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UNCLASSIFIED

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

PROJECT PAPER

ALEXANDRIA WASTEWATER SYSTEM EXPANSION
PHASE I

UNCLASSIFIED

PDHAD-985

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

TRANSACTION CODE

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3. DOCUMENT CODE
3

3. COUNTRY ENTRY

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6. BUREAU OFFICE

A. SYMBOL B. CODE

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7. PROJECT TITLE (Maximum 40 characters)

Alexandria Wastewater System Expansion

8. ESTIMATED FY OF PROJECT COMPLETION

FY 85

9. ESTIMATED DATE OF OBLIGATION

A. INITIAL FY 79

B. QUARTER 4

C. FINAL FY 81

(Enter 1, 2, 3 or 4)

10. ESTIMATED COSTS \$000 OR EQUIVALENT \$1 -

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. G	D. TOTAL	E. FX	F. L C	G. TOTAL
AID APPROPRIATED TOTAL	95,000		95,000	167,000		167,000
GRANT	95,000		95,000	167,000		167,000
LOAN						
OTHER U.S.						
HQST COUNTRY		50,000	50,000		264,000	264,000
OTHER COUNTRIES						
TOTALS	95,000	50,000	145,000	167,000	264,000	431,000

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 79		H. 2ND FY 80		K. 3RD FY	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
ESF	720 B	829		95,000		72,000			
				95,000		72,000			
TOTALS									

A. APPROPRIATION	N. 4TH FY		O. 5TH FY		LIFE OF PROJECT		12. IN-DEPTH EVAL. SCHEDULED
	P. GRANT	Q. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	
ESF					167,000		
TOTALS					167,000		

MM YY
01 81

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11 NC
21 YES

14. ORIGINATING OFFICE CLEARANCE

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TITLE

Donald S. Brown
Director USAID, Egypt

DATE SIGNED

ALEXANDRIA WASTEWATER SYSTEM EXPANSION
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 Housing, GOE.
3. Grant Amount: FY 1979 - \$95 million; FY 80 - \$72 million.
4. Project Purpose: To improve public health conditions in Alexandria by expansion and development of wastewater collection, treatment and disposal facilities.
5. Project Description: Design, construction and start-up of the First Stage Expansion Facilities to the Alexandria wastewater system consisting of: (a) two primary treatment plants with sea outfalls; (b) wastewater pump stations, force mains and sewer collectors; (c) extension of sewers into selected unsewered areas; (d) upgrading of selected existing facilities to be retained as part of future system; and (e) studies to assess solid and toxic waste disposal systems.
6. Total Project Cost: The total project cost is estimated to be \$431 million of which \$167 million is foreign exchange.
7. Environmental Considerations: An Environmental Impact Statement has been prepared.
8. Grant Application: The GOE has requested a Grant of \$167 million over a two-year period, of which up to \$95 million would be authorized in FY 1979 and the remainder in FY 80/81.
9. Source of U.S. Funds: Economic Support Fund
10. Mission's Views: USAID/Cairo has recommended that this Grant be authorized. The principal officer's certification pursuant to Section 611(e) of the Foreign Assistance Act is included as ANNEX D to this paper.

11. Statutory Criteria: Satisfied. See ANNEX B.

12. Recommendations: That a Grant in the amount of \$167 million be authorized on terms and conditions as set forth in the draft Grant Authorization included as ANNEX C of this paper.

13. Project Committee:

USAID/Egypt: Chairperson: Richard M. Dangler
Sanitary Engineer: Jack R. Snead
Capital Development Officer: Keith E. Brown
Economist: James Norris
Counsel: Theodore Carter

AID/Washington: Chairperson: NE/PD, Joseph DeSousa
Environmental Coordinator:
NE/PD, Stephen F. Lintner
Engineer: NE/PD, Wally F. Bowles
Desk Officer: NE/EI, James Sperling
Counsel: GC/NE, Gary Bisson

I. INTRODUCTION

A. Background

1.01 On November, 4, 1976, the Ministry of Housing and Reconstruction (MOHR) of the Government of the Arab Republic of Egypt (GOE) entered into a contract with Camp Dresser & McKee, Inc. (CDM), a U.S. consulting engineering firm to prepare a master plan for the staged development of the city of Alexandria's sewage system and feasibility studies of specific viable projects. AID financed the foreign exchange cost of CDM's contract.

On May 30, 1978, CDM submitted to MOHR the Alexandria Wastewater Master Plan Study. The principal finding of the Master Plan Study was that discharge to the sea through submarine outfalls is clearly the most feasible and economic alternative for the disposal of wastewaters from the presently developed and populated areas of Alexandria.

To ensure the environmental soundness of the proposed wastewater scheme recommended, and in accordance with AID's environmental procedures, the consultant was engaged to prepare a Draft Environmental Impact Statement (DEIS), including a 12 month study of the marine environment. After review by appropriate authorities in the Government of Egypt (GOE) it was released to AID on April 9, 1979.

Following a plan of action agreed to by the Department of State and the President's Council on Environmental Quality, the DEIS was distributed to selected federal agencies and members of the American environmental community. On June 22, 1979, a technical review meeting was held in Washington, D.C. with representatives of the consultant, federal agencies, environmental organizations and the GOE.

A variety of comments stemming from this meeting were received by AID. As a result of this review process, AID modified the project to upgrade the wastewater treatment from "preliminary" as recommended in the Master Plan Study to "primary" prior to disposal through two sea outfalls. This modification greatly reduces the limited adverse environmental impacts identified in the DEIS. The recommended outfall lengths were retained beyond those normally required in connection with "primary" treatment as an added measure of

safety. Also, the lengths of the diffusers will be increased at the ends of outfalls to maximize dilution and dispersion of the wastewaters and the settleable solids respectively.

The written comments and formal responses to the DEIS are included in the Final Environmental Impact Statement.

1.02 One early facet of the master planning studies included identification of Top Priority Projects (TPP) that could be implemented prior to the completion of the Master Plan. In August, 1977, CDM's special report on the immediate Top Projects was submitted to MOHR and USAID. In September, 1977, the GOE requested AID financing of the foreign exchange costs associated with these projects. A loan agreement was signed between the United States Agency for International Development (AID) and the General Organization for Sewerage and Sanitary Drainage (GOSSD) to finance the foreign exchange cost of Alexandria Sewerage Top Priority Projects in the amount of \$15 million. The ongoing TPP is a quick "fix-up" project that provides for the rehabilitation of parts of the existing wastewater system in the anticipation of the major expansion to the Alexandria wastewater system.

B. Scope of Project Paper

1.03 the projects recommended for financing in this paper are the first stage improvements to the Alexandria wastewater system as identified by the above procedures. These improvements include construction of: A) Two primary treatment facilities and sea outfalls (elements 1,2,3,13 & 14*); B) wastewater pump stations, force mains and sewer collectors (elements 5,6, 9, 10,12,15, & 19); C) extension of sewerage service into certain unsewered areas (elements 4,7 & 18*) and D) upgrading of selected existing facilities that will be retained as part of the master plan system (elements 11,16,17 & 20*). The estimated costs of all this construction work is \$431.2 million of which AID has been requested to grant fund the \$167 million foreign exchange component. The GOE will finance the remaining local costs of \$264.2 million equivalent in Egyptian Pounds.

*See Table IV-I for details of system elements.

1.04 The current sewerage situation in Alexandria, as will be described herein, is extremely critical. Serious public health problems have resulted from sewage ponding in streets of highly congested districts. The swimming beaches along the city's Mediterranean shoreline and the harbor area are heavily polluted with raw sewage discharges and overflows at the water's edge. Water courses such as Lake Maryut and irrigation canals receive enormous amounts of untreated domestic and industrial wastes. The fishing industry associated with Lake Maryut has declined in productivity over the last decade because of this pollution. Therefore, the need for implementing the first stage improvements of the Alexandria master plan cannot be overstated.

1.05 The above conditions have been caused by allowing the wastewater system to reach such a state of disrepair and neglect in the past three decades that the present public health situation of the city's 2.5 million residents is close to a disaster. Outbreaks of waterborne disease have and will increasingly continue to have a very serious consequences for Alexandria (and Egypt) both internally and externally as a tourist, industrial and trade center of the Middle East.

1.06 The minimum corrective action needed immediately is the concurrent funding and implementation of all 20 project elements forming Stage I (see Table IV-1) as recommended in this paper. These project elements have been carefully selected to minimize the initial capital investment and form a complete working system which will produce significant improvements in Alexandria's public health and environmental conditions. Because of the physical configuration of Alexandria (long and narrow), its coastal orientation and the economies of scale possible during construction, it is impractical to separate this project into smaller divisions.

II. ORGANIZATION

A. Existing Organization

2.01 The implementing organization for this project will be GOSSD, which is an agency under the Ministry of Housing. GOSSD was established by Executive Decree 1637 of 1968 and is responsible for the planning, design, construction, supervision of all sewerage facilities in Egypt, and, in addition, operation and maintenance of sewerage systems of Alexandria and Cairo.

2.02 The GOSSD structural organization is shown in Annex E. It has a Board of Directors consisting of nine persons:

GOSSD BOARD OF DIRECTORS

Eng. Mohamed Abdel Moneim Ashmawy	Chairman
Eng. Fayez Riad Fahmy	Under Secretary for Operations & Maintenance
Eng. Louis Shaker Ghobrial	Director General of Cairo Sewerage System
Eng. Abdallah Mahmoud	Director General of Alexandria Sewerage System
Eng. Mohmoud Ibrahim Shabaka	Ex-Chairman GOSSD
Mr. Magd Abdel Rahim Moustafa	General Secretary
Counsellor Adel Botros Farag	Ministry of Housing, Director of Legislative Ofc
Eng. Albert Wahab	Vice-Chairman, General Organization for Potable Water (GOPW)
Dr. Hussein Soliman Mohamed Soliman	Ministry of Health, Director General

2.03 Four are present officers and one a former chairman of GOSSD. The others are representatives of the Ministries of Housing and Health, the Cairo Governorate and GOPW. The Chairman of the Board serves as Chief Executive Officer. There are three principal line offices: Finance/Administration/Economic, Operations and Maintenance, and Projects. The first is headed by an Under Secretary, the last two by Vice Chairmen. A General Planning Committee consisting of the Chairman and the Vice-Chairman reviews major project planning and prepares recommendations for consideration by the Board. Both the projects and the Operations and Maintenance Departments are organized on a geographic basis.

B. GOSSD-Alexandria

2.04 GOSSD-Alexandria is currently 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 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 functions. Purchasing activities conform to nationally established procedures in excess of L.E. 500. Stores are maintained units. 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 (see Annex E).

C. Operation and Maintenance

2.05 Operation and Maintenance of the GOSSD-Alexandria sewerage system is accomplished in three departments. The Sewer Maintenance Department, responsible for cleaning and repairing sewerage throughout the City, utilizes a highly decentralized approach to 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 Alexandria Sewerage project AID Loan No. 263-K-044.

2.06 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 unit when needed to

alleviate flooding or for dewatering pumping 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 of this Department is being provided in conjunction with the rehabilitation and construction of pump stations under the ongoing Loan No. 263-K-044.

2.07 The Water Pollution Control Department is responsible for the operation and maintenance of the Eastern Treatment Plant and for monitoring water quality in Lake Maryut and along the beaches. The plant is not functioning properly due to a variety of circumstances including faulty design, heavy loading of industrial wastes and lack of training and motivation of plant staff.

D. Development Function

2.08 Project design functions are divided between GOSSD's Cairo and Alexandria offices. With limited staff and equipment resources, the Alexandria office is severely handicapped in performing its duties which include the design of small extensions and pumping stations, collection of field data for designs to be accomplished in Cairo, placement of grade stakes for construction and taking quantity measurements for contractor's payments.

2.09 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 amount of 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 also includes a drafting unit to meet its requirements as well as the needs of the design department.

E. Comments and Recommendations

2.10 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 draft in late 1978 and has been submitted to the Ministry of Development and New Communities. The foreign exchange costs of this study are being financed by USAID. The study included certain recommendations on improving the organizational structure of GOSSD as a whole and GOSSD-Alexandria as well. These recommendations are currently under government review. Implementation of these recommendations is addressed in the Covenants to be included in the Grant Agreement (see Chapter XI).

2.11 Generally, GOSSD-Alexandria 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 office whose sole function will be to work on this project and interface with the consulting engineer and the internal departments of GOSSD. Appropriate conditions and covenants will be included in the Grant Agreement covering these actions.

III. THE PROJECT AREA

A. City of Alexandria

3.01 Alexandria is the principal seaport of Egypt, located about 175 km northwest of Cairo. The city is situated at 31°N on a narrow strip of land approximately 4 km wide and 42 km long between the Mediterranean Sea and the brackish Lake Maryut.

3.02 Local and international tourism is becoming one of Alexandria's major industries and the city serves as the principal summer resort of Egypt. Industries include cotton ginning, cottonseed oil, leather tanning, metal works, petroleum refining, paper, soap, matches, shoes, clothing, cigarettes and foodstuffs.

3.03 The population of Alexandria has been increasing at a rapid rate. By early 1970, the number of permanent residents had grown to more than 2,000,000. As a resort area, seasonal population fluctuations are experienced. This summer influx has been estimated to be about 25 to 33 percent of the permanent resident population. It is expected that by the turn of the century, about 5.3 million people will reside within the Governorate Boundaries. This includes 600,000 temporary residents during the summer holiday season as well as 4.7 million permanent inhabitants.

3.04 The rapid population and industrial growth of Alexandria, combined with limited investment in public services for 25 years, has posed a serious wastewater collection and disposal problem. This problem will become intolerable unless improvements to the existing system combined with construction of additional sewerage facilities are carried out to keep pace with the planned expansion of the city. At present, virtually none of the industrial wastewaters are pretreated prior to their disposal into the city's collection system.

B. Alexandria Wastewater Collection and Disposal System

3.05 The existing sewerage system serves an area of about 4300 ha and has a connected population which varies from about 2 million in the winter months to about 2.5 million in the summer. In addition, there is a considerable industrial wastewater flow, estimated to amount to 870,000 ML/day.

3.06 The existing system includes about 150 km of main interceptor sewers, 1500 km of secondary collectors and street sewers, 30 km of force mains and 34 pump stations of varying capacities. There are, in addition, some privately operated pump stations force mains, and sewers. The system also includes the East Treatment Plant (65 ML/day capacity) which was placed in operation in 1974 and West Treatment Plant (design capacity 85 ML/day) presently under construction. Except for wastewater effluent to the East Plant, all collected wastewaters of the area discharge untreated to local water bodies. Major discharges occur into Abu Kir Bay through the Tabia Pump Station, into the Mediterranean Sea through the existing Kait Bey outfall, into the Western Harbor through local drains, and into Lake Maryut through a number of sewer outfalls and drains. Wastewaters discharged into Lake Maryut are conveyed after a short detention time into the Western Harbor through Mex Pump Station. There are, in addition, many local points of discharge to the Mediterranean Sea through shoreline overflows and local drains. These 48 separate discharges are primarily wastewater except during wet weather when sewage is partially diluted with storm runoff.

3.07 The existing sewerage system is divided into three zones; the Central, Western, and Eastern. The tributary limits of each zone and the principal features of the system are discussed in the Master Plan Studies and shown in Figure III-1.

C. Existing Conditions

3.08 The discharge of an estimated volume of 560 ML/day of predominately raw sewage (less than 15 percent of all wastewater flows receive any form of treatment) to Lake Maryut and along the shoreline of the city's Mediterranean beaches creates serious health problems, causes extensive pollution of the receiving waters, and results in considerable nuisance and noxious odors throughout Alexandria. Sewage from the Central Zone is either pumped to the sea through a badly corroded and leaking outfall at Kait Bey or overflows directly into the Eastern and Western Harbors. East Zone flows are conveyed by sewer or open drain to either the East Plant, located near the hydrodrome for partial treatment, or is discharged as raw sewage to the Smouha Drain. Wastewaters

from the Eastern area, after passing through several kilometers of open drains, enter Lake Maryut and are subsequently discharged to the Western Harbor, with the exception that the wet weather overflows occur at shoreline discharge points along the Mediterranean from Sisila to Montazah. In the West Zone, raw sewerage from areas north of the main ridge flows directly into the Western Harbor, while to the south, the sewage drains to the main lagoon of Lake Maryut via sewers and open channels.

3.09 The existing collection system is often overloaded during times of wet weather as it is essentially a combined (sanitary sewage and stormwater runoff) system. Extensive portions of the sewerage system are operated in surcharged condition much of the time even during dry weather. Overflows exist at many locations in the city, discharging either to the sea or to nearby surface drains.

3.10 The existing system is plagued by many operational problems, many of which could be alleviated by enforcement of the existing sewer use law. Large quantities of such materials as garbage, trash, mazout residue and other oils, toxic industrial wastes, cow manure and septage from holding tanks, are illegally dumped into the system which results in reduction in flow capacity and ultimate blockage of the sewers, as well as difficult biological treatment conditions, fire hazard, and increased pollution loads on the receiving waters.

3.11 Water quality along the Mediterranean shore at Alexandria, especially at the Western Harbor, Eastern beaches, and Abu Kir Bay is poor due to the discharge of raw sewage, industrial wastes, and surface drainage of the area. Inland waters, primarily those of the Lake Maryut main lagoon, the lower reach of the Mahmoudia Canal, the full length of the Montazah Canal, the Kalaa and Abu Kir drains are also polluted by wastewater discharges from domestic and industrial activities.

3.12 The current state of public health of Alexandria, discussed in detail in Chapter IX, is found to be very poor, due, in part, to lack of facilities for maintaining adequate sanitation.

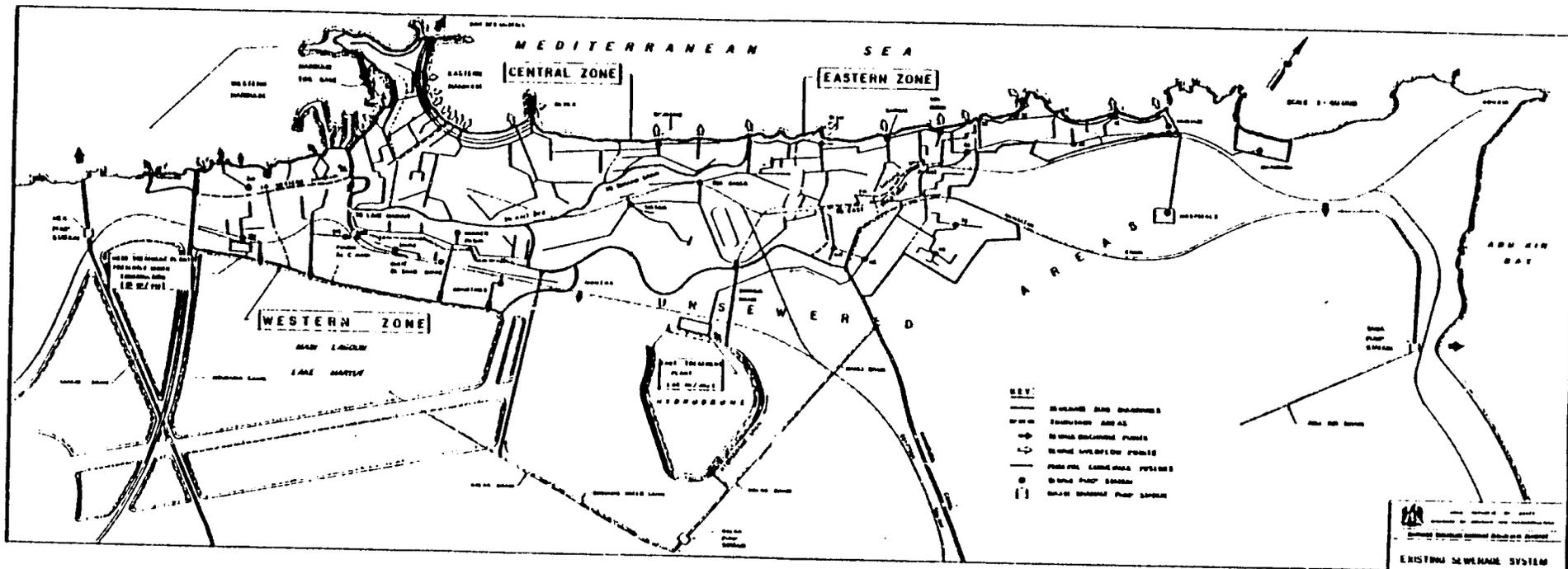


Figure III-1

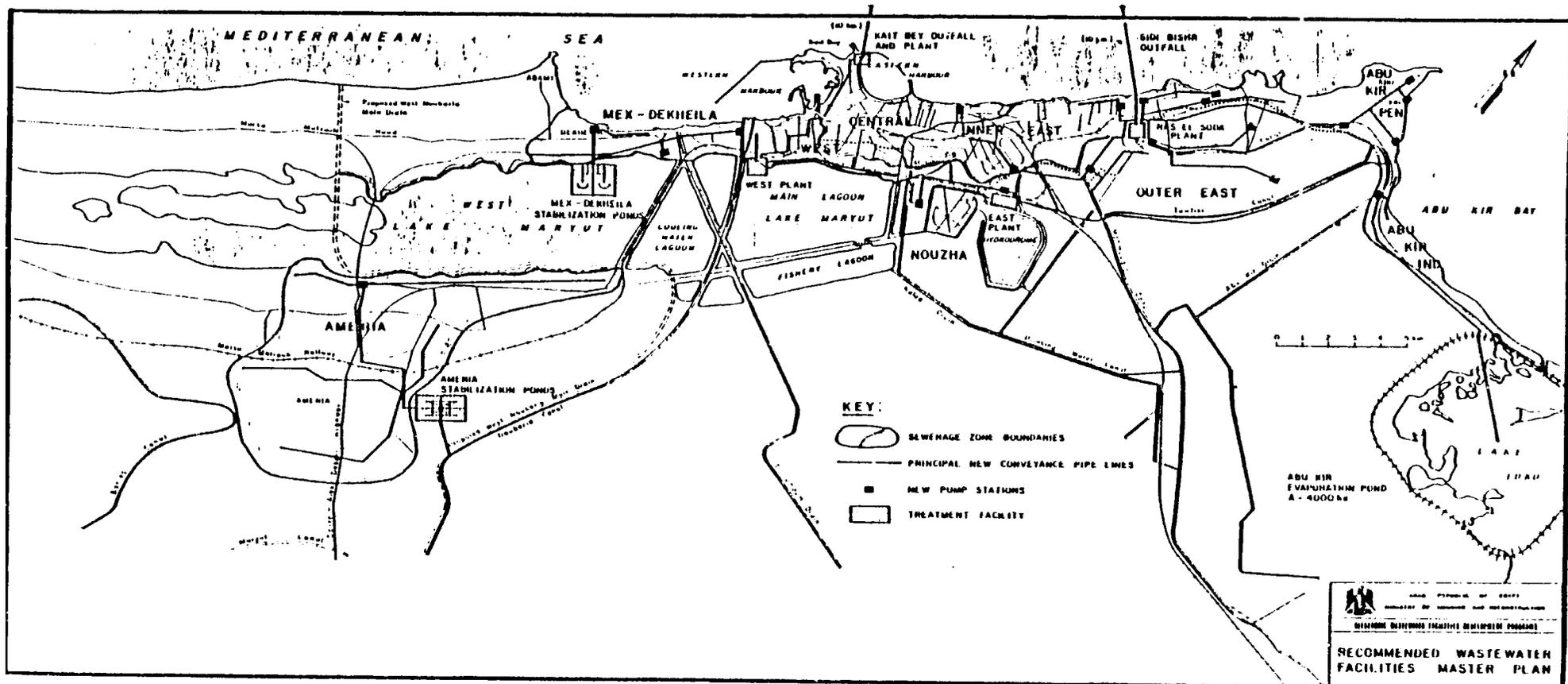


Figure III-2

D. Projected Sewerage Loads

3.13 Total flow of wastewater is now estimated at 560 ML/day is expected to reach two and one half times this quantity, 1470 ML/day, by the year 2000. Total wastewater pollution loads are projected to approximately treble between now and the year 2000.

E. The Alexandria Wastewater Master Plan

3.14 Providing sewerage facilities which will meet the needs of Alexandria through the year 2000 poses challenging problems, both technical and financial. The task is of such magnitude as to necessitate a staged construction program for the many individual projects needed over the next 2 decades. The Alexandria Wastewater Facilities Master Plan provides the framework within which the funding, scheduling, and construction of individual projects is coordinated to form an adequate sewerage system.

3.15 The recommended wastewater plan is composed of six independent collection treatment disposal systems (not to be confused with the seven sub-projects of the expansion program), as follows (see Figure III-2):

1. Eastern - All flows from the Inner and Outer East Zones and Abu Kir Peninsula conveyed to a regional preliminary treatment facility (560 ML/day capacity) located in Ras El Soda for subsequent marine disposal through a 2200 mm diameter submarine outfall discharging 10 km off the sea coast at Sidi Bishr.

2. West/Central - All wastewater treated at preliminary levels within West zone, 175 ML/day capacity at New Kait Bey (Central Zone flows) Plant and 220 ML/day capacity at expanded West Plant, for combined disposal to the sea through a 1700 mm diameter submarine outfall discharging 8 km off Kait Bey Point.

3. Nouzha - All wastewaters conveyed to the existing East sewage Treatment Plant (modified to adequate secondary level of biological treatment at 45 ML/day capacity) for subsequent discharge to the Kalaa Drain leading to Lake Maryut.

4. Abu Kir - Predominantly industrial wastewaters conveyed to a 4000 ha fully contained evaporation pond at Lake Idku for complete retention avoiding discharge to any receiving water.

5. Mex/Dekheila - All Outer West Zone flows conveyed to a 370 ha waste stabilization pond (anaerobic/aerobic lagoons) at west Lake Maryut for 30 days detention prior to discharge to an open channel for conveyance 6 km to the West Noubaria Main Drain.

6. Ameria - All wastewater flows conveyed to a 315 ha waste stabilization pond (anaerobic/aerobic lagoons) east of the city for 30 days detention prior to effluent discharge into the nearby West Noubaria Main Drain.

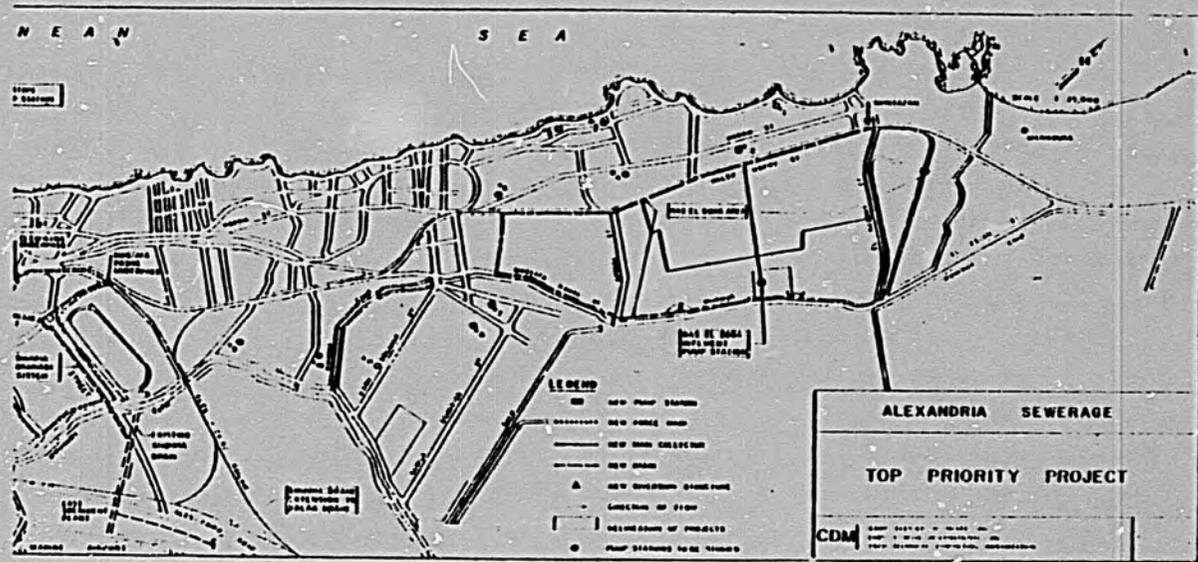
3.16 The Master Plan recommends the provision of 92,800 new dwelling connections and 1040 km of additional lateral sewers (ranging in size between 200 mm and 800 mm diameter pipe), as well as principal wastewater conveyance, treatment, and disposal facilities. A doubling of present GOSSD staff is estimated to be required in order to operate and maintain the expanded system by 1990.

3.17 The scope of the recommended plan will require, at minimum, staging of major construction projects over the planning period to the year 2000.

3.18 Costs associated with the recommended plan show a total capital investment for facilities of \$907 million (LE 635 million at 1983 prices) over the next two decades and an annual cost for operation and maintenance of the system increasing from \$2.7 million (LE 1.8 million) in early 1980's to \$4.1 million (LE 2.7 million) by year 2000.

F. The Ongoing Sewerage Top Priority Projects

3.19 The Alexandria Sewerage Top Priority Projects (TPP) is currently being undertaken by the General Organization for Sewerage and Sanitary Drainage (GOSSD) and has an approximate total cost of \$76 million of which \$15 million is being financed by USAID Loan No. 263-K-044. The TPP,



II-3

expected to be completed in early 1982, represents less than one-tenth of the overall wastewater master plan. The TPP elements include: (1) personnel training, (2) establishment of an improved collection and disposal system for solid wastes and toxic substances, (3) cleaning of existing sewers, (4) repair or replacement of sewer lines now in disrepair and (5) extension of sewerage services into Ras El Soda, a presently unsewered area.

3.20 A listing of the components of the program is given in the Alexandria Project Paper 263-0038. General location of the facilities is shown on Figure III-3.

G. The Ongoing Industrial Pollution Control Grant Sub-Project Under the Industrial Production Project (263-0101)

The Industrial Production Project (262-0101) is to improve the capability of the Ministry of Industry and the public sector industrial companies in the planning, upgrading and implementation of industrial production. As a part of this project \$20.5 million in grant financing is available for the purpose of reducing detrimental environmental effects created by the uncontrolled discharges of industrial wastes from many industrial firms.

The need for assistance to industrial concerns in eliminating industrial waste hazards, both in the plant and external to the plant, has become apparent through the master plan studies. This study showed that at least 11 major polluters were dumping toxic waste into Alexandria's wastewater system. The industries maintain that nothing can be done because of the lack of funds. This project provides not only the funds, but the technical and engineering expertise needed to eliminate harmful industrial waste from reaching Alexandria's collection system. AID plans to make additional financing available in the future to help correct the large industrial pollution problem in Egypt.

IV. THE PROJECT

A. Project Scope

4.01 With the completion of the engineering studies presented in the Alexandria Wastewater Master Plan, it has become apparent that basic capability sufficient to handle the sewerage problems of Alexandria can be obtained only with a substantial investment. The improvements include construction of: A) two primary treatment plants with sea outfalls, B) needed pump stations, force mains and sewers to convoy the collected wastewaters to the treatment and disposal facilities, C) extension of sewer services into unsewered areas to serve more of the present population, and D) upgrading selected existing facilities that need to be retained as a part of the overall systems plan. These facilities, as identified in the master plan, are the next steps required to adequately handle the city's sewerage problems over the next two decades.

The ongoing Top Priority Projects (TPP), although quite modest in scale, will result in early and visible improvements to the existing sewerage system. The TPP will provide some needed rehabilitation and immediate construction to bring the system to near its original capacity and will also provide the needed organizational momentum to implement the Master Plan. The Industrial Production sub-project will address in part the problems of industrial waste and toxic substance discharges. The next step is to implement the critically needed Stage I of the Alexandria Wastewater Master Plan.

B. Project Elements

4.02 As outlined above, Stage I Expansion consists of 20 facility elements as shown in Figure IV-I. These 20 elements in turn have been grouped into seven sub-projects:

- A. East Zone Treatment Plant and Sea Outfall
- B. Smouha Sewerage System
- C. Siouf Kebliya Sewerage System
- D. East Zone Pump Stations' Rehabilitation and Additions
- E. Central Zone Treatment Plant and Sea Outfall
- F. West Zone Sewerage and West Treatment Plant Upgrading
- G. Nouzha Sewerage and East Treatment Plant Upgrading

4.03 The minimum corrective action required is the construction of all 20 recommended elements of Phase I. The elements have not only been carefully selected to minimize the initial capital investment, but also to interrelate so as to form a complete working system. Only by building all of the recommended facilities can significant and positive improvements on Alexandria's public health and its environment be obtained. Also, it is impractical to separate this project into smaller divisions because of the physical configuration of Alexandria (long and narrow), its coastal orientation and the economies of scale possible during construction. To have an effective impact both socially and environmentally, all the proposed facilities outlined herein should be concurrently implemented.

C. Project Benefits

4.04 Implementation of project facility elements 1 through 20 will provide for long range sewerage needs of the urbanized areas of Alexandria through the year 2000 and beyond. Implementation of project facility elements 1 through 14 affect the sewerage needs of the East and Central Zones of Alexandria where about 81 percent of the permanent population lives. The East Zone Treatment Plant and sea outfalls at Ras El Soda (Elements 1, 2 & 3) provide the wastewater disposal needs of 2.2 million people in the year 2000 (or 41 percent of Alexandria).

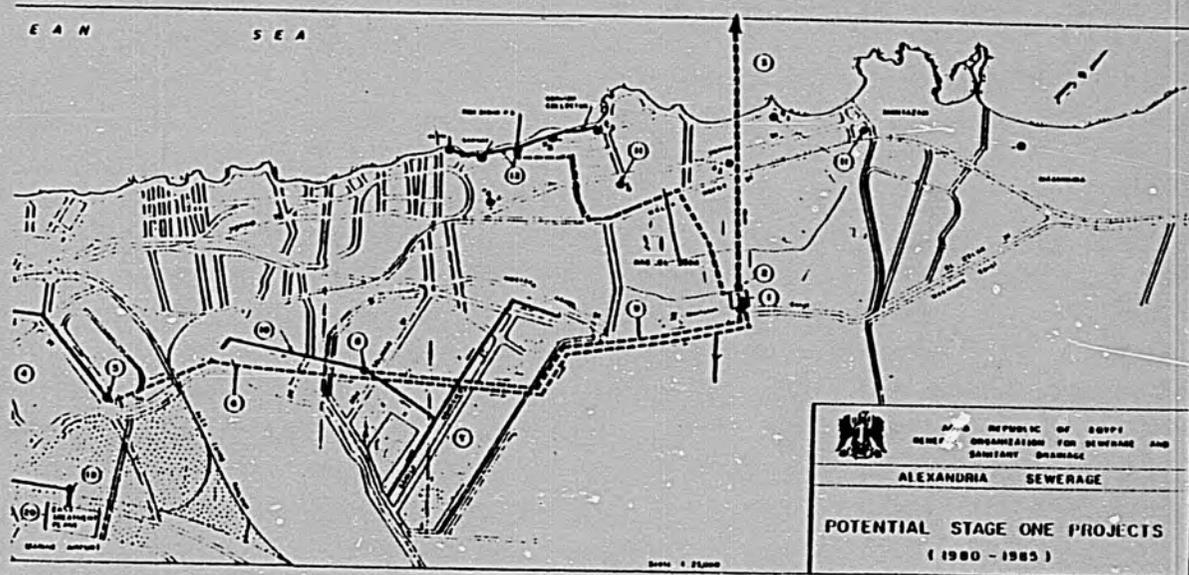
The Central Zone Treatment Plant and sea outfall at Kait Bey (elements 13 & 14) provide the wastewater disposal needs of 1.2 million people in the year 2000 (or 22 percent of Alexandria).

4.05 The system benefits of project facility elements 1 through 20 are summarized in Table IV-1.

TABLE IV-1

SYSTEM SUB-PROJECTS AND BENEFITS

<u>Project Elements</u>	<u>Sub-Projects</u>	<u>Benefits</u>
1, 2, 3	A. East Zone Treatment Plant & Sea Outfall	Long range treatment plant & disposal for 2.2 million by year 2000
4, 5, 6	B. Smouha Collection and Conveyance	Remove pollution from Smouha Drain & Lake Maryut. Transfer to East Zone Treatment Plant & Disposal Collection/Conveyance for 500,000 by year 2,000.
7,8,9,10	C. Siouf Kebliya/Abou Siliman Collection and Conveyance	Remove Pollution from Lake Maryut. Eliminates Pump Stations 7,8,9 & 10. Collection/Conveyance for 600,000 by year 2000.
11,12	D. East Zone Pump Stations Rehabilitation and Additions	Prolong life of Existing Wastewater & Stormwater Pumping Units, & new Facilities for Coastal Area.
13,14	E. Central Zone Treatment Plant & Sea Outfall	Long Range Treatment Plant and Disposal for 1.2 million by year 2000.
15,16,17	F. West Zone Conveyance and West Treatment Plant Upgrading	Eliminate 8 Existing Pumps Reduce Pollution in Lake Maryut. Serves 800,000 by year 2000.
18,19,20	G. Nouzha Sewerage and East Zone Treatment	Reduce Pollution in Lake Maryut. Serves 70,000 by year 2000.



IV-1

V. ALTERNATIVE AND TECHNICAL ANALYSIS

A. General

5.01 Providing sewerage facilities which will meet the needs of Alexandria through the year 2000 poses several challenging technical and financial problems. The task is of such magnitude as to necessitate a staged construction program over the next two decades. The project as outlined in this paper is the first stage of the Master Plan, and if implemented, will provide the necessary collection, treatment and disposal facilities to handle approximately 81 percent of the city's future domestic needs.

B. Alternative Analysis

5.02 Alternative approaches to future wastewater control in the study area have been based on (1) a thorough assessment of existing conditions, (2) the careful development of planning projections, (3) the proposed use of technically appropriate engineering methods, materials, criteria and costs, and (4) recognition of both adequate collection of sewage and protection of receiving water uses as planning objectives.

5.03 The public health implications of population growth without adequate wastewater facilities emphatically point to a disaster situation, particularly given Alexandria's status as an international port and national industrial center. Tourism also presents a potential means of disease transmission to other areas, both within and outside of Egypt. As a result it would be reasonable to expect that the tourist trade, which represents a considerable revenue, would rapidly decline in direct response to increasing health hazards. While only 15 percent of the current population live in unsewered areas, this would increase to about 40 percent by the year 2000, and the public health hazards for these areas would affect 1.9 million persons. Identification and description of these health hazards are presented in detail in the Master Plan Report (Vol. II, Sec. 3.7).

5.04 The ecological balance of Lake Maryut and Alexandria's Mediterranean fisheries would also be endangered by the increase in raw wastewater discharges. The actual conditions in the lake would depend on the balance between flushing rate,

nutrient levels, and the rate of phytoplankton growth, but calculations indicate that the annual catch from the Main Basin of Lake Maryut would drop sharply. Pressure on the Mediterranean fisheries would intensify, as a result of population growth and decreased freshwater catches in Lake Maryut. Unabated wastewater pollution along the shore of the Mediterranean could also cause irreparable damage to fisheries and place Egypt in an increasingly embarrassing international position.

5.05 In summary, both the social and ecological environment of Alexandria would be profoundly degraded by the failure to improve wastewater facilities. Although the precise extent of these deleterious effects is hard to assess, the no action alternative is clearly unacceptable, and corrective action is required immediately.

C. Alternative Disposal Options

5.06 Analyses performed in the course of the Master Plan Study (subsequent reviews and modifications by USAID) involved four regional alternatives, each using a different disposal option. These plans principally involve:

1. Sea disposal following primary treatment.
2. Lake disposal following secondary treatment (as an interim solution).
3. Effluent reuse for crop irrigation following secondary treatment.
4. Evaporation in the desert following preliminary treatment.

D. Sea Disposal Alternative

5.07 The following environmental influences are predicted under this alternative:

1. Negligible effect on the dissolved oxygen concentration of the receiving water;

2. Estimated wastewater nutrient concentrations should not have any detrimental effect and would, in all probability, enhance the fish productivity of the eastern Mediterranean near the outfall locations;
3. Bacterial pollution of the beaches will be reduced to acceptable limits 90 percent of the time with wastes discharged from a sea outfall with diffuser at 8-10 km offshore and in water depths of about 50 m (164 feet);
4. Potential sludge banks forming at ends of sea outfalls if only preliminary treatment used;
5. Should sludge banks occur, these may reduce the number of benthic species in the vicinity of the outfalls.
6. Transport of some bacteria from sea outfall discharges onto bathing beaches, may occur during periods of unfavorable conditions (i.e. strong on-shore winds and currents);
7. Assuming effective treatment of industrial waste, the accidental discharges of toxic waste into the municipal sewers will result in some environmental threat to the Mediterranean.
8. There would be a potential loss of nutrients otherwise available for agricultural reuse.

5.08 Should bacterial pollution of the beaches associated with outfall disposal occur, it can be mitigated by chlorinating the effluent prior to discharge. However, this method of disinfection is of limited value and will be very costly when only preliminary treatment is employed. Primary treatment would not only reduce the potential of bacterial pollution, it would make disinfection of the discharges more practical, eliminate the formation of sludge banks and act as a buffer system if accidental spills of industrial toxics reach the sewer system. However, the only effective protection against toxic discharges, no matter what disposal alternative is used, will be strong enforcement of the "Sewer Use Law" and the building of industrial waste pretreatment facilities at the various industrial plants as recommended in the Master Plan.

E. Lake Disposal Alternative

5.09 Lake Maryut currently receives untreated domestic and industrial wastewater from two of the three sewered areas. Because of these discharges and agricultural drainage, the lake is highly eutrophic (turning into a swamp).

5.10 The effect of discharging domestic wastewater after secondary treatment into Lake Maryut are:

1. Reduction in Biological Oxygen Demand (BOD₅) and suspended solids loadings.
2. Increase in nutrient loadings.
3. Enhancement of photosynthetic plant production and corresponding secondary organic loading.
4. Increased photosynthetic activity by day and possible oxygen depletion by night, resulting in anaerobic conditions and possible fish mortalities.
5. If organic productivity rates were less than expected, surplus nutrients would remain dissolved in the water and contribute to the eutrophication of Dekheila Bay and the Western Harbor after leaving the Lake.

5.10 Even with secondary treatment of the wastewaters discharged into Lake Maryut, the ecological stability of the lake would not significantly improve and conditions might not be any better than the current highly eutrophic state. If an industrial waste law requiring adequate pretreatment is implemented and enforced, current and future industrial wastewater discharges should have no adverse environmental impact beyond increasing wastewater loadings and nutrients and the same general effects described for the lake above would still apply. If pretreatment of industrial plant effluent is not enforced the potential impact on the Lake Maryut ecosystem must be regarded as being highly adverse.

5.11 Continued disposal to the inland fresh waters of Lake Maryut even with treatment has been considered as an interim solution only. Treatment with disposal to the lake (except for minor flows through existing improved treatment works) is, therefore, not a viable long range solution.

F. Effluent Reuse (Irrigation) Alternative

5.13 The Master Plan specifies a secondary level of wastewater treatment for the agricultural reuse alternative. Secondary treatment is specified to minimize public health risks and because significant advantages, such as the need for less land area, less extensive distribution systems, and considerably less maintenance of the soil surface because of reduced clogging, also accrue if secondary treatment effluent is used.

5.14 The viability and environmental impact of the irrigation alternative depend to a large measure on the strength of Alexandria's wastewater and the dilution required before reuse. Principal considerations include:

1. High total dissolved solids (TDS) values (1300 mg/l) limit the ability of irrigation waters to flush damaging salts from the soil around the roots of crops.
2. The nutrient concentrations found in Alexandria's wastewater are so high that the direct application of treated effluent could actually decrease crop yields. TDS concentrations are twice those considered acceptable for unrestricted irrigation, while direct irrigation of croplands by treated effluent would apply about three times the average nutrient application to agricultural land.
3. Dilution would reduce the salinity hazard to an acceptable level, and would not significantly reduce the nutrient benefits of the wastewater. Dilution would also, however, reduce the amount of wastewater than can be applied to the agricultural lands within economic transmission distance by a factor of two.

5.15 Costs of wastewater reuse are not those of the entire wastewater system, but rather the difference in cost between the reuse alternative and other roughly comparable ways of disposing of Alexandria's wastewater, because the major portion is attributable to the collection and disposal of Alexandria's wastewater, and not to its reuse. Basic considerations are:

1. The agricultural reuse alternative can supply irrigation water and nutrients at a cost of LE 0.022 per m³.
2. The current cost of irrigation water in the delta region, as estimated by the Ministry of Irrigation, as 0.0002 LE per m.
3. The value of fertilizer saved by wastewater irrigation is approximately LE 0.0027 per m³.

5.16 Thus, wastewater reuse, under favorable assumptions, costs three to five times as much as conventional irrigation taking into account fertilizer benefits. Additional factors to be considered in assessment of the reuse alternative include the environmental impacts of the unused wastewater effluent, the need to match wastewater peaks with agricultural demands, and the farmer's reduced control over nutrient application.

5.17 In summary, agricultural reuse of the majority of Alexandria's wastewater involves technical and economic problems which significantly limit the viability of the alternative.

G. Desert Evaporation Alternative

5.18 Three sites have been considered for the evaporation of wastewater in the development of the Alexandria Wastewater Master Plan:

1. The Saline portion of Lake Maryut west of the Ameria-Agamy road.
2. The northern portions of Lake Idku.
3. The Western Desert for most of the wastewater generated by Alexandria.

Almost all other land in the Alexandria region has the current or intended use of agricultural, urban housing, or industrial development. Because of the fraction of Egypt's total land area which has been or will be reclaimed for agriculture in the near future is so small and its role in the Egyptian

economy is so significant, the value of agricultural land is high and reclamation is subject to top priority considerations. The Master Plan recommends against use of potential agricultural lands for the evaporation of Alexandria's wastewater as an essentially irreversible and irretrievable commitment of these resources.

5.19 The proposed evaporation sites in the Western Desert are currently low priority lands because of relatively poor soil quality. If the land cannot be effectively used for agricultural purposes, then the physical and biological environmental impacts of wastewater disposal at this site appear minimal. The socioeconomic impacts of the additional cost of wastewater disposal at this site are, however, substantial. Disposal of Alexandria's total wastewater flow at this site has a present worth cost which is LE 78 million more than the preferred ocean disposal plan; when expressed on a per capita basis of current population, this is LE 32 per person additional cost for the Western Desert disposal alternative. If a smaller fraction of Alexandria's wastewater is evaporated at the Western Desert, then the total cost would be lower, but the cost per unit of evaporated flow would be higher, because many component costs would not decrease with flow.

H. Selection of the Preferred Alternative

5.20 The preferred plan has been selected largely on the basis of the following five interrelated criteria:

- environmental impact
- economics
- reliability
- flexibility, and
- social acceptability (both domestic and international)

ECONOMICS

5.21 The economic analysis of regional disposal alternatives in the Master Plan make a clear distinction between the ocean and lake disposal alternatives on the one hand and

agricultural reuse and evaporation ponds on the other. While disposal of the bulk of Alexandria's wastewater by agricultural reuse and evaporation ponds offer some advantages outside an economic context, they must be evaluated in depth to justify what might be regarded as severe economic disadvantages noted earlier. Although detailed present worth analysis for the central portions of Alexandria favor ocean discharge over Lake Maryut disposal, the ocean and lake alternatives must be compared on the basis of the other values to select a preferred means of disposal.

5.22 Preliminary calculations on the energy requirements of alternatives have been made, and they indicate that energy consumption is not a major factor in the selection of alternatives. Of the four disposal alternatives considered, ocean disposal requires by far the least energy, despite the pumping requirements for the two outfalls. Lake disposal requires at least twice as much power as ocean disposal, because of the aeration and process equipment used in secondary treatment. Evaporation in the Western Desert requires about the same energy as lake disposal; while evaporation requires virtually no treatment processes, the wastewater must be pumped 75 kilometers against a head of 80 meters to a suitable site. Finally, agricultural reuse requires the most power because of both the secondary treatment requirement and the need for effluent pumping to appropriate canals. These comparisons do not include the pumping requirements for the collection system, which would be common to all alternatives. The fact that energy represents only approximately 10 percent of the annual operation and maintenance cost of the preferred plan indicates the relatively minor role of energy costs in wastewater planning in Alexandria.

RELIABILITY

5.23 The reliability of wastewater treatment and disposal facilities and the consequences of their possible failure must be considered in assessing environmental impacts. The simplest and most reliable treatment and disposal facilities are those required for evaporation ponds, where the only concerns are the removal of coarse solids and the continuous operation of the pumping facilities. Because the treatment process associated with evaporation ponds is so simple (coarse screening, grit and floating particle removal) there is little significant adverse impact that can be attributable with the temporary failure of the treatment facilities. The

sea disposal alternative uses primary treatment, a slightly more complex process employing sedimentation and sludge handling facilities. As an added measure of reliability for this process, outfall lengths longer than normally required in connection with primary treatment are being used as an added measure of safety rather than be adjusted to fit the increased level of treatment. Should the treatment process fail for any reason, the longer outfalls will provide the needed dispersion and dilution of the wastewaters.

5.24 Secondary treatment facilities required for lake disposal and agricultural reuse are far more complicated than the preliminary and primary treatment processes of the desert and ocean disposal alternatives. Activated sludge facilities obtain high waste treatment efficiency through the use of sophisticated equipment and complex artificially controlled biological processes. The complexity of the system makes it vulnerable to failure, and the resultant sharp decrease in treatment efficiency could have a severe impact on the environment.

FLEXIBILITY

5.25 The major issue of disposal flexibility is the ease with which wastewater could be reused for agricultural irrigation in the future, if future conditions so warranted. Secondary treatment and disposal of wastewater to Lake Maryut could be more easily converted to agricultural reuse than either ocean disposal or evaporation facilities, because the appropriate treatment facilities would already be built. Evaporation pipelines would be required to transport wastewater to the Western Desert facilities for conversion to agricultural reuse to the south of Alexandria; however, this advantage is largely offset by the cost savings of ocean disposal which could be applied to reuse conversion.

SOCIAL ACCEPTABILITY

5.26 Major issues of social acceptability affecting the Master Plan are:

1. The perceived impact of the recommended Master Plan on international waters of the Mediterranean.

2. The impact of the recommended plan on tourism.
3. The value to the Egyptian people of water conservation for agricultural purposes.
4. The economic cost of the plan.

5.27 A Mediterranean Action Plan developed by the United Nations Environmental Programme (UNEP) has resulted in the agreement on June 29, 1979 to a "Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-based Sources" by all effected Mediterranean countries. The Protocol recognized, in general, the existence of and the necessity of outfall disposal into the Mediterranean Sea. Secondary treatment and discharge to Lake Maryut of Alexandria's wastewater would not cause as much concern as direct Mediterranean pollution, although the water quality of the lake has a profound impact on the discharges to Dekheila Bay and the sea. Western Desert evaporation and agricultural reuse are the alternatives least likely to cause international or local environmental concerns.

5.28 Similarly, the perceived impact of ocean discharge on bathing water quality may differ from any measured impact. Alexandria's current tourist industry does not exhibit great concern for the pollution of the short, broken outfall at Kait Bey, so that soundly designed and built outfalls which are several kilometers in length should create no such concern. Lake, desert, and irrigation disposal of Alexandria's wastewater are not perceived to affect tourism to any significant degree.

5.29 The high value attached to water conservation in Egypt favors agricultural reuse and lake disposal over both evaporation and ocean disposal. As with other issues of social acceptability, there may be a painful difference between the public perception and the reality of the alternatives' impacts. Discharge to Lake Maryut may also appear to "conserve" wastewater, when, in fact, it is merely rerouted to Dekheila Bay and the sea via the Mex Pump Station.

5.30 In practice, the acceptability of a plan probably depends more on economics than on any other factor. While agriculture reuse and evaporation may well be socially acceptable to the Egyptian public as a means of wastewater disposal, their extra costs of LE 60 to 80 Million are probably not. Of all the values addressed, social acceptability is perhaps the most difficult to assess.

PREFERRED PLAN

5.31 After taking all the above issues into account, the Master Plan recommended preliminary treatment followed by sea disposal using outfalls as the preferred plan.

5.32 To assure environmental soundness and to comply with AID's "Environmental Procedures", a Draft Environmental Impact Statement (DEIS) was prepared on the project. This included an extensive 12-month marine investigation. The DEIS and accompanying Wastewater Master Plan was reviewed by the scientific and technical community of Egypt and selected U.S. agencies and members of the American environmental community.

5.33 As a result of these reviews a variety of written comments and informal communications were received by AID. The comments received were translated into the following areas of concern:

1. The Appropriateness of Sea vs. Land Disposal

After careful review of technical, social and economic aspects of the disposal alternatives, AID agreed with the consultant's conclusion that sea disposal represents the best choice in the case of Alexandria. The alternative of land reclamation or agricultural reuse of treated wastewater is not feasible presently due to the volumes involved, the high direct and indirect costs, poor social acceptability and the lack of an organizational unit or land owners groups to receive and utilize the wastewaters.

The approach proposed for this project provides the needed flexibility for possible future reuse schemes by the redirection of the treated wastewaters into desert areas

where it can be additionally treated prior to reuse. In the event the Government of Egypt adopts this option in the future as the needs for reuse decrease during the rainy season, then excess wastewater can continue to be disposed of through the sea outfall system.

2. The Level of Wastewater Treatment Prior to Discharge

AID has modified the project to upgrade the wastewater treatment from "preliminary" as recommended in the Alexandria Wastewater Master Plan Study to "primary" prior to disposal through two sea outfalls. This modification or "Preferred Plan" will increase project costs by \$31.2 million (\$16.5 million in foreign exchange costs and \$14.7 in local exchange costs) and will result in an increase in operation and maintenance costs. This modification greatly reduces the possibility of sludge bank development, the possibility of wastes reaching the bathing beaches, the cost should disinfection be necessary because of unfavorable oceanographic conditions and reduces the potential impact of toxic waste discharges into the Mediterranean Sea. The recommended outfall lengths which are being retained beyond that normally required in connection with "primary" treatment as an added measure of safety rather than being adjusted to fit with an increased level of treatment. In addition the length of the diffusers will be increased at the ends of the outfalls to maximize the dispersion of settleable solids.

3. The Management of Industrial and Toxic Wastes

A. The project agreement will require the engineering consultant to review the industrial and toxic waste discharges to identify any reasonable improvements than can be made in segregating these waters from entering the collection system.

B. The current Industrial Pollution Control segment of the AID funded Industrial Production Project will be expanded. This project provides technical services and grant funding for industrial plants to reduce waste discharges to acceptable limits.

4. Solid Wastes

An area wide study partially financed by AID will be undertaken dealing with the solid waste collection and disposal problems of Alexandria.

5. Operator Training, Sewer Laws and Environmental Monitoring

A. The inclusion of a covenant to the project agreement providing for continuous and adequate monitoring of the aquatic systems in the vicinity of the sea outfalls and the beaches of Alexandria for changes. To assist the Government of Egypt in this activity the project includes \$150,000 for monitoring equipment.

B. The inclusion of a covenant to the project agreement concerning the enforcement of the current "Sewer Use Law".

C. The inclusion of a covenant to the project agreement requesting the Government of Egypt to consider modifying the current "Sewer Use Law" to upgrade it to conformance with the proposed draft "Ordinance Regulating Sewer Use and Industrial Waste Discharge", as recommended in the Wastewater Master Plan Study for Alexandria.

D. The development of an understanding with the Government of Egypt concerning the actions needed to be taken under the provisions of the "Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-based Sources" developed through the United Nations Environmental Programme.

5.34 In addition, AID is planning a pilot/demonstration study on the reuse of wastewater in Egypt. This study will provide more reliable information in the areas of cost, technical reliability and social acceptability of reclaimed wastewaters and their potential reuse in Egypt.

MONITORING

5.35 The implementation of the "Preferred Plan" will no doubt improve the public health conditions in Alexandria. To preserve the beneficial uses of the Mediterranean Sea and to protect the aquatic environment a program of monitoring will be instituted by GOSSD to check if the targeted water quality standards are being maintained. This program would include a study of bottom (sludge) sediments, examination of local aquatic organisms, laboratory analysis of sea water and beach coliform counts. To assist the GOE in this activity the project includes \$150,000 for monitoring equipment. In the event problems and discrepancies occur with respect to design standards, corrective action or mitigating measures will be undertaken.

I. Technical Aspects of the First Stage Expansion Project

5.36 The proposed first stage expansion facilities of Alexandria's Wastewater Master Plan will serve the needs of the East, Central and West Zones where almost all the urban population of Alexandria are currently residing. These facilities consist of seven collection, treatment and disposal sub-systems proposed to handle the city's wastewater problems through the year 2000. The Master Plan studies found that disposal of East and Central Zone wastewater can best be accomplished by discharge through two outfalls.

5.37 This section describes briefly the technical and economic aspects of each of the seven project sub-systems.

1. East Zone Treatment Plant and Sea Outfall

5.38 Also known as the Ras El Soda treatment plant and Sidi Bishr sea outfalls, this system includes a 560 Ml/day preliminary treatment plant, an effluent pump station and a sea outfall 10 km offshore, approximately 2200 mm diameter.

The East Zone treatment and disposal facility would serve 2.2 million inhabitants (or 40 percent of Alexandria) by the year 2000. The primary treatment facilities will be provided with mechanical (coarse) screens, grit removal units, scum flotation, sedimentation units, sludge stabilization and drying facilities and chlorination units. The effluent pump station will discharge treated wastewater into the land outfall (2.5 km long) and sea outfall (10 km long). (See Figure V-1 for outfall profile.)

2. Smouha Collection and Conveyance Facilities

5.39 The Smouha area has a total area of 700 ha of which about 200 ha are currently unsewered. Facilities included in this drainage area are: sewer collectors (about 4.2 km with sizes up to 2000 mm diameters); sewer mains and lateral for the presently unsewered areas; a wastewater pump station (230 Ml/day capacity); and a force main about 1200 mm diameter, 9.1 km long. The Smouha facilities will convey wastewater, currently discharging into the Smouha Drain and Lake Maryut, to the East Zone Plant in the Ras El Soda for the final discharge to the sea. By the year 2000, these facilities would serve about 500,000 people or 10 percent of the Alexandria area.

3. Siouf Keblia Collection and Conveyance Facilities

5.40 This system will also discharge into the East Zone Plant for eventual disposal into the sea. The Siouf Keblia sewer system will serve about 160,000 by the year 2000. The major components of the system include 7.6 km of collectors up to 1600 mm diameter; the Abou Soliman Pump Station with year 2000 capacity of 270 Ml/day and a force main 1200 mm diameter about 5.6 km long. Completion of the collector and conveyance system will satisfy the Master Plan intent to eliminate existing Pump Stations Nos. 7, 8, 9 and 10. The collector/conveyance system will serve about 600,000 people or 11 percent of the Alexandria area by the year 2000.

4. East Zone Pump Stations - Rehabilitation and Addition

5.41 Eight existing pump stations in the East Zone are to be upgraded and rehabilitated for incorporation into the Master Plan facilities. Upgrading will involve: (See Figure III-1).

TABLE V-1

COST DETAILS - FIRST STAGE EXPANSION FACILITIESBased on Primary Treatment and Long Outfalls

<u>ITEMS</u>	<u>Total Facility Cost LE Millions</u>		<u>Cost Component-LE Millions</u>		<u>FOREX (\$Millions)</u>	<u>Ratio FX/Total</u>		
			<u>Forex</u>	<u>Local Costs</u>				
1. RES Primary Tmt. Plant	LE	23.00	LE	12.87	LE	10.13	18.57	0.55
2. RES Effluent P.S.		6.25		2.54		3.71	3.63	0.41
3. RES Sea Outfall (10 km)		38.11		27.34		10.77	39.06	0.72
4. Smouha Sewerage		23.66		2.22		21.44	3.17	0.09
5. Smouha Pump Station		4.19		1.49		2.70	2.13	0.36
6. Smouha Force Main		4.73		2.35		2.38	3.36	0.50
7. Slouf Kebliia Sewerage		35.72		3.05		32.67	4.36	0.09
8. Abou Soliman P.S.		4.99		1.78		3.21	2.54	0.36
9. Abou Soliman Force Main		4.35		2.16		2.19	3.08	0.50
10. Abou Soliman Collectors		6.93		1.11		5.82	1.58	0.16
11. East Zone P.S. Rehab.		4.32		3.72		0.60	5.31	0.86
12. East Zone Additions		10.46		2.54		7.92	3.63	0.24
13. Kait Bey Primary Tmt. Plant and Effluent P.S.		24.00		12.00		12.00	17.14	0.50
14. Kait Bey Sea Outfall (8 km)		23.99		17.69		6.30	25.27	0.74
Items 1-14 Sub-total		214.7		92.86		121.84	132.83	0.42
15. West Zone Collector		32.29		5.22		27.07	7.46	0.16
16. P.S. 2W-Upgrading and Force Main		0.95		0.48		0.47	0.68	0.50
17. West Tmt. Plant-Upgrading and Force Main		32.08		14.75		17.33	21.07	0.46
18. Nouzha Sewerage		17.47		1.49		15.98	2.13	0.09
19. Pump Stations & Force Mains		3.65		1.65		2.00	2.36	0.45
20. East Tmt. Plant-Upgrading		0.42		0.33		0.09	0.47	0.79
Items 15-20 Sub-total	LE	86.86	LE	23.92		62.94	34.17	0.27
GRAND TOTAL	LE	301.56	LE	116.78		184.78	167.0	0.37

<u>Number of Pump Stations</u>	<u>Component to be Upgraded</u>
1	Wastewater pumping only
4	Stormwater pumping only
3	Stormwater & Wastewater Pumping

East Zone additions would include a new Sidi Bishr Pump Station; force main and collector along the Cornish. The Cornish collectors will permit abandonment of Existing Pump Stations Nos. 3, 5, Glym and Sarwat.

5. Central Zone Treatment Plant and Sea Outfall

5.42 This system includes the Kait Bey primary treatment plant, an effluent pump station and a sea outfall. The Kait Bey outfall will be 8 km long and about 1700 mm diameter. The effluent pump station will have a year 2000 capacity of 175 Ml/day by the year 2000. The treatment processes as described in Section A, East Zone System are basically similar to those proposed for the Central Zone which will eventually serve 1.2 million people by the year 2000 or 22 percent of Alexandria.

6. West Zone Sewerage and West Treatment Plant Upgrading

5.43 This system will be a tributary to the Existing West Treatment Plant which is proposed to be upgraded to a 220 Ml/day primary treatment plant. Effluent from this plant will be pumped to the Kait Bey effluent pump station for re-pumping into the sea. The other elements of this system include 6.1 km of collectors up to 2300 mm diameter, an upgraded Pump Station No. 2W, and new force main. Completion of these facilities will eliminate 8 existing pump stations and reduce significantly pollution now being discharged into Lake Maryut. The West Zone system will serve about 800,000 people by the year 2000 or 15 percent of Alexandria.

7. Nouzha Sewerage and East Treatment Plant Upgrading

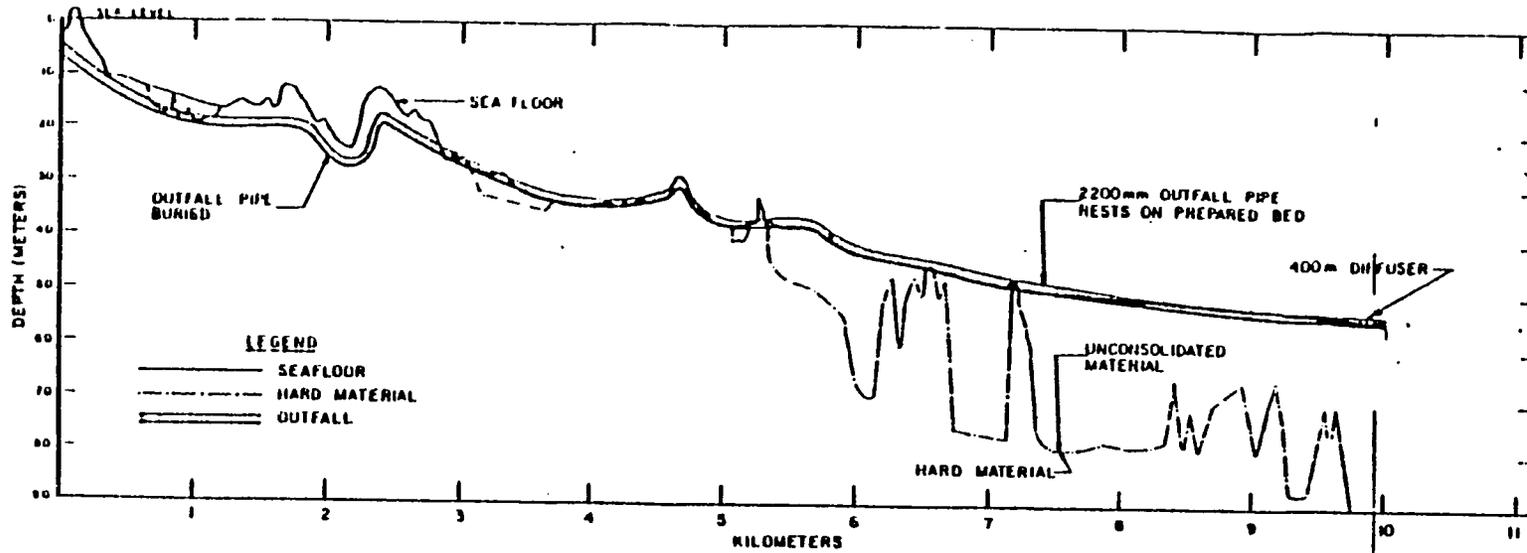
5.44 This system will provide sewerage service to about 70,000 by year 2000 in the presently unsewered Nouzha area, other elements in this system include:

1. 3.7 km of collectors up to 1000 mm dia.
2. 2 pump stations (capacities 16 and 74 Ml/day)
3. 2.6 km of force main, 350-750 mm dia.
4. upgraded East Treatment Plant (activated sludge), 45 Ml/day

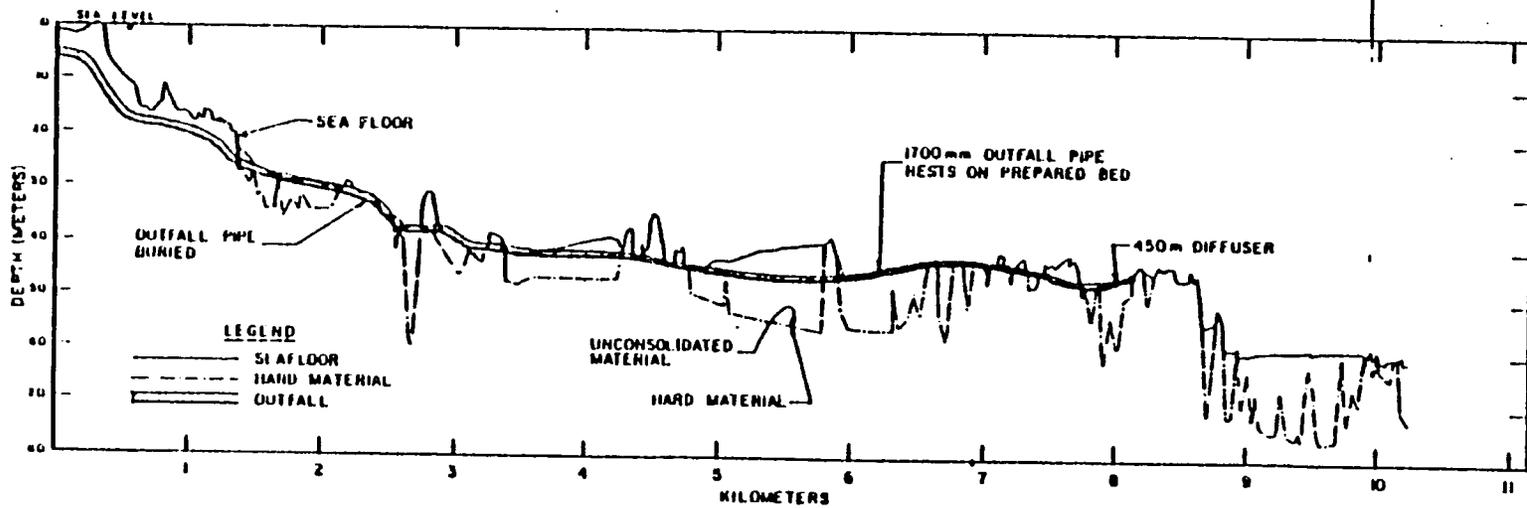
1. Cost Estimates

5.45 The project costs for the First Stage Expansion facilities (Items 1 through 20 in Figure IV-1) is estimated to be LE 301.56 (\$431.2) million, based on projected 1983 price levels, and including engineering and contingencies. The foreign exchange component of overall project is estimated to be US \$167 million.

5.46 The cost details for the 20 Master Plan facility items proposed for Stage I are presented in Table V-1.



PROFILE OF PROPOSED SIDI BISHR OUTFALL ALIGNMENT



PROFILE OF PROPOSED KAIT BEY OUTFALL ALIGNMENT

VI. FINANCIAL PROJECTIONS

A. Introduction

6.01 The Master Plan Studies include financial information regarding GOSSD-Alexandria's recent (1973-1978) performance and its projected future financial condition on the basis of implementing the proposed facilities for the East and West/Central districts (See Appendix M, Alexandria Wastewater Master Plan Study, Volume III for details). This section presents in summary form the project's annual financial statements for the ten year period, 1979-1988, as well as the past performance in 1973-1978.

B. Past Financial Performance

6.02 Table VI-I shows the annual operating and capital costs, as well as debt payments and revenue sources for GOSSD-Alexandria for the years 1973-1978 (inclusive).

REVENUES

6.03 Before 1962, GOSSD-Alexandria generated revenues through a sewer service charge to industrial customers. The charge was 0.003 LE/m³ of wastewater discharge based on metered water use. There was adjustment for industries that did not return all water to the sewer due to evaporation or use in production. The industrial wastewater service charge was abandoned in 1963 however, when the government nationalized industry. The funding requirements to meet O&M and capital expenses are now generated from two sources: (1) Service charges for new sewer connections and (2) GOE budget allocations.

6.04 Those customers who specifically request a sewer connection must pay the estimated cost of making the connection in advance. The fee is then adjusted in accordance with the actual cost incurred. The average cost has risen from LE 43 per connection in 1973 to LE 102 in 1976. There are also those customers who are connected to the system without requesting a connection, the result of the GOSSD capital improvement program for sewer extensions which includes the routine construction of all connections for newly sewered streets. The connection fee in this instance has averaged approximately LE 150 through 1976. The total revenue generated

TABLE VI-1

GOSSD-ALEXANDRIA FIVE-YEAR FINANCIAL SUMMARY
(1973-1978)

<u>Annual Expenditures, LE</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
<u>Operating Costs</u>						
Salaries and Allowances	398,482	437,150	497,074	544,442	656,198	875,870
Employee Benefits	68,618	73,822	97,921	141,640	152,828	172,152
Fuel	24,215	23,413	24,024	25,412	25,873	30,191
Utilities	33,485	34,266	30,683	84,755	82,242	83,667
Spare Parts & Materials	65,495	63,898	50,253	58,277	72,174	121,312
Major Repairs	15,499	16,241	13,088	13,647	13,104	34,219
Other Expenditures	<u>23,049</u>	<u>26,725</u>	<u>28,437</u>	<u>29,734</u>	<u>55,088</u>	<u>22,486</u>
TOTAL	630,843	675,515	741,480	897,907	1,062,477	1,339,897
<u>Capital Costs</u>						
Master Plan Sewers	111,155	163,763	99,248	484,903		
Master Plan Pump Stations	48,041	40,105	34,036			
Master Plan Tmt Facilities	203,859	175,270	303,423	399,940		
Other Projects	<u>181,795</u>	<u>120,862</u>	<u>100,951</u>	<u>144,809</u>		
TOTAL	544,850	500,000	537,658	1,029,652	419,000 ^a	4,134,785
Debt Payments	----	----	9,312	3,508	3,646	
Total Annual Expenditures	1,175,693	1,175,515	1,288,450	1,931,067	1,485,093	5,474,682
<u>Revenues</u>						
Service Charges, Fee ^b	87,870	127,015	79,262	96,993	194,250	(a)
Government Contribution	1,087,823	1,048,500	1,209,188	1,834,074	1,290,790	(a)

Source: Financial records of the Budget and Finance Department, GOSSD-Alexandria.

- (a) Breakdown not yet available at time of writing.
 (b) Customer contributions for extensions and connections.

is reduced because GOSSD subsidizes the connection costs for lower income families. As illustrated in Table VI-1 for the 1973-1977 period, these service charges have averaged only fifteen percent of total O&M costs and eight percent of total annual expenditures.

6.05 The balance of the funding requirements for 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 funds remaining are used to reduce the allotment for the first quarter of the succeeding year.

OPERATING COSTS

6.06 During the 1973-1978 period GOSSD-Alexandria operating costs have increased 112%, an average of 16% annually. Those categories experiencing dramatic growth over this period include: (1) salaries, allowances and employee benefits of 124%, an average of 17% annually; and (2) utilities of 150%, an average of 33% annually. GOSSD has no control over these costs as they are regularly increased by the GOE. Spare parts and materials costs have increased 85% during this period - 17% on an average annual basis - primarily due to operational problems, the result of (1) deficiencies of structure and capacity; (2) abuse of the system from non-compliance with sewer use laws; (3) lack of detailed operational knowledge by the system operators; and (4) O&M costs as a percentage of total annual expenditures, have averaged 62% during the 1973-1977 period, however a precipitous drop to 24% occurred in 1978, reflecting increased capital budgeting allocations to GOSSD for the rehabilitation and modernization of this system.

CAPITAL COSTS

6.07 Budget amounts for capital improvement projects fluctuate according to the availability of funds and project priorities. During the 1973-1978 period this budget has fluctuated from a low of LE 419,000 in 1977 to a high of LE 4,134,785 in 1978. Budgets in 1973-1975 remained constant averaging LE 528,000 but in 1976 the budget increased approximately 89% to LE 1,029,652, this falling again to the LE 419,000 level in 1977. The capital expenditures percentage of total annual expenditures fell from 46% in 1978 to only

28% in 1977. In 1978 the capital budget was reflective of the shift in GOE development priorities and was 76% of total expenditures.

C. Projected Financial Statements

6.08 On the assumption that Master Plan elements for the East, West and Central Zones of Alexandria are implemented, projected financial statements have been prepared yearly for 1979-1988. These financial statements have been developed in full detail and are presented in Appendix M, Volume III of the Alexandria Wastewater Master Plan Study. Pertinent material to support the project paper have been excerpted and are shown as follows. Table VI-2 shows the projected income statements. Table VI-3 presents the projected cash flow statement. Table VI-4 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

6.09 Currently there is an upward trend in the escalation of costs in Egypt. The Consumer Price Index increase of 13.5 percent from mid-1975 to mid-1976 was the highest recorded in recent years; components of this index are goods whose prices are controlled through Government. Although a comparable index is not available to monitor escalation of construction costs, which are more reflective of the free market situation, available information indicates that these costs have experienced much higher increases.

6.10 The present trend in Government policy indicates a shift toward more private control of industry. An effort to make local pricing more reflective of actual costs of production through a reduction in Government subsidy is also anticipated. During the early years of this transition a high level of inflation is expected followed by a tapering off to a moderate level as prices are stabilized. Escalation of the cost of foreign goods is expected to maintain its current moderate level of seven percent a year. Based on these assumptions the following rates have been utilized in the financial projections. (See Table VI-5.)

TABLE VI-2
PROJECTED INCOME STATEMENT
(LE thousand)

<u>REVENUES</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1994</u>	<u>2000</u>
Service Charges (a) NC	—	—	3,625	5,447	6,530	7,536	8,293	8,924	9,769	10,717	17,438	26,716
Less Provision for Uncollectables (b) NC	—	—	173	259	311	359	395	425	465	510	830	1,272
1 TOTAL NC	—	—	3,452	5,188	6,227	7,177	7,898	8,499	9,304	10,207	16,608	25,444
2 Operating Costs (c)	3,866	4,607	3,059	4,715	5,679	7,753	9,599	10,139	10,875	11,698	17,561	25,654
3 Income before Depreciation 1-2	(3,866)	(4,607)	393	473	548	(576)	(1,701)	(1,640)	(1,571)	(1,491)	(953)	(210)
4 Depreciation (d) (VI-4 2 N-O +)	3,359	3,618	3,917	4,495	5,648	7,911	8,653	9,093	12,716	13,204	21,045	23,853
5 Net Income 3-4	(7,225)	(8,225)	(3,524)	(4,022)	(5,100)	(8,487)	(10,354)	(10,733)	(14,287)	(14,695)	(21,990)	(24,063)

(a) Service charge was designed to recover annual operating costs, plus a reserve to provide working capital equal to one month of operating costs in the following year, plus a provision for uncollectable revenues. Service charge is assumed to be instituted in 1981.

(b) Estimated to be 5 percent of Total Revenues.

(c) Estimated operation and maintenance costs for wastewater facilities in the Eastern, Western and Central districts.

(d) Based in Table M-21, Schedule of Depreciation Expenses. (Master Plan)

TABLE VI-3

PROJECTED CASH FLOW STATEMENT
(In thousands - escalated)

<u>SOURCES OF FUNDS</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1994</u>	<u>2000</u>
Net Income ^(a) (VI-2)	(7,225)	(3,225)	(3,521)	(9,022)	(5,100)	(8,487)	(10,354)	(10,733)	(14,287)	(14,695)	(21,998)	(24,063)
Depreciation ^(b) (VI-2)	3,359	3,618	3,917	4,495	5,648	7,911	8,653	9,093	12,716	13,204	21,045	23,853
Increase in Current Liabilities ^(c)	1,767	1,197	4,910	1,408	1,675	149	6,198	4,892	—	2,178	—	—
Decrease in Current Assets (Excluding Cash) ^(d)	—	—	—	—	—	—	—	—	—	—	—	—
Capital Contributions from Customers ^(e)	214	277	473	1,392	523	3,399	3,980	4,376	4,730	5,061	4,096	6,038
Capital Contributions from Government ^(f)	18,803	28,342	48,222	48,002	55,206	75,649	88,352	88,907	74,516	57,884	22,531	32,430
1 TOTAL = 2 + 3	16,918	25,209	54,001	51,275	57,952	78,621	96,829	96,535	77,675	63,632	25,674	38,258
<u>USES OF FUNDS</u>												
Investment in Utility Plant ^(g)	16,216	22,659	53,532	50,201	55,958	76,374	96,263	98,478	71,856	67,642	25,616	38,258
Decrease in Current Liabilities ^(h)	—	—	—	—	—	—	—	—	5,669	—	—	—
Increase in Current Assets (Excluding Cash) ⁽ⁱ⁾	35	106	612	514	310	533	244	215	332	239	—	—
2 TOTAL	16,321	22,765	54,144	50,715	56,268	76,907	96,507	98,693	77,857	67,881	25,616	38,258
3 NET OF SOURCES LESS USES	597	2,444	(140)	560	1,684	1,714	322	(2,158)	(182)	(4,249)	58	0
4 CASH AT BEGINNING OF PERIOD^(j)	1,675	2,272	4,716	4,576	5,136	6,820	8,534	8,856	6,698	6,516	3,402	5,130
CASH AT END OF PERIOD^(k)	2,272	4,716	4,576	5,163	6,820	8,534	8,856	6,698	6,516	2,267	3,460	5,130

(a) Taken from Income Statements

(b) Taken from Schedule of Depreciation Expenses

(c)(d) Changes as shown in Projected Balance Sheets

(e) Includes contributions from sewer connection charges and benefit charges to beneficiary developers. One-third of each year's connection charge billings is assumed to be collected in the following year; five percent of all connection charges are assumed to be uncollectable.

(f) Includes government funding required to supplement customer contributions to ensure a sound financial posture throughout the period of study and maintain a sufficient level of working capital for sound financial management.

(g) Estimated capital expenditures for East, West and Central Systems are shown in Table 9-11. (Master Plan)

(h)(i) Taken from Projected Balance Sheets.

(j)(k) Based on cash required to finance one month of operating costs. Income Statement plus one month of the capital expenditures.

TABLE VI-4

PROJECTED BALANCE SHEET
(In thousands - escalated)

ASSETS	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	2000
<u>Fixed Assets</u>												
1 Utility Plant in Service ^(a) + 2206	141,551	154,986	169,506	191,556	227,525	320,217	440,741	570,265	729,579	925,021	1,156,190	1,632,779
2 Less Accumulated Depreciation ^(b) 2206/1x212	76,499	79,917	81,702	88,214	93,794	101,665	109,913	118,207	129,198	140,749	150,974	188,428
3 Net Fixed Assets in Service 1-2	67,054	75,069	87,804	103,342	133,731	226,552	330,800	452,058	600,381	784,272	1,005,216	1,444,351
4 Work in Progress ^(c) 1K	16,130	27,164	66,124	94,212	114,133	89,775	165,471	242,391	104,078	227,030	20,916	11,144
5 <u>TOTAL 314</u>	83,182	102,233	153,928	197,554	247,864	316,327	496,271	694,450	704,459	911,302	1,026,132	1,455,495
<u>Current Assets 1K</u>												
Cash ^(d)	2,272	4,716	4,576	5,136	6,830	8,534	8,856	6,698	6,516	2,267	1,460	5,130
Accounts Receivable - Service Charges ^(e)	---	---	102	454	545	628	691	744	814	891	1,451	2,226
Less Uncollectable Service Charges ^(f)	---	---	173	259	311	359	395	425	465	510	630	1,272
Accounts Receivable - Capital Contributions ^(g)	77	100	129	156	181	407	454	500	541	570	500	711
Less Uncollectable Capital Contributions ^(h)	12	15	19	23	28	61	68	75	81	87	75	107
Inventories ⁽ⁱ⁾	286	366	470	715	850	995	1,085	1,165	1,340	1,412	2,124	3,526
6 <u>TOTAL 1K</u>	2,647	5,197	5,669	6,741	8,737	10,984	11,550	9,667	9,757	5,747	4,642	12,974
7 <u>Total Assets 516</u>	85,829	107,430	159,597	204,297	256,601	327,311	415,829	503,966	565,027	617,049	634,674	688,069
<u>LIABILITIES</u>												
<u>Equity</u>												
Capital Contributions ^(j)	97,005	125,624	174,325	221,719	279,448	358,496	451,170	545,140	626,165	698,705	808,766	(975,179)
Retained Earnings (Losses) (year-1) + (year VI-2-5)	(11,487)	(21,712)	(25,236)	(29,250)	(34,158)	(42,045)	(53,199)	(61,932)	(70,219)	(92,914)	(105,796)	(104,594)
8 <u>TOTAL</u>	85,518	103,912	149,089	192,469	245,290	316,451	397,971	483,208	555,946	605,791	702,970	(670,585)
<u>Current Liabilities 1K</u>												
Accounts Payable ^(k)	1,351	1,888	4,461	4,183	4,661	6,271	7,930	6,207	5,988	5,647	10,455	15,615
Deposits ^(m)	968	1,630	3,967	5,653	6,848	5,307	9,928	14,541	11,091	13,622	1,249	1,869
9 <u>TOTAL 1K</u>	2,319	3,518	8,428	9,836	11,511	11,660	17,858	22,750	17,081	19,269	11,704	17,484
10 <u>Total Liabilities</u>	85,819	107,430	157,517	204,297	256,601	327,311	415,829	503,966	6,565,027	617,049	634,674	688,069

NOTES TO ACCOMPANY TABLE VI-4

RECOMMENDED MASTER PLAN PROJECTED BALANCE SHEET

- a. Utility Plant In Service is the sum of Depreciable Values plus Land appearing on Table M-20 Schedule of Capital Assets.*
- b. Accumulated Depreciation is taken from Table M-21 of Depreciation Expenses.*
- c. Work In Progress is taken from Table M-20 Schedule of Capital Assets.*
- d. Cash balance on December 31 is taken from Table M-18 Cash Flow Statement.* This end of year balance is sufficient to finance one month of operating costs (Table M-17 Projected Income Statement) plus one month of capital expenditures.*
- e. Accounts receivable are estimated to equal one month of service charge billings for each year as shown in Table M-17 Projected Income Statement.*
- f. Taken from Table M-17 Projected Income Statement.*
- g. Accounts receivable are estimated to equal one-third of the sewer connection charges in each year.
- h. Estimated to be 5 percent of connection charge billings.
- i. Inventory for 1978 based on end of year balance from 1976 GOSSD-Alexandria financial records; inventories in succeeding years assumed to increase with increased expenditures for materials and supplies operating costs.
- j. Capital Contributions are the cumulative sum of the annual Capital Contributions of Customers and Government as shown on Table M-18 Cash Flow Statement.*

*Refers to Tables in Appendix M, Volume III, Alexandria Wastewater Master Plan Study

- k. Retained Earnings (Losses) are the cumulative earnings or losses appearing on Table M-17, (Appendix M, Alexandria Wastewater Master Plan Study, Volume III) Project Income Statement as Net Operating Income. Under the proposed revenue program Operating Income after depreciation will result in operating losses during the entire period 1978-2000 which will require an operating subsidy from government.
- l. Accounts payable are equal to one month of capital costs.
- m. Deposits include contractor deposits of 5 percent and contractor insurance of 1 percent based on the amount of work in process for each year.

TABLE VI-5
FORECASTED RATES OF COST ESCALATION
ANNUAL RATE (PERCENT)

<u>Year</u>	<u>Local Operating And Construction Costs</u>	<u>Imported Equipment Materials and Construction</u>
1977	20	7
1978	20	7
1979	20	7
1980	15	7
1981	10	7
1982	8	7
1983	7	7
1984-2000	6	7

OPERATING COSTS

6.11 Historical operating costs were related to the various functions and operating costs, the resulting unit costs were applied to the recommended programs for improvement and extension of wastewater services in Alexandria. The relevant parameters for these unit cost projections are presented in Table VI-6.

TABLE VI-6
PROJECT UNIT OPERATING COST PARAMETERS

	<u>Existing</u>	<u>1980</u>	<u>1982</u>	<u>1985</u>	<u>1990</u>	<u>2000</u>
Administrative and Eng. Staff	172	222	231	244	265	308
Length of Sewers (km) in use	1500	1620	1780	1960	2242	3129
Number of Pumping Stations	34	35	45	46	48	48
Number of Vehicles	148	264	281	298	326	414

While these parameters and unit costs, escalated in accordance with projected inflation rates, accomplished most of the forecasting effort, some refinements were required. Since there are no historical operating costs for primary treatment or waste stabilization ponds used in Alexandria, wastewater treatment costs for these facilities were based on equations relating operating costs to design flow and to the various level of treatment, based on operating cost experience at other facilities (Water and Sewerage Works, November 1976, pp. 96-99). The operating costs at the East Treatment Plant for secondary treatment were used to normalize these cost relationships to local conditions.

6.12 Additional refinements to the unit cost approach to project operating costs included calculation of power requirements and electricity costs and estimation of staffing and equipment requirements for the solid waste collection program and industrial waste monitoring programs.

6.13 A preliminary staffing plan was developed for improved organization and management and to the requirements of expanded and improved wastewater operations.

ESTIMATED CAPITAL EXPENDITURES

6.14 Estimates include additions to and expansion of the system and other required capital items such as vehicles and sewer cleaning equipment. With the exception of house connections all construction items include provision for the cost of engineering (design and construction supervision) at an average of 10 percent of the base construction cost. Project costs also include provisions for contingencies (15 percent) and legal and administrative cost (5 percent); the assumption is that such costs incurred will be capitalized in the project cost. 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 or acquisition of each capital item. The projected vehicle acquisition and replacement program are those necessary for the expanded operation and maintenance program. Vehicles are expected to be in service no more than 10 years.

FIXED ASSETS AND DEPRECIATION

6.15 Assets now in service and all proposed additions have been included. Facilities which are under construction for more than one year are recorded as "Work in Process" during the construction period and then transferred to "depreciable values" on January 1, of the year in which they are placed in service. Depreciation for each year was determined by multiplying the balance of depreciable assets by the depreciation rate for each type of asset according to the rates in Table VI-7.

TABLE VI-7

ANNUAL DEPRECIATION RATE

<u>Asset</u>	<u>Annual Depreciation Rate</u>
Sewers	2%
Structures	2.5%
Equipment	5%
Vehicles	10%
Land	Not depreciated

REVENUE

6.16. Ideally, GOSSD should charge a service fee which would cover all capital and operating costs. It is doubtful, however, that customers have the ability to pay at that level. We therefore have assumed that charges would commence in 1981 and cover only operating and working capital costs - a partial recovery of costs. For new sewer connections, it has been assumed that the present cost will continue to escalate, at the levels previously stated; but because most new connections will be in poorer areas, only one out of every four connections will be billed. For new developments it has been assumed that the developers will be charged one-third the cost of constructing collection sewers in their developments.

D. Financial Plan

6.17 The detailed capital cost of this project is provided in Section V - Alternative and Technical Analysis, Table V-1. These costs will be funded as described in Table VI-8.

TABLE VI-8

FINANCIAL PLAN (in thousands)

<u>Capital Costs</u>	<u>\$</u>	<u>LE</u>
a. East Zone Treatment Plant & Sea Outfall	61,200	24,610
b. Smouha Collection & Conveyance	8,700	26,500
c. Siouf Keblia/Abou Soliman Collection and Conveyance	11,600	43,900
d. East Zone Pump Stations' Rehab & Additions	8,900	8,500
e. Central Zone Treatment Plant and Sea Outfall	42,400	18,300
f. West Zone Conveyance & West Treatment Plant Upgrading	29,200	44,870
g. Nouzha Sewerage and East Zone Treatment	<u>5,000</u>	<u>18,100</u>
GRAND TOTAL	167,000	184,780
 <u>Sources:</u>		
AID Grant	167,000	---
GOSSD Budget	<u>---</u>	<u>184,780</u>
GRAND TOTAL	\$167,000	LE 184,780

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. 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, other than direct GOE budget allocations, to meet O&M capital, and debt servicing costs, is service charges for new sewer connections. These charges recover only a minute portion of total annual expenditures by GOSSD. The GOE has recognized the major problems associated with not allowing GOSSD to charge for its services, as:

- a. A strain on GOE budgetary resources because of having to almost totally subsidize the service; and
- b. GOSSD is a public utility which is difficult to operate as a financially viable organization.

6.20 The GOE is also cognizant that a large majority of the population is unable to pay service charges or tariffs which would allow GOSSD to both: (1) finance total annual expenditures and (2) allow it to realize a reasonable return on its investment in capital facilities 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, to be completed in September 1979, will make recommendations for GOE implementation of sewerage tariff charges which take into account the base capital expenditure program needed to rehabilitate, modernize and expand the sewerage systems to meet present and future needs and concurrently recognize the limited ability of the general population to bear the full cost of this effort.

6.22 Given the extent of capital expenditures required to meet present and future system needs, if GOSSD or its successor organization must debt finance these enormous costs, it will undertake a tremendous financial burden, assuming it is to be a self-sustaining institution. Given the current and projected income levels in Egypt, the general population would not be able to pay the tariffs required to fully recover O&M and debt servicing costs. This means that GOE subsidization would have to continue for several years in the future.

To service its debt, GOSSD or the successor organization would have to accept annual contributions from the GOE. These funds would then be returned to the treasury as repayment of the reloan to the GOE - at best a fruitless exercise, not contributing to making the sewerage utility a financially viable organization.

6.23 A transition period is needed whereby, (1) annual O&M costs can be recovered and a reserve established for uncollectable revenues and working capital needs; and (2) tariffs to fully recover all annual expenditures can be gradually brought in-line with the ability to pay. The major assumption here is that with all major capital expenditures contributed to the wastewater utility's asset base on a grant basis, total annual expenditures which include O&M and other capital and debt servicing costs will be at a level which can be fully recovered by a tariff which is payable by the general populace.

6.24 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 Nos. 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 the wastewater utility, no matter what management form GOSSD may ultimately take, and the users.

6.25 Tariffs to recover annual O&M costs, plus reserves are assumed to be instituted in 1981 in the projection of financial statements. A covenant has been included whereby GOSSD will take all necessary action to implement a sewer service tariff schedule producing sufficient revenue to fully recover these O&M costs.

VII. ECONOMIC ANALYSIS

A. General

7.01 The economic analysis of development projects is concerned with social profitability of the projects. In order to measure benefits and costs to the society, it is necessary to evaluate all inputs to and outputs of the projects from an overall economic point of view. Outputs of some projects, however, are difficult to measure in financial terms and usual cost/benefit analysis has little meaning in such projects. Sewerage improvements projects are cases in point. Primary benefits include medical and hospitalization cost savings attributable to reduced water related infection and improved hygiene as a result of improved sewage disposal. In case of the Alexandria sewerage improvement project, further justification can be developed based on the fact that tourism is one of Egypt's major sources of foreign exchange revenue, and Alexandria is Egypt's summer resort. The current situation involving sewage ponded in certain streets, if allowed to worsen, will have a severe effect on city's ability to serve as a tourist focal point. It would be difficult to quantify the loss of local revenues caused by Alexandria being undersirable for tourism ,but, the loss would be significant. Alexandria needs a good utilities infrastructure in order to maintain and, certainly to expand, its ability to host tourist. A sound sewerage system along with a sound water system are the two basic components. Efforts are now underway by the World Bank (IBRD) to improve and expand the water system. Similar efforts with the sewerage system are also needed to avoid a steadily worsening situation which will occur as a result of added water supply and increasing population.

B. Economic Analysis of the Least Cost Alternatives

7.02 Cost comparisons among alternatives have been made using shadow prices and discount technique. Three different schemes considered for future disposal are: A) discharge to the sea, B) reuse by irrigation of cropland, and C) conveyance to the desert for evaporation. An alternative D), treatment with disposal to the Lake Maryut, was considered but not accepted as a viable alternative on account of the implied long term deterioration of the lake which will result in complete eutrophication of the fresh water system, ending its value as an important beneficial resource. For more detailed description, see Volume II, Master Plan Studies.

7.03 In the economic analysis of the above three alternatives, the following estimates of shadow prices are used:

1. Capital - Given Egypt's current capital shortage, projects with lower initial cost are relatively more desirable. The current rate of interest in Egypt for government backed loans is about 8.5 percent. Therefore, use of a reasonable high discount rate appears to be advisable. The evaluation is based on a discount rate of 10 percent.
2. Foreign Currency - For purposes of economic evaluation, the "parallel" exchange rate, which is currently 70 piasters to the US dollar has been used. A sensitivity analysis assuming a 10 percent lower value (77 pt = US \$1) has also been performed.
3. Construction Labor - Current wages paid in Alexandria for unskilled labor reflect a competitive labor market. This and a shortage of skilled construction workers, which also creates competitive market situations, suggest that no adjustment to labor costs is required in economic evaluation.
4. Materials and Supplies - As with other project input costs, noncompetitive market price distortions should be eliminated when assigning values to construction materials and supplies (electricity, fuels, etc.). Currently, prices of many basic construction materials such as steel, cement, and lumber are government regulated. The controlled prices are below actual cost of production. In order to arrive at a value more reflective of the actual cost to Egypt, world market prices (CIF) of imported construction materials have been used. In-country transport costs have then been added to the CIF price to arrive at a total cost of materials. This procedure was followed for all items. Domestic prices of materials have been used for non-price controlled items, e.g. sand and gravel, and for those which represent a small share of total construction costs. As power is also regulated, electricity costs are not reflective of true costs for production. A cost of 2.5 pt/hWh has been estimated as the production cost and used in the economic analysis.

7.04 Table VII-1 shows that, based on the least cost economic analysis, the sea outfall alternative (scheme A) is about 18 - 32% less expensive than the other alternatives in terms of the present value of future costs.

TABLE VII-1
COMPARATIVE COSTS

<u>ITEM</u>	<u>SCHEME A (SEA)</u>	<u>SCHEME B (REUSE)</u>	<u>SCHEME C (EVAPORATION)</u>
Total Capital Cost ¹ LE	310	380	410
Annual Operation & Maintenance Cost LE Million	4	7	6
Cropland Benefit ²⁾ LE Million	0	15	0
Relative Present Worth Cost ³⁾	1.00	1.18	1.32

1) Mid-1977, Value of Capital costs excluding costs for common facilities to all schemes such as for property connections and street sewers.

2) Present value of estimated total potential benefit derived from reuse on cropland.

3) Present value of capital and operation and maintenance (net of economic benefit for reuse) discounted at an annual rate of 10 percent over a 38 year period (1977-2015).

4) For more detailed data information, see Chapter 7, Volume II of the Master Plan Studies.

7.05 In addition, functional assessments of the alternative projects (see Table VII-2) show that for the major developed portion of Alexandria, sea disposal, incorporating a primary level of treatment and outfalls extending to 10 km offshore, is the most viable alternative. In terms of effectiveness, reliability, flexibility, ease of implementation, minimal environmental impact, and operational simplicity, the sea outfall scheme is rated either good or acceptable in performance, whereas the other alternatives have poor ratings on some of the performance criteria. This economic analysis clearly indicates cost effectiveness of the sea outfall plan over the other feasible alternatives.

TABLE VII-2

FUNCTIONAL ASSESSMENT COMPARATIVE EVALUATION

<u>Factor</u>	<u>SCHEME A (Sea)</u>	<u>SCHEME B (Reuse)</u>	<u>SCHEME C (Evaporation)</u>
Effectiveness	Good	Good	Good
Reliability	Good	Poor	Good
Flexibility	Good	Poor	Acceptable
Ease of Implementation	Acceptable	Poor	Poor
Minimal Environmental Impact	Good	Acceptable	Acceptable
Operational Simplicity	Acceptable	Poor	Good

C. Cost/Benefit Analysis

7.06 Although rigorous cost/benefit analysis is not possible, a general description of costs and benefits of the project to the year 2010 is presented in Appendix K of the Master Plan Studies. Economic benefits include increases in land values, benefits to the consumer and industry and gains from recreational and health facilities. Cost include capital as well as operational and maintenance costs. Using shadow prices of capital, foreign exchange, construction materials, and fuel and electricity as described above, and a discount rate of 10% present value of the economic benefits exceeds that of the costs by 9%¹.

7.07 Although this benefits/costs calculation is necessarily unprecise, it further reinforces the earlier conclusion that the sea outfall plan is the most economically viable alternative.

1) For more detailed description, see the Appendix K, Volume III of Master Plan Studies.

VIII. ENVIRONMENTAL ISSUES AND CONSIDERATIONS

8.01 Safe discharge of effluent to the sea via an outfall is dependent upon good dispersion and aquatic assimilation balanced against long and short-term environmental factors. Proper outfall planning and design requires comprehensive analysis of the seasonal interactions of the physical, chemical, and biological factors which characterize the local marine environment and the impact of the wastewater upon this environment.

8.02 The Alexandria Wastewater Master Plan Study included a Program of Marine Studies which examined the offshore environment of the Alexandria study area; Volume IV, Marine Studies, presents the results of an oceanographic investigation. The report provides pertinent field and laboratory data collected on a year-round seasonal sequence during the period July, 1978 through June, 1978. In addition, the Marine Studies also utilized available scientific publications and technical data directly pertaining to the study area and the Mediterranean environment. These studies were used to develop the conclusions arrived at in the Master Plan Study and served as basic background information to establish the feasibility of ocean disposal of wastewater through an outfall system in Alexandria. In turn, the studies allowed for the development of preliminary outfall designs and the recommendation of preliminary treatment as the preferred plan by the Consultant in the Alexandria Wastewater Master Plan.

A. Adverse Impacts Which Can Be Avoided

8.03 Implementation of the Consultant's recommended plan of providing only preliminary treatment prior to discharge of effluents to the sea through long outfalls would create some impacts which cannot be avoided. While the impacts associated with the construction and operation of almost any type wastewater treatment facilities cannot be avoided, although sound planning, good design and construction monitoring can greatly reduce these short-term problems. The most probable adverse impacts which cannot be avoided should the consultants recommended program of providing for only preliminary treatment be implemented, include:

1. Formation of sludge banks at the end of the sea outfalls.
2. Possible reduction of benthic species in the vicinity of the sludge banks.
3. Possible transport of bacteria in excess of acceptable limits from sea outfalls to bathing beaches along the coastline.
4. Possible discharge of toxic wastes reaching the wastewater collection system from industrial sources.

B. Mitigation Measures

8.04 Mitigation measures for adverse impacts associated with construction and operation of wastewater facilities can be reduced by sound planning, design, and construction monitoring procedures. The adverse impacts associated with effluent disposal are generally more severe and this section describes measures for their mitigation.

8.05 With only preliminary treatment of the wastewaters as recommended by the Master Plan Study, if oceanographic conditions should prove unfavorable, sludge deposits of varying thickness in the vicinity of the end of the outfall pipes are certain to cause problems. The sludge deposits will cause a change in the types of benthic species present resulting in some marine life abandoning direct use of the area.

These deposits and their effects on the aquatic environment could be avoided by employing primary sedimentation in the treatment process. While the Master Plan Study recommended the monitoring of preliminary treated discharges to identify early the adverse effects to evaluate the need to add future primary treatment facilities later, USAID believes it would be better from both a technical and economical point of view to build the primary facilities initially. The effects of sludge banks are difficult to reverse once formed plus the cost of building primary treatment units later will be 3 to 4 times more expensive.

8.06 One of the concerns raised with the preliminary treatment process was that bacterial pollution of the beaches may reach unacceptable levels should unfavorable meteorological and oceanographic conditions develop, i.e. continuous onshore winds and currents. The Master Plan Study indicates during these unfavorable periods, beach pollution can be mitigated

by employing disinfection (chlorination). However, chlorinating preliminary treated effluents is not only very expensive but questionable as to the effectiveness because of the large amount of organics that must be oxidized before disinfection can take place. When primary sedimentation is employed, approximately 65 percent of the settleable solids are removed along with roughly 50 percent of the bacteria. As the settleable solids are mostly organic in nature, chlorination of the primary treated effluents becomes not only less expensive because lower dosages are needed, but more effective because chlorine residuals needed for disinfection can be more easily obtained.

8.07 While the initial cost of constructing primary facilities will increase capital investments by \$31.5 million, to build these same feasibilities even 10 years later will increase the cost to more than \$100 million. Rather than wait for future impact studies to verify a need to reduce solid discharges, primary treatment facilities installed now can forestall environmental concern and insure needed facilities are built. It is problematic if additional facilities needed to protect the environment can be built in the future given the high development needs of Egypt over the next two decades.

C. Irreversible and Irretrievable Commitments of Resources

8.08 Resource commitments which may be considered irreversible and irretrievable include the materials, manpower, and energy used in construction of the proposed facilities. The sites for pump stations and treatment plants are not likely to be used for other purposes, and project costs and continued operation and maintenance costs require irretrievable financial resources. Finally, the disposal of wastewater to the sea also represents a potential loss of nutrients otherwise available for agricultural reuse.

D. Short-Term Uses Vs Long-Term Productivity

8.09 The adverse impacts associated with construction and operation of the facilities of the proposed project are short-term ones, necessary to eliminate the long-term neglect of Alexandria's wastewater facilities. Perhaps the most significant ways in which the project plan enhances long-term productivity of the

natural environment is through the elimination of raw wastewater discharges to Lake Maryut, and the supply of nitrogen and phosphorus to the nutrient poor waters of the eastern Mediterranean.

8.10 The Master Plan eliminated lake disposal as an acceptable alternative because, while the short-term use of the lake as a means of waste disposal is economically competitive with ocean disposal, the long-term productivity of the lake ecosystem would be sharply reduced by such use.

E. Impacts of Construction and Operation

8.11 The environmental impacts normally associated with the construction of wastewater facilities can be expected with implementation of any of the alternatives considered in the Master Plan. These include increased traffic congestion, noise and dusts, the litter of construction debris, public safety hazards from open excavations, some relocation of housing and other disturbances of the local environment. These impacts are temporary, but require technical attention during the final design and construction stages.

8.12 Operation of facilities may create odor problems, excessive noise, dust, hydrogen sulfide generation which can corrode sewers, and similar normally encountered operational impacts. Operations problems requiring particular attention include wastewater flooding if pumping equipment fails, and the clogging of sewers by solids if no reasonable solid waste disposable alternative is offered to the people of Alexandria. As with construction impacts, these problems require special attention during the life of the project to minimize their impact.

F. Indirect (Secondary) Environmental Impacts

8.13 Secondary impacts are defined as (1) indirect or induced changes in population and economic growth and land use, and (2) other environmental effects resulting from these changes in land use, population and economic growth. While these may cause appropriate environmental concerns in the suburban or rural United States where wastewater facilities planning is a de facto surrogate for land planning, they do not represent significant issues in Alexandria where industrial development and employment opportunities are the growth-limiting factors. People from rural areas of Egypt will migrate to Alexandria,

whether or not wastewater facilities are improved, in search of jobs, education for their children, better health care, and a better life. The role of adequate wastewater facilities in these migrants' attraction of Alexandria is uncertain, but most likely would not affect immigrants moving to Alexandria.

G. Environmental Review

In accordance with the provisions of the "AID Environmental Procedures", the Agency prepared a Draft Environmental Impact Statement (DEIS) which included extensive marine investigations, the contents of which were reviewed by appropriate authorities in the Government of Egypt and then released to AID on April 9, 1979. The recommended Wastewater Master Plan was also reviewed by the scientific and technical community in Egypt. Following a plan of action agreed to by the Department of State and the President's Council on Environmental Quality, these studies were distributed for review and comment to selected federal agencies and members of the American environmental community. On June 22, 1979, a technical review meeting was held in Washington, D.C. with the study contractor, and representatives from four federal agencies and six environmental organizations. Representatives of the Egyptian and Alexandrian governments were also present.

8.15 As a result of the above activities, a variety of written comments and informal communications were received by AID. These communications assisted continued project review and expanded consultation on the part of AID personnel, resulting in significant changes in project design (see Chapter V, 5.31-5.34 for details). The written comments and formal responses are included in the Final Environmental Impact Statement (FEIS).

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 in Alexandria, for the current environment is an ideal setting for extensive outbreaks of disease similar to the cholera epidemic that infected the City in 1970. This section of the project paper presents relevant public health statistics for Alexandria, followed by eyewitness 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 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. Alexandria's average infant mortality rate from 1963 to 1972 is about one for every eight infants born (see Table IX-1).

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 Alexandria than in Cairo and 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 Alexandria.

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>Governorates</u>		
	<u>Cairo</u>	<u>Alexandria</u>	<u>Egypt</u>
Typhoid & Paratyphoid Cases	99	110	35
Infectious Hepatitis	50	118	61
Dysentery	0.5	9.2	0.9

9.04 Epidemiological studies performed by the High Institute of Public Health in Alexandria, Egypt, reveal a significantly higher incidence of health complaints among bathers relative to nonbathers at Alexandria's beaches, and exposure to the bacterial pollution from current onshore

*Sources: World Health Statistics Annual 1973-1976 World Health Organization, Vols. I and III. Compenium of Vital Statistics From 1930, Pub. 01-100; February 1973 Published by CAPMAS.

**Source: Ministry of Health, as reported in WHO/World Bank Water Supply & Sewerage Sector Study, June, 1977.

discharges presumably accounts for some of the difference (see Table IX-3).

9.05 Statistics of 1970 (see Table IX-4) show that the incidence of cholera in Alexandria was four times greater than the Cairo rate and six times greater than the national average. Alexandria health department statistics for 1974 show a clear association between inadequate wastewater management and the incidence of cholera. Gheit El Enab, Alexandria's dairy district, has a very high incidence rate of 958 per 100,000 which reflects the inadequate wastewater removal due to sewer blockage by cow manure. The cause and effect relationship between inadequate wastewater treatment facilities and these public health problems cannot be rigorously shown on the basis of such data, but water-borne human wastes are clearly implicated in the transmission of these diseases.

TABLE IX-4
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 (1971-71)
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 Special Report No. 4, of the Alexandria Wastewater Facilities Development Program, to quote:

- "Sewage overflowing manholes in a residential-industrial area due to overloaded conditions. The sewage flowed across the street and directly into the Montazah Canal which not only serves as the raw water supply for the Maamoura Water Treatment Plant".
- "Sewage overflowing manholes in another location, flowing along and across the street, with heavy traffic splashing through and pedestrians who wished to pass having to walk through because there was no other way to get from one side to the other".
- "Sewage overflowing from septic tanks, flooding the area between adjacent houses and flowing into the door on one of the apartments. This area has no sewer system".
- "Great ponds of wastewater lie in the low lands surrounding housing areas in Siouf Kebliia and Ras El Soda. In the former area, inhabitants have constructed earthen walkways above the level of the water to gain access to their homes."
- "Septage, sludge, and water pumped out septic tanks have been observed to be dumped into the sea at several locations along the seashore. Discharge of septage has also been observed in the open ditches which drain agricultural lands".
- "Children have been observed swimming in the obvious plume of a combined sewage overflow in the Eastern Harbor".
- "People were observed to be swimming on the beach adjacent to the Sporting Pump Station at a time when the pumps were operating and the full flow was discharging to the sea less than 70 m away".
- "Open channels carrying very strong sanitary sewage exist beside and between closely built houses in the Nouzha area. Children in this low income area play in these areas and certainly at some time they must come in direct contact with these waters. Flies abound in the area from garbage and sewage, and children can be seen with scores of flies around them".

C. Social Analysis

9.07 This project will be a giant stride towards the elimination of wastewater from the streets in open ditches and on the swimming beaches of Alexandria. If the current sewage problems are not corrected, the problems with health conditions will reach catastrophic proportions within a short period of time.

As pointed out above, the potential for additional outbreaks of serious disease epidemic is ever present in Alexandria and conditions are worsening daily.

9.08 This project can improve and certainly reverse worsening of these conditions by greatly reducing disease vectors (wastewater) from the streets. Just removing sewage from the streets and getting away from populated areas will greatly improve living 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. Even with this system in place, however, the prosperity of urban areas has declined relative to the rural areas.

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 surely on the verge of becoming affected.

9.13 There is no question that the long term effects of this project and the induced cultural changes will have significant impact. The changes in the standard of living may bring about substantial changes in community cohesion and life styles. The project will help improve Alexandria to fulfill its role as the resort capital of Egypt and one of the most important cities in the Arab World.

X. IMPLEMENTATION

A. Implementing Agencies

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. The GOSSD will establish a special project Team or Steering Committee, reporting to or under the chairmanship of the Chairman of GOSSD, having full authority to approve contracts, change orders, payments to contractors, etc., and to make final decision on all project-related matters. This Project Team shall be supported, as required, by the full organizational resources of GOSSD and the Ministry of Housing.

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 Governorate of Alexandria through the Office of the Governor, this office being responsible for the overall functioning of municipal government and public services and for the general welfare of the people of Alexandria. Prompt assistance of the Governorate will be needed to properly schedule project commodity movements and construction activities in a manner which will not constrain and Project progress and yet, will minimize disruption of city traffic and business. Also, role of the Governorate will be representation to the people of Alexandria of the benefits resulting from this project such benefits being placed in proper perspective with the temporary and minor inconveniences caused by project activities.

Another important responsibility of the Governorate will be the overall management of the area wide solid waste study to be financed by AID and Ministry of Housing, to assist GOSSD in the enforcement of the current "Sewer Use Law" and assist GOSSD and the Ministry of Housing to draft and request the Government of Egypt to upgrade current "Sewer Use Law" to conform with the suggested draft "Ordinance Regulating Sewer Construction, Sewer Use and Industrial Waste Discharge", as recommended in the Alexandria Wastewater Master Plan Study.

10.03 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 afforded timely clearance through the Port of Alexandria. Other Alexandria 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. General Organization for Industries (GOFI) will need to work along with GOSSD in expanding and implementing the Industrial Pollution Control segment of the AID funded Industrial Production Project to reduce industrial waste discharges in the Alexandria Area to acceptable limits. Prime responsibility for establishing such relationships will be GOSSD's; USAID will use its good offices to assist GOSSD as needed.

USAID Responsibility

10.04 Within USAID, primary responsibility for administration of this project is assigned to the Office of Infrastructure Development 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, assisted by an Egyptian engineer and Loan Officer.

B. Implementation Plan

Consulting Services

10.05 Because of the complexity, magnitude and schedule of this project, GOSSD and USAID have agreed that the services of a US engineering firm, joint venture or associations of such firms, in association with qualified Egyptian engineering firm, are needed to ensure proper and timely project implementation. This Consultant shall be responsible for preparation of a preliminary design report, schedule and cost estimates, an updated refinement of previous planning; final design and engineering; full procurement services, including contract document preparation, bid evaluation, contract administration and monitoring; supervision of construction; acceptance testing; and operation/maintenance training. It is presently contemplated that the services of one Consultant will cover all facilities and activities comprising this project.

10.06 On June 26, 1979, a notice was published in the Commerce Business Daily requesting expressions of interest and submission of prequalifying data from experienced US consulting firms relative to provision of engineering services for implementation of this project. The due date for such submission was July 26, 1979. It is contemplated that a cost-plus-fixed-fee type contract will be negotiated between GOSSD and the selected Consultant. The prequalification and selection process, as well as contract terms and conditions, shall be in accordance with the guidelines set forth in AID Handbook II, Country Contracting, Chapter 1, dollar cost of the Consultant's contract will be funded under the project grant; local currency costs for the US consultant's support and for services of associated Egyptian engineering firms will be for the account of GOSSD.

Project Construction

10.07 The facilities to be constructed under this project fall into two distinct categories: (1) collection, conveyance and treatment facilities and (2) ocean outfalls. The first category of facilities include those elements which comprise most sewage systems, are typical of those in operation throughout Egypt, and, for the most part, appear to be within the construction capabilities of most US and Egyptian general contractors of medium to large size. Ocean outfalls, however, are not common to all sewage systems, have not been generally utilized in Egypt, and require a degree of construction expertise found in a few large or very specialized firms.

10.08 For these reasons, therefore, it is anticipated that, while bidding for the construction of most project facilities will be open to prequalified US and Egyptian firms or associations of such firms, only US contractors - taking prime responsibility for the construction of the two ocean outfalls - will be able to prequalify for this category of work. It is presently contemplated that the ocean outfall construction contract will be a turnkey contract, with the contractor responsible for both the final design and construction. It is considered 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 subsequent to review of the US consultant's recommendations regarding this project element.

10.09 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, Chapter 2 and 3. When only Egyptian pounds are being used to fund such procurements, GOE and GOSSD contracting procedures will be utilized. All procurement will be under the supervision of the GOSSD.

C. Implementation Schedule

10.10 The final implementation schedule will be established by the preliminary design report to be prepared by the Consultant and submitted for approval of GOSSD approximately eight weeks after start of his work. Based on the general planning accomplished during the master planning and feasibility study phase; an approximate schedule of implementation is set forth in Figure X-1. Principal milestone dates of the schedule include:

<u>EVENT</u>	<u>ESTIMATED DATE</u>
Consultant's contract signed	February, 1980
Consultant starts work	March, 1980
Prelim. Design Report completed	May, 1980
First construction contract tendered	September, 1980
First construction contract awarded	December, 1980
Last construction contract tendered	December, 1981
Last construction contract awarded	March, 1982
First contracted facilities operational	December, 1983
Last contracted facilities operational	March, 1985
O & M Training completed	September, 1985

D. Terminal Dates

Letters of Commitment

10.12 The terminal date for requesting the opening of Letters of Commitment or amendments thereof will be September, 30, 1984, approximately six months prior to completion of construction.

Disbursement

10.13 The terminal date for disbursement will be December 31, 1985, three months after completion of operation/maintenance training services provided by the Consultant.

**FIGURE X-1
PROJECT IMPLEMENTATION SCHEDULE**

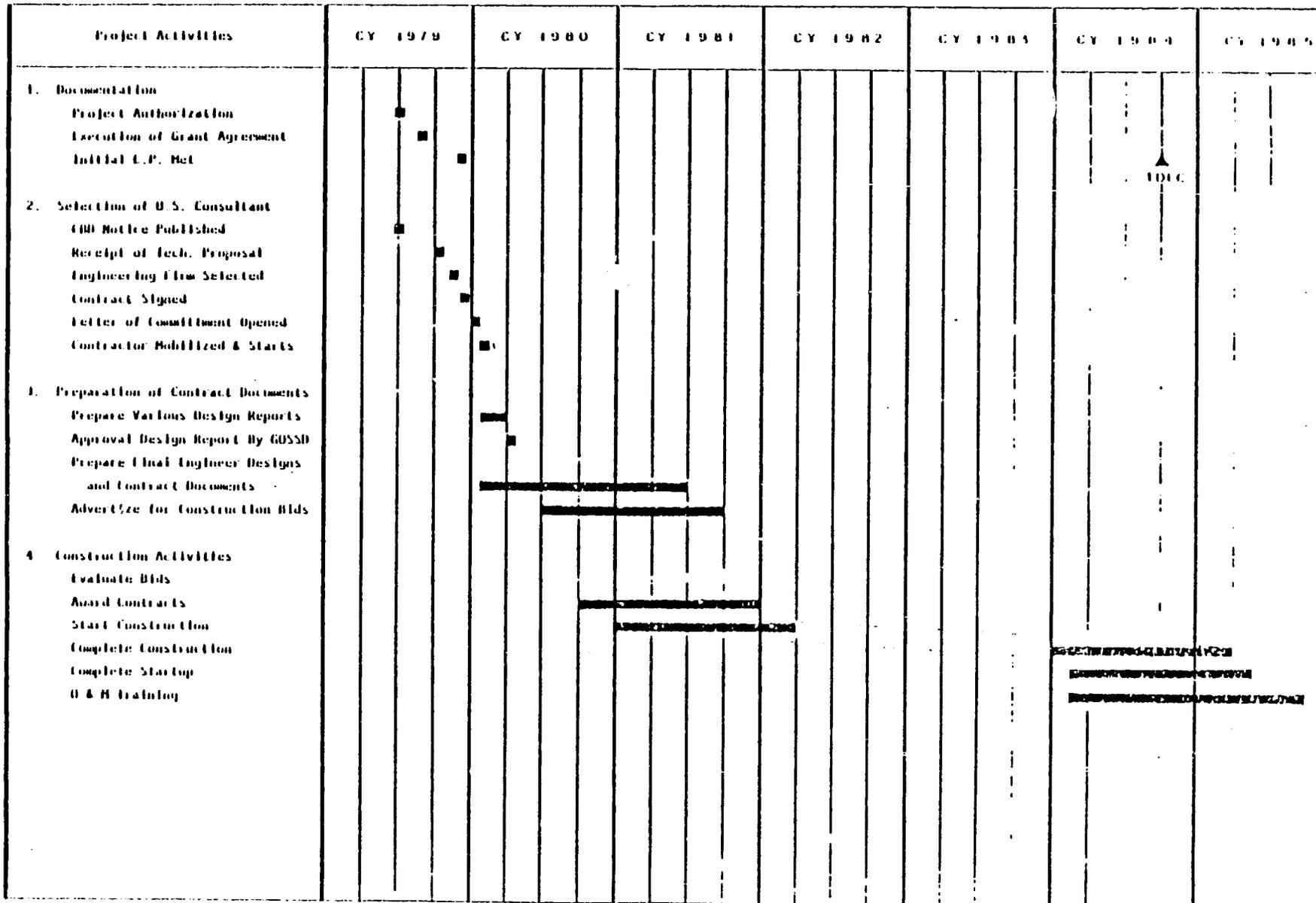


FIGURE X-1

E. Control and Monitoring

10.14 Upon signing of the Grant Agreement, USAID will issue Implementation Letter No. 1 to the GOE and GOSSD which, inter alia, will contain the necessary guidance details on the types of reports, i.e. progress, financial, shipping, etc., and reporting formats and schedules to be followed. The Consultant will be tasked, in his contract, to provide substantial assistance to GOSSD in preparing such reports.

10.15 As one of the initial tasks under the proposed scope of work, the Consultant will prepare, as part of the preliminary design report, a revised updated project implementation plan, schedule and cost estimate. This plan and schedule, upon approval by GOSSD, and USAID and subject to subsequent refinements, shall become the basis for project control and monitoring. GOSSD assisted by the Consultant, will be required to submit to USAID a monthly progress report covering all significant aspects of the project, measuring progress in terms of the approval implementation plan and schedule.

10.16 Throughout the life of the project, the Consultant will bring all routine problems, together with proposed solutioning, to the attention of GOSSD and USAID in the form of monthly progress reports. Problems requiring immediate action will be brought to the attention of the Project Advisory Committee, consisting of a representative of the Chairman of GOSSD, a member from USAID, and other members designated by the Chairman of GOSSD. This committee shall also review major project issues and activities and decide major actions to be taken. In addition, GOSSD shall establish a permanent project team authorized to make the day-to-day decisions required on project related matters.

10.17 The accuracy and comprehensiveness of the GOSSD/Consultant's reporting will be determined by the USAID project officers assigned through frequent and timely visits to the project site, meetings with GOSSD principals and site personnel, US Consultant staff, and others. Regular reviews, usually bi-monthly, of project progress and status will be conducted by USAID/Cairo's top management committee. Such reviews will be followed, when required, by substantive meetings on project matters with GOSSD principals and/or other officials.

F. Evaluation

10.18 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 March 1, 1982. A semi-final project evaluation will be conducted within one month after start-up of the major disposal facilities. A final evaluation will be performed approximately one year after start-up of all project facilities.

10.19 Whereas the annual and semi-final evaluations will focus on project implementation matters, i.e., progress against schedules, costs within budgets, etc., the final evaluation will concentrate on achievement of the project goal and purpose, i.e., end of project status improvement in public health conditions in Alexandria and on the institutional capability of GOSSD to properly operate and maintain the project facilities. With the assistance of the Consultant, USAID will submit to AID/W a proposed plan along with the costs and suggested program for collecting the needed base line data for evaluation within six months after start of the engineering services contract.

XI. RECOMMENDATION, CONDITIONS AND COVENANTS

A. Recommendation

11.01 Subject to the conditions and covenants listed below, we recommend that a grant of \$167 million be authorized to the Government of Egypt (GOE) for the Alexandria Sewerage Project described in the Project Paper. We further recommend that the grant be obligated over the next three fiscal years as follows:

FY 1979	up to	\$95 million
FY 1980/81		\$72 million

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

B. Conditions Precedent to Disbursement

(1) Initial Disbursement

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) An executed contract acceptable to A.I.D. for the engineering consulting services for the Project with a firm acceptable to A.I.D.;

(c) Evidence of the establishment of a Project Team and a Project Advisory Committee;

(d) Evidence that the proceeds of the Grant will be made available to GOSSD as a Grant contribution to assets; and

(e) Such other information and documents as A.I.D. may reasonably require.

(2) Additional Disbursement

Prior to any disbursement or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made for any purpose 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 to A.I.D.:

(a) Evidence that local currency financing for the Project has been budgeted by Grantee and will be available for expenditure 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 a cost estimate made by the consulting engineer and approved by GOSSD.

(b) Evidence that GOSSD has obtained all properties, easements, rights of way, etc., required for the construction and operation of project facilities.

C. Covenants

The Grantee shall be required to covenant as follows:

(1) The Grantee, GOSSD, and A.I.D. 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 either party, exchange views through their representatives with regard to the progress of the Project, the performance of GOSSD of its obligations under the Grant Agreement, the performance of the Consultants, 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 personnel/staffing levels, and train such staff as may be appropriate for the maintenance and operation of the Project.

(3) The Grantee, GOSSD, and A.I.D. 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 inhibit such attainment; (c) assessment of how such information may be used to help overcome such problems; and (d) evaluation, to the degree feasible, of the overall development impact of the Project.

(4) The Grantee and GOSSD shall take necessary actions to provide continuous and adequate monitoring of the aquatic systems in the vicinity of the sea outfalls and the beaches of Alexandria to detect any changes in such systems resulting from the Project.

(5) The Grantee and GOSSD shall take necessary actions to establish the organizational structure to insure that the existing "Sewer Use Law" applicable to this Project is enforced.

(6) The Grantee shall consider modifying the current "Sewer Use Law", applicable to this Project, in order to conform with the proposed draft "Ordinance Regulating Sewer Construction, Sewer Use and Industrial Waste Discharge", as recommended in the Alexandria Wastewater Master Plan Study.

(7) Consistent with the Grantee's obligations under Article 16 of the "Protocol for the Protection of the Mediterranean Sea Against Pollution From Land-Based Sources" as developed through the United Nations Environmental Programme, the Grantee shall cause to be exchanged with the contracting parties to such Protocol information concerning the environmental aspects of the Project as may be appropriate under the Protocol.

(8) The Grantee and GOSSD shall consult with GOFI and other responsible agencies to ensure coordination with regard to problems related to industrial wastes and the disposal of toxic materials and within one year of the signing of the Agreement submit a plan of action which would indicate how this problem is to be addressed.

(9) The Grantee and GOSSD shall undertake necessary studies to evaluate the problem of disposal of solid waste and within one year of the signing of the Agreement propose a plan to exclude from the public sewer system solid wastes such as mazaut, used oil, grease, manure, septage, slaughterhouse and tannery wastes and trash.

(10) 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.

(11) Upon completion of the Wastewater Management and Tarrif Study, the Grantee shall submit a specific tariff plan for the Alexandria water and sewer system.

Mr. Donald S. Brown
AID Director
U.S. Embassy
5, Latin America Street
Garden City, Cairo

Cairo 20 th. August, 1979

Dear Mr. Brown,

As you are aware, the Government of Egypt and USAID have been involved in improvements in the Alexandria Waste Water System. We are pleased with the success of the present effort but need to expand the program.

Studies undertaken by the consultant presently doing basic work on the system indicate a critical need for:

- 1 - two primary treatment plants with sea outfall;
- 2 - wastewater pump stations force mains and sewer collectors;
- 3 - extension of sewers into selected unsewered areas; and
- 4 - upgrading of selected facilities to be retained as part of the future system.

We are hereby requesting the Agency for International Development to provide \$ 167 million in grant assistance to help finance the costs of the design, construction, and start up for this expansion. The Government of Egypt will provide for major local cost financing.

Sincerely yours,


28/8
GAMAL EL-NAZER

Minister of State for Economic
Cooperation and External Finance

5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual fund 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; FAA Sec. 653(b); Sec. 634A.

<p>(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;</p> <p>(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure)?</p>	<p>(a) An "Advice of Program Change" will be transmitted to the Congress</p> <p>(b) The intended obligation is within the level of funds appropriated for Egypt in FY 1979.</p>
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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?

	<p>(a) Yes.</p> <p>(b) Yes.</p>
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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?

	<p>No further legislative action needed.</p>
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A.

4. FAA Sec. 611(b); FY 79 App. Act Sec. 101. 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? Yes.
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 Assistance 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. Project is not susceptible of execution as part of a regional or multilateral project.
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).

A.

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(g). 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. 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.

B. 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, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;
- (2) [104] for population planning under Sec. 104(c); if so, 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 non-formal 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;

(4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:

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

(ii) to help alleviate energy problems;

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

(iv) reconstruction after natural or manmade disaster;

(v) for special development problem, 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?

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. 131(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 and political 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?

B.

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, including reasonableness of repayment prospects.

b. FAA Sec. 520(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, 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 support promote economic or political stability? To the extent possible, does it reflect the policy directions of Section 102?

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

b. FAA Sec. 533. Will assistance under this chapter be used for military, or paramilitary activities?

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 goods 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 commodity procurement financed 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 agreement require that marine insurance be placed in the U.S. on commodities financed? 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. 608(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items? Consideration will be given to use of excess property when practical.

A.

6. FAA Sec. 603. (a) 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.

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

Technical Assistance services will be obtained on a contract basis with U.S. private enterprise firms.

8. 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?

A.

9. FY 79 App. Act Sec. 105. Does the contract for procurement contain a provision authorizing the termination of such contract for the convenience of the United States? Yes.

S. 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 collection, treatment and disposal system is not productive enterprise.

C. Other Restrictions

1. FAA Sec. 122(e). 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.

C.

3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-bloc countries, contrary to the best interests of the U.S.? The Agreement shall stipulate.
4. FAA Sec. 636(1). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S., or guaranty of such transaction? Yes.
5. Will arrangements preclude use of financing:
- a. FAA Sec. 104(f). To pay for performance of abortions or to motivate or coerce persons to practice abortions, to pay for performance of involuntary sterilization, 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 finance police training or other law enforcement assistance, except for narcotics programs? Yes.
- d. FAA Sec. 662. For CIA activities? Yes.
- e. FY 79 App. Act Sec. 104. To pay pensions, etc., for military personnel? Yes.

- f. FY 79 App. Act Sec. 106. Yes.
To pay U.N. assessments?
- g. FY 79 App. Act Sec. 107. Yes.
To carry out provisions of
FAA sections 209(d) and 251(h)?
(Transfer of FAA funds to multi-
lateral organizations for lend-
ing.)
- h. FY 79 App. Act. Sec. 112. Yes.
To finance the export of nuclear
equipment, fuel, or technology
or to train foreign nations in
nuclear fields?
- i. FY 79 App. Act Sec. 601. Yes.
To be used for publicity on
propaganda purposes within
U.S. not authorized by Congress?

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON

THE ADMINISTRATOR

PROJECT AUTHORIZATION
AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

Name of Country: Arab Republic
of Egypt Name of Project: Alexandria
Wastewater
System
Expansion

Number of Project: 263-0100

Pursuant to Part II, Chapter 4, Section 531 (Economic Support Fund) of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Grant to the Arab Republic of Egypt (the "Grantee") of not to exceed Ninety-five Million United States Dollars (\$95,000,000) to assist in financing the foreign exchange costs of goods and services required for the project as described in the following paragraph (the "Project").

The Project will provide for the design, construction, and start-up for the First Stage of Expansion of Facilities for the Alexandria Wastewater System consisting of (a) two primary treatment plants with sea outfalls; (b) wastewater pump stations, force mains and sewer collectors; (c) extension of sewers into selected unsewered areas; and (d) upgrading of selected existing facilities to be retained as part of the future system.

I approve the total level of A.I.D. appropriated funding planned for this Project of not to exceed One Hundred Sixty-seven Million United States Dollars (\$167,000,000) of which \$95,000,000 is authorized above, during the period

FY 1979 through FY 1981. I approve further increments during that period of Project funding of up to Seventy-two Million United States Dollars (\$72,000,000), subject to the availability of funds in accordance with A.I.D. allotment procedures.

I hereby authorize initiation of negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority subject to the following terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Goods and Services

Except as A.I.D. may otherwise agree in writing, goods and services financed by A.I.D. appropriated funding shall have their source and origin in the United States.

b. Conditions Precedent to Disbursement

(1) Initial Disbursement

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 title 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) An executed contract acceptable to A.I.D. for the engineering consulting services for the Project with a firm acceptable to A.I.D.;

(c) Evidence of the establishment of a Project Team and a Project Advisory Committee;

(d) Evidence that the proceeds of the Grant will be made available to GOSSD as a Grant contribution to assets; and

(e) Such other information and documents as A.I.D. may reasonably require.

(2) Additional Disbursement

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

(a) Evidence that local currency financing for the Project has been budgeted by the Grantee and will be available for expenditure 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 a cost estimate made by the Consulting Engineer and approved by GOSSD.

(b) Evidence that GOSSD has obtained all properties, easements, rights of way, etc., required for the construction and operation of project facilities.

c. Covenants

The Grantee shall be required to covenant as follows:

(1) The Grantee, GOSSD, and A.I.D. 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 either party, exchange views through their representatives with regard to the progress of the Project, the performance of GOSSD of its obligations under the Grant Agreement, the performance of the consultants, 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 personnel/staffing levels, and train such staff as may be appropriate for the maintenance and operation of the Project.

(3) The Grantee, GOSSD, and A.I.D. 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 toward attainment of the objectives of the Project; (b) identification and evaluation of problem areas or constraints which may inhibit such attainment; (c) assessment of how such information may be used to help overcome such problems; and (d) evaluation, to the degree feasible, of the overall development impact of the Project.

(4) The Grantee and GOSSD shall take necessary actions to provide continuous and adequate monitoring of the aquatic systems in the vicinity of the sea outfalls and the beaches of Alexandria to detect any changes in such systems resulting from the Project;

(5) 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.

(6) The Grantee shall consider modifying the current Sewer Use Law, applicable to this Project, in order to conform with the proposed draft "Ordinance Regulating Sewer Construction, Sewer Use and Industrial Waste Discharge," as recommended in the Wastewater Master Plan Study for Alexandria;

(7) Consistent with Grantee's obligations under Article 13 of "Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-based Sources" as developed through the United Nations Environmental Programme, the Grantee shall cause to be exchanged with the contracting parties to such Protocol information concerning the environmental aspects of the Project as may be appropriate under the Protocol.

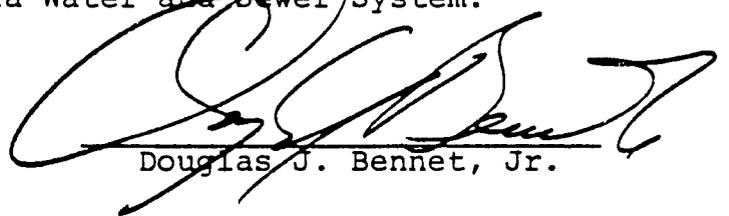
(8) The Grantee and GOSSD shall consult with GOFI and other responsible agencies to ensure coordination with regard to problems related to industrial wastes and the disposal of toxic materials and within one year of the signing of the Agreement submit a plan of action which would indicate how this problem is to be addressed.

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(9) The Grantee and GOSSD shall undertake the necessary studies to evaluate the problem of disposal of solid waste and within one year of the signing of the Agreement propose a plan to exclude from the public sewer system solid wastes such as mazout, used oil, grease, manure, septage, slaughterhouse and tannery wastes and trash.

(10) 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.

(11) Upon the completion of the Wastewater Management and Tariff Study, the Grantee shall submit a specific tariff plan for the Alexandria Water and Sewer System.



Douglas J. Bennet, Jr.

Aug 27, 79
Date



UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

CAIRO EGYPT

ANNEX D

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

I, Donald S. Brown, Director, the 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 Alexandria Wastewater Stage I Expansion Project.

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

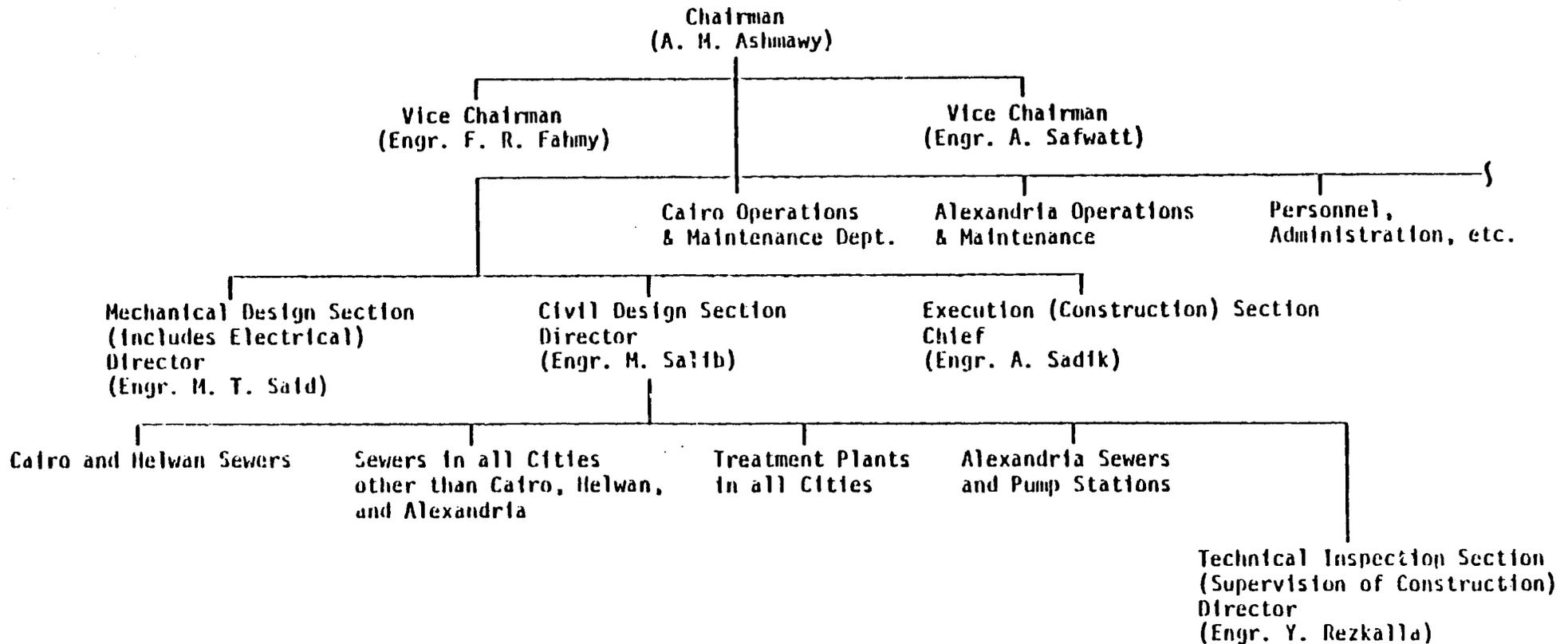
Donald S. Brown
Director

Date

GENERAL ORGANIZATION FOR SEWERAGE AND SANITARY DRAINAGE (GOSSD)

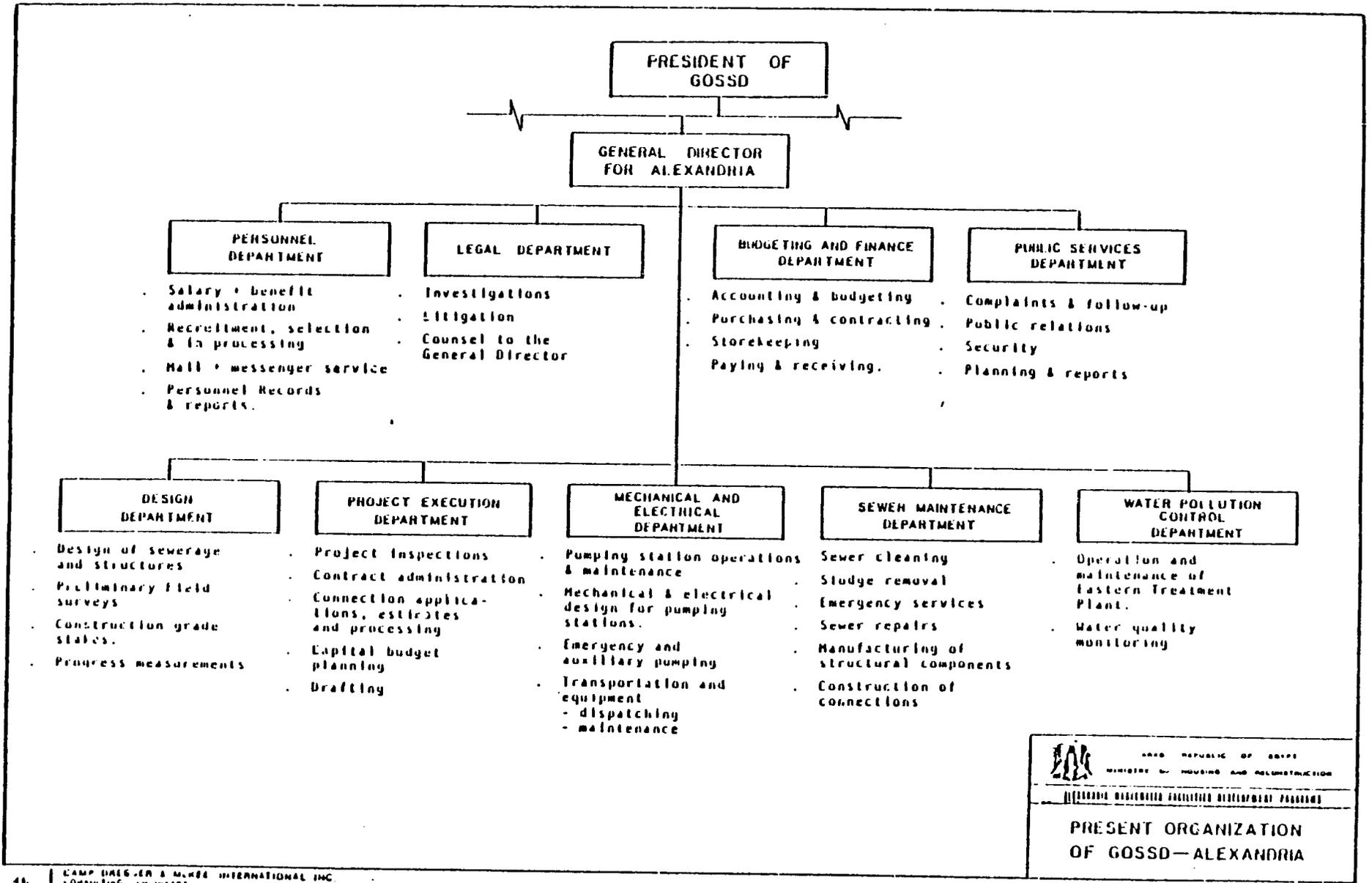
ORGANIZATION CHART

Address: Mogaama Bldg.
Midan El Tahrir
6th Floor
Cairo, A.R.E.



The GOSSD is in charge of planning, design and supervision of construction (most of which is done by private contractors) in all of Egypt, and for operations and maintenance of the sewerage systems for Alexandria and the Greater Cairo areas only.

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 ARAB REPUBLIC OF EGYPT
 MINISTRY OF HOUSING AND RECONSTRUCTION
 URBAN BARRIERS FACILITIES DEVELOPMENT PROGRAMS
PRESENT ORGANIZATION OF GOSSD—ALEXANDRIA


 CAMP DRESSER & MCKEE INTERNATIONAL INC.
 CONSULTING ENGINEERS
 CH2M HILL INTERNATIONAL INC.
 MAIN ENGINEERS
 ARAB TECHNICAL AND ECONOMIC CONSULTING OFFICE
 1988

ANNEX 2

103

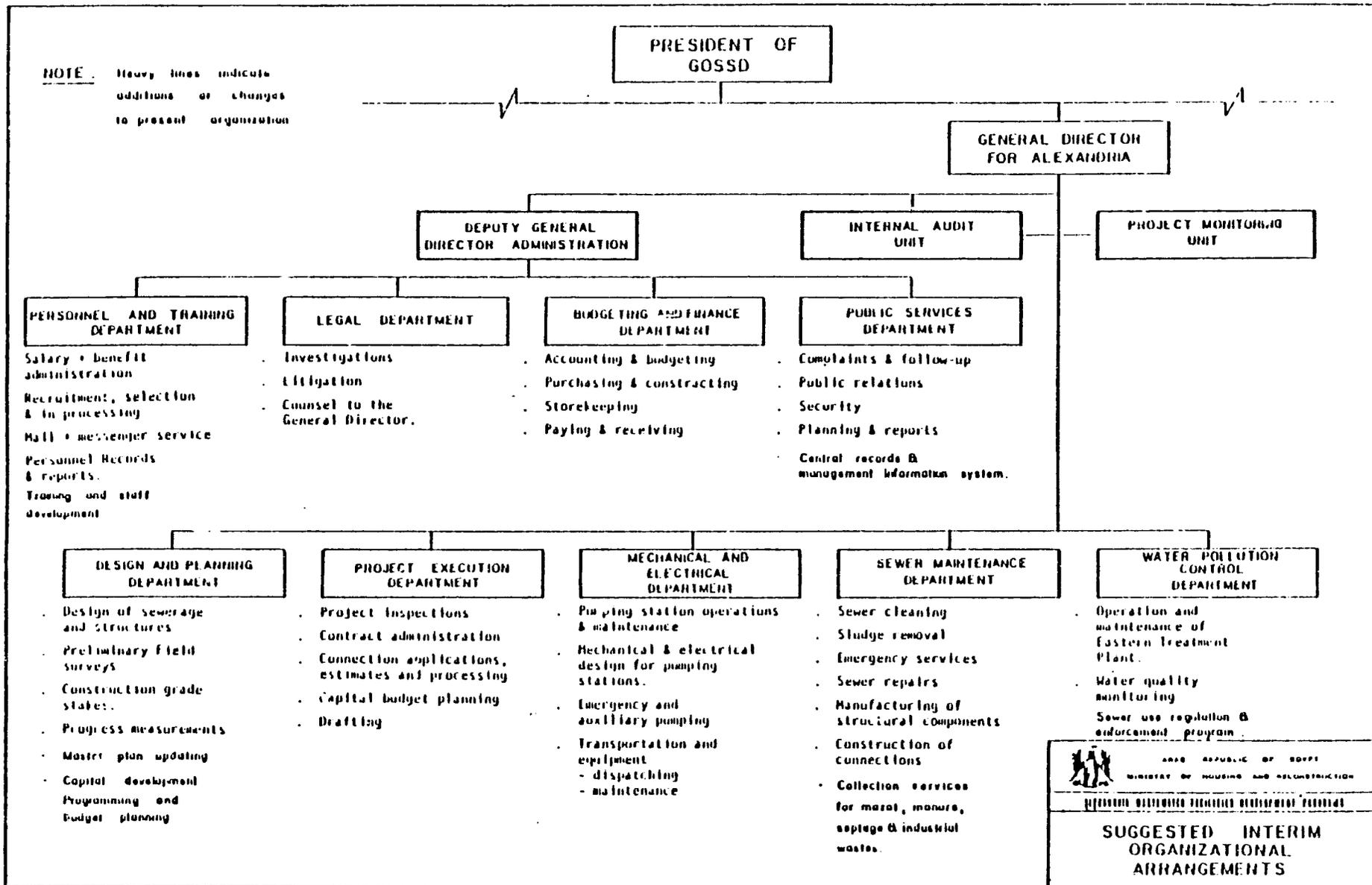
TENTATIVE OUTLINE OF TRAINING REQUIREMENTS

SUBJECT AREA	TRAINEES	APPROX. NO.	NUMBER OF WEEKS	SUGGESTED METHODOLOGY	LOCATION (OVERSEA, EGYPT, ON-THE-JOB)	PREQUALIFICATIONS
Safety practices in sewerage maintenance	Sewer cleaning personnel in districts	600	Continuing	Demonstrations in real situations; begin with foremen; use TPP cleaning project to provide examples; concentrate on visual communication with cartoon style booklets and posters.	On-the-Job	None
Standard operating procedures	Operating staff of all pumping and treatment facilities.	200	1-each facility	Supervisors - system overview and detailed manual review.	Classroom plus, on-the-job	Mechanical aptitude and literacy
			Continuing	Operators-review of posted procedures	On-the-job	
Surveying	New staff in Design Department	12	10	Introduction to basic techniques	Classroom and field	Secondary school
			4 hrs per wk. continuing	Gradual expansion of knowledge and ability geared to specific job needs	Classroom and on-the-job	
Drafting	Drafting section staff	5	2 hrs per day- 6 wks continuing	Introduction to basic techniques of engineering drawing	Enrollment in formal class if available or engage qualified instructor; on-the-job thereafter	Secondary or technical school
Design of wastewater collection and pumping facilities	Design department employees	5	continuing	Enroll in specific applicable design courses at University of Alexandria, one course at a time per employee with time off as required for class attendance; on-the-job training as counterparts to consultants	University of Alexandria and on-the-job	Basic engineering education

1004

SUBJECT AREA	TRAINEES	APPROX. NO.	NUMBER OF WEEKS	SUGGESTED METHODOLOGY	LOCATION (OVERSEAS, EGYPT, ON-THE-JOB)	PREQUALIFICATION
Wastewater quality analysis	Water Pollution Control Department Staff			Instruction furnished on consulting basis		
	1. Laboratory Manager	1	3	Quality control, record keeping, lab safety, industrial operations liaison, specifics of industrial wastewater analysis	Upgrading lab facilities at Eastern Treatment Plant (possible alternate training at Rond Point Lab.)	Graduate Chemist
	2. Laboratory Technicians	2	3	Lab techniques for wastewater analysis, quality control, record keeping, lab safety	"	Technical school, basic chemistry
	3. Field technicians	10	4	Sampling techniques, record keeping, job safety	On-the-job demonstrations at selected industrial locations	Technical school
All new management systems and procedures	(10	BE	DETERMINED)		On-the-job with specific training as required	(10 or DETERMINED)

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ANNEX H



CAMP DRESSER & MCKEE INTERNATIONAL INC.
CONSULTING ENGINEERS
CHARTERED MEMBER INTERNATIONAL INC.
ARAB TECHNICAL AND ECONOMICAL CONSULTING OFFICE
ALEX

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SCHEDULE OF DEPRECIATION EXPENSES
(LE thousand, Estimated)

		<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
Annual Depreciation Expense													
Sewers	Percent 2.0	2 324	2 544	2 833	3 202	3 411	5 430	6 076	6 998	6 973	10 891	11 537	24 039
Structures	2.5	126	125	126	130	547	547	547	638	1 161	1 161	1 246	3 297
Equipment	5.0	736	736	736	965	1 546	1 546	1 546	1 623	1 623	1 623	4 059	4 059
Vehicles	10.0	173	212	212	222	223	224	224	225	226	227	244	262
TOTAL		3 359	3 617	3 907	4 519	5 727	7 747	8 393	9 484	9 983	13 902	26 086	31 607
Book Value of Assets Retired													
Vehicles		191	200	52	63	68	40	43	44	45	48	85	77
Accumulated Depreciation (Net of Retirements)													
Sewers		64 551	67 056	69 920	73 130	76 541	81 971	88 347	95 045	102 018	112 909	214 406	344 078
Structures		2 120	2 260	2 372	2 502	3 049	3 596	4 143	4 781	5 942	7 103	26 581	46 063
Equipment		9 015	9 751	10 487	11 452	12 998	14 544	16 090	17 713	19 316	20 959	45 313	69 667
Vehicles		813	875	985	1 144	1 299	1 483	1 64	1 815	2 076	2 205	3 219	4 251
TOTAL		76 499	79 947	83 772	88 228	93 887	101 594	109 944	119 384	129 322	143 176	289 519	464 059
Net Capital Asset Values		81 192	108 183	165 061	215 990	272 472	379 078	506 701	634 553	744 450	860 918	909 231	1 026 150

PREDICTED OPERATION AND MAINTENANCE COSTS^(a)
(In thousands, Escalated)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1994</u>	<u>2000</u>
Salaries/Benefits	1 542	1 918	2 299	3 648	4 392	5 187	5 940	6 620	7 444	7 418	14 275	27 830
Fuel	40	53	69	108	133	152	167	185	202	216	353	552
Utilities	142	180	220	399	490	586	650	701	813	938	1 687	2 543
Materials & Repairs	135	173	222	338	404	480	541	601	714	774	1 334	2 099
Other Expenditures	94	116	150	222	260	304	342	386	432	490	822	1 320
Deferred Maintenance ^(b)	1 313	2 147	--	--	--	--	--	--	--	--	--	--
TOTAL	3 966	4 167	3 059	3 964	5 679	6 711	7 640	8 493	9 605	11 836	18 471	29 344

(a) Operation and maintenance costs are based on historical operating costs for WSSD Alexandria, recommended staffing levels presented in Chapter B, and expanded operation and maintenance activities anticipated in accordance with the recommended plan; all costs are escalated at assumed total inflation rates.

(b) Deferred maintenance includes those portions of the Top Priority Projects expenditures which are not categorized as capital in Table 9-2 such as contract sewer maintenance and sewer use law implementation.

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PROJECTED CAPITAL EXPENDITURES
(in thousand, Israelis)

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989-1994	1995-2000
<u>Major Construction Projects (a)</u>												
Building Connections	207	366	470	597	693	1 086	2 747	3 305	3 599	3 845	13 334	19 297
Street Sewers	401	780	2 078	9 358	13 819	29 252	32 421	35 547	38 326	40 957	181 137	271 950
Gravity Collectors	38	178	2 248	3 736	4 262	23 535	33 070	36 533	47 056	27 306	-	-
Force Mains	8	465	855	2 427	3 800	4 918	7 480	9 566	9 143	13 329	-	-
Pump Stations	131	1 554	3 412	3 808	604	5 959	7 276	3 982	9 414	10 315	-	-
Treatment Facilities	329	273	6 540	8 586	11 026	21 357	23 624	21 711	23 529	23 191	-	-
Outfalls	524	580	21 684	25 365	27 930	27 401	29 350	26 267	-	-	-	-
Land	2 110	9 605	8 383	-	-	-	-	-	-	-	-	-
TOTAL	3 848	14 121	45 650	54 378	62 134	114 308	135 968	137 511	131 167	149 938	194 471	291 247
<u>Other Capital Expenditures</u>												
Top Priority Projects (b)	12 308	14 758	16 135	-	-	-	-	-	-	-	-	-
Vehicles (c)	-	-	-	70	75	45	48	55	56	59	670	646
TOTAL	12 308	14 758	16 135	70	75	45	48	55	56	59	670	646
Total Capital Expenditures	16 216	28 879	61 785	54 448	62 209	114 353	136 016	137 366	131 223	148 997	195 141	291 893

(a) Based on Chapter 8 recommendations and inflation rates presented in Section 9-3

(b) Based on recommendations in Special Report Number 4. Values include expenditures on sewers, pump stations, and vehicles while all other IPP costs are included in operation and maintenance cost under "Deferred Maintenance".

(c) Includes cost of vehicle addition and replacements; from 1979 through 1991 such costs are part of Top Priority Projects.

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PROJECTED CUSTOMER CONTRIBUTIONS
(LE thousand, escalated)

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1990	
Customer Data												
Number of Sewer Connections (a)	1 770	1 880	2 060	2 260	2 320	2 600	2 760	2 880	2 860	2 860	3 490	3 540
Total Sewer Connections	79 360	81 740	83 320	85 600	87 920	93 520	100 680	100 900	117 120	125 280	147 420	168 760
Operating Revenues												
Average Sewer Service Charge, pt/m ³ (b)	-	-	1.2	1.5	1.8	2.1	2.3	2.5	2.7	2.9	4.4	6.0
Annual Service Charge Billings, LE thousand	-	-	3 625	5 447	6 550	7 714	8 765	9 766	11 033	12 423	21 175	31 461
Connection Charge Revenues												
Connection Charge, LE/connection (c)	178	213	253	300	346	395	441	486	525	561	900	1 353
Connection Charge Billing, LE thousand(d)	230	300	395	513	602	1 459	2 435	2 945	3 213	3 454	2 490	3 613
Charge to Beneficiaries (e) LE thousand	-	-	356	1 495	2 101	4 648	5 152	5 649	6 090	6 507	4 739	7 116

- (a) Based on construction scheduling for the recommended Wastewater Master Plan.
- (b) Service charges designed to recover annual operating costs and, in addition, one month operating costs in following year (to facilitate cash flow requirements) plus 5% of total cost for coverage on uncollectable billings, billable wastewater flow assumed at 60% of projected wastewater flow from sewered customers (Table 4.10) based on revenue collection experience of AMS.
- (c) Based on estimated connection cost of LE 125 at mid-1977 costs.
- (d) Assumes that 25 percent of all new connections will not be billed due to inability to pay for future low income areas.
- (e) Includes charges to developers for one third cost of sewer in newly developed areas beginning in 1980; 40% of sewer costs in the East, West, and Central Zones and 60% of sewer costs in North, Outer West, Abu Eir Bay, and Andria assumed to be in areas owned by developers.

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SCHEDULE OF CAPITAL ASSETS
(In thousand, Escalated)

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1994	2000
<u>Assets Added During the year</u>												
Sewers	3 308	11 047	14 420	18 459	10 455	100 925	32 323	46 121	131 735	60 292	32 412	48 541
Structures	-	-	-	189	76 670	-	-	3 636	20 916	-	-	-
Equipment	-	-	-	4 578	11 611	-	-	1 550	-	-	-	-
Vehicles	567	591	152	70	75	45	48	55	56	59	112	108
Land	-	-	-	-	-	3 549	-	1 916	-	-	-	-
TOTAL	3 875	11 638	14 572	23 296	88 811	104 519	32 371	53 278	154 707	60 951	32 524	48 649
<u>Assets Retired</u>												
Vehicles	193	200	52	63	68	40	43	44	45	48	85	77
<u>Depreciable Values</u>												
Sewers	16 179	127 221	141 641	160 100	173 555	271 480	303 803	349 924	481 659	544 551	926 835	1 201 953
Structures	5 026	5 026	5 026	5 215	21 885	21 885	21 885	25 521	46 437	46 437	129 851	129 871
Equipment	14 725	14 725	14 725	19 303	33 914	30 914	30 914	32 464	32 464	32 464	81 179	81 179
Vehicles	1 725	2 116	2 216	2 223	2 230	2 235	2 240	2 251	2 262	2 273	2 437	2 613
TOTAL	37 655	149 088	163 608	186 841	225 584	326 514	356 642	410 160	564 822	625 725	1 140 302	1 415 622
<u>Work In Progress</u>												
Sewers	11 612	15 810	43 312	66 817	105 886	92 953	165 698	231 295	195 684	220 724	32 412	48 541
Structures	219	1 201	6 405	12 817	2 581	22 879	45 742	57 650	60 279	83 414	-	-
Equipment	2 157	4 320	10 492	11 707	5 292	12 310	20 347	28 846	32 394	49 715	-	-
Land	2 130	11 735	20 118	20 118	23 118	16 569	16 569	14 653	14 653	14 653	-	-
TOTAL	16 118	33 114	80 327	111 479	137 887	144 711	246 356	332 444	305 960	367 046	32 412	48 541
Land	5 898	5 898	5 898	5 898	5 898	9 447	9 447	11 353	11 363	11 363	26 016	26 016
Book Value of Capital Assets	159 691	188 100	249 033	304 218	361 359	480 672	616 615	751 967	878 742	1 004 072	1 198 750	1 490 179

**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Annex J

Title of Project:
From FY 1979 to FY 1980
Total US Funding: \$67,000,000
Date Prepared: July 20, 1979

Project Title & Number: Alexandria Wastewater System Expansion - Phase I

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>System or Sector Goal: The broader objective to which this project contributes:</p> <p>To improve the present and future public health and environmental situation for the inhabitants of the city of Alexandria by providing sewer facilities and services to meet the needs of the present and future population to the year 2000.</p> <p>To maintain and expand the city's infrastructure to allow Alexandria to continue to function as an important sea port, trade center, tourist center and a center for industrial expansion.</p>	<p>Measures of Goal Achievement:</p> <p>Public health improvements related to sewerage system improvements and expansion of the collection, conveyance treatment facilities, and disposal facilities;</p> <p>reduced contamination of streets, canal beaches, lakes and bays surrounding city of Alexandria;</p> <p>continued capability of Alexandria to function as a desirable trade center, tourist site, and an essential industrial center.</p>	<p>Ministry of Health Records, WHO/World Bank Reports -</p> <p>Statistics on water related diseases for Alexandria</p> <p>Infant mortality rate in Alexandria</p> <p>Incidence of cholera, typhoid and paratyphoid, infection hepatitis, dysentery, etc.</p> <p>Surveys conducted by GECSD by Water Pollution Control Dept. on beach, lakes, bay contamination.</p> <p>Reports from monitoring program study in ocean contamination, beach & harbor contamination</p>	<p>Assumptions for achieving goal targets</p> <p>Continued peace in the Middle East and continued political stability in Egypt.</p> <p>GOE continues to identify and support sewerage system expansion as a high priority social and economic goal.</p>
<p>Project Purpose:</p> <p>Operating within the GOE's Alexandria Water Plan Expansion Program; to contribute to the expansion, improvement and upgrading of the existing sewerage collection, conveyance and disposal system with the purpose of providing adequate sewerage services for the present 2 million inhabitants of the city of Alexandria and for projected population to the year 2000 (est. 5 million +).</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p>Satisfactory completion of A/E and construction contracts with final acceptance of work completed by GOE (GECSD).</p> <p>Outfalls completely installed and operating at designed capacity, meeting the needs of the current population and the continuing need of the expanding population of Alexandria to year 2000.</p> <p>Treatment plants and pump stations constructed and operating at design capacity effectively meeting environmental concerns.</p> <p>Sewer mains, sewers, reduced facilities in place.</p>	<p>Reporting (monthly) of A/E firm progress.</p> <p>Progress reporting by GOE.</p> <p>Site visits by USAID.</p> <p>AID's post evaluation reporting system.</p> <p>Site visits and inspection of upgrade elements of sewer system.</p> <p>Site visits and inspection of area receiving sewerage service for the first time.</p>	<p>Assumptions for achieving purpose:</p> <p>A/E and construction contracts have capability to do tasks.</p> <p>GOE Ministry and Agencies, etc. cooperate in implementing the project.</p> <p>GECSD will continue to operate as a viable organization particularly in area of operation and maintaining the sewerage system.</p>

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**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Line of Project
From FY 1979 to FY 1980
Total US Funding /67 million
Date Prepared July 01, 1979

Project Title & Number: Alexandria Wastewater System Expansion - Phase 1

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Inputs Completed outfalls, treatment plants, collection, pumping stations with approximately designed operating capacity including an addition of an improved and expanded sewerage system adequately serving the target population (present population and projected pop. to year 2000). Upgraded sections of sewerage system contributing to operational efficiency within the proposed expanded system. Increased area and pop. of Alexandria served.</p>	<p>Magnitude of Outputs: Degree of completion of scope of work of A/E firm. Degree of completion of scope of work of construction contractor Percentage of outfalls installed. Percentage of treatment plants constructed and equipment and facilities installed. Percentage of force mains, sewers and related equipment installed.</p>	<p>REPORTS A/E monthly progress. Construction contractor's monthly report. Site inspection and above reports.</p>	<p>Assumptions for achieving outputs: Other project elements are in place and operating.</p>
<p>Inputs: Consulting services (A/E) for design, engineering and construction supervision. Services of a U.S. construction firm. Materials and equipment required for construction of new outfalls, treatment plants, pump stations and other facilities. Suppl. of force mains, sewers and related equipment. Materials, equipment and supplies for upgrading the designated sections of the existing sewer system. Trainer</p>	<p>Implementation Target (Type and Quantity) Signed A/E contract for engineering, design and construction supervision and A/E team mobilized in Alexandria. Signed construction contract and construction team mobilized in Alexandria. Percentage of new outfalls on site available for installation Percentage of treatment plant facilities and equipment on site available for construction and installation. Percentage of pump station facilities and equipment on site available for construction. Percentage of force mains, sewers & related equip. on site available for install.</p>	<p>GESED reporting system on materials received. Reports of GSE custom office and Ministry of Finance. USAID's inspection - site visits. A/E & construction contractor reports.</p>	<p>Assumptions for providing inputs: A/E consultants & construction firms permitted to operate in Egypt without their relations with other countries in Middle East. Part of Alexandria continues to operate effectively. No significant labor unrest causing Part of Alexandria to close down.</p>

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