Government of Egypt
Governorate of Fayoum

Government of the Netherlands
Ministry of Foreign Affairs
Directorate General for International Cooperation

FAYOUM GOVERNORATE

MASTERPLAN DRINKING WATER SUPPLY and WASTE WATER

VOLUME I

EXECUTIVE SUMMARY

October 1993

EL AZAB WATER WORKS and
FAYOUM SANITATION DEPARTMENT
in cooperation with

IWACO
Consultants for Water & Environment
Rotterdam
The Netherlands

DHV
DHV Consultants
Amersfoort
The Netherlands

ECG
Engineering Consultants Group S.A.
Cairo
Egypt

FAYOUM GOVERNORATE

MASTERPLAN

DRINKING WATER SUPPLY AND WASTEWATER

LIST OF VOLUMES

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1. INTRODUCTION

In the scope of the Egyptian-Netherlands development cooperation programme, the Fayoum Drinking Water and Sanitation Project is being executed. The project aims "to improve the drinking water and sanitation conditions in the Fayoum governorate to such an extent that it has a long lasting impact on the public health and the well being of the population of the governorate." One of the outputs of the first phase of the project is a masterplan for drinking water supply and wastewater.

The general objective of the masterplan is to provide an integrated strategy for the development of the drinking water and wastewater sector in the Governorate of Fayoum. Technical, institutional and socio-economic aspects are integrated in the plan.

In concrete terms, the masterplan aims at formulating short and medium term programmes for :

a) Water supply and wastewater infrastructure development (investment programmes);
b) Institutional capacity building programmes (cost recovery, organisation development, human resources development).

Three stages in the masterplanning process were considered:
- Preliminary Masterplan (July 1992);
- Draft Final Masterplan (May 1993);
- Final Masterplan (September 1993).

Four groups of activities were carried out in the masterplanning process (see figure 1.1):

1. Review of existing situation
2. Needs assessment and identification of sector requirements
3. Strategic planning
4. Priority project formulation.

The last activity is actually a follow-up to the masterplan.

The strong links and interdependence between the supply of drinking water and the disposal of wastewater are fully acknowledged in this masterplan.

There is clear evidence that water consumption in Fayoum is closely related to available wastewater facilities. If these facilities are poor, water consumption is limited; if they are in good shape, water consumption is significantly higher. In most rural areas of the Governorate the poor on-site sanitation facilities allow only a rather modest piped water consumption of an average 50 l\cd for house connection owners.

Improved wastewater facilities (sewers, improved pits and desludging facilities) may double piped water consumption in the served areas through increased per capita consumption levels and additional demand for HC's.

There is a significant gap between water supply and wastewater provisions to date, and care should be taken that the gap between the two service levels does not widen even more. In the two masterplans a balance is therefore struck between the development in the two sub-sectors; the plans are attuned to each other. It implies that, after a period of 7 to 10 years - when it is hoped that major portions of the first phase investment plans have been implemented - an evaluation of the developments in the two sub-sectors is required and an adjustment of the plans is to be made.

Figure 1.1. The Masterplanning Process

	PROCESS STAGE	OUTPUT	AIMED AT
A.	REVIEW OF EXISTING SITUATION	VARIOUS FaDWS TECHNICAL REPORTS	PROVIDING BASIC DATA
B.	NEEDS ASSESSMENT	PRELIMINARY MASTERPLAN	BASIC AGREEMENT ON PLANNING APPROACH AND TARGET SETTING
C.	STRATEGIC PLANNING	DRAFT FINAL MASTERPLAN	AGREEMENT ON INVESTMENT PLAN, ORG. DEVELOPMENT PLAN AND COST RECOVERY STRATEGY
		FINAL MASTERPLAN	APPROVAL BY GOF AND NOPWASD
D.	PRIORITY PROJECT FORMULATION	PRELIMINARY DESIGNS AND COST ESTIMATES	PREPARATION OF FUNDING REQUESTS

2. WATER SUPPLY SUMMARY

2.1 Production and distribution

Production

Present available water supply production capacity, excluding compact units, but including Fayoum city, amounts to 2100 l/s. From the population projections and the development of per capita consumption of water it was concluded that by the year 2020, totally 7100 l/s will be required. This means that in 30 years time a total new production capacity of 5000 l/s has to be constructed, serving both rural Fayoum as well as Fayoum city. Compact units will be abandoned.

The new capacity of 5000 l/s will be built in stages: each stage sufficiently large to meet the requirements of the next seven to ten years. The first stage of 1000 l/s should - according to the demand analysis - be completed in 1995, but will actually not be operational until 1998. The second phase of 1000 l/s must be constructed soon after the year 2000. The masterplan update of 1999 will determine the actual plan (see figure 2.1).

Water production in Fayoum shall remain centralised and use the conventional rapid sand filtration technology. The existing plant of El Azab shall remain in function but needs to be rehabilitated.

Distribution

Until the year 2020, all trunk mains need to be expanded, new storage reservoirs have to be constructed, the majority of branches to individual villages need replacement and service pipelines inside towns and villages need extension. All these works will be done in phases. The first phase will cover the requirements until the year 2005.

For the expansion of trunk mains, first and second priority works have been identified (see figures 2.2 and 2.3).

Rehabilitation of the network has a high priority. Many blockages and leaks still have to be repaired, while appurtenances (valves) have to be repaired or installed. Operation of the network can be improved significantly.

Water delivery

By the year 2020 some 400,000 house connections are required, as compared to the present 80,000. Upto the year 2000 an additional 70,000 HC's will be installed. It is recommended that the connection, inclusive of the meter, will be owned by El Azab.

Parallel improvement is required of wastewater disposal facilities, like sewerage or on-site sanitation, in order to make the considerable increase of HC's possible and environmentally acceptable. This aspect is dealt with in the wastewater masterplan.

Public taps will remain in function until the year 2020, but their average number of users will, towards the end of this period, decline. Most public taps require rehabilitation and need to be provided by a water meter. Water spillage from public taps needs to be

PROJECTED WATER DEMAND AND PLANNED PRODUCTION CAPACITY (1993-2000)

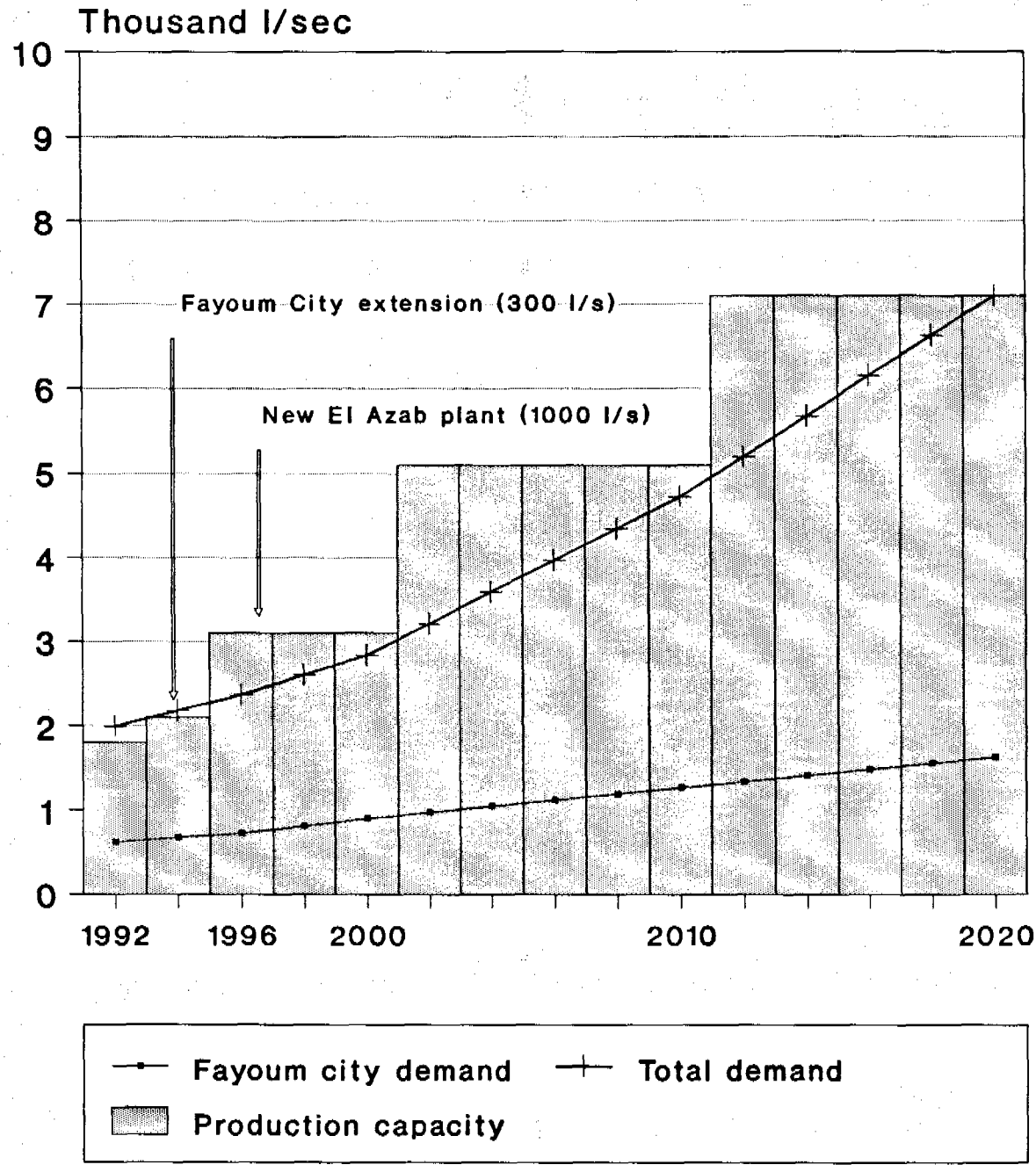
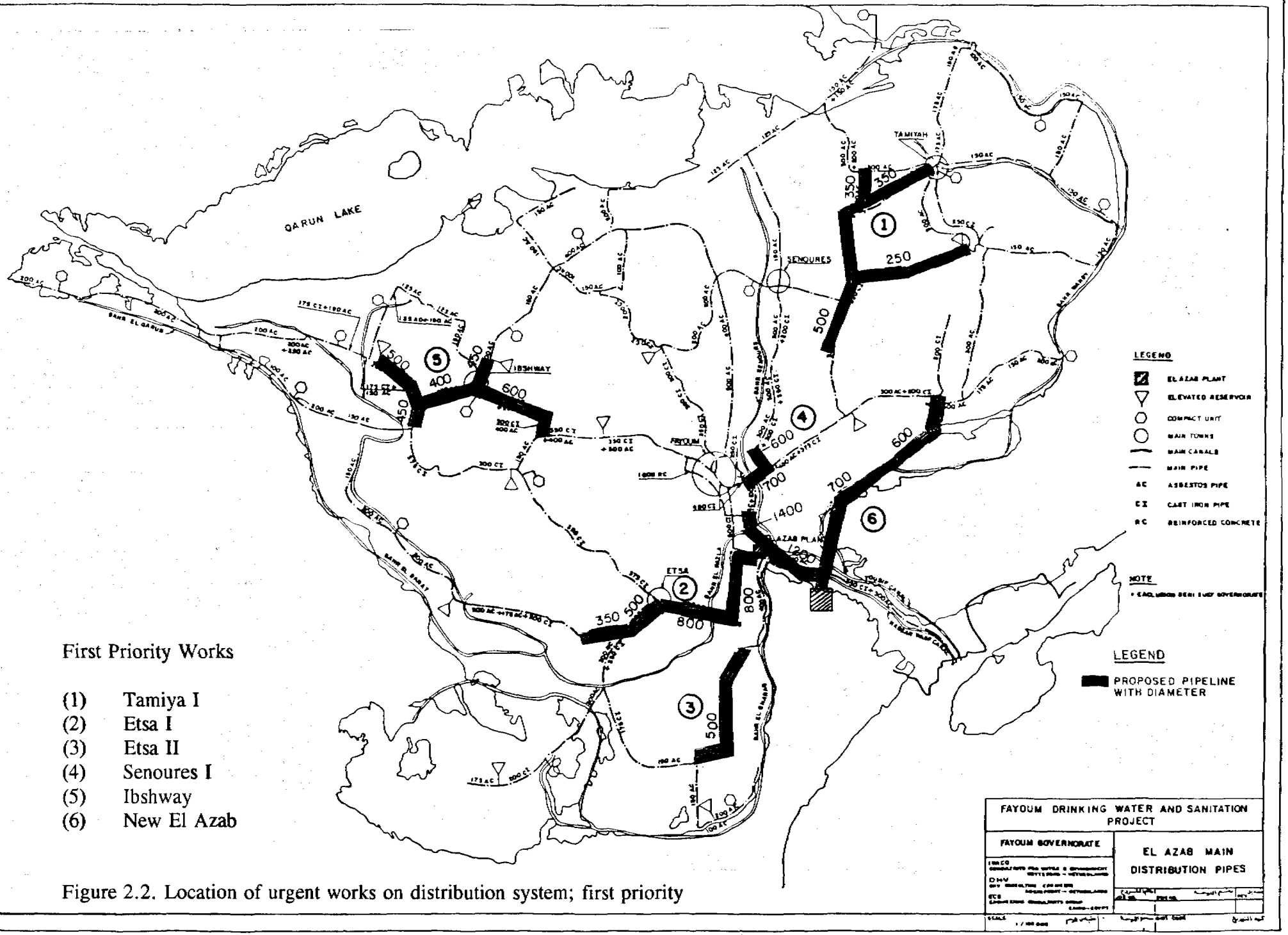


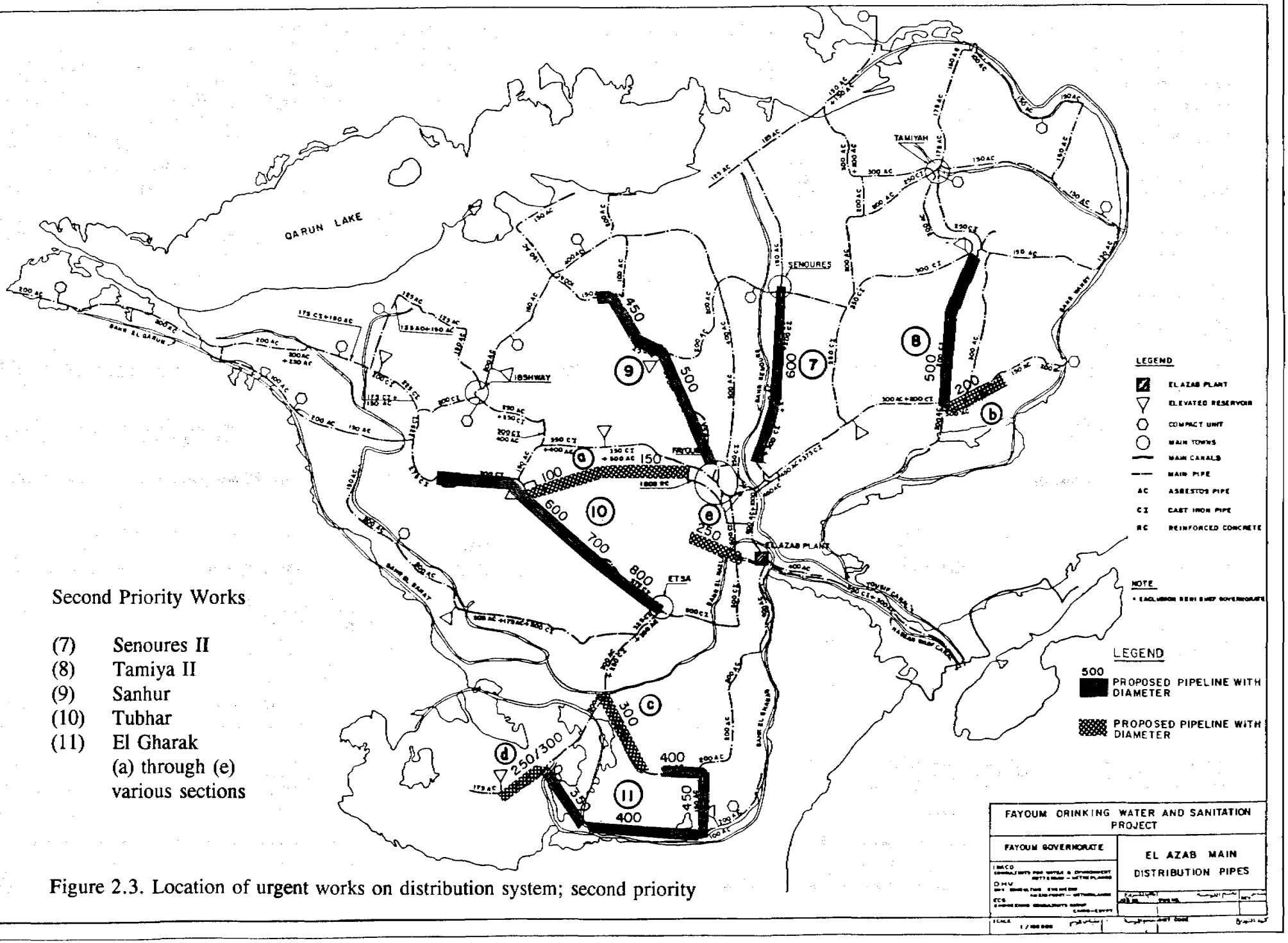
Figure 2.1



First Priority Works

(1) Tamiya I
(2) Etsa I
(3) Etsa II
(4) Senoures I
(5) Ibshway
(6) New El Azab

Figure 2.2. Location of urgent works on distribution system; first priority



Second Priority Works

(7) Senoures II
(8) Tamiya II
(9) Sanhur
(10) Tubhar
(11) El Gharak
(a) through (e) various sections

Figure 2.3. Location of urgent works on distribution system; second priority

reduced drastically, while the water must become priced as from 1995. A proper maintenance system for public taps has to be established.

It is recommended that Local Units pay the bill for public tap water consumption as from 1995.

2.2 Operation and maintenance

O&M of production and the network have to be upgraded to a higher level of performance. This is to be achieved as follows:

- by reducing and simplifying routine administrative work and intensifying professional dedication;
- by developing new procedures and methods for operation and maintenance;
- by developing maintenance centres into more independent distribution districts;
- by recruiting new executive professional staff;
- through training and on-the-job guidance of personnel;
- through increased budgets for O&M.

2.3 Cost recovery and tariffs

Improved cost recovery will be achieved in two ways:

1. by increasing the volume of water sold, as percentage of total production;
2. by increasing the tariffs.

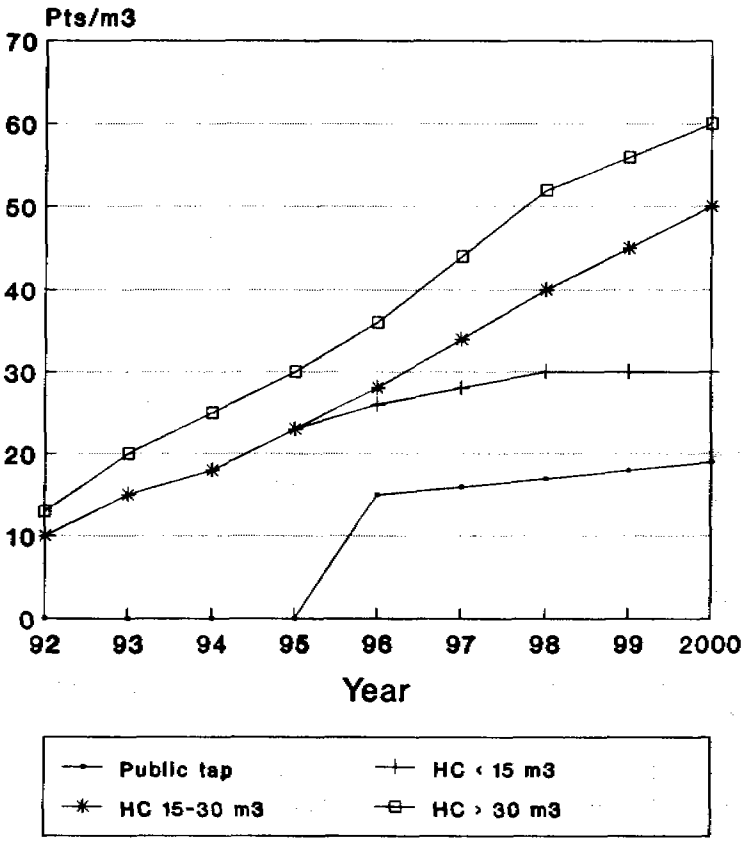
Volume of water sold is targetted to increase from the present 38% to 75% of production in the year 2000. This can be achieved by a reduction of technical losses (from 28 to 20%), by a reduction of free public tap water (from 18 to 4% of production), and by an increase of the revenue collection efficiency from 60 to 95%.

Tariffs should increase, but they should remain affordable to the majority of the population. As from 1995 not only a public tap tariff should be introduced, but also a low basic tariff for house connections, for the consumption of the first 15 m^3 per month. Tariffs become progressive over 15 m^3 monthly consumption. The new recommended tariff structure is shown in figure 2.4 and table 2.1. The financial analysis shows that, with the proposed tariffs for the year 2000, the recovery of O&M cost is possible.

The analysis also shows that full cost recovery will only come within reach of El Azab beyond the year 2000. The basis for this will be laid in the remainder of this decade, when El Azab has the time to develop into an efficient organisation. Whether full cost recovery will be reached in 2002, 2005 or even 2010 will depend mainly on the socio-economic development of the region.

It is recommended that affordability of the population to obtain a water connection should be the main factor in policy decisions on the short term, coupled with full recovery of

DOMESTIC TARIFFS 1992-2000
Based on affordability



AVERAGE TARIFFS YEAR 2000
Based on affordability

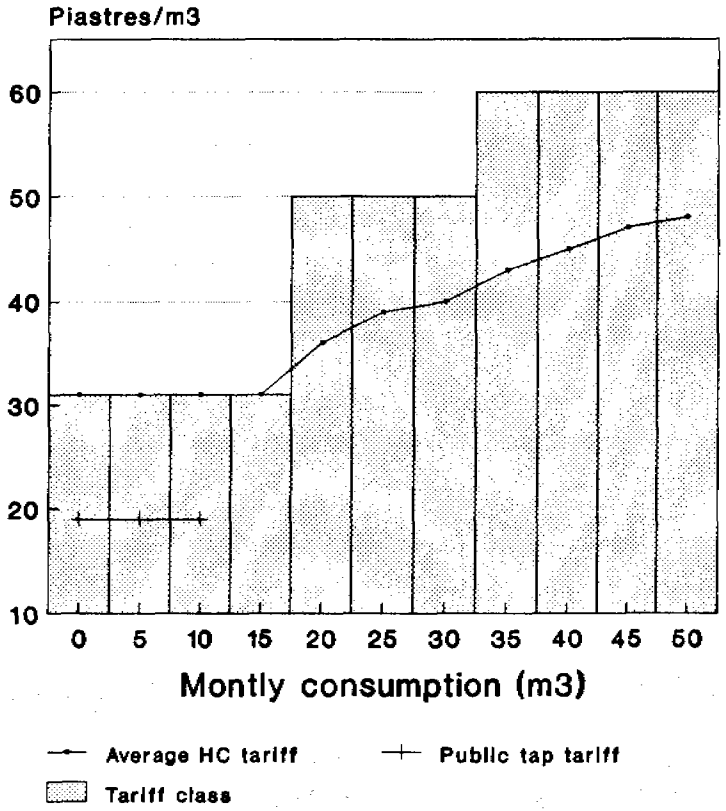


FIGURE 2.4

O&M costs. In the next decade financial autonomy can be pursued if socio-economic conditions allow so.

The proposed tariff structure for the period upto the year 2000 is shown in table 2.1. Upto 1995 the tariffs comply with the Decree of the Ministry of Housing. As from 1995/96 a new tariff structure should be introduced, with more differentiation in the domestic category, and less differentiation in other categories.

Table 2.1 Proposed tariff structure 1992-2000

Type of consumption	Consumption per month in m^3	Tariff class	92	93	94	95	96	98	2000
			Tariffs as per instr. from the Min. of Housing (10/5/93), valid upto 30/6/95				Recommended new tariff structure		
Domestic	< 15 m^3	I	n.a	n.a	n.a	n.a	0.26	0.30	0.31
House connections	< 30 m^3		0.10	0.15	0.18	0.23	n.a	n.a	n.a.
	15-30 m^3	I : < 15 m^3 II : 15-30 m^3	n.a	n.a	n.a	n.a	0.26 0.28	0.30 0.40	0.31 0.50
	> 30 m^3	I : < 15 m^3 II : 15-30 m^3 III: > 30 m^3	n.a 0.13	n.a 0.20	n.a 0.25	n.a 0.30	0.26 0.28 0.36	0.30 0.40 0.52	0.31 0.50 0.60
Public tap	< 10 m^3	IV	n.a	n.a	n.a	n.a	0.15	0.17	0.19
Non-Domestic	Governmental		0.20	0.25	0.32	0.40	n.a	n.a	n.a
	Private		0.23	0.30	0.38	0.50	0.60	0.80	1.0
Sanitation surcharge in % of water bill	Domestic		20	20	30	35	40	50	60
	Non-domestic		20	20	40	60	70	80	90

2.4 Customer and user information

This is presently non-existing but it will be a basic requirement for the future company. Health and hygiene education which is closely related to the supply of drinking water is not considered a responsibility of El Azab, but it is recommended that El Azab liaises with the Health Department for this purpose.

2.5 Organisational status

The change of the present status of El Azab is a number one priority which is at the basis of the total development process. If this requirement is not met on the short term, say by end of 1994, the development programme will meet a giant bottleneck and stumbling stone. If the required actions for organisational development cannot be taken because of administrative constraints, not only the development process will be stagnating but also financers will be reluctant to invest money in the required new projects.

The gap between present conditions and the future requirements is considerable. It is estimated that El Azab will need at least 5 years for its organisational restructuring process. The green light to start this process should be given by the Governorate, even without a change in legal status of El Azab. Within the framework of the existing responsibilities, the Governorate can already start, to charge El Azab with the basic preparations for the restructuring process.

The following phases towards sustainability are considered:

PHASE I: 1994-1996 ORGANISATIONAL RESTRUCTURING

Preparation of an organisational restructuring programme.
Changing the Legal Status of El Azab in order to provide more autonomy and flexibility for the restructuring process. Execution of first phase organisational reforms.

PHASE II: 1996-2000 O&M COST RECOVERY

Reaching cost recovery for Operation and Maintenance at improved technical performance and service levels.

PHASE III: 2000-2010 FULL COST RECOVERY

Full cost recovery, including depreciation and debt servicing. Independent investment decisions can be taken.

2.6 Investments and capital costs

Total investments in water supply capital works amount to a total of LE 203 million in the period 1994-2000. In addition a Technical Assistance budget is required of approximately 10% of the investments. Of the TA budget of LE 20.5 million it is estimated that LE 12.0 million will be required for detailed design and supervision works, LE 2.5 million for start-up O&M services of new installations and LE 6.0 million for organisational support and strengthening.

In table 2.2 the projected annual investments and TA requirements are presented. The investments should be externally financed by a mix of loans, grants and customer payments. The loans are only for financing infrastructure. Two types of grants are considered: investment grants, for the smaller works, and TA grants. It is recommended

to finance the entire TA requirement from grant financing.
No cash contribution from El Azab is taken into account.

The investments in house connections are made upfront by El Azab but paid back by the customers within a year. It is recommended that the house connection, including the meter, will be property of El Azab in order to standardise materials and procedures.

The proposed financing scheme is composed of 54.4% loans, 40.4% grants and 5.2% customer payments.

Table 2.2. Annual investments, TA requirements and financing plan (1994-2000), in million LE

INVESTMENTS	1994	1995	1996	1997	1998	1999	2000	TOTAL
Treatment plant		10.0	30.0	30.0	10.0	2.7		82.7
Distrib. mains		20.0	20.0	30.0	20.0	2.8		92.8
Sec. distribution	1.0	1.0	2.0	2.0	1.0	0.5	0.5	8.0
Public tap rehab.	0.5	0.4	0.3	0.3	0.2	0.2	0.1	2.0
House connections	1.0	1.0	2.0	3.0	3.0	1.6	1.0	12.6
Rehabilitation	1.0	1.0	1.0	0.5	0.5	0.5	0.5	5.0
TOTAL INVESTMENTS	3.5	33.4	55.3	65.8	34.5	8.3	2.1	203.1
TECHNICAL ASSISTANCE								
Detailed design and supervision	6.0	2.0	2.0	1.0	1.0			12.0
Start-up O&M					1.0	1.0	0.5	2.5
Organisational support	1.5	1.5	1.5	1.0	0.5			6.0
TOTAL TECHNICAL ASSISTANCE	7.5	3.5	3.5	2.0	2.5	1.0	0.5	20.5
TOTAL FINANCING REQUIRED	11.0	36.9	58.8	67.8	37.0	9.3	2.6	223.6
PROPOSED FINANCING								
Investment Loan		30.0	50.0	41.7				121.7
Investment Grant	3.5	2.4	4.3	22.1	31.5	5.3	0.5	69.8
TA Grant	7.5	3.5	3.5	2.0	2.5	1.0	0.5	20.5
Customers contrib.		1.0	1.0	2.0	3.0	3.0	1.6	11.6

2.7 Execution

The activities start in 1994 after the formal approval and adoption of the masterplan, which is expected to take place by the end of 1993. In the subsequent three years (1994 through 1996) an external support programme is required, which shall concentrate on:

1. preparing for organisational and operational independance of El Azab and the related development activities;
2. preparation of detailed designs for major investment works;
3. arranging the required investment funds;
4. improving cost recovery.

3. WASTEWATER SUMMARY

3.1 Sewerage and sewage treatment

The need for sewerage - and therewith for sewage treatment - is considerable. Targets for the year 2020 imply that 1.6 million people, living in 70 towns and villages of over 15,000 inhabitants, will be served. In order to reach this target the following approach is adopted:

a. complete integration of all existing and already planned projects in the programme;
b. priority setting for villages requiring sewerage;
c. applying an intermediate approach to sewerage and sewage treatment where possible, through modular sewerage;
d. applying clustering of villages for wastewater treatment.

Since it would be rather inefficient to have a separate wastewater treatment plant for every locality, twelve clusters of villages have been designed, with one central treatment plant in every cluster (see figure 3.1 and table 3.1). The number of required treatment plants in the governorate can thus be reduced significantly.

By the year 2020 most of the sewered villages would be connected to a regional treatment plant. The plants which have been planned already by NOPWASD for Fayoum can - with some relocations - cover the entire need for wastewater treatment capacity well beyond the year 2000. No new plants have to be considered on the short term.

At this moment, discussions are still ongoing between the Governorate and NOPWASD about the relocation of the planned treatment plants. The results of these discussions will determine the final configuration of the clusters and sub-clusters.

In order to decide which towns and villages should be served first, a priority ranking has been executed taking into account such factors as: population size, water service level, regional importance, socio-economic development and health and environmental impact.

Table 3.1 lists the towns and villages where sewerage projects have been - or are being - implemented, mostly under NOPWASD, some through ORDEV. The new proposals are listed in table 3.2. For the top eight villages, only sewer system and force mains are required, as treatment will take place at the plants listed in table 3.1.

At the bottom six villages (of table 3.2) the cheaper modular sewerage systems shall be constructed. These systems consist of a limited sewer network and a temporary treatment facility such as a communal septic tank plus upflow anaerobic filter, or lagoons. Expansion of the sewer networks and connections to a central treatment plant would follow at a later stage.

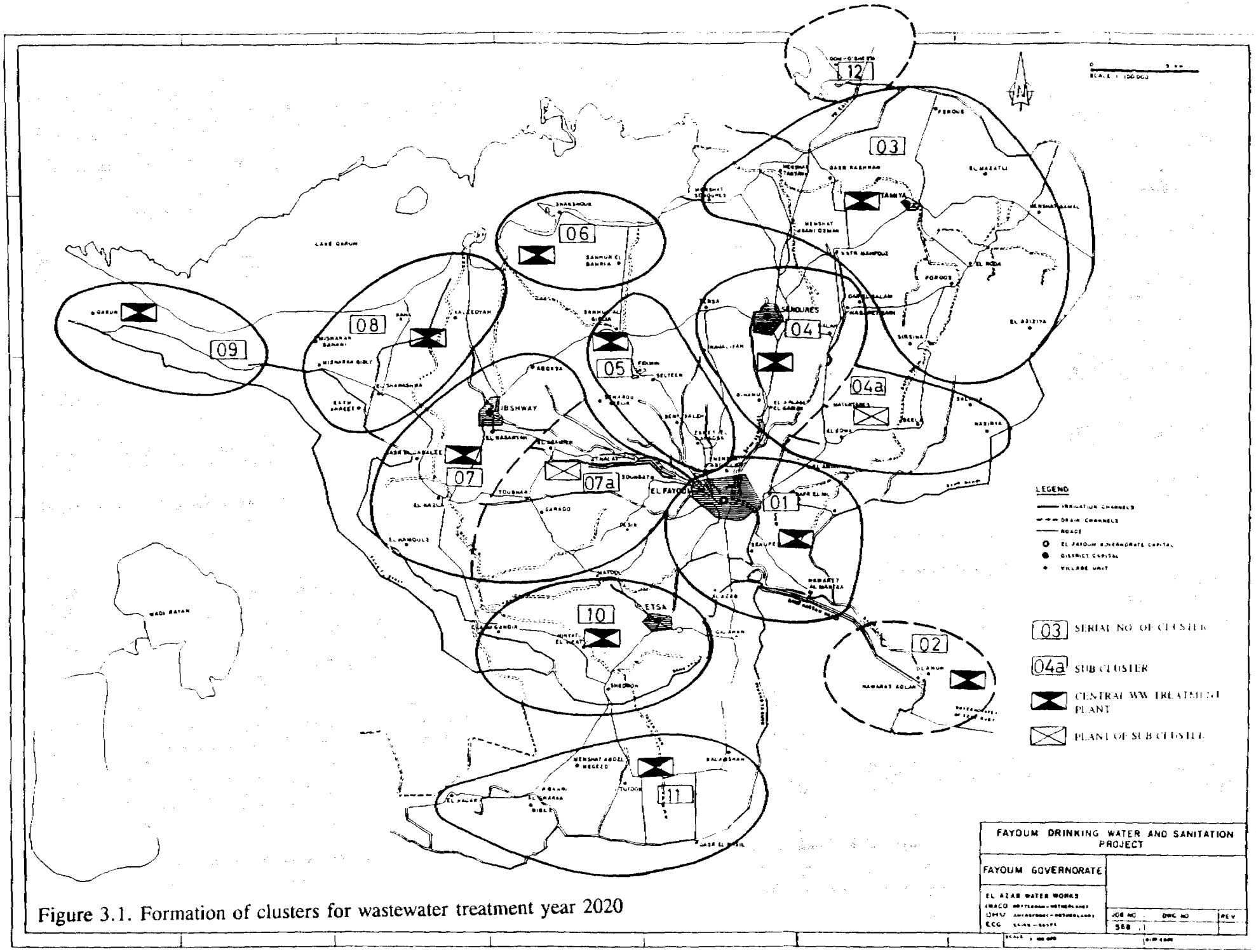


Figure 3.1. Formation of clusters for wastewater treatment year 2020

Table 3.1. **Sewerage and Sewage Treatment Projects: implemented, under construction or already committed.**

Town/village	Cluster	Remarks	Priority ranking
Fayoum city	01	being expanded; not in FaDWS	-
Tamiya	03	sewerage and treatment	2
Qas Rashwan	03	sewerage only	7
Senoures	04	sewerage and treatment	1
Matertaris	04A	sewerage only	11
El Edwa	04A	sewerage and treatment	17
Sanhur	05	sewerage and treatment	4
Fidimin	05	sewerage only	8
Ibshway	07	sewerage and treatment	3
El Agamien	07A	sewerage and treatment	10
El Nazla	07B	sewerage and treatment	24
Etsa	10	sewerage and treatment	5

Table 3.2. Sewerage Projects - New FaDWS Proposals

Town/village	Cluster	Remarks	Priority ranking
Tutoon	11	sewerage only; relocated treatment plant from Qasr Rashwan	6
Minya El Heat	10	sewerage only, treatment at Etsa	9
Qalamshah	11	sewerage only, treatment at Tutoon	12
El Roda	03	sewerage only, treatment at Tamiya	13
Tersa	04	sewerage only, treatment at Senoures	15
Garado	07A	sewerage only, treatment at Ibshway	16
Toubhar	07A	sewerage only, treatment at Ibshway	19
Naqalifah	04	sewerage only, treatment at Senoures	20
Dar El Salam	04	Modular sewerage	14
Beni Saleh	05	modular sewerage	18
Seela	04A	modular sewerage	21
Shakshouk	06	modular sewerage	22
Kahk	08	modular sewerage	23
Masaret Sawi	04	modular sewerage	25

With the above projects, around 250,000 people could be served by the year 2000 at a total investment of LE 95 million of which LE 40 million is needed for the new proposals. These first phase sewerage projects are shown in figure 3.2. In order to manage the new wastewater treatment plants and to initiate sewerage projects a well developed Sanitation Department at Governorate level is required! The present Fayoum Sanitation Department (FSD) needs to be strengthened for that purpose.

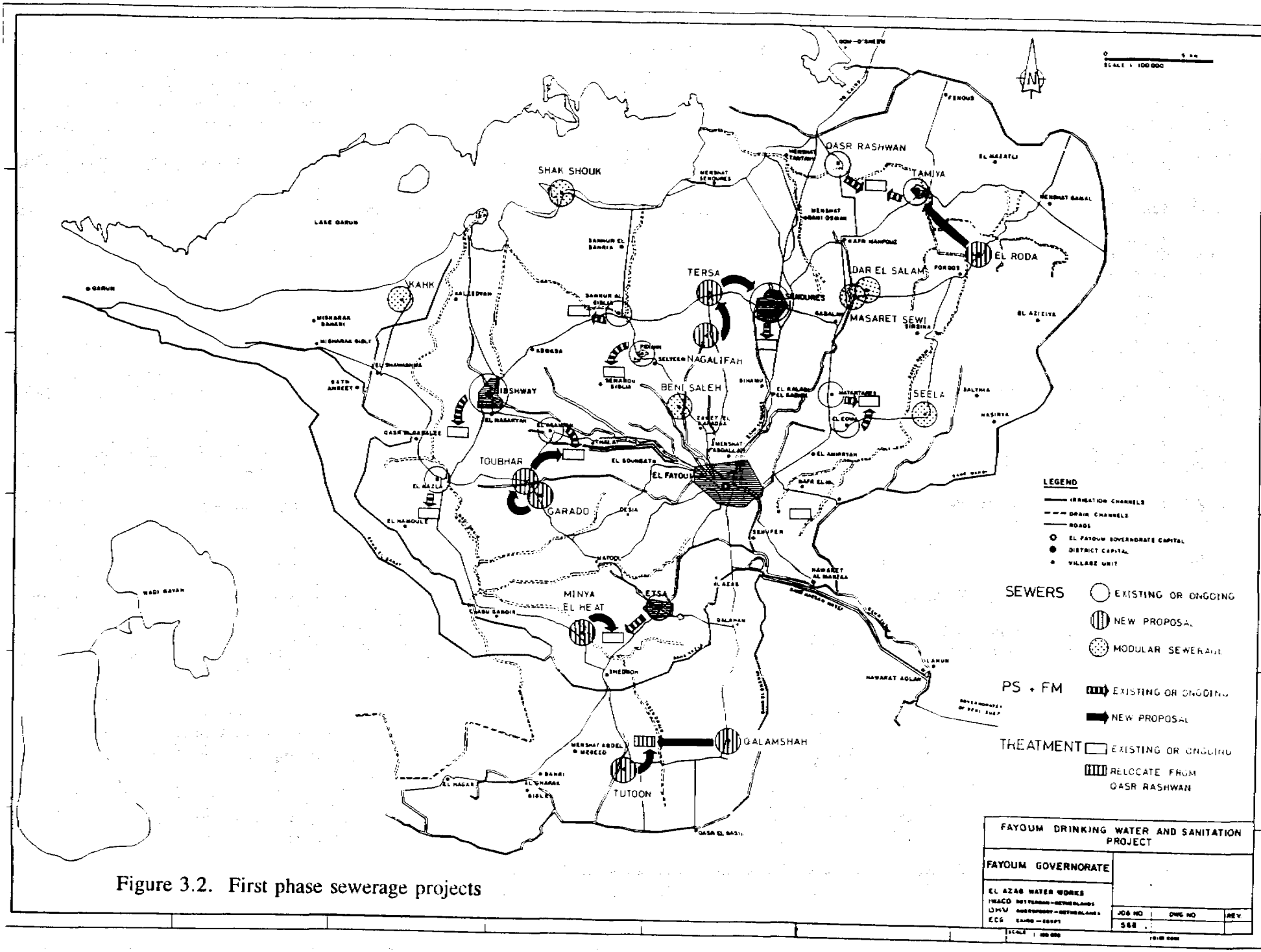


Figure 3.2. First phase sewerage projects

3.2 On-site sanitation

It was found in the surveys that some 50% of the rural population has no latrine nor a wastewater disposal facility. In hamlets this figure is even 60%. This condition prevails among the lower income groups, and mostly concerns households without piped water supply in the house.

There is a strong correlation between the ownership of a house connection for water supply and the access to sanitary facilities (78% access as compared to only 23% access of public tap users).

It is impossible to cover all the needs for wastewater disposal by sewerage. It is estimated that even by the year 2020, 40% of the population will still have to rely on the on-site sanitation (see figure 3.3).

Four fields of action were identified:

1. providing 1.4 million people (some 175,000 households) with an on-site sanitation facility (upto the year 2020). In order to achieve this target the following strategy should be developed:
2. development and promotion of alternative low-cost on-site sanitation technical options;
3. considerable extension of desludging facilities and improvement of the provided services;
4. intensification of hygiene education programmes, particularly directed at low income groups.

Upto the year 2000, some 300,000 people (40,000 households) should be served at a total cost of LE 30 million; for the larger part private household investments.

3.3 Operation and maintenance

There is limited experience with O&M of wastewater treatment plants or sewer systems in Fayoum (apart from Fayoum city). For treatment plants, O&M start-up services are required with adequate on-the-job training. After such a transition period O&M should be transferred to the FSD, who should employ a crew on each of their plants.

O&M of sewers is to be carried out at village/town level by a specialised department of the municipality. An O&M budget should be provided for each village, which can be covered from user fees.

3.4 Cost recovery

It has been analysed that recovery of O&M costs of sewerage can be realised by a 12.6% surcharge on the water bill. If O&M of treatment is to be included the surcharge should

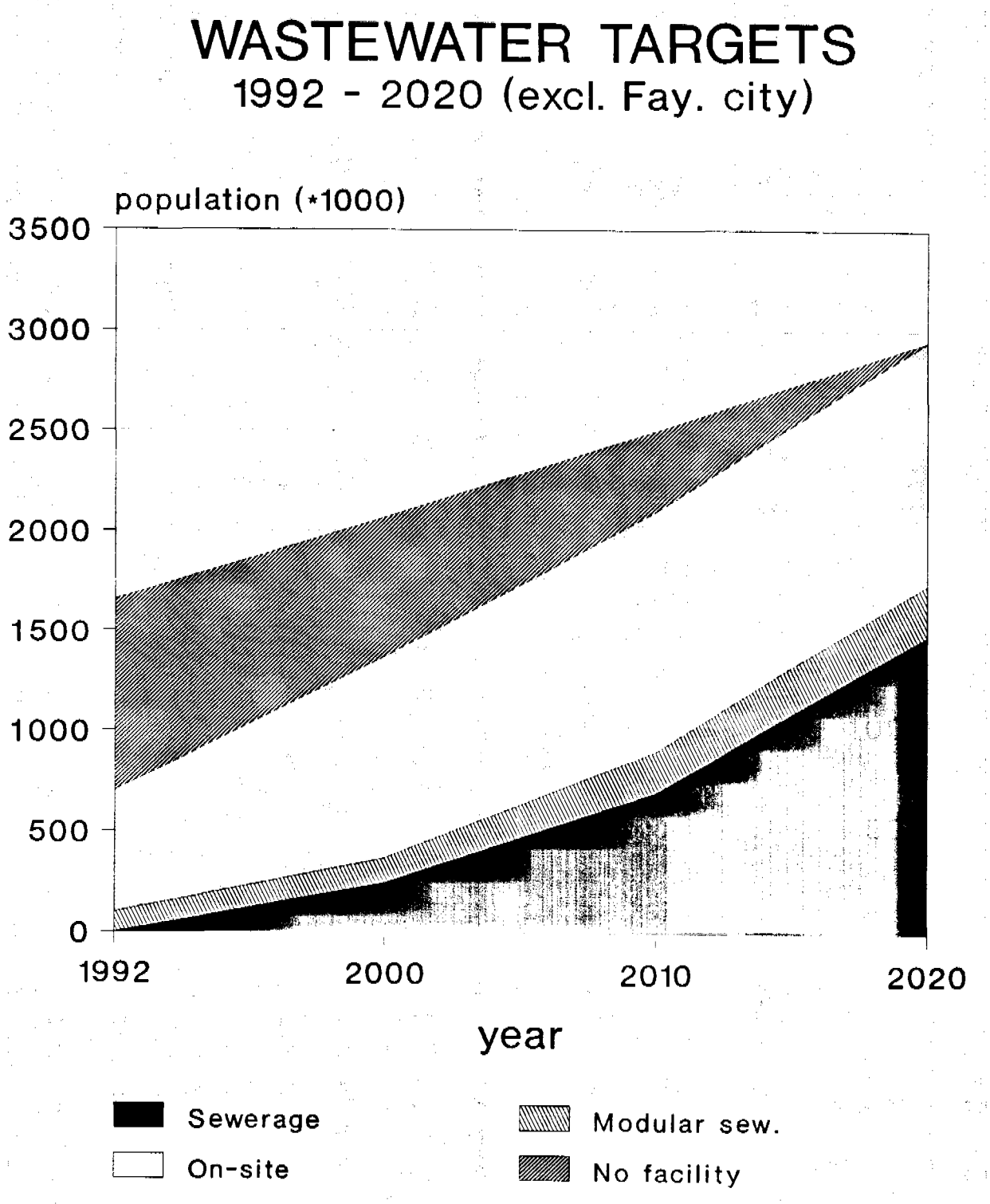

WASTEWATER TARGETS
1992 - 2020 (excl. Fay. city)
population (*1000)
3500
3000
2500
2000
1500
1000
500
0
1992
2000
2010
2020
year
Sewerage
On-site
Modular sew.
No facility

Figure 3.3

be 56.4%. It is recommended that the sanitation surcharge in the year 2000 should be 60% on the waterbill.

Investments in treatment plants and sewer systems should be entirely covered from external funds, except for the house connections. No recovery of capital costs is feasible until the year 2000.

3.5 Organisational development

With the projected increase of sewerage and sewage treatment in rural Fayoum, a well established Sanitation Department is required in the Governorate, which can gradually take over responsibilities from NOPWASD. A committment from the Governorate is needed to provide the required facilities for the FSD. Only then will an external support programme be meaningful.

In Egypt, responsibilities for the O&M of sewage treatment plants and sewer systems lie with the municipalities. This set-up is based on the concept that each municipality or Local Unit has its own wastewater treatment plant. In Governorates where in rural areas sewerage and sewage treatment have been introduced, the responsible agency at Governorate level, like the FSD in Fayoum, provides some support but is not responsible.

Since clustering for wastewater treatment is recommended in Fayoum, the treatment plants are not serving just one municipality, while the service area may even extend beyond the Markaz boundary. It is one of the reasons to develop the FSD as the central managing agency for all the regional wastewater treatment plants in Fayoum. Other reasons are better manageability and assurance of professionalism. It is an equivalent set up as for El Azab.

The responsibility for O&M should include the pump stations and force mains that run from the towns or villages to the regional treatment plants, but excludes the town or village sewer systems. O&M of sewers is a suitable responsibility for municipalities and Local Units, who could still receive initial guidance and technical support from the FSD, especially in the start-up phase.

Sewerage fees are recommended to be collected as a surcharge on the water bill. Therefore El Azab will collect the fees on behalf of the FSD.

The general set-up as described above is pictured in the chart of figure 3.4.

Until the year 2000, design, tendering and financing of especially the treatment plants will have to be arranged from the central level (NOPWASD). FSD however will indicate the requirements, based on the masterplan, and decide on capacity, location, phasing of construction etc. For sewerage projects FSD can be more independent, apart from the financing. FSD can independently prepare sewerage projects and have them constructed under their responsibility (through the Governorate), provided funding has been assured.

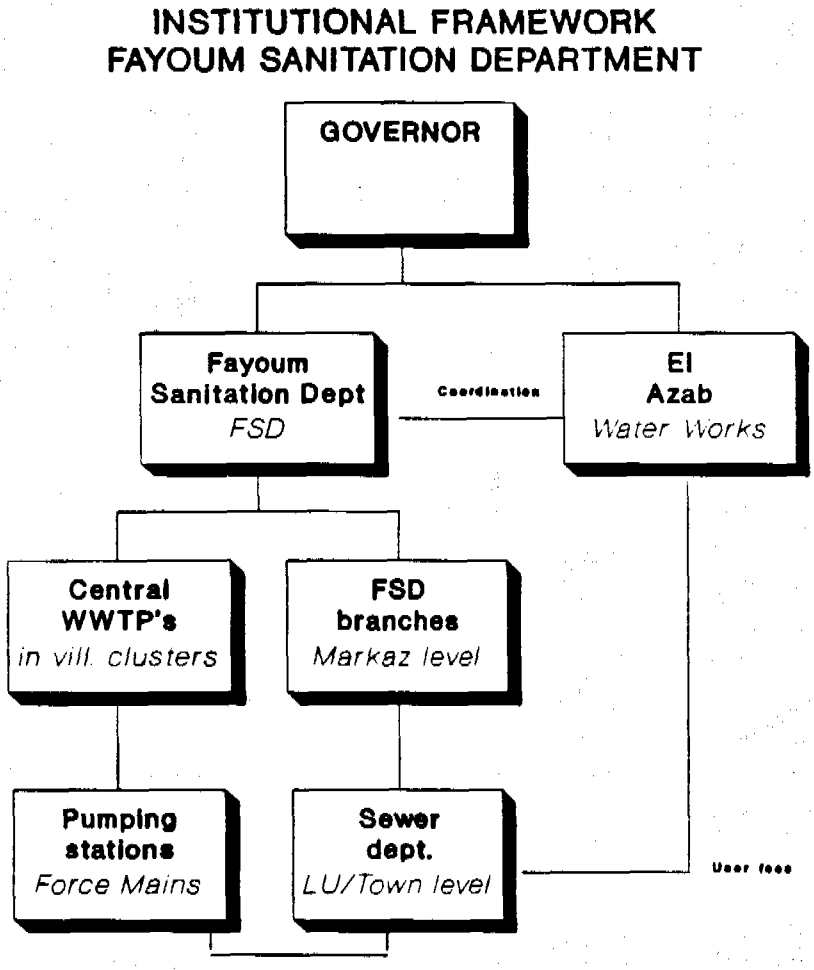

INSTITUTIONAL FRAMEWORK
FAYOUM SANITATION DEPARTMENT
GOVERNOR
Fayoum
Sanitation Dept
FSD
Coordination
El
Azab
Water Works
Central
WWTP's
in vill. clusters
FSD
branches
Markaz level
Pumping
stations
Force Mains
Sewer
dept.
LU/Town level
User fees

Figure 3.4

The following phasing of the organisational development process is proposed:

PHASE I: 1994-1996 ESTABLISHMENT OF THE FSD

The present FSD is still a rudimentary organisation. A few years are required to actually establish this organisation. The sections to be formed in this period are: planning, projects, personnel and training and finance.

PHASE II: 1996-2000 O&M AND COST RECOVERY

By the start of this phase it is expected that a few of the newly planned treatment plants are becoming operational. FSD will be responsible for their O&M, and will have to oversee sewerage operations at town/village level. At the same time cost recovery for O&M has to be ensured. The organisation will be expanded with "treatment operation" and "sewerage support" sections. The financial section will also be expanded.

PHASE III: 2000-2010 AUTONOMY AND INTEGRATION

FSD can become more autonomous and integration in the water company may be considered.

3.6 Financing of required investments

Investment requirements amount to approximately LE 144 million in the period 1994-2000, as specified in table 3.3.

In addition to investments in capital works, a TA budget is required of some LE 18 million in a period of six years, which is required for engineering services and organisational support. Community contributions amount to an estimated LE 33 million (23% of total), mainly in on-site sanitation facilities.

The remainder is to be financed externally from loans and grants. It is recommended to finance TA requirements entirely from grants.

The total loan amounts to LE 20 million, which could be disbursed at once. The investment grants amount to LE 72.6 million and could be disbursed in three installments.

It should be noted that it is not clear which financing arrangements have been made for the already committed projects. It is however quite certain that only funds for the treatment plants are available and not yet for the sewer systems.

Table 3.3. Annual investments, TA requirements and financing plan (1994-2000), in million LE

INVESTMENTS	1994	1995	1996	1997	1998	1999	2000	Community share	TOTAL
Committed projects	11.3	10.2	4.8	7.3	8.2	5.4	4.4	3.1	54.7
New 1st priority	7.8	4.3	3.4	3.5	2.8	4.5	2.6	2.5	31.4
New modular sew.	1.0	0.9	0.8	1.3	0.6	0.7		0.7	6.0
On-site sanitation	1.0	1.0	1.0					27.0	30.0
Desludging	1.0	1.0	1.0	0.8					3.8
TOTAL INVESTMENTS	22.1	17.4	11.0	12.9	11.6	10.6	7.0	33.3	125.9
TECHNICAL ASSISTANCE									
Detailed design and supervision	2.2	2.2	2.2	2.2	1.0	1.0			10.8
Start-up O&M			0.4	0.4	0.4	0.4	0.2		1.8
Organisational support	1.5	1.5	1.0	1.0	0.4				5.4
TOTAL TA	3.7	3.7	3.6	3.6	1.8	1.4	0.2		18.0
TOTAL FINANCING REQUIRED	25.8	21.1	14.6	16.5	13.4	12.0	7.2	33.3	143.9
PROPOSED FINANCING									
Investment Loan		20.0							20.0
TA Grant	3.7	3.7	3.6	3.6	1.8	1.4	0.2		18.0
Investment Grant	22.1		25.5		25.0				72.6
Community contr.									33.3

3.7 Execution

The activities start in 1994 after the formal approval and adoption of the masterplan, targetted for end of 1993. In the subsequent three years (1994 through 1996) an external support programme is required, which shall concentrate on:

1. assisting with establishing the FSD, and training its key staff;
2. preparation of detailed designs for priority sewer systems;
3. arranging the required investment funds for the 1st priority sewerage projects;
4. preparing for cost recovery.

APPENDIX

POPULATION AND MAP OF THE GOVERNORATE

APPENDIX:
POPULATION AND MAP OF THE GOVERNORATE

Population projection Fayoum: 1992-2020

Markaz	1992	2000	2010	2020
FAYOUM				
Urban	255,406	318,857	398,312	469,130
Rural	280,634	350,352	437,656	515,468
sub-total	*536,040*	*669,208*	*835,968*	*984,598*
TAMIYA				
Urban	35,047	43,754	54,657	64,375
Rural	190,396	237,696	296,928	349,719
sub-total	*225,444*	*281,450*	*351,585*	*414,094*
SENOURES				
Urban	66,152	82,587	103,166	121,509
Rural	247,045	208,419	385,273	453,772
sub-total	*313,198*	*391,005*	*488,440*	*575,281*
IBSHWAY				
Urban	41,518	51,832	64,748	76,260
Rural	381,591	476,389	595,100	700,905
sub-total	*423,109*	*528,221*	*659,848*	*777,165*
ETSA				
Urban	33,161	41,399	51,715	60,910
Rural	328,350	409,922	512,071	603,114
sub-total	*361,511*	*451,321*	*563,786*	*664,023*
TOTALS (rounded)				
Urban	431,000	538,000	673,000	792,000
Rural	1,428,000	1,783,000	2,227,000	2,623,000
GRAND TOTAL	**1,859,000**	**2,321,000**	**2,900,000**	**3,415,000**