

DATE: August 7, 1980
REPLY TO
ATTN OF: NE/PD, Robert H. Bell
SUBJECT: EGYPT: Cairo Sewerage
Project 263-0091
TO: See Distribution

08/04/80

The Mission submitted the attached Project Paper on Cairo Sewerage August 4, 1980. The Project Review Committee has been established with the following members:

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NE/PD, L. G. Rosenberg
NE/PD/ENGR, W. F. Bowles
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GC/NE, T. Carter

A meeting of the Project Review Committee is scheduled for August 8, 1980 to develop the Issues Paper. The Issues Paper will be forwarded in advance of the NEAC which has been scheduled for August 14, 1980.

Attachment a/s

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UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

PROJECT PAPER

Proposal and Recommendations
For the Review of the
Near East Advisory Committee

Project No. 263-0091

August 1980

EGYPT - CAIRO SEWERAGE

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT PAPER FACESHEET	TRANSACTION CODE C 1 = ADD 2 = CHANGE 3 = DELETE	PP
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8. ESTIMATED FY OF PROJECT COMPLETION FY 85	9. ESTIMATED DATE OF OBLIGATION A. INITIAL FY 84 B. QUARTER 4 C. FINAL FY 84 (Enter 1, 2, 3, or 4)
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A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FY	C. L/C	D. TOTAL	E. FY	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	75,000		75,000	100,000		100,000
GRANT	75,000		75,000	100,000		100,000
LOAN						
OTHER 1.						
U.S. 2.						
HOST COUNTRY		617,600	617,600		662,600	662,600
OTHER DONOR(S)	115,700		115,700	118,200		118,200
TOTALS	190,700	617,600	808,300	218,200	662,600	886,300

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY		H. 2ND FY		K. 3RD FY	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1) ESF	720	547		75,000					
(2)									
(3)									
(4)									
TOTALS				75,000					

A. APPROPRIATION	N. 4TH FY		O. 5TH FY		LIFE OF PROJECT		12. IN-DEPTH EVALUATION SCHEDULED
	C. GRANT	F. LOAN	B. GRANT	E. LOAN	T. GRANT	U. LOAN	
(1) ESF					100,000		
(2)							
(3)							
(4)							
TOTALS					100,000		

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CAIRO SEWERAGE EXPANSION PROJECT

PHASE I

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SUMMARY AND RECOMMENDATIONS

1. Grantee: The Government of the Arab Republic of Egypt (GOE).
2. Beneficiary/Executing Entity: The General Organization for Sewerage and Sanitary Drainage (GOSSD) of the Ministry of Development Housing, and Land Reclamation.
3. Grant Amount: \$75,000,000 (Seventy-Five Million Dollars) from the FY 80 authorization.
4. Project Purpose: To improve public health conditions and well-being of the people of Cairo by expansion and development of environmentally acceptable wastewater collection, treatment and disposal facilities.
5. Project Description: Design, construction and start-up of the first stage expansion facilities of the Cairo wastewater system consisting of: (a) an East Bank Central Tunnel Collection System, (b) West Bank Collection System, (c) Abu Rawash Treatment Facilities, (d) Khalag Treatment and Disposal Facilities, and (e) West Bank Effluent Disposal Scheme. The project also includes rehabilitation of the existing system, training of GOSSD personnel, and improvement of sanitation in unsewered areas.
6. Total Project Cost: The total project cost is estimated to be equivalent of U.S. \$808.3 million of which \$190.8 million is foreign exchange. The British Government through its Overseas Development Agency (ODA) has committed Pounds Sterling 50 million (equivalent US \$111 million) for this project. The Government of W. Germany has committed the equivalent of \$4.7 million towards financing the foreign exchange costs. The \$75 million requested under the project will complete the total amount of estimated foreign exchange needed.
7. Environmental Considerations: An Environmental Assessment is being prepared.
8. Grant Application: The GOE has requested a grant of \$75 million from FY 80 funds; \$25 million was granted from FY 78 funds for this project. See Annex A.
9. Mission's Views: USAID/Cairo has recommended that this Grant be authorized. The acting principal officer's certification pursuant to Section 611(e) of the Foreign Service Act is included as Annex D.

10. Statutory Criteria: Satisfied. See Annex B.

11. Recommendation: That a grant amendment in the amount of \$75.0 million be authorized on terms and conditions as set forth in the draft Grant Authorization included as Annex C.

12. Project Committee:

USAID/Egypt:	Chairman & Sanitary Engineer	Jack Snead
	Cap.Devel.Off.	Ron Redman
	Economist	Peter Davis
	Financial Off.	Richard Layton
	Counsel	Bunyan Bryant

AID/Washington:	Chairperson:	Alfred Hotvedt
	Development Officer:	Thomas A. Sterner
	Engineer:	Wally F. Bowles
	Desk Officer:	Jonathan L. Sperling
	Program Officer:	Sidney Chernenkoff
	Counsel:	Theodore Carter
	Environmental Specialist	Stephen F. Lintner
	Health Officer (water)	Joseph Haratani
	Economist	Leonard G. Rosenberg

I. INTRODUCTION

1.01 Under a 1976 program instituted by the Government of the Arab Republic of Egypt (GOE) to improve and expand its wastewater facilities in five major cities, a master plan for Cairo's wastewater system was prepared by a joint venture of two British engineering firms, John Taylor and Sons and Binnie and Partners (Taylor-Binnie). A.I.D. financing was not involved in the preparation of that study. A.I.D. did, however, finance the foreign exchange cost of feasibility studies and master planning of water and wastewater facilities in Alexandria, Port Said, Ismailia and Suez. In addition, A.I.D. is financing the foreign exchange cost for the design and construction of water and sewerage facilities in these cities. A study of Egypt's water and wastewater management and tariff structure, completed in 1979, was also financed by A.I.D.

1.02 Work on the Greater Cairo Wastewater Master Plan started in January 1977 and was completed in April 1978. The foreign exchange cost of this study was financed by the Arab Fund. The studies concluded that, because of the tremendous backlog of work which had accumulated over the last 25 years, much of the city is not adequately served nor does the existing system have sufficient capacity to handle the wastes now collected. Sewers are surcharged to the point where the wastes frequently overflow and pond in many sections of the city. Little, if any, of the wastes collected are treated and large emergency by-pass canals carrying raw sewage traverse the city. As a result, the present situation represents a serious health hazard to the population. To correct the situation, Taylor-Binnie recommended, in their master plan, a massive investment program totaling more than \$593 million (mid-1977 prices), both FX and local currency, consisting of 30 top priority projects.

1.03 Taylor-Binnie's contract for the master plan provided for the GOE to contract with Taylor-Binnie for engineering services relative to the implementation of this investment program, i.e., design, engineering and construction supervision. Negotiations, however, were never concluded between the GOE and Taylor-Binnie since the GOE did not have adequate FX resources to fund either the Taylor-Binnie contract or the investment program.

1.04 In January 1978, the then Deputy Prime Minister for Economy/Finance requested immediate U.S. assistance in financing the rehabilitation, improvement and expansion of the Cairo wastewater system. As an interim response, A.I.D. agreed to grant \$500,000 for a pilot sewer cleaning and training program, similar to that which was being successfully implemented for the City of Alexandria.

1.05 Concurrent with the agreement to finance the pilot sewer cleaning and training program, USAID made a careful review of the Taylor-Binnie master plan and concluded that while the basic plan was sound, the report was incomplete in the following respects:

- a. Taylor-Binnie's report concluded no cleaning or rehabilitation of the existing collection system was possible under the existing surcharged conditions. Therefore, the master plan considered the existing flows as the maximum that could be carried by the system until additional capacity could be constructed.
- b. Taylor-Binnie's plan did not appear to address economically all technical alternatives for two critical items--the central collection system and the wastewater disposal scheme. Also, the population densities and sewage flows projected by Taylor-Binnie were questionable, which, of course, affects design capacities and investment priorities.
- c. The Taylor-Binnie investment plan was not appropriately staged. Therefore, it was difficult to plan sound sequential construction phases through incremental financing.

1.06 USAID also concluded that the existing system needed to be repaired and rehabilitated immediately since Cairo could not tolerate a deferment of a solution until the mid-1980's, the earliest that relief would begin to be provided under the Taylor-Binnie plan. Further, it was concluded that the General Organization for Sewerage and Sanitary Drainage (GOSSD), the organization responsible for the Cairo wastewater system, was unable to undertake the enormous repair and rehabilitation program needed for the Cairo system without outside assistance.

1.07 Accordingly, A.I.D. adjusted its FY 78 budget to provide for the financing of \$25 million for a project consisting of the following elements:

- a. Rehabilitation, cleaning, repair and minor modification of the existing trunk sewers, collectors, and pump stations to enable the conveyance system to be operated at near its design capacity.
- b. Training of GOSSD's technical personnel so that the renovated and planned expanded system will be operated and maintained effectively.

- c. Review and update of the master plan and the development of a detailed staged program for the expansion of the wastewater system.
- d. Construction of a few key top priority facilities urgently needed to keep the system operating.

This Project (Grant No. 263-0091), known as the Rehabilitation and Expansion Plan, was the first part of a two-part program planned for the Cairo Sewerage Expansion Project.

1.08 A.I.D. also amended its proposed budgets for FY 80 and FY 81 to accommodate an additional \$75 million in financing for the second part of the Cairo Sewerage Expansion Project. It was planned that this additional funding would be used for financing the final engineering designs and construction of selected facilities needed in the overall expansion program developed under Project No. 263-0091. Because the entire expansion project was at that time estimated to cost almost \$1.0 billion, the GOE agreed to seek additional financing from other donors for those elements not financed by A.I.D.

(Handwritten note)

1.09 The Commerce Business Daily Notice requesting prequalification material from firms interested in providing the engineering services for the full project--FY 78 through FY 81--was published on March 29, 1978. Terms of Reference was prepared and mailed to the six prequalified firms on June 4, 1978. Proposals were received from five firms (or joint ventures) on August 29, 1978.

1.10 In mid-June 1978, The British Government acting through its Ministry of Overseas Development (ODM) expressed interest in participating with A.I.D. in the Cairo Sewerage Project. Specifically, ODM stated that it was prepared to consider providing 50 million pounds sterling for this project, subject to its review of the overall project and agreement with A.I.D. on an implementation plan. In subsequent meetings with ODM in Cairo in July and August 1978, we were informed that a condition of ODM's participation in this project was that Taylor-Binnie, the British consulting firms who prepared the Master Plan, be involved in the project. An agreement was reached among all parties (ODM, GOE, and AID) that the U.S. engineering firms selected by GOE pursuant to the previously discussed CBD notice be asked to associate with Taylor-Binnie and that the services of the joint venture firms be expanded to include final design and construction supervision of a revised master plan. Based on this agreement, the British Government officially informed the GOE of its offer to participate

4

in this project. A copy of the British Government's letter is shown in Annex F. The short-listed U.S. engineering firms were queried regarding this development and each replied positively to the opportunity to associate with Taylor-Binnie in the joint project.

1.11 In September 1978, we again met with ODM to discuss implementation procedures. By that time, ODM had had an opportunity to review the Taylor-Binnie Master Plan and agreed with A.I.D. that additional work was needed before either agency could seek funding for construction of the expansion works. It was agreed, therefore, that the contract with the joint venture engineering firms be in two parts. Part one would include the engineering services previously described in paragraph 1.07, including functional designs and cost estimates of the proposed new facilities to be prepared in sufficient detail so that additional funding for the final engineering and construction of these facilities could be sought from A.I.D., ODM, and other donors. The estimated costs of the engineering services under part one were estimated to be the equivalent of \$15 million with ODM and A.I.D. paying the FX costs of their respective country's engineering firms. The rehabilitation work and construction of the urgently needed top priority projects were estimated to cost \$40 million equivalent.

1.12 On April 9, 1979, GOSSD signed a contract with the engineering consortium known as the American-British Consultants (AMBRIC) consisting of the competitively selected U.S. firms of Camp Dresser and McKee and Black and Veatch International plus the British firms of Taylor-Binnie. This contract was for the Part I engineering services described above and was partially financed (\$5,362,664) by A.I.D. under Grant 263-C091.

1.13 As part of its work under Project 263-0091, AMBRIC submitted an Interim Development Plan Report in July 1980. This report served to review and up-date the Taylor-Binnie Master Plan Report and identified a \$2.4 billion investment needed for the first staged development of the wastewater facilities of Cairo. The project recommended in this paper includes the most essential elements of the first stage facilities needed just to get the sewage off the streets and out of the city. It only includes primary treatment facilities that will later form a part of the secondary facilities needed for the wastewater system as identified in AMBRIC's Development Plan Report. These improvements include construction of: (a) an East Bank central tunnel system, (b) West Bank collector system, (c) Abu Rawash treatment facilities, (d) Khalag treatment and disposal facilities, and (e) West Bank Effluent Disposal works. The estimated costs of all this construction work is \$717.3 million including \$131.9 million in foreign exchange.

1.14 The current sewerage situation in Cairo, as described herein, is extremely critical. Simply put, the existing facilities are completely inadequate to handle the volumes of sewage now being generated by Cairo's 9.0 million inhabitants. Sewage is frequently found overflowing from surcharged sewers in over 200 locations and raw sewage canals or ditches traverse many parts of the city. There is little question that this problem represents a hazardous health problem, not only to the metropolitan area, but to the country as a whole. Therefore, the need for implementing the identified essential elements of first stage improvements of the Development Plan cannot be overstated.

1.15 The minimum corrective action required immediately is the funding and implementation of those project elements forming the modified first stage improvements as recommended in this paper. These project elements have been carefully selected to minimize the initial capital investment yet form a complete working system which will produce significant improvements in Cairo's public health and environmental conditions. Because of the physical configuration of Cairo (separated into two cities by the Nile River), its size and the economies of scale possible during construction, it is impractical to separate this project into smaller parts. It is on this basis that we seek \$75 million to fund the construction for the modified first stage expansion improvements for Cairo's wastewater system to be funded in FY 80.

II.. BACKGROUND

A. Cairo

2.01 Cairo is located on both banks of the River Nile at the start of the Delta about 200 kilometers south of the Nile's discharge into the Mediterranean Sea, as shown on Figure II-1. Cairo is the capital of the Arab Republic of Egypt and one of the most important cities in the Arab World. The beginnings of Cairo reach back to Roman times when a small city named Babylon was founded at what is now the southern limit of east bank Cairo. In the ninth century, when Egypt was conquered by the Arabs, the old city of Fustat, as Babylon was named, was expanded northward along the east bank. Expansion has continued towards the north and east through today. In fact, current expansion is still progressing in that direction. West bank Cairo consists of Giza and its northern environs. The present city is located about 80 percent on the east bank.

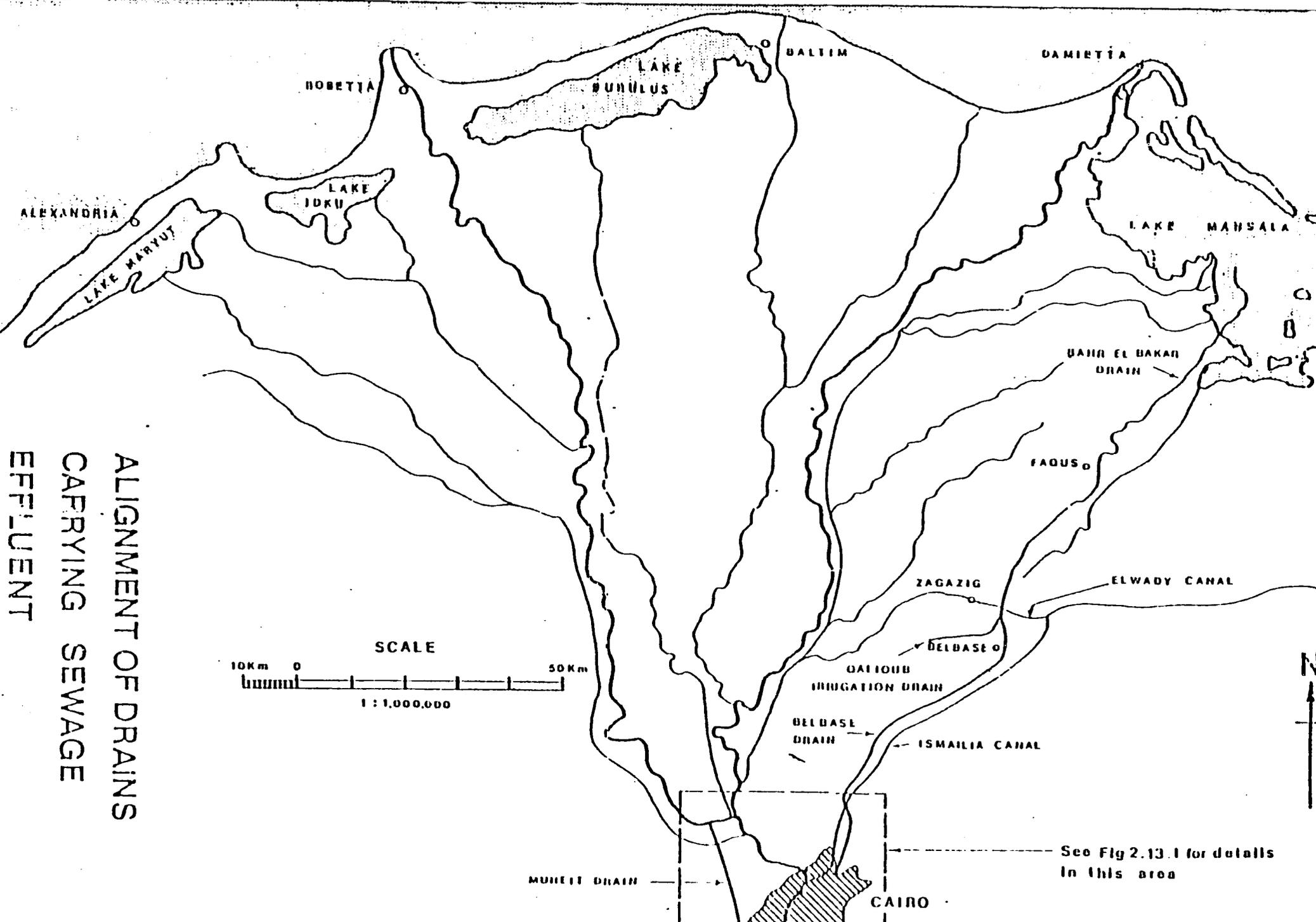
2.02 From the southern extremity to the northern limit, the difference in ground elevation of the city is about six meters. The city is bounded on the east by a sharp scarp called Mokattam. Heliopolis and Nasr City, which are two developing areas to the east, are somewhat higher in elevation than the greater portion of the Project Area. The city is bounded on the west by the Pyramids plateau.

2.03 The total present urban area of Greater Cairo is about 240 square kilometers (Km²). The current population of Greater Cairo is over 9 million, with a projected year 2000 population of 16 million as indicated in Table II-1. Some districts within the Project Area have population densities in excess of 1060 per hectare.

TABLE II-1

Year	Greater Cairo	Population(million)*		
		Project Area		
		Urban	Rural	Total
1980	9.05	7.13	0.21	7.34
1985	10.51	8.26	0.23	8.49
1990	12.12	9.77	0.25	10.02
2000	15.96	13.92	0.30	14.22

* Excludes persons working abroad.



ALIGNMENT OF DRAINS
 CARRYING SEWAGE
 EFFLUENT

Figure II-1

See Fig 2.13.1 for details
 in this area

2.04 The climate of Cairo consists of a moderate winter and a hot summer. Mean air temperature range from 28 degree C in July to 14 degree C in January. Humidity is in the range of 40 to 60 percent. Rainfall is minimal, averaging 27mm per year and occurs between November and April only.

2.05 The area in and around Cairo consists mostly of river deposited material such as silt, sand and gravel with some clay lenses present. The eastern areas of the project area are on rock, primarily limestone and sandstone. Groundwater within the flat areas of the valley is generally 2 to 3 meters below the surface.

3. Existing Sewerage System

2.06 At the present time it is estimated that 80 percent of urban Cairo is sewered and that 60 percent of the population is connected. The system is operated as a combined facility for wastewater and storm drainage.

2.07 The entire system can be divided into four principal zones. These areas are designated: (1) Southern, (2) Northern, (3) Central-Eastern, and (4) Western, and are indicated on Figure II-2

(1) Southern Zone:

Area - 40 Km²

Auxiliary Pumping Facilities - 26 ejector stations (pneumatic)
- 17 pump stations.

All flow is ultimately directed to a 1.2 meter siphon under the Nile and delivered to the west bank.

(2) Northern Zone:

Area - 25 Km²

Auxiliary Pumping Facilities - 21 ejector stations (pneumatic)
- 13 pump stations All flow is ultimately directed to the Souk El Samak pump station from where it is delivered to the Kossous primary treatment plant with effluent discharged into the Kossous Drain.

(3) Central and Eastern Zones:

Area - 105 Km²

Auxiliary Pumping Facilities - 35 ejector stations (pneumatic)
- 22 pump stations .

All flow is conveyed to the four major collectors with discharge to two major pump stations. Collector No. 1 and Collector Duplicate No. 1 both discharge to Ein Shams pump station which pumps to the Gabal El Asfar treatment works. Collectors Nos. 2 and 3 discharge to the Ameria pump station which also pumps to Gabal El Asfar, except for emergency situations when it pumps to the Kossous Drain near the Kossous primary treatment plant.

(4) Western Zone

Area - 28 Km²

Auxiliary Pumping Facilities - 19 stations

All flow ultimately reaches the Zenein treatment plant.

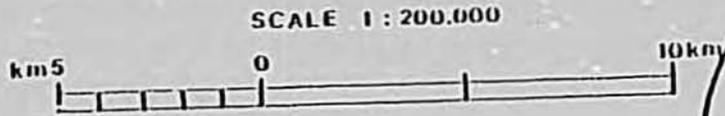
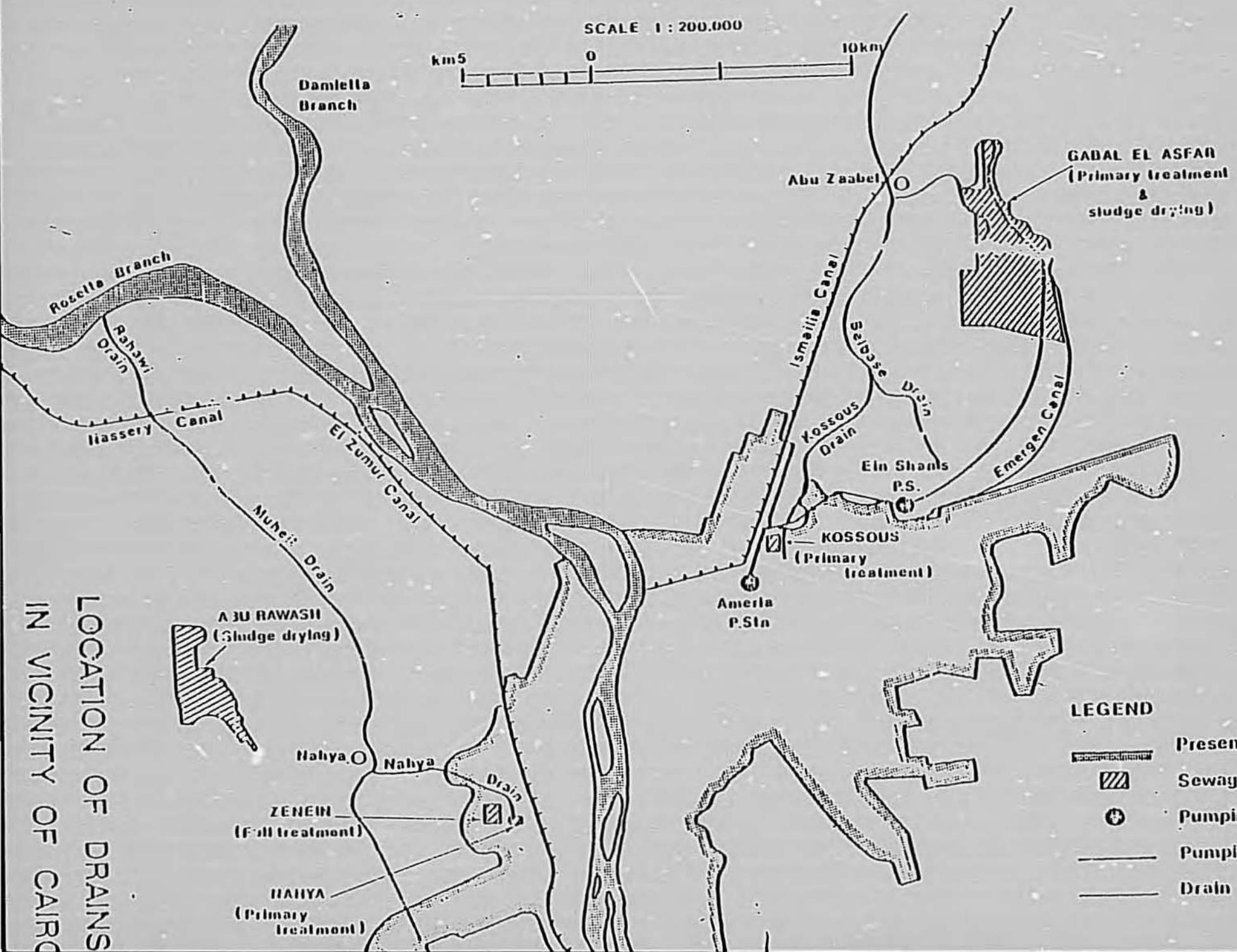
2.08 In general terms, the system broadly fulfills its function in that it enables most of the sewage to be removed from these areas. However, the system is badly overloaded and there is intermittent flooding with raw sewage both in the center of the city and in residential districts.

2.09 The conditions in developed areas which are presently unsewered are most insanitary. There is little in the way of organized sanitary services and the inhabitants have to make their own disposal arrangements. Consequently, seepage tanks often overflow into open drains and, in some localities, night soil and sullage water are deposited in the streets together with domestic refuse.

2.10 The location of the various sewage treatment facilities are shown on Figure II-2. Abu Rawash and Gabal El Asfar are situated well outside the urban area, but Zenein, Nahya and Kossous all have residential areas immediately adjacent to them. Apart from a comparatively small amount of sewage or effluent which is utilized for irrigation, the whole of the sewage flow from the city, much of it still in a raw state, is discharged to the main irrigation drains. Figure II-2 also shows the location of these main drains in the immediate proximity of Cairo while Figure II-1 gives similar detail between Cairo and the Mediterranean coast.

2.11 The Muheit Drain on the western side of the city accepts primary effluent from the Nahya treatment plant and poor quality secondary effluent from the Zenein treatment facilities before discharging into the Rosetta branch of the Nile at a point approximately 20 Km downstream of Cairo.

LOCATION OF DRAINS
IN VICINITY OF CAIRO



LEGEND

-  Present Urban Bound
-  Sewage Treatment Wo
-  Pumping Station
-  Pumping Main
-  Drain

2.12 The Belbase Drain, which runs northeastward along the line of the Ismailia Canal, receives the bulk of the wastewater from the eastern side of the city. The flow in the drain receives some dilution from irrigation drainage at various points. The Belbase and Qalioub (irrigation) drains meet near Zagazig, at which point water from the Qalioub drain can be pumped to the Tora Canal for reuse in irrigation. The remaining flow from the Qalioub, together with the Belbase flow is combined from this point in the Bahr El Bakar drain, which continues to run north and east until it discharges into Lake Mansala, a brackish shallow lake on the Mediterranean coast.

2.13 The Kossous Drain carries primary effluent from the Kossous treatment plant and the pumped discharge of untreated sewage from Ameria. For several kilometers of its length, immediately downstream of the Kossous treatment plant, it passes through a densely populated urban area. There are also communities at a number of points along the length of the main drains.

2.14 The current practice of disposing large quantities of raw sewage and partially treated effluent to the drains constitutes not only a potential danger to public health but is also thoroughly objectionable from esthetic and environmental points of view. The resulting anaerobic conditions in these drains cause black coloration of the water and give rise to abnoxious odors.

2.15 The discharge from the Muheit drain into the Rosetta branch of the Nile is clearly distinguishable by the difference in color between the river water and the drain discharge. The discoloration persists for several kilometers and floating material of sewage origin has been observed 10 km downstream of the point of entry. Dissolved oxygen readings show a substantial decrease in the oxygen content between the values upstream and downstream of the discharge point.

2.16 Continuance of the present methods of disposal can only lead to a further serious deterioration in the environment. The risks to the public health of the community, both in and downstream of the project area, are considerable. The dangers inherent in the present conditions cannot be too highly stressed. There is a compelling need for improvement and extension of the wastewater facilities not only to remedy past neglect, but also to make adequate provision for the predicted large increases in population, water uses and resulting sewage flows through the next decade.

C. Current Problems:

2.17 The current sewerage situation in Cairo, as described herein, is extremely serious. Some of the largest districts with the highest population densities in the city have raw sewage continuously ponded in the streets. As many as two million people are directly affected.

2.18 Current efforts by GOSSD to alleviate these conditions are ineffective because of the lack of sufficient equipment, training and serious shortcomings in the collection and conveyance system.

2.19 Since the original system was constructed in 1914, several major additions were made without benefit of broad planning. Furthermore, a multitude of relief connections were installed. The final result has been a conglomeration of works which are difficult to operate. Preliminary observations indicate the system has a capacity greater than that presently being utilized, provided that significant operational changes are instituted, major collectors and trunk sewers are cleaned, and capital improvements are undertaken.

2.20 The above observations are directed only towards the collection and conveyance elements of the system. The existing east bank treatment works are, for all practical purposes, totally ineffective at this time. One plant, Gabal El Asfar, is of very limited capacity and thus has no effect on the waste discharge from it. The other plant, Kossous, is in such poor condition, it will be abandoned when new facilities are built to replace it. The current mode of operation of all the plants is such that no meaningful treatment is occurring.

2.21 The capacity of west bank treatment plants are also very limited given their present method of operation and physical condition. The Nahya plant is without effect because of severe equipment shortcomings. The Zenein activated sludge plant is potentially capable of effective operation, but there is need for considerable amount of long-deferred maintenance work and equipment modifications.

2.22 Another major factor in the current situation is the high degree of siltation in the major collector sewers. The hydraulic carrying capacity of these conduits is less than two thirds, and in some cases reduced as much as 75%, of the original capacity by blockage of the line from debris. There are approximately 200 locations in the collection system where sewage flooding occurs, the main cause being blockage by debris and/or insufficient sewer capacity.

2.23 A detailed plan to minimize or reduce sewage flooding has been prepared by AMBRIC and implementation started by GOSSD. With the exception of a sewer inspection subcontract, the entire sewer cleaning effort will be handled by GOSSD personnel. Actual field performance has demonstrated that GOSSD crews, when properly trained, supervised and given performance incentives, are capable of sustained productivity. As measured by quantities of silt removed, GOSSD crews have increased productivity from approximately 100 cm/wk in late 1978 to more than 1900 cm/wk. At the present time, there are 25 heavy duty bucket machines operating two 10-hour shifts per day manned by 177 certified AMBRIC trained GOSSD employees. Within the next two months, a full complement of 33 bucket machines employing some 300 trained personnel will be removing approximately 2300 cm/wk of debris from Cairo's sewers. This effort is being partially financed under AID Grant 263-0091.

D. The Master Plan:

2.24 Even with all of the sewers cleaned and the sewerage system operating efficiently, the current rapid growth of Greater Cairo dictates the need for a substantial expansion of the entire system. As stated earlier, the GOE contracted with Taylor-Binnie for the Cairo Wastewater Master Plan. Taylor-Binnie completed their Master Plan in April 1978 and recommended expansion of the system be implemented in two phases. Phase one would provide for most of Cairo's sewerage needs through the year 1990, while phase two would provide a framework for expansion of the system to meet the needs through the year 2000. The estimated cost of the phase one expansion was \$600 million, of which \$250 million was foreign exchange. All these costs were based on 1977 prices with no allowances for inflation or other cost escalation factors.

2.25 As explained in paragraph 1.05, Taylor-Binnie's phase one program lacked sufficient evaluation and justification for all its recommendations to be accepted for investment purposes. Through the Cairo Rehabilitation and Expansion Project, partially funded by AID under Grant 263-0091, these deficiencies have been reviewed and corrected with the intent of reducing the total cost of the phase one expansion program.

III. ORGANIZATION

A. Existing Organization:

3.01 The implementing organization for this project will be GOSSD which is an agency under the Ministry of Housing, Reconstruction and Land Reclamation (MOHR). GOSSD was established by Executive Decree 1637 of 1968 and is responsible for the planning, design, construction, and supervision of all sewerage facilities in Egypt except those for the city of Alexandria. In addition, GOSSD is responsible for the operation and maintenance of Cairo's sewerage system.

3.02 GOSSD's structural organization is shown in Figure III-1 and is governed by the following Board of Directors:

Chairman - Eng. Mohamed Abdel Moneim Ashmawy
Deputy Chairman - Eng. Atalla Safwat
Gen. Secretary - Mr. Magd Abdel Rahim Moustafa
Gen. Director of Cairo Utility - Eng. Abdel Aziz Fahim
Vice Chairman, GOPW - Eng. Mohamed Fathi El Thidawy
Gen. Director, Ministry of Health - Dr. Hussein
Soliman Md. Soliman
Director of Legislative Affairs
Council of State - Counsellor Abdel Botros Farag
Past Chairman, GOSSD - Eng. Mahmoud Ibrahim Shabaka

3.03 Four of the board members are presently officers and one a former Chairman of GOSSD. The other members are representatives of the Ministry of Health, General Organization for Potable Water (GOPW), and Council of State. In the GOSSD organization there are three principal line officers: one for financial, administrative and economic affairs; one for operation and maintenance; and the third for capital projects. Each of them is headed by an Under Secretary with the last two officers reporting to the Vice Chairman. Also, a general planning committee, consisting of the Chairman and Vice Chairman, reviews major project planning and prepares recommendations for consideration by the Board. Both the projects and operations and maintenance departments are organized on a geographical basis.

B. GOSSD-Cairo

3.04 GOSSD-Cairo is headed by a General Director with supporting units for the provisions of personnel service, legal counsel, and financial and general services. The Personnel Department administers the standard national personnel system applicable to all

ORGANIZATION CHART -
GENERAL ORGANIZATION FOR GREATER CAIRO SEWERAGE AND SANITARY DRAINAGE

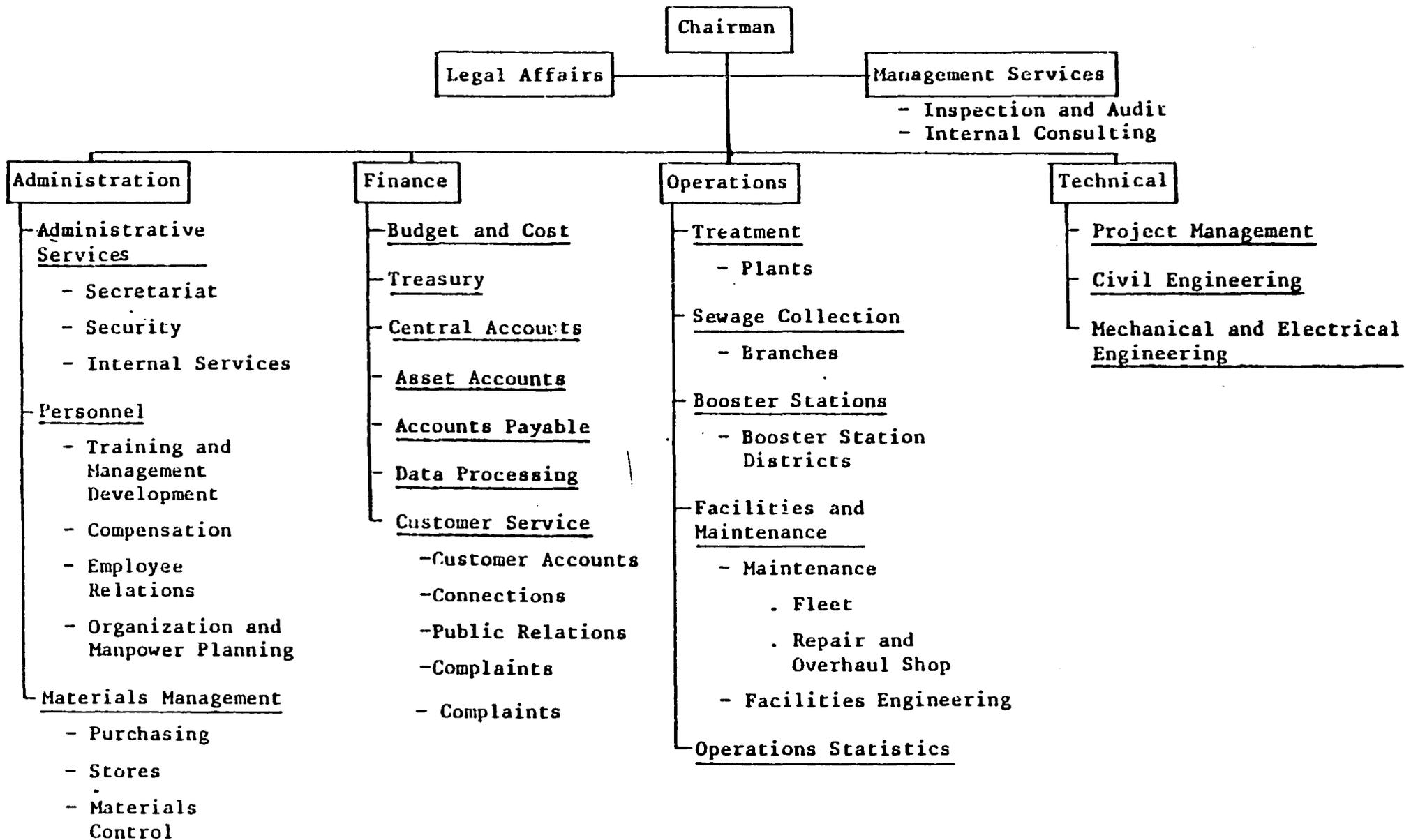


FIGURE III-1

government agencies. The Legal Department provides the range of expected legal services. The Budget and Finance Department includes purchasing and store-keeping as well as the accounting, budgeting, disbursing and cashier function. Purchasing activities conform to nationally established procedures. The Public Services Department receives and processes complaints and provides general community relations services. It also supervises the provision of security services and its Assistant General Director participates in the capital development planning process.

C. Operation and Maintenance

3.05 Operation and maintenance of the GOSSD-Cairo sewerage system is accomplished through three departments. The Sewer Maintenance Department is responsible for cleaning and repairing sewers throughout the city and utilizes a highly decentralized approach in accomplishing its tasks. Seven districts have been established, each with assigned crews and a basic allotment of tools and, in some cases, permanently assigned mobile equipment. Additional requirements for equipment are obtained through a central pool. The districts vary widely in size and other characteristics affecting workload. Most of the Department's work is corrective rather than preventive in nature. However, this Department will be strengthened by receipt of equipment and on-the-job staff training provided under ongoing Cairo Sewerage Project, AID Grant No. 263-0091.

3.06 The Mechanical and Electrical Department operates and maintains pump stations, provides auxiliary pumping services as needed and manages the equipment dispatching and repair functions. In addition, staff of this Department can provide mechanical and electrical design services when required for the design of smaller pumping facilities. Pump stations are staffed 24 hours per day and the city is divided into two zones for operational control purposes. Emergency pumping services are provided by the auxiliary units when needed to alleviate flooding or for dewatering pump stations that are under repair. The equipment shop is capable of repairing or rebuilding virtually any unit included in its inventory. Additional training for operators and maintenance personnel in this Department is being provided in conjunction with the rehabilitation and construction of pump stations under the ongoing Grant No. 263-0091.

3.07 The Water Pollution Control Department is responsible for the operation and maintenance of the treatment plants and for monitoring water quality in the drains and along the Nile. The plants are not functioning properly due to a variety of circumstances including faulty design, heavy loadings, worn out equipment and lack of training and motivation of plant staffs.

D. Development Function

3.08 Project design functions are handled by the Technical Division. With limited staff and equipment resources, the Cairo office is handicapped in performing its duties which include the design of extensions and pump stations, collection of field data for designs, placement of grade stakes for construction and taking quantity measurements for contractor's payments.

3.09 GOSSD's representatives on the site for all construction projects are provided by the Department of Project Execution. Department representatives participate, first, in the bid-opening and evaluation processes. A team of inspectors and engineers is then appointed to assure compliance with the plans and specifications for the project. Applications for connections and extensions are also received and processed by this department. Applicants for new connections are required to deposit the estimated cost of the connection. Developers are also required to bear the full cost of designing and building the collection system and connections to their developments. The Department includes a drafting unit to meet its requirements as well as the needs of the design department.

E. Comments

3.10 GOSSD suffers from the same problems facing all public sector operations in Egypt: overstaffed in some areas and understaffed in other areas; low employee morale due primarily to low wage levels; and a high turnover of its most experienced personnel. A Management and Tariff Study for Water/Sewerage Systems in Egypt was completed in 1979 and submitted to MOHR. The foreign exchange costs of this study were financed by USAID. The study included recommendations on improving the organizational structure of GOSSD as a whole and GOSSD-Cairo as well. These recommendations are currently under government review. Implementation of certain of these recommendations is addressed in the Covenants of the Grant Agreement.

3.11 Generally, GOSSD-Cairo organizational structure is adequate for its tasks. However, project planning, monitoring and execution are now spread throughout the organization. GOSSD soon is expected to review this function and develop clearer lines of authority. In the interim, GOSSD will maintain a staff whose function will be to work on this project and interface with the consulting engineer and the internal departments of GOSSD.

IV. THE PROJECT

A. Summary of Problem

4.01 The gravity of Cairo's wastewater problems are outlined in Section II herein. The existing facilities are completely inadequate to handle the volume of sewage being generated by Cairo's over nine million inhabitants. Sewage is frequently found overflowing from surcharged sewers and raw sewage canals and ditches traverse many parts of the city. These conditions represent a potentially explosive health hazard, not only for Cairo, but for Egypt as well.

4.02 The existing collection and conveyance system is in a bad state of repair primarily due to lack of proper maintenance and continual operation of the system under surcharged conditions. There is a lack of adequate treatment facilities, and the existing facilities are overloaded to the point that the 1.3 million cubic meters per day of generated wastewater receives inadequate treatment.

4.03 There are large areas of the city which are presently not sewered or inhabitants not connected to the system. The living conditions in these areas, usually the poorest and most heavily populated, are intolerable by any standard. However, before wastewater from these areas can be added, the system must be able to handle these additional flows. The GOE urgently needs assistance to relieve and correct these conditions.

B. Project Purpose and Goal

4.04 The project purpose is to return Cairo's existing sewerage system to its design efficiency and to expand the collection, conveyance, treatment and disposal systems to accommodate the projected future wastewater flows. The project goal is to improve the living conditions of the current and future populace of Greater Cairo through provision of an improved and expanded wastewater system.

C. Project Description

4.05 The entire first stage project was identified in the Taylor-Binnie Master Plan, and confirmed by AMBRIC, and is based on urgency of requirement. It consists of ten elements which are described in some detail in Section V.B. of this paper. However, due to funding constraints, both in foreign exchange and local currency, the following modified project has been identified as meeting Cairo's most urgent requirements within the available funding. This modified project consists of eight basic elements

including (a) an East Bank Central Tunnel Collection System, (b) West Bank Collection System, (c) Abu Rawash Treatment Facilities, (d) Khalag Treatment and Disposal Facilities, (e) West Bank Effluent Disposal Scheme, (f) rehabilitation of the existing wastewater system, (g) improvement of sanitation in unsewered areas, and (h) training. The modified project is described in detail in Section V.D. of this paper.

4.06 The majority of the foreign exchange costs will be financed by AID and ODA. The Government of West Germany has committed \$4.7 million equivalent to be utilized in replacing existing German treatment plant and pump station equipment.

4.07 AMBRIC is currently developing a project financing scheme for review by GOSSD, A.I.D. and O.D.A. This scheme will recommend specific packages for funding by A.I.D. and O.D.A. based on overall advantage to the project. The Government of Egypt will finance the local currency costs.

V. TECHNICAL ANALYSIS

A. General

5.01 With the completion of the engineering studies presented in AMBRIC's Development Plan for Cairo's wastewater System, it has become clear that sufficient capacity to handle the city's sewage can be obtained only with a substantial investment in new facilities. Cleaning and rehabilitation of the existing system, now underway through Project No. 263-0091, will only restore the system to near its original design capacity of approximately 1.0 million cm per day. Cairo's present wastewater flow is estimated at 1.3 million cm per day - an overload of 30 percent - and this flow is increasing by approximately 50,000 gallons each day.

5.02 Providing sewerage facilities which will meet the needs of Cairo's estimated population of 16.0 million in year 2000 poses several challenging technical and financial problems. The task is of such magnitude as to dictate a continuing staged construction program over the next two decades. The Modified First Stage Expansion Project as outlined in Section V.D. of this paper is the minimum needed first stage facilities of the Master Plan. If implemented, it will provide necessary collection facilities, degree of treatment and safe disposal of Cairo's wastewaters.

5.03 The following first stage improvements have been recommended by AMBRIC as being needed for the Cairo Wastewater System within the next 10 years.

B. Proposed First Stage Expansion Project

1. Central Tunnel Scheme

5.04 This project element includes a 20-meter (65 feet) deep, 5.0 meter (16.4 feet) diameter tunnel constructed under the central business district of Cairo on the East Bank. The tunnel will begin at GOSSD's Dayoura Pump Station in South Cairo and extend northward to the Ameria Pump Station. The central tunnel will be interconnected to the existing central collector system with flows from the collectors diverted to the tunnel to relieve the overloaded condition. The tunnel will be sized for year 2050 flows, but pump stations equipped for only year 1990 flows. The initial scheme includes one culverted drain to convey the Ameria-pumped wastewaters by gravity to the Khalag Wastewater Treatment Plant. A duplicate culvert system will be needed before year 2000 flows are reached and is not included as part of the first stage improvements. Also additional branches to the main tunnel system will be needed before year 2000 to provide relief for all of the central area of the city. Additional pumping facilities at both Ameria and Kossous will be needed to handle year 2000 flows.

2. West Bank Collection Scheme

5.05 This element of the proposed project covers the districts of Dokki, Agouza, Embaba, Zamalek and parts of Boulac. The existing Dokki and Agouza collection system is badly overloaded and only a small part of Embaba is sewered. This project element will construct a new collector and conveyance system serving the northern parts of the west bank and leading to a new treatment plant to be located at Abu Rawash. The southern branch of the new Dokki collector will intercept flows in the existing collector and redirect them westward. From the point of confluence of the north and south branches, a single collector will convey the flow westwards under the Cairo-Aswan railway line to a new pump station where flows are lifted for conveyance to Abu Rawash. This element of work would require additional pump facilities at the Embaba, Boulac and Nahya stations to handle year 2000 flows. The Abu Rawash culvert will be designed to handle year 2000 flows.

3. Abu Rawash Treatment Facilities

5.06 These new sewerage treatment facilities proposed by AMBRIC will consist of a standardized treatment module with a capacity of 250,000 cmd flow. Each module consists of pretreatment works, primary sedimentation tanks, aeration tanks and final settling tanks utilizing the standard activated sludge process for secondary treatment. The first stage improvement facilities include construction of, initially, one treatment module at Abu Rawash. Before year 2000 flows are reached, two additional treatment modules will be needed.

4. Khalag Treatment Facilities

5.07 On the East Bank, flows from Ameria Pump Station will discharge into a new collector and be again lifted into a 5m x 3.5m culvert at the new Kossous Pump Station. The culvert conveys wastewaters by gravity to the new Khalag treatment works. Proposed for the first stage, these facilities will consist of four treatment modules handling a total flow of 1.0 million cmd (264 million gallons per day). Additional pump facilities and treatment modules will be needed to handle year 2000 flows. Sludges will be pumped to Gabal El Asfar Treatment Plant for drying and disposal. Plant effluent will be discharged in Belbase drain.

5. Gabal El Asfar (High) Treatment Facilities

5.08 The equivalent of three secondary treatment modules are recommended in the first stage improvement program to handle flows from East Cairo and Nasr City. An additional two modules with

increased pumping capacity at pump stations will be needed to deal with projected year 2000 flows. Plant effluent will be discharged into Belbase drain for conveyance to Lake Mansala.

6. Nasr City Collectors

5.09 This scheme forms an integral and major part of the collection and conveyance system needed to serve Nasr City. It consists of a collector from approximately the center of the Nasr City drainage area, conveying flows by gravity to the inlet pump station of the Gabal El Asfar (High) treatment facilities. The collector will vary in size from 1.2 meters in diameter to a 3.0 m by 3.9 m wide culvert where it joins with the route of the existing emergency sewage canals. The total length is about 21 kms of which about 11 km would be constructed as a culvert. The first stage facilities include a single culvert. However, an additional culvert will be needed to handle year 2000 flows.

7. Maadi Collector Scheme

5.10 This scheme provides for Maadi flows to be collected in 35 kms of branch collectors and conveyed by gravity through a 3.0 meter diameter 4 km long rock tunnel which would be constructed from Maadi through Masr El Kadima to Dayoura. The first stage facilities include collection and conveyance for anticipated development up to the year 1985. Further collectors and secondary sewers would be required as development proceeds.

8. South Giza Relief Scheme

5.11 This scheme is needed to relieve the overloaded collection and conveyance system feeding the Giza Pump Station. It is planned to construct new collectors to intercept all flows north of Sharia Tahrir, including diverted flows from Zamalek, and convey the sewage westwards to the existing Zenein sewage treatment works. The Zenein pump station will need to be enlarged to handle year 2000 flows.

9. Giza Pyramids to Abu Rawash Collector Scheme

5.12 The Pyramid Pump Station will lift flows from a series of gravity collectors feeding it to the Abu Rawash/Giza Pyramid culvert, thence conducting them by gravity to the Abu Rawash Pump Station. There the flow is again lifted for gravity flow through another culvert to the Abu Rawash Treatment Plant. Culverts will be sized for year 2000 flows. Pump Stations will require installation of additional pumping equipment to handle year 2000 flows.

10. West Bank Effluent Disposal Scheme

5.13 It is proposed that effluent be temporarily disposed, as is the present practice, into the Moheit drain. As this drain eventually discharges into the Rosetta Branch of the Nile River, it is considered important that all flows receive at least secondary treatment. It is expected that the quantity of effluent discharged to the drain will diminish as its use for reclamation increases. However, because of this increased overall flow as a result of this project, it will be necessary to enlarge the present drains to carry a flow of 800,000 cmd. Maturation ponds will be constructed as part of the treatment facilities to provide balancing storage and will act as buffer if treatment facilities should need to be by-passed. This project element includes provision for enlarging the Moheit drain, construction of an effluent pump station at the Zenein Treatment Plant and 12.5 km of pipeline for discharge of effluent to the drain.

5.14 ANNEX G is a summary of the First Stage Expansion Facilities proposed by AMBRIC and the estimated costs of completing the work. The total estimated cost when inflated to the year of expenditure at the per annum rates of 15 percent for foreign costs and 25 percent for local costs is equivalent to U.S. \$2.4 billion, including U.S. \$429 million in foreign exchange. ANNEX H shows the location of the proposed first stage project facilities as described above.

C. Recommended Project Elements and Basis of Selection

5.15 It becomes quickly obvious that implementation of the first stage facilities recommended are beyond the immediate financial scope of A.I.D., ODA and the GOE. Even if other donors could be located and agreed to finance the additional foreign exchange needed for this size project, GOSSD has indicated it would be almost impossible to obtain the equivalent of \$315 million for each of the next 5 years from the GOE national budget just for Cairo's wastewater system. Given the other priorities and economic needs that must also be satisfied from the national budget, the first stage facilities as proposed are simply too expensive. Therefore, after numerous meetings and discussions with GOSSD and AMBRIC a modified first stage wastewater scheme was developed. This modified scheme solves most of Cairo's immediate wastewater problems and forms an integral part of the overall Master plan proposed by AMBRIC. Also, it is within funding capacity of the GOE and funding agencies.

5.16 The selection of the modified first stage expansion projects was based on several factors. It was determined among AMBRIC, GOSSD, O.D.A. and A.I.D. that on public health grounds, precedence should be accorded to works necessary to remove wastewater from the more densely developed areas of Cairo, over works necessary to ensure a high standard of effluent prior to disposal to drains. It was also determined that from an engineering perspective, the protected approach would include providing Cairo on both the East and West Banks of the Nile, the basic infrastructure to permit collection, conveyance, treatment and disposal of existing and projected wastewater flows through 1990. This project will provide that capability. This modified system will provide the basic building blocks upon which the future system can be expanded. Further, these project elements were identified as permitting maximum impact in reducing sewage flooding with concomitant reduction in public health hazards within the available funding levels.

D. The Modified First Stage Expansion Project

a. West Bank Scheme

5.17 This element of the project work remains essentially as originally proposed for the first stage works as described in Section V-8 above.

b. Modified Central Tunnel Scheme

5.18 The modified tunnel scheme delays the construction of 6.6 km of main tunnel from Taweel to Dayoura until later stages. Also, the branch tunnels planned for Shoubra El Kheima and parts of North-Central Cairo will not be built as part of this project. During the interim, flows from these excluded areas will be handled in the existing collectors Nos. 1, 2 and 3. After cleaning and rehabilitation, these collectors will have sufficient capacity because the major flows from the East Bank will be taken through the central tunnel.

5.19 A reduction of approximately 40 percent in initially estimated costs will be realized by delaying the construction of parts of the central tunnel. Certain economies of scale possible in building all the tunnels at one time will, however, be lost. The modified tunnel scheme will be more than adequate to serve the needs of Central Cairo until 1990.

c. Khalag Treatment Works Scheme

5.20 The Khalag treatment scheme remains much as described in Section V-8 of this paper except that the construction of the secondary treatment facilities have been delayed. This scheme would include primary treatment units, construction of an effluent drain to the Gabal El Asfar drain, provision of sludge handling facilities to convey the sludge to augmented sludge drying facilities at Gabal El Asfar, and widening at Gabal El Asfar drain to its confluence with the Belbase drain.

5.21 At Gabal El Asfar Treatment Plant site, the primary treatment facilities presently being constructed by GOSSD will be modified and utilized, with construction of the planned secondary units delayed until 1990.

5.22 Essentially both treatment facilities will be producing primary or better effluents for discharge into the Belbase Drain. While this interim solution is not the most desirable, the effluent quality being discharged into the Belbase Drain will be a significant improvement over present conditions.

5.23 All other parts of this scheme remain unchanged, and the resulting modifications will reduce initial costs by approximately 40 percent.

d. Abu Rawash Treatment Facilities

5.24 The modified scheme proposed for the Abu Rawash treatment facilities delays construction of the proposed primary and secondary treatment units for approximately 10 years. In the interim, wastewaters will be treated in a series of aerobic ponds which will be converted to the planned maturation ponds at a later stage. The degree of treatment provided by the aerobic ponds will be better than primary treated effluent, and after chlorination discharged into the Moheit Drain.

5.25 At a later stage (1990), the primary treatment plant will be constructed along with additional pumping and sludge drying facilities. The last stage (2000) will include construction of the secondary treatment facilities with the aerobic ponds being converted to maturation ponds. The Abu Rawash facilities will eventually handle all of the West Bank flows when the Zeneim Treatment Plant is phased-out of operation in the year 2000. The modifications proposed for Abu Rawash Treatment Complex reduce the initial investment by approximately 55 percent.

e. West Bank Effluent Disposal

5.26 The modified scheme for the West Bank effluent disposal delays construction of the pumping station at the Zenein Treatment Plant and the force main for delivery of the effluent to Abu Rawash Treatment Plant maturation ponds. This scheme retains only the enlargement of the Nahya and Muheit drains.

5.27 A summary of the estimated costs for constructing the modified first stage facilities recommended for financing in this paper is included in section VI of this paper.

f. Rehabilitation

5.28 In addition to the facilities described above as the modified first stage expansion program, provision must be made to handle the extensive amount of rehabilitation work needed to upgrade those facilities being retained from the existing Cairo System. This principally involves rehabilitation of the Zenein Treatment Works and the principal and subsidiary pumping stations. The total costs of this rehabilitation work is estimated at LE 57.6 million (approx. \$83.5 million equivalent) of which LE 39.1 million (\$56.7 million equivalent) is foreign currency cost. ANNEX I provides further detail on these cost estimates.

g. Interim Sanitary Improvements in Unsewered Areas

5.29 Within the boundaries of Greater Cairo all the rural communities and a significant proportion of the urban and periurban population have no public sewerage at present. The disposal of excreta and household waste presents great difficulties and results in widespread nuisance and environmental degradation.

5.30 In unsewered areas it is common practice for each house to have a latrine discharging to a vault, which for various reasons is often too small for the number of users. Vault emptying services are inadequate and in some areas do not exist, so it is not unusual for the vaults to overflow into the streets or houses. To increase the time taken for vaults to fill some families encourage their children to defaecate and urinate in the street. For many people the emptying of vaults is a constant problem. While some vaults take several months or even years to fill, a few have part of the contents removed every day. Getting rid of vault contents is another problem. Due to lack of suitable facilities for disposal they are often discharged into a nearby canal or drainage ditch, on waste ground or in the street, or even into the drains at public standpipes. All these are places where children play and few are remote from intense human activities.

5.31 Domestic wastewater or "sullage" containing decomposable vegetable matter is often thrown in the street as there is no other way to get rid of it. In the street, sullage forms pools between refuse dumped there because there is no collection system. So the inhabitants of these unsewered areas are surrounded by sullage, refuse and excreta, all of which encourage the proliferation of flies and the spread of disease. Many people are acutely aware of their unhealthy environment, but are totally unable to improve their situation.

5.32 Many of the people living under these deplorable conditions are in the lowest income groups and have little expectation of being able to move to areas with public sewers. But not all are poor and there are many substantial buildings in unsewered areas. Moreover population projections for Greater Cairo indicate a growth of at least three million over the next decade. To satisfy the demands of the increasing numbers of people it is likely that the present housing trend of overcrowded central areas, informal growth of the urban periphery and urban encroachment or rural communities will continue. Inevitably there will be many more people living in areas without sewers.

5.32 Because of the high density of population, the high water table and the availability of a copious supply of water, sewerage is the most appropriate method of sanitation for almost all the project area. However, having regard to the magnitude of rehabilitation and new works required to alleviate the short-comings of the existing system and insofar as is practicable, to keep pace with future development, it is inevitable that it will be many years before all developed areas within the project area can be sewered. It is imperative, however, that areas which cannot immediately be sewered should not be left in their present appalling state, which presents a health hazard to the whole community.

5.33 AMBRIC recommends a pilot demonstration be conducted to develop the most effective means of improving sanitation in the unsewered areas, and has recommended that a detailed program for such a demonstration project be prepared for the Kom El Chorab (old Cairo) area. This area includes most of the typical sanitation situations to be considered in the unsewered areas. Thus, it presents the opportunity to test solutions to numerous problems, and to evaluate the effectiveness of such solutions if used on a broad scale.

5.35 The demonstration plan would include construction of communal latrines, installation of waste transfer stations, continued use of private contractors for vault emptying, and

provision of tanker lorries for final disposal. It is essential that all residents have reasonable access to latrines, and that collection and transfer facilities are convenient and adequate to encourage active use for disposal of liquid wastes. Further study is necessary to refine the details of the demonstration plan. It is estimated that this pilot demonstration effort will cost approximately LE 1.2 million equivalent of which LE 0.6 million (\$0.86 million) will be foreign exchange. Chapter 10 of AMBRIC's Interim Development Plan Report provides more detail on this project element.

h. Training

5.36 The importance of training in this project cannot be overstated. This project represents the largest in GOSSD's history and will be undertaken in a relatively short period of time. It is imperative that GOSSD maintain an adequately trained staff to properly operate and maintain the system. AMBRIC has included an estimated LE 3.0 million (LE 1.6 million of which is foreign currency) in its Interim Development Plan Report Cost estimate for the training element in this project. The foreign currency costs here are the manmonths of technical expertise required to adequately train GOSSD staff, and the purchase of training aids and other miscellaneous items required to carry out an effective training program.

5.37 A summary of all local and foreign currency costs of this modified project, including the rehabilitation, sanitary improvements in unsewered areas, and training elements is included in Section VI of this paper.

5.38 Figure V-2 shows the approximate location of all the modified first stage facilities proposed for financing herein. The minimum corrective expansion facilities as modified, including the rehabilitation work as previously described. All the elements of work have not only been carefully selected to minimize the initial capital investment, but also to interrelate so as to form a complete working system that is consistent with the Master Plan. Should none of the proposed future stages of the Master Plan be built, the work proposed for financing in this paper would still significantly reduce Cairo's sewage problems and form a sound operating system which can be expanded. To have an effective impact, all of the modified first stage facilities outlined should be constructed as quickly as possible.

E. Alternative Disposal Options

5.39 Analysis made in the course of the project study involved four basic alternatives, each using a different disposal option, as follows:

1. Disposal to Nile River following secondary treatment.
2. Disposal to Lake Manzala following treatment.
3. Effluent reuse for irrigation following treatment.
4. Desert disposal without reuse.

Nile River Disposal Alternative

5.40 The following environmental effects are predicted under this alternative:

- Negligible effect on the dissolved oxygen of the receiving water.
- Estimated wastewater nutrient concentrations should have little detrimental effect on the river ecological system.
- Suspended solids concentrations would be less than existing suspended solids concentration of the river.
- Bacterial pollution of the receiving waters will be no greater than present acceptable average levels of 1000 MPN/100 ml.
- There would be a potential loss of nutrients that otherwise may be available for agricultural use.
- Current Law 93/1962 forbids discharge of wastewater (treated or untreated) in any form. However, it is both technically and environmentally sound to discharge secondary treated sewage effluents from the Cairo system into the Nile.

5.40 The Cairo Wastewater System Inception Report dated March 1980 concluded: "AMBRIC totally concurs with the conclusions (discharge of secondary treated wastewaters into Nile) reached both by Taylor-Sinnie and the two other studies discussed above. Furthermore, the state of the art throughout the world, and, in particular, current law in the United States (PL 92-500 as amended

by PL 94-574), accepts discharge into rivers provided secondary treatment is capable of providing removals of BOD and suspended solids levels recommended by Taylor-Binnie and AMBRIC for wastewater regardless of where it is discharged."

5.42 Based on the substantial volume of relevant technological data on the Nile River which already exists and taking cognizance of the accepted practice in most parts of the western world, it must be concluded that the discharge of secondary effluent to the Nile would be both technically and environmentally sound. However, before such a scheme can be seriously considered, other important factors must be taken into account.

5.43 The various schemes of direct discharge to the Nile that were evaluated by AMBRIC all proved to be less cost effective than schemes involving conveyance to the proposed Gabal El Asfar and Abu Rawash treatment sites and were, therefore, rejected. Furthermore, in addition to the social unacceptability of such a scheme, the Nile discharge schemes would have wide ranging disadvantages, particularly with regards to the need to locate a very large sewage treatment plant within the urban boundary of the city. Some of the adverse features would include the following.

- A large area of land would be needed for the treatment plant.
- In all cases, areas of suitably located land were insufficient (and too costly) to accommodate the needed year 2000 plant facilities.
- In the event of a treatment plant malfunction, no means of suitable disposal would be available other than direct discharge to the river.
- Treatment of sludges collected at the plant would require either mechanical treatment/dewatering or conveyance through a long pipeline to drying beds located outside the city. Either method would be very costly.
- Location of plant would need to be in northern part of city where any odor or insect nuisance from plant operations would be carried by prevailing winds toward central Cairo.
- Estimated costs indicate that the economic advantages of these schemes would, at best, be marginal in comparison to the recommended alternative.

On the basis of the above considerations, it was recommended by AMBRIC and approved by GOSSD that disposal schemes involving direct discharge of sewerage effluents to the Nile River would be unacceptable.

Disposal to Lake Manzala Alternative

5.44 Lake Manzala, located some 150 kms north of Cairo (see Figure II-1), currently receives 900,000 cmd (projected to increase to 3.0 million cmd by year 2000) of raw sewage flow from Cairo. This sewage from the East Bank of the city discharges into the Belbase Drain and then enters Lake Manzala by way of the Bahr El-Bakar Drain. The total rate of flow of Bahr El-Bakar Drain including irrigation drainage is reported as 3.5 million cmd. Because of the wastewater and agricultural discharges, the lake is moderately entrophic (turning into a swamp).

5.45 The factors that may affect the lake's future usefulness with the discharge of primary treated domestic wastewaters are:

- Dilution
- Assimulative capacity
- Bacterial pollution
- Nutrient levels
- Dissolved oxygen
- Fish production
- Recreational use
- Health aspects

5.46 In Lake Manzala, dilution is limited by the lack of water movement (average current velocities of less than 2 cm/sec) and depths of less than 1.5 meters. Vertical dispersion of wastewater is not limited by salinity gradients in the lake. However, because of the shallow depth, significant dilution does not occur. These conditions tend to limit the area effects of wastewater discharges by promoting the rapid settling of sewage solids creating sludge banks and localized anaerobic conditions.

5.47 The ability of Lake Manzala to assimilate waste was calculated to support increases in ambient levels of 6.0 mg/l BOD5 without adverse effects on the fishery. Major nutrients occur at levels sufficient to promote algae blooms. However, cell counts are maintained at moderate levels through cropping by zooplankton and fish. The oxygen levels (3.0 mg/l) in all parts of the lake are sufficient to support fish life with the exception of the areas receiving direct discharges of wastewaters. Further, USEPA coliform criteria for bathing water (MPN of 200/100 ml) is met throughout the lake with the exception of areas receiving direct sewage discharges. Fish population studies indicate the lake is being over-fished. Present sewage discharges have little effect on the fishery other than the loss of about 5,000 hectares of habitant area

near the discharge of the Bahr El-Bakar drain. This represents less than four percent of the total lake area of 140,000 hectares. Studies indicate the Heterophyidiasis, helminthic parasite related to sewage, is not being transmitted by Lake Manzala fish.

5.48 Even with the continued discharge of untreated wastewaters from Cairo into Lake Manzala, the ecological stability of the lake will not be significantly affected and would, in all probability, enhance the fish productivity of the lake. Current and future industrial discharges should have no adverse environmental impact beyond increasing wastewater loadings and nutrient levels and the same general effects described for the lake above would still apply.

5.49 Therefore, the continued disposal of Cairo's wastewaters into Lake Manzala's saline waters, even without treatment, must be considered as a viable interim solution. However, it is recommended that conventional primary treatment with distribution of effluents into the Lake be handled by a suitably sized outfall with diffusers to minimize the effects of poor circulation within the lake. No disinfection is recommended because of the adverse effects of chlorine and chlorinated organics.

Effluent Reuse Alternative

5.50 Because of the limited water resources in Egypt, wastewater reuse is becoming an increasingly important aspect of resource planning. Therefore, reuse of treated wastewater effluents was evaluated as a disposal alternative.

5.51 In considering the use of wastewater effluents for irrigational purpose, the following factors were evaluated:

- Degree of treatment required;
- Type of treatment;
- Soil limitations;
- Crop selection and patterns;
- Effluent delivery systems;
- Public health aspects;
- Types of distribution and drainage systems needed.

5.52 Present Egyptian Law requires that effluent from domestic sources contain no more than 40 mg/l BOD5 if it is to be discharged into an agricultural drain. To meet this standard, the revised Master Plan recommends secondary treatment either by land application or conventional secondary treatment methods. While secondary treatment is primarily needed to minimize the public health risks, it is also needed to lessen maintenance problems of

soil clogging. Also, regulatory authorities require either adequate storage capacity or a disposal alternative in the event of reduced irrigational needs or treatment plant malfunctions. For this reason, each scheme proposed is provided with a disposal alternative.

5.53 The viability of the irrigation alternative depends to a large extent on the strength of Cairo's wastewater and the dilution that may be needed before it is used. The principal constraints in this case are the moderately high nutrient and total dissolved solids concentrations in the city's wastewaters. This will limit the use of the treated effluents to certain types of crops and soils without partial dilution with an acceptable quality irrigation water.

5.54 Costs of wastewater reuse are not those of the entire wastewater system, but rather the difference in the cost between the reuse alternative and other roughly comparable ways of disposing of Cairo's wastewaters. AMBRIC has recommended that, if sewage effluents are to be disposed of on agricultural or reclaimed areas, the following essential conditions be met.

- "the reclamation schemes must be developed as and when required to provide the necessary amount of land to receive the rate of flow discharged from the treatment works;
- "the recommended effluent standards must be maintained at all times; low standards could not be tolerated for the scale of reuse envisaged for Cairo;
- "the executing authority must have effective powers to ensure that the schemes are efficiently managed and that proper control and monitoring procedures are strictly observed at all times;
- "....Provided that the above conditions are met, reuse of Cairo's sewage effluents can provide an entirely satisfactory and beneficial means of disposal; if the conditions are not met, a public health disaster could result."

5.55 In summary, agricultural reuse of the majority of Cairo's wastewater involves technical, economic and management problems that presently limit the viability of this alternative.

Desert Disposal

5.56 Apart from the narrow strip of land in the Nile Valley and the Nile Delta, all the land near Cairo is desert. South, east and west of Cairo, the land is rocky, heavily modulating and rising to elevations above 150 meters. To the northeast and northwest of Cairo, the desert land is at a lower elevation, the characteristics of the soil being generally sandy and not suitable for agriculture, but suitable for effluent disposal.

5.57 If disposal of the wastewater is the sole objective, application rates are only constrained by the need to effect a balance between the evaporation and percolation losses with the incoming sewage flow. Nevertheless, because of the large wastewater flows generated in Cairo, huge areas of land would be required, having a topography suitable for impounding surplus wastewater flows when seasonal rates of evaporation are low.

5.58 There would be a saving in treatment costs compared with other methods of disposal as the need to protect public health would be relatively low, provided that the selected area was not readily accessible to the public. This could involve fencing and patrolling the area, an expensive factor.

5.59 An indirect benefit could result from recharge of the underlying aquifer. The degree of recharge could be increased by use of percolation wells or other means. However, because of the enormous quantities of water currently stored in aquifers within Egypt, the continuous recharge seems to offer little or no advantage.

5.60 Almost all the land in the Cairo area has a current or planned use for agriculture, urban housing, or industrial development. Because of its role in the country's economy, the value of agricultural land is high and reclamation a subject of high priority. The Master Plan recommends against use of any lands that have potential for agriculture. This is especially applicable to its use for the evaporation of wastewaters as it causes an irreversible and irretrievable commitment of land resources that could be better used for other purposes.

5.61 All available land for evaporation of wastewaters in the project vicinity is at a relatively high elevation (40 m to 60 m). The cost of conveyance and pumping to these sites will cost approximately LE 117 million more than other more preferred alternative methods of disposal. Because this method of disposal is not economically viable, it will not be considered further.

F. Selection of the Recommended Alternatives

5.62 Four possible basic alternative collection and disposal systems have been identified. Three of these systems (Nos. 2, 3 and 4) plan for the conveyance of the collected sewage in an outward direction away from the Nile to beyond the urban boundaries of Cairo. The fourth system (No. 1) would bring the sewage inwards to treatment works sited on or near the banks of the Nile.

5.63 The recommended plans, Nos. 2 and 3, were selected on the basis of environmental considerations, economics, and social acceptability. A number of alternatives within these basic collection and disposal systems referred to in this paper have been identified, giving 15 possible alternatives for evaluation. By a process of elimination, comparing Net Present Values and other factors, 13 of these alternatives have been rejected to obtain the preferred solution described earlier in this Section. This alternative uses the basic system of sewage generated on one bank of the Nile River would be collected and disposed on the same bank. The preferred solution requires for the East Bank System, two sewage treatment plants, one at Gabal El Asfar (high) serving a year 2000 population of 2.8 million and a second at Khalag serving 8.0 million. Both plants would provide full treatment and discharge effluent to the Belbase Drain for disposal in Lake Manzala. On the West Bank, the existing plant at Zenein after rehabilitation would be retained to serve a population of 1.4 million, with the remainder of the West Bank flow being treated at Abu Rawash Treatment Plant serving another 1.4 million people. The combined effluent from both of these treatment facilities will be discharged via the Muheit Drain to the Rosetta Branch of the Nile River.

5.64 On the West Bank there is no drainage system similar to the Belbase/East Bank's Bahr El-Bakar system. The only alternative for a positive disposal system is to continue discharge into the Rosetta Branch of the Nile via the Muheit Drain. The only alternative would be reuse for agricultural purposes and this is planned in the latter stages of the project.

5.65 On the East Bank reuse would also appear to be both feasible and economical to the east of the Gabal El Asfar treatment works. Again this reuse scheme is recommended for implementation in future stages of the Master Plan; not for the first stage expansion program.

5.66 The reuse of effluents would require continuous monitoring and adequate control to ensure that possible harmful long-term effects are identified and the environmental implications are evaluated. This work is presently being conducted by AMBRIC/GOSSD and will be presented in Environmental Assessment Report due in early 1981.

VI. FINANCIAL ANALYSIS AND PLAN

A. Introduction

6.01 Recent studies have provided financial information regarding GOSSD's recent (1973-1978) performance, and its projected future financial condition on the basis of implementing the proposed capital improvements. This section presents, in summary form, GOSSD's projected financial statements, including the capital expenditures proposed by this project and those future expenditures needed to implement the entire Master Plan.

B. Financial Performance

6.02 ANNEX J shows the annual operating and maintenance costs for GOSSD for the years 1973-1978 with projected costs based on implementation of the Master Plan through year 2000. ANNEX K tabulates the historic and proposed capital improvement program based on the Taylor-Binnie Master Plan Report and includes the improvements requested in this paper. Revenue sources for the period of 1973-1978, plus project revenues through year 2000, are shown in ANNEX L.

Revenues

6.03 Before 1962, GOSSD generated revenues through a sewer service charge to industrial customers. The charge was L.E.0.003 per cubic meter of wastewater discharges based on metered water use. However, in 1962, this charge was dropped in conformance with GOE policy. Information indicates that even when there was a charge for sewer service, little revenue was collected because the sewer charge was not billed with the water charge and separate collection was difficult.

6.04 At the present time, the only two sources of revenue to help meet O & M and capital expenses are from (1) service charges for new sewer connections and (2) GOE budget allocations. Obviously, unless a sewer service charge in some form is instituted soon, most or all of GOSSD's operating and capital expenditures must be subsidized by from the GOE budget.

6.05 Those customers who specifically request a sewer connection must pay the estimated cost of making the connection in advance. The fee is later adjusted to reflect the actual cost of making the connection. The cost of such a connection has risen from LE 43 in 1973 to LE 154 in 1979. There are also customers who are connected to the system without requesting such a connection. Such cases routinely include building connections for newly sewer

streets. The connection fee in these cases has averaged approximately LE 175 through 1979. Because the GOSSD subsidizes such connection costs for lower income families, the total revenue generated is reduced. Regardless, the total service charges from all sources have averaged only 15 percent of the O & M costs.

6.06 As previously mentioned, the balance of the funding needs of GOSSD are met entirely from national budget allocations through quarterly allotments by the Ministry of Finance. Authorization to spend such funds expires at the end of the fiscal year and any such funds remaining are used to reduce the allotment for the first quarter of the succeeding year.

Operating Costs

6.07 During the period of 1973 through 1979, GOSSD's operating costs have increased 142 percent, an average of almost 18 percent annually. Those categories experiencing dramatic growth over this period include (1) salaries, allowances and employee benefits of almost 140 and (2) utility costs of 172%. GOSSD has no control over these costs as they are regulated by the GOE. Spare parts and material costs have increased 103% during this period primarily because of operational problems caused by (1) insufficient capacity of pump stations and collection system; (2) abuse of the system from users not complying with sewer use law; and (3) lack of trained personnel.

Capital Costs

6.08 Budget amounts for capital improvement projects fluctuate according to the availability of funds from national budget and priorities. During the period of 1973-1979 this budget has fluctuated from a low of LE 2.4 million in 1973 to a high of LE 40 million in 1979. Budgets in 1973 to 1975 remained almost constant averaging 2.58 million, but 1976 capital budget increased dramatically to LE 10.95 million followed by an increase to LE 22.36 million the next year. The capital expenditures percentage of the total annual expenditures increased from 44.7% in 1973 to 78% in 1978. Both the 1978 and 1979 budgets are reflective of the shift in GOE development priorities especially in the areas of health and improved conditions for urban poor. It also is indicative of the priority the GOE places on the Cairo project.

C. Projected Financial Statements

6.09 On the assumption that the revised master plan elements for Cairo will be implemented, project financial statements have been prepared for the period of 1979-2000. ANNEX M shows

projected income statement and application of operating funds based on revenues from sewerage user charges. ANNEX N shows the projected balance sheet. A number of major assumptions have been made regarding the development of these statements and are presented below.

Cost Escalation

6.10 Currently there is an acceleration of escalation of costs in Egypt. The Consumer Price Index increase of 13.5 percent from mid-1978 was the highest recorded in recent years; components of this index are goods whose prices are controlled by the GOE. Although a comparable index is not available to monitor escalation of construction costs, available information indicates that these costs have experienced much higher increases.

6.11 The present GOE policy indicates a small shift toward increased private control of industry. Moves to make local pricing more reflective of actual costs of production through reductions in GOE subsidies will probably be slow in taking place. During the early years of this transition, a high level of inflation can be expected, followed by a tapering off to a moderate level as prices begin to stabilize. Escalation of the cost of foreign goods is expected to maintain its current level of seven percent a year. Based on these assumptions, the rates shown below have been utilized in the financial projections.

TABLE VI-6

FORECASTED RATES OF COST ESCALATION

<u>Year</u>	<u>Annual Rate in Percent</u>	
	<u>Local Operating & Constr. Costs</u>	<u>Imported Goods</u>
1978	20	7
1979	25	7
1980	25	7
1981	20	7
1982	15	7
1983	12	7
1984-2000	10	7

Operating Costs

6.12 Historical operating costs were related to the various functions and operating costs. The resulting units were then applied to the recommended programs for rehabilitation and expansion

of the wastewater systems in Cairo. While these unit costs, escalated by the projected inflationary factors, give an indication of the projected costs, some adjustments were needed. Because there are few valid historical O & M cost records for primary, secondary treatment or stabilization ponds, such costs were based on equations relating costs to design flow and to the various levels of treatment in accordance with O & M costs experienced at other facilities. The operating costs at the Zenein Treatment Plant for secondary treatment were used to adjust these cost relationships to local conditions.

6.13 Additional refinements to the unit cost approach for projected operating costs included calculation of power needs and electricity costs and estimated staffing and equipment needs for a larger than normal sewer cleaning program. Also, a recommended staffing plan was developed and used for the operational and management personnel needed for the expanded and improved wastewater facilities.

Estimated Capital Expenditures

6.14 Estimates include not only the additions to and expansion of the system proposed by this project, but the other capital improvements needed to complete the entire Master Plan Program envisioned. Such items as maintenance equipment were also included. With the exception of building connections, all construction items include provision of engineering (design and construction supervision) at an average cost of 10 percent of the total construction cost. Project costs also include provisions for contingencies (15 percent) and legal and administrative costs (5 percent). Cost estimates for land, vehicles and mobile equipment do not include provisions for engineering, contingency, administrative or legal costs. All estimated capital expenditures have been escalated to reflect as closely as possible the actual cost to be incurred at the time of construction.

Fixed Assets and Depreciation

6.15 The assets in service as of December 31, 1978 are shown in ANNEX 0. Facilities which were under construction for more than one year were listed as "work in process" during the construction period, and then transferred to assets on January 1 of the year in which they were placed in service. Depreciation for each year was determined by multiplying the balance of depreciable assets by the depreciation rate applicable for each type of asset according to the following rates.

TABLE VI-1

Cairo Sewerage Project
Cost Estimate and Financial Plan
(In L.E. 000)

Project Element	1980		1981		1982		1983		1984		1985		1986		1987		TOTAL	
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
I. West Bank Scheme	-	-	60	856	787	1,752	1,290	11,758	2,125	39,296	1,996	51,996	460	12,066	85	3,029	6,831	110,783
II. Ab. Hawash S.T.W.	-	-	36	225	544	471	734	7,258	294	8,835	398	12,017	76	1,120	-	-	2,082	29,720
III. West Bank Effluent Disposal	-	-	35	966	-	-	-	-	37	1,418	82	3,020	-	-	-	-	154	5,404
IV. Central Tunnel Scheme	-	-	794	3,514	8,753	25,235	17,416	48,177	13,396	40,314	8,275	31,821	1,707	4,869	-	-	50,351	155,033
V. Kneing Treatment Works	-	-	673	4,439	11,925	4,396	12,631	29,039	1,992	22,258	3,220	29,582	1,215	3,193	-	-	31,859	90,407
VI. Rehabilitation	3,514	740	27,726	6,845	7,810	10,915	-	-	-	-	-	-	-	-	-	-	39,050	18,500
VII. Training	100	200	200	400	200	400	100	200	100	200	100	200	100	200	100	200	1,000	2,000
VIII. Improved Sanitation in Unsewered Areas	-	-	400	300	200	300	-	-	-	-	-	-	-	-	-	-	600	900
Project Total	3,614	940	29,924	17,545	30,219	43,469	32,171	96,432	17,942	112,321	14,071	130,636	3,558	21,448	185	3,229	131,884	500,000

Annual Depreciation Rate

<u>Asset</u>	<u>Percentage</u>
Sewers	2.0
Structures	2.5
Equipment	5.0
Land	Not Depreciated
 <u>Revenue</u>	

6.16 Ideally, GOSSD should impose a sewer service charge of some type to cover all capital and operating costs. However, it is doubtful that such a tariff will be implemented because of the inability of a large segment of customers to pay such a charge. It has been assumed that a charge based on "ability to pay" would start in 1981 and cover only operating and working capital costs. For new sewer connections, it has been assumed that the present connection charge will continue to escalate at the same rate as in the past. However, because most new connections will be in poorer areas, only one out of every three new connections will be billed. For new developments, it has been conservatively assumed that developers will be charged one-third the cost of constructing collection sewers in their developments.

D. Financial Plan

6.17 As reflected in Table VI-1, Summary Cost Estimate and Financial Plan, the proposed project will total \$808.3 million* of which \$190.8 or 24% will be in Foreign Exchange and \$617.5 or 75% in Local Currency. The amounts and sources of this funding follow:

(In LE Millions)

<u>Source</u>	<u>Amount</u>	
	<u>FX</u>	<u>LC</u>
AID	52.5	-
U.K.	76.0	-
Rep. of West Germany	3.2	-
<u>GGE</u>	<u>.....</u>	<u>426.0</u>
<u>Total</u>	<u>131.7</u>	<u>426.0</u>

.....
Exchange rate LE .69=\$1.00

Cost estimates shown in Table VI-1 include an allowance of 7 1/2% of the capital costs of the works to cover the costs of engineering, design and supervision of construction. Also cost estimates include the following contingency allowances:

<u>Item</u>	<u>Percent added</u>	<u>Remarks</u>
Land purchase	10	
Compensation	10	
Sewers - general	15	Variable soil conditions. Possible damage to property from settlement.
Sewers-city centre	65	As above, plus possible (open cut only) night working and disruption.
Tunnels	50	Ground condition uncertainties.
Pumping Stations	20	Difficult ground conditions. Deep substructures for tunnelled sewers.
Mechanical and Electrical Plant	20	Budget prices are estimated.

It should be noted that the variable allowances reflect the present degree of uncertainty prior to detailed site investigation and detailed design of the project components.

AMBRIC is currently developing a project financing scheme for review by GOSSD, A.I.D. and O.D.A. This scheme will recommend specific packages for funding by A.I.D. and O.D.A. based on overall advantage to the project.

6.18 We have recommended in Section XI of this Project Paper that the GOE be allowed to regrant rather than reloan the foreign exchange contribution to this project to GOSSD as a grant contribution to its asset base. The British Government has already recognized this need by agreeing to grant their pounds sterling 50 million to GOSSD. We have made this recommendation for the following reasons.

6.19 As stated in paragraph 6.03 above, the only source of revenue to GOSSD to meet O & M, capital, and debt servicing costs is service charges for new sewer connections. These charges recover only a small portion of total annual expenditures. The GOE has recognized the major problems associated with not allowing GOSSD to charge for its services as:

- a strain on GOE budgetary resources; and
- inability to operate GOSSD as a financially viable organization.

6.20 The GOE is cognizant that a large majority of the population is unable to pay service charges or tariffs which would allow GOSSD to finance total annual expenditures and realize a reasonable return on its investment for working capital and future capital budgeting needs. The GOE is convinced, however, that a gradual shift in the financing burden of these services from the Government to the general population is needed.

6.21 To address these problems, the GOE commissioned a comprehensive study of the management and tariff structures of Egypt's water and sewerage utilities. This study was completed in September 1979. It recommended that the GOE implement sewerage charges which would take into account the capital expenditure program needed to meet present and future needs, and concurrently would recognize the limited ability of the general population to bear the total cost of this effort.

6.22 GOSSD has expressed to USAID in discussions on other AID financed projects (AID Loan No. 263-K-044, Alexandria Sewerage Project; AID Grant No. 263-0091, Cairo Sewerage Project; AID Loan/Grant 263-K-050/263-0048, Canal Cities Water and Sewerage Project) that it would be in a more favorable position to institute tariffs to recover, initially, O & M costs, as a transition to charging for all the costs, if foreign exchange capital costs could be granted. This would reduce the financial burden both on GOSSD and the users.

6.23 Tariffs to recover annual O & M costs, plus reserves, are assumed to be instituted in 1981 in the projection of financial statements.

VII. ECONOMIC ANALYSIS

A. General

7.01 The economic analysis of infrastructure development projects is primarily concerned with social profitability. To measure benefits and costs to the society, it is necessary to evaluate all inputs to and outputs of the project from an overall economic point of view. Outputs of some projects, however, are difficult to quantify in financial terms and the usual cost/benefit analysis has little meaning. Sewerage improvement projects are typical of such projects. Primary benefits include improvement in general health and, thus, work productivity, medical and hospitalization cost savings attributable to reduced water-related infections, and improved hygiene as a result of improved sewage disposal. In the case of the Cairo Sewerage Expansion Project, additional benefits can be based on the fact that tourism is one of Egypt's major sources of foreign exchange earnings and Cairo is the center of this tourist industry.

7.02 The current conditions involving sewage ponded in over 200 locations in the city, if allowed to worsen, will have a severe effect on Cairo's ability to serve as the tourist focal point. It would be difficult to quantify the loss of revenues caused by Cairo becoming an undesirable place for tourism, but the loss would be significant. Cairo, the country's social and cultural center, needs good utilities to maintain and expand its ability to host tourists.

7.03 A sound sewerage system along with an adequate water system are two basic components needed. Efforts are now underway by A.I.D., Japan and Western European nations to assist Cairo improve and expand the water system. Similar efforts with the sewerage system are also needed to avoid a steadily worsening situation caused by increasing population and added water supplies.

7.04 Since benefits cannot be quantified it is necessary to evaluate the project based on an analysis of its being the least cost alternative.

B. Economic Analysis of Least-Cost Alternatives

7.05 Economic cost comparisons among a number of alternatives were originally carried out in the Taylor-Binnie Report (see Vol. No. 1, Chapter 6 and Vol. No. 6). The AMBRIC's July 1980 Interim Development Plan Report reviewed and updated the earlier work. (See Vol. 1, Chapters 6 and 7 and Vol. 2 Appendices E and F.) The AMBRIC Report analyzed three basic alternative East Bank sewage collection schemes derived from the Taylor-Binnie recommendations: a Nile River

bank collector; a tunnel collector with Maadi sewage conveyed to the West Bank; and a tunnel collector sufficient to also handle Maadi flows. The net present values (1980 prices) of the elements which differ among the three alternatives are shown in Table VII-1. The opportunity cost of capital for a basically risk free public sector service project was assumed to be 10 percent. Further, the net present values (NPV) were adjusted to reflect a uniform marginal economic cost of electricity of LE 0.045 per kilowatt hour. Although the third alternative has the lowest NPV, the difference among them all is not believed to be large enough to overcome possible errors in estimation. Therefore all alternatives would have to be considered economically equivalent.

TABLE VII-1

Comparative Net Present Values
of only Differing Elements
among Alternate Collection Schemes
(LE Million, 1980 Prices)

<u>Item</u>	<u>Nile Collector</u>	<u>Tunnel W/Maadi Flow to West Bank</u>	<u>Tunnel W/Maadi Flow</u>
NPV @ 10%	140.0	132.9	130.3
Adjustment for Electricity	<u>-4.0</u>	<u>-2.1</u>	<u>-2.4</u>
Adjusted NPV	136.0	130.8	127.9

Source: Chapter 6 AMBRIC Report (especially Paras 6.37 and 6.42)

7.06 Thus the selection of the preferred alternative must be based on non-economic factors. These factors are basically: system reliability, implementation speed, social cost of construction, financial risk, and location. An analysis of these factors tends to favor the tunnel scheme over the Nile collector. The Maadi flow does not affect this. However, uncertainty about the timely implementation of West Bank scheme argues for the third alternative which will incorporate the Maadi flow on the East Bank.

VIII. ENVIRONMENTAL ISSUES

A. Introduction

8.01 An Initial Environmental Examination (IEE) for this project, recommending that an Environmental Assessment be prepared, was approved by the USAID/Cairo on January 30, 1978, and forwarded to AID/W for its action. On February 21, 1978, AID/W approved the threshold decision recommended by the Mission. The IEE is attached as Annex H. This project represents the first of a series of planned activities to be undertaken by the GOE to provide the Greater Cairo Area with a wastewater collection and disposal system which will adequately serve its population and industry. There is little question that the existing system is the cause for serious environmental concerns. It is a heavily overloaded system where raw wastes frequently overflow sewers and flood over 200 separate populated areas, and, when collected, are discharged untreated into receiving waters such as the Nile River and Lake Manzala. This project is aimed at correcting the adverse conditions described in this paper by construction of the first stage expansion works to eliminate as many of the overload conditions as financial resources will permit.

8.02 It is planned that Environmental Assessments (EA), taking into account the various alternative solutions, will be prepared by AMBRIC, the consulting engineering consortium employed on this project, when the investigation and analysis of the various disposal and reuse schemes have been finalized. It is recommended that a condition precedent be established in the Grant Agreement to preclude the disbursement of any funds under this project, other than for engineering services, until an EA acceptable to A.I.D. is submitted for the project elements related to disposal or reuse of collected waste waters or treatment plant sludges. See Section XI B(2)(a).

8.03 This procedure, while out of sequence with the current requirements of Regulation 16, is necessary because the investigation and analysis of the various disposal and reuse schemes have not been finalized or agreed to by the GOE. While all of the disposal schemes proposed by the master plan will not be built initially under this project, the interim solutions proposed herein will create some environmental changes, however minimal. The following discussion will serve as an interim analysis until the EA is submitted.

B. Existing Conditions

8.04 At the present time, approximately 66 percent of the urban population of the city is served by sewers. In general terms, the system fulfills its function in that it enables the sewage to be removed from these areas. But the system is overloaded, and there is local intermittent flooding of raw sewage, both in the center of the city and in other residential districts.

8.05 The conditions in developed areas which are presently unsewered are most unsanitary. There appears to be little in the way of organized sanitary services, and the inhabitants have been forced, in some cases, to make their own arrangements. Consequently, septic tanks often overflow into open drains and, in some localities, night soil and sewage wastes are deposited in the streets together with domestic refuse.

8.06 The location of the various sewage treatment works are shown on Figure VIII-1. Abu Rawash and Gabal El Asfar are situated well outside the urban area, but Zenein, Nahya and Kossous all have residential areas immediately adjacent to them. Apart from a comparatively small amount of sewage or effluent which is utilized for irrigation, the whole of the sewage flow from the city, much of it still in a raw state, is discharged to the main irrigation drains. Figure II-2 also shows the location of these main drains in the immediate proximity of Cairo; Figure II-1 gives similar detail between Cairo and the Mediterranean coast.

8.07 The Muheit drain on the western side of the city accepts primary effluent from the Nahya works and poor quality effluent from the Zenein works before discharging into the Rosetta Branch of the River Nile at a point approximately 10 km downstream of the Delta Barrage.

8.08 The Belbase drain, which runs northeastwards along the line of the Ismailia Canal, receives the bulk of the wastewater from the eastern side of the city, the flow in the drain receiving dilution from normal irrigation drainage at various points. The Belbase and Qalyub (irrigation) drains meet near Zagazig, at which point water from the Qalyub drain can be pumped to the Tora Canal for reuse in irrigation. The remaining flow from the Qalyub, together with the Belbase flow is combined from this point in the Bahr El Bakar drain, which continues to run north and east until it discharges into Lake Mansala, a brackish enclosed lake on the Mediterranean coast.

8.09 The Kossous drain carries primary effluent from the Kossous works and the pumped discharge of untreated sewage from Ameria and, for several kilometers of its length immediately downstream of the Kossous works, passes through a densely populated urban area. There are also communities at a number of points along the length of the main drains.

8.10 The current practice of disposing large quantities of raw sewage and partially treated effluent to the drains constitutes not only a potential danger to public health but is also thoroughly objectionable from an ecological point of view. The consequential anaerobic conditions in these drains cause dark coloration of the water and gives rise to obnoxious odors.

8.11 Before it receives the discharge from the Kossous drain, the water in the Belbase drain is of good quality with aquatic plants and a small fish population typical of an agricultural drain. But after receiving discharges from the system, it is barely aerobic and smells offensively. Abu Zaabal, a village some 1.2 km north of the junction between the Gabal El Asfar and the Belbase drains, suffers from the odor rising from the Belbase drain. The flow in the drain at this point has the appearance of raw sewage, with large quantities of floating matter. Several of the houses in this locality use shallow wells, some within 20m of the edge of the drain, for the extraction of potable water. The general sanitary conditions in this village are very poor.

8.12 The Bahr El-Bakar drain remains barely aerobic throughout its length and smells offensively. Near the Manzala discharge, the recently reclaimed land is irrigated by small drains from the main drain. The water at this point has an unpleasant appearance rather than smell, yet apparently is able to support small fish. There are considerable amounts of weeds in both the main drain and the side drains, and the area of Lake Manzala in the vicinity of the point of discharge is badly affected by accumulation of weeds, particularly water hyacinth. No data are available on the fisheries in the area, but it is known that Lake Manzala produces about 22,000 tons of fish per annum (about 180 kg per hectare). This yield is less than half the yield from other Delta lakes.

8.13 The discharge from the Muheit drain into the Rosetta Branch of the River Nile is clearly distinguishable by the difference in color of water. The discoloration persists for several kilometers and floating material of sewage origin has been observed 10 km downstream of the point of entry. Dissolved oxygen readings show a substantial reduction in the oxygen content between the values upstream and downstream of the discharge point. Local fishermen report that fish catches are adversely affected for a few kilometers downstream.

8.14 A significant amount of industrial effluent is currently discharged to a number of open drains without treatment. The flow in these drains is partially lost by seepage into the underground aquifer with the remainder discharging into main irrigation drains. Some chemical compounds in these discharges are not biodegradable and seepage may cause accumulations of such constituents in the aquifer.

8.15 The discharge of primary treated effluent to the main agricultural drains was a deliberate act on the part of the Government during the mid-1960's when urgent action was needed to relieve the increased sewage flows removed from the city as capacity was not available in the existing treatment works at Gabal El Asfar and Abu Rawash.

8.16 Earlier than this, it had become necessary to pump large quantities of sewage from Ameria into an open channel system leading to Gabal El Asfar where raw sewage, following settlement in shallow earth lagoons, was distributed over an extensive orchard area. In 1959, a second channel was added to permit further quantities of crude sewage to be disposed of in this manner. The orchard area at Gabal El Asfar is now heavily overdosed with sewage and is waterlogged in many places. As a result, the growth of the trees and other crops is adversely affected and, in summer, the area has an offensive smell and supports the breeding of many flies and mosquitoes.

8.17 Continuance of the present methods of disposal can only lead to a further serious deterioration in the environment. The risks to the public, both upstream and downstream of the city area, are considerable.

8.18 The dangers inherent in the present conditions cannot be too highly stressed. There is a compelling need for improvement and extension of the wastewater facilities, not only to remedy past neglect, but also to make adequate provision for the large increases in population, water use and consequential sewage flows in the future.

8.19 The implementation of the project outlined in this paper will lead to a progressive correction of the problems discussed above. The scale of the project envisaged is large by any standards. However, conditions in the city will continue to deteriorate unless action is taken at once.

C. Construction and Land Use Impacts

8.20 Effects of construction upon the environment are proportional to the type, intensity and duration of the construction work and the extent and significance of the affected environmental resources.

8.21 Construction activities pertaining to the rehabilitation and repair of the existing sewage collection system and the treatment plants will not cause a permanent change in present land usage, because the system is principally underground. Those elements of the system above ground, i.e., pump stations, and treatment plants, if reconstructed, will be treated architecturally to be esthetically compatible with the urban neighborhood.

8.22 Construction of new treatment plant facilities and pumping stations will be limited to the sites of the existing facilities in most cases. This will reduce the significance of or eliminate the need for additional land resources. In most cases, plant sites are located in sparsely populated areas on the outskirts of the city. The building of solid, high security fences around the planned construction sites virtually eliminates any further aesthetic intrusion from the existing or proposed facilities on the surrounding areas.

8.23 The primary environmental problems associated with the repair and reconstruction of old sewers and manholes and the construction of new sewers are the continuation of service during the work and the traffic problems that inevitably result when streets are torn up. The latter problem is particularly troublesome in Cairo because so many of the side streets are narrow and the main streets heavily congested. Continuity of services can be provided by means of temporary bypasses or the use of tank trucks to haul wastewaters to downstream manholes.

8.24 The project will require that sewer cleaning, repair and construction work take place both in city streets and at existing pump station sites. The cleaning operations will be conducted primarily at night because this is the time of lowest wastewater flow. This will minimize any disruption of commercial activity or traffic. The solids, sludge and debris removed from the sewers will be trucked away for safe burial on a daily basis. The consultant services will include identification of suitable traffic detours, disposal sites, and appropriate equipment needed.

8.25 The maintenance of open trenches will be limited in both time and distance to minimize erosion, safety, dust and silt runoff problems.

8.26 To the extent necessary, underpinning will be provided to prevent damage from trenching on nearby structures. Trench sheeting will be provided to protect roads and other surface features against collapse and to protect workmen.

8.27 After completion of underground work, backfilling, compaction and repairing or resurfacing of streets and roads will be made, so there will be no residual effect from the excavation work.

8.28 A major purpose of the proposed work is to ensure the proper functioning of the existing facilities or new facilities, to eliminate extensive ponding of sewage which now occurs in many parts of the city. At present, this ponding has detrimental aesthetic and health effect on approximately one million residents of Cairo. This detrimental effect will initially be reduced by the project rehabilitation work. It will be eliminated after completion of the first stage expansion works to be designed and constructed by the project.

8.29 The net effect of the project on land use will be beneficial. The additional land resources to be used for new facilities will be small.

D. Water Quality

8.30 The disposal of wastewaters, whether treated or not, into the River Nile is presently prohibited by law in Egypt. However, it occurs. Raw sewage and effluent from the Cairo West Bank system is presently discharged into the Rosetta Branch of the Nile. The Rosetta Branch supplies irrigation water for agricultural use in the Delta, water for fisheries in Lake Maryut and is the source of the potable water supply for cities such as Alexandria. The Kossous and Belbase Drains pollute Lake Manzala with untreated sewage from the east bank system. Lake Manzala is a major source of seafood in Egypt.

8.31 One of the objectives of the review-study phase of the project is to determine whether and to what extent discharges of treated wastewater to the River Nile would: (i) be physically feasible without significant impact to downstream users, (ii) be economical, (iii) require legislative or administrative action, and (iv) be environmentally acceptable. Resolution of these questions and provision for control of pollution of receiving waters, including the Rosetta Branch, the Kossous and Belbase Drains and Lake Manzala, will be a major objective of this project.

8.32 The short-term improvement to the wastewater collection and treatment system that will be achieved by the proposed cleaning and rehabilitation work will create no additional pollution of any receiving waters. The first stage expansion plans will develop a feasible solution for improving and controlling the quality of the receiving water. This will provide a basis for rational decision-making by the GOE as to the optimum wastewater quality that can be discharged and long-term effects on water quality.

8.33 Summarizing, the proposed cleaning and rehabilitation work will tend to increase the sewage flows from the city and further pollute receiving waters. However, this work will also reduce the serious health and social problems caused by overflowing sewers and the ponding of new sewage in heavily populated areas of the city. The pollution of receiving waters will be corrected by the first stage expansion work which closely follows in time the rehabilitation work.

E. Atmosphere

8.34 There will be some benefits realized from reducing odor problems caused by the ponding of septic sewage and poorly operated pump stations and sewage treatment plants. The project provides for the rehabilitation of these facilities, including reduction and control of the odor problems at the Abu Rawash, Kossous and Gabal El Asfar treatment facilities.

8.35 Minor and temporary air pollution will be caused by some of the construction activities. This will consist primarily of exhaust emissions and construction dust. However, these emissions will be negligible when compared with ambient conditions. To minimize these effects, construction contractors and GOSSD will be required to:

- a. Keep engines of construction equipment well tuned.
- b. Service filters, blowers and injectors on gasoline and diesel engines to minimize emissions.
- c. Remove all construction debris to approved dump sites; burning of refuse will not be permitted.
- d. To the extent available, use low sulphur fuels to minimize engine emissions of sulphur oxides.

8.36 The impact on air quality of odors from operation of existing facilities and construction activities will be minor in relation to normal ambient levels caused by heavy vehicular traffic,

on-going private and public construction work, uncollected garbage, industrial emissions, and from wind-blown desert dust. The air pollution problems caused by the sewage system and construction should be temporary, lasting in varying degrees only until the end of the project work.

F. Natural Resources

8.37 Lake Manzala is a valuable fishing and amenity resource which is presently polluted by toxic wastes and sewage conveyed from Cairo through the Belbase Drain. Protection of this resource will be one of the objectives of the project.

8.38 The Nile River is Egypt's most valuable water resource. Below Cairo it provides water for irrigation, domestic water supply and industrial uses. In the Delta, the Rosetta Branch of the Nile supplies drinking water to a large number of people, especially in the city of Alexandria (permanent population 2.5 million). It is essential that the full utility of this resource be preserved and will be a basic objective of the project. Not only will further pollution of this resource be corrected, but the reuse of wastewaters will be studied to minimize the loss of valuable water resources.

G. Health

8.39 Despite the fact that Cairo enjoys one of the better water supply systems in the Middle East, its environmental health and sanitation problems are among the worst. Within the Middle East, Cairo experiences higher enteric disease rates than other large populated areas. And from Ministry of Health records, as reported in the WHO/World Bank 1977 Sector Study, from 1970-1974, Cairo had a typhoid-paratyphoid attack rate more than ten percent higher than most other major cities, an infectious hepatitis rate more than twice as great, and a substantially higher dysentery attack rate.

8.40 Improvements to the water supply system of Cairo are at present being planned and implemented. The full potential health and social benefits from improved water supplies will require that adequate means be provided for the collection, treatment and disposal of the resulting increased wastewater flows generated. This project directly addresses this problem.

8.41 The direct exposure of the inhabitants of Cairo to human wastes and the indirect exposure through vectors such as flies, rodents and other vermin have a close relationship to the existing high level of gastro-enteritic disease transmission in Cairo. By

limiting these problems, or preventing the further deterioration of the present insanitary conditions, the project will have a very positive beneficial effect on the health and well being of the population.

8.42 During construction, provisions will be taken to ensure that construction contractors take suitable measures to provide for health, safety and protection of their workers and of the public by providing suitable toilet facilities, protective clothing, traffic control, trench support and other relevant means. Facility designs and criteria to be developed and enforced by the Consultant will provide for hand railings, conformity with relevant electrical codes, washing and changing facilities, and other suitable measures to protect the health and safety of operating personnel.

H. General

8.43 Some late Islamic remains may be encountered in the excavations needed during construction. However, the significance of these archaeological discoveries would be diminished by the presence of better preserved remains of the same period in other parts of the city. Because all excavations are rather shallow, the quantity of excavation small (24,000 cu.m) and the excavations in recent (less than 700 years) fill, the chances appear remote that any archaeological finds of importance will be uncovered. However, the project will require all contractors to use suitable care during excavations and to promptly notify the proper GOE authorities should any sites be uncovered.

I. Summary

8.44 The project will have minimal adverse or permanent effect on the basic aspects of the human environment such as air, water, land, flora and fauna. Environmental risks resulting from any changes in recommendations to be developed under the project will be evaluated in the course of studying alternatives and developing recommendations. Every precaution will be made to minimize these environmental effects during the final design of the proposed first stage expansion facilities.

8.45 Any deterioration of the Nile water quality which could result in the long term from possible discharge of treated effluents to the Nile would be limited to a level acceptable for downstream users. Protection of the downstream users of waters within the boundaries of Egypt will take care of any questions concerning potential effects on international waters.

IX. PUBLIC HEALTH AND SOCIAL CONSIDERATIONS

9.01 Wastewater treatment facilities are built for many reasons, but the most basic is the improvement of public health. Nowhere is the public health justification of a wastewater treatment project clearer than that in Cairo, for the current environment is an ideal setting for extensive outbreaks of disease similar to the cholera epidemic that infected Egypt in 1970. This section of the project paper presents relevant public health statistics for Cairo, followed by accounts of the everyday public health hazards associated with inadequate wastewater facilities.

A. Public Health Data

9.02 Health conditions in Egypt, as a whole, are poor. The most commonly used index of overall quality is the infant mortality rate defined as the death rate of children under one year of age. In 1973, Egypt reported 97.9 infants deaths per thousand live births, a rate of virtually one in ten. This was the seventh highest national rate in the world that year, exceeded only by four small countries in sub-Sahara Africa, an island in the Caribbean, and Pakistan (including what is now Bangladesh). Infant mortality rates in Egyptian cities are higher than the national average presumably due in part to better reporting. Cairo's average infant mortality rate from 1963 to 1972 was about one for every seven infants born (see Table IX-1), one of the highest in the world.

9.03 Statistics on water-related disease are the most relevant for describing existing conditions, as affected by wastewater problems. As shown in Table IX-2 average reported incidence rates of typhoid and paratyphoid, infectious hepatitis, and dysentery are markedly higher in the Cairo area than for Egypt as a whole. While these data are subject to greater reporting error than infant mortality data, they do show the unusual magnitude of sanitation problems in Cairo.

TABLE IX-1

RELEVANT INFANT MORTALITY DATA

<u>Locations & Year(s)</u>	<u>Infant Deaths per 1,000 Live Births</u>
Egypt, 1963-72	116
Cairo, 1963-72	148
Alexandria, 1963-72	131
Pakistan, 1968	124.3
India, 1970	61.0
U.S.A., 1973	17.6
Sweden, 1973	9.9

TABLE IX-2

WATER-RELATED DISEASES IN EGYPT . . . (1970-1974)Cases per 100,000 per Year

	<u>Cairo</u>	<u>Egypt</u>
Typhoid & Paratyphoid Cases	99	35'
Infectious Hepatitis	50	61
Dysentery	0.5	0.9

9.04 Epidemiological studies performed by Public Health officials in Egypt reveal a significantly higher incidence of gastro-enteritis complaints among urban dwellers relative to rural dwellers. Exposure to the bacterial pollution from current sewage flooding discharges presumably accounts for some of the difference.

9.05 Statistics of 1970 (see Table IX-3) show that the incidence of cholera in Cairo was two times greater than the national average, even with a reasonably adequate potable water system. Health department statistics for 1974 show a clear association between inadequate wastewater management and the incidence of cholera. Shoubra el Kheima, one of the poorly sewered districts of Cairo, had a very high incidence rate of 538 per 100,000 which reflects the inadequacy of wastewater removal due to sewer blockage and insufficient flow capacities. The cause and effect relationship between inadequate wastewater disposal facilities and these public health problems cannot be clearly shown on the basis of such data, but water-borne human wastes are clearly implicated in the transmission of the diseases.

TABLE IX-3

CHOLERA IN EGYPT (1970)

<u>Governorate**</u>	<u>Date of Onset</u>	<u>Attack Rate 100,000 in 1970</u>
Kalyoubia	May 31, 1970	27.4
Alexandria	June 3, 1970	100.3
Cairo	June 14, 1970	25.2
Giza	June 27, 1970	21.7
Matrouh	July 4, 1970	75.8
Red Sea	Sept. 5, 1970	56.1
All Egypt	1970	16.5

**Source: Report on the Epidemic Situation in Alexandria (1971)
by Dr. M.H. Wahdan & M. El Nomrousy

B. Public Health Hazards

9.06 This project paper can present no clearer description of the hazards of inadequate wastewater management than the following excerpts from a Report on Public Health Aspects by Dr. D.M. Mackay, Deputy Director of Ross Institute of Tropical Hygiene in London:

- "The effluents from various (treatment) plants are not bacteriologically checked. I image that none is, of high quality. The effluents are discharged into open drains. This is undesirable from the public health point of view unless the effluents were known to be of high quality."
- "Raw sewage appears in a number of drains and water courses, e.g., the Kossous drain and the Emergency Canal. These water courses are completely open to public access and some flow through residential areas. Children were seen playing at the sides of such channels. The public health hazard of these open sewers, full of concentrated noxious and bacteriologically dangerous material, needs no elaboration. There are no data available to prove the danger of this practice, but it must be accepted as part of 'ancestral wisdom'."
- "It is reliably reported that, in the event of power failure putting pumping stations out of action, the sewage system is so overloaded that backflow takes place through manholes, etc. and certain areas are flooded with raw sewage."
- "Certain housing areas have obvious sewage seepage lying permanently between housing blocks. This was seen at Kharbotly and Ideal housing estates in Shourabeya Kism and also extensively along Port Said Street. In the Kharbotly area, I was informed that sewage overflow problem had been present since the housing estate was erected seventeen years ago. Children and livestock (ducks, goats, etc.) seem to find these areas an acceptable playground. Ducks are a notorious source of salmonella infection."
- "The existence of areas where raw sewage continually lies on the surface; areas where night soil is cast into the roadway; areas where raw sewage is discharged on the roadway, alongside the canal from tanks; and open canals and drains, heavily contaminated with sewage or containing raw sewage, must be considered a serious hazard to public health. The introduction of cholera into such a situation could be disastrous; it should always be remembered that the world is having its 7th pandemic of cholera at the present time."

"A further problem arising from grossly polluted water courses is the danger of fly breeding along the banks and fly-borne transmission of disease from floating lumps of sewage. Mosquito breeding could also under right conditions become a real problem, especially of culex fatigans, the carrier of filariasis, a disease which is present in Egypt and considerably endemic in some areas, e.g., Khouka."

"The underlying aim of the whole project which should be accepted and appreciated by all concerned, is not simply to "get rid of sewage". It is to dispose of a highly (and potentially explosive, in epidemiological terms) dangerous material in such a manner as to minimize the danger to the public in every possible way."

C. Social Analysis

9.07 This project will be a giant stride towards the elimination of wastewater from the streets and, especially, open ditches and drains in the city. If the current sewage problems are not corrected, the problems with health will reach catastrophic proportions within a relatively short period of time. As pointed out earlier, the potential for additional outbreaks of serious disease epidemics is ever present in Cairo and the conditions are worsening daily.

9.08 This project can improve and certainly reverse worsening of these conditions by greatly reducing disease vectors (wastewaters) from the urban environment. Just removing sewage from the streets and getting away from populated areas will greatly improve living, esthetic and health conditions.

D. Target Group

9.09 Without equivocation, it can be said that the target population of this project includes some of the most disadvantaged people in Egypt. It has been common over the last decade to consider urban dwellers, no matter how poor, better off than their rural counterparts. In most developing countries, this concept may be valid. In Egypt, however, a special set of circumstances points to a reverse condition. After the disturbances of January, 1977, a number of prominent sociologists commented on the trends in Egypt over the last decade which have eroded the standard of living of the urban dwellers while the rural population has experienced an increase in relative prosperity. The eroding of the urban standard of living has resulted from the continuing rise in the cost of living without a commensurate increase in real income for the urban poor. To some extent, this situation has been ameliorated by subsidies for basic consumer goods which have benefited the urban poor and middle class.

9.10 Living conditions in the rural areas have improved as a result of small increases paid by the government for primary farm products and, to a lesser extent, from the benefits which have resulted from rural development programs carried out over the previous years.

9.11 For the urban dweller, this loss of real income, combined with the inability of the government to meet investment needs in basic urban services, has led to a class of citizens whose living conditions have been deteriorating at a noticeable rate.

9.12 The most immediate impact of this project will be on the type of people described above. The current sewage ponding problems are occurring in their districts, not the relatively affluent districts. This project will prevent expansion of ponding into other areas not yet affected, but on the verge of becoming affected.

X. IMPLEMENTATION

A. Implementing GOE Agencies

10.01 Prime responsibility for the overall management of project implementation will be assigned to the General Organization for Sewerage and Sanitary Drainage (GOSSD) of the Ministry of Housing, Reconstruction and Land Reclamation (MOHR). The GOSSD will establish a special project team or steering committee, reporting to or under the chairmanship of the chairman of GOSSD, and having full authority to approve contracts, change orders, payments to contractors, and other actions relative to the project implementation. This project team shall be supported, as needed, by the full organizational resources of GOSSD and MOHR.

10.02 However, coordination with and the cooperation of a number of other entities of the GOE will be essential to the timely and efficient implementation of the project. Of prime importance is coordination with the Governorates of Cairo and Giza through the offices of the Governors. These offices are responsible for the overall functioning of the municipal government and public services and for the general welfare of the people of Cairo and Giza. Prompt assistance of the Governorates will be needed to properly schedule project commodity movements and construction activities in a manner which will not constrain project progress and, yet, will minimize disruption of city traffic and business activities. The role of the Governorates will be to represent the people of their districts at planning meetings and to distribute information so that project activities and their benefits are presented in proper perspective versus the temporary and minor inconveniences that may be caused by project activities.

10.03 Another important responsibility of the Governorates will be the overall management of a solid wastes program and to assist GOSSD in the enforcement of the current "Sewer Use Law".

10.04 Other GOE agency involvement will be, for example, the cooperation of the Customs Department of the Ministry of Finance, needed to ensure that project commodities and equipment are given timely clearance through the Port of Alexandria. Other Cairo utility agencies, such as water and electricity, must coordinate with GOSSD to avoid utility service conflicts and to provide needed services to new facilities in a timely manner. Fortunately, the Vice Chairman of GOSSD is also a member of the Board of Directors of the General Organization for Greater Cairo Water Supply (GOGCWS), the organization in charge of the water utility.

10.05 The General Organization for Industrialization (GOFI) will need to work with GOSSD in expanding and implementing the industrial pollution control segment of the AID-funded Industrial Sector Production Project to assist reduce industrial waste to acceptable limits before discharge into the Cairo wastewater system. Prime responsibility for establishing such relationships will be GOSSD's; USAID will assist GOSSD as needed.

USAID Responsibility

10.06 Within USAID, primary responsibility for administration and monitoring of this project is assigned to the Office of Infrastructure Development and Program Support (IDPS), supported as required by other elements of the Mission. Day-to-day project supervision will be assigned to a senior sanitary engineering advisor who will be assisted by an Egyptian engineer and a USAID loan officer.

B. Implementation Plan

Consulting Services

10.07 Because of the complexity and magnitude of the project and the financial arrangements with the British and Egyptian Governments, USAID has agreed that the services of the joint American-British engineering consortium, AMBRIC, in association with the Egyptian engineering consortium, EGYCON, are needed to ensure proper and timely project implementation. AMBRIC will be responsible for preparation of engineering designs, schedule and cost estimates, refinement of previous planning, preparation of bid documents, bid evaluation and supervision of construction.

10.08 The selection of the U.S. part of AMBRIC commenced on March 29, 1978, with a notice in the Commerce Business Daily (see Annex E) requesting interested U.S. firms to submit prequalification material to GOSSD for project services including design and supervision of construction. Five firms were short-listed and Request for Proposals sent to each on June 1, 1978. Technical proposals were received on August 1, 1978. On September 11, 1978, each U.S. firm was informed of the ODA requirement to associate with the British firms Taylor and Binnie for engineering services including rehabilitation work, training, review-study work, planning, final designs and supervision of construction work. Selection of the CDM/BVI as the U.S. firm was made by GOSSD on October 15, 1978. The firms then formed the American-British consortium known as AMBRIC. A scope of work was negotiated for the rehabilitation work, training and review/study of master plan which identified urgently needed elements or parts to the system required for expansion. The identified discrete elements are to be carried

to conceptual design level including cost estimates. After review and approval by GOSSD, the final engineering design services are to be added as Work Orders to the basic contract.

10.09 Under this procedure, AMBRIC identified the project elements presented for financing in this paper and GOSSD is prepared to start negotiating the Work Orders upon authorization of the requested \$75 million recommended herein. Therefore, AMBRIC can commence design work within one month after approval of the requested AID funding.

Project Construction

10.10 The facilities to be constructed under this project fall into two distinct categories: (1) collection, conveyance and treatment facilities, and (2) central and Maadi conveyance tunnels. The first category of facilities include those elements which comprise most sewage systems, are typical of those in operation in the larger cities of Egypt and, for the most part, appear to be within capabilities of most U.S., U.K. and Egyptian general contractors of medium and large size. The tunnels, however, which must be constructed in alluvial material and under water for the most part, are not common to most sewerage systems, have not been utilized in Egypt, and require a degree of construction expertise found in only a few large or very specialized firms.

10.11 For these reasons, therefore, it is anticipated that, while bidding for the construction of most project facilities will be open to prequalified U.S./UK and Egyptian firms or associations of such firms, only U.S. or U.K. contractors - taking prime responsibility for the construction of the tunnels - will be able to prequalify for this category of work. It is presently contemplated that the tunnel construction contracts will be of the turnkey type, with the contractors being responsible for both the final design and construction. It is believed that this approach, allowing the contractor to apply his experience and ingenuity more fully, will result in cost and time savings to the project. A final decision on this matter will be made after a review of AMBRIC's recommendations regarding this project element.

10.12 When project dollars are utilized, all materials, equipment and construction services will be procured in accordance with the guidelines set forth in AID Handbook 11, Country Contracting. When British pounds sterling are used to fund such procurements, ODA requirements, restricting sales to U.K. firms, will be used. Egyptian pounds will be used to fund all local procurements not requiring foreign exchange. In those cases (where only Egyptian pound costs are involved), GOSSD contracting or procurement procedures will be followed. All procurement will be under the supervision of GOSSD utilizing the advisory services of AMBRIC.

C. Implementation Schedule

10.13 The final implementation schedules will be developed as the design reports for each discrete project element is prepared by AMBRIC and submitted for the approval of GOSSD. Based on the planning developed during the Rehabilitation/Review Project (No. 263-0091), the best estimate for implementation of each project element is shown in ANNEX R.

D. Terminal Dates

Letters of Commitment

10.14 The terminal date for requesting the opening of letters of commitment or amendments thereof will be September 30, 1985, approximately 6 months prior to completion of all construction work under the project.

Disbursement

10.15 The terminal date for disbursement will be September 30, 1986, six months after completion of construction and acceptance by AMBRIC/GOSSD of the completed project work.

E. Control and Monitoring

10.16 Upon signing of the Grant Agreement, USAID will issue Implementation Letter No. 1 to the GOE and GOSSD which, inter-alia, will contain necessary guidance details on the types of reports, (e.g., progress, financial, shipping), and reporting formats and schedules to be followed. AMBRIC is tasked in their contract to provide assistance to GOSSD in preparing such reports.

10.17 As one of the initial tasks under its scope of work, AMBRIC is to prepare, as part of the design report for each project element, a revised updated project implementation plan, schedule and cost estimates. Each individual plan and schedule, upon approval by GOSSD, USAID and ODA, will be integrated with the overall project plan which forms the basis for project control and monitoring. GOSSD, assisted by AMBRIC, will be required to submit to USAID and ODA monthly progress reports covering all significant aspects of the project and measuring progress in terms of the approved scheduled implementation plan.

10.18 Throughout the life of the project, AMBRIC will bring routine problems, together with proposed solutions, to the attention of GOSSD, ODA and USAID in monthly liaison committee meetings. Problems requiring immediate action will be brought to the attention

of the project Steering Committee, consisting of representatives of GOSSD, USAID, ODA, AMBRIC, and other organizations when designated by the Chairman of GOSSD. This Steering Committee will also review project issues, activities and actions recommended by the Consultant. In addition, GOSSD has established a permanent project team which is authorized to make decisions on various project-related matters.

10.19 The accuracy and comprehensiveness of the GOSSD/AMBRIC reporting will be determined by the assigned USAID project officers through frequent and timely visits to the project sites, meetings with GOSSD principals and site personnel, AMBRIC staff, and others as needed. Regular reviews, usually quarterly, of project progress and status will be conducted by USAID/Cairo's executive committee. Such reviews will be followed, when needed, by substantive meetings on project matters with GOSSD, AMBRIC, ODA principals and/or other GOE officials.

F. Evaluation

10.20 A joint GOE/USAID team will conduct annual evaluations of this project beginning approximately one year after award of the first major civil works construction contract, or about October 1983. A preliminary project evaluation will be conducted within one month following start-up of major project facilities or elements. A final evaluation will be performed approximately one year after final acceptance of all project facilities.

10.21 Whereas the annual and preliminary evaluations will focus on project implementation matters, i.e., progress against schedules, costs within budgets, the final evaluation will concentrate on achievements of the project goal and purpose, i.e., end of project status, improvement in public health conditions in Cairo and on the institutional capability of GOSSD to properly operate, maintain and support the project facilities.

XI. RECOMMENDATION; CONDITIONS AND COVENANTS

A. Recommendation

11.01 Subject to the conditions and covenants listed below, we recommend that a grant of \$75 million be authorized to the Government of Egypt (GOE) for the Cairo Sewerage Expansion Project described in this Project Paper. We also recommend that the entire \$75 million grant be obligated from the FY 80 budget.

11.02 We further recommend that the GOE be required to provide these funds as a grant to the General Organization for Sewerage and Sanitary Drainage (GOSSD) as a contribution to its assets.

B. Conditions Precedent to Disbursement

(1) Initial Disbursement

11.03 Prior to any disbursement or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee shall, except as the parties may agree otherwise in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D.

- (a) A statement of the names and titles with specimen signatures of the person or persons who will act as representatives of the Grantee and the General Organization for Sewerage and Sanitary Drainage (GOSSD);
- (b) Evidence of the establishment of a Project Team and a Project Steering Committee;
- (c) Evidence that the proceeds of the Grant will be made available to GOSSD as a grant contribution to assets;
- (d) Such other information and documentation as A.I.D. may reasonably require.

2. Additional Disbursements

11.04 Prior to any disbursement or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made for purposes of construction of each project element or facility other than to finance services of the consulting engineer, the Grantee shall, except as the parties may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D.:

- (a) An Environmental Assessment (EA), prepared in accordance with the applicable AID Environmental Procedures, of the project elements related to the disposal or reuse of collected wastewaters or treatment plant sludges.
- (b) Evidence that local currency financing for the project has been budgeted by Grantee and will be available for expenditures by GOSSD through establishment of a special fund (to be replenished monthly) adequate to meet at least three months expenditures on the Project, pursuant to cost estimates made by the consultant engineers and approved by GOSSD.
- (c) Evidence that GOSSD has obtained properties, easements right-of-ways, and has taken other actions required to permit the construction and operation of each project element or facility.

C. Covenants

11.05 The Grantee shall be required to covenant as follows:

- (1) The Grantee, GOSSD, ODA, and AID shall cooperate fully to assure that the purpose of the Grant will be accomplished. To this end, they shall, from time to time, at the request of any party, exchange views through their representatives with regard to the progress of the Project, the performance of GOSSD and of its obligations under the Grant Agreement, the performance of the consulting engineers, contractors and suppliers engaged on the Project, and other matters relating to the Project.
- (2) The GOSSD shall provide qualified and experienced management for the Project, establish adequate personnel/staffing levels, and train such staff as may be appropriate for the maintenance and operation of the Project.
- (3) The Grantee, GOSSD, and AID shall establish an evaluation program as part of the Project. Except as the parties otherwise agree in writing, the program will include during the implementation of the Project and at one or more points thereafter: (a) evaluation of progress; (b) identification and evaluation of problem areas or constraints which may be used to help overcome such problems; and (c) evaluation to the degree feasible, of the overall development impact of the Project.

- (4) The Grantee and GOSSD shall take necessary actions to establish the organizational structure to ensure that the existing "Sewer Use Law" applicable to this project is enforced.
- (5) The Grantee shall investigate the need for the creation and implementation of a Utilities Coordination Board which would coordinate and notify all agencies of any construction efforts involving blasting and/or excavation by utility organizations and by private contractors to minimize interruption of services, damage, repair costs and inconvenience to the public.
- (6) Based upon the Water and Wastewater Management and Tariff Study, the Grantee shall implement within two years of the signing of the Agreement, a specific tariff plan for the Cairo wastewater system which will, as a minimum, provide revenues adequate to meet operation and maintenance costs.

900068

INVESTMENT AND FREE ZONES AUTHORITY



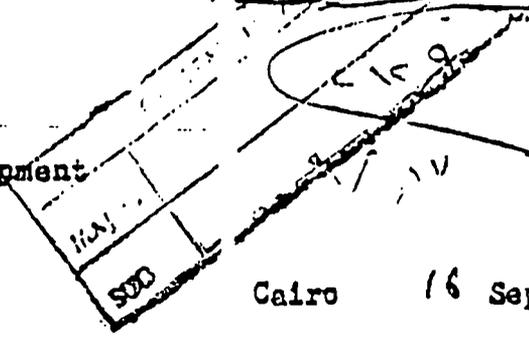
ANNEX A

Telax : 348 GAFEC UN
: 2235 INVST UN
Cable : INVESTAZON
P.O. Box 1007 CAIRO

ACTION TO	CDE	DATE	10/4
ACTION TAKEN			
NO.	21232		

Office of the Deputy Chairman

Mr. Donald S. Brown, Director
Agency for International Development
C/O American Embassy
C A I R O



Cairo 16 Sept., 1978

Dear Mr. Brown,

On February 7, 1978, the General Organization for Sewerage and Sanitary Drainage forwarded a request to the Agency for International Development for immediate assistance in improving the Cairo wastewater system. Several studies undertaken on the system had indicated the serious nature of the problem and the need for a major investment in this area to avert further deterioration and to overcome the mounting problems associated with ever-increasing demand.

The Government of the Arab Republic of Egypt places great importance in enhancing the quality of life of our citizens and to this end we have stressed the urgent need to redress this problem. In response to our request, A.I.D. is presently providing specialized sewer cleaning advisory assistance. We are now ready to move forward on major system improvements and therefore request that A.I.D. make available a grant of U.S. dollars to cover foreign exchange expenses. The level of the grant we are requesting from your Government for Fiscal Year 1978 would be \$ 25 million, with a total funding level of \$ 100 million over several years.

Sincerely yours,

G. El-Haz
GAMAL EL-HAZER
Deputy Chairman

Investment Authority
In Charge of American Aids to Egypt

SC (2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual funding sources: Development Assistance (with a subcategory for criteria applicable only to loans); and Economic Support Fund.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE?
HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. FY 79 App. Act Unnumbered; FY 80 App. Act Unnumbered; FAA Sec. 634A; Sec. 653(b);

(a) Describe how authorizing and appropriations Committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure)?

2. FAA Sec. 611(a) (1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

(a) Yes.

(b) Yes.

3. FAA Sec. 611(a) (2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

No further legislative action needed.

4. FAA Sec. 611(b); FY 79 App. Act Sec. 101; Yes. FY 80 App. Act Sec. (501.) If for water or water-related land resource construction, has project met the standards and criteria as per the Principles and Standards for Planning Water and Related Land Resources dated October 25, 1973?

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?

Yes. The Mission Director has so certified.
See Annex D.

6. FAA Sec. 209. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.

Yes, project is susceptible of execution as part of a multilateral project. Other major donor is the ODM of the U.K.

7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

Project will not impact significantly on items (a) through (f).

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

Project funds will be expended for U.S. source and origin goods and services provided by U.S. private sector engineering firms and suppliers.

9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

The Agreement shall so provide.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

Yes. However, such funds shall not be utilized in this project. The GOE shall provide all local currency.

11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

Yes.

12. FY 79 App. Act, Sec. 608; FY 80 App. Act Sec. (521.) If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

Not applicable.

3. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

Not applicable.

a. FAA Sec. 102(b); 111; 113; 281a.
Extent to which activity will
(a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts

of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

b. FAA Sec. 103, 103A, 104, 105, 106, 107.

Is assistance being made available:
(include only applicable paragraph which corresponds to source of funds used.
If more than one fund source is used for project, include relevant paragraph for each fund source.)

(1) [103] for agriculture, rural development or nutrition; if so (a) extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, full account shall be taken of the needs of small farmers, and extensive use of field testing to adapt basic research to local conditions shall be made; (b) extent to which assistance is used in coordination with programs carried out under Sec. 104 to help improve nutrition of the people of developing countries through encouragement of increased production of crops with greater nutritional value, improvement of planning, research, and education with respect to nutrition, particularly with reference to improvement and expanded use of indigenously produced foodstuffs; and the undertaking of pilot or demonstration programs explicitly addressing the problem of malnutrition of poor and vulnerable people; and (c) extent to which activity increases national food security by improving food policies and management and by strengthening national food reserves, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food

reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.

(2) [104] for population planning under sec. 104(b) or health under sec. 104(c); if so, (a.) extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems and other modes of community research.

(3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development; and (b.) extent to which assistance provides advanced education and training of people in developing countries in such disciplines as are required for planning and implementation of public and private development activities.

(4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is: (i) (a) concerned with data collection and analysis, the training of skilled personnel, research on and development of suitable energy sources, and pilot projects to test new methods of energy production; and (b) facilitative of geological and geophysical survey work to locate potential oil, natural gas, and coal reserves and to encourage exploration for potential oil, natural gas, and coal reserves.

(ii) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;

(iii) research into, and evaluation of, economic development processes and techniques;

(iv) reconstruction after natural or manmade disaster;

(v) for special development problems, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(vi) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

c. [107] is appropriate effort placed on use of appropriate technology? (relatively smaller, cost-saving, labor using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor.)

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least developed" country)?

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"?

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's

intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government

g. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

2. Development Assistance Project Criteria (Loans Only) Not applicable.

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest.

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

3. Project Criteria Solely for Economic Support Fund

a. FAA Sec. 531(a). Will this assistance promote economic or political stability? To the extent possible, does it reflect the policy directions of section 102?

a. Yes, to the extent that improvements in urban environmental conditions and health promote such stability.

b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities?

b. No.

5C(3) - STANDARD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds.

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed?

Use of small business procedures will be considered if appropriate to the nature and magnitude of procurements.

2. FAA Sec. 604(a). Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him?

Yes.

3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will commodities be insured in the United States against marine risk with a company or companies authorized to do marine insurance business in the U.S.

Yes.

4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?

There shall be no such procurements.

5. FAA Sec. 603 Compliance with requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.

Yes.

6. FAA Sec. 606(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items?

Consideration shall be given to the use of excess property when practica.

7. FAA Sec. 621. If technical assistance is financed, to the fullest extent practicable will such assistance, goods and professional and other services from private enterprise, be furnished on a

All technical assistance services will be obtained on a contract basis with U.S. private enterprise firms.

contract basis? If the facilities of other Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

3. International Air Transport. Fair Competitive Practices Act, 1974.

Yes.

If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available?

9. FY 79 App. Act, Sec. 105; FY 80 App. Act Sec. [505.]

Yes.

Does the contract for procurement contain a provision authorizing the termination of such contract for the convenience of the United States?

B. Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest?

Yes.

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?

Yes.

3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million?

Not applicable. Wastewater system operation is not productive enterprise.

C. Other Restriction

1. FAA Sec. 122(b). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?

Not applicable (Grant).

2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? Not applicable.
3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries? The Agreement shall so stipulate.
4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, sale, longterm lease, exchange or guaranty of motor vehicles manufactured outside the U.S.? Yes.
5. Will arrangements preclude use of financing:
- a. FAA Sec. 104(f). To pay for performance of abortions as a method of family planning or to, motivate or coerce persons to practice abortions; to pay for performance of involuntary sterilization as a method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization? Yes.
- b. FAA Sec. 620(g). To compensate owners for expropriated nationalized property? Yes.
- c. FAA Sec. 660. To provide training or advice or provide any financial support for police, prisons, or other law enforcement forces, except for narcotics programs? Yes.
- d. FAA Sec. 662. For CIA activities? Yes.
- e. FY 79 App. Act, Sec. 104; FY 80 App. Act Sec. [504.] To pay pensions, etc., for military personnel? Yes.
- f. FY 79 App. Act, Sec. 106; FY 80 App. Act. Sec. [506.] To pay U.N. assessments? Yes.

- g. FY 79 App. Act, Sec. 107; FY 80 App. Act. Sec. [507.] To carry out provisions of FAA section 209(d)? (Transfer of FAA funds to multilateral organizations for lending.) **Yes.**
- h. FY 79 App. Act, Sec. 511; FY 80 App. Act Sec. [511.] To finance the export of nuclear equipment, fuel, or technology or to train foreign nationals in nuclear fields? **Yes.**
- i. FY 79 App. Act, Sec. 601; FY 80 App. Act Sec. [515.] To be used for publicity or propaganda purposes within U.S. not authorized by Congress? **Yes.**

ANNEX C

DRAFT AUTHORIZATION AMENDMENT

Name of Country: Arab Republic of Egypt Name of Project: Cairo Sewerage
" Number of Project: 263-0091

Pursuant to Part II, Chapter 4, Section 532 of the Foreign Assistance Act of 1961, as amended, the Cairo Sewerage Project for the Arab Republic of Egypt was authorized on September 29, 1978. That authorization is hereby amended as follows:

- a. The amount of the Grant is revised to read "not to exceed One Hundred Million dollars (\$100,000,000)".
- b. The second paragraph is deleted in its entirety and the following substituted therefor:

"The project will assist the Cooperating Country to repair and expand Cairo's wastewater collection, conveyance, treatment and disposal system. The project includes the following elements:

1. Rehabilitation, repair and minor modification of the existing trunk sewers, collectors, pump stations and selected treatment facilities to enable the existing wastewater system to be operated at full capacity with proper treatment at such facilities.
2. Review of the conclusions drawn in the Master Plan and development of a staged program for implementing the Master Plan.
3. Training of the technical personnel of the General Organization for Sewerage and Sanitary Drainage (GOSSD) so that the rehabilitated and

expanded system can be operated effectively.

4. Design, construction and start-up of the first stage expansion facilities of the Cairo wastewater system consisting of: (a) an East Bank Central Tunnel Collection System, (b) a West Bank Collection System, (c) Abu Rawash Treatment Facilities, (d) Khalag Treatment and Disposal Facilities, and (e) a West Bank Effluent Disposal Scheme consisting of enlargement of the Nahya and Muheit drain systems.

5. A pilot project to provide sanitary improvements in unsewered areas."

c. A new/^{sub}paragraph e, "Conditions Precedent to Disbursement From Additional Funds Made Available under the First Amendment to the Grant Agreement (the 'Additional Funds')" is added as follows:

"1. Initial Disbursement from Additional Funds

Prior to any disbursement or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made from the Additional Funds, the Grantee shall, except as the Parties may agree otherwise in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D., evidence that the proceeds of the Additional Funds will be made available to GOSSD as a Grant contribution to assets.

"2. Additional Disbursement from Additional Funds

Prior to any disbursement or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made from Additional Funds to finance project elements other than services of the consulting engineer, the Grantee shall, except as the Parties may otherwise agree in writing, furnish in form and substance satisfactory to A.I.D.:

(a) An environmental assessment, prepared in accordance with the applicable A.I.D. environmental procedures, of the project elements related to the disposal or reuse of collected wastewaters or treatment of plant sludges.

(b) Evidence that local currency financing for the project has been budgeted by the Grantee and will be available for expenditures by GOSSD through establishment of a special fund (to be replenished monthly) adequate to meet at least three months expenditures on the project, pursuant to cost estimates made by the consultant engineers and approved by GOSSD.

(c) Evidence that GOSSD has obtained properties, assessments, rights-of-way, and other legal rights required for the construction and operation of each project element."

d. The last sentence of subparagraph d(2) is hereby deleted and the following substituted therefor:

"The Grantee and GOSSD shall review and discuss with A.I.D. at least semi-annually the progress made in developing and implementing the tariff plan and other matters related to the proper operation and maintenance of the wastewater system."

e. Subparagraph d is further amended by adding new covenants as follows:

"3. The Grantee shall provide through GOSSD qualified and experienced

management for the project, establish personnel/staffing levels, and train such staff as may be appropriate for the maintenance and operation of the project.

"4. The Grantee and GOSSD shall take necessary actions to establish the organizational structure to ensure that the existing "Sewer Use Law" applicable to this project is enforced.

"5. The Grantee shall investigate the need for the establishment of a Utilities Coordination Board to coordinate and notify all agencies of any construction efforts involving blasting or excavation by utility organizations and by private contractors to minimize interruption of services, damage, repair costs and inconvenience to the public.

"6. Based upon the Water and Wastewater Management and Tariff Study, the Grantee shall develop, in consultation with A.I.D., a tariff plan which will, at a minimum, cover operation and maintenance costs of the Cairo wastewater system and shall implement such plan within two years of the signing of the Project Agreement. To the extent that such a plan is not implemented during such time, the Grantee shall provide on a timely basis all funds necessary for the proper operation and maintenance of the expanded wastewater system."

(Title)

(Date)



UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT

CAIRO, EGYPT

CERTIFICATION PURSUANT TO SECTION
611(e) OF FAA 1961 AS AMENDED

I, Owen P. Cylke, Acting Director, the Acting Principal Officer of the Agency for International Development in Egypt, having taken into account, among other things, the maintenance and utilization of projects in Egypt previously financed or assisted by the United States, do hereby certify that in my judgment Egypt has both the financial capability and the human resources to effectively install, maintain and utilize the capital assistance to be provided for the Cairo Wastewater System Expansion Project.

This judgment is based upon general considerations discussed in the capital assistance paper to which this certification is to be attached.

Owen P. Cylke
Acting Director

The COMMERCE BUSINESS DAILY

Issue No. PSA-7044; Wed., Mar. 29, 1978

DEPARTMENT OF STATE
AID FINANCED

Contractors and services are advised that the Agency for International Development has a fund of available resources available for projects and activities. All qualified contractors are encouraged to participate. A.I.D. will have a view procurement in which bidders or other responsive firms are invited.

EGYPT: RENOVATION AND EXPANSION OF THE CAIRO SEWAGE DISPOSAL SYSTEM which covers a contract of approximately eight million people. The terms to be performed are: 1. To provide for the renovation and expansion of essential parts of existing sewage systems, i.e., collectors, pump stations, treatment plants, etc. 2. Training in operating and maintenance to insure the utilization of the existing system. 3. Approve and evaluate the proposed expansion of the system and provide the necessary technical solutions for the expansion work. 4. Preparation of final engineering designs, cost estimates, and contract documents for the proposed expansion (plan development and master construction supervision). Work costs for these professional services will be financed by A.I.D. Local costs will be paid in Egyptian pounds by the GOSCO. A company-based contract is contemplated for the above services. Prequalification information will describe the firm's experience and expertise with work on similar facilities. Firms seeking prequalification must supply information on all firms in which 3. Firms must include completed SF 254 and 255 (Architect-Engineer Government), which can be received from CER/EG-GR, A.I.D., Department of State, Washington, D.C. 20523. Data including firm's current financial condition and worked with this staff can be submitted. Firms submitting expressions of interest should not propose an Egyptian subcontractor at this time. The procedures and annual reports of interested firms will also be used in evaluating qualifications. Expressions of interest firms and joint ventures seeking prequalification must be received by Engr. I.M. Kamel, Chairman, General Organization for Sewers and Sanitary Drainage, Angkor Wat Building - 6th Floor, Tahrir Square, Cairo, A.R.E., within forty (40) days of the publication date of this notice. In addition, an information copy should be sent to: (1) I.E./CG, Attn: Thomas Slawer, A.I.D., Department of State, Washington, D.C. 20523; and (2) I/7410, Attn: Jack Jined, American Embassy Box 10, PPO, New York, N.Y. 09627. Technical inquiries concerning this project should be

sent to Engr. James C. Gannon (703) 235-2805. After evaluation of qualifying information GOSCO will establish a shortlist of pre-qualified firms to which requests for technical proposals will be issued. Pre-qualified firms will be required to attend a pre-technical conference in Egypt. (015)



CAIRO

1 September 1973

His Excellency
Engineer Ahmed Talaat Tewfik
Minister of Housing
1 Ismail Abaza Street
CAIRO

His Excellency

CAIRO SEWERAGE

I am writing to confirm that as mentioned at the World Bank Consultative Group Meeting in Paris in June the British Government is prepared to allocate up to £50 million as a contribution towards the cost of the rehabilitation and expansion of the Cairo Sewerage System.

The new British policies on capital aid, announced by the Minister of Overseas Development on 31 July, mean that this funding will now be a grant, requiring no interest or repayment. It will be tied to the provision of British goods and services in the usual way. We believe that British firms have the necessary expertise to make a useful contribution to this project. The provision of this grant aid will of course be subject to a satisfactory agreement being reached between the Government of Egypt and the British Government on the project terms of reference and the establishment of priorities for its phased execution.

You will recall that during the meeting in your office on 2 August attended by Mr Rowley, Head of the Middle East Development Division of the United Kingdom Ministry of Overseas Development, it was suggested that the best way forward to provide for the satisfactory implementation of the whole of the extensive Cairo Sewerage Project would be for the initial planning and design phases to be undertaken in co-operation by the relevant authorities of the Egyptian Government, the British Government and USAID, bearing in mind the desirability of subsequent participation by other external financing agencies, particularly Arab aid agencies.

The British Government have now confirmed to me that they are happy to proceed on this basis and I would like to suggest that a tripartite meeting as envisaged at the meeting on 2 August, involving your Ministry, officials of USAID and officials from our Middle East Development Division should be organised during the period 11-14 September, at which time Mr Rowley and his associates would be happy to come to Cairo.

I am sending copies of this letter to His Excellency the Minister of Economy, His Excellency the Governor of Cairo, and to Engineer Ashmawy, Chairman of GOSSD.

Yours sincerely,

Michael Harrington

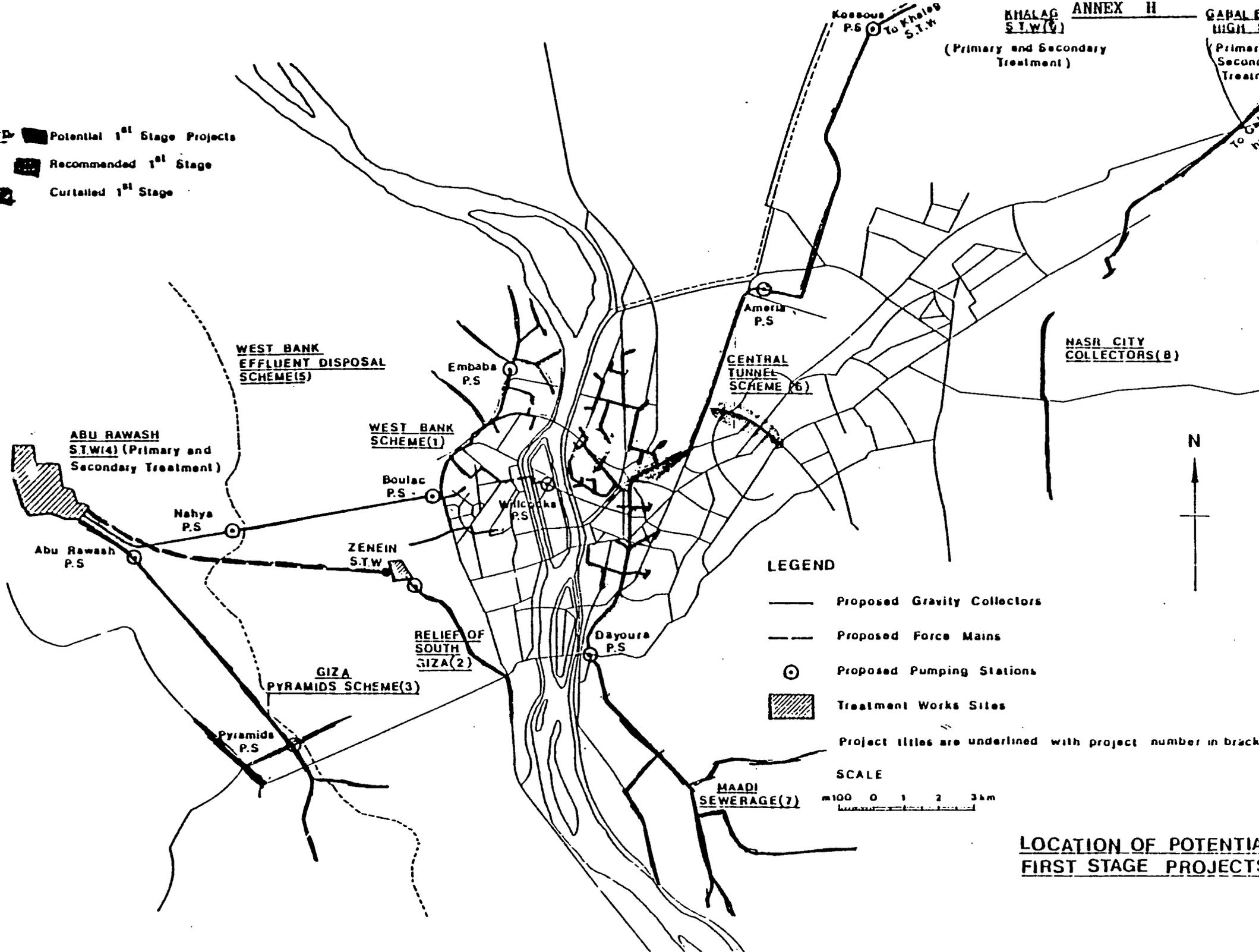
M J Harrington

Chen / 11/1/73/1000

TABLE 7.1.2 SUMMARY: ESTIMATED CAPITAL COSTS - POTENTIAL FIRST STAGE WORKS

Description	Estimated Costs (mid 1980) (J.E x Million)		
	Total Cost	Foreign Currency	Local Currency
1 West Bank Scheme	48.7	3.9	44.8
2 South Giza Relief Scheme	8.7	1.5	7.2
3 Giza Pyramids Scheme	33.4	2.9	30.5
4 Abu Rawash Treatment Works Scheme	38.4	7.1	31.3
5 West Bank Effluent Disposal Scheme	45.8	3.1	42.7
6 Central Tunnel Scheme	200.7	70.4	130.3
7 Maadi Sewerage	34.8	7.7	27.1
8 Masr City Collectors	35.4	2.0	33.4
9 Khalag Treatment Works	101.0	25.6	76.2
10 Gabai el Asfar (High) S.T.W.	70.2	21.5	48.7
TOTAL ESTIMATED COST	617.9	145.7	472.2

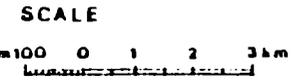
-  Potential 1st Stage Projects
-  Recommended 1st Stage
-  Curtailed 1st Stage



LEGEND

-  Proposed Gravity Collectors
-  Proposed Force Mains
-  Proposed Pumping Stations
-  Treatment Works Sites

Project titles are underlined with project number in brackets



LOCATION OF POTENTIAL FIRST STAGE PROJECTS

PRELIMINARY COST ESTIMATES - REHABILITATION PROJECTS

Description	Estimated Capital Cost				Currency Requirement		Estimated Annual Expenditure					
	Equip. procurement	Civil work & plant inst.	Eng. & contg.	Total	Foreign	Local	Year of implementation					
							1980		1981		1982	
							Foreign	Local	Foreign	Local	Foreign	Local
Sewer cleaning equip.	4.00	-	0.80	4.80	4.32	0.48	0.08	0	3.57	0.40	0.67	0.08
Subsidiary pumping stations	6.50	6.90	2.63	16.23	7.97	6.26	2.90	0.44	6.30	4.38	0.77	1.44
Principal pumping stations												
Group 1	3.30	1.20	0.93	5.43	5.10	1.33	0.15	0.04	3.50	0.46	0.45	0.84
Group 2	5.10	1.70	1.40	8.20	6.23	1.97	0.29	0.05	4.77	0.66	1.17	1.26
Stores, garage and laboratories	0.80	3.60	0.29	4.69	1.11	0.58	0.04	0.02	0.69	0.12	0.38	0.44
Central workshop	2.80	2.10	1.03	5.93	3.91	2.02	0.15	0.07	2.45	0.43	1.31	1.52
Zenein treatment plant	8.30	11.70	4.36	24.86	14.57	10.29	0.57	0.26	9.54	1.85	4.46	8.16
Operational equip.	4.30	-	0.96	5.76	5.19	0.57	0.22	0.02	4.48	0.49	0.49	0.06
	36.10	24.20	12.60	72.90	49.40	** 23.50	4.40	0.90	35.30	8.80	9.70	13.80

Notes:

Costs are at commercial prices.

Costs are in LE millions at mid-1981 price levels.

Projects are listed in order of assigned priority.

*This foreign currency total contains an estimated LE 10.4 million equivalent in rehabilitation costs being funded under the original \$25.0 million project.

**This local currency total contains an estimated LE5.0 million in rehabilitation costs attributable to the original \$25.0 million project.

GREATER CAIRO/HELWAN SEWERAGE UTILITY
OPERATION AND MAINTENANCE EXPENSE

<u>Year</u>	<u>Wages & Benefits</u> LE 1000	<u>Utilities</u> LE 1000	<u>Commodities Including Chemicals</u> LE 1000	<u>Services</u> LE 1000	<u>Head Office Expense</u> LE 1000	<u>Other Expense</u> LE 1000	<u>Billing Expense</u> LE 1000	<u>Total</u> LE 1000
<u>HISTORICAL</u>								
1973	1,967	346	404	117	154	10		2,998
1974	2,097	423	355	58	179	159(a)		3,281
1975	2,482	614	120	92	187	185(a)		3,680
1976	2,904	636	157	70	211	28(a)		4,006
1977	3,549	802	240	92	250	751(a)		5,684
1978	4,600	858	344	93	339	49		6,253
<u>PROJECTED</u>								
1979	4,820	1,435	440	90	375	12		7,172
1980	5,515	1,650	510	110	430	14	153	8,382
1981	6,325	1,895	585	140	495	16	176	9,652
1982	7,275	2,185	1,075	180	570	18	202	11,500
1983	8,300	2,485	1,275	220	650	20	230	13,150
1984	9,400	2,800	1,475	260	735	22	260	14,952
1985	10,500	3,150	1,675	300	825	25	290	16,765
1986	11,600	3,515	1,875	350	915	26	322	18,603
1987	12,700	3,880	2,085	400	1,005	28	354	20,452
1988	13,900	4,250	2,390	450	1,100	30	386	22,506
1990	16,700	5,150	2,950	600	1,300	35	460	27,195
2000	44,000	13,300	8,000	1,800	3,500	100	1,200	72,400

(a) Includes prior year utility cost paid in 1977

HISTORICAL AND PROPOSED CAPITAL IMPROVEMENT PROGRAM

Year	Major Projects			Routine	Total
	Local	Foreign	Total	Projects	
	LE 1000	LE 1000	LE 1000	LE 1000	LE 1000
<u>HISTORICAL</u>					
1973	2,424		2,424		2,424
1974	2,686	70	2,756		2,756
1975	2,467	80	2,565		2,565
1976	6,405	4,547	10,952		10,952
1977	18,341	4,018	22,359		22,359
1978					NA
<u>PROPOSED (a)</u>					
1979	17,820	25,120	42,940	230	43,170
1980	76,970	48,450	125,420	430	125,850
1981	113,630	70,650	184,280	1,000	185,280
1982	89,950	51,180	141,130	1,730	142,860
1983	120,550	79,740	200,290	2,950	203,240
1984	135,740	47,000	182,740	4,620	187,360
1985	102,680	25,290	127,970	5,910	133,880
1986	58,400	15,530	73,930	7,900	81,830
1987	57,420	4,920	62,340	8,830	71,170
1988	107,720	47,410	155,130	11,050	166,180
After					
1988	<u>1,279,560</u>	<u>363,640</u>	<u>1,643,200</u>	<u>255,860</u>	<u>1,899,060</u>
Total					
1979-					
2000	2,160,440	778,930	2,939,370	300,510	3,239,880

NA Not available at date of preparation of report

(a) Adopted from: Greater Cairo Wastewater Project, Draft Master Plan Report Vol. 6, John Taylor & Sons, Binnie & Partners, 1978, and Helwan Wastewater Master Plan, Final Report, Vol. 3, EPC-Environmental, 1978.

GREATER CARIO/HELWAN SEWERAGE UTILITY

ANNEX L

REVENUES

<u>Year</u>	<u>Operating Subsidy</u> LE	<u>Capital Subsidy</u> LE	<u>Miscellaneous Revenues</u> LE
<u>HISTORICAL</u>			
1973	2,878,067	2,573,550	145,176
1974	3,016,680	2,913,538 (a)	124,287
1975	3,331,711	2,758,897	174,513
1976	3,909,320	11,907,938	116,045
1977	3,293,840	20,982,793	128,153
1978	4,518,452	27,746,544 (b)	(c)
<u>PROJECTED</u>			
1979	(d)	(d)	136,000
1980			140,000
1981			144,000
1982			148,000
1983			152,000
1984			156,000
1985			160,000
1986			165,000
1987			170,000
1988			175,000
1990			185,000
2000			240,000

(a) Includes loans of LE 70,330

(b) Includes loans of LE 718,845 and grants of LE 261,400

(c) Substantially all of 1978 Miscellaneous Revenues consist of unused funds from prior years. The amounts comparable with prior years is not available.

(d) No projection of subsidies has been made. Amount will depend upon the level of revenues from tariffs.

GREATER CAIRO/HELWAN SEWERAGE UTILITY
PROFORMA STATEMENT OF SOURCE AND APPLICATION OF OPERATING FUNDS

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1990	2000
	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000
SOURCE OF FUNDS											
Net Operating Income ^(a)	(4,661)	(3,409)	(4,774)	1,947	8,872	13,948	27,765	33,044	47,324	60,075	162,120
Depreciation Expense	7,522	12,544	17,859	23,456	30,209	35,402	38,454	40,529	44,767	55,130	106,310
Sub total	2,861	9,135	13,085	25,403	39,081	49,350	66,219	73,973	92,091	115,205	268,430
Non Operating Income	140	144	148	152	156	160	165	170	175	185	248
Operating Subsidy	711		1,936								
Total Available Operating Fund	3,712	9,279	15,169	25,555	39,237	49,510	66,384	74,143	92,266	115,390	268,678
APPLICATION OF FUNDS											
Routine Improvements	425	1,000	1,730	2,950	4,620	5,908	7,900	8,832	11,050	13,830	33,700
Debt Service Charges											
Interest	3,024	7,598	13,291	21,919	31,154	40,130	47,916	54,104	59,484	71,677	135,577
Principal	123				3,122	3,312	10,403	11,037	21,557	29,698	99,153
Total Debt Service	3,147	7,598	13,291	21,919	34,276	43,442	58,319	65,141	81,041	101,375	234,730
Total Application of Operating Funds	3,572	8,598	15,021	24,869	38,896	49,350	66,219	73,973	92,091	115,205	268,430
Net Operating Fund Change	140	681	148	686	341	160	165	170	175	185	248

(a) Based on revenues from sewerage user charges computed on Cash Basis Revenue Requirements.

GREATER CAIRO/HELWAN SEWERAGE UTILITY

PROFORMA BALANCE SHEET

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1990	2000
	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000	LE1000
ASSETS											
Utility Plant in Service ^(a)	295,525	480,805	623,665	826,905	1,041,265	1,148,145	1,229,975	1,361,145	1,467,325	1,783,835	3,366,3
Accumulated Provision for Depreciation	68,075	80,629	98,488	121,944	152,153	187,555	226,009	266,938	311,705	416,783	1,249,5
Net Utility Plant in Service	227,450	400,176	525,177	704,961	889,112	960,590	1,003,966	1,034,207	1,155,620	1,367,052	2,116,8
Current Assets											
Cash	1,048	1,204	1,438	1,648	1,869	2,096	2,325	2,557	2,813	3,399	9,4
Accounts Receivable	2,989	4,577	6,631	9,512	13,462	16,528	21,205	23,669	28,649	35,600	85,3
Material and Supplies	225	292	538	638	738	838	938	1,043	1,195	1,475	4,3
Total Current Assets	4,262	6,073	8,607	11,798	16,069	19,462	24,468	27,269	32,657	40,474	98,3
Total Assets	231,712	406,249	533,784	716,759	905,181	980,052	1,028,434	1,061,476	1,188,277	1,407,526	2,215,1
LIABILITIES AND EQUITY											
Greater Cairo/Helwan Sewerage Utility Equity Capital	114,355	139,154	159,996	159,652	168,161	118,072	102,621	84,051	76,937	56,191	(46,3
Long Term Debt	115,960	265,490	371,870	554,910	734,528	859,186	922,713	974,016	1,107,589	1,346,802	2,249,3
Current Liabilities											
Accounts Payable	1,397	1,605	1,918	2,197	2,492	2,794	3,100	3,409	3,751	4,533	12,3
Total Liabilities and Equity	231,712	406,249	533,784	716,759	905,181	980,052	1,028,434	1,061,476	1,188,277	1,407,526	2,215,1

(a) Based on Original Cost at December 31, 1978 and projected additions at cost subsequent thereto.

GOSSD-CAIRO-HELWAN
 Fixed Assets
 . IN SERVICE
 December 31, 1978

	<u>Original Cost</u> LE	<u>Reprod. Cost</u> LE	<u>Reprod. Cost Less Deprec</u> LE
<hr/>			
TOTAL UTILITY			
<u>Treatment Plants</u>			
Abou Rawash	1 025 000	1 725 000	1 287 000
Gabal Al Asfar	2 824 000	14 119 000	3 782 000
Khossous	4 497 000	14 650 000	11 504 000
Nahya	1 408 000	5 030 000	3 823 000
Zenein	8 338 000	28 750 000	22 483 000
Helwan			
Tebin			
Unclassified Plant	<u>5 134 027</u>		
Total Treatment Plants	23 226 027	64 274 000	42 879 000
<u>Network</u>			
Collection Plant	81 341 011	350 316 200	187 178 000
Pumping Plant	20 654 199	60 236 700	34 928 000
General Plant	<u>1 283 913</u>	<u>1 283 900</u>	<u>1 253 400</u>
Total Network	<u>103 279 123</u>	<u>411 836 800</u>	<u>223 364 400</u>
TOTAL UTILITY	126 505 150	476 110 800	266 243 400

ESTIMATED CAPITAL COSTS AND ANNUAL EXPENDITURES
FOR Modified First Stage Works

ANNEX P

Sheet 1 of 3

Item No.	Description	Net Cost	Contg	Engr'g	Total Cost	Currency Requirements		YEAR OF IMPLEMENTATION AND CURRENCY REQUIREMENTS (LE x 1000)															
						Foreign	Local	1981		1982		1983		1984		1985		1986		1987			
								Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local		
	PROJECT 1 - WEST BANK SCHEME (See Table 7.1.3)																						
	TOTAL PROJECT 1	39,291	6,080	3,347	48,727	3,934	44,793	52	685	556	1,123	849	6,030	1,213	16,105	993	17,045	199	3,167	32	615		
	COSTS INFLATED TO YEAR OF EXPENDITURE				127,554	6,801	120,753	60	856	787	1,752	1,390	11,758	2,123	39,296	1,996	51,994	460	12,066	85	1,029		
	PROJECT 4 (PART) - ABU RAMASH (PONDS)																						
4.1	Pumping station, force main, ponds, etc.	2,705	1,456	837	11,998	508	11,490	7	177	8	173	160	3,619	160	3,619	160	3,619	13	282				
4.2	Pumping plant	825	165	74	1,064	807	257	24	6	404	129	323	103	8	2	28	5	20					
4.3	Power supply Electricity Department	250	50	22	322	10	312								10	31							
	TOTAL PROJECT 4 (PART)	10,780	1,671	933	13,384	1,325	12,059	31	180	412	302	483	3,722	168	3,621	198	3,840	33	294				
	COSTS INFLATED TO YEAR OF EXPENDITURE				32,008	2,052	29,926	36	225	544	471	734	7,258	294	8,835	398	12,015	76	1,120				
	PROJECT 5 (PART) - WEST BANK DISPOSAL (See Table 7.1.3)																						
	TOTAL PROJECT 5 (PART)	1,067	207	112	2,436	92	2,344	30	773					21	581	41	990						
	COSTS INFLATED TO YEAR OF EXPENDITURE				5,558	154	5,404	35	966					37	1,418	82	3,025						

Sheet 2 of 2

Item No.	Description	Net Cost	Cont'g	Eng'g	Total Cost	Currency Requirements		YEAR OF IMPLEMENTATION AND CURRENCY REQUIREMENTS (LE = 1000)													
						Foreign	Local	1981		1982		1983		1984		1985		1986		1987	
								Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local
PROJECT 6-CENTRAL TUNNEL SCHEME																					
6.1	Construct 3.25km of 5m dia tunnel from Amria to Souk el Samak	16,283	8,141	1,032	26,256	11,032	15,224	221	304	1,931	2,664	3,475	4,796	3,475	4,796	1,655	2,284	275	380		
6.2	Construct 3.25km of 5m dia tunnel from Souk el Samak to Taveel	16,283	8,141	1,832	26,256	11,032	15,224	221	304	1,931	2,664	3,475	4,796	3,475	4,796	1,655	2,284	275	380		
6.3	Construct screw pumping station civil works at Amria and 3.4km duct to urban boundary	16,860	2,582	1,458	20,900	1,299	19,601	39	518	656	9,899	571	8,625	33	499						
6.4	Supply and erect pumping plant to the above pumping station	408	82	37	527	3	123	12	4	359	114	18	6	10	4						
6.5	Construct deep pumping station civil works at Amria	6,204	1,241	555	8,003	926	7,077	14	196	14	166	171	1,309	352	2,689	352	2,689	23	178		
	Supply and erect pumping plant to the above pumping station	4,439	888	400	5,727	4,347	1,380	83	24	1,020	325	2,930	935	43	14	152	49	110	34		
	Construct screw pumping station civil works at Kussous and 5.0km culvert from urban boundary to Khazig	10,171	1,592	382	12,645	804	11,841	12	178	12	176	253	3,730	253	3,730	253	3,730	21	295		
6.11	Supply and erect pumping plant to the above pumping station	1,419	284	128	1,831	1,388	443	28	9	703	226	554	177	14	4	49	16	35	11		
6.12	Land Acquisition	1,153	115	-	1,268		1,268		1,268												
	Power Supply (Electricity Department)	295	59	27	381	12	369					11	332			1	37				
	Site Investigation	56	17	5	78	56	22	56	22												
TOTAL PROJECT 6		73,571	23,142	7,159	103,872	31,290	72,582	690	2,811	6,651	16,176	11,458	24,706	7,655	16,522	4,117	11,089	739	1,278		
COSTS INFLATED FOR YEAR OF EXPENDITURE					206,371	50,341	155,930	794	3,514	8,753	25,235	17,416	48,177	13,396	40,314	8,275	33,821	1,707	4,863		

ESTIMATED CAPITAL COSTS AND ANNUAL EXPENDITURES
FOR Modified First Stage Works

3 of 3

Item No.	Description	Net Cost	Contg	Engg's	Total Cost	Currency Requirements		YEAR OF IMPLEMENTATION AND CURRENCY REQUIREMENTS (I.E. x 1000)											
						Foreign	Local	1981		1982		1983		1984		1985		1986	
								Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign	Local
9.1	PROJECT 9 (PART) - KHALAG TREATMENT WORKS Civil works including pumping stations inlet works, primary tanks, sludge drying beds, drain works, etc.	29,731	4,283	2,507	35,921	9,203	32,716	41	432	16	432	1,120	12,934	959	9,074	958	9,074	76	720
9.2, 9.4	Pumping Plant	5,460	1,092	491	7,043	5,340	1,703	166	51	2,670	852	2,155	681	53	17	187	60	134	42
9.3, 9.4	Sewage treatment plant Land acquisition Power supply (Electricity Department)	12,172 2,705 367	2,434 271 73	1,094 33	15,702 2,976 472	12,635 2,976 15	3,067 2,976 458	379 2,576	92	6,310	1,534	5,054	1,227	126	31	442	107	316	76
	TOTAL PROJECT 9 (PART)	49,825	8,153	4,127	62,115	21,115	40,920	585	3,511	9,034	2,518	8,310	14,892	1,138	9,122	1,602	9,695	526	853
	COSTS INFLATED TO YEAR OF EXPENDITURE				12,562	31,756	92,907	673	4,439	11,925	4,196	12,631	29,039	1,994	22,258	3,220	29,582	1,215	3,191

THRESHOLD DECISION BASED ON
INITIAL ENVIRONMENTAL EXAMINATION

Project Location: Cairo, Egypt (A.R.E.)

Project Title: Cairo Sewerage System Expansion
(No. 263-0091)

Funding (Fiscal Year and Amount): \$75.0 Million Total
\$40.0 Million FY 80, \$35.0 Million

IEE Prepared By: Philip S. Lewis
Date: 7/21/80

Environmental Action Recommended:

Environmental Assessment

Mission Decision:
(Approval/Disapproval of Environmental Action Recommended in the IEE)

Approved : _____

Disapproved : _____

Date : _____

Clearances: Acting
Lewis Environmental Coordinator: PSL Date 7/27/80
Redman Other Mission Offices: MLL Date 7/27/80
Dangler, AD/IIDPS: RMD

INITIAL ENVIRONMENT EXAMINATION
NARRATIVE DISCUSSION

1. Project Location:
Cairo, Egypt (A.R.E.)
2. Project Title:
Cairo Sewage System Expansion
No. 263-0091
3. Funding (Fiscal Year and Amount): \$75.0 Million
\$40.0 Million FY 80; \$35.0 Million FY 81
4. IEE Prepared By: Philip S. Lewis Date : 7/21/80
5. Action Recommended:
Environmental Assessment
6. Discussion of Major Environmental Relationships of Project Relevant to Attached Impact Identification and Evaluation Form:

This project will constitute the first phase of a major rehabilitation and expansion of the wastewater system in the Greater Cairo area. The project will consist of repair and rehabilitation of certain existing sewage collection and conveyance works and the design and construction of new wastewater collection, conveyance, treatment and disposal facilities. The usual environmental factors associated with civil construction works, i.e. fugitive dust, noise, traffic disruption, etc., will be exacerbated by the dense urban conditions of Cairo and, therefore, will require greater efforts toward minimization. Repair and rehabilitation of existing works will necessitate temporary sewage by passing in order to maintain a functioning system and particular care in construction to prevent cross leakage between sewer and water systems will be needed. However, repair of existing collection and conveyance facilities will pose few serious environmental problems. The principal long term environmental concerns will be associated with the rehabilitation/construction of wastewater treatment works and disposal methods, and may include: pollution of agricultural land (if reuse of effluents is proposed) and pollution of Nile River or other receiving waters. Therefore, concurrent with the final design of the principal facilities to be rehabilitated or constructed under this project, it is recommended that an Environmental Assessment, acceptable to AID, be prepared for the individual project elements prior to the release of funds for their rehabilitation or construction

IMPACT IDENTIFICATION AND EVALUATION FORM

<u>Impact Areas and Sub-areas</u>	<u>Impact Identification and Evaluation^{1/}</u>
A. <u>LAND USE</u>	
1. Changing the character of the land through:	_____
a. Increasing the population	_____ N _____
b. Extracting natural resources	_____ N _____
c. Land clearing	_____ L _____
d. Changing soil character	_____ M _____
2. Altering natural defenses	_____ N _____
3. Foreclosing important uses	_____ L _____
4. Jeopardizing man or his works	_____ N _____
5. Other factors	_____
* <u>Possible agricultural reuse</u>	_____
<u>of effluents</u>	_____
B. <u>WATER QUALITY</u>	
1. Physical state of water	_____ L _____
2. Chemical and biological states	_____ M _____
3. Ecological balance	_____ L _____
4. Other factors	_____
_____	_____
_____	_____

- ^{1/}N-- No environmental impact
L - Little environmental impact
M - Moderate environmental impact
H - High environmental impact
U - Unknown environmental impact

IMPACT IDENTIFICATION AND EVALUATION FORM

C. ATMOSPHERIC

- 1. Air additives
- 2. Air pollution
- 3. Noise pollution
- 4. Other factors

L

L

L

D. NATURAL RESOURCES

- 1. Diversion, altered use of water
- 2. Irreversible, inefficient commitments
- 3. Other factors

M

N

E. CULTURAL

- 1. Altering physical symbols
- 2. Dilution of cultural traditions
- 3. Other factors

N

N

F. SOCIOECONOMIC

- 1. Changes in economic/employment patterns
- 2. Changes in population
- 3. Changes in cultural patterns
- 4. Other factors

L

N

N

IMPACT IDENTIFICATION AND EVALUATION FORM

G. HEALTH

- 1. Changing a natural environment L
 - 2. Eliminating an ecosystem element N
 - 3. Other factors
-
-

H. GENERAL

- 1. International impacts N
 - 2. Controversial impacts N
 - 3. Other factors
-
-

I. OTHER POSSIBLE IMPACTS (not listed above)

Prepared By: Philip S. Lewis Date: 7/21/80

Project Location: Cairo, Egypt (A.R.E.)

Project Title : Cairo Sewage System Expansion
(No. 263-0091)

IMPLEMENTATION PROGRAMME FOR MODIFIED FIRST STAGE WORKS

Sheet 2 of 3

Description	Year of Implementation						
	1980	1981	1982	1983	1984	1985	1986
PROJECT 6 - CENTRAL TUNNEL SCHEME							
Tunnel Contract No.1. 5 m dia tunnel 3.25 km long from Ameria to Souk el Semak							
Tunnel Contract No. 2. 5 m dia tunnel 3.25 km long from Souk el Semak to Tawel							
Ameria screw pumping station and culvert to urban boundary							
Civil							
Mechanical							
Electrical							
Ameria deep pumping station							
Civil							
Pumps-Mechanical							
Screens-Mechanical							
Electrical							
Culverts to Khalag from urban boundary plus screw pumping station at Lassous							
Civil							
Mechanical							
Electrical							
Land Acquisition							
Power Supplies (Electricity Dept.)							
Site Investigation							

IMPLEMENTATION PROGRAMME FOR MODIFIED FIRST STAGE WORKS

Sheet 3 of 3

Item No.	Description	Year of Implementation						
		1980	1981	1982	1983	1984	1985	1986
	PROJECT 9 - KHALAG TREATMENT WORKS (Part 4) (Primary)							
9.1	Civil works including inlet works, pumping stations, beds, sludge handling, admin. building, drain widening, etc, Civil		██████████	██████████	██████████	██████████	██████████	██████████
9.2	Pumping Plant		██████████	██████████	██████████	██████████	██████████	██████████
9.3	Sewage Treatment Plant		██████████	██████████	██████████	██████████	██████████	██████████
9.4	Electrical		██████████	██████████	██████████	██████████	██████████	██████████
	Land Acquisition		██████████					
	Power Supplies (Electrical Dept.)						██████████	
	Site Investigation	██████████	██████████					
	PROJECT 7 - MAADI SEWERAGE (Optional)							
7.1	Second stage site investigation for tunnels			██████████				
7.2	Rock tunnels from Postat to Maadi and Dar el Salam branch			██████████	██████████	██████████	██████████	██████████
7.3	Collectors, to Zahran Maadi and Kh-lifa			██████████	██████████	██████████	██████████	██████████
7.4	Collectors, secondary sewers etc Dar el Salam, Kom Ghorab and West Elouf			██████████	██████████	██████████	██████████	██████████
	Land Acquisition				██████████			
	Site Investigation	██████████	██████████	██████████				

Legend
 ██████████ Functional Design, Preparation and Approval of Work Order
 ██████████ Detailed design, preparation of contract documents, admin. approval, tender period, evaluation and acceptance
 ██████████ Construction

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