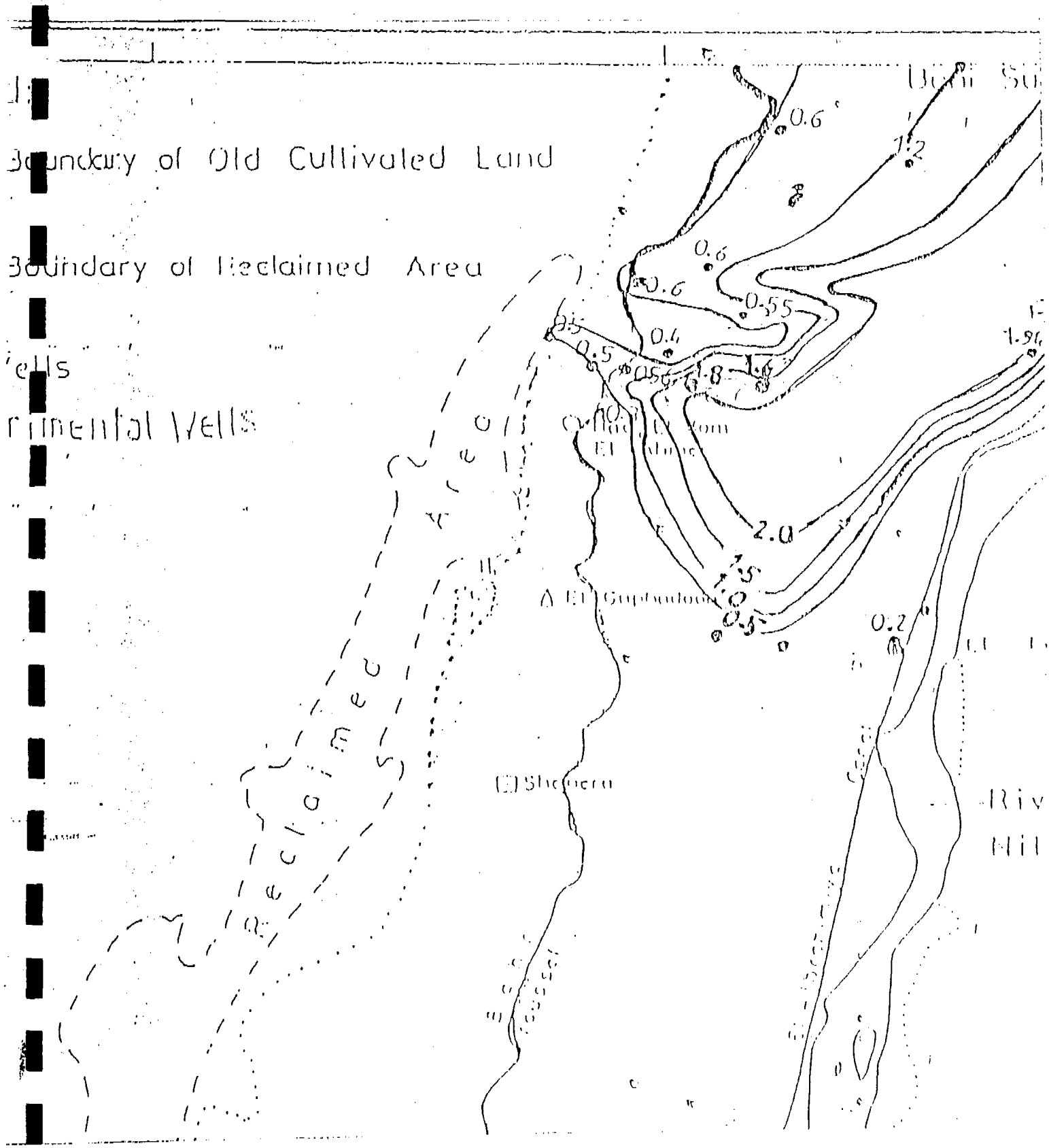
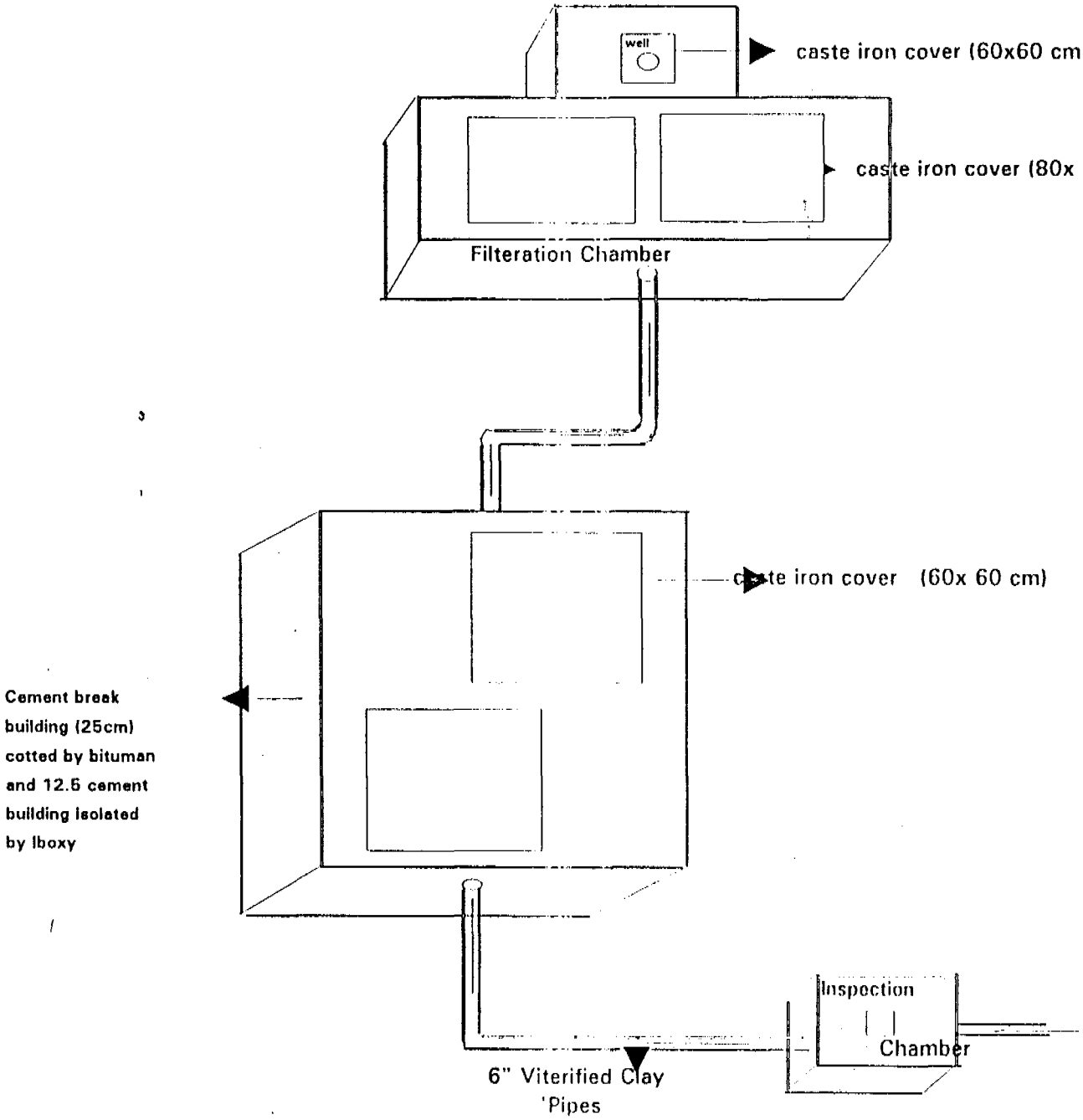


Fig (13) Iron Distribution Contour Map Along The Study Area

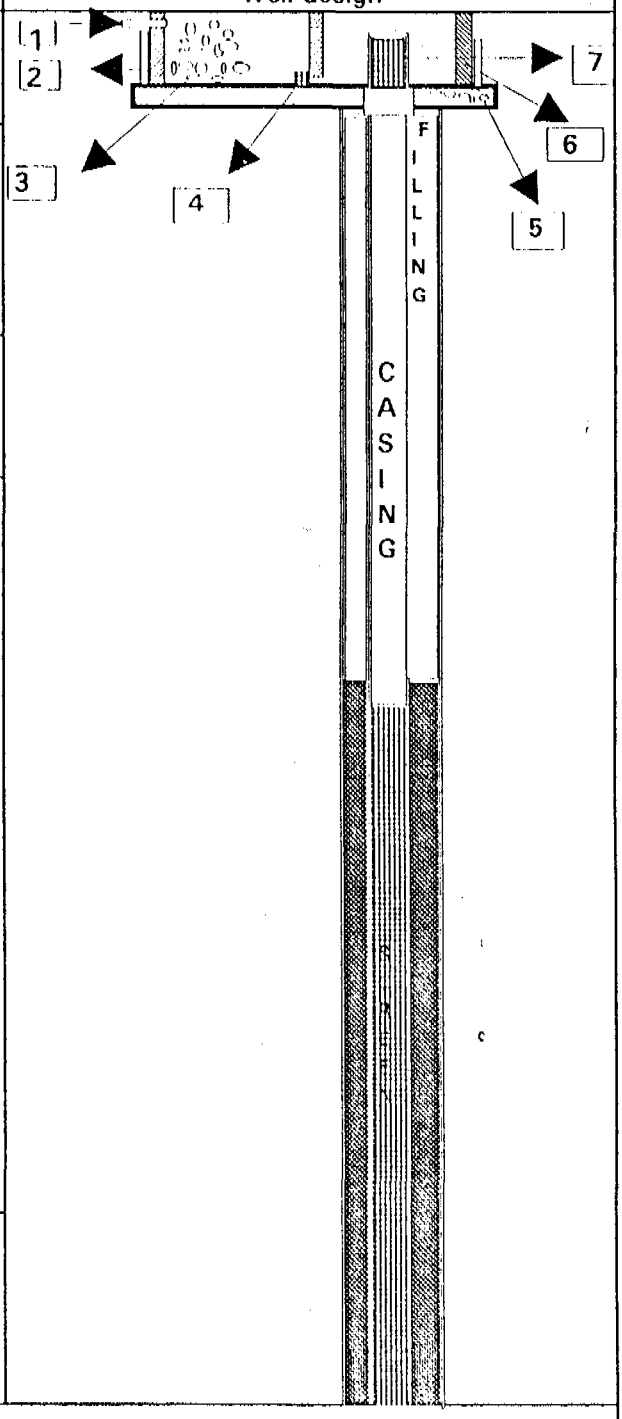
FIG. 14 a WASTE WATER WELL SYSTEM



Location: Biba General Hospital-Biba Markaz
Wells No: 2
Total Depth: 40 m
Casing and Screen Diameter :10"
Casing and Screen material : Galvenized iron

Depth	A.V.Th.	Litho.	Litho. Description
1 2	3.5 m		Agricultural Soil
3 4 5 6 7 8	5.5m		Silty Clay
9 10 11 12	4 m		Fine to Medium Sand
13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 32 33 34	22 m		Coarse Sand to Fine Gravel
35 36 37 38 39 40	5 m		Fine to Coarse Gravel

Well design



LEGNED

	Mud	1	6"inlet pipe coming from the sedimentation Tank
	Silt	2	Supporting wall for the insulation material.
	M.Sand	3	Filteration Gravel.
	C.Sand	4	Pass way from filteration to collection chamber.
	F.Gravel	5	Concret plate 20 cm.
	c.Gravel	6	Chamber wall isolated by iboxy from the inner
	Fil.Pack		side and bitumen from the outer side (25 cm)
	Screen	7	Filter pipe 1 m.

FIG. 14 b

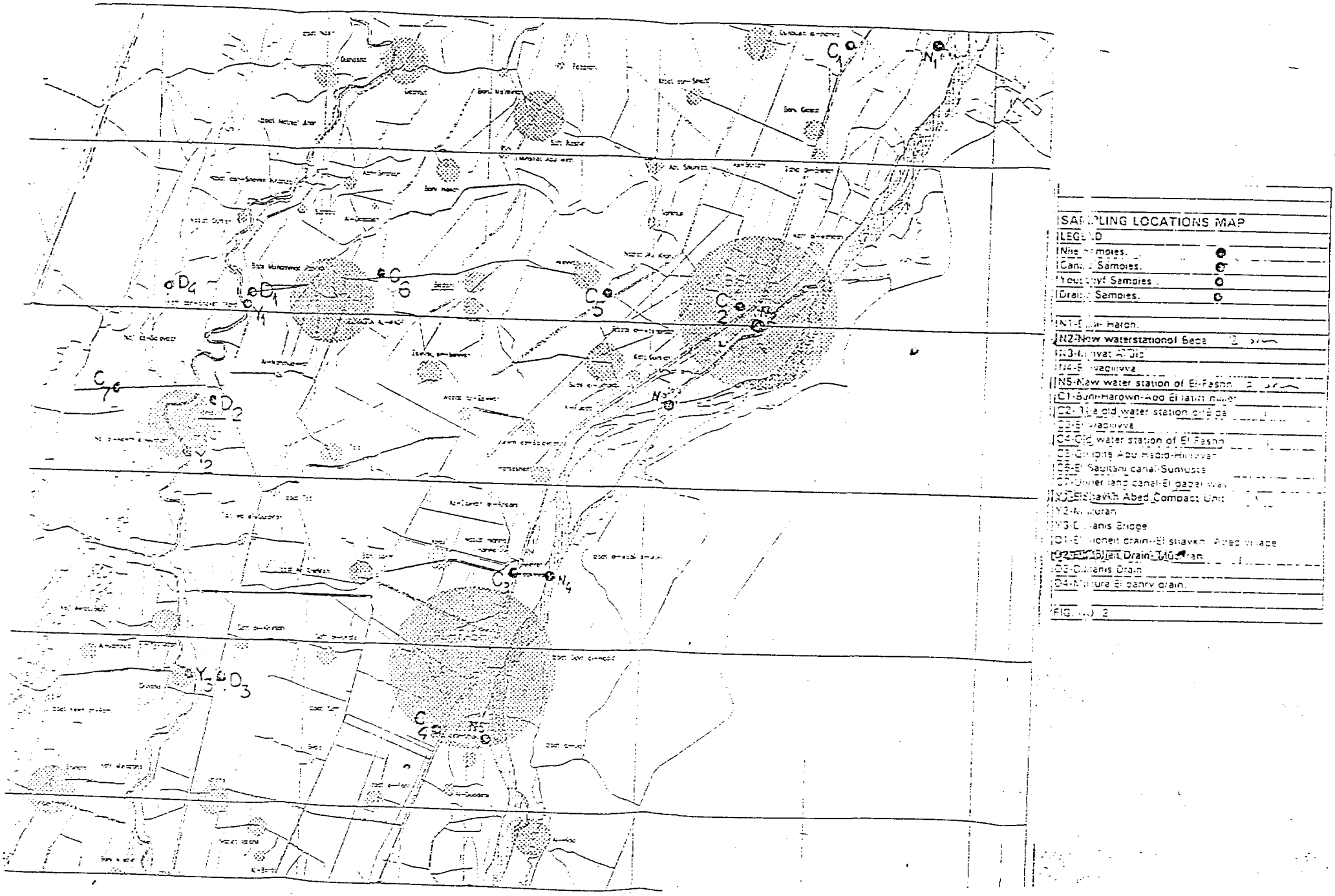


Fig (15) Surface Water Sampling Locations

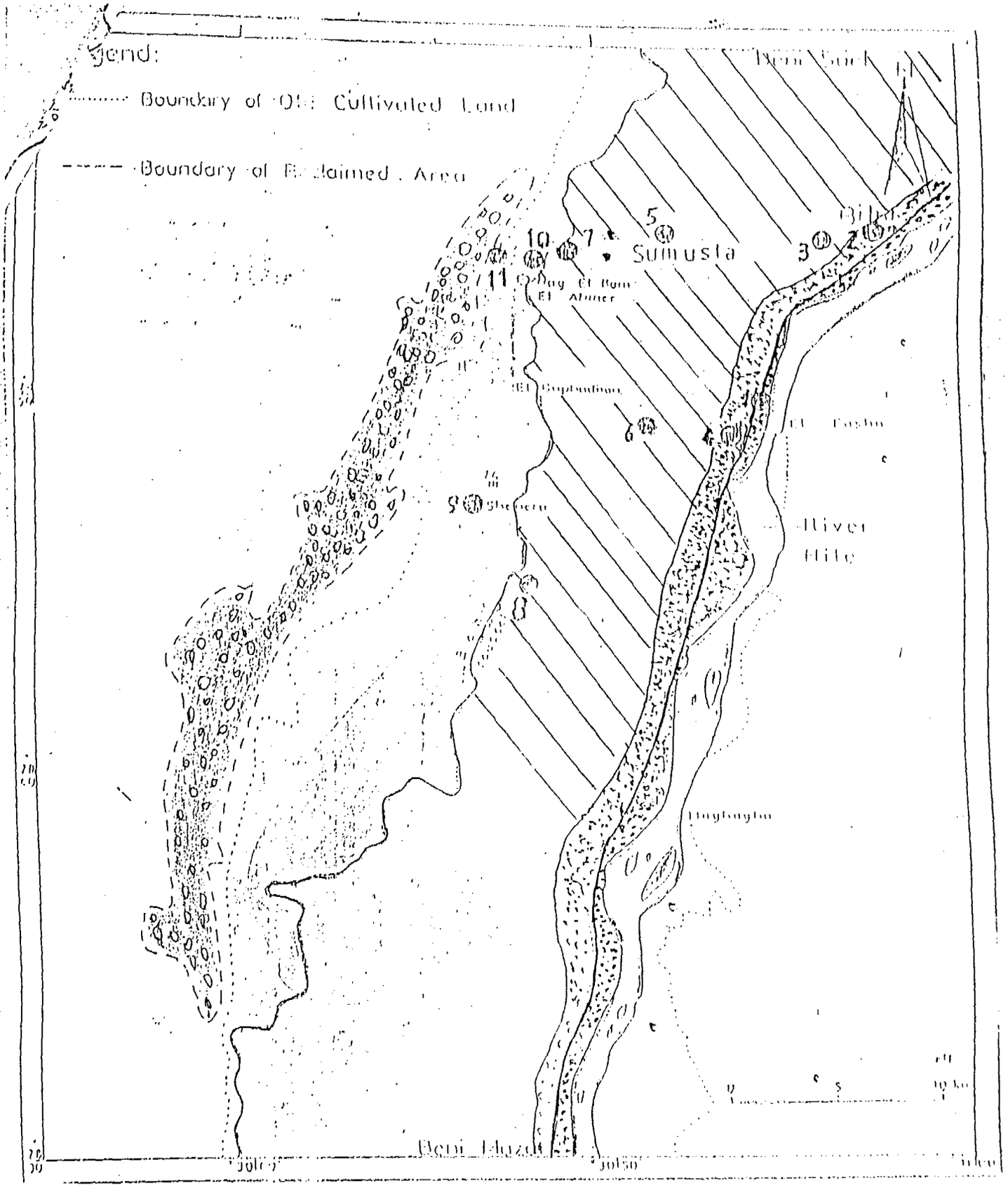


Fig (16) Ground Water Sampling Locations

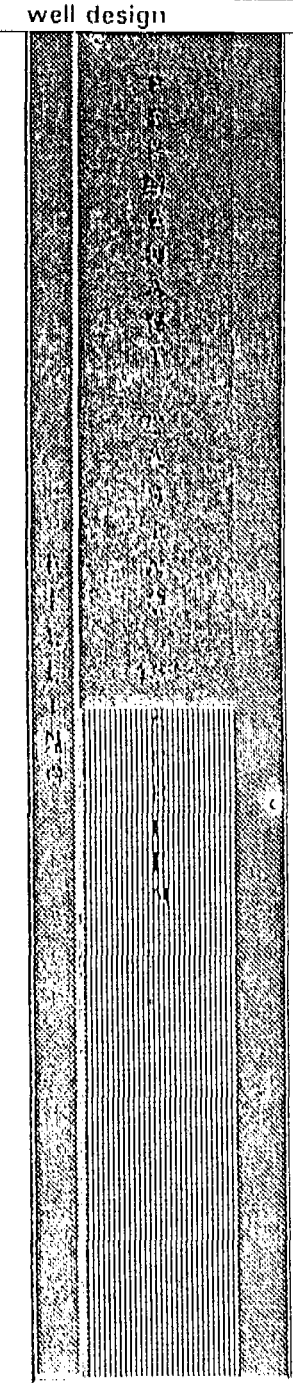
1-El-waqilayya water station (1 well).
2-Biba water station (4 well).
3-Suds water station (1 well).
4-El-Fashn water station (8 well).
5-Badahl water station (1 well).
6-Saft El Arfaa (1 well).
7-El-Sheikh Abed water station (1 exp. well).
8-El- Konesa water station (2 well).
9-Shenera water station.
10-El Genedi exp. Well.
11-Abed El Maqdem well (private well).

	SECTOR 1
	SECTOR 2
	SECTOR 3
	SECTOR 4
	STREAM

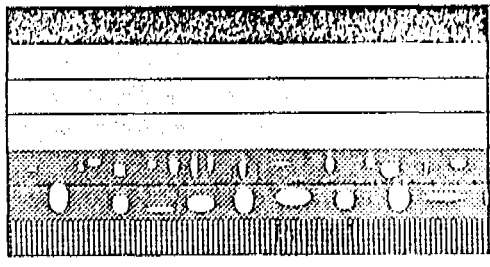
BEBA WATER STATION

Location : Beba city
Wells number : 14 well
Maximum well depth : 39 m
Minimum well depth 36 m
Temporary casing diameter :14"
permanent casing :10"
Well purpose:potable water
Type of screen casing materials : galvanized iron
Type of screen openings: perforated and covered by wire mish.
Static water level :165 cm.

Depth	A.V.Th.	Litho.	Litho. Description	well design
1 2 3	3.5m		Agricultural mud	
4 5 6 7 8 9	5.5 m		Silty clay	
10 11 12 13 14 15	6m		Fine to medium sand	
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	22.5 m		Coarse sand to fine gravel	
38 39	1.5 m		Coarse gravel to pebble.	



LEGNED



Mud
Silty clay
Fine to medium sand
Coarse sand
Gravels
Pebbles
Wire mish

Fig (17a)

Location : Beba city

Maximum well depth : 42 m BIBA.XLS

Technique of drilling :Rotary drilling

Drilling Diameter : 17 1/2 "

Production casing and screen :10"

Filter pack grain diameter :3-4 mm (well sorted gravel pack).

Well purpose:potable water

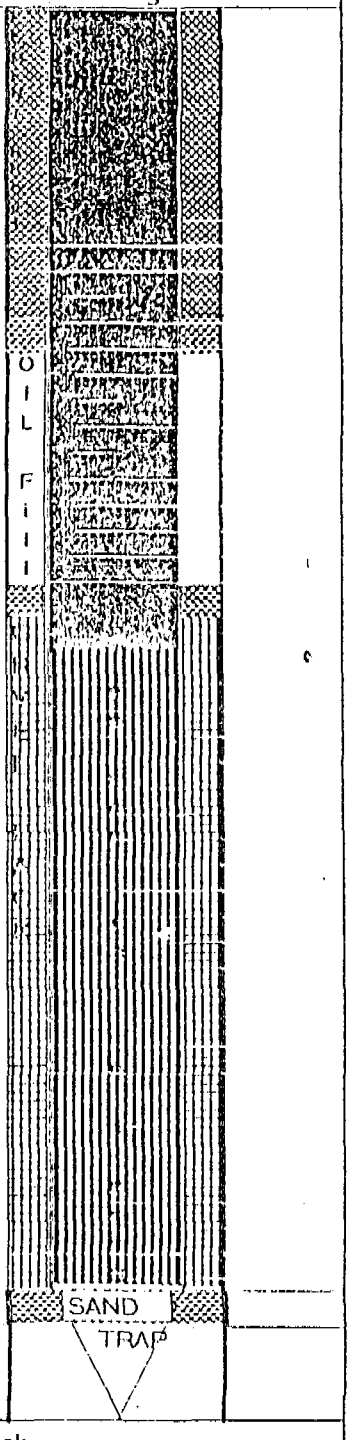
Type of screen casing materials : P.V.C.

Type of screen openings:bridge slotted - 1.2 mm

Static water level :165 cm.

Depth	A.V.Th	Litho.	Litho. Description
1 2 3	3.5m		Agricultural mud
4 5 6 7 8	5.5 m		Silty clay
9 10 11 12 13 14	6m		Fine to medium sand
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	22.5 m		Coarse sand to fine gravel
38 39 40 41 42	1.5 m		Coarse gravel to pebble.

well design



Gravel Pack

Soil Filling

Mud

Silty clay

Fine to medium sand

Coarse sand

Gravels

Pebbles

Bridge Slotted

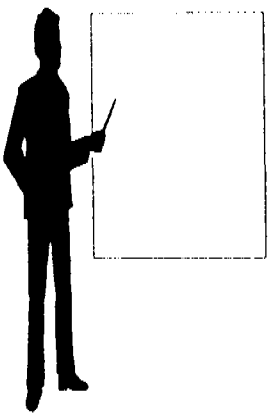
Cement Grout

Bentonite Cement Ball

Fig (17b)

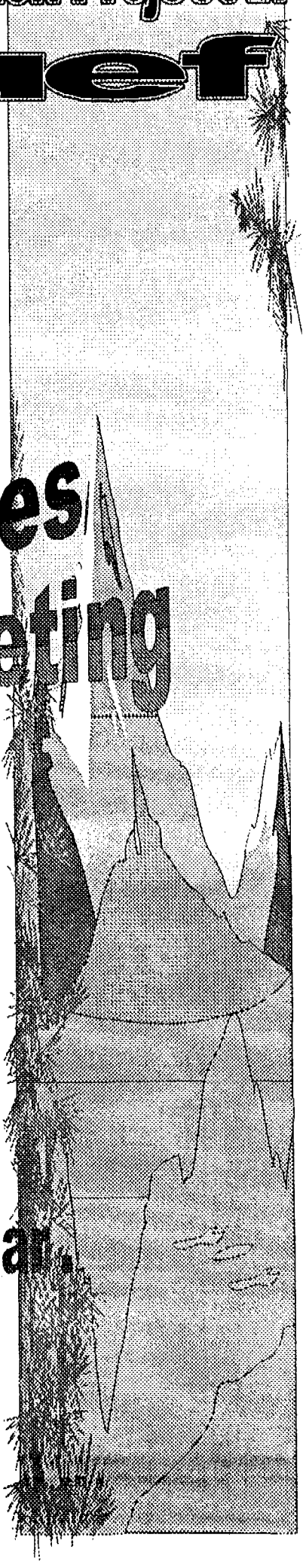
Regional Water Supply And Sanitation Project in Beni Suef

Water Resources Management Meeting



Water Quality study

Presentation by: Dina Omar
Water Chemist



May 97

water quality studies

1. Introduction

The water quality issues have become crucially important during recent years. The traditional resources have quality problems and water demand has increased due to increase of population. Water quality in the River Nile, which is the main water resource in Egypt, has worsened. The attention is now paid to the possible use of other resources, such as ground water resources. Studies have shown that substantial ground water resources exist.

2. Objectives of the water quality study

The on going studies aim to clarify the usability of water from different sources, optimum condition for treatment of the water and contamination levels and types. Ground water can be easily used beside the surface water, mixed with it or sometimes instead of it. The aim is also to try to find the way to recover the contamination.

3. Water quality and health

Sometimes the results of these studies help to rectify earlier misunderstandings. For example here in Egypt there is an old fear that iron and manganese have bad effects on health, but in fact we all need iron for increasing the hemoglobin percentage in the blood. It is true that bigger concentrations of iron and manganese are stannous for laundries and some times they give the water unpleasant taste. The unpleasant taste can be often avoided by proper borehole design and simple treatment, which does not require use of chemicals. Most of water resources, such as the River Nile and its branches(ElEbrahemia and Baher Yossef), face now a wild war against the contamination by human settlments. This contamination is due to poor sanitary habits of man.

Our study proved that the places, which were badly treated by people, show high level of contamination. Contamination includes high concentration of harmful heavy metals (lead,mercury,cadmium,cromium,silver,arsenic,cyanide,copper,etc.).

The harmful heavy metals come mainly from the drains of the factories, which do not treat their wastes. Also, the agricultural drains to the water streams increase the concentration of nitrogen compounds. The heavy metals are a health hazard. The nitrogen compounds cause different types of illnesses and harmful effects to human life. Another contamination source are the organic compounds such as pesticides,herbicides, halomethans,etc.

The biologic contamination comes from such bad habits of the human as throwing dead animals and rabich in the water streams and washing of children, animals and clothes on the shores of the water streams. The biologic of contamination is a very serious hygienic hazard, which causes cholera,typhoid,etc. to the population.

Even the underground water faces serious contamination problems due to the draining of sewage water into the ground water reservoirs through boreholes and due to lack of waste water treatment plants or poor operation of the existing plants.

Different types of contamination in the raw water resources are sources for various diffuclties. Treatment needs vary from simple coagulation and disinfection with conventional chemicals(Aluminum sulphate and chlorine gas) and conventional techniques to complicated techniques and complicated chemicals (polyelctrolights and Ozone).

The chemicals used in the treatment of the surface water can become health risks if they are used in wrong doses. High concentrations of these chemicals in the drinking water cause contamination which can not be removed in our ordinary water plants and even we can not discover the contamination in the usual laboratories. People with high skills are needed to do such examinations and analyses.

The studies which have been carried out by the project from 1994 to 1997 show us that we have in BaniSuef good or acceptable quality ground water which can be utilized for domestic use. Even those locations which have high values of TDS,T.harness,Fe and Mn have no health risks.

4. Water quality standards

The summaries of Egyptian and WHO water quality standards are provided in **annex(1).** The standards are divided to the physical and chemical parameters. Physical parameters include the taste,the odor,the colour,turbidity and pH . Physical parameters define the qualities which make the water acceptable or not acceptable to the people. The chemical parameters (chemical compounds) may influence the taste and for instance the hardness increase the consumption of the detergents.

The following chemical parameters do not cause health risks, TDS,Fe,Mn,T.H.,Calcium,Sulphate,Magnesium,Chloride and Sodium.

Chemical parameters which really affect on the human life and cause health risks are Lead, Arsenic, Cyanide, Cadmium, Chromium, Selenium, Mercury, Nitrogen compounds and Aluminum.There are some ather chemical parameteres which are known as organic compounds.There are twenty five types of pesticides,five types of herbicides and other organo compounds which we can identify them as organic compoundes and which are not recognized in the Egyptian standards..

The biologic parameters cause most dangerous health risks. Their existence is a quite new phenomenon.

5. Ground water study

Studies of ground water quality in the project area(Baba-Sumusta-ElFashen)-**annex(2)**-cover the resources which are used for drinking water supplies. Most of the concerned ground water stations need renovation, improvement of operation and maintenance programs and improved techniques to be able to cover the needs of the costumers in the long run.

Sampling and analyzing were made during the time from 1994 to 1997. The results show some changes in the water quality in some places.

For example,the samples which were taken from Sumusta production well in the early beginning of the investigations or after forty eight hours give us parameters within the Egyptian standard limits. However after operation of few months some parameters started to change.Monitoring period is now too

concentration of the iron and manganese were slightly changed.Generally these changes either indicate connection between different aquifers or problems in the sampling.

6. Surface water study

The project also made a study on surface water quality in August 1996-**annex (3)-annex(4)**. This study include the Nile,Baher Yossef canal,ElEbrahemia canal and some drains. This study show high level of total coliform and algae contamination.

The increase of the algae content is due to the flood season.The coliform contamination is due to the washing and cleaning activities at the River and draining the waste water to the River .

7. Comparison of ground and surface water

Treatment of ground water is easier than the treatment of surface water and it needs simpler techniques. There is no doubt about the advantages of ground water compared with surface water, assuming that the quality can be improved by following the proper principles in identifying the locations and depths of these resources.

The advantages and disadvantages of surface and ground water are summarized in the -**annex(5).**

8. Conclusions

We can conclude that in some areas ground water offers a safe alternative for future needs. However the use of ground water will require utilization of proper borehole site selection and proper borehole design and utilizing the lesson learned by the project in this respect.

Minor changes in ground water quality has taken place as function of the pumping time. The water quality needs to be continuously monitored.

We can also conclude that mixing the treated surface water and ground water in some areas will provide economic savings in long run and it will increase

the reliability of the water supply systems. This possiplity needs further studies.

The water quality information should be used together with the hydrogiological information when planning the water supply projects.

There is an urgent need to include in the Egyptian standards instructions to cover the pollutants like pesticides.

The recommendations regarding the industrial pollution and waste water treatment are discussed in more detail in the water resources paper.

Annex (1)

-Phesical parameters:

Parameter	Egypt.standards1995	WHO standards 1993
Colour co-pt	20-30	15 Tcu
Taste	accepted	1 taste units
Odor	odorless	1 odor units
Turbidity NTU	5 JTU treated water 10 JTU mixed or ground water	1 NTU
pH	6.5-9.2	6.5-8.5

-Chemical parameters:

*Inorganic parameters:these parameters do not affect the health,only affect the taste and domestic uses.

Parameter	Egypt.standards1995	WHO standards1993
TDS mg/l	1200	1000
Fe mg/l	0.3 treated 1.0 mixed or ground	0.3
Mn mg/l	0.1 treated 0.5 mixed or ground	0.1
T.Hardness mg/l	500	500
Calcium mg/l	200	
Magnesium mg/l	150	
Sulphates mg/l	400	400
chlorides mg/l	500	250
Sodium mg/l	200	200

* other inorganic parameters:these parameters have health risks.

Parameter	Egypt. standards1995	WHO standards1993
lead mg/l	0.05	0.01
Arsenic mg/l	0.05	0.07
Cynide mg/l	0.05	0.07
Cadmium mg/l	0.005	0.005
selenium mg/l	0.01	0.01
Mercury mg/l	0.001	0.001
Chromium mg/l	0.05	0.05
Nitrate mg/l	10 as N	50
Nitrite mg/l	0.005 as N	
Florides mg/l	0.8	1.5
Aluminum mg/l	0.2	0.2

*Organic Parameters:these organic parameters have health risks.
Pesticides,Herbicides and other organic compounds are good examples for what we talk about.

There about 25 type of pesticides and the limits between 0.03 and 30 micro gram/l in the Egyptian standards1995.

There are about 5 types of Herbicides and the limits between 9 and 100 micro gram/l.

The other organo compounds are widly classified but not all of them identified in the Egyptian standards1995.

-Microbiological parameters:
Thse parameters contain three items:

1- Total naumber of bacteria
not more than 50 cell/1cm3 at37 C/24 hr
not more than 50 cell/cm3 at22 C/48 hr

2-bacteriological contamination
Which include:

-Total coliform.
95% of the samples must free from total coliform/100 ml.

-Fecal coliform.
all the samples free from fecal coliform.

-Strepptoccous coliforms.
all the sample free from sterpptoccous coliforms.

3- biological parameter
by microscopic examinatins all the samples must free from brotozoa,blugreen algea.

Annex (2)

Table (1):Sumusta : (1994 - 1997)

Loc.	Depth meter	Mn mg/l	Fe mg/l	TDS mg/l	pH	Turb. NTU	T.H. mg/l	Bact. col/ 100ml	over the Egypt stand
Elgend. EX.W.	43	nil	0.05	420	7.55	0.5	164	>1	
Noseer EX.W.	42	0.2	0.5	1120	7.55	7.34	434	>1	
Elsh.abd EX.W.	48	0.44	0.73	1440	7.8	6	632	700	TDS T.H.
High res.EX.W	51	0.12	0.5	720	7.2	2	380		
Elsk.Ali EX.W.	29	1.13	0.58	1200	7.3	2.9	1000		Mn
Elsk.Ali EX.W.	66	0.27	1.24	800	7.06	15	816		Fe, TDS Turb. T.H.
Elestad EX.W.	30	0.6	0.77	1600	7.39	5.7	648		TDS T.H.
Elestad EX.W.	63	0.37	1.8	1840	7.04	9	988		Fe, TDS T.H.
ElSala. EX.W.	26	0.65	0.65	1200	7.24	3.2	676		T.H. Mn
Elsala. EX.W.	63	<7	<7	880	7.4	0.8	472		Fe,Mn
Bedahl W.S.	45	1.28	1	880	7.36	4.7	394		Mn
Bani Mohamed R.W.S.	40	0.18	0.4	475	7.2	1.8	210	1	
Bani Hala W.S.	40	0.41	0.4	400	7.52	8.8	284		
KomElnor W.S.	40	1	0.55	840	7.64	4.5	266		

Loc.	Depth meter	Mn mg/l	Fe mg/l	TDS mg/l	pH	Turb. NTU	T.H. mg/l	Bact. col/ 100ml	over the Egypt stand
Dashtot W.S.	40	0.5	0.93	528	7.7	16	277		Turb.
ElSant. W.S. befor T.	40	0.41	1.7	576	7.2	1.8	210	12	
Koftan W.S.	40	0.2	0.4	515	7.66	3.6	206	20	
Elsultan EX.W.	28	0.58	0.58	960	7.38	2	590		T.H.
Elsultan EX.W.	50	0.13	0.65	960	7.39	1.8	380		
ElSultan EX.W.	70	0.2	1.27	2480	7.09	9.3	750		T.H. Fe
Mazora W.S.	40	0.07	0.5	330	7.47	0.9	110		
ElShant. Ezba W.S.	40	>0.05	0.2	720	6.97	0.3	320		
Sum.P.W.	62	0.3	0.6	1680	7.55	6.9	580	>1	T.H

- **Table (2): Beba:** (1994 - 1996)

Loc.	Depth meter	Mn mg/l	Fe mg/l	TDS mg/l	pH	Turb. NTU	T.H. mg/l	Bact. col/ 100 ml	over the Egypt stand.
Bani Khalil EX.W.	35	1.4	1	1760	7.5	11	1110		T.H. Turb. Mn. TDS
ElGezera EX.W.	16.7	nil	0.3	960	7.3	2.6	282		
Beba old W.S.	40	0.4	nil	390	7.75	0.15	264	>1	
Seds E.W.S.	40	0.3	1.94	1200	7.88	2.5	277	>1	Fe

-Table(3):ElFashen : (1994 - 1996)

Loc.	Depth meter	Mn mg/l	Fe mg/l	TDS mg/l	pH	Turb. NTU	T.H. mg/l	Bact. col/ 100 ml	over the Egypt stand
Saft ElOraf fa W.S.	40	0.35	nil	960	8.075	5.1	344	>1	
Elwaq. W.S.	40	0.5	nil	560	7.96	0.5	315	>1	
ElFash en Old W.S.	40	0.25	0.2	550	7.079	0.6	176	>1	
Delhan .W.S.	37	0.4	0.3		7.47	3.7	410		
Ezba Boshra W.S.	37	0.2	0.3		7.4	2.6	392		
Shenry W.S.	37	nil	2.6		7.59	144	580		Fe, T.H.

-Sum.P.W.:Sumusta production well
-W.S.: water station
-EX.W.:Expermental wells
The samples were analyzed in the following laboratories:
-ElFustat Lab.-Cairo
-N.R.C.lab.-Cairo
-American lab.-Benisuf city
-Sumusta central lab.-Sumusta

Ground water quality during March 1997-Sumusta markaze									
Loc.	Date	Mn mg/l	Fe mg/l	TDS mg/l	pH	Turb. NTU	T.H. mg/l	Bact. Col/ 100 ml	over the Egypt. stand.
Kom el Nor w.s.	3/97	1	0.55	840	7.6	4.5	465.9	1	
Dashtot w.s.	3/9	0.5	0.93	528	7.7	16	277.3	<1	
ElShantor w.s.1	3/97	0.6	1.7	637	7.9	2.7	354.6	12	bact.
Koftan w.s.	3/97	0.2	0.4	514.8	7.7	3.6	206.3	20	bact.
Mazora w.s.	3/97	0.15	0.35	415.8	7.8	0.9	128.9	<1	
Bani M.rashed w.s.	3/97	0.25	0.4	462	7.7	3.9	177.3	1	

Annex (3)

-Table (4): The River Nile samples

Loc.	sampl. point	Mn mg/l	Fe mg/l	TDS mg/l	pH	Turb. NTU	T.H. mg/l	Bact. col/ 100 ml	over the Egypt stand
Bani sol. V.	near the shore	nil	nil	190	8.56	20	117	1200	bact.
Bani sol. V.	middel of Nile	nil	nil	186	8.47	28	112	200	
Bani sol. V.	other dirct. of the shore	nil	nil	186	8.36	28	106	180	
Beba N.W.P.	Intake	nil	nil	170	8.36	7.5	128	1000	bact.
Beba N.W.P.	Other dirct. of the shore	nil	0.2	169	8.34	6.5	144	1300	bact.
Meny Elgied V.	middel of NIle	nil	0.78	190	8.12	6	152	520	bact.
Meny Elgied V.	other dirct. of shore	nil	0.2	180	8.21	5.9	128	150	
Elwaqlia V.	near the shore	nil	nil	190	8.04	5.5	96	900	bact.
Elwaqlia V.	middel of Nile	0.25	nil	186	8.11	7.5	100.8	620	bact.
Elwaqlia V.	other dirct. of the shore	nil	nil	186	8.06	6	99.2	310	bact.
ElFashen N.W.P.	Intake	nil	0.161	193.7	7.89	5	132.8	1200	bact.

ElFashen N.W.P.	middel of the Nile	0.5	nil	192	8.05	4.5	123.2	1150	bact.
ElFashen N.W.P.	other dirct of the shore	nil	nil	192	8.04	4.5	123.2	1050	bact.

-Table(5): El-Ebrahemia canal samples

Loc.	Sampl. point	Mn mg/l	Fe mg/l	TDS mg/l	pH	Turb. NTu	T.H. mg/l	Bact.col/100 ml	over the Egypt stand.
Bani Haon V.	Intake	nil	nil	164.5	8.05	15	126.4	400	
Beba O.W.P.	Intake	nil	0.02	177.5	8.19	16	120	800	bact.
Elwaqlia V.	the bridg	nil	0.16	177	7.96	15	96	4000	bact.
ElFash.O .W.P.	Intake	0.05	0.2	183.3	7.91	10	116.8	6200	bact.
Abo Hadid C.	canal stream	nil	1.3	180	7.8	25	115.2	3500	Fe, bact.
Elsultan . C.	canal stream	0.05	2.14	150	8.16	41	120	9400	Fe, bact.
Mazora C.	Elgabl C.	0.15	nil	204	8.45	25	153.6	2950	

-Table(6): Baher Yossef canal samples:

Loc.	sampl. point	Mn mg/l	Fe mg/l	TDS mg/l	pH	Turb. NTU	T.H. mg/	Bact. col/100 ml	over the Egypt stand.
Elsk. Abd	Intake	0.1	0.78	239.8	7.84	20	156.8	1800	bact.
Mazora C.U.	Intake	0.25	0.12	262.3	7.66	16	140.8	2500	bact.
ElGendi V.	the bridge	0.1	nil	260	7.9	20	145.6	2000	bact.
Dlhanis V.	the bridge	nil	0.6	260	7.87	20	136	3000	bact.

Annex (4)

-Table (7):drains samples

loc.	sampl. point	Mn mg/	Fe mg/	TDS mg/l	pH	Turb. NTU	T.H. mg/l	Bact. col/100 ml	over the Egypt stand.
Elsk.Abd V.	Abo Shosha D.	0.15	0.68	180	7.84	40	115.2	8000	bact.
Elmahmodia V.	Elmohiet D.	0.15	nil	421.2	7.79	16	240	7200	bact.
Mazora V.	Elbahary D.	0.1	0.16	228	7.84	13	144	10000	bact.

-C.:Canal
-D.:Drain
-V.:Village

Annex (5)

Comparison between surface water and ground water:

- The advantages.

Surface water	Ground water
1- Available in large quantities.	1- No health risks if the suitable methods followed in implemntation.
2- acceptable taste for most costmurs.	2- cost of costruction is mush less than the surface water plants
3-It does not contain Fe,Mn,Hardness,or TDS in the normal condtions.	3-Cost of operation and maintenance is much less than the surface water.
	4- It is easier in operation(very simple teqnics needed for operation).

-The Disadvantages.

Surface water	Ground water
1-Great health risks are existed(pulltion due to pesticides,herbicides,heavy metals,bacteria,....).	1- There are no problems if we follow the right steps for drilling and implemnting of the wells.
2- high cost for operation and maintenance(chemicals,electricity,manpower,).	2- Smale problems come from the different taste due to increasing some parameters which are not health hazards.
3-Diffculty in operation because of sophisticated technology. 4- Low water level in dry season period,it result in changing the water quality.	

REGIONAL WATER SUPPLY AND SANITATION PROJECT IN BENI SUEF

MEETING FOR WATER RESOURCES MANAGEMENT

18.05.1997

Beni Suef Sport Club

RECOMMENDATIONS

Summary of the recommendations have been based on the presentations and intensive discussions and comments given by the participants after the presentations. Also many different existing plans have been taken into account in preparation of the recommendations.

Water Supply

- The utilization of the existing water resources and facilities as much as possible.
- More efficient utilization of the ground water resources of good quality due to simple technology, lower implementation and operation and maintenance cost:
  - increasing running hours of the water stations for the long run up to 16 hours/day
  - rehabilitation/increasing of the capacity of existing water stations based on the investigations case by case
  - construction of the new bore wells of good quality, correct design and construction method
- The location of the new ground water wells will be carefully selected based on the Water Resources Study and pre drilling study for proposed locations especially for the central part of the project area. The layers bearing water of good quality should be detected.
- Mixing ground water and surface water in the areas of salty or hard ground water (iron and manganese). There are promising test results already available, further studies needed.
- Developing simplified water treatment methods for ground water of high contents of Iron and Manganese.
- To train the population to understand the advantages of ground water
- The actions should be taken for protection of the water resources:
  - correct location and structure for the bore wells
  - the existing deep drain wells (sanitation) are recommended to be closed and not allowed anymore to construct new ones. Design is recommended to be changed completely, e.g. isolated septic tanks
  - application of law 48 regarding water pollution

- technique of irrigation should be changed from flood irrigation to sprinkler or drip irrigation to decrease soil salinity and aquifer contamination in the upper land (western reclaimed area)
- to erect new barriers of the canal intakes for removing dead animals. This system needs further developing (alternative method might be burning)
- the methods to remove Nile Roses from water intakes should be studied more detailed in the future (e.g. mechanical, biological treatment etc.).
- cooperation with water authorities and irrigation department should be increased for removing dead animals and Nile Rose.

- Note: There is also an advantage with Nile Rose. It has been recently studied utilization of it for biological waste water treatment.

- It is important to monitor continuously both surface and ground water quality and levels according to regular monitoring program to detect in advance any undesirable conditions.

Waste Water System

- To take into consideration waste water collection and treatment system of lower standard (more pilot plants needed).
  - on-site waste water treatment plants for rural areas
  - smaller villages far away from central treatment plants

- To treat the industrial waste waters and wastes.

- On-site waste water systems (vaults) should be carefully isolated

- The sanitation plan should linked with the water supply plans to prevent future sanitation problems

- The reuse of waste waters for planting trees and desert reclamation.

- To train the population regarding waste and waste water handling

Population and Water Consumption Forecasts

- Population forecast based on the estimates of Central Agency for General Mobilization and Statistics/Information Center.
  - The results of new census will be taken into account if possible

- Water consumption per capita mainly based on the NOPWASD proposal (commonly in use in Egypt as well as internationally).
  - 215 l/capita/day for urban areas
  - 125 l/capita/day for rural areas

Appendix: List of the participants

REGIONAL WATER SUPPLY AND SANITATION PROJECT IN BENI SUEF GOVERNORATE

MEETING FOR WATER SUPPLY AND RESOURCES MANAGEMENT.

Participants:

Representative of NOPWASD/Cairo.

- Mr. Emeel Hana Takla (Absent and send Ms. Faten Wahba)

Representative of Ministry of Planning/El Menia.

- Mr.Hamed Gad Hassan
- Mr. Mohammed Mahfuz

Representative of Beni Suef Governorate

- Chairman of Transition Committee of EGA Mr. Houssein Abdel Qawi
- Director of Housing Department Mr. Hassan El Banna
- Director of Planning Mr. Mohammed Said

Representative of three Markazes

- Chief of Beba Markas Mr. Mohammed Taher
- Chief of El Fashn Markaz Mr. Mohammed Tawfeek (Absent)
- Chief of Sumosta Markas Mr. Ibraheem Mohammed
- Utility Engineer of Beba Ms. Amira Ibraheem (Absent)
- Utility Engineer of El Fashn Mr. Adel Abdala Metry
- Utility Engineer of Sumusta Mr. Ahmed Abdel Wahed

Representative of RWSASP

- Mr. Hossien Dawood
- Mr. Hassan Abdel Atty
- Dr. Mohammed El Hosseiny
- Mr. Ashraf Farouk
- Mr. Anwar Manaf
- Mr. Adel Abu Taleb (Absent)
- Ms. Dina Omar
- Mr. Pentti Ruohonen
- Mr. Heimo Ojanen
- Mr. Jukka Leppanen (Absent)