

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
THE WATER SUPPLY AND SEWER SYSTEM UPGRADING
IN
MONIB, GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT**

MAY 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to a request from the Government of the Arab Republic of Egypt, the Government of Japan decided to conduct a basic design study on the Project for the Water Supply and Sewer System Upgrading in Monib, Giza City and entrusted the study to the Japan International Cooperation Agency (JICA).

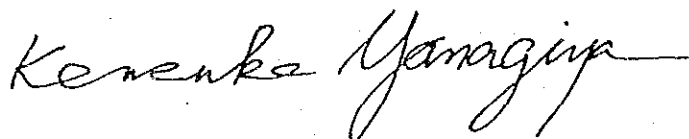
JICA sent to Egypt a study team headed by Mr. Haruo IWAHORI, development specialist of JICA, from November 23rd to December 27th, 1991.

The team held discussions with the officials concerned of the Government of Egypt, and conducted a field survey at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Egypt in order to discuss a draft report and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Egypt for their close cooperation extended to the teams.

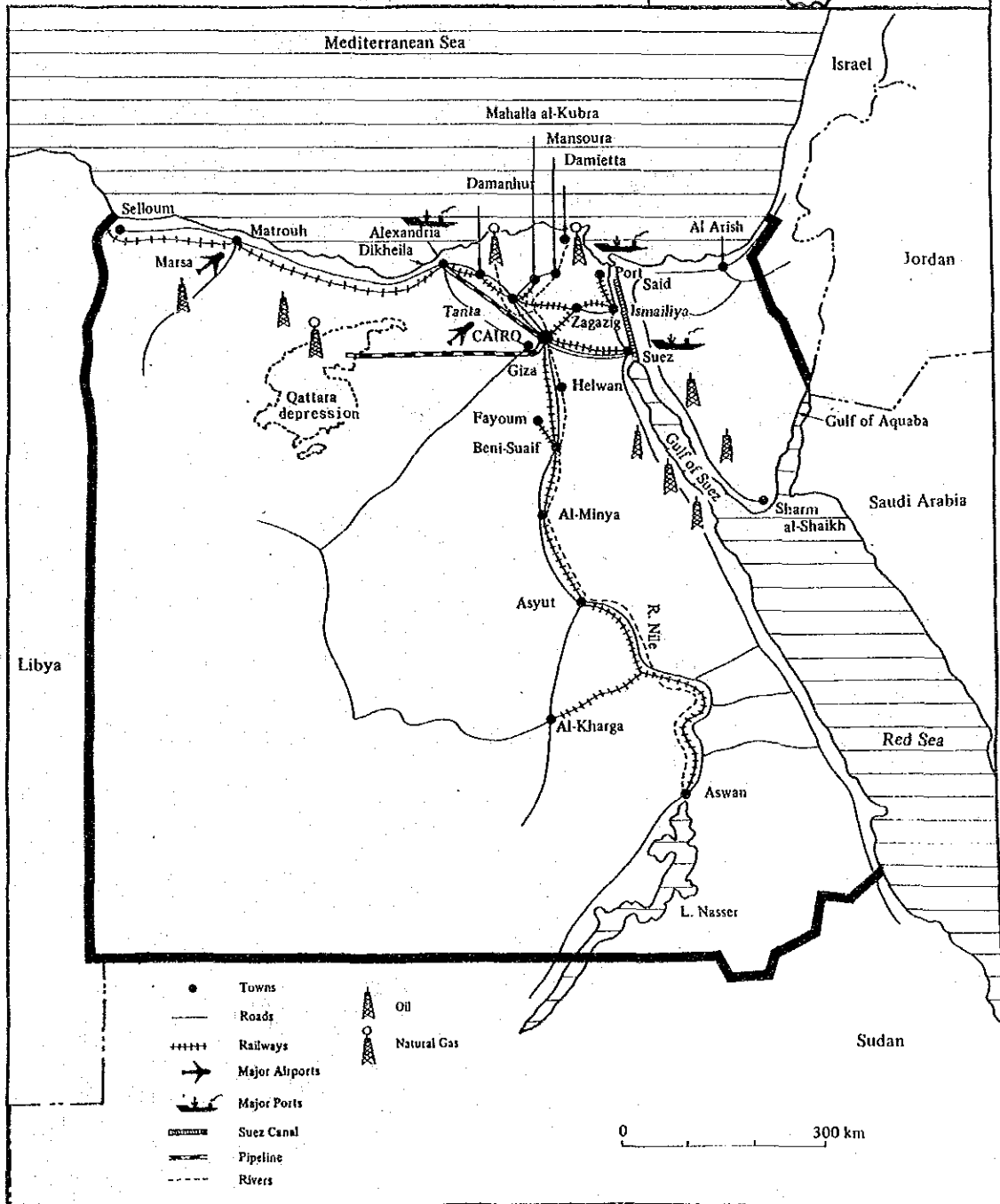
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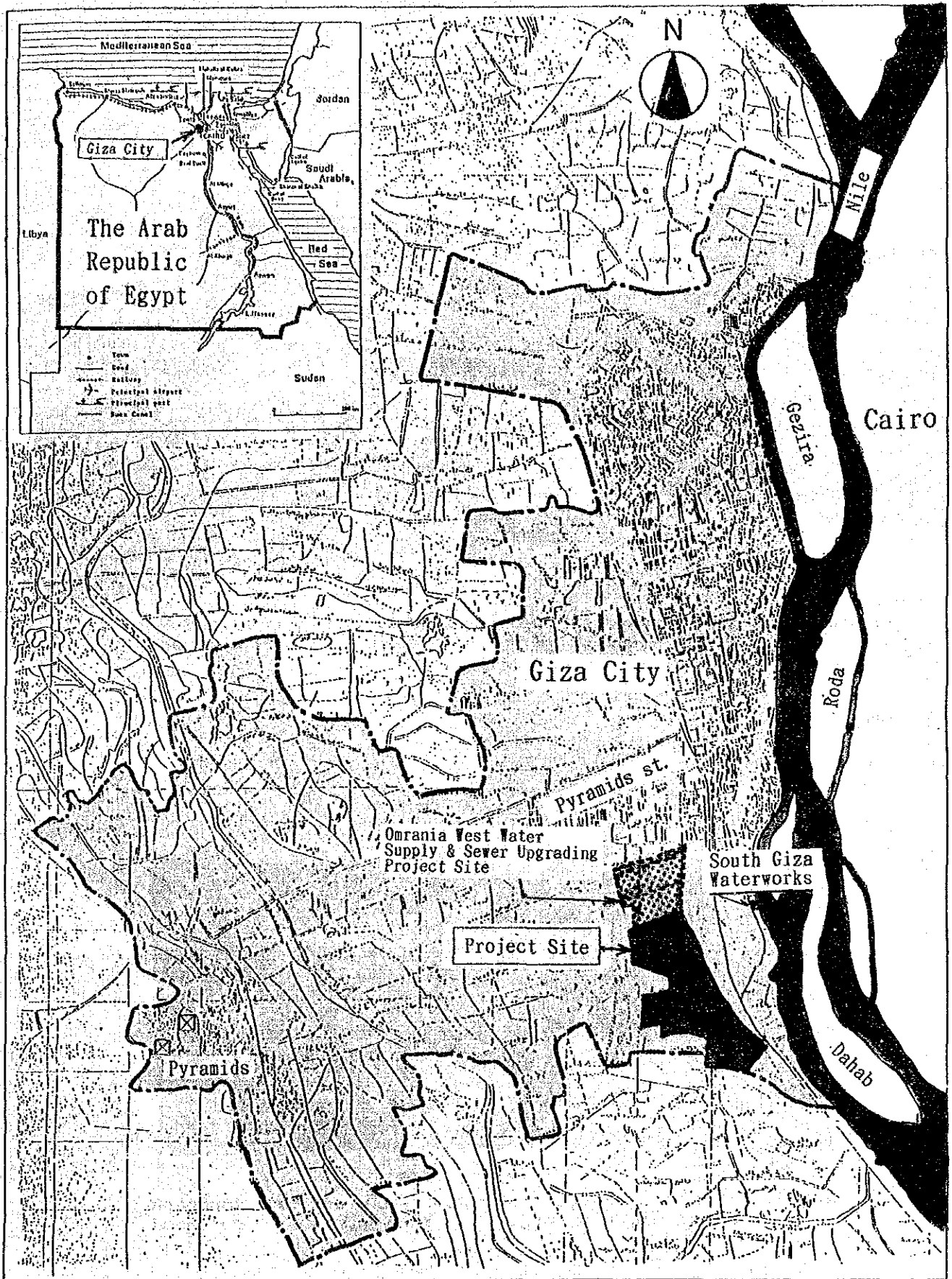


Kensuke Yanagiya
President

Japan International Cooperation Agency

Map of Egypt





Location of Giza City and Project Site



Water Supply Branch Line at the Cairo-Aswan Railway Crossing
Section (Work to be constructed by Japanese side)



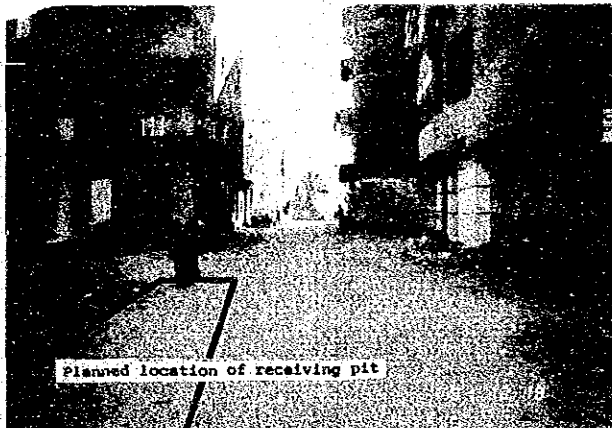
Aqueduct (to be constructed by Egyptian Side) and Planned
Location of Jacking Work Pit for Sewer Trunk Line



El Kasabgy Street
(Sewer trunk line to be
constructed by jacking method)



Osman Moharam Street
(Sewer trunk line to be constructed
by jacking method and buildings
standing just besides the road.)



Kordy Street
(Sewer trunk line to be constructed
by jacking method and buildings
standing just besides the road with
the existing sewer line laid GL-4m)

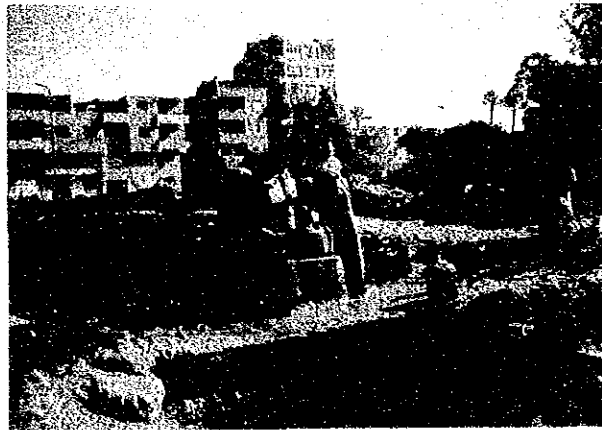
Branch Roads in the Project Site
(where the water and sewer branch
lines will be constructed)



General Conditions in the Project Site



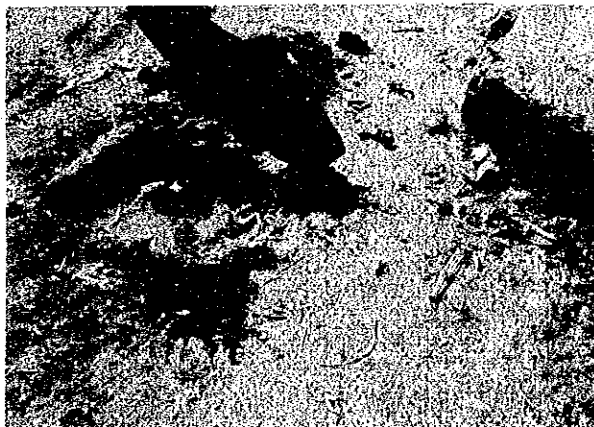
Well for Household



Public Taps
(Water transportation is
hard work for women and children.)



Unsanitary conditions resulting from
the outflow of sewage as well as
dumped garbage and refuse on the roads.



Sewage overflowing from
cesspit for household

SUMMARY

SUMMARY

The Arab Republic of Egypt (hereinafter referred to as Egypt) is situated at a nodal point of 3 continents and has been regarded as a strategic land since ancient times. While the total land area of approximately 1 million km² is some 2.7 times larger than Japan's land area, cultivable land accounts for a mere 2.9% of the total area and is almost limited to the Nile Delta and narrow strips of green belt on both banks of the Nile. The overwhelming majority of the population (estimated total population in 1991: approximately 54 million) live in these areas, resulting in an extremely high population density. The GDP per capita is estimated to be approximately 480 U.S. dollars (1991).

The Government of Egypt has prepared a number of national development plans, such as the Long-Term Perspective Plan covering a period of 20 years from 1983 to 2003, the First 5-Year Plan (1982-1987) and the Second 5-Year Plan (1988-1992). The priority targets of these national development plans are (1) consolidation of the economic strength, (2) improvement of the basic infrastructure and (3) appropriate distribution of the population. The Second 5-Year Plan particularly envisages an increase of the water supply capacity to urban areas from 8.6 million m³/day (1986/87) to 12.4 million m³/day by the end of the plan period as one of the most important components of infrastructural improvement.

The Greater Cairo Region consisting of Cairo, Giza and part of the Governorate of Qalyubiya is the center for political and economic functions. The Region's population has been rapidly expanding since the 1960's due to a large inward migration caused by a series of 4 Middle East wars and the inflow of local people seeking employment, reaching some 13.21 million in 1989. The construction of such public infrastructure as water supply, sewer facilities, road, etc., has failed to keep pace with the rapid population increase and local life and industrial activities have been severely affected by the over-population.

The provision of public infrastructure in Giza City, located in the Giza Governorate, lags far behind Cairo which is situated on the opposite side of the Nile. In the Monib District (Project Site) in particular where many low income people live (estimated population of some 133,000 in 1990 in an area of 185ha, resulting in a population density of 718/ha), the provision of public infrastructure is almost non-existent as shown by the water service ratio of approximately 5% and the lack of a sewer system due to the District's omission from urban development planning.

Under these circumstances, the Government of Egypt has prepared the Greater Cairo Region Long Range Urban Development Scheme which focuses on such pressing issues in the Greater Cairo Region as the appropriate distribution of the population and improvement of the transport network. In regard to the improvement of the water supply service in Cairo, a master plan

covering the whole area of Ciaro has been prepared with US assistance while for Giza City, a study on water supply in Giza City has also been completed with German assistance. In the case of the sewer service, the Greater Cairo Wastewater Master Plan has been prepared with the assistance of the US, Britain and other countries. In Cairo the East Bank Wastewater Project is currently implemented with British assistance and in Giza City the West Bank Wastewater Project is being implemented with US assistance as part of the overall attempt to gradually improve sewer services in the Greater Cairo Region. These plans and projects to improve the water supply and sewer services, however, mainly aim at the construction of key water supply and sewer facilities and the construction of service networks has been left to the own efforts of the Government of Egypt. Unfortunately, efforts to construct water supply and sewer networks have been hampered by the deteriorated public finance in Egypt and the low profitability of these services. As a result, the Government of Egypt has requested the provision of financial and technical assistance by foreign governments, including the Government of Japan.

In response to this request, the Government of Japan decided to provide grant aid for the Project for Omrania West Water Supply and Sewer Upgrading, Giza City (Omrania West Project) in 1988 and the project was completed in March, 1991. Despite the progress made by the Omrania West Project, however, the water supply and sewer facilities in Giza City are still far from satisfactory, prompting the Government of Egypt to make a further request to the Government of Japan for the provision of grant aid for the Project for Water Supply and Sewer System Upgrading in the Monib, Giza City (the Project).

The Government of Japan decided to conduct a preliminary study for the Project to ascertain the appropriateness of the Project and to examine the possibility of providing Japan's grant aid for the Project. Commissioned by the Government of Japan, the Japan International Cooperation Agency (JICA) sent the Preliminary Study Team to Egypt for the period between June 28 and July 12, 1991.

Having confirmed the appropriateness and scope of the Project through the Preliminary Study, the Government of Japan then decided to conduct the Basic Design Study on the Project, as requested by the Government of Egypt, with a view to preparing ① a water supply facilities construction plan, ② a sewer facilities construction plan and ③ a plan to provide materials for water supply and sewer branch lines.

Following this decision, JICA sent the Basic Design Study Team to Egypt for the period between November 23rd and December 27th, 1991. JICA again sent the same team to Egypt for the period between April 14th and April 25th, 1992 to explain the contents of the Draft Final Report to the Egyptian side.

Through consultations with the Egyptian side, the Basic Design Study Team learned the present conditions of water supply and sewer services in Egypt and recognised the fact that inhabitants of the Project Site are forced to endure poor living and sanitation conditions caused by a chronic water shortage and the poor drainage of sewage, in turn the result of the much delayed construction of water supply and sewer facilities in the Project Site despite its being part of an important area for development in Egypt as part of the Greater Cairo Region. In addition, the Study Team confirmed the urgent need for implementation of the Project, covering an area of 185ha with a design service population of 247,000 (in the target year of 2010).

The Study Team also confirmed that the Government of Egypt has no plan to request assistance for the Project from foreign countries other than Japan, that the contents of the requested construction work [i.e., (1) water supply facilities: a) construction of a branch line (diameter: 500mm) at a railway crossing section, b) under-pressure drilling and tapping work (to connect an existing 1,000mm trunk line and a 600mm new branch line) and (2) sewer facilities: a) construction of a trunk line (diameter: 1,600-2,000mm) for approximately 1.8km] are in line with the pipe diameters, specifications and pipe lengths, etc., set by the relevant master plans prepared with the assistance of such foreign countries as the U.S., Britain, Germany, etc., and that the Japanese assistance for the sewer trunk line (section left undone due to the work being beyond the capability of technologies currently available in Egypt) would be particularly beneficial for enabling the use of upperstream sewer facilities already constructed by the Egyptian side. Furthermore, the Study Team confirmed the appropriateness of the Egyptian request as the materials of which provision was requested [i.e., (1) water supply facilities: a) materials for branch lines (diameter: 300-600mm), b) materials for branch lines (diameter: less than 300mm) and (2) sewer facilities: a) material for branch lines (diameter: 300-600mm), b) materials for branch lines (diameter: less than 300mm)] are essential for the improvement of water supply and sewer facilities throughout the Project Site.

In planning the contents of the Project, the evaluation results of the Omrania West Project were taken into consideration and the construction methods and sites were selected in view of avoiding adverse effects on local life, industrial and economic activities, traffic, living environment and existing buildings, etc., given the fact that the Project Site is a densely populated mixed area of residential and commercial quarters. It was also decided to make the maximum use of local materials, equipment and manpower as long as their local procurement or recruitment was deemed feasible in order to contribute to industrial growth, vitalisation of economic activities and increased employment in Egypt.

The outline of the Project, compiled by the Study Team on its return to Japan, is shown in the table below based on the field survey results.

Project Outline

Category		Item	Size
Water Supply Facilities	Construction	Branch Line	<ul style="list-style-type: none"> • Pipe jacking work with 500mm diameter pipes at railway crossing section (approx. 60m) • Ductile cast iron pipes with sleeve pipe method
		Under-Pressure Drilling and Tapping Work	<ul style="list-style-type: none"> • Connection between existing 1,000mm trunk line and new 600mm branch line (at 1 site)
	Provision of Materials	Materials for Branch Lines (Pipe diameter of 300-600mm)	<ul style="list-style-type: none"> • Total length of some 4.3km • Ductile cast iron pipes • Including ancillary facilities: gate valves, wash-out valves, air valves, fire hydrants and aqueduct
		Materials for Branch Lines (Pipe diameter of less than 300mm)	<ul style="list-style-type: none"> • Total length of some 33km • PVC straight pipes and cast iron pipe fittings • Including ancillary facilities: gate valves, wash-out valves, air valves and fire hydrants
Sewer Facilities	Construction	Trunk Line	<ul style="list-style-type: none"> • Pipe jacking work with 1,800-2,000mm pipes for a total length of some 1.8km • Reinforced concrete pipes for pipe jacking method
	Provision of Materials	Materials for Branch Lines (Pipe diameter of 300-600mm)	<ul style="list-style-type: none"> • Total length of some 5.5km • Clay pipes
		Materials for Branch Lines (Pipe diameter of less than 300mm)	<ul style="list-style-type: none"> • Total length of some 27km • Clay pipes

Note: The construction of water supply and sewer branch lines using materials provided by Japan will be conducted by the Egyptian side.

On the Egyptian side, in the Project, Giza Governorate will be the responsible and coordinating organization and Giza City will be the executing organization. The new facilities will be immediately transferred upon completion to Giza City which will further transfer the authority to control, operate and maintain these facilities to the Greater Cairo Water Supply Authority (GCWSA; total number of employees as of 1991: approximately 14,000) and the Greater Cairo General Organization for Sanitary Drainage (GOSD; total number of employees as of 1989: approximately 11,000).

Although both the GCWSA and GOSD have sufficient manpower, equipment and technical ability to properly maintain the new facilities, their budgets have been in the red in recent years because of the repayment of interest on foreign loans and other debts, having been supplemented by government subsidies and loans by the National Investment Bank, etc. In order to improve the financial situation, the Government of Egypt plans to increase the water charge to the break-even level (a rise of the current level of approximately 230%) and to impose a new sewer charge rate which will be approximately 30% of the water charge (currently 10%) by 1995.

The estimated annual operation and maintenance cost of the planned facilities is approximately 10,000 US dollars (some 33,000 LE) for the water supply facilities and 20,000 US dollars (some 66,000 LE) for the sewer facilities. As the available funds for the operation and maintenance expenditure of the planned facilities based on the revised charges are estimated to be approximately 17,000 US dollars (some 56,000 LE) for the water supply facilities and approximately 24,000 US dollars (some 80,000 LE) for the sewer facilities (on the grounds that the ratio of the operation and maintenance cost vis-a-vis revenue is some 25% for the water supply facilities and some 80% for the sewer facilities based on actual figures provided by the GCWSA and GOSD), the likely level of available funds will, therefore, be sufficient to meet the expected level of operation and maintenance expenditure.

Giza City will, however, be required to clearly indicate the contents of the assets of the facilities and their operation and maintenance methods at the time of transferring them to GCWSA and GOSD in order to ensure the efficient use of these facilities over a long period of time.

If the Project is implemented with Japan's grant aid, the main component of the work to be undertaken by the Egyptian side is the construction of water supply and sewer branch lines using materials to be provided by Japan and the estimated cost is some 6.5 million LE (1LE = approximately 40 yen as of February, 1992). On the other hand the periods required to complete the Project to be undertaken by the Japanese side, if implemented, are as follows.

From the signing of construction work to the completion of the Project : 12 months

The Egyptian side is required to secure, by the commencement of construction, all work sites including a temporary storage yard and access roads for construction, which are within the scope of the work to be undertaken by the Egyptian side, to communicate and coordinate with related ministries, agencies and organizations in Egypt to smoothly implement the Project in cooperation with the Japanese side and to conduct the construction of water supply and sewer branch lines using materials provided by Japan in coordination with the work to be undertaken by the Japanese side.

The direct effects of the Project through the construction of various facilities and provision of materials will be a stable supply of potable water and the sanitary discharge of sewage to the public sewer system. Assuming that the construction of branch lines using materials provided by Japan is completed by the end of 1995 by the Egyptian side, the average water supply volume will be some 70 ltr/person/day (currently 10-20 ltr/person/day) while the maximum sewage discharge to the public sewer system will be some 95 ltr/person/day (there is currently no public sewer system in the Project Site).

Implementation of the Project is expected to achieve various positive effects, including the liberation of inhabitants of the Monib District (estimated number of beneficiaries in 1995:

approximately 150,000) from poor and unsanitary living conditions; the liberation of women and children from the hard work of water transportation, improving living and health conditions, consolidation of medical and educational activities and the promotion of the creation of safe urban areas with the provision of fire hydrants, and to greatly contribute towards stable and improved living conditions and increased employment. It is, therefore, both highly significant and appropriate for the Project to be implemented with the grant aid of the Government of Japan.

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Location Map
Photograph
Summary

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ABBREVIATIONS

AD	Datum Level at Alexandria
CWO	Organization for the Execution of the Greater Cairo Wastewater Project
E/N	Exchange of Notes
GCWSA	Greater Cairo Water Supply Authority
GDP	Gross Domestic Product
GNP	Gross National Product
GOSD	Greater Cairo General Organization for Sanitary Drainage
ha	hectare
ISO	International Organization for Standardization
JICA	Japan International Cooperation Agency
JIS	Japan Industrial Standard
LE	Egyptian Pound
NOPWASD	National Organization for Potable Water and Sanitary Drainage
O & M	Operation and Maintenance
OJT	On the Job Training
USAID	United States Agency for International Development

Definitions of Certain Technical Terms Used

The technical terms in this report are defined as follows.

Water Supply Facilities

Water Supply Trunk Line : water trunk line to supply water from a waterworks to an area of consumption and not directly connected to households
(diameter: 800mm or more)

Water Supply Branch Line : water supply line branching from the trunk line to supply water to an area of consumption and not directly connected to households
(diameter: 300mm-600mm)

Water Supply Branch Line : water supply line branching from the main branch line (diameter: 300mm-600mm) to supply water to households
(diameter: less than 300mm)

Sewer Facilities

Sewer Trunk Line : trunk line to forward sewage collected from an area of discharge to the lowerstream and not directly connected to households
(diameter: 1,200mm or more)

Sewer Branch Line : sewer line to forward sewage collected from an area of discharge to the sewer trunk line and not directly connected to households
(diameter: 300mm-600mm)

Sewer Branch Line : sewer line to discharge sewage from households to the sewer main branch line (diameter: 300mm-600mm)
(diameter: less than 300mm)

CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

The Government of the Arab Republic of Egypt (hereinafter referred to as Egypt) considers the consolidation of the national economic strength, improvement of the public infrastructure and appropriate distribution of the population to be the 3 main priority targets in its First 5-Year Plan (1982-87) and Second 5-Year Plan (1988-92) under the Long-Term Perspective Plan which covers the 20 year period from 1983 to 2002.

In Giza City in Giza Governorate, located on the opposite bank of the Nile to Cairo, improvement of the public infrastructure has been greatly delayed compared to Cairo. The poor public infrastructure is particularly noticeable in the Monib District (population of some 133,000) as it has been outside the area of urban development planning.

In regard to the water supply system in Giza City, while a relevant master plan has been prepared with the assistance of Germany (former West Germany), implementation has been delayed due to the lack of funds.

In contrast, a master plan to improve the sewer system in Greater Cairo, including Giza City, has been prepared with the assistance of the U.S., U.K., and others and the construction of major facilities (wastewater treatment plant, transfer pumping stations, sewer trunk line, etc.) is underway with a grant provided by USAID in the lowerstream of the system as part of a sewer improvement project on the west bank of the Nile. Improvement in the upperstream of the sewer system, however, has been left to the own efforts of the Government of Egypt.

While trying to improve the water supply and sewer systems in Giza City step-by-step in accordance with these master plans, the Government of Egypt has been forced to request the provision of financial assistance from donor countries, including Japan, because of the shortage of its own project funds.

In response to such request, the Government of Japan decided to provide grant aid for the project for Omrania West Water Supply and Sewer Upgrading, Giza City in 1988 and this project was completed in March, 1991.

Despite the advancements achieved following the completion of the Omrania West Project, the present water and sewer service ratios in Giza City are still low and the Government of Egypt, therefore, made a further request to the Government of Japan for the provision of similar grant aid for the Project for the Water Supply and Sewer System Upgrading in Monib, Giza City.

In response to this new request, the Government of Japan decided to conduct a preliminary study to determine the appropriateness of the Project as the basis for providing the requested cooperation and entrusted the Japan International Cooperation Agency (JICA) to conduct the

study. JICA accordingly sent the Preliminary Study Team to Egypt for the period between June 28th and July 12th, 1991. Following the decision to conduct the Basic Design Study on the basis of the findings of the Preliminary Study, JICA then sent the Basic Design Study Team headed by Mr. Haruo Iwahori, Development Specialist, JICA to Egypt for the period between November 23rd and December 27th, 1991. A list of the Study Team members and the schedule of the field survey are given in Appendix 1 and Appendix 2 respectively.

The objectives of the Basic Design Study were to obtain a correct understanding of the contents of the Egyptian request relating to the Monib District, Giza City, i.e., (1) construction of water supply facilities, (2) construction of sewer facilities and (3) provision of materials for branch lines for both the water supply and sewer systems, (4) examination of the South Giza Waterworks Expansion Project planned by the Government of Egypt in order to properly confirm the possible effects of the Project and its suitability as a grant aid project to be financed by the Government of Japan.

The Study Team visited related organizations in Egypt, including the Giza Governorate, Giza City, Greater Cairo Water Supply Authority (GCWSA), Greater Cairo General Organization for Sanitary Drainage (GOSD), etc., to explain the objectives of the study and to discuss the general conditions of water supply and sewer services in Egypt as well as Giza City. The Study Team also discussed the contents of the original request with the Egyptian side, reconfirming the background and objectives, etc., of the requested Project. Furthermore, it was confirmed that the Project is essential to supplement the master plan for the improvement of water supply and sewer services in Giza City. The Minutes of Discussions (M/D) (see Appendix 4) were concluded on December 15, 1991 based on the results of the discussions and studies on both the reconfirmed background and contents of the request. A list of those interviewed in Egypt is given in Appendix 3.

Following the signing of the M/D, the Study Team continued to collect and analyze data and information, to consult with related organizations and to conduct a series of field surveys. The Field Report was subsequently submitted to Giza City and other related organizations on December 24th, 1991 to confirm the basic technical issues for the basic design of the Project with the Egyptian side (Appendix 5).

Upon their return to Japan, the Study Team prepared the Basic Design Study Draft Final Report for the Project for the Water Supply and Sewer System Upgrading in Monib, Giza City (hereinafter referred to as the Project), taking into consideration the current conditions of water supply and sewer systems in Egypt, current conditions of project sites, relationship between the Project and master plans and the propriety, contents and scale of the grant aid. JICA then sent the Draft Final Explanatory Team to Egypt for the period between April 14 and April 25, 1992

to explain the contents of the Draft Final Report to the Egyptian side. Having received approval of the contents of the said Draft Report, the Basic Design Study Report has now been finalized.

A list of the team members, field survey schedule and M/D for the Final Explanatory Team are given in Appendices 1, 2 and 4 respectively.

CHAPTER 2 BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGROUND OF THE PROJECT

2-1 General Conditions on the Country

2-1-1 Geographical Location and Topography

Egypt is situated at the northeastern corner of the African Continent and is connected to the Asian Continent by the Sinai Peninsula. It is also closely situated to Europe across the Mediterranean and forms a nodal point for the 3 continents. As a result, Egypt has been regarded since ancient times as a strategic land and a key meeting place for Asian, Mediterranean and African influences. The national land is roughly confined into a square formed by latitude 32°N, the Mediterranean coastline, latitude 22°N, the boundary with Sudan to the south, longitude 25°E, the boundary with Libya to the west and longitude 35°E, running through the Sinai Peninsula and the Red Sea. Cairo, the capital of Egypt, is located on latitude 30°N which also runs through Yakushima in Japan.

While the total land area of 1,001,000km² is some 2.7 times larger than the land area of Japan, the cultivated area of approximately 28,600km² accounts for only some 2.9% of the total area. The Nile, which originates from Ethiopia and Uganda and which has a length of some 6,500km, is the world's second longest river. It runs through Egypt from south to north and splits into the 2 main effluents to the north of Cairo, forming a fertile delta which spreads towards the north with Cairo at the peak and Alexandria and Damietta at the 2 corners. Some 97% of the cultivated land is concentrated in the Nile Delta and the green belts on either side of the Nile where most people live. Both sides of the Nile have a great expanse of desert, i.e., the Western Desert extending to the Libyan Desert and the Eastern Desert extending to the Sinai Peninsula. Cultivation is impossible in these desert areas except at some of the scattered oases and only a small number of nomads live here.

The Greater Cairo Region, which constitutes Egypt's metropolitan area, consists of 3 areas, i.e., Cairo, Giza and part of Qaliyoubia. Excluding the area covered by the Nile and deserts, it has a total area of approximately 642km² (National Statistics, 1986) but has been sprawling into the green belt areas along the Nile and the hilly areas to the north, south and east of the Nile.

Apart from some hilly areas, the green belt areas along the Nile and the Nile Delta are practically flat.

The climate varies from one area to another but is generally characterized by severe hot and dry weather conditions. Based on these weather conditions, Egypt can be classified into the zones shown in Table 2-1.

Table 2-1 Climatic Zones in Egypt

Climate	Area	Typical Urban Centers
Mediterranean	Mediterranean Coast	Alexandria
Semi-Inland	Greater Cairo Region, Central Egypt	Cairo, Giza
Inland	Upper Egypt	Aswan, Luxor

The area along the Mediterranean coast is warm throughout the year and has relatively large rainfall in winter. While the mean temperature in the Greater Cairo Region is similar to that of Tokyo, the rainfall is extremely low and the summer is long and hot. The annual rainfall in the Upper Egypt area is almost zero and the desert climate means an enormous difference in the day-time and night-time temperatures and also consistently extremely high temperatures during the day.

2-1-2 Population

As already described in 2-1-1, the population of Egypt is highly concentrated in the Nile Delta and the narrow green belts along the banks of the Nile where the majority of Egypt's some 54 million people (1991 estimate) live. Consequently, the real population density in the Greater Cairo Region is as high as 400 persons/ha (as of 1991).

The nationwide population growth rate is as high as some 2.7% with a resulting annual population increase of 1.4-1.5 million. However, the extreme overcrowding and lack of additional housing sites in Cairo City have resulted in a slightly lower annual population growth rate of 2.6%. In comparison, the population growth is gaining in momentum in Giza City at an annual growth rate of some 3.0% as Giza City will become a convenient residential area for commuters to Cairo City with the completion of the Greater Cairo Region Ring Road, of which the section in Giza City is currently under construction. There has accordingly been accelerated land use conversion from farmland to housing sites. The Government of Egypt has, in fact, organized a committee to discuss and introduce appropriate measures to deal with the population explosion.

2-1-3 Socioeconomic Conditions

Egypt is estimated to have accumulated a foreign debt of some 49 billion U.S. dollars in fiscal 1989/90 (increased from some 45.7 billion U.S. dollars in fiscal 1988/89), of which the government debt is approximately 35 billion U.S. dollars. According to the calculation results of the IMF and World Bank, this is beyond Egypt's medium-term repayment capability. Egypt's budgetary deficit of some 2.7 billion U.S. dollars in fiscal 1990/91 or some 3 billion U.S. dollars in fiscal 1991/92 (estimated value) is also high.

The Government of Egypt introduced a sales tax and a tariff increase in May, 1991 to reduce the budgetary deficit and plans to withdraw government subsidies for main products shortly. An increase of energy prices, such as electricity and petroleum products, enforced at the same time as the new tax, has begun to financially squeeze the public.

The outbreak of the Gulf War resulted in a substantial reduction in tolls from the Suez Canal, tourism earnings and remittances by Egyptian workers abroad, the 3 main sources of hard currency. One estimate puts the total loss as high as 2.5 billion U.S. dollars. There has not yet been a full recovery in any of these 3 fields.

In view of the detrimental impact of the Gulf War on the Egyptian economy, the U.S. and Gulf states offered grant aid (writing-off of outstanding debts) after the War. Japan and E.C. countries also provided low interest commodity loans as well as project loans to alleviate the stress on the Egyptian economy. Nevertheless, ordinary citizens are still suffering from economic difficulties.

On its part, the Government of Egypt is making efforts to restore the health of the domestic economy and finance through loan negotiations with the IMF as well as discussions on debt reduction with the Paris Club (a non-official organization of creditor countries to discuss the repayment of officials debts of developing countries in cooperation with the IMF and BIS). The targets of the economic reform being implemented by the Government of Egypt since the Gulf War are listed in Table 2-2.

Egypt's estimated GDP in 1991 is some 25.9 billion U.S. dollars, i.e., some 480 U.S. dollars per capita, with an annual economic growth rate of 5.4% (fiscal 1989/90). The international balance of payments, central government budget, production targets and achievements of the Second 5-Year Plan (fiscal 1987/88 - 1991/92) and the trends of prices and the GDP are given in Appendix 6.

Table 2-2 Targets of Egyptian Economic Reform

No.	Target
1	Introduction of market economy
2	Promotion of stage-by-stage economic reform
3	Establishment of new market mechanism to create employment opportunities
4	Production increase by improvement of productivity and technological strength
5	Successful dealing with inflation and unemployment
6	Promotion of investment and removal of barriers
7	Population control
8	Promotion of exports and improvement of international balance of payments
9	Development of new technologies through cooperation between industries and universities

Source: Current Egyptian Society and Economy
Association for Promotion of International Cooperation in Japan

2-2 Outline of Water Supply and Sewer Services in Giza City

2-2-1 Administration and Finance in Giza City

The administration organization and financial strength of Giza City, which will be the implementation body of the Project on the Egyptian side, are outlined here.

(1) Organization

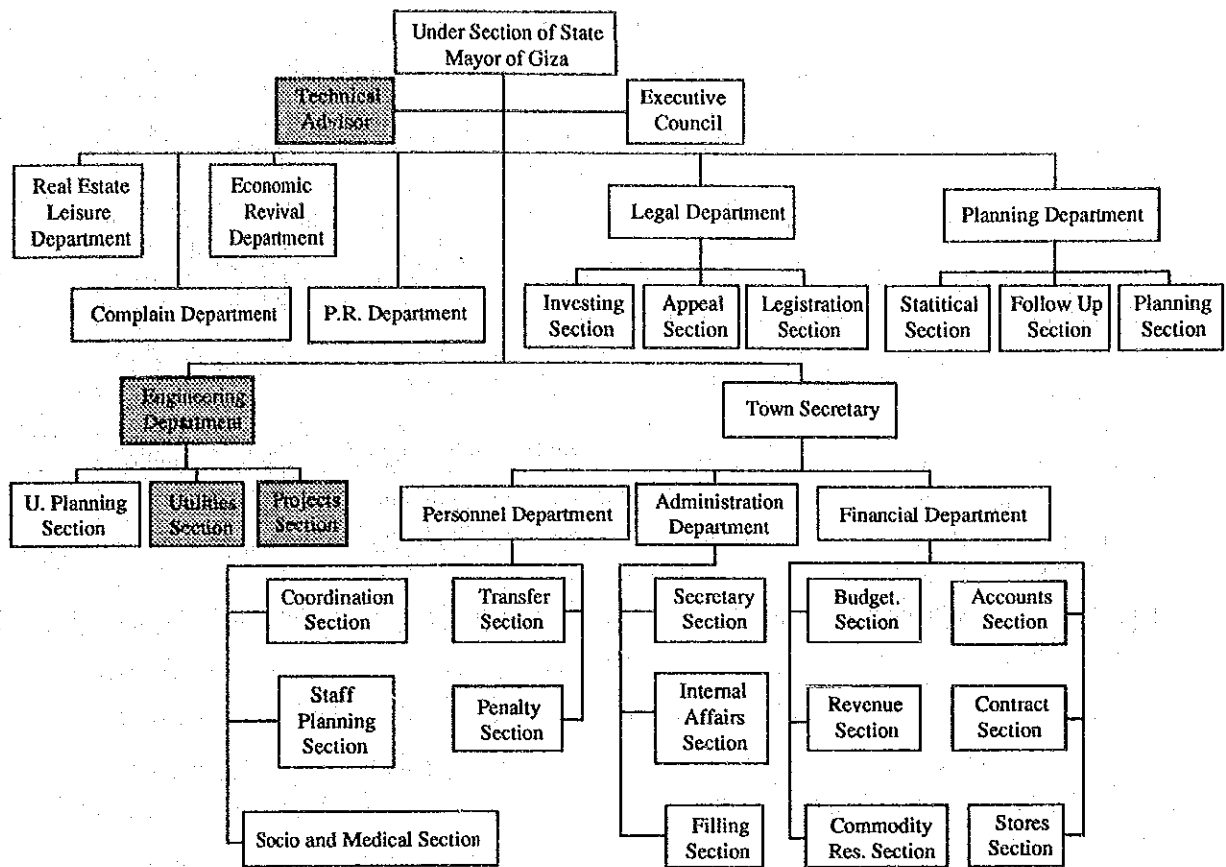
The project implementation body will be the Engineering Department, Technology and General Affairs Bureau of Giza City.

Fig. 2-1 shows the organizational set-up of Giza City while Table 2-3 shows the personnel plan for project implementation.

Table 2-3 Personnel Plan for Project Implementation of Giza City

Field of Work	No. of Staff Members
Technical Adviser	1
Project Administration	1
Civil Engineering	4
Architect Engineer	3
Public Relations & Others	6

Source: Giza City



Remarks: Shaded sections are those which will be involved in the implementation of the Project.

Fig. 2-1 Administrative Organization of Giza City

(2) Financial Situation

The revenue of Giza City consists of local revenue arising from local tax and other sources and finance in various forms from the central government. Table 2-4 shows the revenue and expenditure of Giza City in the last 3 years (fiscal 1989/90-1991/92). It is clearly shown that the revenue, including local tax, has been increasing in line with the expansion of business operations. However, the dependence on central government finance is very strong, for example, some 31% of the total revenue in fiscal 1989/90. The relevant ratio has been gradually declining but the city's present financial situation is still very tight.

Table 2-4 Annual Revenue and Expenditure of Giza City

Item	1989/90		1990/91		1991/92	
	Budget	%	Budget	%	Budget	%
Revenue						
Various Revenues	12,617,200	28.1	15,876,313	30.6	16,346,230	27.8
Project Revenue	15,682,442	35.0	18,201,600	35.1	31,680,826	53.8
Revenue of the Service Fund	2,820,670	6.3	2,930,640	5.7	3,290,160	5.6
Finance from National Budget	13,718,201	30.6	14,844,000	28.6	7,540,000	12.8
Total	44,838,511	100.0	51,852,553	100.0	58,857,216	100.0
Expenditure						
Wages	4,320,500	9.6	5,444,667	10.5	6,680,135	11.3
Administration Expenses	3,260,450	7.3	3,410,560	6.6	3,420,650	5.8
Capital Expenses	16,172,560	36.1	18,236,450	35.2	18,420,680	31.3
Housing Projects Expenses	18,174,200	40.5	20,734,200	39.9	22,860,430	38.9
General Services Fund Expenses	2,910,801	6.5	4,026,667	7.8	7,475,321	12.7
Total	44,838,511	100.0	51,852,553	100.0	58,857,216	100.0

Source: Giza City

2-2-2 Outline of Water Supply Service

(1) National Outlook of Water Supply Service

Egypt's relatively high annual average population growth rate of some 2.7%, as described earlier in 2-1-2, is causing overcrowding in urban areas, including Giza City. Consolidation of the public infrastructure designed to cope with such population growth has been much delayed over the years due to the series of 4 Middle East wars.

According to national statistics, the national average rate of households served by water supply was 73.1% in 1986 but the service was under full capacity due to general deterioration and the lack of adequate maintenance of service facilities, including the service pipe network and waterworks. The deterioration and inadequate capacity of the waterworks mean that they cannot possibly meet the water demand, resulting in a serious water supply shortage. The water service ratio in Egypt as of 1986 is shown in Table 2-5.

Table 2-5 Water Service Ratio in Egypt

Area	Rate of Households Served by Water Supply
Nationwide	73.1%
Urban Area (Average)	92.4%
Rural Area (Average)	55.9%

Source: National Statistics, 1986

The Government of Egypt plans to alleviate the serious water shortage by increasing the water supply capacity in urban areas from 8.6 million m³/day to 12.4 million m³/day in its Second 5-Year Plan as part of its emphasis on the consolidation of the public infrastructure. In order to achieve this target, the Government of Egypt has divided the national water supply service into 3 service areas, i.e., Greater Cairo Region, Alexandria and other areas and a body responsible for the improvement of the water supply service has been established in each area under the jurisdiction of the Ministry of Reconstruction, New Communities, Housing and Utilities (hereinafter referred to as the Ministry of Reconstruction). Projects aimed at achieving this goal include the Alexandria Water Supply Improvement Project assisted by the Government of Italy, the Greater Cairo Water Supply Improvement Project assisted by the Government of Japan, etc. Some projects are already underway.

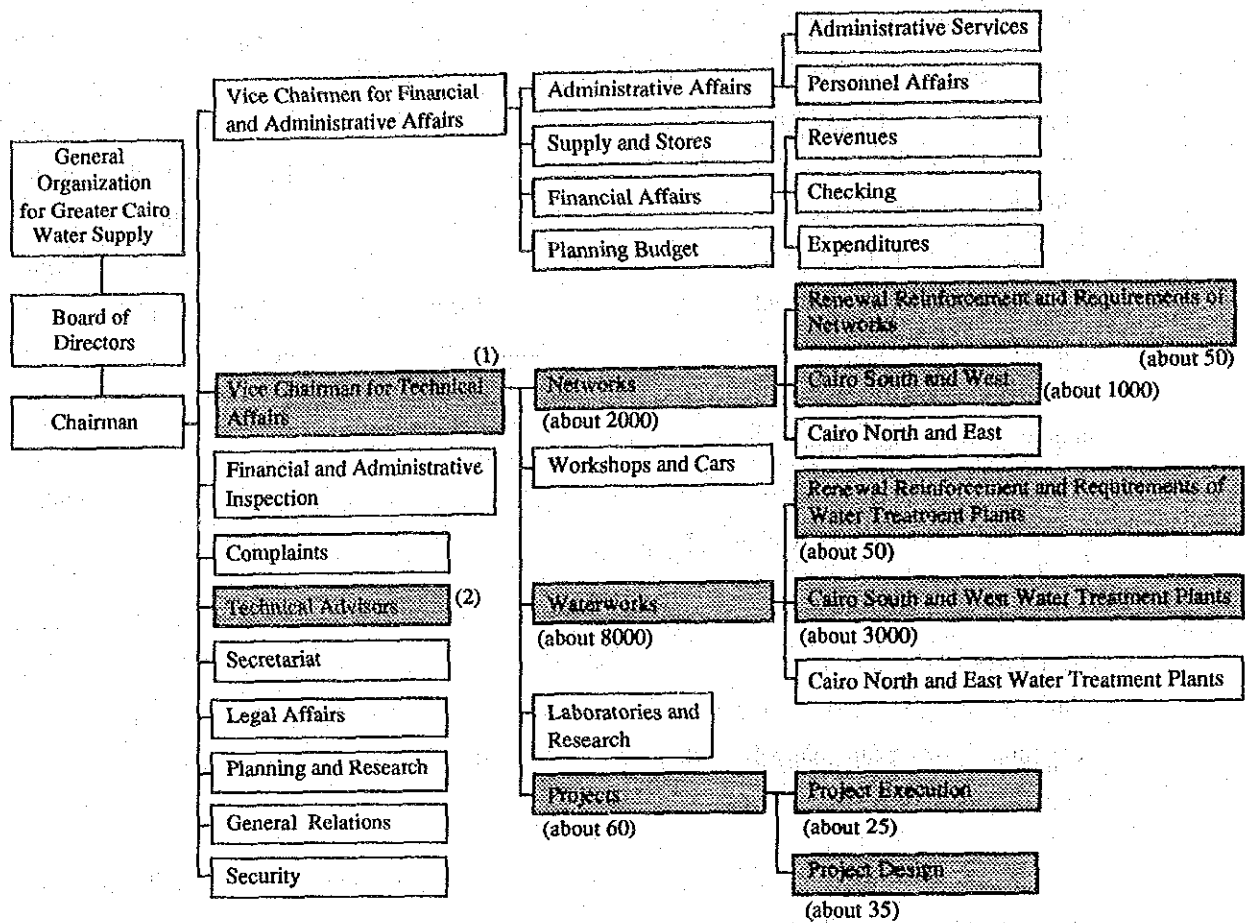
The body responsible for the water supply service in the Greater Cairo Region where Giza City is located is the Greater Cairo Water Service Authority (GCWSA) while the National Organization for Potable Water and Sanitary Drainage (NOPWASD) is responsible for water supply and sewer services for all areas in Egypt except the Greater Cairo Region and Alexandria.

NOPWASD employs some 1,000 people for the planning, construction and maintenance of water supply and sewer services and has been actively rehabilitating and constructing water supply facilities, mostly in terms of improving the water supply capacities of waterworks in accordance with the policy set by the Second 5-Year Plan.

(2) Outline of Water Supply Service in Greater Cairo Region

1) Related Administrative Organizations

The planning, operation and maintenance of the water supply service in the Greater Cairo Region, including the Monib District, Giza City, i.e., the Project Site, are conducted by GCWSA which was established to succeed the Greater Cairo Water Supply Company by a Presidential Decree in 1968. As described earlier in 2-2-2(1), GCWSA is under the jurisdiction of the Ministry of Reconstruction and its Board of Directors operate the service with some 14,000 employees (1991). The Project is mainly handled by Technical Advisers, Network Section, Waterworks Section and Projects Section with coordination by the Vice-Chairman for Technical Affairs.



- Notes :
- 1) Shaded sections are those which will be involved in the implementation of the Project.
 - 2) The total number of GCWSA employees is 13,735 as of December, 1991.
 - 3) Figures in brackets indicate the number of employees in sections which will be involved in the implementation of the Project.

Source : GCWSA

Fig. 2-2 Organization of GCWSA

2) Water Supply Situation

GCWSA has a service area of 380km² (December, 1991) in the Greater Cairo Region and its aggregate service line length is some 5,000km with a design service population of approximately 12 million.

While GCWSA claims a service ratio of some 85% in the Greater Cairo Region, it has only erected several public taps in Monib where water supply to individual households is virtually non-existent.

Waterworks under the operation by GCWSA have a daily water supply capacity of some 5.9 million m³ from 17 waterworks(13 of which use river water and 4 use wellfield). There are 4 such waterworks on the west bank of the Nile where the Project Site is located. The historical increase of the water supply capacity and the planned increase in the future for each waterworks are shown in Table 2-6 while the planned water supply volume and the required supply volume in the Greater Cairo Region are shown in Fig. 2-3.

Table 2-6 Water Supply Capacity of Waterworks in Greater Cairo Region: Past, Present and Future

Waterworks	(Unit: m ³ /day)			
	1986	1987	1991	2010
Embaba	115,000	300,000	345,200	745,000
Giza	143,000	120,000	125,300	122,500
South Giza	226,000	140,000	220,400	400,000
El Ahram (Wellfield)	30,000	30,000	29,200	60,000
Total	514,000	590,000	720,100	1,327,500

Source: GCWSA

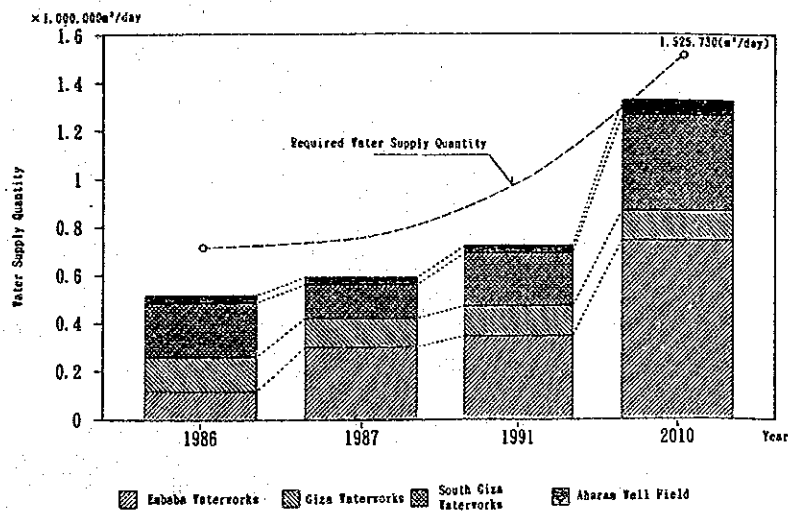


Fig. 2-3 Planned Water Supply Volume and Required Water Supply Volume in Giza City

As shown in Table 2-6, an expansion programme has been conducting since 1986 at the Embaba waterworks to increase the supply capacity. Nevertheless, the overall water supply capacity showed only a minor increase due to the deterioration in the performance of other waterworks. The supply capacity is currently some 70% of the required capacity (Fig. 2-3), indicating that the poor water supply capacity is the cause of the chronic water shortage in Greater Cairo Region.

All waterworks are forced to conduct overload operation to meet the demand. This is particularly noticeable at the South Giza waterworks which serves the Project Site. The present working water production is some 220,000m³/day, a +60% overload against the design capacity of 140,000m³/day, necessitating the urgent construction of a new facility as well as the maintenance and/or repair of the present facilities.

The water supply improvement plans for the Greater Cairo Region shown in Fig. 2-4.

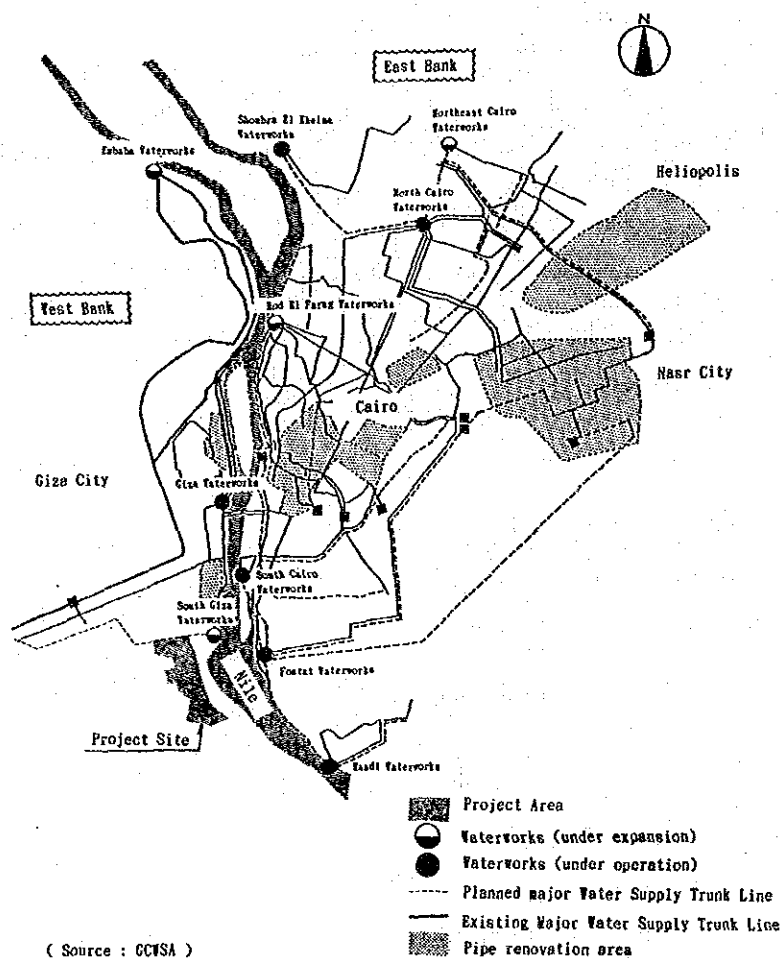


Fig. 2-4 Water Supply Improvement Plans for Greater Cairo Region

Table 2-7 shows the water supply performance in 1986 while Table 2-8 shows the target water supply volume in 2010 set by the master plan which was prepared by GCWSA with German assistance to improve the water supply situation in Giza City.

Table 2-7 Household Water Supply in Giza City (1986)

Daily Supply Volume (inclusive of Leakage Rate of approximately 23%)	Service Population (person)	Ratio (%)	Water Supply Volume (m ³ /day)
High Class : 390 ltr/person/day	240,300	9.5	93,717
Middle Class : 225 ltr/person/day	401,000	16.0	90,225
Low Class : 95 ltr/person/day	716,500	28.6	68,067
Communal Tap : 20 ltr/person/day	179,200	7.2	3,584
Unserviced Area	967,000	38.6	—
Total	2,504,000	100.0	255,593

Source: Study of Water Supply for Giza City

Table 2-8 Target Household Water Supply Volume in Giza City (2010)

Daily Supply Volume (inclusive of Leakage Rate of approximately 14%)	Service Population (person)	Ratio (%)	Water Supply Volume (m ³ /day)
High Class : 390 ltr/person/day	327,200	10.2	81,800
Middle Class : 160 ltr/person/day	559,700	17.4	89,552
Low Class : 120 ltr/person/day	2,012,300	62.7	241,476
Communal Tap : 20 ltr/person/day	41,100	1.3	822
Less Populated Area	270,000	8.4	—
Total	3,210,300	100.0	413,650

Source: Study of Water Supply for Giza City

3) Financial Situation of GCWSA and Water Tariffs

The financial situation of GCWSA has been worsening in recent years, particularly because of a rapid increase in expenditure which increased by some 130% in 1990 on the previous year. The main reason for this increase is the interest repayment of foreign loans and debt.

To improve the situation, GCWSA is currently implementing the Water Tariff Structural Readjustment Plan with the assistance of USAID and plans to increase the current charges by 10%-30% for domestic use, service use and commercial use and 35%-100% for other use from fiscal 1992/93. In case that the income of GCWSA increases about 150% by introducing new tariff system, it is expected to obtain about 40 million LE, contributing to the improvement of the current financial situation of GCWSA. The Government of Egypt plans to introduce a phased increase of the water charge within 3 years to fundamentally improve the financial situation of the water supply service. Table 2-9 shows the current and planned water tariff.

Table 2-9 Present Water Tariff and Proposed Increases

Kind of use	Fiscal Year		
	1991/92	1992/93	
1. Domestic Use			Rate of Increase (%)
- Upto 30m ³	0.085	0.10	18
- Excess of 30m ³	0.10	0.13	30
- Building works	0.25	0.28	12
2. Services Use			
- Religious Buildings, Bakeries, etc.	0.075	0.08	7
- Sporting Clubs	0.10	0.13	30
3. Companies and Commercial Shops			
- Small Factories, etc.	0.18	0.23	28
- Big Factories	0.25	0.31	24
4. Production and Investment Use (1st class hotel & restaurant, tourist facility, etc.)	0.35	0.55	57
5. Raw Water	0.06	0.08	33
6. Portable Water for nondomestic use			
- Government Factories	0.18	0.20	11
- Government Agencies	0.10	0.20	100
7. Filtered Water	0.08	0.10	25
8. Monthly fixed rate for houses built by governorate			
- 1 Room	0.75	1.00	33
- 2 Rooms	0.90	1.25	39
- 3 Rooms	1.20	1.50	25
- More than 3 Rooms	1.50	2.00	33

Source: GCWSA

2-2-3 Outline of Sewer Service

(1) National Outlook of Sewer Service

Improvement of the sewer service in Egypt, as in the case of the water supply service discussed in 2-2-2, was almost ignored until 1980 because of the lack of funds to consolidate the public infrastructure, in turn caused by a series of Middle East wars, despite the intensified population concentration in urban areas. Most of the sewer facilities today are operating at over-capacity, forced by the inflow of sewage of which the volume far exceeds the design capacities of these wastewater treatment plant.

Many cities, in fact, lack an adequate sewer network or wastewater treatment plants. The sewage from households is consequently drained to cesspits, causing poor living

and sanitary conditions in the forms of groundwater pollution and the overflow of sewage onto roads due to the inadequate drainage system of these cesspits.

The Government of Egypt invested 1,520 million LE (some 456 billion yen) in the sewer service sector during the First 5-Year Plan period (commencing in fiscal 1981/82) to improve the situation. Further investment of 2,296 million LE (138 billion yen) is planned in the Second 5-Year Plan (commencing in fiscal 1987/88) to improve the national average sewer service ratio from the current 25% to 85%.

While the said investment has improved the sewer facilities in the Greater Cairo Region, Alexandria and other urban centers, the promotion of the relevant projects has necessitated foreign aid because (1) the rate of population growth has exceeded the speed of sewer service improvement, (2) sewer system improvement is an expensive undertaking, etc.

As in the case of the water supply service, the sewer service is also divided into 3 areas (Greater Cairo Region, Alexandria and other areas) which have their own organization responsible for the provision of the sewer service.

The construction of main lowerstream sewer facilities in the Greater Cairo Region, with U.S. and British assistance is implemented and supervised by the Organization for the Execution of the Greater Cairo Wastewater Project (CWO). Upperstream facilities are planned and constructed by the Greater Cairo General Organization for Sanitary Drainage (GOSD) which is responsible for the operation and maintenance of all sewer facilities in the Greater Cairo Region, including those completed by CWO. In areas other than the Greater Cairo Region and Alexandria, NOPWASD (see 2-2-2(1)) is responsible for the sewer service in addition to the water supply service.

At present, NOPWASD is implementing as many as 46 projects for the improvement of sewer systems and/or the construction of wastewater treatment plants in accordance with the target set by the Second 5-Year Plan, having enlisted assistance from Italy, France and Australia, etc. The number of projects increases to 76 if small-scale projects are included.

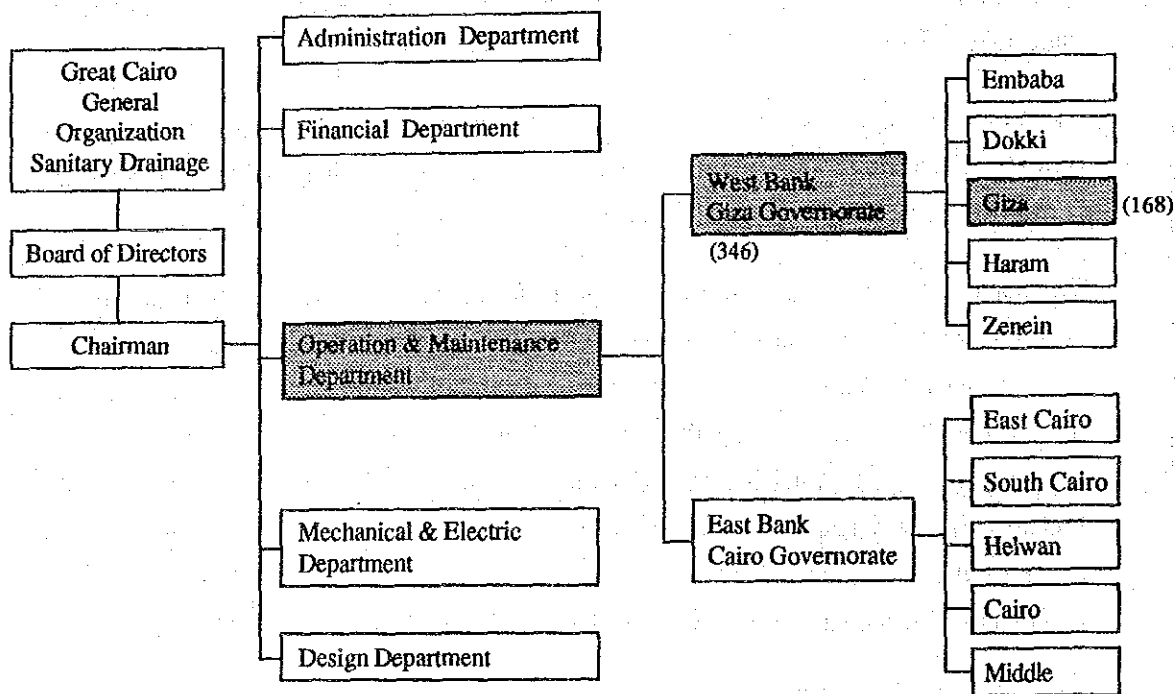
(2) Outline of Sewer Service in Project Site

1) Related Administrative Organizations

A Presidential Decree in 1981 divided the responsibility for the sewer service in the Greater Cairo Region, including the Project Site, which was formerly borne by the National Organization for Sanitary Drainage whose operation and maintenance

responsibility for sewer facilities covered all Egypt between the newly created CWO and GOSD with the former responsible for the construction and supervision of main lowerstream facilities and the latter responsible for the operation and maintenance of all sewer facilities in the Greater Cairo Region (see 2-2-3(1)).

GCWSA and GOSD are under the jurisdiction of the Ministry of Reconstruction and are run by the Board of Directors. It employs some 11,000 people (1989) with the organization shown in Fig. 2-5. As Fig. 2-5 indicates, responsibility for the implementation of the Project will fall on the West Bank Giza Governorate Section of the Operation and Maintenance Department.



- Notes :
- 1) Shaded sections are those which will be involved in the implementation of the Project.
 - 2) The total number of GOSD employees is 10,950 as of October, 1989.
 - 3) Figures in brackets indicate the number of employees in sections which will be involved in the implementation of the Project.

Source : GOSD

Fig. 2-5 Organization of GOSD

2) Sewer Service Situation

Data provided by GOSD on sewer facilities in the Greater Cairo Region are given in Table 2-10. As of 1985, an aggregate length of some 4,700km is operated and maintained by GOSD.

Table 2-10 Sewer Facilities in Greater Cairo Region

(as of 1985)

Facility	Size
1. Sewer Networks	
- Total Length of Network	approx. 4,600km
- Total Length of Collectors	approx. 117km
2. Main Pump Stations	
- Number of Pump Stations	8
- Total Capacity	180,840m ³ /hr
- Average Working Capacity	95,560m ³ /hr

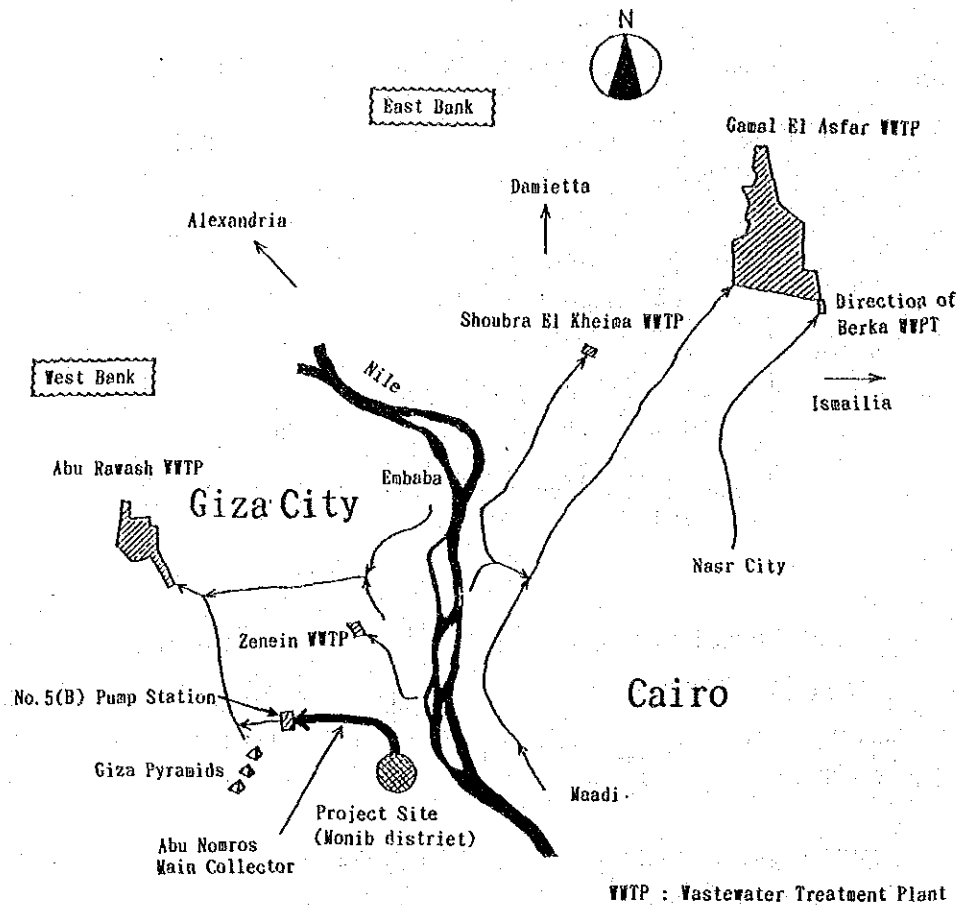
Source: GOSD

Most of the existing sewer networks were laid more than 30 years ago and the general deterioration and inadequate capacity have reduced the efficiency of the sewer service, necessitating upgrading of the facilities as well as the overall capacity.

GOSD estimates that the drainage capacity of the existing sewer networks is some 50% of the required level and the overflow of sewage onto roads has caused a deterioration of the general environment and of sanitary conditions in particular.

The Government of Egypt has responded to the situation by dividing the Greater Cairo Region into the West Bank and East Bank areas and has been implementing projects to improve and expand wastewater treatment plants and sewer trunk lines, etc., with the assistance of the U.S., Britain and others. Fig. 2-6 shows the main projects being implemented by CWO in the Greater Cairo Region (some sections have been completed and the newly constructed facilities which have been handed over to GOSD are currently in operation) and the location of the Project Site.

Also, the master plan to improve the sewer system in Greater Cairo is given in Appendix 8.



(Source : Greater Cairo Wastewater Project)

Fig. 2-6 Sewer System Improvement Projects in Greater Cairo Region and Location of Project Site

The Monib District (Project Site) is located on the west bank of the Nile where the only operating wastewater treatment plant is located at Zenein. The treatment capacity of the Zenein Wastewater Treatment Plant of some 300,000m³/day covers only 50% of the drainage and the plant is forced to operate at an overload.

In order to improve the situation, the Government of Egypt commissioned a British consultant in 1978 to prepare the Greater Cairo Wastewater Master Plan and subsequently requested AMBRIC, a joint project organization of 4 consultants in the U.S. and Britain, to review and update the Master Plan in 1981. Based on this revised Master Plan, projects have since been implemented with U.S. assistance in the West Bank area and by British assistance in the East Bank area.

For the West Bank area of the Nile, it is planned that sewage which cannot be treated by the Zenein Wastewater Treatment Plant will be forwarded to the Abu

Rawash Wastewater Treatment Plant, construction of which is currently in progress in the northwestern part of the Giza Governorate with U.S. assistance, via the trunk line passing through the Boulac Pump Station and also via another trunk line passing through the Pyramid Pump Station. The plan also includes the use of treated water for afforestation projects in the desert.

The design treatment capacity of the Abu Rawash Wastewater Treatment Plant is one million m³/day in the year 2000 which will increase to 2 million m³/day by 2010.

In addition to the construction of the Abu Rawash Wastewater Treatment Plant, USAID is also helping the improvement of so-called lowerstream facilities, including the construction of pump stations and sewer trunk lines. In comparison, general improvement of the upperstream facilities will be conducted by the own efforts of Egypt.

GOSD plans the construction of the Abu Nomros sewer trunk line (or main collector) and Pump Station No.5 (B) to improve the sewer service in southern Giza, including the Project Site, so that the facilities to be constructed by USAID will be efficiently operated.

Although the planned completion of the Abu Nomros sewer trunk line by GOSD is June, 1993, construction work has not yet started in sections where the technical requirements are beyond the present levels of local technologies because (1) the pipe laying depth is too deep, (2) the soil is too soft and the groundwater level is too high, (3) the construction area is too small and the traffic volume is too large, etc. The work section for which Japanese assistance has been requested by the Government of Egypt (approximately 1.8km) is this kind of difficult section, requiring the application of advanced technologies. Excluding this section, the Egyptian side have so far completed some 50% of the planned work. With regard to Pump Station No.5 (B), the basic design and land acquisition have been completed but the actual construction has not yet commenced due to the lack of funds.

3) Financial Situation of GOSD

The sewer line construction cost is met by central government appropriation and financial assistance provided by foreign countries.

10% of the collected water charge is allocated for operation and maintenance purposes for sewer lines but is far below the actual expenditure of GOSD. The

funding shortfall is met by the central government which finds it difficult to provide the full amount required due to its own tight financial situation.

GOSD is currently implementing the System Management Plan with U.S. assistance to review the financial system and other aspects of the organization. Table 2-11 shows the main items for which the necessity for improvement is pointed out by the Plan.

Among the items listed in Table 2-11, ⑦ an adequate financial system was particularly stressed to improve the financial strength of GOSD and 3 measures were pointed out for urgent implementation. These were (i) an improved budgeting system for GOSD, (ii) an improved water charge system to reflect the wastewater flow discharged and (iii) a review of the present water charge system.

As in the case of the water charge referred to in 2-2-2-(2)-3, the Government of Egypt also plans to increase the sewer service charge rate from the present 10% of the water charge to approximately 30% to fundamentally improve the financial situation of the sewer service.

Table 2-11 Planned Organizational Improvement by GOSD

No.	Improvement Item
1	Legal Basis or Authority to Operate Autonomously
2	Manageable Organization Structure
3	Adequate Facilities for Providing Services
4	Sufficient Number of Qualified and Experienced Staff
5	Comprehensive Training Programme
6	Appropriate Types and Quantities of Equipment, Tools and Consumable Supplies
7	Adequate Financial System

Source: GOSD System Management Plan

2-3 Outline of Related Plans

2-3-1 National Development Plans

Egypt's current long-term development plan is the Long-Term Perspective Plan which covers the 20 year period from 1983 to 2002 as described in Chapter 1. Table 2-12 shows the basic national development objectives called for by the Master Plan.

Table 2-12 Objectives of Long-Term Perspective Plan

No.	Objectives
1	Establishment of economic self-reliance system
2	Consolidation of basic infrastructure
3	Appropriate distribution of population

Source: Current Egyptian Society and Economy
Association for Promotion of International
Cooperation in Japan

In order to set concrete targets in line with the objectives given in Table 2-12, the Government of Egypt prepares and implements 5-year plans. The First 5-Year Plan with a plan period from 1982 to 1987 gave the highest priority to the improvement of the standard of living and improvement of the production capability of the Egyptian economy through the improvement of the public infrastructure and strengthening of the energy and construction sectors.

The Second 5-Year Plan (1988-1992) is currently in progress and gives the highest priority to the improvement of the public infrastructure, including water supply and sewer facilities, which was also a priority issue under the First 5-Year Plan. Table 2-13 shows the improvement targets for water supply and sewer services under the Second 5-Year Plan.

Table 2-13 Improvement Targets for Water Supply and Sewer Services Under Second 5-Year Plan

Service	Targets
Water Supply	Increase potable water from 8.6 million m ³ /day in 1986/87 to 12.4 million m ³ /day at the end of plan (1991/92) (including improved capacity in Greater Cairo Region from 3.4 million m ³ /day to 5.3 million m ³ /day)
Sewer	Wastewater drainage capacities will have to be increased to meet the expansion in the production of potable water

Source: Second 5-Year Plan

The Government of Egypt also gives the 5 concrete policies shown in Table 2-14 in the Second 5-Year Plan to be followed by the water supply and sewer service sectors to achieve the targets shown in Table 2-13, indicating its strong commitment to the improvement of the public infrastructure.

Table 2-14 Policies for Water Supply and Sewer Service Sectors under Second 5-Year Plan

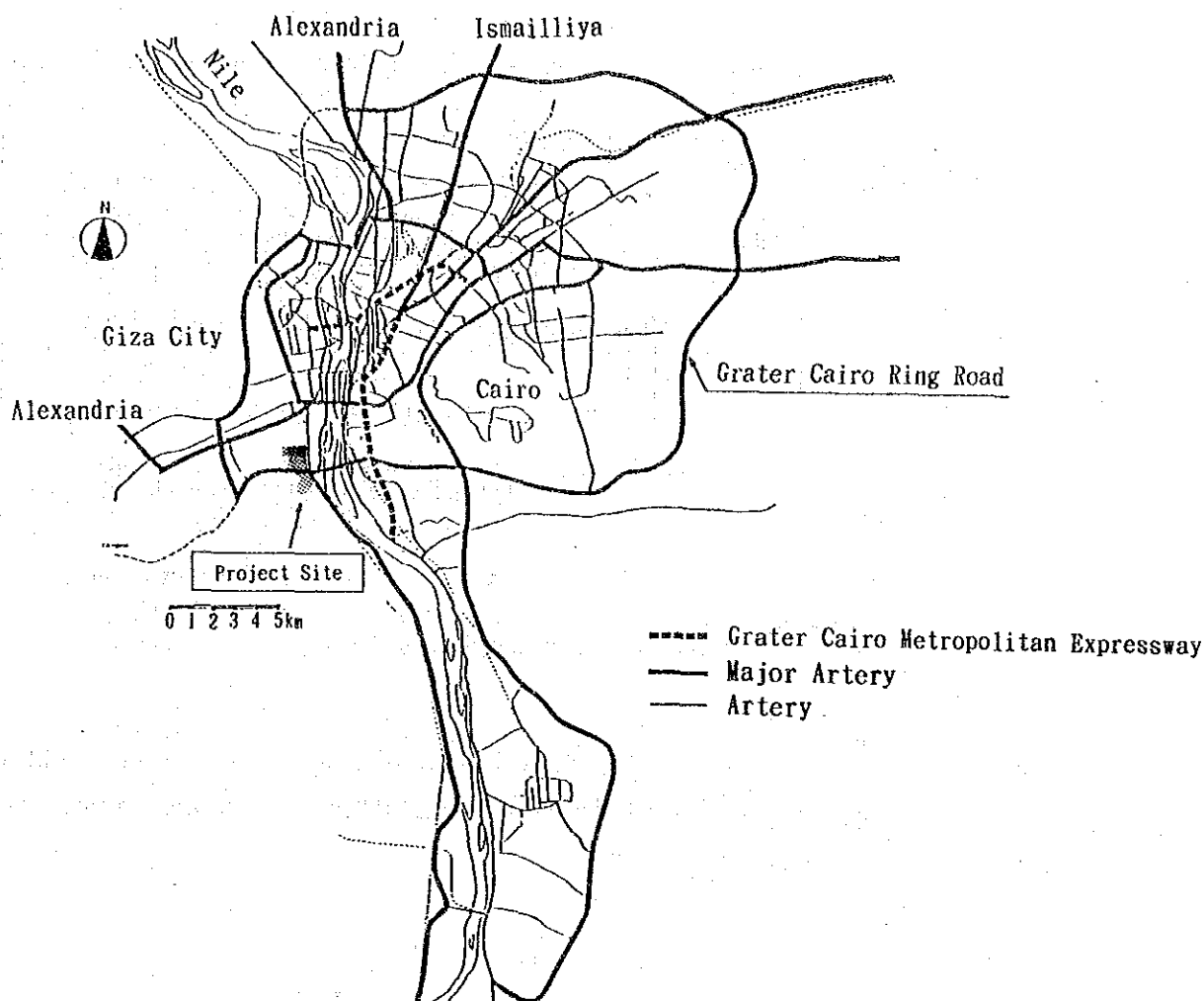
No.	Policy	Relevance	
		Water Supply	Sewer
1	Conservation of water use, restriction of losses and study of the application of progressive pricing to water consumption	○	-
2	Upgrading of the manufacture of plumbing fixtures to ensure that they conform to international standards	○	○
3	Making the greatest use possible of non-traditional methods to supply potable water to areas lacking it by using artesian wells where possible and portable filtration stations	○	-
4	Coordination and integration of water and sewage projects in accordance with urban plans	○	○
5	Supply of trained manpower for water and sewage utilities	○	○

Source: Second 5-Year Plan

2-3-2 Regional Development Plans

There are 2 main urban development plans with the target year of 2000 for the Greater Cairo Region, i.e., the Greater Cairo Region Long Range Urban Development Scheme and the Greater Cairo Region Transportation Master Plan Study. The former was prepared in 1982 with the main objective being the appropriate distribution of the population and improvement of the transportation network. The latter was conducted between 1987 and 1989 with Japanese technical cooperation as part of the former and proposed the construction of a ring road connecting the main areas of the Greater Cairo Region as a priority project to consolidate the public infrastructure in order to support economic development in the Region.

The Monib District is included in the proposed route for the ring road and is expected to show much development in the future. Fig. 2-7 shows the proposed route for the Greater Cairo Region Ring Road.



(Source : Greater Cairo Region Transportation Masterplan Study)

Fig. 2-7 Proposed Route for Greater Cairo Region Ring Road to be Completed by 2000

2-3-3 Development Plans in Water Supply and Sewer Service Sectors

(1) Outline of Water Supply Development Plans and Status of the Project

As described in 2-2-2 (2), several water supply development plans for the Greater Cairo Region, including Giza City in which the Project Site is located, have been prepared over the years with foreign assistance and some plans are indeed underway. Table 2-15 shows the planning completion dates for these plans, the subject areas and assisting countries.

Table 2-15 List of Water Supply Improvement Plans for Greater Cairo Region

Year of Planning Completion	Subject Area	Assisting Country	Description
1979	Greater Cairo Region	U.S.	Master plan for water supply improvement in Greater Cairo Region and basis for all future plans, including the Project (for Monib District)
1980	Cairo and Part of Giza	Japan	Water supply improvement for Cairo and part of Giza City in 3 phases. First 2 phases completed with Japanese assistance
1987	Giza	Germany	Water supply improvement master plan for Giza City based on Master Plan in 1979 (Study of water supply in Giza City)
1990	Cairo	U.S.	Water supply improvement master plan for Cairo based on Master Plan in 1979

Source: Greater Cairo Region Transportation Master Plan Study

Water supply improvement in Giza City is being conducted in accordance with the relevant master plan prepared by Germany and the Project will be part of this master plan as shown in Fig. 2-8.

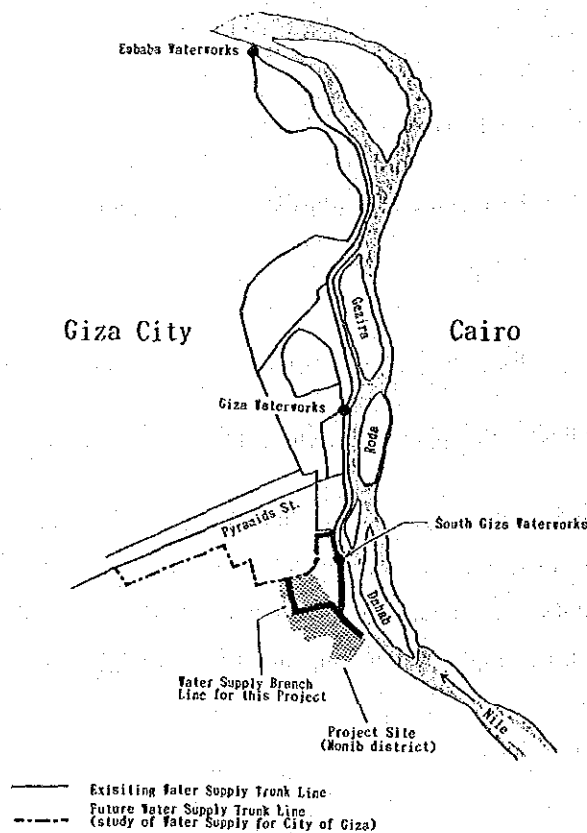


Fig. 2-8 Giza Water Supply Improvement Master Plan and the Project

(2) Outline of Sewer Development Plans and Status of the Project

The history of sewer improvement planning for the Greater Cairo Region commenced with the preparation of the Greater Cairo Wastewater Master Plan by a British consultant in 1978 using the Arab Fund for Economic and Social Development. Later, a joint venture formed by 4 consultants from the U.S. and Britain revised the said Master Plan in 1981 with the financial assistance of these 2 countries. Sewer improvement projects are currently being implemented in the East Bank area of the Nile, i.e., Cairo side, with British assistance and in the West Bank area, i.e., Giza side, with U.S. assistance in line with the objectives set by the Revised Master Plan. Table 2-16 shows the history of sewer improvement projects for the Greater Cairo Region.

Table 2-16 History of Sewer Improvement Projects for Greater Cairo Region

Year of Planning Completion	Subject Area	Assisting Country	Description
1978	Greater Cairo	British	Greater Cairo Wastewater Master Plan prepared by a British consultant using the Arab Fund for Economic and Social Development
1981	ditto	U.S. and British	Revised Master Plan prepared by a joint venture (AMBRIC) formed by 4 consultants from the U.S. and Britain in cooperation with an Egyptian consultant
1983	ditto	ditto	Greater Cairo Region Sewer Improvement Project started with the rehabilitation of existing facilities
1984	ditto (East Bank Area)	British	Greater Cairo East Bank Project started with British assistance (to be completed by the end of 1994)
1985	ditto (West Bank Area)	U.S.	Greater Cairo Wastewater Project (for west bank of the Nile) started with U.S. assistance (to be completed by mid-1994)

Source: Greater Cairo Wastewater Master, Review Statement

The Project Site is part of Giza City on the west bank of the Nile and is included in the subject area of the U.S.-assisted Greater Cairo Waste Water Project. Although this project aims at the construction of major lowerstream facilities, such as wastewater treatment plants, sewer trunk lines and pump stations, it does not include sewer improvement in southern Giza, including the Monib District. Nevertheless, the Monib District is part of the sewer service area of the project and sewage in the Monib District is taken into consideration in the design capacities of the above lowerstream facilities.

Fig. 2-9 shows the relation between the Greater Cairo Wastewater Project and the Project and also the construction schedule of the former.

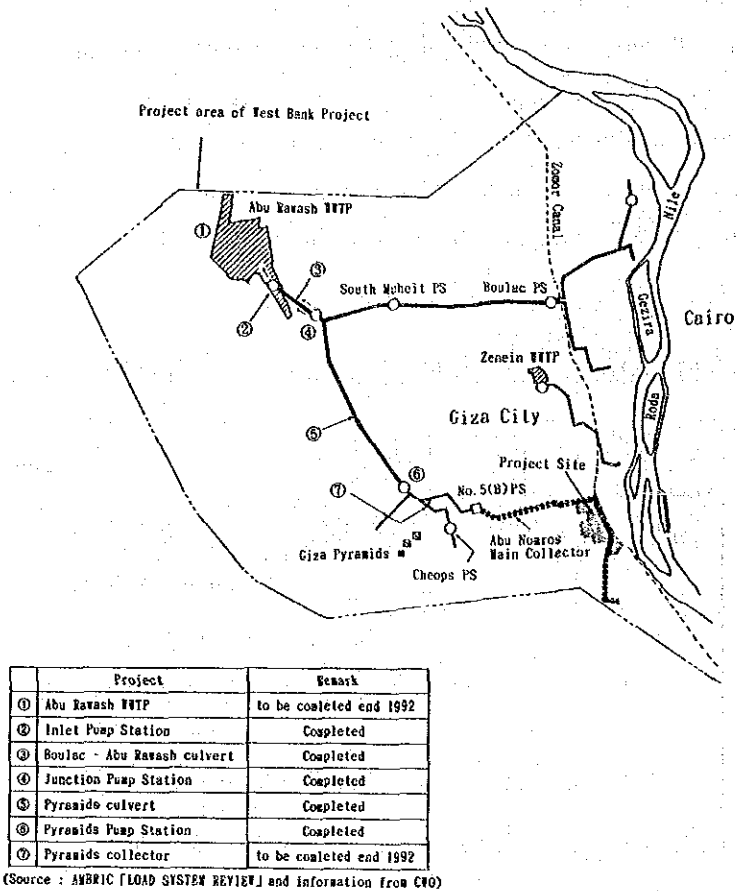


Fig. 2-9 Greater Cairo Waste Water Project and the Project

2-4 Outline of the Request

2-4-1 Background of the Request

Giza City in the Giza Governorate is located on the opposite bank of the Nile to Cairo. The public infrastructure of the city is much poorer than that of Cairo. The Monib District with a current population of some 133,000 is particularly poor in terms of the provision of public infrastructure as the area has not been included in urban development plans.

Although a master plan for water supply improvement in Giza City has been prepared with (West) German assistance, implementation has hardly commenced due to the lack of funds.

In the sewer service sector, the Revised Greater Cairo Wastewater Master Plan covering the Giza City area has been prepared by U.S. and British consultants. In accordance with this Master Plan, the construction of major lowerstream facilities (wastewater treatment plants, sewer trunk lines and main pump stations) is in progress under the Greater Cairo Wastewater Project with grant aid provided by USAID. However, improvement of the upperstream facilities has been left to the own efforts of the Government of Egypt.

The Government of Egypt aims at conducting the gradual improvement of water supply and sewer services in Giza City in accordance with the Revised Master Plan but has been forced to request the provision of financial assistance by foreign governments, including the Government of Japan, due to its own lack of funds.

In response to such a request, the Government of Japan decided to provide grant aid for the Project for Omrania West Water Supply and Sewer Upgrading in 1988 which was subsequently completed in March, 1991. Despite progress, however, the water supply and sewer service ratios were still low at the end of 1989 and the Government of Egypt made a further request to the Government of Japan for the provision of new grant aid for water supply and sewer upgrading in the Monib District, Giza City.

2-4-2 Contents of the Request

The contents of the Egyptian request for the Monib District Project, confirmed through discussions with the Egyptian side, are shown in Table 2-17.

Table 2-17 Contents of Egyptian Request

Requested Item	Description	Study Item of the Project
Water Supply Facilities		
- Construction of South Giza Waterworks	- 35,000 m ³ /day	
- Construction of Water Supply Trunk Lines (ø1,200mm)	- total length of approximately 2.7km	
- Construction of Water Supply Branch Lines (ø500mm)	- crossing railway tracks at one site	○
- Provision of Materials for Water Supply Branch Lines (ø300-600mm)	- total length of approximately 4.7km	○
- Provision of Materials for Water Supply Branch Lines (diameter less than 300mm)	- total length of approximately 20km	○
- Under-Pressure Drilling and Tapping Work	- between 1,000mm and 600mm line at one site	○
- Detailed Design Work for Branch Line	- 1 lot	○
Sewer Facilities		
- Construction of Sewer Trunk Lines (ø1,600-2,000mm)	- total length of approximately 1.8km (gravity flow)	○
- Provision of Materials for Sewer Branch Lines (ø300-600mm)	- total length of approximately 4.5km	○
- Provision of Materials for Sewer Branch Lines (diameter less than 300mm)	- total length of approximately 20km	○
- Construction of Pump Station No.5 (B)	- 1 set	
- Detailed Design Work for Branch Line	- 1 lot	○

The Government of Egypt has also expressed a strong desire that the Government of Japan will further agree to provide grant aid for the project involving the expansion of the South Giza Waterworks and construction of water supply trunk line which provides a stable water supply to the Monib District and construction of Pump Station No.5 (B) which will enable the sewage to be efficiently discharged.