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U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER

SECONDARY CITIES PROJECT

PROJECT NO. 263-0236

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PDS/PS
USAID/CAIRO

ANNEXES

VOLUME I
SECONDARY CITIES PROJECT PAPER
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Glossary Of Abbreviations

AGOSD	Alexandria General Organization For Sanitary Drainage
AID	Agency For International Development
AID/C	AID/Cairo
AID/W	AID/Washington
AP	Action Plan
BOD	Biochemical Oxygen Demand
CBD	Commerce Business Daily
CDSS	Country Development Strategy Statement
CFR	Code Of Federal Regulations
C/GOSD	Cairo General Organization For Sanitary Drainage
CMC	Construction Management Contract
DANIDA	Danish International Development Agency
D/B	Design/Build
DI	Ductile Iron
DR	Development Resources Directorate
DR/UAD	Development Resources/Office of Urban and Administration Development
EA	Environmental Assessment
ED	Engineering Design
ESF	Economic Support Fund
FAA	Foreign Assistance Act
Feddan	4,200 m^2
FIDIC	Federation International des Ingenieurs Conseils
FM	Financial Management Directorate
FX	Foreign Exchange
FSN	Foreign Service Nationality
FX	Foreign Currency
FY	Fiscal Year
GOE	Government Of Egypt
GOV	Governorate
HCC	Host Country Contribution
IFB	Invitation For Bid
ISB	Institutional Support Branch
ISC	Institutional Support Contract
KM	Kilometer
L/Comm	Letter Of Commitment
l/s	liter/second
LE	Egyptian Pound
LOP	Life Of Project
M^2	Square Meter
m^3/d	Cubic Meter per Day
MHPU	Ministry Of Housing and Public Utilities
MIC	Ministry Of International Cooperation
MLA	Ministry Of Local Administration
MOU	Memorandum Of Understanding
mm	Millimeter
NOPWASD	National Organization For Potable Water And Sanitary Drainage
O&M	Operation and Maintenance
PACD	Project Assistance Completion Date

PD	Presidential Decree
PDS	Program Development And Support Directorate
PDS/ENV	PDS/Environment Office
PDS/PS	PDS/Project Support Office
PIL	Project Implementation Letter
PID	Project Identification Document
P/M	Person/Month
PP	Project Paper
PT	Project Design Team
PTR	Piaster
RFP	Request For Proposal
RFTP	Request For Technical Proposal
SC	Secondary Cities
TA	Technical Assistance
W/WW	Water/Wastewater
WASH	Water and Sanitation For Health
WWTP	Wastewater Treatment Plant
WTP	Water Treatment Plant

CHAPTER I

EXECUTIVE SUMMARY

A. Introduction

USAID has invested in excess of $2 billion over the last eighteen years in the water/wastewater sector (w/ww) sector. This investment has enhanced human resource productivity/quality of life, improved maternal/child health, and reduced environmental degradation through increased access by the Egyptian populace to efficient, reliable water/wastewater utilities. USAID's investment to date has or will meet the w/ww needs of approximately 25 percent of Egypt's population of about 60 million people.

Nevertheless, access to potable water and treated sewage collection systems for the majority of the remaining population remains a large development need. Without access to potable water and sanitary drainage, the environment in which people live and work will continue to be seriously threatened by the high risk of exposure to water-borne diseases. For example, numerous epidemiological linkages between water-borne diseases and the level of sanitation in Egypt have been well documented. Improperly treated water and wastewater are linked to schistosomiasis, cholera, typhoid fever, hepatitis, and diarrhea. Lack of potable water and effective sewerage systems remain a serious public health problem, especially in the Delta and Upper Egypt.

Although USAID assistance in the w/ww sector has already had a broad based impact, a number of technical, financial, institutional and social issues remain to be addressed in the context of structuring future assistance. These issues include population growth which exceeds systems capacities for water and wastewater; improperly designed, constructed, and maintained facilities which result in excessive leakage; unplanned systems expansion; inoperable equipment; insufficient manpower and training; lack of local participation in the reform process; and ineffective financial and institutional processes which prevent utility operation efficiency.

Failure to address these issues stems in part from a number of constraints on the Government of Egypt (GOE). The GOE remains burdened with a lack of resources and structural defects which hamper its ability to provide sustainable water and wastewater (w/ww) services for many of its people who often pay substantial amounts to informal vendors for water delivery and sewage vault maintenance. The long-standing policy of heavy subsidy for operation and maintenance of w/ww facilities has shielded the system users from having to bear actual system costs, has kept the GOE burdened with increasing debt, and has directly prevented infrastructure operation, maintenance and rehabilitation needs from being adequately met. Funding is controlled by an inflexible

central government budgetary process which is not readily responsive to local needs. The w/ww sector is further burdened by a myriad of other constraints including lack of local ownership, accountability and initiative contributing to severe shortages of experienced and qualified staff, inappropriate project selection, design and implementation, and deficient quality of construction works.

Future USAID investments in the w/ww sector are predicated on the need for a clear, well-developed strategy toward reform of the sector. Significant GOE movement toward reform is already visible under two ongoing USAID projects: Cairo Sewerage II and Alexandria Wastewater Systems Expansion. Under both of these projects, the GOE has developed time-phased action plans which detail the GOE's planned steps toward transforming existing wastewater authorities into autonomous organizations. Additionally, two presidential decrees were recently signed which provide the enabling legal framework to support the action plan reforms. USAID funding for future systems expansion in these two cities is based on actual GOE progress in the areas of cost recovery, revenue retention, labor force adjustment, tariff-setting authority and the removal of legal constraints inhibiting autonomy. With recent emphasis on reform activities in two of Egypt's largest population centers, many senior Egyptian w/ww sector authorities publicly agreed with the need for sector-wide reform in a recent meeting with World Bank representatives.

As the only new USAID project currently under design in the w/ww sector, the Secondary Cities Project is conceived with the principal objective of demonstrating replicable, economically viable utilities in different geographic regions of the country. To ensure the sustainability of these investments, the proposed project recognizes the need to carefully relate the timing of infrastructure construction to substantive GOE movement in implementing policy and institutional reforms. USAID plans to provide assistance to the GOE in establishing locally funded, locally controlled and fully sustainable utilities supported by adequate tariffs. Key to the successful implementation of a reform strategy is national and local level participation in the reform process. The needs of the local communities must be considered to ensure that those affected by reform have a vested interest in its success. Community participation must be included in any future w/ww project to ensure that the social impact of institutional reform considers the needs and behaviors of project beneficiaries. Willingness to pay and community acceptance are social issues which are readily overcome through community awareness and participation.

It is clear that achievement of the proposed policy and institutional changes and construction of the large systems after the reforms are achieved would require substantial time and funds.

B. Perceived Problem

The project seeks to address two problems: 1) the need to provide w/ww service to meet growing demand throughout Egypt, and 2) the need to ensure autonomy of local w/ww entities and sustainability of existing and new w/ww facilities.

Local institutions responsible for the operation and maintenance of the w/ww infrastructure currently have neither the financial nor the human resources sufficient to allow them to discharge their responsibilities effectively. Dependence on civil service regulations makes it difficult for these entities to attract and retain sufficiently experienced and motivated management and staff. The policy of heavily subsidized operations encourages user waste while further burdening an already depleted central government budget. Despite the evidence of a deteriorating national picture in the sector (outside of the cities where USAID has been active), the demand for increased w/ww service continues to grow. The MOH has a backlog of more than 200 cities requiring service, with little hope of meeting even a modest portion of this demand.

D. Project Strategy

To achieve its purpose, the Secondary Cities Project will employ a three-stage strategy:

1. Design of Action Plans for Reform USAID-funded technical assistance (TA) will work with governorate and local officials as well as community representatives to develop individual time-phased action plans for each of the project cities. Because of the extensive involvement of the communities in the development of these action plans, they are expected to take up to 15 months to be developed and agreed upon by USAID and the GOE from the date of initial project obligation. The plans will specify steps needed to achieve cost recovery and autonomy for the local entities responsible for operations and maintenance of water and wastewater systems. This would include required reorganization, interim steps, targets, and timing of reforms required to achieve institutional autonomy. The achievement of full institutional autonomy could entail enabling presidential or ministerial decrees, laws to be enacted, schedules for 100% cost recovery, tariff increases, full revenue retention, labor force adjustment, or other sustainable models of institutional reform. GOE/USAID agreement on the content and timing of reforms in each action plan will be one of the conditions to disbursement for construction.

2. GOE Implementation of Action Plans As specified in the Milestones Schedule (Annex D), the Mission will seek "substantial progress" toward reform as a prerequisite to construction within the time frame prescribed by the action plan. The specific definitions of "substantial progress" will be detailed for each

city and approved by USAID and the GOE in project implementation letters before funds are committed for construction.

3. Provision of Water/Wastewater Infrastructure Once the agreed upon progress has been achieved for a specific city construction activities will begin for that city.

E. Site Selection

Based on discussions with the Ministry of Housing/Public Utilities (MHPU) and the National Organization of Potable Water and Sanitary Drainage (NOPWASD), 200 "secondary" cities (cities with populations between 20,000-650,000) were identified to be in dire need of water and wastewater infrastructure to meet current and future projected demands. From this list of 200 cities, sixteen cities from nine different governorates were selected for further study. The criteria for consideration were: need for service, ability to pay, population, economic activity, existing water/wastewater infrastructure, current consumption, projected demand, percentage of existing coverage, condition of existing infrastructure, current tariff rates, future plans, groundwater table and land availability. Meetings with each of the nine Governors were held to discuss possible project sites, each Governorate's priorities, potential project size at different sites, location and manageability.

Geographic dispersion has been emphasized as a priority for developing sustainable, replicable institutional models over a broad range of socio-economic settings throughout Egypt. Four different regions were considered for closer study: the Delta, Red Sea, the Sinai, and Upper Egypt. The Delta has a combination of saltwater intrusion and uncontrolled discharge of urban sewage which is raising the groundwater level and threatening the urban water supply. For the Red Sea and the Sinai, the lack of access to potable water coupled with wastewater discharge in excess of treatment capacity threatens the coral reefs and constrains the growth of tourism. A similar situation exists in the smaller cities of Upper Egypt along the Nile where little treatment capacity exists.

As a result of the preliminary technical evaluation of the sixteen candidate cities in these four regions, eleven cities (three adjoining cities are considered under one regional plan, hence eight project "locations") were identified for possible inclusion in the project. A team of consultants undertook extensive data collection and analysis at each potential project city. This analysis included review of current and projected needs for water system production and wastewater system treatment capacities through the year 2010. Current population, projected growth rates, existing system useful life, estimated water loss, and actual consumption rates were factors used which reveal that all candidate cities are currently underserved in water and

wastewater systems. Additionally, many contiguous communities within these cities where growth is most likely to occur currently have no access to sewerage or water treatment.

The eleven candidate cities identified were: Nuweiba, Sharm El Sheikh, Luxor, Mansoura, Kom Ombo/Nasr City/Darawo (the latter three grouped as one city), Hurghada, Mahalla el Khobra and Isna/Armant. Criteria utilized for further refining site selection included existing institutional arrangements, the perceived likelihood for administrative and social acceptance, technical merit, environmental impact, and potential for cost recovery/economic rate of return. Of these, Hurghada, Mahalla el Khobra, and Armant were dropped for not fulfilling the project's criteria. With the exception of the Aswan Group, discussed below, city selection was based on the prefeasibility analysis evaluation and final Mission Executive Committee review. Based on the prefeasibility analysis, Mahalla el Khobra was the only city that scored high that was removed from further consideration. It was not selected because of its relative cost, technical complexity, and proximity to Mansoura.

Although the Aswan Group scored relatively low in the economic analysis, tariff analysis indicates that the Aswan Group will cover over 100% of its O&M costs (See Table IV-7, Chapter IV) with a 6% annual increase through the year 2000. It is also considered an attractive candidate as it represents smaller cities that are in dire need of w/ww services and are representative of the large number of smaller, poorly served cities in Upper Egypt, a section of the country which has traditionally received very little GOE or donor assistance. With USAID's global strategy emphasizing the promotion of sustainable growth in local communities and direct impact on the poor, Upper Egypt has one of the poorest governorates in Egypt and is considered an excellent project location. As a result of its rural nature and location, this group of cities has unique social and economic patterns that may provide the basis for a broader impact. Because they are near each other, an opportunity to introduce a regional approach to w/ww development exists. It is notable that the Aswan Governorate is already making progress in an aggressive program of policy reform under a project funded by the DANIDA and has embraced USAID's policy reform agenda by drafting a presidential decree which provides the enabling legal framework to achieve institutional reform.

The final selected cities (Mansoura, Luxor, Sharm El Sheikh, Nuweiba, and Aswan Group) were determined by a USAID final review of the Project Paper. Should one of the selected cities not fulfill project conditionality or make less than acceptable progress on reform, another replacement candidate city may be selected (which meets project criteria).

F. Project Description:

The **goal** of the Secondary Cities Project is to provide a sustainable foundation for improved health and living conditions for the Egyptian people in urban centers. Its **purpose** is to expand and develop sustainable, replicable, water/wastewater facilities in selected urban population centers of Egypt. By FY2004, it is expected that water/wastewater infrastructure will be constructed, operated, and maintained in five project sites supported by responsible autonomous entities. The **outputs** of the project are: environmentally sound water and waster infrastructure constructed and functioning, the establishment of sustainable institutional frameworks, and the achievement of financial viability.

The USAID funded portion of the Secondary Cities Project will fund four major areas of activity and a contingency account:

1. Institutional Support/Technical Assistance

The project will provide technical assistance and training to introduce reforms at central and local government levels in all the areas critical to the operation of a utility: accounting, inventory control, O&M, personnel policy, administration and computerization. Agendas of required reforms and tariff increases will be defined for each city in individual action plans (AP). Each action plan will provide a detailed schedule which the GOE agrees to follow to implement the reforms and tariff increases. Funds are released for construction only when benchmarks, identified by USAID as critical to autonomy, and agreed to by the GOE/USAID, are met.

2. Engineering Design and Construction Management

Engineering design and environmental assessments (EA) for each site will be contracted for immediately upon obligation of the project. The EA will ensure that the choice of physical intervention is environmentally sound. The results of the EA will be completed within six months of initial project obligation. Detailed design of all of the proposed w/ww systems should be completed within a year thereafter by an American engineering firm. At that point, pending satisfactory GOE progress in implementing policy reforms, funds for construction will be available to be released. Construction management services will be provided to oversee physical construction.

3. Construction

The largest portion of project funds will be for construction. Included under construction are pipelines, pump stations and treatment plants rehabilitation/construction. Whether or not to initiate construction will be contingent on GOE performance as measured against each city's action plan.

4. Audit and Evaluation This will include an interim evaluation after four years and a final evaluation. Audits will be carried out as required by FM and RIG.

5. Contingency

G. Proposed Conditionality

Much of what is being attempted in the way of institutional reform under the Secondary Cities Project (SCP) parallels the Mission's work in Cairo and Alexandria. Based on Mission experience in those cities, the conditionality attached to the SCP is realistic and achievable if the GOE is committed to reform.

As more specifically stated in Chapter V, Section F, the conditionality is summarized below:

- CP to Disbursements for Technical Assistance: This CP will require: (1) the establishment of a Project Steering Committee (PSC) with representatives of each of the involved ministries and governorates. The PSC will provide guidance on all key issues related to policy reform and how these reforms can best be addressed under the SCP; (2) that NOPWASD, as the host country implementing agency, establish an internal Project Implementation Unit (PIU). The PIU will have the authority to make most day-to day decisions involving design standards, construction and other operational concerns. A similar PIU was established in support of past and current USAID-assisted projects with positive results.

- CPs to Disbursements for Construction: Prior to the commitment of funding for construction activities, the GOE will be required to develop action plans which detail the actions necessary to achieve institutional autonomy and full recovery of operation and maintenance costs, implement a benchmark contained in the action plan which is acceptable to AID, provide all the necessary title to land, and ensure that all related environmental assessments have been completed and incorporated into the final design for the construction of all facilities.

H. Responsibilities of GOE Agencies

The agency responsible for the project is the Ministry of Housing (MOH) through its implementing agency, NOPWASD. It is NOPWASD's responsibility to manage all w/ww design and construction. However, as it is left to the governorate to operate and maintain the utility, the governorate must be fully integrated into the project. Provincial authorities will necessarily be required to take significant policy decisions and therefore a large portion of technical assistance will be directed to the provincial authority responsible for the utility. Since all issues involving governorate staffing and funds pass through the Ministry of Local Administration (MLA) from the Ministry of Finance, it is important

that MLA be kept informed of project activities related to the governorates. It should be further noted that a number of other GOE agencies (i.e. Ministry of Planning, National Investment Bank, Popular Council, People's Assembly, the Executive Cabinet) will likely become involved as a result of the reform process. The question of autonomy at the governorate level requires clarification of legal mandates and jurisdictional responsibilities of various organizations involved in the provision of quality w/ww services. Specifically, the relationship between the governorate departments, the Ministry of Finance and the Ministry of Planning must be clarified if the governorate w/ww departments are to function as autonomous bodies with the ability to raise and retain revenues and determine organizational size. These working relationships and roles will be more clearly established and defined in the development of each individual action plan.

In March, 1994 responsibility for construction in South Sinai was assigned to the newly established Ministry of Reconstruction and New Communities (formerly part of the MOH). The Sinai Development Authority is the implementing agency of the Ministry of Reconstruction, the equivalent of NOPWASD in the MOH. This created the possibility that responsibility for construction might be divided between the two ministries. In a letter recently received from the Ministry of Housing, endorsed by the Ministry of Reconstruction, USAID has been assured that NOPWASD will remain the implementing agency for all w/ww construction under the Secondary Cities Project.

I. Cost Estimates and Financial Plan

1. Financial Plan

AID grant funds will finance the foreign exchange and 48% of local currency costs of the construction contracts. AID will finance all the remaining project activities excluding land acquisition, local operating budgets for NOPWASD and the governorates, and a portion of contractors' office support costs which will be financed through the GOE in kind contributions in addition to GOE cash contribution representing 52% of the local currency of the construction cost.

The estimated project life is ten years commencing late FY 1994 and ending in FY 2004. Engineering design, construction management and institutional support activities are scheduled to be completed by the year 2004, providing four years of institutional support (including three years of operation and maintenance support) after the completion of construction works, which are estimated to be implemented during the years 1997 through 2000.

3. Financial Analysis

The financial study developed estimates of the proposed tariffs required to recover recurring costs. The overall reasonableness of the proposed tariffs were assessed in the light of current charges to users and different levels of assumed annual tariff increase. The length of the period required to achieve partial to full recovery varied between the various project cities according to the cost and demand factors. The preliminary findings from the financial analysis concludes that major institutional support is a basic requirement to achieve reasonable tariffs and accordingly financial viability.

J. Project Negotiations

During the preparation of the Project Paper (PP), frequent meetings were held between the USAID project team (PT) and senior GOE officials. DR/UAD and PDS/PS staff met with the governors represented by each proposed project site and spoke at length about the purpose of the Secondary Cities (SC) Project. It was made clear that policy reform was the basis of the project. Although the PT had not yet defined the specific CPs of the project, the general nature of the CPs was well known. These were discussed with the governors and their staffs. All the governors represented in the project supported the objective of establishing utility operations which were sustained by user tariffs.

In Egypt, an organization which covers its costs is known as an "economic organization", as opposed to the more traditional "service organization". All the governors involved in the SC

Project knew of the recently signed Presidential Decree which authorized the change in Alexandria's and Cairo's wastewater agencies from service organizations to economic organizations. The governors were also aware of the decree's implications in terms of revenue retention and personnel system independence. They supported the same concepts for their governorates and understood this was to be the goal of the SC Project. The only requests made consistently by the governors was that the financial burden of increased tariffs be applied gradually and construction start as quickly as possible.

To enlist the support of the governors during PP preparation, frequent meetings were held with the governors and appropriate staff. All meetings between USAID staff and governorate staff were cleared through the governors' offices. DR/UAD staff has been in almost weekly telephone contact with the governorates as there is considerable interest to see the project begin.

In early July 1994, DR and PDS staff met with the Governors of Dakahliya, Qena, South Sinai, and Aswan and the Administrator of Luxor who holds the rank of Governor. The policy reform agenda was discussed in detail and tying of construction to achievement of targets in the action plans was emphasized. The Governors fully supported greater autonomy for the cities including the need to raise and retain revenues. They did emphasize that tariff increases should be gradual.

NOPWASD and the Ministry of Housing and Public Utilities were contacted to review the specific project activities at the various sites. As a result of these meetings, the decision was made to exclude the Talkha wastewater project component from Mansoura activity because NOPWASD will be financing that activity.

CHAPTER II

PROJECT BACKGROUND AND RATIONALE

A. Background

Across the sector, GOE entities (local, governorate level, and national) responsible for construction, operation and maintenance of water and wastewater facilities are hampered by severe structural constraints. Shortcomings are evident in the institutional framework, performance of operating companies and national institutions, policy and investment setting, cost recovery, selection, design and implementation of water/wastewater projects. Personnel shortages and insufficient expertise exist in technical and management disciplines. Inadequate cost recovery policies produce low rates that do not cover operation and maintenance costs leading to heavy government subsidies and continued reliance on international donors. Limits on management autonomy and the lack of available funding inhibit operational efficiency. Because of these poor policies and practices, civil works construction and equipment rapidly deteriorate and many future investment projects are neither timely nor technically appropriate.

In January 1984, a Memorandum of Understanding (MOU) was signed between the GOE and USAID in recognition of "the need for certain management and administrative actions to strengthen Egyptian water and wastewater institutions", and in particular the need for: "Tariff increases adequate to cover the cost of water and wastewater operations, maintenance and investment budgets provided to fund the sector"; and "Establishment of autonomous local water and wastewater organizations, with the authority to retain service revenues for their own operating needs". Other provisions of the MOU called for adequate facilities, technical services, and appropriate incentives in support of personnel, training and completion of project construction activities. The objectives and elements laid down in the MOU, and later adopted as a series of "benchmarks", provide the framework for structuring the institutional development component of the proposed project.

Until recently, there has been slow progress toward the goals set out by the MOU. The most significant accomplishment was setting of a wastewater surcharge which prior to 1984 did not exist. Within the past six months, however, as a direct result of USAID's policy reform efforts, the GOE has made significant progress in implementing several features of the MOU, particularly with regard to authorizing the General Organizations on Wastewater in Cairo and Alexandria to operate as autonomous bodies and to retain revenues. The question of autonomy at the governorate level requires clarification of legal mandates and jurisdictional responsibilities of various organizations involved in the provision

of quality water and wastewater services. Specifically, the relationship between the governorate departments, the Ministry of Finance and the Ministry of Planning must be clarified if the governorate w/ww departments are to function as autonomous bodies with the ability to raise and retain revenues and determine organizational size. Therefore, the institutional support component is designed to assist the GOE in accomplishing the objectives of the MOU.

Improvement in sector performance is achievable through policy reform which focuses on structural adjustment and the provision of capital projects. Specifically, the proposed project will pursue structural changes to utilities and assist the GOE in establishing locally funded, locally controlled and fully sustainable w/ww utilities supported by adequate tariffs. As part of the Mission's next generation of urban w/ww projects, the Secondary Cities project will address policy reforms and high priority water and/or wastewater system needs of seven Egyptian cities (Mansoura, Nuweiba, Sharm El Sheikh, Luxor, Darawo, Kom Ombo and Nasr City - the last three are "regionalized" and identified as the "Aswan Group").

The Government of Egypt (GOE) has recognized the importance of providing potable water and sanitary drainage to the Egyptian economy. With growing population demands, the GOE's national investment for these services is currently budgeted at LE 7.9 billion for the entire country for the period 1992-1997. Recent data shows that the population of provincial and secondary cities (cities other than Cairo, Alexandria and the Suez Canal cities) is growing faster than Cairo and Alexandria proper. In response, the latest GOE Five Year Plan (1992-1997) proposes to provide LE 4 billion for water/wastewater in Egypt's secondary cities. Budgetary limitations, however, preclude financing all of the proposed investments in the Plan. NOPWASD has sought USAID assistance in the secondary cities and the governorates identified in this paper have agreed, in principle, to establish independent utility operations.

As part of the preparatory work for the Project Paper, a team of consultants was asked to undertake extensive data collection and analysis at each potential project city. The team visited and ranked eleven cities based on extensive analysis of all available data. The USAID project committee further studied the data and proposed eight cities (three adjoining cities are considered under one regional plan, hence six project "locations") for inclusion in the project. It is expected that each city will implement the required reforms to fulfill project conditionality and that construction will take place at each location. Should a city not fulfill project conditionality or make less than acceptable progress on reform, funding may be deobligated and/or another replacement city undertaken (which meets project criteria).

The collected data comprised six chapters with extensive supporting data: (1) environmental analysis; (2) technical analysis; (3) financial analysis; (4) economic analysis; (5) institutional and administrative analysis; (6) social soundness analysis. These analyses provided the basis for evaluating eleven broad issues which are critical to project success. Based on a scoring of each issue, the project cities were ranked numerically. The outcome of the scoring is shown in Annex J (attached).

The scoring was then adjusted to ensure a geographic spread and to permit the project to develop institutional models geared to the unique characteristics of each socio-economic region. Based on this ranking and Mission Executive Committee Review, the selected cities are: (1)Mansoura, (2) Nuweiba, (3) Luxor, (4) Sharm el Sheikh, and (5) the Aswan group: Kom Ombo, Darawo and Nasr City.

B. Perceived Problem

The project seeks to address two problems: (1) the need to provide w/ww services to meet growing demand throughout the country; and (2) the need for policy reform to ensure autonomy of local institutions and sustainability of existing and new w/ww infrastructure.

A recent census indicates that 76 percent of Egypt's population lives outside Greater Cairo and Alexandria. The governorates, NOPWASD and the Suez Canal Authority are responsible for improving the w/ww services to this population with about 26 percent of the sector budget. Therefore, roughly 3/4 of the people receive the benefits of 1/4 of the GOE budget for the sector.

NOPWASD has a backlog of 200 secondary cities that have requested NOPWASD assistance to construct new w/ww treatment facilities and networks or to expand and rehabilitate existing facilities. NOPWASD is trying to address top priority needs through their centrally funded budget and from international donors, but institutional weaknesses compound its problems.

Despite considerable institutional strengthening efforts, the sustainability of USAID's future investments in the w/ww sector are jeopardized by inappropriate policies and institutional arrangements caused by overly centralized GOE control and lack of budgetary resources. Weaknesses in the GOE w/ww sector are evident in the local entities which operate, manage and maintain the w/ww facilities. Contingent upon serious government efforts at policy reform in the sector which shall be established during project development, the proposed project shall develop a sustainable new generation of water and wastewater projects in secondary cities (populations 20,000 - 650,000) of Egypt which can serve as models for more generalized institutional reform within the sector.

C. Conformity With The GOE'S Development Strategy

To achieve its goals of increased productivity and an improved standard of living for its citizens, the Government of Egypt (GOE) has embarked on a major economic reform program designed to stabilize its economy, remove distortions, and give a newfound impetus to the private sector as a central element in its growth strategy. This project will address sector policy and institutional constraints which negatively impact on sustainable economic growth in Egypt. Along with economic reforms, the GOE has developed a new environmental action plan and is currently strengthening its environmental laws. Activities funded under the Secondary Cities Project will contribute to a cleaner environment through improved treatment of wastewater. This will result in lower morbidity and mortality for the 1.25 million beneficiaries in the proposed cities.

The GOE has recognized the importance of providing potable water and sanitary drainage to the Egyptian economy. With growing population demands, the GOE's national investment for these services is currently budgeted at LE 7.9 billion for the entire country for the period 1992-1997.

The epidemiological linkages between the diseases in a community and the level of sanitation prevalent in the area has been well-documented. Numerous reports, commissioned by the World Bank, WHO and other UN agencies, have discussed the worldwide impacts of inadequate or impure water supplies and unsanitary sewage disposal practices on public health.

In Egypt, extensive research into w/ww borne diseases has been conducted by the US Naval Medical Research Unit and the Ministry Of Health. These studies indicate that diseases such as cholera and typhoid fever, are communicated to the general Egyptian population through contact with improperly treated water or by unsanitary disposal of sewage. Accurate information regarding specific health conditions in the selected cities has not been located. However, to varying degrees, sanitation problems resulting from improperly treated water and sewage exist in all the selected cites.

NOPWASD has sought USAID assistance for the secondary cities, and the governorates identified in this PP have agreed, in principle, to establish independent utility operations. Using the Alexandria Wastewater project as a model, each secondary city has agreed to begin the evolution of its local w/ww entity into an independent body. The new organizations will be capable of retaining revenue, adjusting staff size, and modifying tariffs with the goal of achieving sustainability. To accomplish this goal, TA will assist each of the project cities in the development of an action plan. An approved action plan will be a precondition for detailed design at each site. To date, the GOE has not been able to effect structural changes needed to ensure that existing and

future systems are adequately operated and maintained. Nonetheless, the Mission believes that the Egyptian people are able and willing to pay if the w/ww organizations provide service efficiently.

Recent data shows that the population of the secondary cities is growing faster than that of Cairo and Alexandria. In response, the latest GOE Five Year Plan (1992-1997) proposes to provide LE 4billion for w/ww activities in the secondary cities. Budgetary limitations preclude financing all of the proposed investments in the plan.

D. Relationship TO USAID Strategy/Policies, And Similar Projects

The January 1994 Agency-wide "Strategies for Sustainable Development", characterizes sustainable development as:

> **"... economic and social growth that does not exhaust the resources of a host country; that respects and safeguards the economic, cultural, and natural environment; that creates many incomes and chains of enterprises; that is nurtured by an enabling policy environment; and that builds indigenous institutions that involve and empower the citizenry. Development is "sustainable" when it permanently enhances the capacity of a society to improve its quality of life. Sustainable development enlarges the range of freedom and opportunity, not only day to day but generation to generation." (Page 4)**

The Mission's Country Program Strategy for FY 1992-1996, dated May 1992, is consistent with and reinforces the overall objectives of sustainable development as well as the four major areas of focus, i.e., protecting the environment, building democracy, stabilizing world population growth and protecting human health, and encouraging broad-based economic growth. The primary goal of the Mission's strategy is the enhancement of Egypt's role as a model of stability, democracy, free markets, and prosperity in the region. A comprehensive approach to the political and economic development of Egypt is essential to achieve the program goal. The three program sub-goals are: increased economic growth; enhanced human resource productivity and quality of life; and strengthened democratic systems.

To accomplish these sub-goals, the Mission is placing greater emphasis on economic policy reform through policy-based programs and major infrastructure projects. Specific emphasis is being placed on policy constraints in those infrastructure sectors such as water and wastewater as well as power and telecommunications where we have made, and will continue to make, major investments. Over the past 15 years, USAID has invested approximately $2.2 billion in Egypt to help people in urban and rural areas have better access to potable water and sewerage services. These USAID

funded projects contribute to USAID/Cairo's 1992-96 Water and Wastewater Sector Strategy by increasing access to, and efficiency and reliability of, public utilities in urban areas.

Provision of such assistance is commensurate with the following Mission strategic objectives (S.O.):

S.O.6. Providing increased access to, efficiency and reliability of public utilities in urban target areas

S.O.7. Adoption of water and air protection practices

Under S.O.6, this project supports Program Outcome (P.O.) 6.3 for the increased number of w/ww facilities and P.O. 6.4. which supports increased GOE management capacity. Under S.O.7, it supports P.O. 7.1 of environmental policy and institutional reform, P.O. 7.2 of increased use of protection and conservation technologies, and PO 7.3 increased treatment of wastewater.

E. Other Donor Involvement In The Sector

Although many donors are active in Egypt's water and wastewater sector, only the Danish and Dutch are involved in institutional reform and the provision of infrastructure. The Germans, Swedish and Italians are involved in four cities, not included in this project, primarily with system rehabilitation or construction. The World Bank has a small program to establish three private water companies in the Delta of Egypt. Another World Bank sponsored program involving tourism development on the Red Sea includes water and wastewater components.

In addition to the ongoing physical interventions in country, the World Bank undertook an extensive study of the entire water and wastewater sectors 1993. The report assesses in detail sector performance and constraints as well as elaborates a program for sector reform. For purposes of considering any future investments in the sector, key recommendations from the report stress the need for extensive feasibility study which ensures technical soundness, economic justification and environmental acceptability. Additionally, institutional analysis/strengthening and financial assessment are strongly recommended to be included as an integral part of any project.

The Danish (DANIDA) have activities in the governorates of Qena and Aswan. Since the Aswan Group is where planned activities will be undertaken, USAID and DANIDA had a special meeting in July 1994 to discuss coordination of activities. At the meeting, it became clear that DANIDA has a very similar policy reform agenda to that of USAID's. In Aswan, DANIDA is finishing a water and wastewater infrastructure project and been actively pursuing institutional reform. Presently, a draft Presidential decree which provides the enabling framework for the establishment of an

independent company is being discussed. A proposal is being considered for future assistance to implement the reforms described in the decree. The possibility of furthering DANIDA's reform initiatives was discussed as a strong possibility. DR/UAD has agreed to work closely with DANIDA to ensure that there are no coordination problems and duplication of effort.

CHAPTER III

PROJECT DESCRIPTION

A. Project Goal and Purpose

The **goal** of the Secondary Cities Project is to provide a sustainable foundation for improved health and living conditions for the Egyptian people in urban centers. Its **purpose** is to expand and develop sustainable, replicable, water/wastewater facilities in selected urban population centers of Egypt. The project is consistent with the Mission's country program goals of increased economic growth, enhanced human resource productivity and improved quality of life for the people of Egypt. To encourage economic growth, emphasis is being placed on economic policy reform through policy based programs focussed on major infrastructure projects.

B. End of Project Status

At the end of this project (FY2004), it is expected that the following will be accomplished:

1. Infrastructure constructed, operated and maintained at design capacity in five project sites (seven cities): Increased wastewater treatment and/or water supply coverage will be provided to the cities of Mansoura, Nuweiba, Sharm El Sheikh, Luxor, and the Aswan Group (Nasr City/Kom Ombo/Darawo City). Increased coverage will be in the form of constructing new facilities and/or rehabilitation of existing facilities. The constructed facilities will be technically and environmentally sound. The infrastructure will constitute a least cost solution to the water/wastewater needs of the target beneficiaries and be based on realistic demand projections and design parameters. Safe water and adequate sewerage systems will be provided for the project's 647,000 beneficiaries. Plant level O&M improvements will result in decreased plant down time, equipment repairs and fuel costs. Systems for leak detection/repair and waste reduction will be installed and functioning to ensure that the infrastructure provided is adequately maintained.

2. Entities responsible for operation and maintenance of water/wastewater systems in five project sites (seven selected cities) operating autonomously: As a result of institutional and policy reforms, autonomous institutional frameworks shall be in place permitting the creation of sustainable, financially viable entities capable of efficiently operating and maintaining infrastructure provided. Autonomous utility operation will be achieved through an array of differing institutional arrangements. With autonomy achieved, national and local level constraints to efficient operation and maintenance will be significantly reduced. A favorable policy climate will lessen dependence on national government agencies and permit improved resource allocation. Local

entities will be enabled to make investment and borrowing decisions, select, remunerate, develop, and promote personnel unencumbered by existing civil service regulations, and charge agreed upon rates to recover operation and maintenance costs. Consequently, adequate incentives for appropriate cost effective projects will be in place to promote efficient operation and financial viability of the operation.

C. Project Outputs

The activities proposed to accomplish the purpose of this project include the provision of water and/or wastewater treatment facilities to each of the project cities, selective rehabilitation and expansion of the water distribution and wastewater collection systems, and institutional reform to achieve long term sustainability and financial viability of the entities responsible for operation and maintenance of the infrastructure provided.

1. Environmentally sound water and wastewater infrastructure constructed and functioning: By FY2004, water/wastewater systems will be designed, constructed, an operating in Mansoura, Nuweiba, Sharm El Sheikh, Luxor, Darawo, Nasr City, and Kom Ombo. A discussion of the infrastructure is provided in Chapter 4 of Volume II. Tables attached to the summary of the technical analysis, summarizes the nature of the infrastructure by location and magnitude.

2. Sustainable institutional framework established: To ensure the long term sustainability of the project's investment, all the necessary administrative and structural reforms to achieve institutional autonomy will occur by FY2004. To develop the necessary sustainable framework, the GOE will need to address the following issues in the context of implementing reforms: authority, asset ownership, political acceptability, community responsiveness, organizational structure and systems, quality of service, GOE laws, and rate of cost recovery. Reforms are expected to include the removal of all legal impediments inhibiting institutional autonomy, decentralized authority for tariff rate determination, and the operation of restructured administrative, financial, and personnel systems of water/wastewater entities. A comprehensive and consistent framework of laws and policies ensuring sustainability will be in place. Organizational disciplines relating to efficient management of a utility (i.e. management, personnel, financial, information and related others) will have been reconfigured to accommodate institutional autonomy.

3. Financial viability achieved: To recover 100% of recurring costs, prices will be rationalized and subsidies are envisioned to be discontinued by FY2004. The entities will have the ability to raise and retain enough financial resources to perform services efficiently. The entities will have adequate management systems to increase revenue collection. Cost accounting mechanisms will be in

place at each governorate which will separate budget, identify income and expenses of water and wastewater services, accurately project O&M costs, and monitor w/ww accounts on a regular basis. With the collaboration of NOPWASD, the Ministries of Housing and Reconstruction and the full participation of the governorates, an equitable tariff structure will be developed. Systems will be devised to estimate water consumption by unmetered individual households; for those large consumers served by meters, an efficient system of meter installation and repair will be instituted; a cost-effective system of billing and collection of tariffs will be in place.

D. Project Inputs To achieve institutional reform and provide the needed w/ww infrastructure, technical assistance for institutional development, engineering design, construction management, and construction interventions are required. Institutional technical assistance will lead to the development of governorate-based action plans which define the GOE's commitment to implement institutional reform in each local utility agency. Institutional strengthening activities beyond development of action plans, will include training and assistance to update the day-to-day operation of the utility operation. Detailed engineering design will be provided to form the basis for new system construction and/or rehabilitation. Extensive w/ww systems construction will occur. Construction supervision will be provided to manage and oversee all aspects of construction activities. Technical assistance will also support the operation and maintenance of the newly constructed facilities.

1. Institutional support: The project will provide technical assistance to assess the organizational needs of the entities responsible for the operation and maintenance of the infrastructure provided. Working collaboratively with the governorates, local level stakeholders and NOPWASD, TA will design and implement action plans to carry out central and local level government reforms. Technical expertise and training will be provided in all areas critical to the operation and maintenance of a utility: technical, accounting, inventory control, O&M, personnel policy, management information systems, procurement and administration. Financial systems will be developed and installed to verify and ensure financial viability. Management capabilities will be strengthened through the design and implementation of a comprehensive training program, computer systems modernization, and administrative systems upgrades.

Agendas of required reforms and tariff increases will be defined for each city in individual action plans. Each action plan will lay out an agreed-upon schedule by which the GOE agrees to implement the reforms and tariff increases. Funds are released for construction only if GOE performance meets an agreed upon benchmark.

2. Engineering Design/Construction Management: Detailed engineering designs of the w/ww systems are considered to be relatively straightforward and all utility system designs should be completed within two years. Construction management services are needed to manage and oversee all construction activities. The construction management services will be provided over the construction period and the O&M phase.

3. Construction: The largest portion of project funds will be for construction. Included under construction are pipeline rehabilitation and installation, construction and rehabilitation of pump stations and treatment plants. Initiation of construction will be contingent on GOE performance as measured against each city's action plan and the conditionality specified by USAID.

4. Project Audit and Evaluation: Project evaluations will be performed in the fourth year of project implementation and at the conclusion of the project. NOPWASD's contracting capability assessment will expire early in 1995 and will be updated at that time.

5. Contingency: Funds totalling approximately 9.5% of the construction line item will be allocated for contingencies. Contingency allowances will be budgeted for each year of project implementation.

CHAPTER IV

COST ESTIMATES AND FINANCIAL PLAN

A. Project Cost Estimates

B. Financial Plan

1. Assessment of NOPWASD Contracting Capabilities

NOPWASD is the proposed GOE implementing agency for the Provincial Cities and Canal Cities Projects and will serve in the same capacity for the implementation of this project.

NOPWASD's host country contracting capabilities certification will be expired in January 1995. Actions to renew the certification have begun to ensure that NOPWASD is recertified prior to the expiration date of the current certification.

2. Audit, Assessment Ane Evaluation

A project mid-term evaluation will be performed after four years, and a final evaluation will be performed in the tenth year of the project. Assessments of host country implementing agency are planned to be performed during the first, fourth, seventh and tenth year of the project life.

Costs were not escalated based on regular factor since the volume and type of activities vary from a project stage to another.

CHAPTER V

IMPLEMENTATION PLAN

A. Project Approach

1. Project Concept:

To address the need for basic water and wastewater infrastructure and to provide a framework for system sustainability, the Secondary Cities Project proposes to establish replicable models of water and wastewater utilities across a broad range of Egyptian geographic and socio-economic settings. In exchange for GOE progress in instituting policy reform permitting sustainable operation of these utilities, USAID will agree to provide assistance in constructing environmentally, technically sound w/ww infrastructure.

2. Target Group:

A key feature of the Secondary Cities Project is to focus attention on the smaller cities of Egypt, on populations which represent a broad socio-economic and geographic range. Five locations, comprising seven cities, have been selected:

a. **Delta Zone:** Mansoura, the capital of Dakahliya governorate on the Nile delta is a prosperous commercial city with a population of more than 500,000. Here, as elsewhere on the delta, a combination of saltwater intrusion and uncontrolled discharge of urban sewage and industrial waste has raised the groundwater table and threatens to contaminate the urban water supply.

b. **Sinai Zone:** In the South Sinai cities of Nuweiba and Sharm El Sheikh, wastewater generation is growing faster than the ability to provide treatment and threatens the coral reefs and the tourism it supports. Also, the scarcity of potable water will eventually constrain the growth of tourism in South Sinai, the core of the region's economic development.

c. **Upper Egypt Zone:** Luxor in Upper Egypt is a prosperous tourist center but its water system infrastructure is aging and in generally poor condition. Its wastewater treatment capacity is well below what is required. Because Luxor is in the desert, it is an excellent location to introduce stabilization pond technology on a broad scale.

The three cities of the Aswan Group (consisting of Nasr, Darawo, and Kom Ombo) are located in the desert and are very poor. Because they are near to each other, the three cities will provide an opportunity to introduce a regional approach to water and wastewater development. The governorate is especially progressive

in recognizing the need for policy reform as evidenced by its ongoing work with DANIDA.

3. Implementation Approach:

Prefeasibility analysis revealed that the actual institutional, financial, economic, and social framework to ensure the project's long term sustainability can only be realistically developed during project implementation. The sustainability of the physical systems installed under the proposed project is not possible without the implementation of needed reforms and the expansion of the institutional capacity of the municipal organizations responsible for managing, operating and maintaining these facilities. Agendas of required reforms and tariff increases will be defined for each city in individual action plans. Each action plan will lay out an agreed-upon schedule by which the GOE agrees to implement the reforms and tariff increases. Funds are released for construction only if GOE performance meets an agreed upon benchmark. The implementation approach proposes to utilize the Fixed Amount Reimbursable (FAR) method of financing, direct and host country contracting to implement the project following a very rigorous sequence of activities.

Engineering design/construction management, environmental assessments, and institutional support are activities that will be awarded under AID direct contracting arrangements and directly managed by DR/UAD project management. All construction activities will be awarded using host country contracting and Fixed Amount Reimbursement (FAR) funding mechanisms. With the exception of Sharm El Sheikh, construction for water and wastewater systems needs in all target groups is included in the project. While engineering design and institutional TA will be provided to support water system expansion in Sharm El Sheikh, it should be noted that water construction for Sharm El Sheikh is not included as part of the project's current activities.

All construction will be tendered by NOPWASD, an arm of the MHPU. Construction of the major works will be done by US contractors. Smaller pipeline work and other minor construction activities will be handled through the FAR mechanism. All construction will be overseen by a US construction management contractor.

Well in advance of the major TA effort will be the initiation of the EA of the candidates cities under the project. The EA will be a relatively short activity and will be contracted through the Indefinite Quantity Contract (IQC) mechanism. The assessments will address the site-specific environmental issues broadly identified in the Project Paper. This work will take four months and is essential to complete before engineering design work may begin.

Upon project obligation, two scopes of work will be developed and advertised soliciting consultants to undertake institutional strengthening (technical assistance) and engineering design/construction management contracts. At the same time, AID staff will begin the process of sensitizing project counterparts to project mechanics. Of prime importance is the explanation of project conditionality.

The first major activity of the institutional strengthening TA consultant will be to work with each of the governorates to assess the counterpart organizations and develop an action plan. In collaboration with the GOE, a detailed study will be undertaken to identify the specific steps needed toward reform. Institutional constraints stemming from overlapping authorities, weak management structure, poor internal controls, training needs, technical expertise and contracting capabilities will be fully assessed and institutional strengthening activities fully defined.

Once the organizational needs are assessed, an action plan for reform will be designed and implemented for each governorate. The institutional TA will work with the central, governorate and local levels of government to ensure successful implementation of the reform process. TA shall also work with local participants in the design and implementation of action plan based reforms. This would include work with local PVOs, health officials at local hospitals and any other potential stakeholders to ensure that local communities are fully involved in the success of the project.

The action plan represents the official policy of the GOE and will demonstrate GOE willingness to reform. It will provide a schedule of activities and benchmarks the utility must undertake to achieve cost recovery and institutional autonomy. The basis of the action plan is consultant-generated cost of service data which will then be used to negotiate a series of reform measures and tariff increases. While most of the Secondary Cities in comparative terms are recovering a greater percentage of the recurrent expenses for water and wastewater services, further steps must be taken to recover 100%.

It is proposed that as part of the TA effort in each Secondary City an action plan be required to show how the city plans to increase tariffs to meet 100% of its recurrent costs for w/ww operations. Part of the action plan (AP) will include a measurable benchmark indicative of GOE commitment to cost recovery. The construction will begin only upon achieving the agreed upon benchmarks. The AP will also identify the design of a comprehensive and consistent framework of laws, policies, and institutions required to achieve institutional autonomy. Development of an AP will be done during the first six months of the institutional contractor's time in country. The specifics of the reforms and the time required to make measurable progress in implementing the reforms will be defined in each action plan.

Once action plans are designed and agreed upon, different institutional arrangements will be undertaken to achieve the agreed upon reforms. Institutional strengthening activities will assist the GOE in strengthening its existing organization and reformed organizations once defined. This could include modernizing management, technical and administrative systems in such fields as: personnel policies and procedures, training, procurement, payroll, inventory, information systems, finance, accounting, utility O&M, and all other specialized technical disciplines as required to achieve the needed reforms.

Other TA activities include a consumer education program, network improvements, a study of private sector absorptive capacity in handling FAR procurement, and updating host country contracting assessments for NOPWASD. A comprehensive program of consumer education to improve public awareness, to promote conservation, and to control waste will be developed, field tested and adopted; and a permanent mechanism to interact and coordinate these activities with other public/private agencies will be installed. A system of water/wastewater leak detection and repairs will be instituted. A system of network expansion to extend water and wastewater services, including the possibility of extending credit for hook-up services, will be established. The feasibility of limiting all FAR projects to the private sector shall be examined in the context of private sector absorptive capacity and availability of local expertise. Engineering design will include further economic study to economically justify the selection of the proposed interventions in the selected cities. NOPWASD will require recertification to conduct host country construction contracting.

With the arrival of the ED/CMC team in June 1995, work will begin at once on the design of each municipal utility system. At the same time, ISC team will begin on defining individual action plans enumerating the reforms that must be undertaken to achieve full cost recovery and institutional autonomy in each city. The action plans will be completed by Dec. 1995 and be endorsed by both the GOE and USAID.

By May 1996, it should be clear whether the GOE, at the local level as well as centrally, has made progress. (Typical measures of progress include a tariff increase, the passage of enabling legislation, or a labor force readjustment.) Tendering for construction will begin only when it is determined that there has been progress, as defined in the USAID-GOE endorsed action plan. Ideally, tendering for construction should begin mid-1996, and construction should start within one year. As each city will be tendered independently, construction at all sites could take place simultaneously. Realistically, it is expected that progress in implementing action plans will vary, and construction will therefore parallel the pace of policy reform. It should be noted, however, that once construction begins there is no further project conditionality regarding construction.

Upon completion of engineering design and the start of construction, approximately two and a half to three years after project obligation, technical assistance will focus exclusively on institutional strengthening activities typically including training, financial management and accounting, computerization, O&M training and inventory management.

Upon completion of construction works and up to three years afterward, training will be provided to the w/ww staff in the selected cities. Training will focus on operating and maintaining the newly provided facilities. The last year of the project represents reduced assistance and a six month period for final evaluation and project closeout. The USAID role at this time will parallel the pattern established under the Alexandria, Cairo, Provincial Cities and Canal Cities projects.

Shortly after the consultant arrives in the governorate, work will begin in enhancing the skills of the local staff. Courses and on-the-job training will be provided in areas of finance, administration, computerization, inventory control and operations and maintenance. This work will continue until the PACD.

Concurrent with the provision of institutional support for governorate staff, the engineering consultant will begin detailed design of the proposed utility system intervention. Two years are allowed for the completion of the designs.

Construction will be contingent upon progress toward autonomy and self sustainabilty, measured against the negotiated Action Plan. The exact terms and conditions for each governorate will be determined once the consultancy is in process.

On-the-job training will be provided during construction by the construction contractor. This element of the assistance will focus on operating and maintaining the newly-constructed systems. On the job training will continue for three years after construction.

B. Management and Administrative Arrangements

1. GOE Project Management Responsibilities:

The governorates and NOPWASD will be the two GOE entities responsible for the implementation of the proposed project. Governorate involvement, at least at this time, is limited to operating and maintaining the utility agency once the facility is constructed. This includes all matters related to billing, staffing and on-going training. The governorates are also the recipients of the major portion of the technical assistance geared to strengthening local capabilities and engaging the local communities, (i.e. the institutional development component of the project). In this area, the governorates will be supported by an

American consultant. Based on long-standing Mission and GOE practice, the governorates have no involvement in the construction process itself.

USAID's current portfolio of projects with NOPWASD (Provincial Cities and Canal Cities) had initially experienced delays as a result of slow decision making within NOPWASD. USAID explored alternative implementation arrangements but concluded that NOPWASD was the only reasonable choice to implement the construction component of this project. Several modifications to NOPWASD project management and implementation arrangements have been recently introduced to avoid problems experienced previously. For example, GOE counterpart funds for the Canal Cities Project have now been provided on time and in the correct amount. Furthermore, construction site management has been exceptional and has successfully advanced project implementation. Overall, NOPWASD administers a current portfolio of 600 construction contracts throughout the country, providing extra support to donor funded projects as required.

To reinforce the importance of focussed attention on the Secondary Cities Project, it is proposed, in the form of a condition precedent, that NOPWASD establish a Project Implementation Unit specifically to implement the proposed project. The unit will be staffed with qualified personnel representing all of NOPWASD's concerns, properly equipped and delegated sufficient authority to implement the project. The unit will be directly responsible to the Chairman, and its actions (as far as legally possible) will not be subjected to the review and approval of various committees within NOPWASD. In addition, again, in the form of a condition precedent, a Project Steering Committee will be established to monitor project progress. At a minimum, the Project Steering Committee will include a representative of each of the involved governorates, NOPWASD's chairman, a representative of the Ministry of Housing and Public Utilities, the Ministry of Reconstruction and Development and any such other representatives the GOE deems appropriate for successful implementation of the project. The role of the Project Steering Committee is to work with the institutional contractor to provide any necessary guidance and resolve problems during implementation.

2. USAID Project Management:

The Office of Urban Administration and Development (UAD) in the Development Resources (DR) Directorate will be responsible for monitoring project activities on behalf of AID. A U.S. direct hire employee will be assigned as project officer with support from a full time FSN engineer. The UAD Office Director will also monitor project progress, and the DR Associate Director will provide needed guidance and support to the UAD team as required. In addition, up to three additional FSN engineers will be assigned to the project once construction begins. Also, approximately 25 percent of the

time of a direct hire U.S. engineer assigned to the DR/Office of Engineering (DR/ENG) is expected to be devoted to the project. The project plans, project reports, contractor reports, financial reports, consultations with NOPWASD and governorate water and wastewater department heads and other GOE officials, site visits and evaluations will be the Project Officer's tools for monitoring project activities. A monitoring checklist detailing responsibilities will be developed by the Project Officer in the earliest stages of implementation. UAD will seek the support and assistance of others such as the legal, contracting and financial offices within USAID as necessary.

While preliminary estimates indicate that there will be a significant volume of host country and FAR contracting, previous experience in other USAID w/ww projects indicates that the proposed administrative arrangements are indeed feasible. Under the $816 million Cairo Sewerage II and $129 million Provincial Cities Projects, numerous FAR and host country contracts have been managed through similar staffing arrangements.

C. Procurement Plan

1. Contractual Mechanisms: A separate AID direct contract will be awarded for the Institutional Support (IS) Services and Engineering Design/Construction Management (ED/CM) Services required under the project. IQC arrangements will facilitate the environmental, evaluation and host country contracting assessments activities. Host country contracting procedures are not considered appropriate for the IS and ED/CM services because there is no suitable host country agency counterpart which can provide appropriate administrative and management support of a cost type contract. However, based on previous DR/UAD experience with NOPWASD for infrastructure construction, host country contracts and the Fixed Amount Reimbursement method of financing shall be used.

a. **Institutional Support Contract (ISC):** The ISC Contractor will assist the Governorates to develop action plans, implement procedures, laws, regulations, training, annual business plans and other institutional development tasks as required.

A cost-plus-award-fee, performance-based, AID Direct Contract is anticipated. The success of the institutional strengthening activities will be measured by the degree to which the established contract outcomes are achieved using appropriate indicators. Although measured by a mix of indicators, the focus is on the outcome of the contract, i.e. the changes that occur as a result of the activities conducted in the scope of work. Each outcome is linked to tasks to be performed by the contractor. Tasks are specific pieces of work to be carried out by the contractor which, when completed, should contribute to achievement of the outcome to which they are related. The contract outcomes will be based on each Governorate's action plan. An award fee

incentive mechanism will be used to reward initiative, innovation and effectiveness in the performance of the Contract. The Contractor will be assessed on a semi-annual basis according to criteria established in the contract. The evaluation criteria will relate to factors under the control of the Contractor (such as accomplishment of benchmarks in the annual work plan, cost consciousness, communication effectiveness, etc.). The Contractor will not be held accountable for accomplishment of tasks when affected by political or other factors beyond their control.

For monitoring and evaluation of the institutional strengthening component, indicators will be established for each outcome under the contract. All tasks and activities planned and carried out under this contract will also have established indicators. For each task listed in the Statement of Work, offerors will be expected to propose their recommended approaches to carrying out the task and achieving the outcome to which the task contributes.

The Contractor will provide an adequate number of professionals with appropriate disciplines and skills to work with the Governorates to plan and implement each reform action within the agreed-upon time frame as well as to facilitate the award and supervision of the construction contracts through NOPWASD.

The ISC contract will be incrementally funded and extend for the life of project. Subject to the availability of funds, AID's operational objectives and action plan content, the contract may be modified to ensure successful implementation of the project.

As mentioned above, AID Direct Contracting procedures will be used, based on Part 15 of the Federal Acquisition Regulations (FAR). These procedures require the issuance of a Request for Proposal (RFP) which competes offers on the basis of technical and cost proposals. The RFP Technical Evaluation criteria will be developed to appropriately evaluate competing firms which offer strong teams as well as innovative, well-developed and realistic technical proposals.

The participation of disadvantaged enterprises in this procurement will be encouraged in accordance with Mission policy. The technical complexity, demonstrated experience and size of this procurement makes it inappropriate for an 8(a) set-aside.

b. **Engineering Design/Construction Management Contract (ED/CMC)** The ED/CMC Contractor will assist in the design, procurement, project management and supervision of the work associated with the construction of the facilities to be procured under the project; a cost-plus-fixed-fee, AID direct contract will be awarded to a qualified U.S. Engineering firm for these services. The statement of work for the ED/CMC will be based on FIDIC and AID Handbook 11, Chapter 2 to permit the contractor to work closely

with NOPWASD in the management of the host country construction contracts.

The ED/CMC basic contract will be for deliverables, i.e. the design of the water and wastewater systems for each site under the project and the development of construction tendering documents. In certain cases, particularly treatment plants, construction activities might proceed more expeditiously under a design/build contract. As each Governorate meets the CPs established in their particular Action Plan, USAID will exercise the option in the ED/CMC contract to begin solicitation, award and supervision of the construction contracts. Preparation of construction contracts should be straightforward since model contracts have been developed.

USAID must obligate funds for construction before the option in the ED/CMC contract is exercised and the construction management services are initiated. Delays in meeting the CPs in a particular Action Plan will also delay the exercise of the option to initiate the construction management phase of the work for that specific site. The ED/CMC Contractor will be expected to manage these delays to minimize the disruption to the project and its cost impact on the contract.

The option phases will be for levels of effort given the supervisory nature of the work and the inappropriateness of defining a specific deliverable. The Contractor will provide monthly reports detailing the progress of the installations as well as its own level of effort and quality control work. The cognizant Project Officer will monitor the performance of the ED/CMC through regular and frequent site visits and meetings as well as the routine reporting requirements and voucher reviews.

The solicitation procedures for the ED/CMC contract will be in accordance with FAR Part 36.6, entitled Architect & Engineering Services. The participation of disadvantaged enterprises in this procurement will be encouraged in accordance with Mission policy. The technical complexity, demonstrated experience and size of this procurement makes it inappropriate for an 8(a) set-aside.

c. **Environmental Assessment (EA) Contract:** The Environmental Assessments will begin soon after Project initiation using a Delivery Order issued under an Indefinite Quantity Contract (IQC) or Multiple User Contract ("Buy-In") through USAID/Washington. The estimated value of the assessments coupled with the availability of these quick-turn-around contracting mechanisms makes this requirement ideal for an IQC or "Buy-in" Delivery Order. Although these mechanisms are administered in USAID/Washington, the Mission will have sufficient input and oversight through the approval process detailed in the statement of work to assure the appropriateness and quality required. It is

expected that these assessments will be completed in time for design process to begin upon award of the ED/CMC contract.

d. **Construction or Design/Construct Contracts:** The contracts for the main treatment facilities and large water and sewer lines will be awarded and administered as host country contracts with US firms through NOPWASD using normal competitive bidding procedures described in AID Handbook 11, Chapter 2. NOPWASD, with the assistance of the ED/CMC Contractor, will pre-qualify bidders for each procurement, conduct pre-bid conferences and inspections of the respective sites for all pre-qualified bidders and following submission of bids, will evaluate the bids for responsiveness and for each procurement, and award the contract to the lowest responsive, responsible bidder.

The construction work to be done to connect housing to the main sewer or water lines is relatively simple and best achieved through Fixed Amount Reimbursement Agreements (FARA) with NOPWASD for the services of local construction firms. USAID and NOPWASD will negotiate an appropriate FARA for each locality based on the local construction markets. NOPWASD will then be paid the fixed amount for the completion of an agreed upon length of water or sewer lines and hook-ups. The ED/CMC will also be responsible for monitoring the FARA construction activities.

The procurement of each subproject will be tranched, subject to obligation of sufficient funds under the larger project. As conditionality is met by each Governorate, commitment of funds shall be released to begin construction activities.

The construction of major facilities such as treatment plants and large water and sewer lines will likely require the U.S. prime construction contractors to subcontract with suitably qualified US and Egyptian construction firms. The U.S. prime contractor, however, will be held responsible for the quality and performance of all works. Utilization of subcontracted US disadvantaged enterprises will be encouraged where possible.

2. Mode of Contracting and Financing Procedures:

AID Grant funds will finance the foreign exchange and the foreign exchange equivalent of local currency costs for the ISC and ED/CMC contracts, environmental assessments, evaluations and audits which are anticipated to be cost-reimbursable types with payment paid directly by USAID/Cairo. The Project will also finance the foreign exchange costs for the construction contracts and the foreign exchange equivalent of local currency costs for the FARA with payment being made by a USAID/Cairo Direct Letter of Commitment. Funds provided by this project will be used to finance host-country, firm, fixed-priced contracts between NOPWASD and U.S. suppliers of construction services. All equipment and materials to be financed by AID funds will comply with the standard U.S.

source/origin rules. These implementation methods and contracting procedures have been successfully adopted for the contracts financed by AID under previous projects in the water and wastewater sector. The contractors will be paid through use of Mission Direct Letters of Commitment and where NOPWASD is responsible for payment, LE letters of credit.

3. Buy America Considerations:

With the exception of audit and local procurement of commodities and services available locally only, the source of all inputs obtained under this project will be AID Geographic 000. Local procurement and local currency expense will be allowable as provided by AID Handbook 1, Supplement B, Chapter 18 on local cost financing. Audit services will be obtained locally, but as these will be professional services contracts estimated not to exceed $250,000, they are eligible in accordance with Section 18A1c(4) of Handbook 1B, Chapter 18. Although it is not presently known the extent of minor pipeline work required, source and nationality waivers will be required for construction service contracts estimated to exceed $5,000,000 as set forth in Section 18A1c(5) of Handbook 1B. Other support commodities and services include residential and office rent, utilities, temporary lodging allowance, education allowance, local per diem, salaries of local staff, office consumable and short-term vehicle rental. Local procurement of these items is eligible in accordance with Section 18A1c(6) of Handbook 1B, Chapter 18.

D. Training Plan

As part of the institutional support component, the project will fund in-country training as well as a limited amount of participant (overseas) training. Implementation of training activities will be through the institutional support contractor(s), who will also be responsible for conducting training needs assessments in the five sites selected (seven cities) for the project: Mansoura, Nuweiba, Sharm El Sheikh, Luxor, and the Aswan Group. Based on the training needs assessments for each of these cities, the contractor will develop the life-of-project participant and in-country training plans and budgets for each site.

From January through March 1994, a series of studies was carried out that included an institutional/administrative analysis of the organizations providing w/ww services in the cities being considered for inclusion under the project. The analysis described the institutional and administrative configuration of the existing w/ww organizations; identified and described the current levels, types, and quality of staff working in these organizations; and provided estimates on the quality and numbers of staff needed to operate both the existing and the expanded systems in each location. The institutional analysis, however, did not assess detailed training needs in every location or provide

recommendations of the types and levels of training that would be required under the project.

Therefore, it is not possible at this stage to identify all the types of training needed or the numbers of individuals to be trained under the project. However, based on the institutional and administrative analysis carried out and experience under previous projects in the w/ww sector, key fields of training will include areas essential to the operation of a utility such as accounting, inventory control, operation/maintenance (O&M), personnel policy and administration, computerization, and perhaps training of trainers (TOT).

It is anticipated that most of the training will be done in-country. However, some U.S. and possibly third-country participant training will be required such as twinning programs with cities in the U.S. Trainees will be drawn from a variety of occupational groupings within the work force of the water and wastewater organizations in the seven cities included in the project.

As mentioned above, one of the tasks of the institutional support contractor(s) will be to conduct training needs assessments of the water/wastewater organizations in the selected cities. In all probability, the needs for training (and re-training) of staff will vary significantly among the selected locations. Those sites with more experienced and capable staff (such as Mansoura) may not require as much training/re-training as those sites with less experienced staff.

Based on the site-specific needs assessments, the contractor(s) will develop training plans and budgets for both in-country and participant training. The training plans will be developed in accordance with guidelines in AID Handbook 10 (Participant Training) and USAID Mission Order 10-1 (Participant and In-Country Training) dated 2/26/92 and will include the needs assessments, implementation plans, monitoring, reporting, and follow-up plans, and training evaluation plans. As required by Mission Order 10-1, the training plans for the different cities will be approved by the Secondary Cities project committee as well as DR/UAD and HRDC/ET prior to implementation and disbursement of funds for training.

As part of the training needs assessments and training plan development, the institutional support contractor(s) must assess the availability of appropriate training programs in-country, especially those programs offered through the Damanhour Training Center. This assessment will also determine whether there is a need to develop new or improved training programs at the Damanhour Training Center and whether training programs will need to be developed and offered at sites other than Damanhour. If the need for new courses or new training sites is identified, the contractor(s) must determine what curricula and training materials

need to be developed and whether additional trainers will need to be trained to provide the required courses.

In addition to providing appropriate personnel for institutional support activities, the institutional support contractor(s) will need to provide both long-term and short-term training expertise to conduct the needs assessments, develop the training plans and budgets, and implement training activities over the life of project. Short-term training specialists (expatriate and Egyptian) will be required to assist with planning and implementing, monitoring, reporting on, and evaluating in-country training and in further institutionalizing training capacity in the Damanhour Training Center or elsewhere.

Part of the institutional support funding is intended for institutional strengthening, which will include the training activities. During initial stages of project implementation, funding in support of training will be required primarily to carry out the necessary needs assessments for the six project locations and to develop life-of-project training plans and budgets. Actual expenditures for participant and in-country training are not expected until after completion and approval of the training plans.

E. Implementation Schedule and Anticipated Implementation Problems:

1. Project Schedule:

As illustrated in Annex D, significant events of the implementation schedule are as follows:

ACTIONS	DATE
- Project Agreement signed	Sep. 1994
- Project Authorization/Obligation	Sep. 1994
- IQC for the Env. Assessment (EA)	Oct. 1994
- Host country contracting assessment (NOPWASD)	Oct. 1994
- CPs to disbursement for TA met	Nov. 1994
- Institutional Support Contract (ISC):	
CBD notice advertised	Oct. 1994
RFP issued	Nov. 1994
ISC awarded	Mar. 1995
ISC team mobilized	Jun. 1995
- Eng. Design/ Construction Management Contract (ED/CMC):	
CBD notice advertised	Nov. 1994
RFTP issued	Dec. 1994
ED/CMC awarded	Mar. 1995
ED/CMC mobilized	Jun. 1995
- EA completed	Mar. 1995
- Municipal action plans developed	Dec. 1995
- Engineering design completed	Apr. 1996
- CPs prior to construction met	Apr. 1996
- CBD notice for construction contract(s)	May 1996
- IFB issued	Jun. 1996
- Prequalify/Shortlist phase completed	Aug. 1996
- Award contract(s)	Feb. 1997
- Construction firm(s) mobilized	May 1997
- Construction completed	Apr. 2000
- Facilities specific O&M started	May 2000
- Final Project Evaluation	Mar. 2004
- Final Project Closeout	Jun. 2004
- Project Assistance Completion Date	Sep. 2004

2. Anticipated Implementation Problems:

A frequent source of implementation difficulties is the lack of a common agreement as to how a project is to be implemented. To counter this, implementation workshops will be held on a quarterly basis, early in the life of the project, moving to a semi-annual basis for the balance of the life of the project. Staff in the implementing agencies, others in the GOE and USAID who will play a role in the implementation of the project as well as the representatives of various contractors will be invited to attend. These workshops, lasting one to two days, will be held at a site away from the implementing agencies, USAID and the project site.

This is essential to minimize routine work place distractions and to encourage total concentration on detailed project implementation. All costs incidental to the implementation workshops have been included in the proposed financial plan.

F. Proposed Project Conditionality

In addition to standard USAID/Cairo conditions and covenants relating to host country taxes, project evaluation, and authorized representatives, it is currently anticipated that the Grant Agreement will include the following conditions and covenants:

1. Conditions Precedent to First Disbursement. Except as the parties may otherwise agree in writing, prior to any disbursement or to the issuance by A.I.D. of any commitment documents under the Grant Agreement, the Grantee shall furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that adequate staff, physical facilities and financial resources either have been, or on a timely basis will be, made available to NOPWASD to carry out its project implementation responsibilities.

2. Conditions Precedent to Disbursements for Technical Assistance. Except as the parties may otherwise agree in writing, prior to any disbursement or to the issuance by A.I.D. of any commitment documents under the Grant Agreement for the purpose of financing technical assistance, the Grantee shall furnish the following to A.I.D. in form and substance satisfactory to A.I.D.:

(a) Evidence that the Grantee has established a Project Steering Committee which will be responsible for the identification and implementation of necessary policy reforms and which consists of the Chairman of NOPWASD, the Governor (or his/her designee) of each governorate affected by the project, a representative of the Ministry of Housing and Public Utilities, and such other members as the Grantee shall deem appropriate.

(b) Evidence that a Project Implementation Unit has been established within NOPWASD; that such Unit has been, or will be, fully staffed on a timely basis; and that such Unit has full authority to make all routine decisions regarding construction activities, including the award and administration of construction contracts, without review or approval by any other Grantee official.

3. Condition Precedent to Disbursements for Construction. Except as the parties may otherwise agree in writing, prior to any disbursement or to the issuance by A.I.D. of any commitment documents under the Grant Agreement for the purpose of financing the construction of any water/wastewater facility in any city, the Grantee shall furnish the following to A.I.D. in form and

substance satisfactory to A.I.D.:

(a) An Action Plan which describes in detail the actions necessary to transform the water/wastewater authority serving such city into an autonomous organization with full recovery of its operation and maintenance costs.

(b) Evidence that the Grantee has made substantial progress, as determined by A.I.D., towards implementing each of the actions described in the Action Plan.

(c) Evidence that clear title to all land necessary to construct and operate such facility has been obtained

(d) Evidence that an Environmental Assessment has been completed for such facility, together with the Grantee's statement as to how the results of that Assessment will be incorporated into the final design for such facility.

4. Covenants

(a) Exemption from Decennial Liability. The Grantee agrees that contractors, architects, engineers, consultants and subcontractors, regardless of nationality, working on this project shall be exempt from the application of Egyptian law (Articles 651 through 654 of the Civil Code and Law No. 106 of 1976) with respect to decennial liability. This exemption shall not relieve such contractors, architects, consultants or subcontractors of their respective contractual obligations which relate to their duty to exercise sound judgment, in accordance with the standards of their respective professions, to ensure the safety and fitness of the works for the purpose for which they are designed and erected.

(b) Terms of Construction Contracts; Role of the Engineer. Except for contracts to be financed using the Fixed Amount Reimbursement method, each construction contract financed under the project (i) shall be based on the "Conditions of Contract for Works of Civil Engineering Construction", published by the Federation International des Ingenieurs Consei[illegible]IC); (ii) shall appoint as "the Engineer" for purposes c[illegible] I and II of such "Conditions of Contract" the U.S. engineerin[illegible]m which will provide construction design and management se[illegible]es under an A.I.D. direct contract and (iii) shall include prov[illegible]sional sum arrangements and value engineering provisions acceptable to A.I.D.

(c) Salary Supplements and Incentives. Except as the parties may otherwise agree in writing, neither Grant proceeds nor funds derived from the Special Account may be used to pay salary supplements or incentives to Grantee personnel under the project.

CHAPTER VI

MONITORING AND EVALUATION

A. Monitoring of Engineering Design/Construction Management Contractor (ED/CMC):

NOPWASD and USAID are responsible for monitoring the contractor's work. The ED/CMC team will design the infrastructure improvements and then provide construction management services. Monitoring will be through inspection of design reports, vouchers and contents of monthly implementation reports. The Project Implementation Unit (PIU) that will be established within NOPWASD will be working closely with the contractor during the design and construction phase. The USAID Project Officer and his team will meet with the ED/CMC team periodically to follow up the construction progress and resolving contractual problem.

1. Monitoring of Construction Contractors:

The ED/CMC contractor will provide construction management and routine supervision services to the construction contractors. Problems will be identified on a timely basis and reported to NOPWASD through the PIU and USAID with recommended solutions on a timely basis and documented in the monthly progress report. The monthly reports among other topics will compare implementation progress with the project schedule. During the construction period, NOPWASD, USAID, the construction contractors and the ED/CMC contractor will meet frequently to solve problems and evaluate the construction progress.

As infrastructure facilities are completed, the construction contractors will prepare an operation and maintenance program for the selected governorates water/wastewater employees. NOPWASD, USAID and ED/CMC contractor will review and approve the training program. During the implementation of the training program ED/CMC contractor will be responsible for monitoring the contractor's performance. USAID and NOPWASD will review progress on the training activities through site visits, training reports and meetings.

2. Monitoring by the Institutional Support Contractor (ISC): One of the main tasks of the ISC is developing and monitoring the action plan for policy reform(s) at each of the selected cities to achieve institutional autonomy. The plan will contain specific, detailed benchmarks leading to institutional autonomy and self-sufficiency. The ISC will establish performance indicators, baseline data and benchmarks for each action plan to assess progress. These indicators will be reviewed and approved by USAID and GOE. The ISC will track these indicators for USAID and GOE during project implementation.

Monitoring progress against this plan will include, but not be limited to, site visits, evaluations, assessments and periodical reports.

The ISC will also establish an internal monitoring/evaluation system incorporating, but not limited to, information detailed under "Objectively Verifiable Indicators" and "Means Of Verification" in Annex (C): Log Frame. The ISC must make sure that data is routinely and accurately collected and analysis of this data is reported to USAID, NOPWASD and GOE. These monitoring systems will assist in tracking progress in such critical areas as institutional development and health impact.

It is well known that health benefits result from improved quality and increased quantities of water, adequate sanitation facilities, and changes in hygiene behavior. It is expected that the water and wastewater interventions in the target cities in Egypt will reduce the incidence of many diseases that exact a heavy burden on the economy, the community, the family, and the individual. These diseases include schistosomiasis, diarrhea, intestinal parasites, hepatitis A and E, trachoma, Rift Valley Fever, and typhoid. A project of this magnitude has the possibility of dramatically improving the health status of the populations served in the five target areas.

The Mission will request an expert group to recommend a system to document the health impact of the project on families living in areas served. These experts will study the morbidity and mortality patterns in the target areas, assess the quality of available data already collected on a regular basis, and recommend any additional information that should be gathered. They will be expected to outline several possible options for the Mission to consider which will range from the simplest feasible alternative to a complex surveillance system. A minimum maintenance option should be addressed which will develop a baseline and a final project evaluation of the same parameters. The system recommended should provide enough information to determine if other health interventions are needed to ensure health benefits; the desirability and need for a health education intervention should be addressed by the team as well. Once the Mission has selected the preferred alternative, the expert consultants will be asked to design the baseline collection instrument and possibly implement it.

For the different aspects of the project, the ISC in cooperation with USAID and GOE will develop measurable indicators which will capture health and social impact of the project on local communities. The indicators will be based on available information or special studies and will be tracked during the life of the project. The emphasis of the indicators will be to capture impact on project beneficiaries.

NOPWASD and USAID will monitor the ISC activities through inspection of progress reports and frequent meetings. As the ISC will be implementing numerous activities simultaneously, a schedule which explicitly identifies each major task and reporting deadlines will be crucial. ISC will identify problems as they emerge and keep USAID informed of their status until they are resolved. The ISC will also establish monitoring systems and conduct special studies to track progress in achieving the project's goal, purpose and outputs.

B. Evaluation Arrangements:

In addition to evaluating the health impact and reform process of the project, an interim evaluation will be conducted at the end of the fourth year of the project. This evaluation will focus on the progress toward achieving policy reform and institutional autonomy. Institutional technical assistance activities will include the design and development of systems to measure and verify progress toward achievement of institutional autonomy.

The final evaluation will review progress in institutional development and impact on beneficiaries in the selected cities. Baseline data will be provided by the ISC. Prior to the final evaluation team's arrival, USAID will contract a local consulting firm for a survey of residents in the project areas to find out their perception of the effect of project sponsored improvements. The final evaluation team will use this information as well as the baseline data collected through project monitoring systems in assessing overall project impact on beneficiaries.

CHAPTER VII

SUMMARIES OF ANALYSES

A. Summary of Institutional Analysis

The institutional analysis carried out during project design performed preliminary analysis of the operation and maintenance requirements of the recommended project interventions based on the existing institutional arrangements in each city. The preliminary feasibility of various institutional reform options were explored in light of ownership, operation, and maintenance of existing and future facilities.

The objective of the analysis was to develop for each location an institutional arrangement that would support long term sustainability of the utility. The analysis defined the parameters of long term sustainability in terms of the characteristics of a well run, i.e. efficient and effective utility able to set its tariffs and retain its revenues. It also examined the existing institutional mechanisms in each location to identify the institutional gap between the actual conditions and the long term goal.

The analysis recognized that the long term goal will have to be reached through a series of development steps: that several paths exist to the ultimate goal of long term sustainability. It defined various options to achieve O&M cost recovery, revenue retention and local control over resources. These options were compared based on their acceptability and likelihood of achieving institutional results and a recommended option advanced for each location.

Finally, the preferred option was reviewed in relation to existing conditions. Remedies for addressing these constraints were suggested.

Existing Water and Wastewater Arrangements In general, service in the cities under consideration is provided by what the January 1993 World Bank report on the sector refers to as Category IV Organizations: governmental divisions within the organizational structure of the local entity, with engineering departments reporting to the markaz organization or local departments of the Ministry of Housing and Public Utilities.

In the cities and governorates visited, specific organizations for water supply and sanitary drainage do not exist. At the governorate level the service is only one of a number of services provided by the Housing Directorate. A similar situation exists at the city level. There are, however, interesting variations in the way each city provides water and wastewater services.

The tables attached to Volume II, Chapter 7, are derived from the analysis of the conditions in each location, present various indicators of performance reviewed in the Institutional Annex. It further provides an attempt at measuring the gap between the existing condition of service in each location and the desired long term system that achieves the ultimate goal.

Based on available information, comparison can be made regarding the size of the "institutional gap" in each of the locations under consideration. Four measurements have been used to quantify the gap:

- Degree of control or independence exhibited by the local authorities in their dealings with the central government in the water and wastewater sector; the more independent are the local authorities the stronger the likelihood of their being able to move forward.

- Degree of cost recovery; based on the estimates of the team, the ability of the local system to cover its O&M costs. The smaller the jump the easier it will be to achieve sustainability.

- Staffing adequacy; the better the quality and composition of the staff of the location the easier the retraining.

- Management systems performance; the better the workings of the existing system the smaller the required changes.

A review of the information presented in Table 7.1 suggests the following grouping as to the size of the "institutional gap".

SMALLEST GAP	**INTERMEDIATE GAP**	**LARGEST GAP**
Mansoura	Luxor	Armant
Nuweiba	Mahalla El Kobra	Isna
Sharm El Sheikh		Kom Ombo, Darawo, and Nasr City

From the foregoing it is evident that the city with institutional development promise in the delta is Mansoura; in the Sinai, both Nuweiba and Sharm offer potential; while in upper Egypt, Luxor offers an opportunity for change, while Kom Ombo, Nasr City, Darawo and Isna have the largest gap to close to improve institutionally.

Detailed information and background data are presented in the Institutional Annex to this report, including recommendations for addressing the institutional shortfalls.

As a result of the preliminary institutional analysis conducted in the course of the project design, it was evident that

a rational approach to reform was needed to achieve institutional autonomy. Numerous national, governorate, and local level policies constrain the development of sustainable institutional options. Institutional shortcomings such areas as existing organization, overlapping authorities, management, accounting, training needs, and internal control adversely impact efficient facility operation and maintenance. Inadequate cost recovery policies and practices continually lead to deepening government subsidy. The design and development of action plans provide the enabling environment for the reforms needed to achieve institutional autonomy.

The action plans will provide a comprehensive and consistent framework of laws, policies, and institutional arrangements required to achieve reform. Targets, dates, and means of change are specified and agreed upon with USAID through the linking of future systems expansion to the development of utilities. Reform activities in the plans will address such issues as authority, ownership of assets, ability to set personnel policies, establish and modify organizational configuration, procurement of assets, and cost recovery policy. As the complexity of reform requires extensive policy research and data, the action plans define a committee structure to design, move forward and build consensus within the GOE. Accordingly, the plan represents official GOE policy and demonstrates GOE willingness to reform without the prior commitment of USAID to fund construction activities.

B. Summary of Technical Analysis

The technical analysis assessed the existing facilities, in terms of type, size, characteristics, condition, general location and availability of qualified staff to operate and maintain. Existing maps and aerial photographs were reviewed. The current value and remaining useful life of the existing facilities were examined. The feasibility of alternative water and wastewater infrastructure interventions were preliminarily analyzed. The type, size, characteristics, and general location of the future facilities along with the level of additional environmental study were identified. O&M costs, construction time, and useful life of the proposed infrastructure were estimated. Probable population/tourism growth rates and city Master Plan needs were developed and preliminary recommendations for actual w/ww systems made.

In undertaking the technical analysis in each location, the design team reviewed available literature and reports to develop background information for each city and its water and wastewater systems. Using a questionnaire format, each city was visited to collect more detailed information and to assess the present status of facilities. The information was assembled into categories to present a logical development of the facts and to form the basis for reaching decisions on the most appropriate interventions, if any, for the w/ww systems. As part of this development, sketches, flow diagrams, maps and figures were produced to support and clarify points, as required. The compiled information, assembled into draft assessment reports, was reviewed. Requirements for additional information, or for clarification of information, were compiled, and follow-up site visits were conducted.

The initial locations for study included: Nuweiba, Sharm El Sheikh, Luxor, Isna, Mansoura, Mahalla El Kobra, Kom Ombo, Darawo, Nasr City and Hurghada. During the initial field trips to each location, the various interventions that might be considered were discussed with GOE officials at the governorate and city level. Based on more detailed information obtained during these visits, from data developed afterward, and Mission review of the proposed cities, Armant, Isna, Sharm El Sheikh (physical construction of water facilities), Mahalla El Kobra and Hurghada were dropped from the list of Secondary Cities. This technical analyses therefore, focuses on the cities which were proposed to be included in the project.

The attached tables illustrate the type of intervention and the level of funding needed for each city.

C. Summary of Environmental Analyses

The Secondary Cities (SC) project is designed to expand and develop sustainable w/ww systems in selected urban areas. As part of a comprehensive analysis to determine which secondary cities would be the best candidates for participation in this project, environmental analyses were conducted at each site. These analyses consisted of site visits, interviews with city planners and engineers, questionnaires, and a review of existing w/ww treatment plant monitoring data. The proposed interventions (new plant construction or expansion of existing facilities) at each site are different depending upon local needs and capabilities. However, the w/ww treatment approaches which have been proposed are ones with a proven successful track record in Egypt. These interventions include: slow sand filtration systems; rapid sand filtration systems; pond systems (stabilization lagoons, aerated lagoons, oxidation ditches); trickling filters; and conventional activated sludge systems. Selection of appropriate technologies for each site will be highly site-specific.

The status of the candidate cities vary greatly by population, climate, and geology. In the Delta region, the city of Mansoura has a high population density and substantial population (over 500,000), commercial, and industrial development. This area is characterized by high groundwater tables, generally impermeable soils, cooler weather conditions, and very intense competition for land. These conditions are likely to require more advanced w/ww treatment technologies which are more energy intensive but require less land. Treated wastewater effluent will likely have to be discharged into agricultural drains since land disposal would be impractical. Sludge disposal will be a significant issue at these sites.

In the Nile River Valley, the cities are typically smaller with less developed commercial and industrial sectors. The river valley location is characterized by moderately permeable soils, warmer, drier weather, and the close proximity of the desert. While there is competition for available irrigated land, the level of pressure to convert agricultural land to accommodate populations is much lower than in the delta region because of the lower populations and population densities. Darawo, Nasr City, and Kom Ombo are representative of smaller (under 50,000) Nile River valley cities; Luxor represents a larger, more developed version of this category. The proximity of the desert will permit the use of more land intensive wastewater treatment technologies such as stabilization ponds with agricultural reuse of the treated effluent. Great care must be taken to ensure that the numerous antiquities in this area are not negatively affected by the project's activities.

The cities of Sharm El Sheikh and Nuweiba on the Eastern Coast, located on the Sinai peninsula, are small (under 50,000)

with less developed commercial and industrial sectors. However they are heavily oriented towards tourist services. Some of the most spectacular coral reefs in the world are located just offshore from these sites. Their locations along the coast results in generally good soil drainage and warm weather. The cities are effectively in the desert. Sources of water are very limited which impacts the daily lives of the citizens significantly. Interventions in both cities will emphasize water supply (Sharm El Sheikh: engineering design only) and appropriate disposal. Under no circumstances will effluent be discharged into the Red Sea. Instead, desert disposal with possible agricultural reuse will be favored.

A more detailed description of the environmental issues for each city is included in Volume II, Chapter 3.

Recommendations

After a review of the environmental analyses for each site, the cities were given a ranking based on the anticipated impacts, both positive and negative (negative meaning adverse), to the environment and surrounding populations. The greater the potential for introducing a negative environmental impact, the lower the score. The results are summarized below:

Location	Environmental Impact Score
Mansoura	6
Mahalla	6
Nuweiba	8
Sharm El Sheikh	8
Luxor	7
Armant	9
Isna	9
Aswan Group *	9

* Darawo, Nasr City, and Kom Ombo

Significant long-term positive environmental benefits are anticipated for the proposed improvements for water supply and wastewater treatment at all sites. However, the environmental impacts related the Aswan group were generally seen to be less significant than at other sites which resulted in higher scores. Issues related to land use, effluent disposal, sludge disposal, and magnitude of construction will have a greater impact in Mansoura resulting in a lower score.

Recommended Environmental Plan of Action

It is the opinion of the Mission that overall impact of each of the project's activities on the environment will be positive. The project design will place a strong emphasis on the selection of

environmentally sound alternatives. However, there are many environmental issues which have not been fully addressed in the existing studies or within the context of the Project Paper and Technical Annexes. It is proposed that site-specific environmental assessments be prepared for each selected site. The assessments will address the issues identified in the project paper as well as any other issues determined to be significant as a result of the scoping sessions to be held in each city.

As soon as the US contractor for the environmental assessment is selected, a scoping session will be held in each city or locality to refine the Environmental Assessment Scopes of Work. Scoping Sessions are mandated by USAID's environmental regulations (22 CFR 216.6) and form an integral component to the public participatory process. The US contractor will chair a meeting in which the proposed project activities will be presented and discussed. Representatives from USAID/Cairo and local, regional, and national governing bodies as well as NGOs and interested members of the public should attend. Minutes will be kept and summarized in a Scoping Session Report. This report will be submitted to the Bureau Environmental Coordinator for clearance. All environmental issues and/or concerns which are deemed to be environmentally significant will be incorporated into the Environmental Assessment work plan.

D. Summary Of Financial Analyses

The Financial Analysis was performed by WASH, the Secondary Cities Project Consultant, in consultation with USAID'S Office of Financial Management. The analysis is structured to estimate, via a series of sub-analyses, the tariffs requirements to completely recover the operation and maintenance (O&M) costs for the upgraded and proposed facilities in each of the proposed cities.

Capital costs were estimated based on available data obtained from NOPWASD and the facilities visited by the consultant's technical team. Cost assumptions and methodology are provided under the financial analysis annex.

Operation and maintenance (O&M) costs have been estimated as a percentage of capital costs excluding institutional support costs, to ensure full recovery of O&M costs of each facility. The proposed O&M rate chargeable per cubic meter is based on demand analysis completed by the consultant for each city.

Proposed rates were escalated through the useful life of each sub-project and have been adjusted as needed to account for inflation in O&M cost factors, demand projections, bad debts, water loss, etc.

The proposed tariffs varied between the cities according to the gaps between demand and the sub-project production capacity.

As O&M consists of both fixed and variable components of costs, tariffs would change to the extent variable costs are affected by demand fluctuations. Fixed costs will continue to be increased as long as the facility is in operation and even if the demand was nil. The sensitivity analysis showed that if the demand declines by 20 to 50 percent of the survey projections, the proposed increases in tariff levels will still be reasonable.

The overall reasonableness of the proposed tariffs was assessed in light of the current tariffs charged to users (LE 0.35/M3) and the annual tariff increases which actually took place during the period from 1991 to 1994 (the least annual increase was 21%).

The length of the period required to achieve partial to full O&M recovery varied between the various project cities according to cost and demand factors.

Table **IV.7**, Chapter **IV** shows that full coverage in the Aswan Group may be achieved by the year 2000, in Mansoura and Luxor by the year 2005, and over 50 percent coverage in other cities. The study indicates that financial viability cannot be achieved without major institutional change, including labor force adjustments and realistic tariffs.

Some of the assumptions based on which the cost estimates and the tariff analysis were developed in the WASH report have been changed by the Mission as follows:

a) The Life of Project was increased from six years ending in the FY 2000 to ten years ending in the FY 2004. The four additional years provide institutional support for four years ending in FY 2004 and operational support for three years ending in FY 2003.

b) Talkha city was excluded from USAID funding for Mansoura region.

c) Potable water construction and CMC work were excluded from USAID funding for Sharm El Sheikh city.

d) Engineering design costs, as proposed by WASH, have been reduced by two thirds, of which one third was added to institutional support budget to develop the action plans.

The above changes are not reflected in Table **IV.7.** However, Mission believes that the subsequent changes in LOP and proposed interventions have no significant impact on the conclusions reached by the WASH Analysis.

E. Summary Of Economic Analysis:

Preliminary economic analysis was carried out for the five identified sub-projects. This involved a comparison of the economic benefits and costs resulting from each sub-project. Benefits of improved water systems result from: greater access to potable water by households and businesses; higher quality water services; and lower water production and delivery costs. The benefits of wastewater system enhancements result from more households and businesses being connected to wastewater systems.

In general, a willingness-to-pay approach was used to estimate most of the economic benefits resulting from water and wastewater (w/ww) system improvements. That is, demonstrated evidence of what consumers actually pay for w/ww services was used to provide lower bound estimates of the economic benefits they receive from such services. Since w/ww tariffs are not market determined, and are exceedingly low, non-tariff measures of willingness to pay have been used. For example, the typical payment to water vendors by families not serviced by piped water was used as a measure of the benefits of providing such families with piped water, while the annuitized costs of roof water tanks was used to value the benefits of improved water services. Similarly, the benefit of increased sewer connections was valued in terms of what un-sewered households pay to have wastewater vaults emptied on a regular basis.

It should be kept clearly in mind that this approach to economic benefit estimation is apt, for several reasons, to provide a lower bound estimate of benefits. First, the quality of water/waste water services supplied under the sub-projects will be much higher than the services consumers are currently paying for. Thus willingness to pay for the existing lower quality services is a minimum estimate of willingness to pay for the higher quality services to be supplied through the sub-projects. Second, the proposed w/ww system improvements will likely result in a variety of external benefits--such as improved health status and improved working and living conditions--which accrue to individuals who are not directly connected to the new systems. This may be especially true in cities, such as Aswan, which do not have existing wastewater systems. No attempt has been made to include estimates of such benefits in the analyses summarized here due to measurement difficulties.

The results of the preliminary economic analyses are summarized below in Table E.1. There appears to be a strong economic justification for the proposed sub-projects in Mansoura, Sharm El Sheikh, and Nuweiba, which have economic rates of return in the range of 13-18 percent, and a marginally adequate economic justification for the Luxor sub-project.

In contrast, the Aswan group sub-project--as currently designed, costed and valued--is more difficult to justify on an

economic basis. Per beneficiary investment costs are relatively high since Aswan is characterized by a small population, low income, and the lack of any existing wastewater system infrastructure. Before finally committing to this sub-project, the Mission needs to better understand the economic benefits of improved w/ww services there, and the feasibility of introducing w/ww system design modifications which reduce system costs while maintaining adequate supply quality.

Table E.1

Economic Internal Rate of Return for Secondary Cities

(in percentage)

City	Water	Waste water	Combined
Mansoura	14	11	13
Nuweiba	26	-14	18
Sharm El-Sheikh	18	0	15[1]
Luxor	15	2	8
Aswan Group	-1	-10	-6

Implicit in this analysis is a clear linkage between the economic viability of a sub-project and its sustainability. The economic analyses described above assumed a certain acceptable level and quality of service. These can be provided by the local utilities over the long run only if the necessary tariff, legal/regulatory, and operational reforms are implemented by the GOE and the local utilities themselves. In the absence of such reforms, the economic returns to the proposed sub-projects will be considerably reduced. This underlines the importance of the policy reform and institutional strengthening components of the overall project. USAID should make certain that adequate progress is made in achieving these reforms before committing resources to the actual infrastructure improvements.

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[1]The ERR estimated for the water activity in Sharm El Sheikh is included for informational purposes only since the project, as currently designed, will not fund its construction. The ERR determined by the WASH team for the wastewater activity appears to be significantly underestimated in light of the potentially catastrophic impact which serious sewage disposal problems could have on the local economy. It will be revised during the engineering design process.

Next Steps: Results of the economic analysis carried out up to now are clearly preliminary. Before sub-project selection, design, and costing are finalized, the economic viability of individual sub-projects should be rechecked in light of the latest available information. This is especially critical for the Aswan and Sharm El Sheikh sub-projects if the Mission continues to be seriously interested in proceeding with them. In the coming months, the results of the on-going water/wastewater sector economic assessment will provide a much more comprehensive measure of the economic benefits resulting from w/ww system improvements. Once these results are available, they should be integrated into the sub-project economic analyses to see if the findings of the analyses are significantly affected. Further study of ways to reduce w/ww construction and operations costs is also needed--especially for any sub-projects under serious consideration by the mission despite their apparently low economic rates of return. It would be logical to carry out these refinements of the economic analysis during the engineering design phase of the project.

F. Summary of Administrative Analysis

This analysis is aimed at assessing the capacity of various agencies with regard to functions considered critical to the successful implementation of the Project. Secondly, it was designed to assess the adequacy of the proposed implementation arrangements given the relative strengths and weaknesses of concerned GOE agencies.

1. Selection of GOE Implementing Agencies

GOE agencies included in the analysis are NOPWASD, the agency within the Ministry of Housing (MOH) responsible for w/ww policy and construction and the local governorate-based w/ww departments. NOPWASD has served as the implementing agency for all w/ww projects funded by USAID since 1979, with the exception of the projects implemented in Cairo, Alexandria and the water projects in the three Suez Canal cities. Under previous USAID-funded projects, local w/ww departments, which are responsible for the operation and maintenance of w/ww facilities, played virtually no role in the design and construction of physical facilities.

The governorates and NOPWASD were analyzed with regard to their legal authority, their management capabilities including delegation of authority and the adequacy of managerial/supervisory staff, their contracting capacity including award and management of contracts with international firms, their financial management including ability to resolve payment disputes and process payments on timely basis, and their capacity to monitor, evaluate and satisfy typical USAID reporting requirements. The results indicate that there is limited or no capacity within the governorates to manage large projects. The governorates played virtually no role in the design and construction of previously constructed USAID-funded facilities. Although the local authorities have expressed a strong desire to actively participate in the implementation of the Secondary Cities Project, their participation will be limited to involvement in the reform process and not include responsibility for project management.

In March, 1994 the Ministry of Reconstruction and New Communities (MOR) was established separately from the MOH. The MOR, through its implementing agency, the Sinai Development Authority was given responsibility for all development in Sinai. This opened the possibility that the newly formed Ministry would be responsible for implementing a large portion of the Secondary Cities Project. Based on written guidance received from both Ministries, the MOR has agreed to defer to NOPWASD to implement the Secondary Cities Project in Nuweiba and Sharm el Sheikh.

2. Experience in the Implementation of Donor Projects

NOPWASD was charged with the implementation of the Canal Cities Water and Wastewater Project financed by AID. It is also implementing the AID-financed Provincial Cities Development and the Water and Wastewater Institutional Development Projects. In addition, NOPWASD has implemented projects financed by other donors, primarily the French and German governments.

Current USAID experience in NOPWASD's administration of the Canal Cities Project's construction activities is positive. NOPWASD has assigned strong staff to its Canal Cities Project Implementation Unit and site engineering has proceeded smoothly. Counterpart contributions are also being provided on schedule and in the proper amounts. NOPWASD is currently administering more than 600 on-going construction contracts throughout the country and is clearly providing extra support to donor funded projects. Based on this recent experience, USAID is optimistic of continued positive support from NOPWASD in administering the construction component of the Secondary Cities Project.

During previous work involving NOPWASD-administered construction, there was a concern that the projects suffered for lack of meaningful participation of the governorates, the ultimate owners/managers of the w/ww facilities. One important reason for this exclusion was their extremely limited managerial and technical capacity in these areas. A major emphasis on institutional development is being proposed to address these constraints in the new Project. Additionally, the Secondary Cities Project was designed in collaboration with the Governorates to enhance the successful implementation of the Project. Finally, a series of workshops aimed at expediting implementation have been planned over the life of the Project.

3. Weaknesses

NOPWASD, as it exists today, is burdened with a bureaucratic system in which an action on even the smallest of the task gets bogged down in a complex review and approval process. All of the decision making authority is centered in the position of its Chairman. USAID has experienced numerous difficulties during the implementation of the Canal Cities and Provincial Cities projects.

4. Proposed Remedies

If USAID does not address this issue, implementation of the Secondary Cities Project will most certainly experience extensive delays and face other problems. It appears, that at a minimum, NOPWASD should be required to establish a small implementation unit staffed with qualified personnel and with reasonable delegation of authority from its Chairman. It is proposed that all of NOPWASD's

concerns such as engineering, contracting legal, financial and others be represented in the implementation unit. The implementation unit should report directly to the NOPWASD Chairman. The actions/decisions of the implementation unit should not be subjected to the review/approval of any other official/committee of NOPWASD. The establishment of the unit will bring focus to the implementation process, and make an identifiable group accountable for delays and other unresolved difficulties.

The establishment of a unit is, however, no guarantee that the implementation will proceed smoothly and not experience any difficulty. To make sure that NOPWASD is doing all it can, it is proposed that a project steering committee consisting of the Governors of the project cities, or their designees, the NOPWASD Chairman, the Sinai Development Authority Chairman and the representatives of the Ministry of Housing and Public Utilities, the Ministry of Reconstruction and the Ministry of Finance be established. The role of the Project Steering Committee will provide overall guidance, monitor progress, and solve problems during implementation. The Project Steering Committee will meet periodically to review progress and resolve problems as reported by the head of the implementation unit and the contracting personnel. The Project Steering Committee mechanism assures local participation/control. The institutional development aspects of the project will get the proper attention they deserve which otherwise could be ignored. In the process, the local authorities will gain a useful experience in the implementation of large projects. These outcomes in turn contribute, to a certain extent, towards the attainment of another key objective of the Project, i.e., the eventual autonomy and self-sufficiency of the local utilities.

5. Conclusion

Given the existing status of NOPWASD, as discussed above, the creation of an implementation unit and the Project Steering Committee as proposed, and modifications to implementation arrangements based on lessons learned from our previous experience, the implementation of the Secondary Cities Project is most likely to proceed as planned. In summary, it can be concluded that the organizational and implementation arrangements proposed for the Secondary Cities Project are reasonable, and that the Project is administratively feasible.

G) Summary of Social Soundness Analysis

The Secondary Cities Project focuses on, among other things, improving the quality of life of the residents in the selected cities. The urban scene in Egypt is that Cairo, the capital, and Alexandria, the principal port, dominate the other urban cities. Although the two cities represent approximately 1/4 of Egypt's population, they have been receiving 3/4 of the funds allocated for the W/WW sector. This domination is not only reflected in population size, but also in the range and quality of services available to the residents. The subject project will help in reducing this inequity of W/WW services and restoring some balance to Egypt's urban scene. Providing improved utility services will upgrade the quality of life in these smaller cities and may reduce the pressure to move to the two major population centers.

The selected secondary cities are being located among three geographic zones; 1) The Nile Delta (Mansoura); The Upper Egypt (Luxor and Aswan Group); and The Red Sea (Sharm El Sheikh and Nuweiba). The entire population (gender neutral) of each of the selected cities shall benefit either directly or indirectly form the subject project. Physically measurable benefits coupled with sustained economic growth are attributable to improved W/WW services. Although the project is gender neutral, it recognizes that on the household level, women are the prime consumers of W/WW services.

The Secondary Cities Project as designed recognizes that its success is contingent on government support and commitment to policy reform in the W/WW sector, and that an understanding of the local institutional set-up related to that sector is necessary; hence, its framework for partnership is bilateral than multi-lateral, where interaction is seen as being mainly between the project staff and the formal sector. To assure community and public support, the project is formulated to be perceived by the residents in the selected cities as a means of furthering their well-being, improving health practices and sanitation. Appropriate communication channels to approach beneficiaries in general and women in particular are identified. A comprehensive communication strategy will be developed during the course of implementation without upsetting community values and customs. Communication strategies will be flexible and appropriate to the community's socio-economic status and value systems.

The GOE has shown movement toward reform which is aimed at achieving sustainability in the W/WW sector. A presidential decree for AGOSD was signed and publicized. The residents of the selected cities have indicated a willingness to pay for O&M costs provided that adequate services are available. The socio-economic/cultural indicators such as poverty, type of activities,willingness to pay and political involvement among the three zones were identified during the design stage.

For lack of information, the present analysis is a general one and mostly relies on available statistical information and secondary data. The need for an elaborate monitoring/evaluation system and series of small impact studies to resolve this problem may be required during the implementation of the project. Accordingly, technical assistance activities will include designing a monitoring/evaluation system and conducting small impact surveys to develop baseline social impact data.

ANNEX H

GRANTEE REQUEST FOR ASSISTANCE:

TO BE PROVIDED PRIOR TO MISSION DIRECTOR SIGNATURE OF THE PROJECT AGREEMENT

SECONDARY CITIES PROJECT

NO# 263 - 0236

VOLUME II
BACKGROUND DATA AND INFORMATION

REPORT

MARCH 1994

WASH

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Chapter 1

BACKGROUND

1.1 Background Information

USAID has invested approximately $2.2 billion in Egypt over the past fifteen years to help people in urban and rural areas have better access to potable water and sewerage services. Despite considerable institutional strengthening efforts, the sustainability of this investment is seriously jeopardized by inappropriate policies and institutional arrangements which lead to overly centralized Government of Egypt (GOE) control and lack of budgetary resources. At the same time the GOE recognizes that there is a dire need to provide water and wastewater facilities in secondary cities. The National Organization of Potable Water and Sanitary Drainage (NOPWASD) has a backlog of more than 200 secondary cities and that have requested assistance to construct new water and wastewater treatment facilitates and networks or to expand and rehabilitate existing facilities; and has sought USAID assistance in the secondary cities.

In conjunction with the next generation of urban water and wastewater projects, the Mission is pursuing structural changes to utilities that will enable the GOE to establish locally funded, locally controlled water/wastewater utilities, supported by adequate tariffs. There is evidence that the Egyptian people are able and willing to pay for water/wastewater services if the organizations can provide them efficiently.

In order to assist the GOE in amplifying its reform efforts in the wastewater and water sector, USAID is developing a Secondary Cities Project. It has gathered preliminary data from eight locations in six governorates of Egypt. From the data gathered of the cities examined, USAID/Cairo is planning to finance a project which will provide water and/or wastewater infrastructure to up to six of the surveyed cities, provided that appropriate policy and institutional reforms are implemented. The planned project will provide technical assistance to the selected utilities. The long term objective is to achieve an organization that can recover and retain all of its operations and maintenance costs through revenue generation without outside subsidy. Assistance past the engineering design stage will be tied directly to policy reform achievements.

1.2 Objectives of This Assignment

The objective of this assignment is to gather, analyze, organize, develop, and submit background data to enable USAID to develop the Secondary Cities Project Paper. It requires the provision of advisory and assistance services to the Mission in the fields of sanitary engineering, environmental engineering, economics, finance, and social science. Working closely under the supervision of the Mission and collaboration with the GOE, the services to be provided include: (1) analyze the feasibility of water/wastewater projects and sustainable institutional arrangements; (2) define the policy constraints and recommended strategies for reform; (3) refine the estimated

levels of assistance required; (4) explore implementation options; and (5) identify the environmental consequences of site selection (See detailed Scope of Work in Annex S).

Chapter 2

PROCEDURES USED IN PERFORMING TASKS

2.1 Liaison with USAID

During the planning process used to develop a work plan and schedule for the performance of the assignment, the procedures for liaison with USAID were confirmed. The liaison office was the Urban and Administration Development Office of the Development Resources Directorate (DR/UAD). It was also agreed that DR/UAD would closely coordinate the work to be performed with the Project Support Office of the Program Development and Support Directorate (PDS/PS).

In addition procedures were established for frequent communication between the WASH team and the following offices of USAID/Cairo:

- Economic Analysis and Policy Directorate (EAP)
- Financial Management Directorate/Office of Financial Analysis (FM/FA)
- Office of Environment (PDS/ENV)

Close liaison was maintained throughout the conduct of the project by essentially daily communication between the WASH team leader and USAID, frequent contact between members of the project paper team and the WASH staff, briefings held on an approximate two week schedule, and coordination for joint field visits by both USAID and WASH personnel.

2.2 Contacts with GOE Offices and Agencies

Based on arrangements made by USAID, joint visits were made to the following offices and agencies of the GOE:

- National Organization for Potable Water and Sanitary Drainage (NOPWASD)
- Ministry of Housing and Public Utilities (MPHU)
- Offices of the Governors in the governorates of South Sinai, Qena/Luxor, Dakahlia, Gharbia, Aswan, and Hurghada
- City officials in Nuweiba, Sharm El Sheikh, Luxor, Khobra, Kom Ombo, Nasr City, Darawo, and Hurghada

2.3 Field Trips

Introductory visits were made to the six governorates involved by representatives of USAID

and WASH. The overall objectives of the project were reviewed and the role of the WASH consulting team was described. Based on these initial meetings arrangements and schedules were made for field data to be collected at the 11 cities involved. The field data were collected by three teams that spent an average of two days in each location on an initial visit, followed by additional visits as required to obtain additional information and to confirm previously obtained data. To the extent possible teams consisted of an environmental engineer, and financial/economist specialist, and an institutional/administrative specialist. A complete schedule of field visits and persons contacted is included in Annex S.

2.4 Use of Questionnaires

Immediately following the team planning meeting held during the first week of the assignment, questionnaires were developed to assist in the collection of direct information from the selected municipalities and governorates. Three questionnaires were developed: technical, financial and economic, and institutional. During the various field visits and as supplemented in written and telephone communications, the questionnaires were completed to the fullest extent possible.

The major points addressed in the questionnaires are as noted below.

Technical

- General demographic information
- Water and wastewater facilities
  - inventory of existing facilities
  - staffing
  - costs

Financial and economic

- Specific demographic information
- Water and wastewater service information
  - personnel and salaries
  - connections and customer information
  - tariffs and revenues
  - accounting procedures
  - budgets

Institutional

- General data
- Water and wastewater authority
  - structure of utility
  - legal structure
  - organizational structure

information and personnel systems
- information and training practices
supporting information

Copies of the questionnaires are included in Annex S.

2.5 Development of Cost Information

Cost estimates as used in the various analyses have been prepared on the bases of current construction and O&M costs being experienced in the water and wastewater sector. The cost curves were developed using current information and comparing these costs with previous cost methodologies used for the Provincial Cities Development Project. When escalating the previous costs to 1994 costs good correlation was achieved in that the economy of scale factor remain essentially the same as noted in the 1984 cost estimates.

Construction costs were developed from several references, primarily from actual costs currently being experienced, making appropriate allowances for inflation, exchange rates, shipping and insurance charges, and contractor overhead and profit. Cost curves have been used in comparing technical options and in the financial and economic analyses. The curves are presented at the end of this section of the report and cover the following items:

- Water Treatment Plants

  Rapid sand filtration
  Slow sand filtration
  Conventional dual media, high rate filtration
  Dual media, high rate direct filtration

- Water Distribution Lines

  PVC for diameters of 100 to 300 mm
  ACP for diameters of 400 to 600 mm
  PCCP for diameters of 700 to 1200 mm

- Raw Water Intakes and Pump Stations

- Reinforced Concrete Elevated Water Storage Tanks

- Wastewater Treatment Plants

  Waste stabilization ponds
  Trickling filters
  Activated sludge

- Force Mains

- Sewer Lines

PVC for diameters of 175 to 300 mm
VCP for diameters of 200 to 300 mm
RCP for diameters of 400 to 700 mm
PCCP for diameters of 800 to 1200 mm

- Wastewater Pump Stations

For the financial analysis the base construction costs were increased by 15 percent to allow for contingencies during construction. Engineering design and construction surveillance costs were estimated at 15 percent of estimated total construction costs. An additional 3 percent of total construction costs was included for construction management contracts. The total capital cost estimates were escalated to projected mid-year construction for each of the stage of the suggested construction program.

The cost estimates are based on the work being performed by Egyptian contractors. The coefficient used for the conversion of local costs to costs for work to be performed by U.S. contractors is 1.6 times the local costs. This was based on the comparison of the costs for construction of a conventional rapid sand filtration plant. The approximate cost of a 300 lps water treatment plant constructed by a USAID funded contractor was $12 million in 1989. Escalating this cost to 1994 costs (say $16 million) results in a cost approximately 1.6 times greater than the current estimated costs for construction of a similar plant by Egyptian contractor.

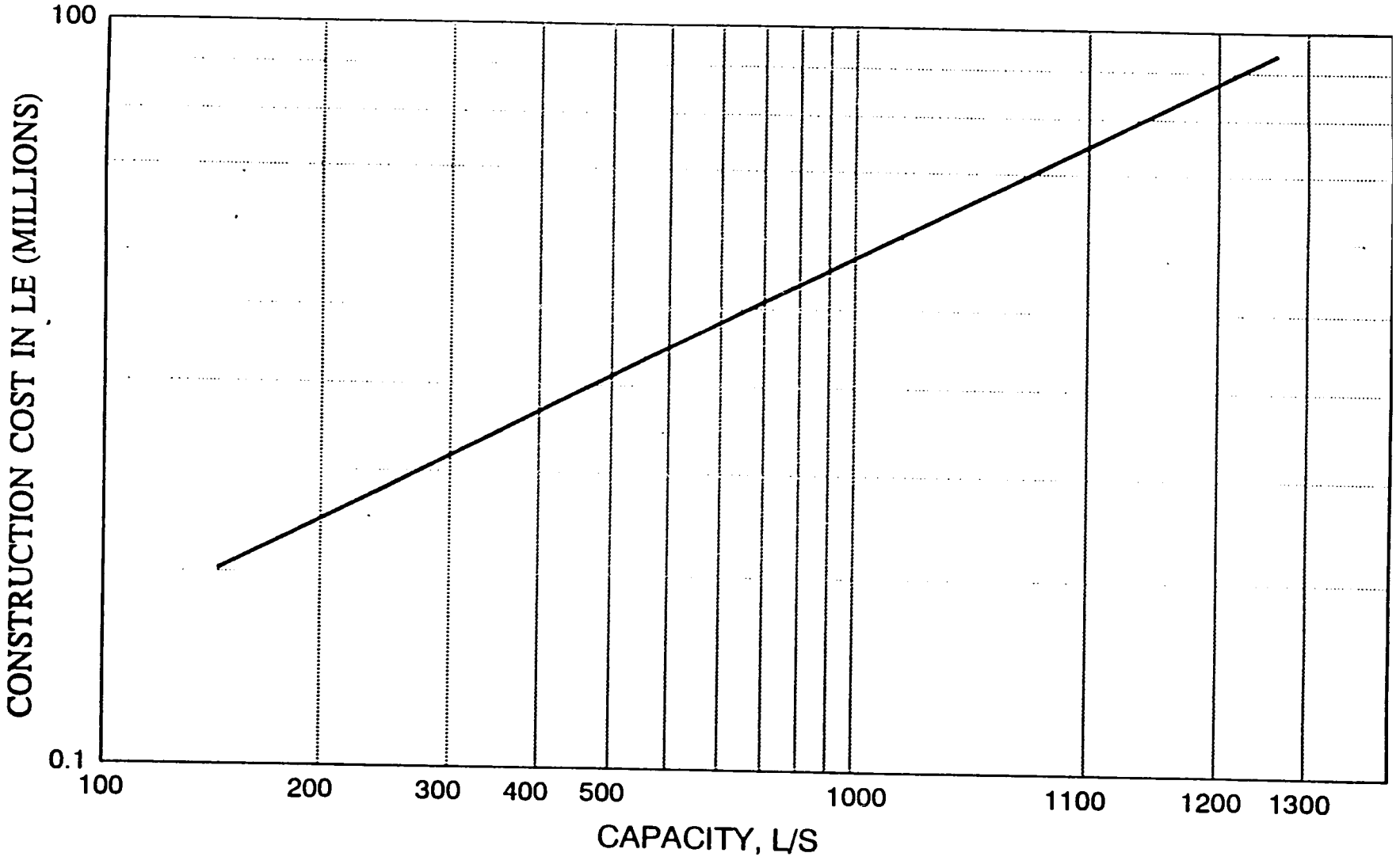

FIG. 2.1 ESTIMATED BASE CONSTRUCTION COST 1994 RAPID SAND WATER FILTERATION PLANTS

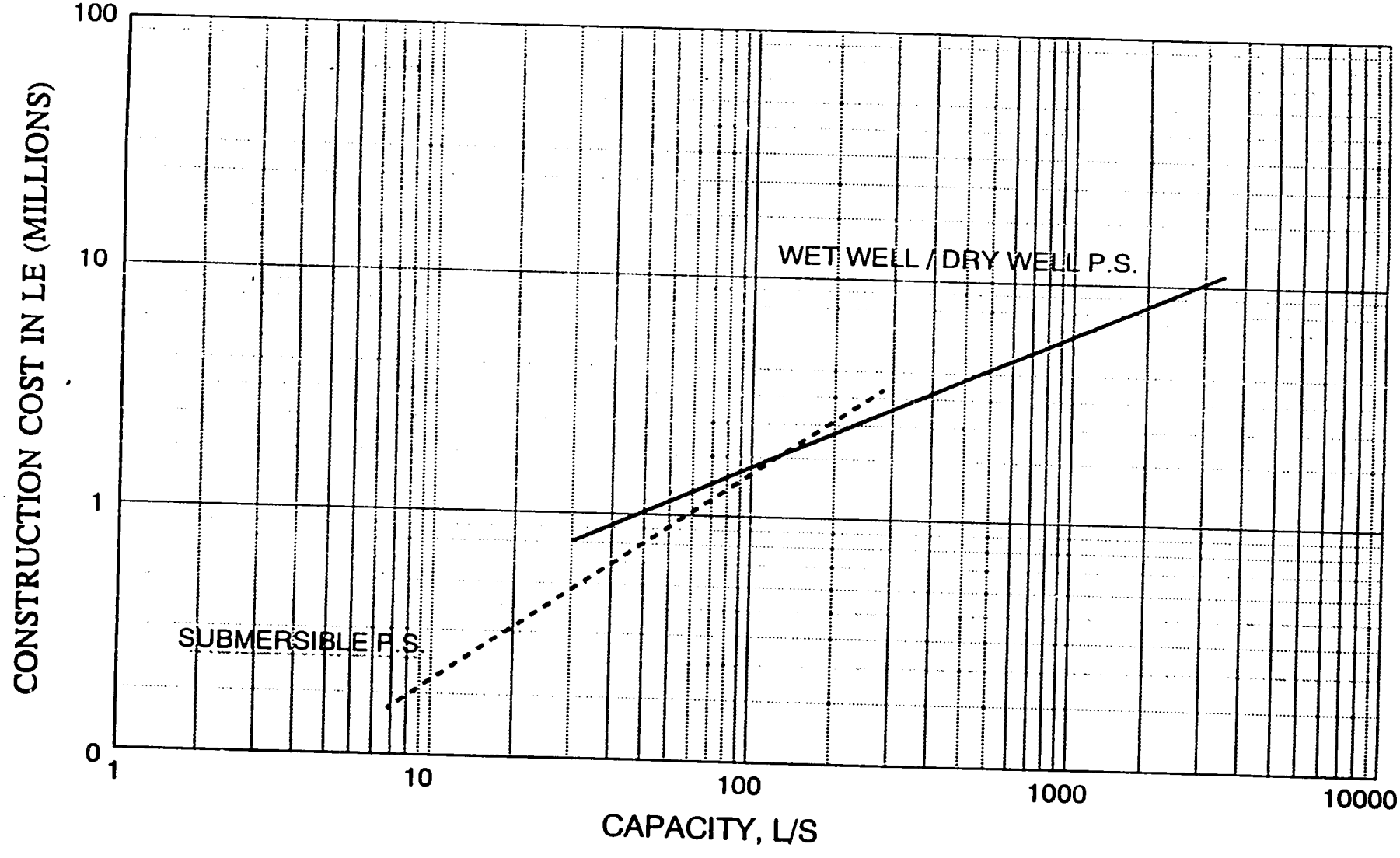

FIG. 2.2 ESTIMATED BASE CONSTRUCTION COST 1994 WASTEWATER PUMP STATIONS

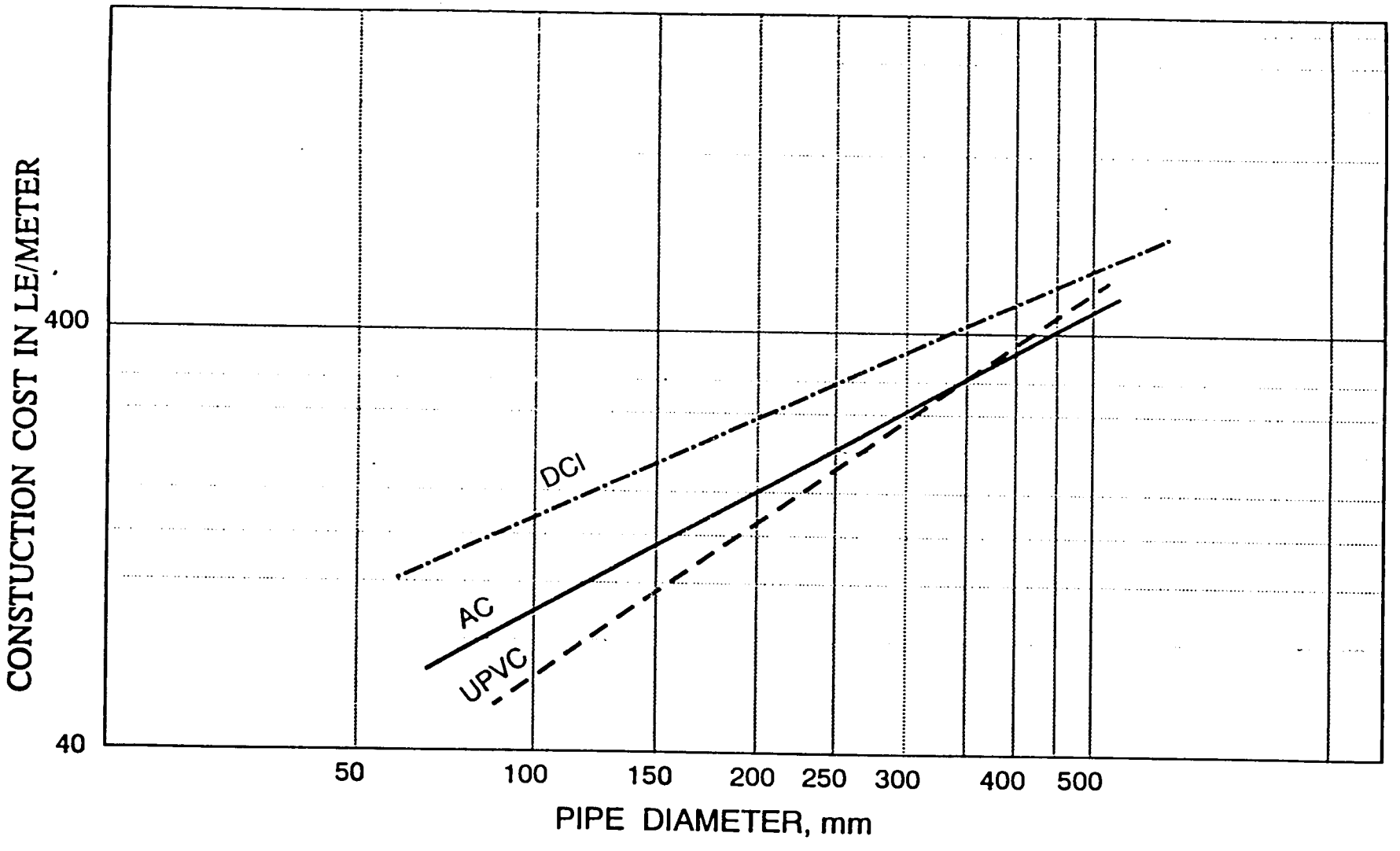

FIG. 2.3 ESTIMATED BASE CONSTRUCTION COST 1994 WATER LINES

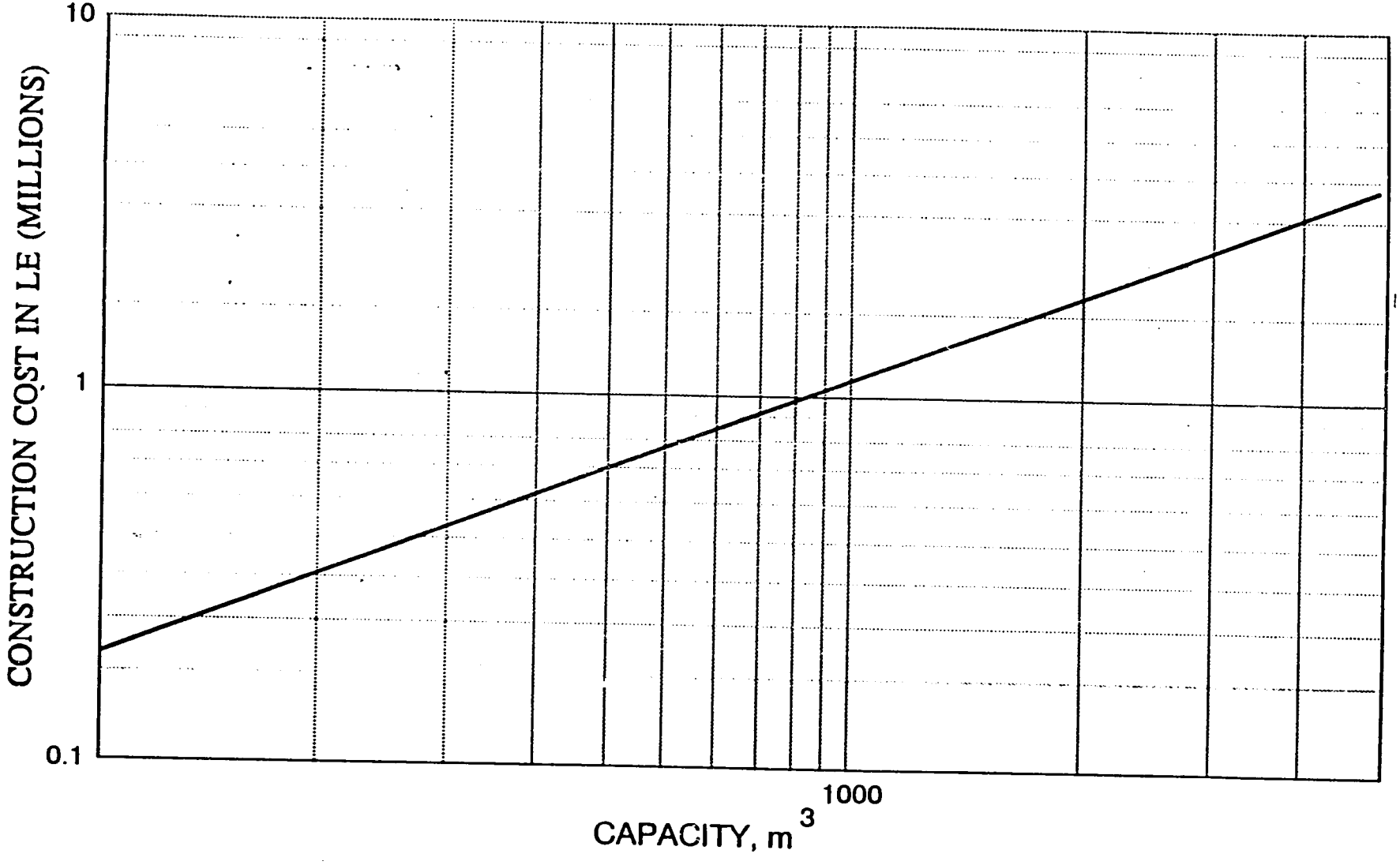

FIG. 2.4 ESTIMATED BASE CONSTRUCTION COST 1994 ELEVATED STORAGE TANKS *

* Maximum height = 30 m, reinforce concrete construction

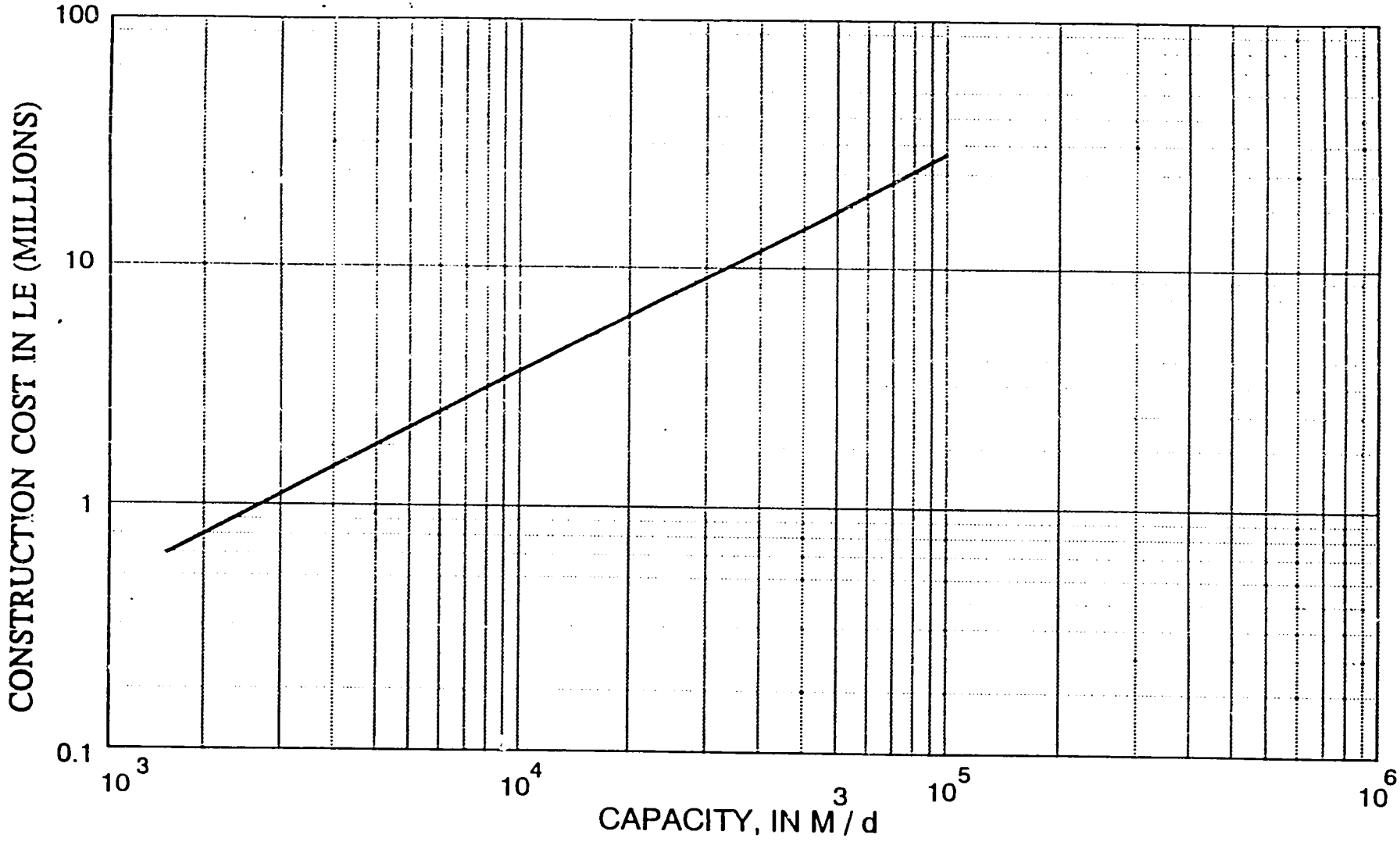

FIG. 2.5 ESTIMATED BASE CONSTRUCTION COST 1994 CONVENTIONAL WASTE STABILIZATION PONDS

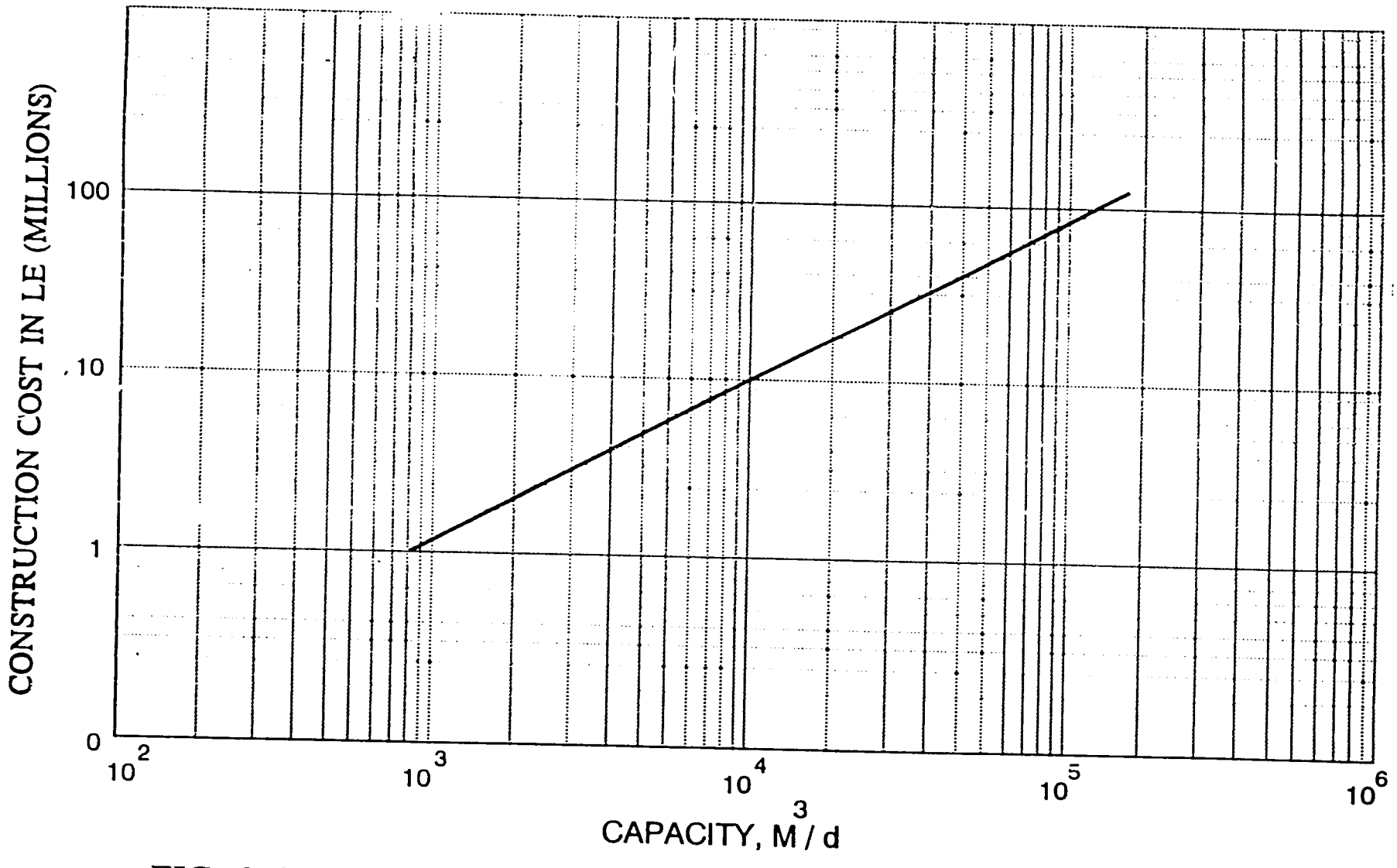

FIG. 2.6 ESTIMATED BASE CONSTRUCTION COST 1994
HIGH RATE TRICKLING FILTERS

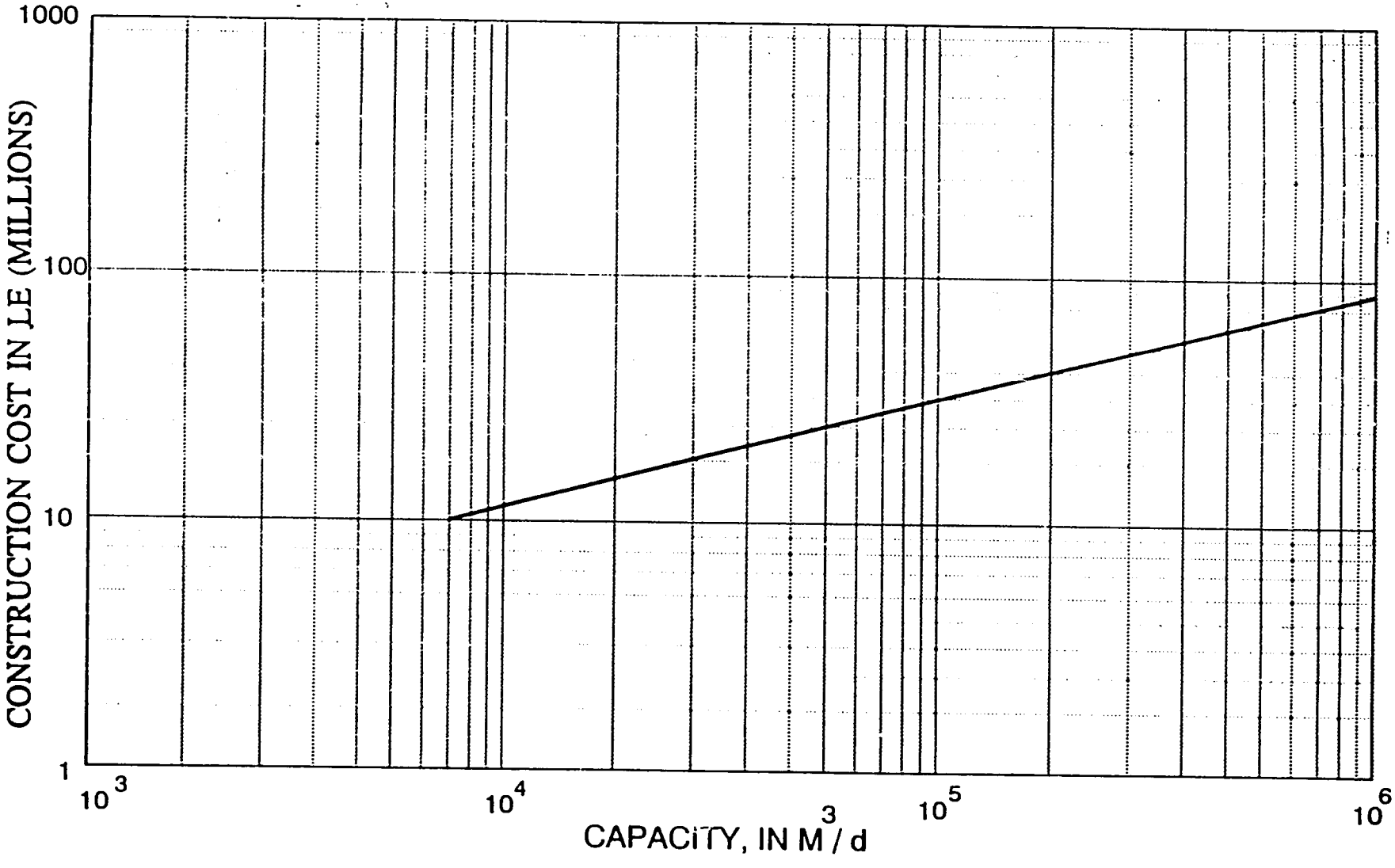

FIG. 2.7 ESTIMATED BASE CONSTRUCTION COST 1994 ACTIVATED SLUDGE WWTP

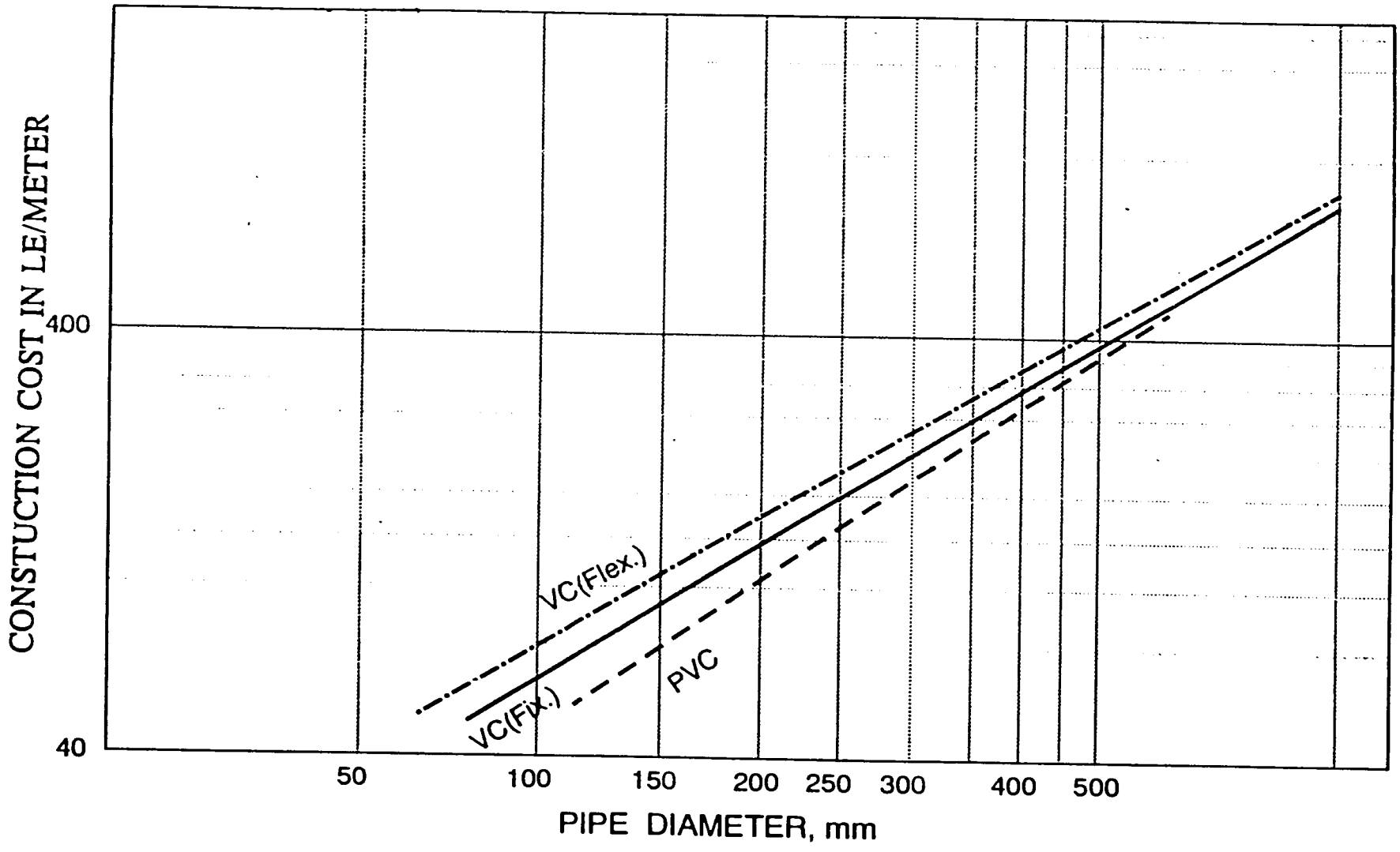

FIG. 2.8 ESTIMATED BASE CONSTRUCTION COST 1994 SEWER LINES

Chapter 3

ENVIRONMENTAL CONSIDERATIONS

3.1 Project Consequences and Necessary Analyses

3.1.1 General Overview

The locations that were reviewed have differing environmental conditions. For a variety of reasons, none of the cities studied is providing residents with the full services of properly-functioning water or wastewater systems. These reasons embrace technical, financial, institutional and social issues. They include unrestrained population growth which outstrips system capacity; improperly designed, constructed and maintained facilities which results in excessive leakage, unplanned system expansion, inoperable equipment, and insufficient manpower and training; and ineffective financial and institutional processes which prevent the systems from performing as efficient public utilities.

From the site investigations and review of available literature, the locations sites can generally be grouped into three basic types:

The Delta Cities

These cities are typically large (200,000 to 500,000) to very large (over 500,000), have substantial population, commercial and industrial development, and relatively high population densities. Their delta locations have high groundwater tables, generally impermeable soils, cooler weather conditions, and very intensive competition for available land. Water is generally abundant. Agricultural land is being transformed into villages and suburban areas, and the cities are expanding and swallowing up nearby settlements. Mansoura and Mahalla El Kobra are in this category.

The Nile River Valley Cities

These cities are typically small (under 50,000) to medium (50,000 to 200,000) sized. They have less developed commercial and industrial sectors, although they may have tourist attractions. Their river valley locations have moderately permeable soils, warmer, drier weather, and the close proximity of the desert. Water is generally abundant. While there is competition for available irrigated land, the level of pressure to convert agricultural to accommodate populations is much lower than in the delta cities because of the relatively lower populations and population densities. Armant, Isna, Darawo, Nasr City and Kom Ombo are representative of the smaller Nile River valley cities; Luxor represents a larger, more developed version of this category.

The Eastern Coastal Cities

These cities are typically small (under 50,000). They have less developed commercial and industrial sectors, but they typically have a developing tourist industry and are heavily oriented

toward tourist services. Their locations along the coast results in generally good soil drainage and warm, dry and often windy weather; the cities are effectively in the desert. Sources of potable water are very limited, and this limitation impacts the daily lives of citizens significantly. These cities have generally low populations and population densities. Vegetation is typically sparse. Nuweiba and Sharm El Sheikh represent this category.

It is important to keep the characteristics of these city types in mind as these characteristics drive a wide variety of environmental factors, including population growth, water supply and sewage disposal strategies, and the relative impacts of potential improvements to water/wastewater systems.

Improvements to the systems must result in better living conditions. However, recommendations for improvements must be selected with a healthy recognition of the prospects for reliable performance. Technical system improvements must be chosen which will have the greatest opportunity for successful performance over the next 20 years. Experience with technologies which have proven themselves to effective in Egypt has been incorporated into the development of recommendations for water and wastewater systems' improvements.

3.1.2 Population Growth

Nationally, the annual growth rate for Egypt is approximately 2.3 percent. In general, populations in the eleven sites studied have population growth rates clustered around that figure. The population growth rates for the locations are summarized in Table 3.1. The number of years needed to double the population at the projected annual growth rate is shown in the last column.

Several comments on the growth rate figures will serve to clarify the estimates:

- The highest growth rate is projected for Sharm El Sheikh. This area is expected to develop rapidly in the next ten years to accommodate the expanding tourist industry in the South Sinai. The growth rate for Nuweiba is also expected to be high for the same reasons. The availability of reliable water services will also encourage population growth as there are few other private-sector employment opportunities elsewhere in these areas.

- The growth rate in Nasr City is projected to be relatively low. Its location away from the Nile River and its rather homogeneous Nubian culture are both expected to contribute to the low figure.

- The growth rates in Armant, Isna, Darawo and Kom Ombo are all fairly consistent. These cities are, in many way, representative of a large majority of potential sites throughout the Nile River Valley. Lack of economic opportunities is seen as a significant factor in keeping these rates from rising.

TABLE 3.1 SUMMARY OF POPULATION GROWTH RATES

Location	1994 Population	Annual Growth Rate	2010 Population	Years to Double
Mansoura[1]	478,095	2.4%	715,506	29.2
Mahalla El Kobra	422,215	2.7%	664,097	26.0
Nuweiba	11,715	3.5%	21,025	20.2
Sharm El Sheikh	6,770	3.1%	11,376	22.7
Luxor	152,100	2.8%	243,227	25.1
Armant	66,265	2.8%	105,966	25.1
Isna	52,235	2.8%	83,530	25.1
Kom Ombo	63,800	2.8%	102,024	25.1
Darawo	30,300	2.3%	44,599	30.5
Nasr City	10,500	2.2%	15,200	31.9

- The growth rates in the Mansoura and Mahalla El Kobra areas, although nominal, will result in significant new populations requiring service simply because of the large population base already present in these cities. These populations will also be absorbed into areas which currently have high population densities. Even modest growth rates in these areas will have the most significant impact on environmental issues.

3.1.3 Public Health

The epidemiological linkages between the diseases in a community and the level of sanitation prevalent in the area has been well-documented. Numerous reports, commissioned by the World Bank, the World Health Organization and other United Nations agencies, have discussed the worldwide impacts of inadequate or impure water supplies and unsanitary sewage disposal practices on public health.

In Egypt, extensive research into water- and sewage-borne diseases has been conducted by the United States Naval Medical Research Unit No. 3 in conjunction with the Abassiya Fever Hospital in Cairo. These studies clearly indicate that the incidence of schistosomasiasis, cholera, typhoid fever, hepatitis A, hepatitis E, roundworm infections, hydatid disease, and diarrhea caused by enterotoxigenic Escherichia coli, shigella, campylobacter, rotavirus, Norwalk agent, giardia lamblia, entamoeba histolytica and cryptosporidium species which are communicated to the general Egyptian population through contact with improperly treated water or by unsanitary

[1] Includes the city of Talkha with a 1994 population of 108,169.

disposal of sewage water containing human fecal wastes. Compounding the problem is the ever-increasing resistance of enteric pathogens to commonly used antibiotics in treatment regimes.

In addition, disease vectors which require stagnant water as part of their life cycle, or which thrive in areas of untreated wastewater, breed and transmit pathogens to humans. Flies, mosquitoes and rodent pests are the most common examples of these types of vectors.

Accurate information regarding specific health conditions in these cities has not been located. However, to varying degrees, all these factors exist in the cities investigated in this report.

3.1.4 Environmental Consequences

The population of Egypt is growing rapidly; most growth is occurring in the relatively confined area of the Nile River valley and delta. Population densities are high. Adequate, reliable water supplies and distribution systems are essential to serve these populations. Similarly, sanitary wastes generated by these populations must be properly treated and disposed. Through both these endeavors, it is necessary to maintain a level of quality of life which will protect the population of controllable diseases which are becoming increasingly resistant to conventional treatment.

These water and wastewater interventions will invariable improve the general public health conditions in the areas in which they installed. It is essential that, in providing systems (or improved systems) to address clearly-defined public needs, other aspects of the environment are not inadvertently harmed. Environmental criteria which must be considered include terrestrial and aquatic ecosystems; air quality; land use; transportation and traffic; public health; antiquities and cultural heritage; and economics. Each of these criteria must be thoroughly assessed against the engineering requirements and plant products associated with each specific intervention at each individual site.

Therefore, the "no action" alternative will, at best, be the continuation of the present situations; more likely, conditions will worsen as populations continue to grow and the reliability of water and wastewater services erodes.

Through a rigorous assessment of the potential issues of environmental criteria which could arise, and the opportunities of recommended interventions to negatively impact these issues, the water and wastewater interventions will produce maximum benefits to the Egyptian population.

3.2 Issues and Preliminary Assessments

3.2.1 Appropriate Technologies

The water and wastewater treatment approaches which have been shown to be most appropriate for consideration have been discussed in detail in Chapter 11 of the Technical Annex. In

assessing the needs of each individual site, these types of interventions have been proposed. These interventions include:

- Water Treatment:
  - Slow sand filtration systems
  - Rapid sand filtration systems

- Wastewater Treatment:
  - Pond systems (stabilization ponds, aerated lagoons, oxidation ditches)
  - Fixed film systems (trickling filters)
  - Activated sludge systems

These water and wastewater treatment processes will impact environmental factors including water quality, aquatic resources, terrestrial and aquatic ecosystem, geology and soils, groundwater, land use, public health, energy, air quality and cultural resources. Table 3.2 presents a general summary of the relative impacts of each of these environmental issues against the water and wastewater treatment technologies which have been considered. Several issues are setting-specific and cannot be assessed generally.

TABLE 3.2
SUMMARY OF IMPACTS OF ENVIRONMENTAL ISSUES

Environmental Factors	Treatment Interventions						
	Water		Wastewater				
	Slow Sand	Rapid Sand	Stabilization Ponds	Aerated Lagoons	Oxidation Ditches	Trickling Filters	Activated Sludge
Water Quality	1	1	2	2	2	2	2
Aquatic Resources	1	1	2	2	2	2	2
Terrestrial/ Aquatic Ecosystems	1	1	2	2	2	2	3
Geology/Soils[4]	-	-	-	-	-	-	-
Groundwater	2	2	2	2	2	2	2
Land Use	1	1	3	2	2	1	1
Public Health[4]	-	-	-	-	-	-	-
Air Quality	1	1	2	2	2	2	2
Cultural Resources[4]	-	-	-	-	-	-	-

Notes: 1 = Least/Lowest Impact; 2 = Moderate Impact; 3 = Greatest/Highest Impact; 4 = setting-specific

Generally, the technical issues are associated with the long-term, day-to-day operation of the facilities; therefore, unresolved environmental issues will continue to cause problems if they are not properly addressed. Specific areas of concern involve process susceptibility and wastewater effluent quality, use of hazardous chemicals, and sludge characteristics and disposal strategy.

In contrast to technical issues, construction-related environmental issues are typically short-term. Nonetheless, they must be evaluated carefully, as construction can last several years on many of these types of interventions. Noise, dust, traffic control, access to emergency services, interruptions to commercial or residential utility services or access, and public safety are among the environmental issues which can be substantially mitigated through carefully-crafted construction documents, rigorous on-site supervision during construction, and appropriate penalties assessed to the contractor for failure to adhere to mitigation procedures.

Other water and wastewater interventions which improve existing system capacity, such as increased water transmission capabilities or expanded sewage collection systems, generally produce no products; they are essential a transportation system. Environmental impacts of these interventions will center primarily on the construction phase and on regular, reliable maintenance of the facilities.

3.2.2 Environmental Criteria

As noted above, the environmental criteria must be considered in consideration of the recommended water or wastewater treatment intervention at each individual site. The environmental criteria cover a wide range of issues. As can be seen, a number of them will, of necessity, overlap:

Water Quality

Water quality is one of the primary environmental factors Surface hydrology and water quality must be assessed. Water quality is primarily associated with raw water drawn for water treatment plants and for water bodies receiving wastewater treatment plant effluent. Physical conditions, including depths, currents, wind patterns and evaporation rates, must be assessed. The potential for changes in pH and salinity must also be determined. Concentrations of pesticides and heavy metals, including mercury, zinc, copper and chromium, need to be established to provide background for determining post-implementation impacts.

The distribution of nutrients, suspended solids and dissolved oxygen will indicate the ability of the water course to support aquatic resource such as phytoplankton, and they will provide an means to evaluate if recommended wastewater treatment processes will generate effluents detrimental to the existing ecosystems.

Aquatic Resources

Potential receiving water bodies, especially the Nile River, all serve as a main source of fish for the local population. The rivers and canals contain active populations of aquatic macrophytic vegetation, phytoplankton, zooplankton, benthos as well as a substantial fish population.

Aquatic resources could be severely impacted by the release of nutrient-rich effluent from wastewater treatment facilities. While the impacts on these organisms of a properly-operated wastewater treatment plant are not expected to be significant, a review of the impacts on aquatic resources, and the possible changes in populations due to effluent introduction, must be thoroughly understood.

Terrestrial and Aquatic Ecosystems

Issues include impacts of the facility and the products on animal and plant life. Sensitive habitats must not be disrupted by facilities siting, construction or operations. Animal populations for endangered species must be carefully monitored before the plant is sited and after the plant is in operation as well as during the construction phase. Sensitive habitats for plant life which could be threatened also need to be identified. The effects of wastewater effluent for reuse on local fauna and flora must also be reviewed.

Similarly, avian species which could be impacted by the facilities must also be monitored. Migratory patterns must not be upset by the destruction of resting areas; indeed, the construction of stabilization ponds may positively encourage migratory patterns.

Issues affecting aquatic ecosystems, including both freshwater and marine environments, primarily involve the impacts of the disposal of wastewater effluent, plant sludges, and other hazardous materials on the site. Of special concern is the disposal of sludges; they may contain concentrated amounts of metallic or toxic compounds which could serious harm fish or other aquatic animal and plant life, including coral.

Geology and Soils

The regional and local geology associated with each individual project must be assessed. In some locations, a single assessment may satisfy several adjacent projects. The presence of unstable soils, which may occur in the delta or along the Nile River valley, must be established so potential for subsidence can be anticipated. The evidence of groundwater must also be determined. The geology and soils information will assist in establishing the structural basis of design for facilities and enable decisions to be made on proper methods of construction.

Groundwater

A complete assessment of the extent, characteristics and flow patterns of groundwater in the vicinity of potential projects must be determined. Of special concern is the opportunity for

changes in groundwater which could affect existing structures, including cultural resources. The groundwater information will assist in establishing percolation rates for the sludge drying beds and, together with the soils data, for determining the need for corrosion protection for pipes and concrete foundations.

Land Use

The impacts on land use represent a major consideration in siting and constructing a water or wastewater facility; these constraints also would apply, to a lesser extent, to projects to expand or rehabilitate water distribution or sewage collection systems. Issues which must be addressed include conflicts with land management plans or urban development plans which exist, especially relating to needs for housing, schools, hospitals, recreation or solid waste landfills. The existence of hazardous wastes on the preferred sites must also be investigated.

Impacts on agricultural development must also be assessed; indeed, it must be confirmed that land which has been identified for treatment facilities, and which is presently under cultivation, can be made available for project use. Conflicts with the use of land under Ministry of Defense control must also be identified.

Also associated with this aspect is the preservation of the natural landscape and resources of the undeveloped regions of Egypt, including the deserts, mountains, national parks and other natural refuge areas.

Several environmental issues relating to transportation and traffic must be considered both as part of the construction phase as well as during regular operation (and maintenance) of all interventions (plants, pump stations, distribution and collection systems).

The impacts of the additional traffic associated with construction, and the traffic generated as a result of plant operations, must be assessed; the need to develop special hours of operation must be considered. Of particular concern are the creation of hazards for the public; normal vehicular and pedestrian traffic movements must not be unduly disrupted. Disruptions to normal traffic patterns during construction must be addressed; potential mitigation measures must be agreed by police officials. In addition, the effects of noise and dust caused by construction equipment must be determined.

The presence of a new treatment plant may generate additional regular traffic involving heavy, multi-axled vehicles. The effects of the regular use of these vehicles on the shortening the useful lives of local roads needs to be evaluated.

Public Health

The availability of reliable water and wastewater services cannot help but improve the public health of the areas being served. Improved physical health and a better quality of life should be principle expectations of the community. Environmental issues associated with providing the

new systems, including land use, transportation/traffic, air quality and ecosystems issues, have already been addressed.

To protect the public health from any undesirable situations or from unforeseen problems, programs to regularly monitor the quality of water and wastewater must be implemented; the Ministry of Health currently schedules the monitoring of all water treatment plants in Egypt on a weekly basis, and this program should be extended to the wastewater treatment plants. An emergency evacuation plan must also be developed to safeguard the population in the event of a chlorine leak at either a water or wastewater treatment plant.

All facilities must be made secure from unauthorized entry; this needs to be done to protect public assets and to limit opportunities for injuries to the general public.

The establishment of a new wastewater treatment facility must not result in an explosion in the populations of insects and rodents which might breed on-site, especially at open, largely unattended facilities such as stabilization ponds; an insect and rodent control strategy may be required.

Energy and Community Economics

The availability of energy to meet water or wastewater treatment plant and pump station requirements must be determined. Electricity costs, which are currently subsidized to a significant level, are scheduled to increase during the life of the proposed projects. The details of the energy costs are addressed in greater detail in Chapter 5 and Section 11 of the financial annex this report. Energy costs, and the initial assumptions, must be reviewed to determine the true financial impacts of the proposed facilities as part of the feasibility study and preliminary design.

The impacts of the new water and wastewater systems on the commercial life of the community should be considered. Improved systems, and the improved sanitary conditions and higher level of the quality of life which the systems bring, will likely be reflected in increased human activity and a growth in commercial activity. For example, improved water and wastewater facilities could contribute to an expansion of the tourist industry in Isna or Kom Ombo.

As noted, the economic implications of improved water and wastewater facilities is discussed in detail in Chapter 6 of this report. Nonetheless, the environmental aspects of improved commercial and business must be considered as part of a thorough environmental assessment. Construction activities in tourist industry-based locations, such as Nuweiba, Sharm El Sheikh and Luxor, must be carefully planned and executed to minimize negative impacts on the local economic environment.

Air Quality

The air quality issues which must be considered center on the release into the atmosphere of

objectionable quantities of dangerous or obnoxious odors. Primary odor sources would include excessive residual chlorine from either water or wastewater treatment operations, or foul odors which could be released at wastewater treatment plants. Air quality concerns become particularly sensitive when plants are sited close to populated areas.

Conversely, the areas selected for treatment plants must not be exposed to external pollution sources. This situation is of particular concern in Mansoura; a solids waste collection area is adjacent to the proposed plant site, and extensive burning on the site creates excessive amounts of irritating smoke.

The potential for excessive emissions from mechanical equipment, especially on-site power generation equipment or from vehicles associated with the processes at the plants, must also be assessed.

Air quality also must be considered in the siting and design of wastewater pumping stations as part of collection system expansions or rehabilitation efforts.

Cultural Resources

Environmental issues associated with the protection of antiques and items of cultural heritage must be addressed. In several sites, including Luxor, Isna and Kom Ombo, there may be opportunities to impact items and areas of historical significance. Concerns regarding exposure of these sites to construction activities and to regular operations must be assessed. Recent sewerage and treatment plant construction activities in the Giza/Abu Rawash area offer examples of dealing with these issues.

Other issues which must be addressed center on the activities which could result in raised groundwater levels. Accelerated deterioration of ancient structures due, in part, to increased human presence as a result of improved water and wastewater systems, must also be considered.

Throughout Egypt, and particularly in the Sinai, local populations of Bedouin families continue to live in nomadic camps. An important environmental issue must center on the protection of Bedouin lifestyle, including their nomadic existence.

3.2.3 Preliminary Assessments of Sites

Technical recommendations for water and/or wastewater interventions to each of the locations investigated have been made. Each of the recommendations has been reviewed against the environmental criteria. A brief assessment of each location is presented below. The list focuses on the potential environmental impacts of the recommended water and wastewater treatment plant interventions; they also consider the impacts of the environment on the interventions. As projects proceed into feasibility study and preliminary design phases, additional environmental concerns may be identified, and others already identified may be expanded or resolved.

Environmental issues, discussed in Chapter 3.2.2, have been compared with proposed interventions at each site. The environmental issues which are likely to be associated with the water distribution and sewage collection systems, whether new or rehabilitated, have been considered. In many cases, there is insufficient information available, at this stage of project development, to make a detailed assessment of environmental issues. For example, the water distribution or wastewater collection systems' routes have not been defined, and the locations of associated pump stations have not been determined. Impacts from the operation of the facilities have been the focus in assessing the relative importance of each environmental issue against each site intervention. However, environmental concerns during the construction period have also been considered Environmental assessments are presented on a site-by-site basis:

- Mansoura Water System

  Construct a new 1,200 l/s WTP: The new inlet structure will affect flow patterns in the Mansouriya canal; the suction of the inlet piping will affect aquatic life. The presence of the plant will require new public restrictions on the use of the canal in the vicinity of the plant. There are no apparent sensitive animal or plant habitats in the vicinity of the proposed plant site. The land on which the plant will be constructed is currently agricultural and is owned by the governorate. Construction of the plant will remove 4 hectares from production; more importantly, the farmers cultivating the land, under rental agreements with the governorate, must find new land to work. During construction, dewatering activities may impact the local area, and additional land may be required temporarily for spoils, storage and concrete batch plant activities. The plant will represent a major electric load on the existing grid; existing capacity may require expansion. The plant site will require rerouting of a local road. The plant also represents a new risk for the local population because of the potential use of gaseous chlorine for disinfection and the possibilities of incurring a chlorine leak. Noise at the plant, and additional traffic required to service the plant, may also become issues. Failure of the plant to operate will result in reduced water services, but there should not be any other significant affects. The local environment will, however, be impacted by any improper operations and maintenance activities occurring at the plant, including unsuitable sludge disposal. The introduction of plant operations will also require a significant improvement program in the water distribution system (to reduce leakage as pressures are raised) and the wastewater collection system (as more water becomes available in the community). Of benefit will be the improvements to water service in terms of quality and quantity; the creation of the plant also represents an opportunity for economic growth in the region.

  Rehabilitate two existing WTPs: The technologies of the plants will not be changed. Both plants are on one site. Because the work does not require the expansion of the existing site or the acquisition of new property, land use issues are not expected to significant. The increase in plant capacity will result in increased electrical energy demands which the existing power grid may not be equipped to handle. The potential for chlorine leakage already exists on the site; the chlorination system of the rehabilitated plant should not substantially increase this risk. The local environment will be impacted by improper

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operations and maintenance activities at the plant, including improper sludge disposal. As a result of the rehabilitated plants, the existing water distribution system will require significant upgrading to handle increased quantities and operating pressures. There is no evidence that hazardous materials have been stored in the areas in which rehabilitation will occur; this needs to be confirmed. During construction, disposal of waste materials generated during the work may be of concern; asbestos was not noted, for example, but it may be present. Public health may be affected if construction results in unacceptable interruptions of service or excessive levels of dust, noise or construction traffic.

Rehabilitate five existing compact units: Since the compact units will be used only in a stand-by mode, daily operational impacts will be negligible. Disposal of waste materials generated during construction should be carefully monitored. No hazardous chemicals or other materials will be stored at the site. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not be able to roam on the site. Electric power consumption will drop in the grid, and other daily impacts, such as traffic and noise, should be eliminated.

Rehabilitate regional distribution system: Improvement in the regional distribution system will have the effect of decreasing the emigration of rural populations to the cities of Mansoura and Talkha, thereby positively impacting population densities in these cities. The primary environmental issues involve public safety, traffic control and service interruptions during construction, including interruptions of water service. The locations of new routes have not been determined; however, if mains cross agricultural land, they must be installed so they do not interfere with agriculture use of the land or become a hazard to farming operations. Likewise, booster pump stations, if required as a result of the hydraulic analysis, are necessary, their impacts on land use, energy consumption and traffic must be assessed.

Rehabilitate and expand local distribution system: As a result of improved water distribution systems, the load on the sewerage collection systems will increase, including costs for more conscientious maintenance; the impact of sewage flooding will also be more severe. A review of all sources of hazardous waste along existing and new routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Because of the high groundwater levels, dewatering of construction trenches may impact adjacent structures; this impact must be considered when developing construction documents. Other environmental issues involve public safety, traffic control and interruptions during construction, including interruptions of water service. Of positive benefit will be improvements in public health expected due to reduced use of other, contaminated water sources as well as the ease in obtaining water.

Mansoura Wastewater System

Construct a new 24,000 m^3/d Talkha WWTP: The most obvious environmental impact will

the dramatic improvements expected in the drains following operation of the new treatment plant, since untreated wastes will not longer be discharged. Like the new water treatment plant, the new wastewater treatment plant will take agricultural land out of service and will displace farmers. There are no apparent endangered species or sensitive habitats on the site of the proposed plant, but this must be confirmed. Normal plant operations have the potential to impact the environment; effluent discharge and sludge drying may increase aquatic plant and algae blooms, and raise insect and rodent populations. This could, in turn, affect the local bird populations. Failure of the plant to operate properly represents a significant risk, as untreated sewage would be released to the drain; this would have an impact on aquatic life and animal and plant life along the drain. Odors generated at the plant, especially as the result of improper operation, will impact local populations; winds are predominately from the northwest, and odors could drift into populated areas. The introduction of the sludge drying beds may also affect migratory bird patterns. Unless the bottoms are sealed, liquid from the sludge beds will infiltrate into the groundwater, and this may have an impact on groundwater quality, especially since there are numerous groundwater wells currently in the area. Large volumes of dried sludge will be generated, and the additional traffic created by the sludge removal process may have an environmental impact. The plant will consume large amounts of electric power which the present local power grid may be unable to provide. The plant also represents a potential public health concern because of the increased risk of leakage from gaseous chlorine on-site which is to be used for pre-chlorination and effluent disinfection. The opportunities for disruptions to plant operations because of industrial waste discharges must also be determined (an industrial survey has already been recommended). The plant will also require the construction of a new road to serve the facility. During construction, environmental issues will center public safety and traffic control. Also during construction, dewatering activities may impact the local area, and additional land may be required temporarily for spoils, storage and concrete batch plant activities.

Expand local collection systems (Mansoura and Talkha): The introduction of reliable sewerage collection, in addition to adequate water supply, will improve public health; it will also encourage emigration of rural populations to the cities if similar levels of service are not provided in the surrounding village areas. In conjunction with the wastewater treatment plant in Talkha, sewerage force mains from Mansoura, presently discharging directly into nearby drains, will be routed into the treatment plant, thereby dramatically improving the quality of the drains. A review of all sources of hazardous waste along existing and new sewerage and force main routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Failure of the system, or portions of the system, to operate properly will have severe environmental implications in the form of sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. The primary environmental issues involve public safety, traffic control and service interruptions during construction, including interruptions of sewage collection or other utility services; pipe connections could present opportunities for raw sewage leakage during construction. Because of the high groundwater levels in Mansoura and Talkha, dewatering of construction

trenches may impact adjacent structures; this impact must be considered when developing construction documents. The impacts on land use, energy consumption and traffic must be assessed for new pump stations. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern.

- Mahalla El Kobra Water System

  Construct a new 1,100 l/s WTP: The new plant inlet structure will affect flow patterns in the Bahr El Shabien Canal; the suction of the inlet piping will affect aquatic life. The presence of the plant will require new public restrictions on the use of the canal in the vicinity of the plant. The land on which the plant will be constructed is currently agricultural and is owned by the governorate. Construction of the plant will remove approximately 4 hectares from production; more importantly, the farmers cultivating the land, under rental agreements with the governorate, must find new land to work. There are no apparent sensitive animal or plant habitats in the vicinity of the proposed plant site. The plant will add a major electric demand on the existing grid, and system capacity may require expansion. The plant site will impact local traffic due to realignment of a local road. The plant also represents a new risk for the local population because of the potential use of gaseous chlorine for disinfection and the possibilities of incurring a chlorine leak. Noise at the plant, and additional traffic required to service the plant, may also become issues. Failure of the plant to operate will result in reduced water services, but there should not be any other significant affects. The local environment will, however, be impacted by any improper operations and maintenance activities occurring at the plant, including unsuitable sludge disposal. The introduction of plant operations will also require a significant improvement program in the distribution system (to reduce leakage as pressures are raised) and the wastewater collection system (as more water becomes available in the community). Of benefit will be the improvements to water service in terms of quality and quantity; the plant also represents an opportunity for economic growth in the region.

  Expand Plant No. 2 by 200 l/s: The technology of the proposed plant expansion will not be changed. Land use issues are not expected to significant because the work does not require the expansion of the existing site or the acquisition of new property. The increased plant capacity will result in increased electrical energy demands which the existing power grid may not be equipped to handle. The potential for chlorination already exists on the site; the presence of the expanded plant should not substantially increase this risk. The local environment will be impacted by improper operations and maintenance activities at the plant, including unacceptable sludge disposal. As a result of the expanded plant, the existing water distribution system will require significant upgrading to handle increased quantities and operating pressures. There is no evidence that hazardous materials have been stored in the areas in which plant expansion will occur; this needs to be confirmed. During construction, disposal of waste materials generated during the work may be of concern. Public health may be affected if construction results in unacceptable interruptions of service or excessive levels of dust, noise or construction traffic.

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Rehabilitate Plants No. 1 and No. 2: As with the expansion of Plant No. 2, the technology of the proposed plant rehabilitations will not be changed. Land use issues are not expected to significant because the work does not require the expansion of the existing site or the acquisition of new property. The electricity demands of the rehabilitated plants will likely increase, and the existing power grid may be undersized. Chlorination systems already exist on the sites; the risks of chlorine leakage presented by the rehabilitated plants should not substantially increase. The local environment will be impacted by improper operations and maintenance activities at the plant, including unsuitable sludge disposal. As a result of the rehabilitation, the existing water distribution system will require significant upgrading to handle increased quantities and operating pressures. There is no evidence of hazardous materials in the areas being rehabilitated; this must be confirmed. During construction, disposal of waste materials generated during the work may be of concern. Public health will be affected if construction results in unacceptable interruptions of service or excessive levels of dust, noise or construction traffic.

Rehabilitate and expand local distribution system: As a result of improved water distribution systems, the load on the sewerage collection systems will increase, including costs for more conscientious maintenance; the impact of sewerage flooding will also be more severe. Reduced reliance on private wells, standpipes and trucked (transported) water will have positive public health and economic impacts. A review of all sources of hazardous waste along both existing and new routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Other environmental issues involve public safety, traffic control and service interruptions during construction, including interruptions of water service.

Mahalla El Kobra Wastewater System

Expand existing WWTP by 30,000 m^3/d: The technology of the proposed plant expansion will not be changed. Land use issues are not expected to significant because the work does not require the expansion of the existing site or the acquisition of new property. There are no endangered species or sensitive habitats on the site of the proposed expansion. Plant expansion must not interfere with ongoing plant operations which may have an adverse impact on effluent quality. The impacts on environmental issues, including terrestrial and aquatic ecosystems, groundwater and public health, of the existing plant and its operations should be assessed to determine if plant expansion will exacerbate existing problems. As with the existing facilities, normal plant operations have the potential to impact the environment; effluent discharge and sludge drying may increase aquatic plant and algae blooms, and raise insect and rodent populations. This could, in turn, affect the local bird populations. As with the existing plant, process or equipment operations problems represent significant risks to the environment since untreated sewage would be released to the drain; this would have an impact on aquatic life and animal and plant life along the drain. Odors generated at the plant, especially as the result of improper operation, will impact local populations; winds from the west will push odors into populated areas. Additional volumes of dried sludge will be generated, and the additional traffic created by the sludge removal

process may have an environmental impact. The expanded plant will consume additional amounts of electric power which the present local power grid may be unable to provide. Chlorination facilities will exist at the plant, and the expansion should not noticeably increase present levels of risk. During construction, environmental issues will center public safety and traffic control.

Expand local collection system: The introduction of reliable sewerage collection, in addition to adequate water supply, will improve public health; it will also encourage emigration of rural populations to the city if similar levels of service are not provided in the surrounding village areas. With the introduction of proper sewerage, instances of sewage flooding should be eliminated. A review of all sources of hazardous waste along existing and new sewerage and force main routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Failure of the system, or portions of the system, to operate properly will have severe environmental implications in the form of sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. Other environmental issues involve public safety, traffic control and interruptions during construction, including interruptions of sewage collection or other utility services. Pipe connections could present opportunities for raw sewage leakage during construction. The impacts on land use, energy consumption and traffic must be assessed for new pump stations. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern.

- Nuweiba Water System

Construct new wells for 5,440 m^3/d: The installation of the new wells will allow the desalination plants to go off-line; this will result in lower overall energy costs, reduced air pollution from on-site diesel generators, reduced noise levels on and around the site, and the elimination of hot, saline waste process water discharges to the sea. Use of the new wells will allow the groundwater table in Nuweiba to return to its normal level; the impact of this restoration is not known. No sensitive animal or plant habitats have been identified in the proposed well area, but this must be confirmed. Although the National Groundwater Research Institute has addressed the technical adequacy of the central Sinai aquifer to supply the Nuweiba system, the environmental impacts of drawing from the aquifer must be determined. Bedouin populations in the area are not expected to be impacted by well construction or operation, but this must be confirmed. The new wells will also result in increased traffic along the existing road, and the effects of the increased traffic must be evaluated. Construction of the wells will temporarily generate noise and air pollution.

Construct new transmission system: No sensitive animal or plant habitats have been identified in the proposed transmission pipe and pump station area, but this must be confirmed. Bedouin populations in the area are not expected to be impacted by pipe or pump station construction or operation, but this must be confirmed. The pump station will

create an new power demand for the existing electric grid; the ability of the system to accommodate this load must be confirmed. On-site electrical power generation, if selected as an alternative to grid power, would create noise and air pollution. The pump station represents a new risk for the local population because of the potential use of gaseous chlorine for disinfection and the possibilities of incurring a chlorine leak. Noise at the pump station, and additional traffic required to service the pump station, may also become issues. Failure of the pump station to operate will result in reduced water services and the temporary use of the desalination plant. Improved water supply from the transmission pipe will require improvements to the water distribution system to accommodate increased quantities and pressures.

Rehabilitate and expand local distribution system: As a result of improved water distribution systems, the load on the sewerage collection systems will increase, including costs for more conscientious maintenance; the impact of sewerage flooding will also be more severe. Reduced reliance on private wells, standpipes and trucked (transported) water will have positive public health and economic impacts. A review of all sources of hazardous waste along existing and new routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Other environmental issues involve public safety, traffic control and interruptions during construction, including interruptions of water service and other utilities. Disposal of waste materials during decommissioning of existing desalination facilities, if added to this project, would also be required. The impacts on the tourist industry due to inconveniences during construction should be considered.

Nuweiba Wastewater System

Expand two stabilization ponds by 4,300 m^3/d: No sensitive animal or plant habitats have been identified in the proposed expanded stabilization ponds' areas, but this must be confirmed. The potential of the ponds to attract migratory birds must be considered. The expanded ponds could create increased insect and rodent populations. The environmental impacts of the present wastewater treatment operations must be assessed to ensure that expansion of the ponds does not exacerbate problems; this review should include operations in the agricultural area using the pond effluent. Because of its central location in Nuweiba, odors generated at the ponds could impact local residents and the tourist areas; these potential impacts require further assessment. Failure of the pond liner could impact the level and quality of groundwater; the impact must be assessed. Public safety at these unattended ponds must also be reviewed. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not be able to roam on the site. There may be problems with effluent quality and disposal during pond expansion. Effluent will be used for reuse, so reuse regulations must be maintained. The types of crops which can be successfully cultivated with the effluent should be assessed to promote the most profitable use of the land. The existing agricultural area can apparently be expanded and watered with the increased effluent volumes. The impacts of alternative disposal schemes must be evaluated if the present agricultural area cannot be

expanded sufficiently to accommodate the increased effluent quantities; however, disposal to the sea will not be an option, so there will be no impacts to marine resources or ecosystems in the Nuweiba area.

Rehabilitate and expand local collection system: The introduction of reliable sewerage collection, in addition to adequate water supply, will improve public health; it will also encourage emigration to Nuweiba. A review of all sources of hazardous waste along existing and new sewerage and force main routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Failure of the system, or portions of the system, to operate properly will have severe environmental implications in the form of sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. Other environmental issues involve public safety, traffic control and interruptions during construction, including interruptions of sewage collection or other utility services. Pipe connections could present opportunities for raw sewage leakage during construction. The impacts on land use, energy consumption and traffic must be assessed for the new pump stations. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern. The impacts on the tourist industry due to inconveniences during construction should be considered.

- Sharm El Sheikh Water System

Construct new transmission system: The capacity of the Wadi Qaa well fields in El Tur should be reconfirmed. The ability of the local electrical power grid to meet the increased pumping requirements of the well field must also be assessed. Unless the geographic extent of wells must be significantly expanded, there should be minimal impact on the Bedouin population. Adequate water supplies through the new two-pipe transmission system will allow the existing water supply methods to be eliminated. Trucked water traffic will decrease, thereby reducing the volume of large vehicles moving along the relatively narrow road between El Tur and Sharm El Sheikh. The new transmission system will also allow the existing public desalination facilities to be decommissioned; this will result in reduced noise and air pollution, reduced energy costs, and reduced hazardous waste (oils, solvents, etc) disposal at the desalination plant site. Sensitive animal or plant habitats along the proposed transmission pipe route must be identified, and proper mitigation measures must be developed. The rehabilitation of the existing pipeline, to be performed by others, should be monitored to understand potential environmental problems associated with construction and operation of the new pipe. Bedouin populations in the area are not expected to be impacted by pipe construction or operation, but this must be confirmed. A failure of the pipe could create localized flooding in the desert; depending on the location, the environmental impacts will vary. The environmental impacts of potential conflicts with military use of the proposed right-of-way should be determined. Construction will create noise, dust and additional traffic.

Rehabilitate and expand local distribution system: Because of the improved water distribution systems, the load on the sewerage collection systems will increase, including costs for more conscientious maintenance; the impact of sewerage flooding will also be more severe. Reduced reliance on standpipes and trucked (transported) water will have positive public health and economic impacts. The new main pump station will represent an additional electrical load which the local system must absorb. The station may also be the source of additional noise and traffic, although these are expected to be minimal. The proximity of the station to commercial and public buildings will increase any negative impacts on the community. In several areas in the old city section, disposal of petroleum products is obvious; a review of all sources of hazardous waste along existing and new routes must be made to identify the nature and levels of potential contaminated soils removal efforts. The primary environmental issues involve public safety, traffic control and service interruptions during construction, including interruptions of water service and other utilities. Disposal of waste materials and contaminated soils during decommissioning of existing desalination facilities, if added to this project, would also be required. The impacts on the tourist industry due to inconveniences during construction should be considered.

Sharm El Sheikh Wastewater System

Expand stabilization ponds by 6,200 m^3/d: No sensitive animal or plant habitats have been identified in the proposed expanded stabilization pond area, but this must be confirmed. The environmental impacts of the present wastewater treatment operations must be assessed to ensure that expansion of the pond does not exacerbate problems; this review should include operations in the agricultural area using the pond effluent. Failure of the pond liner could impact the level and quality of groundwater; the impact must be assessed. The expanded ponds could create increased insect and rodent populations. In addition, migratory birds have stopped near the ponds in the past; the environmental impacts on increasing the pond size must be assessed. Public safety at these unattended ponds must also be reviewed. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not be able to roam on the site. Because of its location, odors, if generated, should not present a problem; however, given the tourist industry sensitivities, this impact must be thoroughly assessed. There may be problems with effluent quality and disposal during pond expansion. Effluent will be used for reuse, so reuse regulations must be maintained. The types of crops which can be successfully cultivated with the effluent should be assessed to promote the most profitable use of the land. The existing agricultural area can apparently be expanded and watered with the increased effluent volumes. The impacts of alternative disposal schemes must be evaluated if the present agricultural area cannot be expanded sufficiently to accommodate the increased effluent quantities; however, disposal to the sea will not be an option, so there will be no impacts to marine resources or ecosystems in the Sharm El Sheikh area.

Rehabilitate and expand local collection system: Reliable sewerage collection, along with adequate water supply, will improve public health. The need to manually remove raw

sewage from vaults, and the need to transport it by truck, will be eliminated. As noted, there are areas within Sharm El Sheikh which show evidence of hazardous waste contamination; all sources of hazardous waste along existing and new sewerage and force main routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Failure of the system, or portions of the system, to operate properly will have severe environmental implications in the form of sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. Two new pump stations represent an additional energy load which the local electrical grid must accommodate. The impacts on land use, energy consumption and traffic must also be assessed for the new pump stations. Other environmental issues involve public safety, traffic control and service interruptions during construction, including interruptions of sewage collection or other utility services. Pipe connections could present opportunities for raw sewage leakage during construction. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern. The impacts on the tourist industry due to inconveniences during construction should be considered.

- Luxor Water System

Expand regional distribution system: Improvement in the regional distribution system should decrease the emigration of rural populations into Luxor, thereby positively impacting population densities. Other environmental issues involve public safety, traffic control and service interruptions during construction. The locations of new regional routes have not been determined; however, if mains cross agricultural land, they must be installed so they do not interfere with agriculture use of the land or become a hazard to farming operations. Because of the presence of significant historical ruins in the Luxor area, potential regional routes must be assessed for the likelihood that cultural resources may be threatened. Booster pump stations, if required as a result of the hydraulic analysis, are necessary, their impacts on land use, energy consumption and traffic must be assessed.

Rehabilitate and expand local distribution system: With improved water distribution systems, loads on (and costs for) the sewerage systems will increase; the impact of sewerage flooding will also be more severe. Reduced reliance on private wells and standpipes will have positive public health and economic impacts: the impact on raised groundwater levels because of reduced use of wells in the agricultural areas should be considered, especially in the historical sections of Luxor. New booster pump stations will represent additional electrical loads which the local system must absorb. The stations may also be the source of additional noise and traffic, although these are expected to be minimal. A review of hazardous waste sources along existing and new routes must be made to identify the nature and levels of potential contaminated soils removal efforts. As with the regional distribution system, the presence of significant historical ruins in the Luxor area creates a potential that cultural resources may be threatened. Other important environmental issues involve public safety, traffic control and service interruptions during construction. The impacts on the

tourist industry due to inconveniences during construction must be assessed.

Luxor Wastewater System

Construct new 24,000 m^3/d stabilization pond: No sensitive animal or plant habitats have been identified in the proposed stabilization pond area just east of the present treatment facilities, but this must be confirmed. The environmental impacts of potential conflicts with military use of the proposed right-of-way should be determined as the proposed site is on the southern approach to Luxor International Airport. The environmental impacts of the proposed treatment operations must be assessed, including the reuse of the effluent for agricultural purposes. The ponds could create increased insect and rodent populations, and the potential to attract migratory birds must be evaluated. Failure of the pond liner could impact the level and quality of groundwater; the impact must be assessed. Public safety at this unattended ponds must also be reviewed. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not be able to roam on the site. Because of its location, odors, if generated, should not present a problem; however, this impact must be thoroughly assessed. As noted, effluent will be used for reuse, so reuse regulations must be maintained. The impacts of alternative disposal schemes must be evaluated if the present agricultural area cannot be expanded sufficiently to accommodate the increased effluent quantities; disposal to the nearby drains may be an option, and the impacts to terrestrial and aquatic ecosystems must be assessed.

Rehabilitate existing WWTP: The basic trickling filter technology of the existing plant will not be changed; however, the process flow patterns will be reviewed to improve performance of the facilities. The environmental impacts of the present wastewater treatment operations must be assessed to ensure that rehabilitation of the plant does not exacerbate problems; this review should include an assessment on aquatic and terrestrial ecosystems and public health which are affected by present discharge practices. Because the work does not require the expansion of the existing site or the acquisition of new property, land use issues are not expected to significant. The local environment will be impacted by improper operations and maintenance activities at the plant, including improper sludge disposal. Sludge drying will require a significantly greater area than is presently on-line; the impact of this additional sludge drying process on the quality of the groundwater table must be evaluated. The increase in plant capacity will result in increased electrical energy demands which the existing power grid may not be equipped to handle. The potential for chlorine leakage will exist on the site; the chlorination system of the rehabilitated plant should not substantially increase that risk. There is no evidence that hazardous materials have been stored in the areas in which plant rehabilitation will occur; however, this needs to be confirmed. During construction, disposal of waste materials generated during the work may be of concern; asbestos was not noted, for example, but it may be present. Public health may be affected if construction results in unacceptable interruptions of service or excessive levels of dust, noise or construction traffic.

Expand local collection system: The introduction of reliable sewerage collection, in addition to adequate water supply, will improve public health. The presence of significant historical ruins in the Luxor area creates a potential that cultural resources may be threatened, especially in areas close to the river. Hazardous waste sources along existing and proposed sewerage and force main routes must be identified to determine the nature and levels of potential contaminated soils removal efforts. Failure of the system to operate properly will have severe environmental implications in the form of sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. Environmental issues also involve public safety and interruptions during construction, including interruptions of sewage collection or other utility services. Pipe connections present opportunities for raw sewage leakage during construction. The impacts on land use, energy consumption and traffic must be assessed for the new pump stations. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern. The new force main from the pump station to the treatment plant will cross agricultural land and will generally parallel the existing pipe; environmental impacts of this pipe are expected to be minor. The impacts on the tourist industry in Luxor due to inconveniences during construction should be considered.

- Armant Water System

Construct new 240 l/s WTP: The new plant inlet structure may affect flow patterns along the shore of the Nile River; the suction of the inlet piping may also affect aquatic life. The presence of the plant will require new public restrictions on the use of the river in the vicinity of the plant. There are no apparent sensitive animal or plant habitats in the vicinity of the proposed plant site. The land on which the plant will be constructed is currently agricultural and is owned by the governorate. Construction of the plant will remove 3 hectares from production, and the farmers cultivating the land must find new land to work. The plant will represent a major electric load on the existing grid; existing capacity may require expansion. The plant site will alter traffic flow patterns in the area of the plant. The plant represents a new risk for the local population because of the potential use of gaseous chlorine for disinfection and the possibilities of incurring a chlorine leak. Noise at the plant, and additional traffic required to service the plant, may also become issues. Failure of the plant to operate will result in reduced water services, but there will not be otherwise affected. The local environment will, however, be impacted by improper operations and maintenance activities occurring at the plant, including unsuitable sludge disposal. The introduction of plant operations will also require a significant improvement program in the distribution system (to reduce leakage as pressures are raised) and construction of a wastewater collection system. Of benefit will be the improvements to water service in terms of quality and quantity; the creation of the plant also represents an opportunity for economic growth in the region. The existing groundwater wells can be taken from service, and the groundwater can return to its natural level; the impact of this on the community must be evaluated.

Rehabilitate compact unit: Since the compact unit will be used only in a stand-by mode, daily operational impacts will be negligible. The site, which is across the street from a school, could also be converted into public or recreational use. Disposal of waste materials generated during construction should be carefully monitored. No hazardous chemicals or other materials will be stored at the site. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not be able to roam on the site. Electric power consumption will drop in the grid, and other daily impacts associated with the unit, such as traffic and noise, should be eliminated.

Rehabilitate and expand local distribution system: As a result of improved water distribution systems, the need for a sewerage collection system will become critical. Reduced reliance on private wells or standpipes will have positive public health and economic impacts. A review of hazardous waste sources along the existing and new routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Other important environmental issues involve public safety, traffic control and service interruptions during construction, including interruptions of water service.

Armant Wastewater System

Construct new 15,000 m^3/d stabilization pond: The presence of sensitive animal or plant habitats in the proposed stabilization pond area must be confirmed. The environmental impacts of the proposed treatment operations must be assessed, including the reuse of the effluent for agricultural purposes. The ponds could generate increased insect and rodent populations, and the potential to attract migratory birds must be evaluated. Failure of the pond liner could impact the level and quality of groundwater; the impact must be assessed. Public safety at this unattended ponds must also be reviewed. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not be able to roam on the site. Because of its location, odors, if generated, should not present a problem; however, this impact must be thoroughly assessed. As noted, effluent will be used for reuse, so reuse regulations must be maintained. The impacts of alternative disposal schemes must be evaluated if the present agricultural area cannot be expanded sufficiently to accommodate the increased effluent quantities; disposal to the nearby drains may be an option, and the impacts to terrestrial and aquatic ecosystems must be assessed. The overall environmental impacts associated with siting of the ponds in a relatively undeveloped area of Qena Governorate must be thoroughly assessed.

Construct new local collection system: The introduction of reliable sewerage collection, in addition to adequate water supply, will dramatically improve public health in Armant. Manual collection of raw sewage, the need to haul it through crowded streets, and the need to dispose it into local watercourses will be eliminated. All hazardous waste sources along existing and new sewerage and force main routes must be identified to determine the nature and levels of potential contaminated soils removal efforts. Failure of the system to operate

properly will have severe environmental implications in the form of sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. Environmental issues also involve public safety, traffic control and interruptions during construction, including interruptions of sewage collection or other utility services. Pipe connections present opportunities for raw sewage leakage during construction. The impacts on land use, energy consumption and traffic must be assessed for two new pump stations once they have been sited. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern. The new force main from the main Armant pump station to the treatment plant will cross agricultural land; environmental impacts of this pipe must be assessed. Connections to the existing sugar cane factory will be required, but the impacts on the environment of treating this industrial flow cannot be determined at this time because information on flows was unavailable. A full environmental assessment of the factory's water and wastewater practices should be performed.

- Isna Water System

Construct new 260 l/s WTP: The new plant inlet structure may affect flow patterns along the shore of the Nile River; the suction of the inlet piping may also affect aquatic life. The presence of the plant will require new public restrictions on the use of the river in the vicinity of the plant. There are no apparent sensitive animal or plant habitats in the vicinity of the proposed plant site; the land on which the plant will be constructed is owned by the governorate. Construction of the new Isna plant will remove 3 hectares from production, and the farmers cultivating the land must find new land to work. The plant will represent a major electric load on the existing grid; existing capacity may require expansion. The plant site will alter traffic flow patterns in the area of the plant. The plant represents a new risk for the local population because of the potential use of gaseous chlorine for disinfection and the possibilities of incurring a chlorine leak. Noise at the plant, and additional traffic required to service the plant, may also become issues. Failure of the plant to operate will result in reduced water services, but there will not be otherwise affected. The local environment will, however, be impacted by improper operations and maintenance activities occurring at the plant, including unsuitable sludge disposal. The introduction of plant operations, along with the rehabilitation work discussed below, will also require a significant improvement program in the distribution system (to reduce leakage as pressures are raised) and construction of a wastewater collection system. Opportunities may exist to uncover cultural items; the potential environmental impacts of disturbing cultural resource must be evaluated. Of benefit will be the improvements to water service in terms of quality and quantity; the creation of the plant also represents an opportunity for economic growth in the region.

Rehabilitate two existing WTPs: The plants' technology will not be changed. The environmental impacts of present treatment operations must be assessed to ensure that rehabilitation of the plants do not exacerbate problems; this review should include an

assessment on aquatic ecosystems and public health which are affected by present practices. Because the work does not require the expansion of the existing site or the acquisition of new property, land use issues are not expected to significant. The rehabilitation will increase electrical energy demands which the existing power grid may not be equipped to handle. Chlorination equipment presently does not function; there is no potential for chlorine leakage presently. The rehabilitated chlorination system will represent an increased risk. The local environment will be impacted by improper operations and maintenance activities at the plant, including improper sludge disposal. The existence of hazardous materials on the site is unknown; this needs to be confirmed. During construction, disposal of waste materials generated during the work and from the demolition of the 1971 plant may be of concern; asbestos was not noted, for example, but it may be present. Public health in Isna may be affected if construction activities result in unacceptable interruptions of service or excessive levels of dust, noise or construction traffic; the plants are in close proximity to populated areas.

Rehabilitate and expand local distribution system: As a result of improved water distribution systems, the need for a sewerage collection system will become critical. Reduced reliance on private wells or standpipes will have positive public health and economic impacts. Two new booster pump stations will represent additional electrical loads which the local system must absorb. The stations may also be the source of additional noise and traffic, although these are expected to be minimal. A review of hazardous waste sources along the existing and proposed routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Because of the high groundwater levels, dewatering of construction trenches may impact adjacent structures; this impact must be considered when developing construction documents. The presence of significant historical ruins in the Isna area creates a potential that cultural resources may be threatened. Other important environmental issues involve public safety, traffic control and interruptions during construction, including interruptions of water service and other utilities. The impacts on the tourist industry due to inconveniences during construction must be assessed.

Isna Wastewater System

Construct new 14,000 m^3/d stabilization pond: The presence of sensitive animal or plant habitats in the proposed stabilization pond area must be confirmed. The overall environmental impacts associated with siting of the ponds in a relatively undeveloped area of the governorate must be thoroughly assessed. The environmental impacts of the proposed treatment operations must be assessed, including the reuse of the effluent for agricultural purposes. The ponds could generate increased insect and rodent populations, and the potential to attract migratory birds must be evaluated. Failure of the pond liner could impact the level and quality of groundwater; the impact must be assessed. Public safety at this unattended ponds must also be reviewed. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not be able to roam on the site. Because of its location, odors, if generated, should not present

a problem; however, this impact must be thoroughly assessed. As noted, effluent will be used for reuse, so reuse regulations must be maintained. The impacts of alternative disposal schemes must be evaluated if the present agricultural area cannot be expanded sufficiently to accommodate the increased effluent quantities; disposal to the nearby drains may be an option, and the impacts to terrestrial and aquatic ecosystems must be assessed.

Construct new local collection system: The introduction of reliable sewerage collection, in addition to adequate water supply, will dramatically improve public health in Isna. Manual collection of raw sewage, the need to haul it through crowded streets, and the need to dispose it into local watercourses will be eliminated. All hazardous waste sources along existing and new sewerage and force main routes must be identified to determine the nature and levels of potential contaminated soils removal efforts. Failure of the system to operate properly will have severe environmental implications in the form of sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. Other environmental issues also involve public safety, traffic control and interruptions during construction, including interruptions of sewage collection or other utility services. Pipe connections present opportunities for raw sewage leakage during construction. The impacts on land use, energy consumption and traffic must be assessed for the new pump stations once they have been sited. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern. The new force main from the main Isna pump station to the treatment plant will cross agricultural land; environmental impacts of this pipe must be evaluated. The presence of historical ruins in the Isna area creates a potential that cultural resources may be threatened. The impacts on the tourist industry due to inconveniences during construction must be assessed.

- Kom Ombo Water System

Rehabilitate and expand existing 200 l/s WTP: The technology of the plant will not be changed. The local environment will be impacted by improper operations and maintenance activities at the plant, including improper sludge disposal. The environmental impacts of present treatment operations must be assessed to ensure that rehabilitation of the plant does not exacerbate problems; this review should include an assessment on aquatic ecosystems and public health which are affected by present practices. Because the work does not require the expansion of the existing site or the acquisition of new property, land use issues are not expected to significant. The increase in plant capacity will result in increased electrical energy demands which the existing power grid may not be equipped to handle. The chlorination system for the new/rehabilitated plant represents an increased risk only if it is used. Noise at the plant, and additional traffic required to service the plant, may also become issues. Failure of the plant to operate will result in reduced water services, but there will not be otherwise affected. There is no evidence that hazardous materials have been stored in the areas in which plant expansion or rehabilitation will occur; this needs to be confirmed. During construction, disposal of waste materials generated during the work

may be of concern; asbestos was not noted, for example, but it may be present. Public health may be affected if construction results in unacceptable interruptions of service or excessive levels of dust, noise or construction traffic. The introduction of plant operations will also require a significant improvement program in the distribution system (to reduce leakage as pressures are raised) and construction of a wastewater collection system; as a result of the rehabilitated plant, the existing local distribution system in Kom Ombo will require significant upgrading to handle increased quantities and operating pressures. Of benefit will be the improvements to water service in terms of quality and quantity; the creation of the plant also represents an opportunity for economic growth in the region. The existing groundwater wells can be taken from service, and the groundwater can return to its natural level; the impact of this on the community must be evaluated.

Rehabilitate regional distribution system: This work will be undertaken in conjunction with the Nasr City regional transmission pipe work. Improvement in the regional distribution system will have the effect of decreasing the emigration of rural populations into the e cities, thereby positively impacting population densities. Other environmental issues involve public safety, traffic control and service interruptions during construction. The locations of new routes have not been determined; however, whenever mains cross agricultural land, they must be installed so they do not interfere with agriculture use of the land or become a hazard to farming operations. Because of the presence of historical ruins in the Kom Ombo area, potential regional routes must be assessed for the likelihood that cultural resources may be threatened. Booster pump stations, if required as a result of the hydraulic analysis, are necessary, their impacts on land use, energy consumption and traffic must be assessed.

Rehabilitate and expand local distribution system: As a result of improved water distribution systems, the need for a sewerage collection system will become critical. Reduced reliance on private wells and standpipes will have positive public health and economic impacts. New booster pump stations will represent additional electrical loads which the local system must absorb. The stations may also be the source of additional noise and traffic, although these are expected to be minimal. A review of hazardous waste sources along the existing and proposed routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Because of the high groundwater levels, dewatering of construction trenches may impact adjacent structures; this impact must be considered when developing construction documents. The presence of historical ruins in the Kom Ombo area creates a potential that cultural resources may be threatened. Other important environmental issues involve public safety, traffic control and interruptions during construction, including interruptions of water service. The impacts on the tourist industry due to inconveniences during construction must be assessed.

Kom Ombo Wastewater System

Construct new 14,000 m^3/d stabilization pond: The construction of this pond will be undertaken in conjunction with the Darawo pond. The overall environmental impacts associated with siting of the ponds in a relatively undeveloped area of the governorate must

be thoroughly assessed. The presence of sensitive animal or plant habitats in the proposed stabilization pond area must be confirmed. The environmental impacts of the proposed treatment operations must be assessed, including the reuse of the effluent for agricultural purposes. The ponds could create increased insect and rodent populations, and the potential to attract migratory birds must be evaluated. Failure of the pond liner could impact the level and quality of groundwater; the impact must be assessed. Public safety at this unattended ponds must also be reviewed. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not be able to roam on the site. Because of its location, odors, if generated, should not present a problem; however, this impact must be thoroughly assessed. As noted, effluent will be used for reuse, so reuse regulations must be maintained. The impacts of alternative disposal schemes must be evaluated if the present agricultural area cannot be expanded sufficiently to accommodate the increased effluent quantities; disposal to the nearby drains may be an option, and the impacts to terrestrial and aquatic ecosystems must be assessed.

Construct new local collection system: The introduction of reliable sewerage collection, in addition to adequate water supply, will dramatically improve public health in Kom Ombo. Manual collection of raw sewage, the need to haul it through crowded streets, and the need to dispose it into local watercourses will be eliminated. All hazardous waste sources along existing and proposed sewerage and force main routes must be identified to determine the nature and levels of potential contaminated soils removal efforts. Failure of the system to operate properly will have severe environmental implications in the form of sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. Environmental issues also involve public safety, traffic control and interruptions during construction, including interruptions of sewage collection or other utility services. Because of the high groundwater levels, dewatering of construction trenches may impact adjacent structures; this impact must be considered when developing construction documents. Pipe connections present opportunities for raw sewage leakage during construction. The impacts on land use, energy consumption and traffic must be assessed for the new pump stations once they have been sited. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern. The presence of historical ruins in the Kom Ombo area creates a potential that cultural resources may be threatened. The new force main from the main Kom Ombo pump station to the treatment plant will cross agricultural land; environmental impacts of this pipe must be assessed. Connections to the existing sugar cane processing and silica iron factories will be required; but the impacts on the environment of treating these industrial flows cannot be determined at this time because information on flows was unavailable. Full environmental assessments of the factories' water and wastewater practices should be performed. The impacts on the tourist industry due to inconveniences during construction must be assessed.

- Darawo Water System

Rehabilitate existing 80 l/s WTP: The technology of the Darawo plant will not be changed. The environmental impacts of present treatment operations must be assessed to ensure that rehabilitation of the plant does not exacerbate problems; this review should include an assessment on aquatic ecosystems and public health which are affected by present practices. Because the work does not require the expansion of the existing site or the acquisition of new property, land use issues are not expected to significant. The rehabilitation will increase electrical energy demands which the existing power grid may not be equipped to handle. Chlorination equipment presently does not function; there is no potential for chlorine leakage presently. The rehabilitated chlorination system represents an increased risk; the plant is in close proximity to populated areas. The local environment will be impacted by improper operations and maintenance activities at the plant, including improper sludge disposal. As a result of the rehabilitated plant, the existing distribution system will require significant upgrading to handle increased quantities and operating pressures. The existence of hazardous materials on the site is unknown; this needs to be confirmed. During construction, disposal of waste materials generated during the work may be of concern; asbestos was not noted, for example, but it may be present. Public health may be affected if construction results in unacceptable interruptions of service or excessive levels of dust, noise or construction traffic.

Rehabilitate and expand local distribution system: As a result of improved water distribution systems, the need for a sewerage collection system will become critical. Reduced reliance on private wells and standpipes will have positive public health and economic impacts. Because of the high groundwater levels in parts of Darawo, dewatering of construction trenches may impact adjacent structures; this impact must be considered when developing construction documents. A review of hazardous waste sources along the existing and proposed routes must be made to identify the nature and levels of potential contaminated soils removal efforts. Other important environmental issues involve public safety, traffic control and service interruptions during construction, including interruptions of water service.

Darawo Wastewater System

Construct new 6,850 m^3/d stabilization pond: The construction of this pond will be undertaken in conjunction with the Kom Ombo pond. The overall environmental impacts associated with siting of the ponds in a relatively undeveloped area of the governorate must be thoroughly assessed. The presence of sensitive animal or plant habitats in the proposed stabilization pond area must be confirmed. The environmental impacts of the proposed treatment operations must be assessed, including the reuse of the effluent for agricultural purposes. The ponds could create increased insect and rodent populations, and the potential to attract migratory birds must be evaluated. Failure of the pond liner could impact the level and quality of groundwater; the impact must be assessed. Public safety at this unattended ponds must also be reviewed. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not

be able to roam on the site. Because of its location, odors, if generated, should not present a problem; however, this impact must be thoroughly assessed. As noted, effluent will be used for reuse, so reuse regulations must be maintained. The impacts of alternative disposal schemes must be evaluated if the present agricultural area cannot be expanded sufficiently to accommodate the increased effluent quantities; disposal to the nearby drains may be an option, and the impacts to terrestrial and aquatic ecosystems must be assessed.

Construct new local collection system: The introduction of reliable sewerage collection, in addition to adequate water supply, will dramatically improve public health in Darawo. Manual collection of raw sewage, the need to haul it through crowded streets, and the need to dispose it into local watercourses will be eliminated. All hazardous waste sources along existing and new sewerage and force main routes must be identified to determine the nature and levels of potential contaminated soils removal efforts. Failure of the system to operate properly will have severe environmental implications in the form of sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. Environmental issues also involve public safety, traffic control and interruptions during construction, including interruptions of sewage collection or other utility services. Because of the relatively high groundwater levels in parts of Darawo, dewatering of construction trenches may impact adjacent structures; this impact must be considered when developing construction documents. Pipe connections present opportunities for raw sewage leakage during construction. The impacts on land use, energy consumption and traffic must be assessed for the new pump stations once they have been sited. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern. The new force main from the main Darawo pump station to the treatment plant will cross agricultural land; environmental impacts of this pipe must be evaluated.

- Nasr City Water System

Rehabilitate regional transmission pipe: The work is to be undertaken in conjunction with the Kom Ombo regional supply system. Improvement in the regional distribution system will have the effect of reducing the incentive to emigrate from rural areas to the cities. The force main runs through agricultural areas along the main road connecting Nasr City and Kom Ombo; land use impacting farming, traffic control and safety will present a major environmental issue. A booster pump station, if required as a result of the hydraulic analysis, is necessary, its impacts on land use, energy consumption and traffic must be assessed.

Rehabilitate and expand local distribution system: As a result of improved water distribution systems, the need for a sewerage collection system will become critical. Reduced reliance on standpipes and trucked (transported) water will have positive public health and economic impacts. A review of hazardous waste sources along the existing and proposed routes must be made to identify the nature and levels of potential contaminated soils removal efforts.

Other important environmental issues involve public safety, traffic control and service interruptions during construction, including interruptions of water service.

Nasr City Wastewater System

Construct new 2,300 m^3/d stabilization pond: The presence of sensitive animal or plant habitats in the proposed stabilization pond area must be confirmed. The overall environmental impacts associated with siting of the ponds in a relatively undeveloped area of the governorate must be thoroughly assessed. The environmental impacts of the proposed treatment operations must be assessed, including the reuse of the effluent for agricultural purposes. The ponds could create increased insect and rodent populations, and the potential to attract migratory birds must be evaluated. Failure of the pond liner could impact the level and quality of groundwater; the impact must be assessed. Public safety at this unattended ponds must also be reviewed. Proper security provisions will be required to maintain public health and safety; residents should not be able to enter and injure themselves, to vandalize the facility, or to discard solid wastes, and stray animals should not be able to roam on the site. Because of its location, odors, if generated, should not present a problem; however, this impact must be thoroughly assessed depending on final site selection and the predominate wind direction (from the west). As noted, effluent will be used for reuse, so reuse regulations must be maintained. The impacts of alternative disposal schemes must be evaluated if the present agricultural area cannot be expanded sufficiently to accommodate the increased effluent quantities; disposal to the nearby drains may be an option, and the impacts to terrestrial and aquatic ecosystems must be assessed.

Construct new local collection system: The introduction of reliable sewerage collection, in addition to adequate water supply, will dramatically improve public health in Nasr City. Although there is a partial system, it is ineffective. Manual collection of raw sewage, the need to haul it through crowded streets, and the need to dispose it, along with the sewerage system flows, into local watercourses will be eliminated. All hazardous waste sources along existing and new sewerage and force main routes must be identified to determine the nature and levels of potential contaminated soils removal efforts. Failure of the system to operate properly will have severe environmental implications resulting from sewage flooding. Improper operation and maintenance also has the potential to create environmental problems of odors and disposal of material removed during sewer cleaning operations. Environmental issues also involve public safety, traffic control and interruptions during construction, including interruptions of sewage collection or other utility services. Pipe connections present opportunities for raw sewage leakage during construction. The impacts on land use, energy consumption and traffic must be assessed for the new pump stations once they have been sited. House connections will require very close contact with individual building owners and residents, and construction safety (or lack thereof) will be a very important environmental concern. The new force main from a new main Nasr City pump station to the treatment plant will cross agricultural land; environmental impacts of this pipe must be assessed.

Chapter 4

TECHNICAL ANALYSIS

4.1 Introduction

In undertaking the technical analysis in each location, a standard process was followed. Discussed in detail in Chapter 2, this process included review of available literature and reports to develop background information for each city and its water and wastewater systems. Using a questionnaire format, each city was visited to collected more detailed information and to assess the present status of facilities. The information was assembled into categories in order to present a logical development of the facts and to form the basis for reaching decisions on the most appropriate interventions, if any, for the water and wastewater systems for each individual city. As part of this development, sketches, flow diagrams, maps and figures were produced to support and clarify points, as required. The compiled information, assembled into draft assessment reports, was reviewed. Requirements for additional information, or for clarification of information, were compiled, and follow-up site visits were conducted.

In conjunction with the development of reliable technical information for the facilities at each site, credible cost information was also compiled, and cost curves for the types of facilities to be recommended were generated. The cost information covered both capital construction and estimated annual operations and maintenance costs. These curves were used consistently to establish base costs. Area factors to adjust the base costs for each specific city location, were then applied. The cost information is representative of prices in March 1994; the costs are not escalated to project or construction mid-points.

The levels of manpower required to properly operate and maintain the recommended facilities were also estimated based on reasonable staffing levels typical of water and wastewater facilities elsewhere; existing facilities which suffer from overstaffing were not used as examples. The skills levels and labor categories of staffing have also be identified. The basis for staffing was applied consistently to all facilities.

The initial locations for study included 11 cities; Nuweiba, Sharm El Sheikh, Luxor, Isna, Mansoura, Mahalla El Kobra, Kom Ombo, Nasr City, and Hurghada. On the initial field trips to each location, the various interventions that might be considered were discussed with GOE officials at the governorate and city level. Information obtained during the visits to Hurghada confirmed that the major water and wastewater facilities were in place or were being constructed through NOPWASD. Other opportunities for potential projects were limited to facilities that would predominately serve the tourist industry. Since other identified locations provide an opportunity to achieve project objectives in similar settings, the WASH team was advised not to proceed further with the various analyses for Hurghada.

commissioned and is receiving flows from about 40 percent of the city; the remaining flows are discharged into drains leading to Lake Manzala. Talkha has no sewage treatment capacity; all flows discharge to drains.

The sewerage system in Mansoura covers approximately 95 percent of the population, and the system in Talkha covers about 80 percent of the population. Because of the high groundwater level, infiltration appears to be a significant factor. Both systems will require expansion to meet expected 2010 flows.

Other than a WHO demonstration project using aerated lagoons, villages have neither sewerage systems nor treatment facilities.

4.2.2 Analysis of Potential Water and Wastewater Projects

Water System

Projected 2010 demands for the regional system cannot be met by the existing facilities. To meet 2010 water demands reliably, the two existing water treatment plants must be rehabilitated. Following rehabilitation, technical assistant for the combined 77,760 m^3/d (900 l/s) complex will be needed to promote consistent, dependable operation.

Talkha will also require a new 104,000 m^3/d (1,200 l/s) water treatment plant. The plant should consider the use of chemically-enhanced settling/rapid sand filtration technology. Land for the plant is available. The five compact units should be rehabilitated and used to meet intermediate needs until the new plant is commissioned.

The regional distribution requires rehabilitation. A hydraulic analysis, a leakage detection program and a system operations plan are recommended in conjunction with rehabilitation.

The local distribution systems require rehabilitation and expansion. Hydraulic analyses and leakage detection programs are recommended as part of this effort. The Mansoura system is estimated to require about 100 km of new pipes. The Talkha system will need approximately 30 km of new pipes.

Wastewater System

Projected 2010 demands for Mansoura can be met with the existing 135,000 m^3/d treatment plant. A technical assistance program should be implemented to obtain maximum benefit from the plant.

Projected demands for Talkha will require the construction of a new 25,000 m^3/d treatment plant. An assessment of technical alternatives indicates that a conventional activated sludge plant would be appropriate. A four hectare site for the plant is available.

The Mansoura collection system will require expansion; approximately 100 km of new sewers is estimated. Although no detailed information on the Talkha collection system was available, it is estimated that approximately 30 km of new sewerage must be constructed. A new systems operations plan should be developed.

4.2 Mansoura

4.2.1 Inventory of Facilities

Mansoura is part of a regional water system which includes the city of Talkha and 16 surrounding villages. Technical data are discussed in greater detail in the Technical Annex. Water demand and wastewater generation information is summarized in Table 4.1.

TABLE 4.1
SUMMARY OF MANSOURA WATER AND WASTEWATER INFORMATION

Location	Water Demands, m^3/d		Wastewater Flows, m^3/d	
	1994	2010	1994	2010
Mansoura	33,390	115,050	19,460	80,120
Talkha	10,610	34,480	5,340	23,870
Villages	10,000	32,870	0[1]	0[1]
TOTALS	54,000	182,400	24,800	103,990

Note 1: Village wastewater flows do not contribute to the flows handled by the Mansoura plant

Water System

Present water production capability is 54,000 m^3/d (625 l/s). Mansoura has two existing plants totalling 43,200 m^3/d (500 l/s). The existing facilities require substantial rehabilitation. Plant capacity is being expanded by 34,600 m^3/d (400 l/s) and should be available in 1995. In addition, three compact high-pressure rapid sand filters, totalling 6,500 m^3/d, are located in Mansoura, and two units, with a total capacity of 4,300 m^3/d, are in Talkha.

Residential per capita consumption in both Mansoura and Talkha is estimated to be 56 l/p/d. Present water consumption stretches system production and distribution capability; there is no excess production capacity.

The regional water distribution system needs to be upgraded; system losses are estimated to be 30 percent.

The local distribution systems in both Mansoura and Talkha cover roughly 100 percent of the population. Pressures in the systems are inadequate, and losses are estimated at 30 percent. These systems will require rehabilitation and expansion to accommodate the 2010 demands.

Wastewater System

Present sewage treatment capacity in Mansoura is 135,000 m^3/d. The plant is being

4.2.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Mansoura are summarized in Table 4.2.

Costs for improvements to the regional water supply system are also included.

4.2.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for the Mansoura systems are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

TABLE 4.2

CONSTRUCTION COSTS FOR

MANSOURA

SERVICE	PROPOSED INTERVENTION	DESCRIPTION OF PROPOSED PROJECTS	CONSTRUCTION COSTS
WATER	Treatment	• Construct new 1,200 lps water treatment plant for Talkha	• LE 90 million
		• Rehabilitate existing treatment plants (200 lps and 300 lps).	• LE 10 million
		• Rehabilitate five compact units	• LE 2 million
	Distribution System	• Rehabilitate regional system: hydraulic analysis and leakage study; system operations plan	• LE 7 5 million
		• Rehabilitate and expand systems in Mansoura and Talkha: 130 km of pipes in 100 mm to 300 mm diameters; new storage tanks.	• LE 15 4 million
WASTEWATER	Treatment	• Construct new 24,000 m3/day wastewater treatment plant to serve Talkha City; technical assistance	• LE 35 million
	Collection System	• Expand local collection systems in Mansoura and Talkha; connect existing pump stations to Mansoura WWTP; 130 km of 100 mm to 300 mm diameter pipes in Talkha and Mansoura.	• LE 36.5 million

4.3 Mahalla El Kobra

4.3.1 Inventory of Facilities

Mahalla El Kobra is part of a regional water system which includes eight surrounding villages. The city has a significant textile and associated industrial sector. Details of the technical data are discussed in greater detail in the Technical Annex. Water demand and wastewater generation information is summarized in Table 4.3.

TABLE 4.3
SUMMARY OF MAHALLA EL KOBRA WATER AND WASTEWATER INFORMATION

Location	Water Demands, m^3/d		Wastewater Flows, m^3/d	
	1994	2010	1994	2010
Mahalla	47,260	168,250	26,020	114,900
Villages	12,340	15,000	0[1]	0[1]
TOTALS	59,600	183,250	26,020	114,900

Note 1: Village wastewater flows do not contribute to the flows handled by the Mahalla El Kobra plants

Water System

Present water production is 59,600 m^3/d (690 l/s). Mahalla El Kobra has six existing water treatment facilities. Plants No. 1 and No. 2 both require extensive rehabilitation. Plant No. 2 capacity is being expanded by 17,280 m^3/d (200 l/s) and should be available in 1996. Plants No. 3 through 6, which use groundwater, have minimal useful lives; Plant No. 6 is not operating.

Residential per capita consumption is estimated to be 59 l/p/d. Present water consumption stretches system production and distribution capability; there is no excess production capacity.

The regional distribution system needs to be upgraded; system losses are estimated to be at least 30 percent.

The local distribution system covers approximately 84 percent of the city and is generally inadequate; losses exceed 30 percent. The system will require rehabilitation and expansion to meet expected 2010 flows.

The major industries in Mahalla El Kobra produce their own water on-site; they do not draw system water for their operations.

Wastewater System

Presently, there is no effective sewage treatment operations in Mahalla El Kobra. The existing 10,000 m^3/d trickling filter plant is out of service; rehabilitation is so extensive as to be impractical. A new activated sludge sewage treatment plant will provide 90,000 m^3/d capacity by the end of 1994. The plant appears adequate to handle the design flow. There is sufficient space on site for drying the volume of sludge expected.

The sewerage system in Mahalla El Kobra covers about 80 percent of the city. It requires rehabilitation and expansion. Sewage flooding occurs in the southeast zone of the city. System pump stations are generally in good shape and should be suitable until 2000. High groundwater is a problem in the area.

The villages have neither sewerage systems nor treatment facilities.

4.3.2 Analysis of Potential Water and Wastewater Projects

Water System

Projected 2010 demands for the regional system cannot be met by the existing facilities. In meeting the 2010 demands, the groundwater-sourced facilities may not play important roles in the system. Plants No. 1 and No. 2 should also be rehabilitated to provide a dependable flow of about 69,120 m^3/d (800 l/s). In addition, Plant No. 2 should be expanded by 17,280 (200 l/s) using the present technology.

Mahalla El Kobra will require a new 95,040 m^3/d (1,100 l/s) water treatment plant. The plant should use chemically-enhanced settling/rapid sand filtration technology. Land for the plant is available.

The regional distribution system requires rehabilitation. A hydraulic analysis, a leakage detection program and a system operations plan are recommended in conjunction with rehabilitation.

The local distribution system in Mahalla El Kobra also requires rehabilitation and expansion. Hydraulic analysis and leakage detection programs are recommended as part of this effort. The system will require about 100 km of new pipes.

Wastewater System

Based on the projected 2010 demands for Mahalla El Kobra, the existing conventional activated sludge plant should be expanded to 120,000 m^3/d by constructing the next 30,000 m^3/d module. Demolition of the original 10,000 m^3/d plant will be necessary to obtain sufficient space.

The collection system will require expansion; approximately 120 km of new sewers should be constructed. A new system operations plan should be developed.

4.3.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Mahalla El Kobra are summarized in Table 4.4. Costs also include improvements to the regional water supply system.

4.3.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for the Mahalla El Kobra regional systems are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

TABLE 4.4

CONSTRUCTION COSTS FOR

MAHALLA EL KOBRA

SERVICE	PROPOSED INTERVENTION	DESCRIPTION OF PROPOSED PROJECTS	CONSTRUCTION COSTS
WATER	Treatment	• Construct new 1,100 lps water treatment plant	• LE 80 million
		• Rehabilitate existing WTP No. 1	• LE 15 million
		• Rehabilitate and expand existing WTP No. 2 to 700 lps.	• LE 20 million
	Distribution System	• Rehabilitate and expand local system: hydraulic/ leakage studies, install 100 km of 100 mm to 300 mm diameter pipes. System operations plan.	• LE 9.3 million
WASTEWATER	Treatment	• Expand existing WWTP by 30,000 m3/d. Testing facility	• LE 41 million
	Collection System	• Perform an industrial waste survey; flooding study. Construct new local system. 120 km of 150 mm to 60 mm diameter pipes. Pump stations and force mains. Systems operations plan.	• LE 21.5 million

4.4 Nuweiba

4.4.1 Inventory of Facilities

Nuweiba is comprised of separate north and south areas. This is reflected in the arrangement of the water and wastewater systems. The water and wastewater systems in Nuweiba are stand-alone facilities; they are not part of any regional system. However, the South Sinai Governorate is considering a strategy to supply water to support coastal development north of Nuweiba; in this scenario, Nuweiba would become part of a future regional system. Nuweiba is also the site of an important port, and the tourist industry is just beginning to take off.

Technical data are discussed in greater detail in the Technical Annex. Water demand and wastewater generation information is summarized in Table 4.5.

TABLE 4.5
SUMMARY OF NUWEIBA WATER AND WASTEWATER INFORMATION

Location	Water Demands, m^3/d		Wastewater Flows, m^3/d	
	1994	2010	1994	2010
Nuweiba	2,670	8,440	990	5,550

Water System

Present production capability is 2,670 m^3/d (30 l/s). Nuweiba obtains its water from groundwater wells (2,000 m^3/d) and from two sets of flash evaporation-type desalination units (670 m^3/d). Well water has a high salinity, and the well fields have been overpumped. The single unit in the older desalination water facility is at the end of its useful life. The four units of the newer desalination water facility are in good condition.

Residential per capita consumption is estimated to be 61 l/p/d. Present water consumption stretches system production and distribution capability; there is no excess production capacity.

There are two separate water distribution systems for well water and for desalinated water serving both areas. Well water is used for general domestic purposes; the desalinated water is used for drinking and cooking. Both systems generally serve the same buildings and cover about 85 percent of the population. Both systems appear to be in fair condition although they have been extended to their limits; system losses are estimated to be 40 percent. The largest demands are generated by several large hotels along the coast in the south area which use desalination water extensively.

Each component of the water system is operated under separate contracts; the contractors are different.

Wastewater System

Present sewage treatment capacity in Nuweiba is approximately 1,250 m^3/d using waste stabilization ponds in the two areas; this capacity exceeds present generation. The south pond is presently undergoing rehabilitation. The effluent quality could not be confirmed as not testing has been done; there is evidence of salinity. Both facilities require rehabilitation. Effluent is reused to irrigate a nearby citrus orchard.

The sewerage systems in north and south Nuweiba cover about 85 percent of the population. Installed facilities appear to be in acceptable condition. These systems will require rehabilitation and expansion to meet 2010 demands.

The wastewater system is operated under contract.

4.4.2 Analysis of Potential Water and Wastewater Projects

Water System

The most pressing need for Nuweiba is a reliable water source to meet 2010 requirements; the inclusion of other coastal community/development needs have not been included in this assessment. Present sources are either becoming unreliable or are expensive. The springs of Ein Furtaga, approximately 14 km west, have shown promise as a new source. Four wells (three completed, one under development by the Governorate) are producing over 3,000 m^3/d. According to the National Groundwater Research Institute, the Ein Furtaga area could continuously produce about 10,000 m^3/d for 30 years. Five new wells, and a 400 mm diameter transmission pipe should be constructed to convey water to Nuweiba. Approximately 4,000 m^3/d of system storage a 118 l/s lift station should also be constructed.

The existing wells should be abandoned, the older desalination plant should be decommissioned, and the newer plant should either be decommissioned or mothballed for standby use.

The two existing water distribution systems should be combined to the greatest extent possible, and the single system should be expanded following an hydraulic analysis and leakage detection programs. The system will require about 110 km of new pipes.

Wastewater System

The collection system will require expansion; approximately 110 km of new sewers and two new lift stations will be required. A system operations plan should be developed.

An additional 4,300 m^3/d should be added to the wastewater treatment capacity of Nuweiba to accommodate 2010 flows. An assessment of alternatives indicates that the existing stabilization ponds should be expanded at the existing facilities' sites. Additional rehabilitation will also be required. An effluent disposal system to the agricultural area will require gravity piping. The capability of the area to utilize the additional flows must be confirmed; development of an expanded area, if required, should be coordinated with an overall master plan.

4.4.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Nuweiba are summarized in Table 4.6.

4.4.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for the Nuweiba systems are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

TABLE 4.6

CONSTRUCTION COSTS FOR

NUWEIBA

SERVICE	*PROPOSED INTERVENTION*	*DESCRIPTION OF PROPOSED PROJECTS*	*CONSTRUCTION COSTS*
WATER	Water Supply Source	• Install 5 new wells in Ein Furtega to provide 8,440 m3/d. Construct new 118 lps pump station. Install new chlorination system.	• LE 2.2 million
		• Construct new transmission pipeline – 14 km of 400 mmm diameter pipe.	• LE 4.9 million
		• Construct new 4,000 m3 storage tank.	• LE 2.5 million
	Distribution System	• Rehabilitate, consolidate and expand local system based on hydraulic/leakage studies. 160 km of 100 mm to 400mm diameter pipes. System operations plan.	• LE 11.5 million
WASTEWATER	Treatment	• Expand north stabilization ponds from 450 m3/day to 2,270 m3/day. Effluent pipe.	• LE 1 8 million
		• Expand south stabilization ponds from 800 m3/d to 3,280 m3/d. Effluent pipe.	• LE 2.5 million
	Collection System	• Expand local collection system. Install 106 km of 150 mm to 250 mm diameter pipes. Construct two pump stations and force mains. System operations plan. Testing facility.	• LE 11.5 million

4.5 Sharm El Sheikh

4.5.1 Inventory of Facilities

The development of Sharm El Sheikh, driven by the tourist industry, unevenly follows the coastline; significant interior development has not occurred. Based on the tourism potential, Sharm El Sheikh is expected to experience an annual growth rate of 3.5 percent in the next decade.

Technical data are discussed in greater detail in the Technical Annex. Water demand and wastewater generation information is summarized in Table 4.7.

TABLE 4.7
SUMMARY OF SHARM EL SHEIKH WATER AND WASTEWATER INFORMATION

Location	Water Demands, m^3/d		Wastewater Flows, m^3/d	
	1994	2010	1994	2010
Sharm El Sheikh	3,710	10,320	2,370	6,935

Water

Sharm El Sheikh obtains its water from groundwater wells in El Tur, approximately 100 km to the northwest, and from local desalination plants. The well water is conveyed to Sharm El Sheikh either through a 250 mm diameter pipe (1,680 m^3/d) or by tanker trucks (1,200 m^3/d). Desalination water is produced either by publicly-owned flash evaporation-type units (360 m^3/d) or by privately-owned reverse osmosis-type units (950 m^3/d). The transmission pipe is reaching the end of its useful life, and it is in the process of being rehabilitated. The governorate desalination units are also wearing out; only two of the five units still operate. The private desalination plants are owned and operated by several large hotels to provide water to guests.

Residential per capita consumption is estimated to be 65 l/p/d. Present water consumption stretches system production and distribution capability; there is no excess production capacity.

Pipeline and public desalination water are pumped together through the system by a single pump station. This facility is very basic and needs to be completely replaced. The distribution system is undersized, and system losses are estimated at approximately 40 percent. Because of poor hydraulics and excessive demands, in-system storage tanks are always empty.

The local distribution system covers approximately 80 percent of the city and is generally inadequate. The system will require rehabilitation and expansion to meet expected 2010

flows.

Wastewater

Present sewage treatment capacity in Sharm El Sheikh is approximately 800 m^3/d; this is inadequate for the present flows. The treatment system uses conventional waste stabilization ponds. The ponds are operated under contract, and effluent quality could not be confirmed as not testing has been done. An abandoned primary treatment plant, built by the Israelis, is adjacent to the ponds. Effluent is reused to irrigate a nearby citrus orchard.

The sewerage systems in Sharm El Sheikh serve about 80 percent of the population. Installed facilities appear to be in acceptable condition; the system in the Naama Bay area is new. Most of the system will require rehabilitation and expansion to meet 2010 demands.

4.5.2 Analysis of Potential Water and Wastewater Projects

Water

Projected 2010 demands cannot be met by the existing water supply system. Reliable water supply and distribution is a priority for Sharm El Sheikh. The existing pipeline from El Tur, currently being rehabilitated, needs to be paralleled with a new 350 mm diameter pipe. Approximately 140 l/s of additional pumping capacity in El Tur is also required. The existing public desalination plants should be decommissioned or sold for spare parts. The private desalination plants could be used as stand-by sources, as required. The need to import water by truck should be eliminated. Approximately 5,000 m^3/d of transmission storage will also be needed.

The existing water distribution system rehabilitated and expanded following an hydraulic analysis and leakage detection programs. The system will require about 100 km of new pipes. A new booster pump station and approximately 2,000 m^3 of system storage will also be required.

Wastewater System

The collection system will require expansion; approximately 100 km of new sewers and a new lift station will be required. A system operations plan should be developed.

Based on the projected 2010 demands for Sharm El Sheikh, the existing treatment capacity should be expanded to approximately 7,000 m^3/d. An assessment of treatment alternatives indicates that the expansion of the existing stabilization ponds should be undertaken. Land adjacent to the ponds is available. The capacity of the existing agricultural area can accommodate the effluent must be confirmed.

4.5.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Sharm El Sheikh are summarized in Table 4.8.

4.5.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for the Sharm El Sheikh systems are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

TABLE 4.8

CONSTRUCTION COSTS FOR

SHARM EL SHEIKH

SERVICE	PROPOSED INTERVENTION	DESCRIPTION OF PROPOSED PROJECTS	CONSTRUCTION COSTS
WATER	Water Supply Source	• Construct new 350 mm transmission pipe 100 km from El Tur well fields. Develop wells, increase pumping capacity at El Tur. Provide 5,000 m3 storage.	• LE 48.5 million
	Distribution System	• Rehabilitate and expand local system: hydraulic/ leakage studies, install 60 km of 100 mm to 300 mm diameter pipes. System storage of 2,000 m3. System operations plan.	• LE 15.7 million
WASTEWATER	Treatment	• Expand existing waste stabilization ponds from 600 m3/day to 7,000 m3/day. Effluent disposal: 300 m of 350 mm diameter pipe. Testing facility.	• LE 5.1 million
	Collection System	• Expand local collection system. Install 75 km of 150 mm to 300 mm diameter pipes. Construct two pump stations and force mains. System operations plan.	• LE 10.3 million

4.6 Luxor

4.6.1 Inventory of Facilities

Luxor is the site of numerous famous ancient ruins, and the city's development has been driven by the tourism industry. Luxor extends on both sides of the Nile; however, the west bank population is basically rural, and it may be relocated by the government to avoid further encroachment on historical sites; for these reasons, the west bank population of Luxor has not been included in this assessment.

Technical data are discussed in greater detail in the Technical Annex. Water demand and wastewater generation information is summarized in Table 4.9.

TABLE 4.9
SUMMARY OF LUXOR WATER AND WASTEWATER INFORMATION

Location	Water Demands, m^3/d		Wastewater Flows, m^3/d	
	1994	2010	1994	2010
Luxor	44,930	69,500	11,190	49,150

Water System

Present water production capability is 44,930 m^3/d (520 l/s). Luxor has two existing plants; both plants are well-maintained and appear to be properly operated despite the age of some of the component facilities. Production capacity is currently being expanded to approximately 79,500 m^3/d (920 l/s).

Residential per capita consumption in Luxor is estimated to be 135 l/p/d. Present water consumption stretches system and distribution capability; there is no excess production capacity.

The distribution system covers approximately 94 percent of the population. Pressures in the system are inadequate. and system losses are estimated at 30 percent. The system will require rehabilitation and expansion to accommodate the 2010 demands.

Wastewater System

Present sewage treatment capacity in Luxor is 13,000 m^3/d. The plant uses secondary treatment trickling filtration technology. There are numerous technical deficiencies with the plant; plant effluent quality indicates that the plant is providing the equivalent of primary treatment. Sludge bed capacity is inadequate, there is no chlorination system, and substantial rehabilitation of equipment and controls will be required. A second, identical train is under construction but is not expected to be available until 1997.

The sewerage system in Luxor covers about 30 percent of the population. The installed sewerage requires rehabilitation. A project is now underway to provide service to another 20 percent of the population. The last phase of sewage expansion has been defined, but funding is preventing this phase from going forward. The pumps in the main sewage station can each handle approximately 13,000 m^3/d (150 l/s). The facility requires extensive rehabilitation.

4.6.2 Analysis of Potential Water and Wastewater Projects

Water System

Projected 2010 demands for Luxor can be met with the 79,500 m^3/d facilities either on-line or being constructed.

The distribution system requires rehabilitation. A hydraulic analysis, a leakage detection program and a system operations plan are recommended in conjunction with rehabilitation. The system will require about 250 km of new pipes.

Wastewater System

Based on projected 2010 demands for Luxor, the existing trickling filter plant, including the new treatment train under construction, will be inadequate. An assessment of treatment technologies and strategies indicates that 2010 demands could be addressed through a combination of rehabilitation of the trickling filters and construction of new conventional waste stabilization ponds. The existing 13,000 m^3/d plant should be rehabilitated, and the design of the new process train under construction should be reviewed to identify improvements which could be incorporated into the plant during construction. Land for the new 24,000 m^3/d stabilization ponds is available near the present plant site.

Most importantly will be a comprehensive technical assistance program to work with the operators to obtain maximum performance from the facilities following rehabilitation.

The next phase of the collection system development should be implemented. Approximately 190 km of new pipes, along with eight pump stations and a new force main to the plant site, should be constructed. A new system operations plan should also be developed.

4.6.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Luxor are summarized in Table 4.10.

4.6.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for the Luxor systems are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

TABLE 4.10

CONSTRUCTION COSTS FOR

LUXOR

SERVICE	PROPOSED INTERVENTION	DESCRIPTION OF PROPOSED PROJECTS	CONSTRUCTION COSTS
WATER	Distribution System	• Rehabilitate regional system: hydraulic analysis and leakage study; system operations plan	• LE 17 million
		• Rehabilitate and expand local system: hydraulic/ leakage studies, install 250 km of 200 mm to 800 mm diameter pipes. Pump stations force mains.	• LE 12.8 million
WASTEWATER	Treatment	• Construct new 24,000 m3/d wastewater treatment stabilization ponds and effluent disposal.	• LE 31 million
		• Rehabilitate existing treatment plant.	• LE 5 million
		• Technical Assistance	• LE 5 million
	Collection System	• Construct local sewerage to serve 50 percent of the population and 75 percent of the area. Eight pump stations and 30 km of forcemains. Install 190 km of sewers. System operations plan.	• LE 41 million

4.7 Armant

4.7.1 Inventory of Facilities

Armant is comprised of separate north and south areas. A major sugar cane processing plant is located in Armant.

Technical data are discussed in greater detail in the Technical Annex. Water and wastewater generation information is summarized in Table 4.11

TABLE 4.11
SUMMARY OF ARMANT WATER AND WASTEWATER INFORMATION

Location	Water Demands, m^3/d		Wastewater Flows, m^3/d	
	1994	2010	1994	2010
Armant	8,640	20,400	4,790[1]	14,400

Note 1: The actual flows generated are likely much less than this since wastewater must be disposed without the convenience of a sewerage system

Water System

Present reliable production capacity is 8,640 m^3/d (100 l/s). Armant obtains its water from groundwater wells and from a pressure sand filter (compact) unit drawing from the Nile River. Groundwater is pumped from both areas of Armant. The well pumps are very poorly maintained; several do not operate. Groundwater levels appear to be stable, but the water contains iron, manganese and arsenic. The compact unit requires frequent, time-consuming maintenance.

Residential per capita consumption is estimated to be 78 l/p/d. Present water consumption stretches system production and distribution capabilities; there is no excess production capacity.

The local distribution system covers approximately 95 percent of the population and is generally inadequate, pressures are low, and losses are estimated at 40 percent.

The sugar cane processing plant produces its own water from wells. It is not connected to the Armant water system.

Wastewater System

Armant has no wastewater collection or treatment facilities. Wastes are collected and disposed in local drains or the desert.

The sugar cane processing plant provides pre-treatment for wastes generated on-site for disposal to nearby drains.

A stabilization pond for Armant is included in a package of 19 sites for which NOPWASD intends to select design consultants.

4.7.2 Analysis of Potential Water and Wastewater Projects

Projected 2010 demands for Armant cannot be met by the existing facilities. In meeting the 2010 demands, the groundwater wells may not play an important role because of the potential for limitations on both reliable quantities and quality. Armant will require a new 20,400 m^3/d (236 l/s) water treatment plant. The plant could be designed to use chemically-enhanced settling/rapid sand filtration technology. Land for the plant is available.

The local distribution system in Armant also requires rehabilitation and expansion. Hydraulic analysis and leakage detection programs are recommended as part of this effort. The system will require approximately 30 km of new pipes. A system operations plant is required.

Wastewater System

A completely new wastewater collection should be constructed. The system will require approximately 100 km of new pipes and two pump stations. A system operations plan should be developed.

A new 14,400 m^3/d wastewater treatment facility is required. An assessment of alternative technologies indicates that waste stabilization ponds should be considered. Land is available near the desert, approximately 8 km to the west. Effluent reuse will require a pump station and 2 km of force main.

4.7.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Armant are summarized in Table 4.12.

4.7.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for the Armant systems are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

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TABLE 4.12

CONSTRUCTION COSTS FOR

ARMANT

SERVICE	PROPOSED INTERVENTION	DESCRIPTION OF PROPOSED PROJECTS	CONSTRUCTION COSTS
WATER	Treatment	• Construct new 240 lps water treatment plant; new inlet structure	• LE 27 million
		• Rehabilitate compact unit	• LE 0.5 million
	Distribution System	• Rehabilitate existing system based on hydraulic analysis and leakage studies: 5 km of 500 mm pipeline. Extend existing system: 30 km of 200 mm to 400 mm pipe. System operations plan.	• LE LE 8.6 million
WASTEWATER	Treatment	• Construct new 15,000 m3/d wastewater stabilization ponds. Effluent disposal facilities. Testing Facility.	• LE 20 million
	Collection System	• New sewarage facilities. 10 km of 200 mm to 400 mm pipes. Two pump stations and forcemain 8 km of 300 mm diameter pipe. System operations plan.	• LE 19.5 million

4.8 Isna

4.8.1 Inventory of Facilities

Isna is part of a small regional water system which serves the nearby rural area. Isna is the site of several important historical ruins.

Technical data are discussed in greater detail in the Technical Annex. Water demand and wastewater generation information is summarized in Table 4.13.

TABLE 4.13
SUMMARY OF ISNA WATER AND WASTEWATER INFORMATION

Location	Water Demands, m^3/d		Wastewater Flows, m^3/d	
	1994	2010	1994	2010
Isna	5,300	16,320	3,200[1]	10,500
Villages	3,340	14,380	0[2]	0[2]
TOTALS	8,640	30,700	3,200[1]	10,500

Note 1: The actual flows generated are likely much less than this since wastewater must be disposed without the convenience of a sewerage system

2: Sewage flows from the rural areas will not contribute to the Isna plant

Water System

Present production capacity is 8,640 m^3/d (100 l/s). Isna obtains its water from the Nile River. Water is processed with two rapid sand filtration plants. Both facilities require extensive rehabilitation. A third plant, rated for 4,320 m^3/d (50 l/s), is under construction; it is unsure when work will be completed.

Residential per capita consumption is estimated to be 58 l/p/d. Present water consumption stretches system production and distribution capabilities; there is no excess production capacity.

The local distribution system covers approximately 95 percent of the population and is generally inadequate, pressures are low, and losses are estimated at 40 percent.

Wastewater System

Isna has no wastewater collection or treatment facilities. Wastes are collected and disposed in local drains or the desert.

A stabilization pond for Isna is included in a package of 19 sites for which NOPWASD intends to select design consultants.

4.8.2 Analysis of Potential Water and Wastewater Projects

Projected 2010 demands for Isna cannot be met by the existing facilities. To meet 2010 demands, a combination of rehabilitation and new facilities is required. The older existing plant should be rehabilitated and combined with the plant now under construction which should also be rehabilitated before going on-line; this will provide a reliable 8,640 m^3/d (100 l/s) capacity. The newer existing facility should be decommissioned and dismantled. A new 22,100 m^3/d (260 l/s) plant, using chemically-enhanced settling/rapid sand filtration technology, should be considered. Land for the plant is available.

The local distribution system in Isna also requires rehabilitation and expansion. Hydraulic analysis and leakage detection programs are recommended as part of this effort. The system will require approximately 20 km of new pipes. A system operations plant is required.

Wastewater System

A completely new wastewater collection should be constructed. The system will require approximately 50 km of new pipes and a pump station. A system operations plan should be developed.

A new 12,580 m^3/d wastewater treatment facility is required. An assessment of alternative technologies indicates that conventional waste stabilization ponds should be constructed. Land is available near the desert, approximately 8 km to the west. Effluent reuse will require a pump station and 2 km of force main.

4.8.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Isna are summarized in Table 4.14.

4.8.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for the Isna systems are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

TABLE 4.14

CONSTRUCTION COSTS FOR

ISNA

SERVICE	PROPOSED INTERVENTION	DESCRIPTION OF PROPOSED PROJECTS	CONSTRUCTION COSTS
WATER	Treatment	• Construct new water treatment plant with capacity of 260 lps, incl new inlet structure. • Rehabilitate two WTPS.	• LE 30 million • LE 2 million
	Distribution System	• Rehabilitate existing local systems based on hydraulic/leakage studies. Install 20 km of pipes 100 mm to 300 mm diameter. System operations plan.	• LE 8.4 million
WASTEWATER	Treatment	• Construct new 14,000 m3/d waste stabilization pond system. Effluent disposal system.	• LE 19 million
	Collection System	• Construct new sewerage system: 50 km of 200 mm to 400 mm diameter pipe. System operations plan. Testing facility.	• LE 14.5 million

4.9 Kom Ombo

4.9.1 Inventory of Facilities

Kom Ombo is part of a regional water system which includes the cities of Darawo and Nasr City and the villages in the areas of those three cities. Kom Ombo is the location of several historical sites. A sugar cane processing factory and a silica iron factory are also located in Kom Ombo.

Technical data are discussed in greater detail in the Technical Annex. Water demand and wastewater generation information is summarized in Table 4.15.

TABLE 4.15
SUMMARY OF KOM OMBO REGIONAL WATER AND WASTEWATER INFORMATION

Location	Water Demands, m^3/d		Wastewater Flows, m^3/d	
	1994	2010	1994	2010
Kom Ombo	7,500	19,810	4,390[1]	13,920
Darawo	4,280	9,680	2,690[1]	6,850
Nasr City	1,670	3,370	910	2,260
Villages	11,950	43,170	0[2]	0[2]
TOTALS	25,400	76,030	7,990[1,2]	23,030[2]

Note 1: The actual flows generated are likely much less than this since wastewater must be disposed without the convenience of a sewerage system

2: Sewage flows from the rural areas will not contribute to the Kom Ombo plant

Water System

Kom Ombo has one water production facility with a total capacity of approximately 19,700 m^3/d (200 l/s). A rapid sand filtration plant, with a capacity of 17,280 m^3/d (200 l/s), requires substantial rehabilitation. A compact high-pressure rapid sand filter unit is producing 2,400 m^3/d (28 l/s). It also requires rehabilitation. A new 34,560 m^3/d (400 l/s) treatment plant, using rapid sand filtration technology, is presently under construction at a nearby site; the plant should go on-line in 1997. Raw water supplies are interrupted each winter due to lowered Nile River levels.

Residential per capita consumption in Kom Ombo city is estimated to be 76 l/p/d. Present water consumption stretches system production and distribution capabilities; there is no excess production capacity. Water produced at the Kom Ombo plant is generally distributed as follows:

Distribution of Kom Ombo Plant Water, m^3/d	
Kom Ombo City	7,500
Nasr City	1,670
Villages	10,530
TOTAL	19,700

A total of eleven compact units and groundwater wells, producing a total of 28,950 m^3/d (335 l/s), are scattered throughout the Kom Ombo area to serve villages which are not connected to the regional system.

The existing regional water distribution system needs to be upgraded; system losses are estimated to be 40 percent. The system also needs to be expanded to include unconnected villages, wherever practical.

The local distribution system in Kom Ombo City covers roughly 90 percent of the population. Pressures in the systems are inadequate, and losses are estimated at 40 percent. The system will require rehabilitation and expansion to accommodate the 2010 demands.

Wastewater System

Kom Ombo has no wastewater collection or treatment facilities. Wastes are collected and disposed in local drains or the desert.

A stabilization pond for Kom Ombo is included in a package of 19 sites for which NOPWASD intends to select design consultants.

4.9.2 Analysis of Potential Water and Wastewater Projects

Water System

Projected 2010 demands for the regional system cannot be met by the existing facilities. In meeting the 2010 demands, the groundwater-sourced facilities may not play important roles in the system. Further studies regarding the potential use of groundwater are required. The existing plant must be rehabilitated and expanded to 34,560 m^3/d (400 l/s) using present technology. Land for the expansion is available at the site.

The regional distribution system requires rehabilitation. A hydraulic analysis, a leakage detection program, and a regional operations plan are recommended in conjunction with rehabilitation and expansion activities.

The local distribution in Kom Ombo also requires rehabilitation and expansion. Hydraulic analysis and leakage detection programs are recommended as part of this effort. The system will require approximately 100 km of new pipes. A system operations plan should be developed.

Wastewater System

A completely new wastewater collection should be constructed. The system will require 180 km of new pipes and a pump station. A system operations plan should be developed.

A new 14,000 m^3/d wastewater treatment facility is required. An assessment of alternative technologies indicates that conventional waste stabilization ponds should be constructed. Land is available near the desert, approximately 13 km to the southeast. Effluent reuse will require a pump station and force main.

A treatment facility which consolidates flows from Kom Ombo, and Darawo City would be technically preferred. The decision to consolidate treatment plants requires agreement from officials from the two cities.

4.9.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Kom Ombo are summarized in Table 4.16.

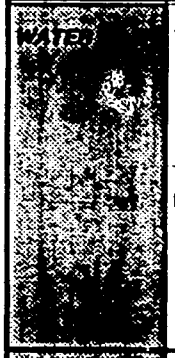
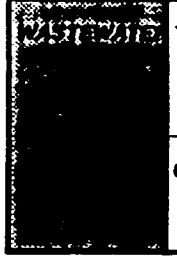
4.9.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for the Kom Ombo systems are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

TABLE 4.16

CONSTRUCTION COSTS FOR

KOM OMBO

SERVICE	PROPOSED INTERVENTION	DESCRIPTION OF PROPOSED PROJECTS	CONSTRUCTION COSTS
	Treatment	• Expand existing water treatment plant by 200 lps. • Rehabilitate 200 lps water treatment plant. • Technical Assistance	• LE 17 million • LE 3 million • LE 0.5 million
	Distribution System	• Rehabilitate regional system: hydraulic analysis and leakage study; system operations plan • Rehabilitate and expand local system: hydraulic/ leakage studies, install 100 km of 100 mm to 400 mm diameter pipes.	• LE 5.3 million • LE 18.2 million
	Treatment	• Construct new 14,000 m3/d wastewater stabilization pond. Effluent disposal system. system. Test facility. Will be combined with Darawo facility.	• LE 14.3 million
	Collection System	• Construct new local system. Install 180 km of 200 mm to 500 mm diameter pipes. System operations plan.	• LE 32.4 million

4.10 Darawo

Darawo is part of a regional water system which includes the cities of Kom Ombo and Nasr City and the villages in the areas of those three cities. Darawo is a center for the camel trade from the Sudan.

Technical data are discussed in greater detail in the Technical Annex. Water and wastewater generation information is summarized in Table 4.15.

4.10.1 Inventory of Facilities

Water System

Darawo has one plant with a water production capability of approximately 6,910 m^3/d (80 l/s); however, it presently operates only 20 hours per day to provide approximately 5,700 m^3/d (66 l/s) to the regional system. Problems with unreliable raw water supplies from wells and a nearby canal, due to variations in the Nile River level, limit operating time and have resulted in plans to construct a new raw water supply system from the Nile River. The plant facilities require substantial rehabilitation.

Residential per capita consumption is estimated to be 71 l/p/d. Present water consumption stretches system production and distribution capabilities; there is no excess production capacity. The water produced at the Darawo plant is generally distributed as follows:

Distribution of Darawo Plant Water, m^3/d	
Darawo	4,850
Villages	850
TOTAL	5,700

A total of eleven compact units and groundwater wells, producing a total of 28,950 m^3/d (335 l/s), are scattered throughout villages in the Kom Ombo area. They are not connected to the regional system.

The regional water distribution system needs to be upgraded; system losses are estimated to be 40 percent. The system also needs to be expanded to include unconnected villages.

The local distribution system in Kom Ombo covers roughly 90 percent of the population. Pressures in the systems are inadequate, and losses are estimated at 40 percent. The system will require rehabilitation and expansion to accommodate the 2010 demands.

Wastewater System

Darawo has no wastewater collection or treatment facilities. Wastes are collected and disposed in local drains or the desert.

4.10.2 Analysis of Potential Water and Wastewater Projects

Water System

Projected 2010 demands for the regional system cannot be met by the existing facilities. By 2010, Darawo will require water from the regional system; its own demand will exceed the capacity of the plant in Darawo. In meeting the 2010 demands, the groundwater-sourced facilities may not play important roles in the system. The new raw water supply system should improve raw water delivery. The plant should be rehabilitated to ensure a reliable 6,910 m^3/d production level.

The regional distribution system requires rehabilitation. A hydraulic analysis, a leakage detection program, and a regional operations plan, recommended in Chapter 4.9.2 as part of the discussion on Kom Ombo, should be executed in conjunction with rehabilitation and expansion activities.

The local distribution in Darawo also requires rehabilitation and expansion. Hydraulic analysis and leakage detection programs are recommended as part of this effort. The system will require approximately 100 km of new pipes. A system operations plan should be developed.

Wastewater System

A completely new wastewater collection should be constructed. The system will require 180 km of new pipes and a pump station. A system operations plan should be developed.

A new 6,850 m^3/d wastewater treatment facility is required. An assessment of alternative technologies indicates that waste stabilization ponds should be constructed. Land is available near the desert, approximately 6 km to the southeast. Effluent reuse will require a pump station and force main.

A treatment facility which consolidates flows from Kom Ombo, and Darawo would be technically preferred. The decision to consolidate treatment plants requires agreement from officials from the involved cities.

4.10.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Darawo are summarized in Table 4.17. Costs also include for improvements to the regional water distribution system.

4.10.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for the Darawo systems are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

TABLE 4.17

CONSTRUCTION COSTS FOR

DARAWO

SERVICE	PROPOSED INTERVENTION	ESCRIPTION OF PROPOSED PROJECTS	CONSTRUCTION COSTS
WATER	Treatment	• Rehabilitate existing 80 lps treatment plant. • Technical Assistance	• LE 3 million • LE 0.5 million
	Distribution System	• Rehabilitate and expand local system: hydraulic/ leakage studies, install 30 km of 100 mm to 250 mm diameter pipes. System operations plan; regional improvements.	• LE 8.7 million
WASTEWATER	Treatment	• Construct new 6,850 m3/d wastewater stabilization pond. Effluent disposal system. Testing facility. Will be combined with Kom Ombo facility.	• LE 10.8 million
	Collection System	• Construct new local system. Install 120 km of 200 mm to 300 mm diameter pipes. System operations plan. Pump stations and force mains.	• LE 23.8 million

4.11 Nasr City

Nasr City is the primary resettlement area for the Nubian population which was displaced by the construction of the Aswan high dam. It is at the edge of the cultivated agricultural area and the desert.

Technical data are discussed in greater detail in the Technical Annex. Water and wastewater generation information is summarized in Table 4.15.

4.11.1 Inventory of Facilities

Water System

Nasr City has no water treatment plant capacity; it relies on the regional plant in Kom Ombo for its water supplies.

Residential per capita consumption is estimated to be 79 l/p/d. Present water consumption stretches system the regional production and distribution capabilities; there is no excess production capacity. The water produced at the Kom Ombo plant is generally distributed as follows:

Distribution of Kom Ombo Plant Water, m^3/d	
Nasr City	1,670
Kom Ombo City	7,500
Villages	10,530
TOTAL	19,700

The need to upgrade and expand the regional water distribution system is discussed in Chapter 4.9.1. Nasr City feels the effects of reduced water production annually in mid-winter. The main 450 mm diameter transmission pipe from Kom Ombo, supplying Nasr City and several villages in the area, also requires rehabilitation. Losses in this supply pipe are estimated to be 40 percent. The regional system supplied by this pipe also needs to be expanded to include unconnected villages.

The local distribution system in Nasr City covers roughly 90 percent of the population. Pressures in the systems are inadequate, and losses are estimated at 40 percent. The system will require rehabilitation and expansion to accommodate the 2010 demands.

Wastewater System

The city council of Nasr City has constructed a sewerage system serving about 50 percent of the population. There is no design for the system. It discharges to a nearby drain. The remainder of Nasr city is unsewered.

4.11.2 Analysis of Potential Water and Wastewater Projects

Water System

It is not prudent to consider construction of a new water treatment facility in Nasr City as there are no available raw water sources. Nasr City must continue to rely on water conveyed from the regional system.

The main transmission pipe from Kom Ombo should be rehabilitated in conjunction with the overall regional improvements discussed in Chapter 4.9.2. An hydraulic analysis, leakage detection program, and regional operations plan for the pipe should be incorporated into similar work recommended in Chapter 4.9.2.

The local distribution system in Nasr City also requires rehabilitation and expansion. Hydraulic analysis and leakage detection programs are recommended as part of this effort. The system will require about 40 km of new pipes. A 5,000 m^3 water storage tank is required.

Wastewater System

A completely new wastewater collection should be constructed. The system will require 70 km of new pipes and a pump station. A system operations plan should be developed.

A new 2,300 m^3/d wastewater treatment facility is required. An assessment of alternative technologies indicates that waste stabilization ponds should be constructed. Land is available in the desert adjacent to the city; pumping distances should not exceed 5 km. Effluent reuse will require a pump station and force main.

4.11.3 Estimated Construction Costs

The costs to construct water and wastewater systems for Nasr City are summarized in Table 4.18. Except for the transmission pipe serving the Nasr City area, costs for improvements to the regional water distribution system are included in Table 4.16.

4.11.4 Estimated Operating Costs

The annual costs to properly operate and maintain the new water and wastewater facilities for Nasr City are presented in the financial annex. The total operations and maintenance costs, covering both existing and new facilities, are discussed in detail in Chapter 5.4.

TABLE 4.16

CONSTRUCTION COSTS FOR

NASR CITY

SERVICE	PROPOSED INTERVENTION	DESCRIPTION OF PROPOSED PROJECTS	CONSTRUCTION COSTS
WATER	Water Supply	• Rehabilitate 450 mm diameter regional distribution pipe in conjunction with Kom Ombo work.	• LE 1 million
	Distribution System	• Rehabilitate and expand local system: hydraulic/ leakage studies, install 40 km of 200 mm to 800 mm diameter pipes. Pump stations force mains. System operation plan.	• LE 7 6 million
		• Provide 5,000 m3 of new raised storage.	• LE 2.5 million
WASTEWATER	Treatment	• Construct new 2,300 m3/d wastewater stabilization pond. Effluent disposal system. Testing facility.	• LE 7 million
	Collection System	• Expand local collection system. Install 70 km of 200 mm to 300 mm diameter pipes. Construct a pump station and 200 mm diameter force mains. System operations plan.	• LE 17.8 million

Chapter 5

FINANCIAL ANALYSIS

5.1 Introduction

The financial analysis presents information and data regarding the investments required, and operations and maintenance cost (O&M) of the individual projects described in Chapter 4, and the Technical Annex. The main thrust of this analysis is the examination of the proposed projects in terms of financial sustainability regarding their O&M requirements. Thus, the analysis is structured to estimate, via a series of sub-analyses, the tariffs requirements to completely cover the (O&M) costs.

The objective of this analysis is to portray a financial situation for each of the projects under study as if they were operated by highly efficient and effective -- that is, well run -- utilities, capable of retaining their revenues, and setting the tariffs necessary to avoid all government subsidies. In effect, a scenario has to be created for each project which simulates the conditions and characteristics of an "ideal model" water or wastewater utility.

The main constraint to performing this analysis for entities in the Egyptian municipal water and wastewater sectors is that there are virtually no models to which to compare. Most of the water and wastewater systems in Egypt's secondary cities, including almost all of those included in this study, are badly deteriorated due to chronically low levels of maintenance, and lack of experienced staff. In many cases, the utilities appear to lack the motivation to perform well as they recognize their shortfalls may be covered by the GOE's practice of highly subsidizing water supply service.

Notwithstanding the obvious constraints, the analysis included many features that are characteristics of well operating utilities. As such, the analysis necessarily contains many assumptions. However, the structure of the analysis -- a model based upon spread sheet software (Version 2.4, developed by the Lotus Corporation) -- contains a great deal of flexibility, and can be easily revised to test alternate assumptions and changing conditions.

The model's development, and other features of the analysis are described in the following sections. The various printouts illustrating the computations are shown in the Financial Annex, together until the data logic diagram and a complete listing of files by sub-directory which constitute the model.

5.2 Analysis Components

The financial analysis consists of a series of schedules, each forming the basis of, or providing input to the successive schedules. The output of the spreadsheet model is comprised of the following for the projects in each city:

Capital Costs

The capital costs of projects are estimated as discussed in Chapter 2, Section 2.5. The total project costs include these costs plus the following costs: rehabilitation of existing systems, allowances for contingencies, engineering design, construction management and supervision, and institutional support costs.

These cost are displayed in the Capital Investment Summary by year, over the project cycle, years 1994 through 2000. Construction is projected to occur in years 1997 through 2000, and these costs plus contingencies at 10 percent of the construction costs are distributed over these years. Similarly, the allowances for construction management and supervision -- 3 percent and 4 percent respectively of the construction and contingency costs, are also distributed over these years. One sixth of these costs are projected for the first and last years of the four year period, and one third each for the second and third years.

Institutional support costs, estimated by project (See Chapter 7), are also included and distributed over the final two to three years of the project cycle.

Rehabilitation Costs

Rehabilitation costs are capital cost investments required to restore facilities to perform at their intended purpose. Water supply and wastewater facilities in Egypt have often incurred rapid deterioration due to very low O&M expenditures, poor design features, or faulty construction practices. The facilities inspected during the engineering team's field visits indicated that rehabilitation investments were warranted for almost all of the water and wastewater systems under study. The type and extent of the rehabilitation requirements are described in the Technical Annex. The cost estimates for rehabilitation are shown in the summaries at the end of each section.

The estimates are based upon data derived from NOPWASD, or by applying a percentage of the updated original cost.

An important point to recognize is that the rehabilitation cost estimates represent values adequate to allow for the rehabilitated facilities to function, with proper maintenance, at least throughout the 1995 -- 2010 period. Estimating the rehabilitation costs in this manner is a feature which helps simulate the ideal utility model. In effect, the analysis infers that after rehabilitation the existing systems can provide high quality, as the rehabilitation investment will correct the system's deterioration and/or deficiencies caused by improper past practices of poor O&M.

Value of Existing Facilities

The value for the existing facilities is estimated to be equal to the cost of new facilities. This is a logical assumption recognizing the inferred condition of the rehabilitated facilities.

Estimates for the value of existing facilities stem from the technical team's field investigations undertaken to prepare an inventory of the existing facilities. These facilities are described in the Technical Annex. Estimated costs are based upon available data from

- a Capital Investment Summary displaying the total and component costs by year and type of project, and the foreign exchange component,

- a Demand Forecast displaying the water and wastewater demands by year, and type of demand,

- a Staffing Levels Analysis indicating the staff size by year and type of employee,

- a Projected Salaries and Wages schedule, indicating the total personnel cost by year and system,

- two Operations and Maintenance Unit Cost Calculation schedules, for both the proposed water supply and wastewater projects,

- a Cost of Production schedule indicating the projected O&M production costs for the proposed water supply and wastewater projects,

- a Tariff Analysis schedule for both the water supply and wastewater projects.

The key components of the financial analysis are the estimates of the production cost, and the tariff computations. The production costs are estimated by allocating the O&M costs for the existing and new facilities into their component parts (ie: labor, electricity, chemicals, materials), and computing unit costs at the rated existing and future capacities, for the various components.

The component unit costs are converted to annual costs, and combined, after certain adjustments, with the estimated costs for the forecasted wages and salaries as given by the staffing analysis. The resulting annual costs are converted to unit production costs by dividing by the annual demands, adjusted for losses as given by the Demand Forecast schedule.

The estimated tariff requirements come directly from the production costs.

The analysis is discussed in greater detail in the following sections. The detailed schedules are presented in the Financial Annex,

5.3 Capital Investments, Rehabilitation Costs, and Value of Existing Facilities

The major portion of the financial analysis is devoted to estimating the tariffs required to support the O&M costs for the existing and proposed facilities. However, the capital costs are of obvious concern and the financial model can easily produce the schedules required to display the cash flows required. Further the O&M costs for new and existing systems are based upon the value of the existing and proposed facilities. These values are represented by the raw construction costs for the proposed facilities, and the new construction cost for the existing facilities. Thus, prior to discussing the details of the financial analysis, it is of benefit to discuss the capital and other costs.

NOPWASD, and other GOE sources,or are taken from the cost curves referenced in Chapter Two. These costs are shown by system in the O&M Unit Cost Schedules.

5.4 Projected O&M Costs

The annual O&M costs are estimated as percentages of the capital cost of the facilities. For new systems, the percentage is applied to the total project cost excluding the cost instutional support. For existing systems, the percentage is applied to the value of the existing system new.

The percentages are as follows:

Water Supply:	5 percent of the cost of treatment facilities 1 percent of the cost of pipelines and appurtenances
Wastewater:	3 percent of the cost of treatment facilities - for waste stabilization ponds
	5 percent of the cost of other wastewater treatment technologies
	1.5 percent of the cost of pipelines and appurtenances

These percentages represent the total annual O&M costs at the rated capacity of the facilities, that is for year 2000 in the case of existing facilities (ie: after the rehabilitation investments), and the year 2010 for the proposed facilities. Thus a methodology is provided to estimate the proper value to utilize in the intermediate years.

The methodology is structured around the separate examination of two O&M components costs -- salaries and wages, and electrical power. These costs warrant separate examination as they form a large part of the "model utility" concept upon which the O&M cost estimates are based. The model using the described methodology computes a unit cost of production -- LE per m3 -- for all components of the O&M cost including an adjusted electrical cost but excluding the salary and wages component. This unit cost is applied to the production values for water supply and wastewater using the data provided by Demand Forecast schedule. These costs combined with the yearly value of wages and salaries form a separate analysis to obtain the total cost for the intermediate years.

A step by step discussion of the O&M analysis, is presented below. Prior to this, the features of the inter - linked schedules and separate sub - analyses are presented.

5.4.1 Special Studies

Demand Forecast Schedule

A demand forecast schedule is prepared for the projects in each city. The basic data is presented in the box at the top of each schedule. Three types of schedules are presented: a

schedule for cities with projects that do not include significant water supply service for tourism or markaz demands, and schedules for cities with either tourism or markaz water supply demands.

The key outputs of this schedule are the volume per day of water supply delivered to each customer type, and the corresponding volume of wastewater discharged. These values are linked, through the computer model, to provide input to the computation of annual production and processing costs.

Staffing Levels Analysis, and Projected Salaries and Wages Schedule

The special study on staffing levels is a major portion of the effort to simulate the conditions of a model utility in each of the cities in this study. Egyptian water supply and wastewater entities often have staff sizes which are not necessarily related to their responsibilities. For the most part, experience indicates they are over-staffed. At the same time, the employee skills mix often do not match the needs. Another serious problem is the low level of salaries and wages. These are too low compared to the scale offered by the private sector, and makes retention of such staff extremely difficult.

The objectives of the staffing study are to determine an optimum number of staff for each water supply and wastewater project, at a level of salaries and wages comparable to the private sector.

The technical staff analyzed the size and skills mix at the existing facilities and compared these to the levels estimated for the combination of existing and recommended facilities. These totals are increased to account for the commercial operations required in a self sustaining utility, and the new staff size estimate is compared to the existing level.

Staff estimates are adjusted to produce the required number of staff and skills mix to properly operate the total system to be on line year 2000. This total was distributed in the 1993 to 1999 period (that is -- all staff on line during the institutional support activities).

The analyses is displayed on the Staffing Levels Schedule. The output of this analysis is linked through the computer model to provide direct input to the analysis of salaries and wages.

The second portion of the analysis concerns increasing the salary level. Payroll data regarding salary and wage levels of the existing staff were obtained as part of the field work. This allowed the average annual level for all employees to be computed. This amount, about LE 2,600 per year includes an increment of about 30 percent for social benefits.social insurances

For purposes of this analysis, the base salaries were increased by 100 percent. The increase is assumed applicable to 25 percent of the total staff in each year, starting in year 1996, and goes on until all staff are covered. A step increase of 3 percent per year is applied to salaries and wages for the years not covered by the larger increases. The results of this analysis in terms of total cost for personnel are displayed on the Projected Salaries and Wages Schedule.

Adjustments to Electrical Power Cost

The cost of electrical power is adjusted upward to reflect the subsidized production cost. This adjustment is made to reflect another characteristic of a model utility.

The unsubsidised tariff rate for electric power has been quoted in many studies and publications as 29 piasters per KWH. (Most recently, this cost was used by Ernst and Young in the tariff study for the Cairo wastewater system).

The existing tariff is 18 piasters per KWH. Thus the electrical costs were increased by the factor 29/18 (ie: about 60 percent)in equal increments over the 1995 - 1997 three year period. This increase in base cost is indicated on the Cost of Production Schedule.

5.5 O&M Cost Projections - Analysis

The O&M cost projections are shown as the total annual production costs for water supply and wastewater services, in the Cost of Production Schedule for each city. This analysis is driven by the Unit Cost Calculation Schedules for water and wastewater provided for each city. The components of the analysis for the Mansoura water supply project are discussed to illustrate the flow of the data and the computational logic. The table for Mansoura is presented at the end of this text.

Part One of the water supply Unit Cost Calculation Schedule for Mansoura lists the investment value of the existing and proposed facilities. The cost of the proposed facilities is the project cost from the Capital Investment Summary Schedule (and the Technical Annex), and the cost of existing facilities is from estimates furnished by the technical team. Part Two lists the capacity of the facilities in Part One. Part Three shows the percentages to apply to various facilities to determine the first approximation of annual O&M costs.

Part Four indicates the unit costs at nominal capacity of the existing and proposed facilities. The Part Four values are obtained from computations performed by the model. The model uses the percentages shown in Part Three -- 5 percent, and 1 percent for Mansoura to determine the total annual O&M costs at nominal capacity for the existing and proposed system. The model then distributes the total O&M cost to its components, using the percentages shown in Part Five. First, the labor cost is subtracted from the total, and the percentages are then applied.

The unit costs in Part Four are produced by the model by dividing the component costs by the nominal capacities listed in Part Two. Note that the unit cost for power (ie: electrical power is computed separately, as this value will be increased as described in Section5.4). The last unit cost of Part Four, (ie: the lowest line in the Unit Cost Calculation Sheet) is the total unit cost, excluding labor. This is obtained by the model performing the computation for distribution unit cost O&M, and adding this value to the value of unit production cost O&M. The distribution cost O&M is obtained by applying the distribution percentage factor in Part Three to the value of the distribution facilities listed in Part One and dividing by the nominal capacities from Part Two.

The model uses the unit costs thus derived to complete the Cost of Production Schedule. The

model first "reads" the total customer demand from the Demand Forecast Schedule, and lists this value by year on the first line of the Cost of Production Schedule. (Actually the computerized linkage provides the value). The model divides the demand by the estimated percentage of losses, to calculate the total annual production of water shown on the third line of the Cost of Production Schedule.

The cost section of this schedule is produced by the model. First, the model posts the annual salaries and wages values from the Projected Salaries and Wages Schedule. The electricity costs are obtained through the model. The electrical power unit cost from the O&M Unit Cost Calculation Schedule is multiplied by the production volume in 1994. The electrical costs for the following three years are obtained by applying the adjustment to the base rate, and the ratio in flows from one year to the next. The annual electrical cost after 1997 is obtained by multiplying the previous year's cost be the ratio in production from one year to the next.

The other processing costs, and the network materials and supply costs are computed by the model by applying the unit costs to the annual production. The annual value of other processing costs is adjusted by multiplying the previous year's cost be the ratio in production from one year to the next.

The final cost is an allowance for administrative overheads, taken as 10 percent of the cost of Salaries and Wages.

The sum of all annual costs is the total annual production costs,including all the variations as discussed in Section 5.4. The unit production cost for each year is the total production cost divided by the total annual water production.

Variations introduced into the model for specific locations included:

Kom Ombo, Darawo and Nasr City

- The three cities in the "Kom Ombo Triangle" were combined into the Aswan groupal water supply system. As such, the inputs of demand, staffing etc. for existing and future conditions were aggregated and the total capacity of the regional system used as the divider into the aggregated annual costs to obtain the unit values. In addition, about 175 km of existing regional distribution mains were included as part of the existing facilities. The wastewater systems were analyzed in the same manner, producing an average tariff for both potable water and wastewater throughout the Aswan groupal system.

Mansoura/Talkha

- These cities were also treated as regionalized for both water supply and wastewater. Although the proposed wastewater treatment plant will be on Talkha's side of the river and thus serve only Talkha, the two cities were assumed to be combined in a region, thus paying a common tariff. The combination of existing and proposed facilities produces the same unit O & M cost as described for the Aswan group. The wastewater systems were burdened with extra electrical charges to reflect the

inordinate pumping requirements. These in effect were "assigned" by the writer, using the computation in the "PUMPS" file and the '92/93' budget values for electricity as a guide. The additional cost of LE 600,000 P.A. (1994) increases the unit cost, after the electrical price adjustment (1995 - 1997) by 18.5 PT.M^3.

Mahalla El Kobra

- The wastewater systems were burdened for electrical charges in a similar manner to Mansoura. These additional electrical charges of LE 1,200,000 P.A. increases the unit cost after the electrical price adjustment (1995 - 1997) by 9.5 PT./M^3.

Nuweiba/Sharm

- The water systems for Nuweiba and Sharm are based on the existing very high costs for water as representative of existing conditions. These are combined with the future O & M costs computed in the "standard" manner. The wastewater costs for these cities are computed using the same management options for existing and with the future conditions computed as per the standard procedure.

NOTE: THE COSTS COMPUTED IN THE COST OF PRODUCTION SCHEDULE, AND COSTS IN ALL OTHER SCHEDULES DISCUSSED UP TO THIS POINT ARE 1994 COSTS. NO ALLOWANCE FOR INFLATION HAS BEEN INCLUDED.

5.6 Tariff Requirements

The tariff requirements are shown in the Tariff Table, the last schedule included in the set. This schedule is also produced by the model, using the information available from the Cost of Production Schedule.

The average water supply tariff, equal to the value shown on the line "Average Required Revenue Yield" is based upon recovering all O&M costs by charging this rate for the demand volume -- the volume provided to the users. (This is equal to the water production volume minus the looses). The wastewater tariff is based upon recovering all wastewater O&M costs by charging for 80 percent of the water supply volume.

The tariff tables also illustrate the percentage level of the water supply tariff represented by the wastewater tariff. This percentage is equal to surcharge on water billings required to cover the O&M costs. Further. the table also presents the tariff increased for inflation at the indices shown.

The tariff levels as indicated. appear very reasonable for all of the proposed projects. A family of four persons using from 70 to 100 lpcd would be charged for approximately 9 to 18 cubic meters per month for water supply and about 7.5 to 15 per month of wastewater. The water and wastewater charges at various tariff levels would be as follows:

- at 15p per cubic meter. the total bills would range from L.E. 2.5 to L.E. 5 per month

- at 30p per cubic meter, the total bills would range from L.E. 5 to L.E. 10 per month.

These do not appear unreasonable charges, and the range of 15 to 30p per cubic meter covers most of the proposed facilities.

The question of proper tariffs cannot be fully analyzed in this type of study. Much work is obviously required. However, based upon the assumptions made, the proposed projects seem reasonable from the standpoint of consumer costs.

5.8 Variations in Tariffs

Tariffs vary between cities for a number of reasons. The larger communities with larger facilities benefit from the economies of scale, and in areas with facilities operating appreciably below normal capacity results in increased unit cost of production. Sharm El Sheikh receives water from El Tor and further treatment is not required, however, the pumping costs for the 100 km transmission amounts to 5 Pt per cubic meter (1993). Mahalla and Mansoura have higher wastewater tariffs due largely to the substantial higher energy charges previously discussed in Section 5.5.

5.8 Risk Analysis

The following table shows the impact of water demands that are less than the projected water demands. The base used in the financial and economic analyses is 150 lpcd, while scenarios 1 and 2 are for 120 and 100 lpcd respectively. Labor costs (40 percent) are considered to be relatively fixed, and the production cost for electricity, chemicals for processing are considered to vary with the actual production. The analysis shows that a reduction in demand for 120 or to 100 lpcd will result in a tariff that is 10 and 20 percent greater respectively.

MEASUREMENT	SCENARIO		
	BASE	1	2
LPCD	150	120	100
REDUCTION FACTOR	1	0.80	0.67
FIXED COST FOR LABOR	40	40	40
VARIABLE	60	48	40
TOTAL COST	100	88	80
TARIFF	100	110	120

This risk analysis assumes that the major elements of a well managed and organized utility will be implemented. Without this major institutional change, including reductions in staff numbers and the changing of staff to reflect the required technical and professional ability, acceptable financial performance and reasonable tariffs cannot be achieved. The financial model allows for the assessment of in impact of variables such as water usage, staffing, and O&M costs.

TABLE 5.1 CAPITAL INVESTMENT SUMMARY

EGYPT SECONDARY CITIES MUNCIPALITY MANSOURA SECTOR POTABLE WATER	Constant LE (Millions)								
	Total	1994	1995	1996	1997	1998	1999	2000	2001
Capital									
Supply Improvements	90.00				15.30	29.70	29.70	15.30	
Water Distribution	15.00				2.55	4.95	4.95	2.55	
Rehabilitation–Supply	12.00				2.04	3.96	3.96	2.04	
–Distribution	7.50				1.28	2.48	2.48	1.28	
Total Capital Construction	124.50				21.17	41.09	41.09	21.17	
Contingency (10%)	12.45				2.12	4.11	4.11	2.12	
Construction Management (3%)	4.11				0.70	1.36	1.36	0.70	
Supervision (4%)	5.48				0.93	1.81	1.81	0.93	
Design (11%)	15.06		7.53	7.53					
Institutional Support	13.10					2.62	5.24	5.24	
Total Project Expenditure	174.70	0.00	7.53	7.53	24.91	50.98	53.60	30.15	

SECTOR WASTE WATER									
	Total	1994	1995	1996	1997	1998	1999	2000	2001
Capital									
Treatment Improvements	35.00				5.95	11.55	11.55	5.95	
Collection Improvements	36.50				6.21	12.05	12.05	6.21	
Rehabilitation–Treatment	0.00								
–Collection	0.00								
Total Capital Construction	71.50				12.16	23.60	23.60	12.16	
Contingency (10%)	7.15				1.22	2.36	2.36	1.22	
Construction Management (3%)	2.36				0.40	0.78	0.78	0.40	
Supervision (4%)	3.15				0.53	1.04	1.04	0.53	
Design (11%)	8.65		4.33	4.33					
Institutional Support	9.20					1.84	3.68	3.68	
Total Project Expenditure	102.01	0.00	4.33	4.33	14.31	29.61	31.45	17.99	

TABLE 5.2 – PROJECT COSTS UNDER VARIOUS CONTRACTOR ALTERNATIVES

MUNCIPALITY MANSOURA

COSTS EXPRESSED IN MILLIONS

	LOCAL CONTRACTORS ONLY	COST USING U.S. & LOCAL CONTRACTORS					
		EXPRESSED IN LE			EXPRESSED IN US$		
SECTOR POTABLE WATER	(LE) (1)	FOREIGN	LOCAL	TOTAL	FOREIGN	LOCAL	TOTAL
Total Capital Construction	124.5	165.6	21.0	186.6	49 3	6 3	55 5
Contingency (10%)	12.5	16.6	2.1	18.7	4.9	0 6	5 6
Construction Management (3%)	4.1	2.9	1.2	4.1	0 9	0 4	1 2
Supervision (4%)	5.5	2.7	2.7	5 5	0 8	0.8	1.6
Design (11%)	15.1	10.5	4.5	15 1	3.1	1.3	4.5
Institutional Support	13.1	11.4	1.7	13.1	3.4	0 5	3.9
Total Project Expenditure	174.7	209.7	33.3	243.0	62.4	9.9	72 3
SECTOR WASTE WATER							
Total Capital Construction	71.5	57.5	35 5	93.0	17.1	10 6	27.7
Contingency (10%)	7.2	5.8	3.6	9.3	1.7	1 1	2 8
Construction Management (3%)	2.4	1.7	0.7	2.4	0.5	0.2	0.7
Supervision (4%)	3.1	1.6	1.6	3.1	0.5	0 5	0.9
Design (11%)	8.7	6.1	2.6	8.7	1.8	0.8	2.6
Institutional Support	9.2	8.0	1.2	9.2	2.4	0.4	2.7
Total Project Expenditure	102.0	80.5	45.1	125.7	24.0	13.4	37.4

NOTE (1): EXTRACTED FROM CAPITAL INVESTMENT SUMMARY

TABLE 5.3 – WATER SUPPLY AND WASTEWATER DEMANDS BY CUSTOMER

EGYPT SECONDARY CITIES PROJECT

1993 THROUGH 2010

CITY: **MANSOURA / TALKHA**

	BASE YEAR 1993	YEAR 2005	YEAR 2010
POPULATION	478,100		
POPULATION GROWTH PER YR. (%)	2.40		
WATER SUPPLY (LPCD)	56	150	150
WASTEWATER POP. SERVED (%)	95		100
WASTEWATER/WATER RATIO (%)	80		85
ADDITIONAL MARKAZ W.S. (M3/DAY)	7,000		26,300

YEAR	POPULATION SERVED WITH W.S.	AVG. W.S. PER PERS. (LPCD)	WW POPUL SERVED	POPUL WW/WS RATIO (%)	CUSTOMER DEMAND -- WATER SUPPLY (MILLIONS OF M3 PER YR.) POPULATION	OTHER (1)	TOTAL	WW VOLUME PER YEAR (MILL.M3) (2)
1993	478,100	56	95	80	9.77	3.98	13.75	8.02
1994	489,574	56	95	80	10.01	4.57	14.58	8.46
1995	501,324	56	95	80	10.25	5.17	15.42	8.88
1996	513,356	56	95	80	10.49	5.76	16.26	9.28
1997	525,677	56	95	80	10.74	6.36	17.10	9.68
1998	538,293	56	95	80	11.00	6.95	17.95	10.06
1999	551,212	56	95	80	11.27	7.55	18.81	10.42
2000	564,441	56	95	80	11.54	8.14	19.68	10.76
2001	577,987	75	96	81	15.78	8.74	24.52	14.48
2002	591,859	94	97	82	20.22	9.33	29.55	18.49
2003	606,064	112	98	83	24.86	9.93	34.79	22.82
2004	620,609	131	99	84	29.72	10.52	40.24	27.48
2005	635,504	150	100	85	34.79	11.12	45.91	32.48
2006	650,756	150	100	85	35.63	11.71	47.34	33.17
2007	666,374	150	100	85	36.48	12.30	48.79	33.82
2008	682,367	150	100	85	37.36	12.90	50.26	34.45
2009	698,744	150	100	85	38.26	13.49	51.75	35.04
2010	715,514	150	100	85	39.17	14.09	53.26	35.67

NOTE (1): VOLUME BASED UPON THE POPULATION SERVED BEING 100% IN YEAR 1993.
NOTE (2): THE ANNUAL VOLUME IN THIS COLUMN INCLUDES THE MARKAZ VALUES.
NOTE (3): THIS VALUE IS THE WASTEWATER GENERATED ONLY FROM THE CITY'S WATER SUPPLY. THUS THE MARKAZ WS COMPONENT HAS BEEN SUBTRACTED FROM THE TOTAL ANNUAL WS VOLUME

TABLE 5.4 - STAFFING LEVEL ANALYSIS

EGYPT SECONDARY CITIES PROJECT
CITY MANSOURA

SECTOR POTABLE WATER

	ACTUAL 1993	PROPOSED 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
PROCESSING	196	49	49	49	49	49	49	112	112	112	112	112	112	112	112	112	112	112	112
NETWORK	190	44	46	49	51	54	56	58	61	63	66	68	71	73	75	78	80	83	85
COMMERCIAL AND ADMIN	20	58	60	62	64	66	69	71	73	75	77	80	82	84	86	88	90	93	94
TRANSFER TO WASTE	(4)	(12)	(12)	(12)	(13)	(13)	(14)	(14)	(15)	(15)	(15)	(16)	(16)	(17)	(17)	(18)	(18)	(19)	(19)
NET COMMERCIAL - WATER	16	46	72	74	77	80	82	85	88	90	93	95	98	101	103	106	109	111	112
PROPOSED STAFFING TOTAL		139	167	172	177	182	187	255	260	265	270	276	281	286	291	296	301	306	309
NET HIRED (DISPLACED) STAFF					0	0	0	0	-142	5	5	5	5	5	5	5	5	5	4
ACTUAL STAFFING TOTAL	402	402	402	402	402	402	402	402	260	265	270	276	281	286	291	296	301	306	309

SECTOR WASTEWATER

	ACTUAL 1993	PROPOSED 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
PROCESSING	158	98	98	98	98	98	98	150	150	150	150	150	150	150	150	150	150	150	150
NETWORK	160	195	197	198	200	202	204	205	207	209	210	212	214	215	217	219	221	222	224
COMMERCIAL & ADMIN	4	12	12	12	13	13	14	14	15	15	15	16	16	17	17	18	18	19	19
PROPOSED STAFFING TOTAL		303	305	307	309	311	313	369	372	374	376	378	380	382	384	387	389	391	393
NET HIRED (DISPLACED) STAFF								47	2	2	2	2	2	2	2	2	2	2	2
ACTUAL STAFFING TOTAL	322	322	322	322	322	322	322	369	372	374	376	378	380	382	384	387	389	391	393

TABLE 5.5 – PROJECTED SALARIES AND WAGES

EGYPT SECONDARY CITIES
CITY MANSOURA

BASE RATE PER EMPLOYEE (LE P A) 2600
ANNUAL STEP INCREMENT (%) 3
ADJUSTMENT TO MARKET (%) 100

SECTOR POTABLE WATER

LE (Thousands)

	PROPOSED 1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
BASE SALARY	1.045	1.045	1.045	1.045	1.045	1.045	677	690	703	716	729	743	756	769	782	795	804
STEP INCREMENT	31	31								21	22	22	23	23	23	24	24
ADJUSTMENT TO MARKET			65	131	196	261	127	66	44								
TOTAL SALARY & WAGE EXP	1077	1108	1173	1304	1500	1761	1520	1619	1676	1711	1746	1781	1817	1853	1890	1927	1960

BASE RATE PER EMPLOYEE (LE P A) 2600
ANNUAL STEP INCREMENT (%) 3
ADJUSTMENT TO MARKET (%) 100

SECTOR WASTEWATER

LE (Thousands)

	PROPOSED 1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
BASE SALARY	837	837	837	837	837	960	966	972	977	983	988	994	999	1 005	1 011	1 016	1 021
STEP INCREMENT	25	25								29	30	30	30	30	30	30	31
ADJUSTMENT TO MARKET			52	105	157	240	181	121	61								
TOTAL SALARY & WAGE EXP	862	887	940	1044	1201	1565	1751	1878	1945	1960	2015	2051	2086	2122	2158	2194	2230

TABLE 5.6 – OPERATIONS & MAINTENANCE UNIT COST CALCULATION – POTABLE WATER

EGYPT SECONDARY CITIES PROJECT
SECTOR: WATER SUPPLY — MANSOURA

PART ONE

INVESTMENT VALUE	LE (Millions)
PLANT	
EXISTING FACILTIES VALUE NEW	66 0
NEW FACILITIES CAPITAL COST	132 4
TOTAL	200 4
NETWORK	
EXISTING	50 0
NEW	29 2
TOTAL	79 2

PART TWO

NOMINAL CAPACITY	LPS	M3 PA (Millions)
EXISTING FACILTIES	900	28 38
NEW FACILITIES	1200	37 84
TOTALS	2100	66 23

PART THREE

TABLE OF DESIGN & MTCE INDICES

TYPE	TECHNOLOGY	O&M(%)
A	RAPID SAND - EXIST	5
B	RAPID SAND - NEW	5
	NETWORK	1

PART FOUR

OPERATING & MAINTENANCE COSTS
PLANT

AT NOMINAL CAPACITY	EXIST	NEW	COMBINED
ANNUAL COST(LE Millions)	3 4	7	10 019
UNIT COSTS (EXCLUDING SALARIES)LE			
CHEMICAL	0 03473	0 03473	0 0347
MAINTENANCE	0 00958	0 00958	0 0095
FUEL	0 00958	0 00958	0 0095
SUB-TOTAL	0 05390	0 054	0 0539
POWER	0 02994	0 02498	0 0271
UNIT COST TOTAL	0 08385	0 07869	0 0810

NETWORK

ANNUAL COST(LE Millions)	0 5	0 29205	0 7920
COST EXCLUDING SALARIES	0 25	0 14602	0 3960

PART FIVE

TABLE OF COST INDICES
- LABOR EXCLUDED

	A RAPID SAND - EXI	B RAPID SAND - NEW
CHEMICAL	0 41	0 41
POWER	0 36	0 36
MAINT'N'CE	0 11	0 11
FUEL	0 11	0 11
TOTAL	1 00	1 00

TABLE 5.7 – OPERATIONS & MAINTENANCE UNIT COST CALCULATION – WASTEWATER

SECTOR: WASTEWATER | MANSOURA |

PART ONE

INVESTMENT VALUE	LE (Millions)
PLANT	
EXISTING FACILTIES VALUE NEW	90 0
NEW FACILITIES · CAPITAL COST	45 4
TOTAL	135 4
NETWORK	
EXISTING	38 0
NEW	47 4
TOTAL	85 4

PART TWO

NOMINAL CAPACITY	M3/D(THOUS)	M3 PA (Millions)
EXISTING FACILTIES	135	49 28
NEW FACILITIES	25	9 13
TOTALS	160	58 40

PART THREE

TABLE OF DESIGN & MTCE INDICES

TYPE	TECHNOLOGY	O&M(%)
A	ACTIVATED SLUDGE – EXI	5
B	ACTIVATED SLUDGE	5
	NETWORK	1 5

PART FOUR

OPERATING & MAINTENANCE COSTS

PLANT

AT NOMINAL CAPACITY	EXIST	NEW	COMBINED
ANNUAL COST(LE Millions)	4 5	2 2715	6 7715
UNIT COSTS (EXCLUDING SALARIES)LE			
CHEMICAL	0 01826	0 04978	0 0231
MAINTENANCE	0 00913	0 02489	0 0115
FUEL	0	0	0
SUB – TOTAL	0 02739	0 07467	0 0347
POWER	0 03652	0 09957	0 0463
UNIT COST TOTAL	0 06392	0 17425	0 0811

NETWORK

ANNUAL COST(LE Millions)	0 57	0 71065	1 2808
COST EXCLUDING SALARIES	0 285	0 35532	0 6403

PART FIVE

TABLE OF COST INDICES – LABOR EXCLUDED (%)

	A ACTIVATED SLUD	B ACTIVATED SLUDGE
CHEMICAL	0 29	0 29
POWER	0 57	0 57
MAINT'N'CE	0 14	0 14
FUEL	0 00	0 00
TOTAL	1 00	1 00

TABLE 5.8 – COST OF PRODUCTION

EGYPT SECONDARY CITIES PROJECT
CITY: MONSURA

SECTOR POTABLE WATER

PRODUCTION (M3 Millions)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Customer Demand	14 58	15 42	16 26	17 10	17 95	18 81	19 68	24 52	29 55	34 79	40 24	45 91	47 34	48 79	50 26	51 75	53 26
Unaccounted For Water (%)	30	30	30	25	20	15	20	20	20	20	20	20	20	20	20	20	20
Total Production Required	20 83	22 02	23 22	22 80	22 44	22 13	24 60	30 65	36 94	43 49	50 30	57 39	59 17	60 99	62 82	64 69	66 58
COSTS (LE Thousands)																	
Salaries & Wages	1077	1108	1173	1304	1500	1761	1520	1619	1678	1711	1748	1781	1817	1853	1890	1927	1960
Electricity	624	660	695	683	672	663	737	831	1002	1179	1364	1556	1604	1654	1703	1754	1805
Adj rate		134	283	417													
Total Electricity	624	794	979	1100	1089	1080	1154	1248	1419	1596	1781	1973	2022	2071	2121	2171	2223
Other Processing Costs	1123	1187	1252	1229	1210	1193	1326	1652	1991	2344	2712	3094	3190	3288	3387	3487	3589
Network Materials & Supplies	250	250	250	250	250	[illegible]	250	250	396	396	396	396	396	396	396	396	396
Administrative Overhead	108	111	117	130	150	178	152	162	168	171	175	178	182	185	189	193	196
Total Production Cost	3073	3330	3654	3883	4049	4285	4250	4770	5483	6048	6635	7244	7425	7606	7793	7981	8168
UNIT PRODUCTION COST (Pt/M3)	14 75	15 18	15 73	17 03	18 04	19 36	17 28	15 56	14 84	13 91	13 19	12 62	12 55	12 47	12 40	12 34	12 27

SECTOR WASTEWATER

FLOWS (M3 Millions)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Generated	8 46	8 88	9 28	9 68	10 06	10 42	10 76	14 48	18 49	22 82	27 48	32 48	33 17	33 82	34 45	35 04	35 67
Infiltration (%)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Total For Processing	9 40	9 86	10 32	10 75	11 17	11 57	11 95	16 08	20 55	25 36	30 53	36 09	36 85	37 58	38 28	38 94	39 64
Salaries & Wages	862	887	940	1044	1201	1565	1751	1878	1945	1980	2015	2051	2086	2122	2158	2194	2230
Electricity	1543	1580	1577	1593	1608	1623	1754	1948	2153	2378	2618	2874	2909	2943	2975	3006	3038
Adj rate		838	1270	855													
Total Electricity	1543	2398	3685	4556	4572	4586	4718	4910	5118	5340	5580	5838	5873	5907	5939	5970	6002
Other Processing Costs	571	603	636	625	615	606	674	1066	1285	1513	1750	1996	2058	2121	2185	2250	2318
Network Materials & Supplies	285	285	285	285	285	285	285	285	640	640	640	640	640	640	640	640	640
Administrative Overhead	86	89	94	104	120	156	0	188	195	198	202	205	209	212	216	219	223
Total Production Cost	3261	4174	5546	6511	6873	7042	7428	8139	8987	9473	9985	10525	10658	10790	10922	11054	11186
UNIT PROCESSING COST (Pt/M3)	34 71	42 32	53 76	60 55	58 73	60 85	62 15	50 60	43 74	37 36	32 70	29 16	28 92	28 71	28 53	28 39	28 22

TABLE 5.9 – TARIFF ANALYSIS

EGYPT SECONDARY CITIES PROJECT
CITY: MANSOURA

SECTOR: POTABLE WATER	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Water Needed (M3 mil/pa)	14.58	15.42	16.26	17.10	17.85	18.81	19.68	24.62	29.55	34.79	40.24	45.91	47.34	48.79	50.26	51.75	53.26
Water Produced (M3 mil/pa)	20.83	22.02	23.22	22.60	22.44	22.13	24.60	30.65	36.94	43.49	50.30	57.39	59.17	60.99	62.82	64.69	66.58
Cost of Water Produced (LE thousands)	3,073	3,339	3,664	3,883	4,048	4,265	4,250	4,770	5,453	6,048	6,635	7,244	7,425	7,608	7,793	7,981	8,166
Average Tariff – Unadjusted (Pt/M3)	14.75	15.16	15.73	17.03	18.04	18.36	17.28	15.56	14.64	13.91	13.19	12.62	12.55	12.47	12.40	12.34	12.27
Adj: – Allowances For Uncollected and Bad Debts (Pt/M3)	1.48	1.52	1.57	1.70	1.80	1.84	1.73	1.56	1.46	1.38	1.32	1.26	1.25	1.25	1.24	1.23	1.23
Average Required Revenue Yield (Pt/M3)	16.39	16.85	17.46	18.82	20.05	21.31	19.20	17.29	16.49	15.45	14.66	14.03	13.84	13.86	13.76	13.71	13.63
Rate of Inflation (%)	10	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Inflation Indices	1.10	1.16	1.26	1.33	1.41	1.50	1.59	1.69	1.79	1.89	2.01	2.13	2.26	2.39	2.53	2.69	2.85
Inflated Average Required Rev: Yield (Pt/M3)	18.03	20.01	22.02	25.26	28.36	32.26	30.52	29.14	29.46	29.26	29.42	29.84	31.44	33.13	34.93	36.82	38.81
SECTOR: WASTEWATER																	
Cost of Water Produced (LE thousands)	3,261	4,174	5,548	6,511	6,673	7,042	7,428	8,139	8,987	9,473	9,885	10,525	10,658	10,790	10,922	11,054	11,186
Water Collected (Water Needed X.80)	11.66	12.33	13.00	13.68	14.36	15.05	15.74	19.91	23.64	27.83	32.19	36.73	37.87	39.03	40.21	41.40	42.61
Average Tariff – Unadjusted (Pt/M3)	27.96	33.85	42.65	47.58	46.46	46.79	47.16	41.50	38.01	34.03	31.02	28.66	28.14	27.65	27.17	26.70	26.26
Adj: – Allowances For Uncollected and Bad Debts (Pt/M3)	2.60	3.38	4.26	4.76	4.65	4.68	4.72	4.15	3.80	3.40	3.10	2.87	2.81	2.76	2.72	2.67	2.63
Average Required Revenue Yield (Pt/M3)	31.07	37.61	47.39	52.67	51.62	51.69	52.43	46.11	42.24	37.82	34.46	31.84	31.27	30.72	30.16	29.67	29.17
Rate of Inflation (%)	10	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Inflation Indices	1.10	1.16	1.26	1.33	1.41	1.50	1.59	1.69	1.79	1.89	2.01	2.13	2.26	2.39	2.53	2.69	2.85
Inflated Average Required Rev: Yield (Pt/M3)	34.17	44.66	58.67	70.56	73.04	77.87	83.35	77.70	75.45	71.61	69.17	67.74	70.52	73.43	76.46	79.88	83.08
Wastewater/Potable Water Tariff Ratio (%)	189%	223%	271%	279%	257%	242%	273%	267%	256%	245%	235%	227%	224%	222%	219%	216%	214%

Chapter 6

ECONOMIC ANALYSIS

6.1 Introduction

Financial analysis is not a solid ground for decisions concerning social capital investment. Financial analysis emphasizes the profits of a project only in monetary terms, and not in terms of its real contribution to the welfare of society. Investment decisions taken on behalf of society (social capital investment) should be justified by an economic analysis to test the national profitability of the project. An economic analysis of the individual Secondary Cities projects is therefore carried out to trace the contribution to the Egyptian society and to assess their economic viability.

Financial analysis and economic analysis differ in many ways. The objective of financial analysis is to assess the net financial result of a project, while economic analysis traces the project's contribution to all fundamental development objectives. Financial analysis takes into account only the direct monetary effects of a project; economic analysis considers all benefits, including the indirect effects. The former is based on market prices, while the latter uses prices that would prevail in the presence of competition and free market prices (approximation of economic prices or shadow prices). For financial analysis, the time preference problem is tackled by application of the prevailing interest rate on the capital market, while in the case of economic analysis, it is solved by using the social discount rate.

This report begins with a discussion of the economic benefits that are expected from the Secondary Cities projects. The next section describes how these benefits are to be measured in the economic analysis. Then a discussion is provided of how shadow prices for costs and the social discount rate are set. The final section is an economic analysis of the projects at each location.

6.2 Benefits From the Secondary Cities Project

The Secondary Cities Project will provide benefits through enhancement of both water and wastewater systems. The measurable major water system benefits are expected to come from greater access to water by households and businesses that already are served, higher quality water services, and lower cost production of water services. Only limited benefits will result as extensions of water distribution systems connect new households to water, since most households are already attached to a system. The primary benefits from wastewater system enhancements will come from more households and businesses being connected to wastewater systems. This section provides the framework for conceptualizing these benefits. The discussion is separated into new services, expanded services, improved service quality, lower production costs, externalities and use in production. These benefits are not mutually exclusive and the same project may yield several different types of benefits simultaneously.

6.2.1 New Services

Most wastewater benefits arise from extending systems so that new consumers can access

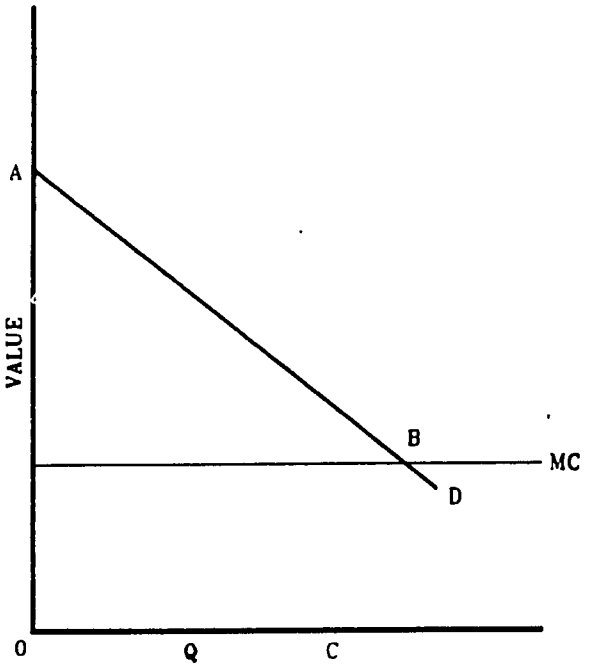


FIG. 6.1 WILLINGNESS TO PAY FOR ACCESS TO SERVICE

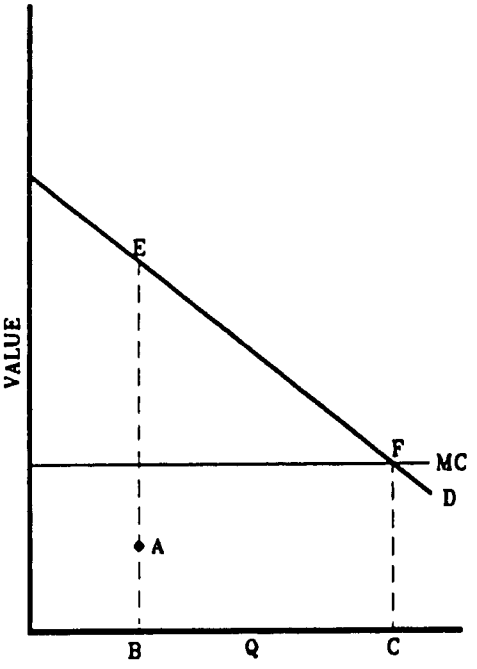


FIG. 6.2 WILLINGNESS TO PAY FOR ACCESS TO GREATER SERVICE

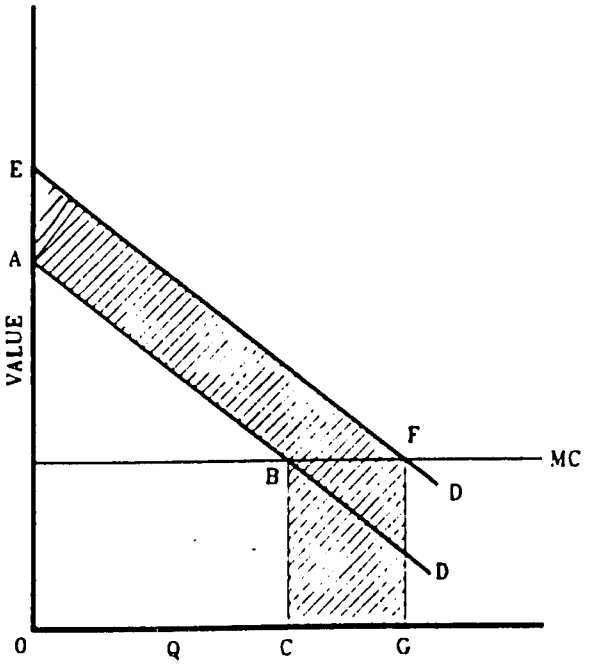


FIG. 6.3 WILLINGNESS TO PAY FOR HIGHER QUALITY SERVICES

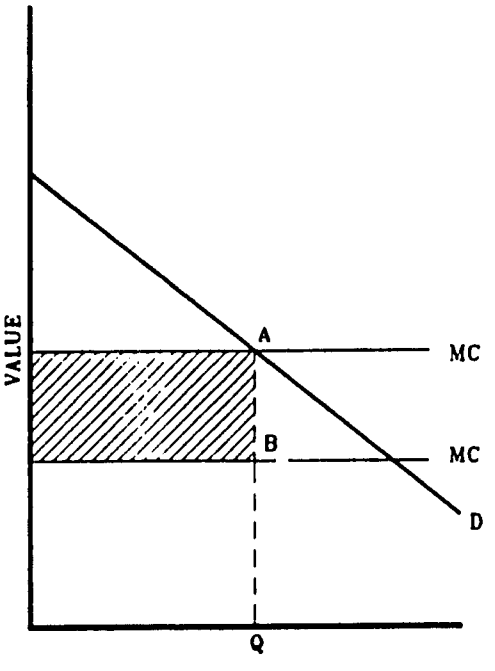


FIG. 6.4 BENEFITS FROM COST SAVINGS

services. For example, projects will provide wastewater systems for Arment and Isna, where none currently exists. Wastewater services will be extended to about 20 percent of the population in Mahalla and to about 50 percent of the population in Luxor. Essentially everyone is connected to water systems in most secondary cities, so new service is less frequently a benefit. One exception is in Nuweiba where a number of people purchase vended water from a desalination plant.

A framework for measuring many project benefits can be found in willingness to pay analysis. Willingness to pay is defined as the maximum amount that consumers will pay for a specific service level. People are willing to pay for water services because of convenience, savings since vended water no longer must be purchased, time savings in collecting water, improved health status, and so forth. People are willing to pay for wastewater services because they can avoid paying to have vaults emptied, reduce standing water in their neighborhood, upgrade their living conditions and improve aesthetics. Willingness to pay simultaneously accounts for households' valuation of all forms of expected benefits. Willingness to pay is an accurate measure of benefits, since people will pay as much for water as they expect in benefits.

Willingness to pay can be visualized using demand curve analysis.[1] An illustration of willingness to pay is given in Figure 1. The optimal level of consumption is at point C where marginal cost equals marginal benefit. Willingness to pay for consumption level C is the area given by 0ABC. If Figure 1 represents sewer services, the system should be built to deliver 0C in services and total benefits equal 0ABC.

6.2.2 Access to More Services

Benefits from improved water services with the Secondary Cities Project often will be greater access to water, rather than new service. Access to water in many secondary cities can be illustrated by point A in Figure 2.[2] Consumers are unable to obtain all water they would like to buy, because the production and distribution systems are unable to provide sufficient quantities. Supply constraints exist because the distribution system has inadequate pressure to pump sufficient water, particularly high up in apartment buildings, or because the flow rate of water is inadequate. Water may be rationed, as occurs in Mahalla during the summer, or people may turn on the tap and find very low or no water flow. People in the top four floors of six story buildings in Mansoura and the top two floors in six story buildings in Mahalla report that water pressure is inadequate and they are unable to obtain water except at off peak hours. Consumers may respond by taking fewer baths, altering the time of day when they use water, purchasing private substitutes, or some other alternative. Also, note that the price of water at A, usually about LE 0.25 in Egypt, is illustrated to be

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[1]Technically, a compensated demand curve must be used to measure willingness to pay.

[2]Note that many consumers may be at a point like B where they are paying essentially nothing for additional consumption of water. Point B represents the consumer's situation where there is no metering of water or where a single meter is used for a large building. With a single meter each consumer will behave as if there is little change in his share of the bill for additional consumption.

below the marginal cost of water.

Secondary Cities water projects should allow consumers to reach point C in Graph 2, where consumers can purchase all of the water they want at a price equal to the marginal cost of water delivery. Consumer's willingness to pay for additional water is illustrated by the area EFCB.

Measuring the specific quantity of water that consumers would want to buy if price were set at marginal cost (corresponding to point C) requires more specific information about the demand curve for water than is currently available. Based on international norms, engineers and planners believe that systems should be designed to allow consumption of at least 150 liters per person per day. Luxor, which has fewer supply constraints, provides some evidence that consumers demand markedly more water than they are currently receiving. Consumers are estimated to use about 120 liters of water daily in Luxor. Water consumption is between 40 and 70 liters per day in most secondary cities.

6.2.3 Higher Quality Services

Quality enhancements are a benefit expected from all Secondary Cities' water and wastewater projects. For example, greater water pressure will allow consumers to obtain the quantity of water they want at the time they want it. Higher water pressure should result in improved water quality because distribution pipes will be better able to hold out contaminants. Health status will improve as a result. Even Luxor, which has sufficient water capacity in the system, expects greater pressure to be a significant benefit from rehabilitation of the water system.

The value that consumers place on quality improvements can be seen by an outward shift in the demand curve, corresponding to consumers greater willingness to pay for higher quality water. The greater demand is illustrated with an outward movement of the demand curve to D' in Figure 3. Suppose consumers formerly were consuming 0C in water and that the marginal cost of water is unaffected by the quality improvement. The additional benefits of the project are 0EFG (benefits of water consumption after the improvements) minus 0ABC (benefits before the improvements), which is the shaded area in Figure 3.

6.2.4 Lower Cost Production of Water

Lower cost water production is beneficial to the economy since fewer resources must be used to generate the benefits. A reduction in the amount of unaccounted for water is the primary means for lowering production cost in the secondary cities projects. About 40 percent of water is unaccounted for in existing secondary city water systems, and the projects anticipate reducing the level to as low as 20 percent. Marginal and average costs of delivering any given amount of water to households is reduced as a result.[3] Also, the marginal cost of water production is dramatically lowered in Nuweiba since the existing desalinization system will be replaced with a well system.

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[3]Cost estimates provided in the financial section suggest the assumption of constant marginal costs is reasonable.

Gains to the economy from lower production costs for water are illustrated in Figure 4 through a downward shift in the marginal cost curve. The economy gains because 0C in water can be produced using 0C x CB in resources, rather than 0C x CA. Gains from reducing unaccounted for water or other means of lowering marginal costs are illustrated by the shaded area (note that this is a reduction in cost rather than an increase in benefits). Benefits also develop because consumers will use more water since the efficient consumption level rises from 0C to 0E. The benefits of increasing consumption to 0E were discussed above in the section on greater access to services.

6.2.5 Externalities

Benefits from wastewater provision accrue to people outside served neighborhoods in the secondary cities. These benefits are not reflected in the willingness to pay of local residents that was used,above to describe benefits, so total benefits are understated. Reductions in standing water help anyone trying to pass through a neighborhood. Improved wastewater treatment will improve the quality of effluents that go downstream, thereby making downstream water users better off. Downstream users gain because Nile River water is of higher quality. One of the benefits of higher quality downstream water is it requires less treatment for drinking.

6.2.6 Value of Water and Wastewater in Production

The previous five benefits above focused on the value of water and wastewater for use in consumption. Water and wastewater also offer benefits in production. A substantial literature seeking to measure economic benefits in production that result from water, wastewater, and other infrastructure has developed in recent years. The literature's conclusion is that infrastructure has significant effects on an economy's production, though there is some disagreement on the extent of benefits. Firms benefit because water they purchase can be less expensive. Also, firms potentially can buy water and wastewater services in place of operating captive water and wastewater systems. Some hotels in the Sinai and several factories in Mahalla are examples of firms with captive systems. Lower water and wastewater charges will reduce firms production costs. The economy's gain will exceed the cost savings if firms become more competitive and are able to expand their efficient size. Firms also benefit if better quality services, both in terms of water pressure and water traits, permit them to undertake activities that are infeasible without good infrastructure. Small businesses and firms in low income neighborhoods often are major beneficiaries of infrastructure services since these firms are least able to find alternative means of overcoming low quality services. The agricultural sector can become more productive as well. For example, some treated effluents can be used to irrigate nearby agricultural products which will increase agricultural production. No quantitative estimates of the gains in production are made here.

6.3 Measures Of Water and Wastewater Benefits and Costs

This section describes the techniques that are used in this report to quantify project benefits and cost savings. Benefits from new services, improvements in access, and savings from lower cost service delivery are measured here. Gains from externalities and benefits in production generally are not accounted for in this analysis. Only a limited effort is made to

measure the benefits of higher quality water and wastewater. Therefore, there is a tendency to understate total project benefits.

The best means for quantifying many project benefits is to directly measure people's willingness to pay for improved water and wastewater services. However, accurate measures of willingness to pay are not currently available and an in-depth analysis is beyond the scope of this study. Therefore, willingness to pay must be measured with a series of proxies.

6.3.1 Water

People's actual behavior can be used as a proxy for certain aspects of willingness to pay for water services. Consumers provide evidence of the value they place on water services as they purchase alternative services. These values are the basis of most benefit estimates that are prepared here. In many cases, people's willingness to pay for improved water will be greater than their expenditures for these alterative services, because the alternatives offer lower value in consumption than do improved services.

Value of New Service

The willingness to pay for water delivery by people who are not currently served with water can be inferred by their payment for vended water. Three anecdotes are available on expenditures for vended water in Egypt. First, some unserved or poorly served households in Cairo are said to spend LE 76.0 (LE 365 per household) annually to purchase 17 liters of vended water per day. Second, unserved households and households living on upper floors in Nuweiba must purchase vended water from a desalinization plant. These households spend LE 169 per person per year for only 3.6 liters per day. Most of the cost is the foregone time spent in collecting the water.[4] Third, hotels in Nuweiba apparently pay LE 18 to LE 25 per cubic meter for delivered water when more is needed than can be obtained from the existing system. The vended price in all cases is dramatically higher than the price charged for improved water anywhere in Egypt.

The LE 76.0 per person spent for vended water in Cairo is used in the benefit/cost analysis as the willingness to pay for water delivery by unserved households. This is only one-half as large as in Nuweiba, but the Cairo data represent an actual market price and the Nuweiba data are very sensitive to the value placed on time spent collecting water. LE 76 is a lower bound on the value of delivered water since this payment is for a limited amount of water (only 17 liters per day), and newly served consumers will receive significantly more water. Also, water from the tap is more useful to consumers than vended water, and therefore, should have a higher value.

Better health status is one benefit from access to new water services and the value of better health is an alternative to the price of vended water as an estimate of water benefits. The

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[4]People are reported to collect 40 liters of water three times per week. The water sells for LE 0.05 per 20 liters (LE 2.5 per cubic meter). People are assumed to spend 30 minutes each time they collect water, at an opportunity cost of LE 0.17 per minute. Thus, the cost is LE 5.1 for time spent in collection and LE 0.1 for water on each visit.

value of better health status can be approximated with savings on health expenditures. A study of health expenditures was undertaken as part of the Village Development Project in Gharbia Governorate (Social Fund for Development). The study indicated that the average household would save LE 28 per year if potable water was available at the main source of water. The survey was conducted in a rural area, so an adjustment must be made to reflect the higher savings on health expenditures that would result in urban areas. Urban expenditures are adjusted by multiplying the rural savings by 1.88, which is per capita urban health expenditure (Le 48.6) divided by per capita rural health expenditure (LE 25.4) as measured by the Family Budget Survey of 1992. Also, an adjustment must be made because health care expenditures are subsidized. A recent study on cost recovery for health services indicates the government provides a 45 percent subsidy to health expenditures, so the shadow price coefficient for health services is 1.8.

In summary, the savings per person from new access to potable water is estimated as follows:

$$B = ((S*U + D) * A) / F$$

Where :

B : Per capita benefit per year resulting from installing new water facilities.
S : The amount rural households would save if potable water is made available in sufficient quantity at the main source (28).
U : An urban adjustment coefficient (1.88).
D : Delivery cost of water from the main source to house connections (LE 15).
A : Shadow price of health services in Egypt (1.8).
F : Family Size (4.8).

Willingness to pay for access to new potable water services is estimated at LE 25.4 per year based on savings in health expenditures and at LE 76.0 using payments for vended water. In general, the vended water approach is used in the benefit/cost analysis because the purchase of vended water represents the acquisition of a broader set of benefits.

Greater Access to Water Services

The value of improved water services is measured in two ways:

- Private payments for improved service
- Willingness to pay for water services in Mansoura

A significant way to improve water services in Egypt is to pump water into tanks on buildings' roofs and then draw from the tank rather than directly from the delivery system.[5] The benefits include a better flow rate and better water pressure. Placing water tanks on roofs is a common practice in Cairo and a number of secondary cities. Consumer's willingness to pay for an improved water system that does not require a roof tank is estimated to be the cost of this tank system. The estimated annual cost per capita to use a

[5]In addition, water filters are frequently used in an effort to improve water quality.

roof tank and pump is LE 38, which is composed of LE 13 for electricity and LE 25 pounds for the annualized cost of the pump and tank. Electricity costs are subsidized and a shadow price coefficient of 1.3 is used. Thus, the economic value of the tank system is LE 42 per person per year.

A limited survey was administered in Mansoura to obtain some measure of the willingness of served households to pay for improved water. Forty-six households living in 4 buildings in Mansoura were asked to place a value on having access to better water services. The average response was LE 14 per household per month. This provides an estimate of LE 35 per person per year. Households living in higher flats responded with greater willingness to pay than those living in lower flats, evidencing the deterioration in water service that occurs in higher flats. The estimates are surely a lower bound since these served households have a significant incentive to understate their true willingness to pay. A much more refined and in-depth survey would be necessary to elicit more accurate willingness to pay surveys.

The approaches to measuring willingness to pay for greater access to improved water lead to estimates of LE 40 and LE 35 per capita per year. Both approaches are based on conservative approaches and yield similar results, so the higher value generally is used.

6.3.2 Wastewater

Households without sewerage services normally have wastewater vaults that must be emptied on a regular basis. Consumers who have sewerage services benefit because they save the cost of having the vaults emptied. Consumers willingness to pay for wastewater services must be at least as much as the cost of emptying the vaults, since these amounts are currently being paid for the handling of wastewater.

Annual costs of emptying vaults, which vary considerably, are listed for several cities in Table 1. Each city's costs are used in the benefit/cost analysis when available. The average value from the table is used when no other number is available. In many cases, vault cleaning may be performed by the public sector at a subsidized rate so actual payments could understate the resource cost. Therefore, the analysis also was conducted using the cost for emptying vaults in Isna, the highest of any city. This still may be a conservative estimate of the cost for cleaning vaults since the annual cost in Cairo are estimated to be about twice as large as in Isna. The savings from not emptying vaults only accounts for part of the benefits from sewerage. First, sewerage offers much stronger aesthetic benefits for the served households than vaults, so consumers likely would be willing to pay more for sewerage than their cost savings. The analysis fails to measure the benefits of higher quality services. Second, the cost savings do not consider externality benefits for others, including cleaner downstream water and use of the effluent for irrigation.

The government currently maintains household vaults at an estimated annual cost of LE 12 per person per year. Government savings for maintaining the vaults are an additional benefit.

6.3.3 Cost Savings

Rehabilitation and distribution improvements for water services reduce the unaccounted for

water in the system, and achieve the major production cost savings. Saved water allows lower cost production for any given level of water consumption. Estimates are that the projects will reduce system losses from around 40 percent (some estimates are that the losses are much greater) to about 20 percent of water production. Therefore, water projects are anticipated to reduce costs by 20 percent of the opportunity cost of water production. The current market price of water is LE 0.25 in most places. Estimates are that the shadow price for water services is 2.2 times greater than the price of water. This is based on a ratio of cost of production per cubic meter to the tariff (including depreciation).

Cost savings also arise from replacing the desalinization facilities in Nuweiba and Sharm el Sheikh with a well system. The production cost of water in the desalinization plant is estimated to be LE 17.0 per cubic meter versus about LE 1.0 per cubic meter with the well system.

TABLE 6.1: EXPENDITURES FOR EMPTYING WASTEWATER VAULTS

City	Annual Amount Per Person
Arment	L.E. 13
Aswan	L.E. 13
Darawo	L.E. 13
Isna	L.E. 21
Kom Ombo	L.E. 19
Mahalla	L.E. 15
Nasr City	L.E. 13
Talkha	L.E. 5
Tanta	L.E. 10

6.3.4 Costs

The costs for water and wastewater projects in the secondary cities have been estimated and are presented in the financial section of this report. The life cycle costs include the initial investments in production, distribution, and collection and costs for operations and maintenance. These costs are used in the economic analysis. However, some market prices prevailing in Egypt do not represent real value (social opportunity cost). The remainder of this section identifies significant price distortions, and where appropriate, suggests the need to adjust prices accordingly. Price adjustments are made only for the most important items, where distortions might considerably affect the project's profitability.

The procedure applied in adjusting the distorted market prices is to use border prices (CIF or FOB prices) as a base for price correction of the tradable goods (importable and exportable), and to adjust the distorted prices of non-tradable goods and services by applying the actual domestic market prices and cost, whichever is higher. Shadow price coefficients are, therefore, derived by relating the adjusted prices to the distorted market prices.

Investigation of the projects' inputs and outputs indicates that price distortion exists in four basic items: building materials, potable water, electricity, and health services. The first is a tradable good while the other two are non-tradable. Shadow prices for potable water, electricity, and health services are used in measuring demand, as described above.

Cement is the most significant component in construction of water and wastewater systems, so its price is used to approximate the shadow price of building materials. The domestic local price (official price) of normal portland cement is LE 129 per ton or US $ 38.4 per ton (1993), while its border price (CIF Alexandria) is US $ 45 per ton. Therefore, cement's shadow price coefficient is estimated to be 1.17.

6.4 Economic Evaluation

All water and waste water projects in the cities or locations under investigation are economically tested on the basis of additional net benefit resulting from additional capital investment. Hence, an economic profitability statement is formulated to reflect the economic returns on the proposed investment over 15 years. The streams of net benefits after the projection period are captured by the residual or terminal value.

However, all monetary values given in this analysis are in Egyptian pounds and based on constant prices of 1994. Foreign components are converted into Egyptian pounds at the market foreign exchange rate (US$ 1 = LE 3.36). The following economic indicators are applied to every project to test its economic viability :

- Net present value
- Economic rate of return
- Benefit/cost ratio

ECONOMIC ANALYSIS

1. MANSOURA CITY

1.1 WATER SYSTEM

A. Project Description

The project aims at increasing the availability of water, and reducing the losses in water due to leakage and illegal connections. Thus the following modifications to the present system have been suggested :

- o Providing a new 1200 l/s water treatment plant
- o Expanding the distribution system
- o Rehabilitation of the existing water distribution facilities to reduce losses of water

B. Expected Output

Based on the above suggested improvements in the system, the following outputs are expected:

- o Expand water delivery capacity to at least 150 litres per person per day from the current 66 litres per day
- o Greater water pressure and quality through rehabilitation of the distribution network
- o Unaccounted-for-water losses reduced from 40 to 20 percent of production.

C. Initial Capital Cost

Capital costs are based on the engineering and technical investigation. They are classified into civil works, equipment, and salaries and wages; and broken down into supply improvements, water distribution, and rehabilitation. The following table summarizes the financial capital cost.

Table E - 1.1
Financial Capital Cost
(LE'000)

Item	Supply Improvment	Water Distribution	Rehabili-tation	Total
Civil Work	34,100	5,000	8,700	47,800
Equipment	32,500	5,200	5,600	43,300
Salaries	23,400	4,800	5,200	33,400
Total	90,000	15,000	19,500	124,500

* Foreign components are converted into Egyptian pounds at US$ 1 = LE 3.36.

Financial cost of civil works is adjusted on the basis of an accounting coefficient of 1.17 to reflect its real or economic cost. Economic capital cost is, therefore, estimated as follows:

Table E - 1.2
Economic Capital Cost
(LE'000)

Item	Supply Improvment	Water Distribution	Rehabilit-ation	Total
Civil Work	39,900	5,800	10,200	55,900
Equipment	32,500	5,200	5,600	43,300
Salaries	23,400	4,800	5,200	33,400
Total	95,800	15,800	21,000	132,600

The time duration of implementation and construction is estimated at 4 years starting in 1997. Design is expected to be finalized in two years time (1995-1996). The following is the time schedule of the capital investment requirements as projected in this analysis.

Table E - 1.3
Time Schedule of Capital Investment
(LE Million)

Item	1995	1996	1997	1998	1999	2000
Supply Improv.			16.29	31.61	31.61	16.29
Water Distribut.			2.69	5.21	5.21	2.69
Rehabilitation			3.57	6.93	6.93	3.57
Total Hard Construction	0.00	0.00	22.55	43.75	43.75	22.55
Contingency			2.25	4.38	4.38	2.25
Construction Mgt			0.74	1.44	1.44	0.74
Supervision			0.99	1.92	1.92	0.99
Design	8.02	8.02	0.00	0.00	0.00	0.00
Institut.Suppor.			0.00	2.61	5.26	5.26
Gross Total	8.02	8.02	26.53	54.11	56.76	31.79

D. Operation and Maintenance Cost

Based on the technology applied in the underlying improvement in water system, operation and maintenance cost are estimated as follows :

Year	O & M Cost LE'000
2001	4,834
2002	5,547
2003	6,112
2004	6,699
2005	7,308
2006	7,489
2007	7,672
2008	7,857
2009	8,045
2010	8,232
2011	8,232

E. Benefits

The two basic sources of benefits resulting from the underlying investment are :

- o Consumer willingness to pay or the amount to be paid by consumers if potable water is unavailable.
- o Reduction in water losses in the year 2000.

Benefits will start to flow in 2001. They are projected as follows :

Table E - 1.4
Expected Benefits

Year	Pop. Served	Willingness To Pay LE'000	Reduction in Water Losses LE'000	Total Benefits LE'000
2001	577,987	24,275	2,165	26,440
2002	591,859	25,330	2,165	27,495
2003	606,064	26,409	2,165	28,574
2004	620,609	27,515	2,165	29,680
2005	635,504	28,647	2,165	30,812
2006	650,756	29,806	2,165	31,971
2007	666,374	30,993	2,165	33,158
2008	682,367	32,208	2,165	34,373
2009	698,744	33,453	2,165	35,618
2010	715,514	34,727	2,165	36,892
2011	732,533	36,033	2,165	38,197

They are based on the following :

- o Consumer willingness to pay per person is LE 42 per year
- o Consumer willingness to pay per person for additional population is LE 76 per year
- o Net reduction in water losses is 20 percent
- o Average cost per cubic meter of water is 25 piasters
- o Accounting coefficient of water is 2.2

F. Economic Viability

Real net benefits are derived by deducting operation and maintenance cost from the expected benefits. Net benefits are, therefore, discounted at the social discount rate (6.5 percent) to be weighted against the capital investment.

Economic profitability statement reflecting the case under investigation is formulated from which the economic indicators are derived to test the economic viability of the proposed investment.

However, the present value of the project is not only positive (i.e. the benefits cover operation and maintenance costs), but is also much greater than the investment cost giving a positive net present value.

This implies that economic rate of return of the proposed investment on Mansoura water system is more than the social opportunity cost of capital, indicating that the underlying project is highly feasible from the economic point of view.

MANSOURA CITY

WATER SYSTEM

E'000

COSTS	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
CAPITAL COSTS																	
SUPPLY IMPROVEMENT	0	0	16,290	31,610	31,610	16,290	0	0	0	0	0	0	0	0	0	0	0
WATER DISTRIBUTION	0	0	2,690	5,210	5,210	2,690	0	0	0	0	0	0	0	0	0	0	0
REHABILITATION	0	0	3,570	6,930	6,930	3,570	0	0	0	0	0	0	0	0	0	0	0
CONTINGENCY	0	0	2,250	4,380	4,380	2,250	0	0	0	0	0	0	0	0	0	0	0
CONSTRUCTION MANAGEMENT	0	0	740	1,440	1,440	740	0	0	0	0	0	0	0	0	0	0	0
SUPERVISION	0	0	890	1,930	1,930	890	0	0	0	0	0	0	0	0	0	0	0
DESIGN	8,020	8,020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INSTITUTIONAL SUPPORT	0	0	0	2,263	5,263	5,263	0	0	0	0	0	0	0	0	0	0	0
TOTAL CAPITAL COSTS	8,020	8,020	26,630	54,111	56,763	31,793	0	0	0	0	0	0	0	0	0	0	0
OPERATION & MAINTENANCE COST	0	0	0	0	0	0	4,834	5,547	6,112	6,699	7,308	7,489	7,672	7,857	8,046	8,232	8,232
TOTAL COSTS	8,020	8,020	26,630	54,111	56,763	31,793	4,834	5,547	6,112	6,699	7,308	7,489	7,672	7,857	8,046	8,232	8,232
BENEFITS																	
WILLINGNESS TO PAY	0	0	0	0	0	0	24,275	25,330	26,409	27,515	28,647	29,806	30,993	32,208	33,453	34,727	36,033
SAVINGS IN WATER LOSSES	0	0	0	0	0	0	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165
RESIDUAL VALUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	461,005
TOTAL BENEFITS	0	0	0	0	0	0	26,440	27,495	28,574	29,680	30,812	31,971	33,158	34,373	35,618	36,892	461,005
NET BENEFITS	(8,020)	(8,020)	(26,630)	(54,111)	(56,763)	(31,793)	21,606	21,948	22,462	22,981	23,504	24,482	25,486	26,516	27,573	28,660	461,005
CUMULATIVE BENEFITS	(8,020)	(16,040)	(42,670)	(96,681)	(153,444)	(185,237)	(163,631)	(141,683)	(119,221)	(96,241)	(72,737)	(48,256)	(22,770)	3,746	31,319	59,979	520,985

ECONOMIC VIABILITY INDICATORS

ECONOMIC RATE OF RETURN	13.9%
NET PRESENT VALUE (LE'000)	135,005
BENEFIT / COST RATIO	8.6

1.2 WASTEWATER SYSTEM

A. Project Description

The project aims at providing :

- o New 26000 m3/day wastewater treatment plant for Talkha
- o New collection system for Talkha

B. Expected Output

The basic output is expanding and improving sewerage connections to ensure proper handling of the city's wastewater up to 40 million cubic meter and hence satisfying the needs of a population of 162,000 in the year 2010.

C. Initial Capital Cost

Capital costs are based on the engineering and technical investigation. They are classified into civil works, equipment, and salaries and wages, and broken down into treatment improvement, sewerage improvement and rehabilitation. A summary of the financial capital cost is presented in the following table:

Table E - 1.6
Financial Capital Cost
(LE'000)

Item	Treatment Improvement	Sewerage Improvement	Rehabilita-tion	Total
Civil Work	9,700	18,300	0	28,000
Equipment	17,400	7,400	0	24,800
Salaries	7,900	10,800	0	18,700
Total	35,000	36,500	0	71,500

* Foreign components are converted into Egyptian pounds at US$ 1 = LE 3.36.

Financial cost of civil works is adjusted on the basis of an accounting coefficient of 1.17 to reflect its real or economic cost. Economic capital cost is, therefore, estimated as follows:

Table E - 1.7
Economic Capital Cost
(LE'000)

Item	Treatment Improvement	Sewerage Improvement	Rehabilit-ation	Total
Civil Work	11,300	21,400	0	32,700
Equipment	17,400	7,400	0	24,800
Salaries	7,900	10,800	0	18,700
Total	36,600	39,600	0	76,200

The time duration of implementation and construction is estimated at 4 years starting in 1997. Design is expected to be finalized in two years time (1995-1996). The following is the time schedule of the capital investment requirements as projected in this analysis.

Table E - 1.8
Time Schedule of Capital Investment
(LE Million)

Item	1995	1996	1997	1998	1999	2000
Treatment Imp.			7.19	13.96	13.96	7.19
Sewerage Imp.			3.72	7.23	7.23	3.72
Rehabilitation			0.00	0.00	0.00	0.00
Total Hard Construction	0.00	0.00	10.91	21.19	21.19	10.91
Contingency			1.09	2.12	2.12	1.09
Construction Mgt			0.36	0.70	0.70	0.36
Supervision			0.48	0.93	0.93	0.48
Design	3.88	3.88	0.00	0.00	0.00	0.00
Institut.Support			0.00	1.29	3.94	3.94
Gross Total	3.88	3.88	12.84	26.23	28.88	16.78

D. Operation and Maintenance Cost

Based on the technology applied in the suggested sewerage system, operation and maintenance cost are estimated as follows :

Table E - 1.7
Economic Capital Cost
(LE'000)

Item	Treatment Improvement	Sewerage Improvement	Rehabilit-ation	Total
Civil Work	11,300	21,400	0	32,700
Equipment	17,400	7,400	0	24,800
Salaries	7,900	10,800	0	18,700
Total	36,600	39,600	0	76,200

The time duration of implementation and construction is estimated at 4 years starting in 1997. Design is expected to be finalized in two years time (1995-1996). The following is the time schedule of the capital investment requirements as projected in this analysis.

Table E - 1.8
Time Schedule of Capital Investment
(LE Million)

Item	1995	1996	1997	1998	1999	2000
Treatment Imp.			7.19	13.96	13.96	7.19
Sewerage Imp.			3.72	7.23	7.23	3.72
Rehabilitation			0.00	0.00	0.00	0.00
Total Hard Construction	0.00	0.00	10.91	21.19	21.19	10.91
Contingency			1.09	2.12	2.12	1.09
Construction Mgt			0.36	0.70	0.70	0.36
Supervision			0.48	0.93	0.93	0.48
Design	3.88	3.88	0.00	0.00	0.00	0.00
Institut.Support			0.00	1.29	3.94	3.94
Gross Total	3.88	3.88	12.84	26.23	28.88	16.78

D. Operation and Maintenance Cost

Based on the technology applied in the suggested sewerage system, operation and maintenance cost are estimated as follows :

Year	O & M Cost LE'000
2001	8,139
2002	8,986
2003	9,472
2004	9,984
2005	10,524
2006	10,657
2007	10,790
2008	10,922
2009	11,053
2010	11,187
2011	11,187

E. Benefits

The two basic sources of benefits resulting from the underlying investment are :

- o Highest willingness to pay by consumers in the cities under investigation (i.e.LE 21/person/year)
- o Savings in government expenditures per person of LE 12 per year

Benefits will start to flow in 2001. They are projected as follows :

Table E - 1.9
Expected Benefits

Year	Population Served	Highest Willingness LE'000	Expenditure Savings LE'000	Total LE'000
2001	577,987	12,138	6,936	19,074
2002	591,859	12,429	7,102	19,531
2003	606,064	12,727	7,273	20,000
2004	620,609	13,033	7,447	20,480
2005	635,504	13,346	7,626	20,972
2006	650,756	13,666	7,809	21,475
2007	666,374	13,994	7,996	21,990
2008	682,367	14,330	8,188	22,518
2009	698,744	14,674	8,385	23,059
2010	715,514	15,026	8,586	23,612
2011	732,533	15,386	8,792	24,179

F. Economic Viability

Real net benefits are derived by deducting operation and maintenance cost from the expected benefits. Net benefits are, therefore, discounted at the social discount rate (6.5%) to be weighted against the capital investment.

Economic profitability statement is, therefore, formulated from which the economic indicators are derived to test the economic viability of the proposed investment.

The present value of the project is not only positive, but is significantly higher than the investment cost of the project indicating that the economic rate of return is higher than the social opportunity cost of capital invested in the proposed investment. Providing improved sewerage service to Mansoura is a highly feasible investment from the economy's point of view.

MANSOURA CITY

WASTE WATER SYSTEM

LE'000

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
COSTS																	
CAPITAL COSTS																	
TREATMENT IMPROVEMENT	0	0	6,220	12,080	12,080	6,220	0	0	0	0	0	0	0	0	0	0	0
SEWERAGE IMPROVEMENT	0	0	6,730	13,070	13,070	6,730	0	0	0	0	0	0	0	0	0	0	0
REHABILITATION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONTINGENCY	0	0	1,300	2,510	2,510	1,300	0	0	0	0	0	0	0	0	0	0	0
CONSTRUCTION MANAGEMENT	0	0	430	830	830	430	0	0	0	0	0	0	0	0	0	0	0
SUPERVISION	0	0	570	1,110	1,110	570	0	0	0	0	0	0	0	0	0	0	0
DESIGN	4,610	4,610	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INSTITUTIONAL SUPPORT	0	0	0	1,289	3,941	3,941	0	0	0	0	0	0	0	0	0	0	0
TOTAL CAPITAL COSTS	4,610	4,610	15,250	30,889	33,641	19,191	0	0	0	0	0	0	0	0	0	0	0
OPERATION & MAINTENANCE COST	0	0	0	0	0	0	8,139	8,986	9,472	9,984	10,524	10,657	10,790	10,922	11,053	11,187	11,187
TOTAL COSTS	4,610	4,610	15,250	30,889	33,641	19,191	8,139	8,986	9,472	9,984	10,524	10,657	10,790	10,922	11,053	11,187	11,187
BENEFITS																	
HIGHEST WILLINGNESS TO PAY	0	0	0	0	0	0	12,138	12,429	12,727	13,033	13,346	13,666	13,994	14,330	14,674	15,026	15,386
SAVINGS IN GOVERNMENT EXPENDITURE	0	0	0	0	0	0	6,936	7,102	7,273	7,447	7,626	7,809	7,996	8,188	8,385	8,586	8,792
RESIDUAL VALUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	189,671
TOTAL BENEFITS	0	0	0	0	0	0	19,074	19,531	20,000	20,480	20,972	21,475	21,990	22,518	23,059	23,612	189,671
NET BENEFITS	(4,610)	(4,610)	(15,250)	(30,889)	(33,641)	(19,191)	10,935	10,545	10,528	10,496	10,448	10,818	11,200	11,596	12,006	12,426	189,671
CUMULATIVE BENEFITS	(4,610)	(9,220)	(24,470)	(55,359)	(89,000)	(108,091)	(97,156)	(86,611)	(76,083)	(65,587)	(55,139)	(44,321)	(33,121)	(21,525)	(9,519)	2,906	202,777

ECONOMIC VIABILITY INDICATORS

ECONOMIC RATE OF RETURN	10.8%
NET PRESENT VALUE (LE'000)	40,082
BENEFIT / COST RATIO	3.2

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IANSOURA CITY

ATER AND WASTE WATER SYSTEM

000

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
OSTS																	
APITAL COSTS																	
WATER SUPPLY IMPROVEMENT	0	0	16,290	31,610	31,610	16,290	0	0	0	0	0	0	0	0	0	0	0
WATER DISTRIBUTION	0	0	2,690	5,210	5,210	2,690	0	0	0	0	0	0	0	0	0	0	0
WASTE WATER TREATEMENT IMPROVEME	0	0	6,220	12,080	12,080	6,220	0	0	0	0	0	0	0	0	0	0	0
SEWERAGE IMPROVEMENT	0	0	6,730	13,070	13,070	6,730	0	0	0	0	0	0	0	0	0	0	0
REHABILITATION	0	0	3,570	6,930	6,930	3,570	0	0	0	0	0	0	0	0	0	0	0
CONTINGENCY	0	0	3,550	6,890	6,890	3,550	0	0	0	0	0	0	0	0	0	0	0
CONSTRUCTION MANAGEMENT	0	0	1,170	2,270	2,270	1,170	0	0	0	0	0	0	0	0	0	0	0
SUPERVISION	0	0	1,560	3,040	3,040	1,560	0	0	0	0	0	0	0	0	0	0	0
DESIGN	12,630	12,630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INSTITUTIONAL SUPPORT	0	0	0	3,900	9,204	9,204	0	0	0	0	0	0	0	0	0	0	0
TAL CAPITAL COSTS	12,630	12,630	41,780	86,000	90,304	60,884	0	0	0	0	0	0	0	0	0	0	0
ERATION & MAINTENANCE COST	0	0	0	0	0	0	12,973	14,533	15,584	16,683	17,832	18,146	18,462	18,779	19,098	19,419	19,419
TAL COSTS	12,630	12,630	41,780	86,000	90,304	60,884	12,973	14,533	15,584	16,683	17,832	18,146	18,462	18,779	19,098	19,419	19,419
NEFITS																	
WILLINGNESS TO PAY FOR WATER	0	0	0	0	0	0	24,275	25,330	26,409	27,515	28,647	29,806	30,993	32,208	33,453	34,727	36,033
SAVINGS IN WATER LOSSES	0	0	0	0	0	0	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165
WILLINGNESS TO PAY FOR WASTE WATER	0	0	0	0	0	0	12,138	12,429	12,727	13,033	13,346	13,666	13,994	14,330	14,674	15,026	15,386
SAVINGS IN GOVERNMENT EXPENDITURES	0	0	0	0	0	0	6,936	7,102	7,273	7,447	7,626	7,809	7,996	8,188	8,385	8,586	8,792
RESIDUAL VALUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	660,876
TAL BENEFITS	0	0	0	0	0	0	45,514	47,026	48,574	50,160	51,783	53,446	55,148	56,891	58,676	60,504	660,876
T BENEFITS	(12,630)	(12,630)	(41,780)	(86,000)	(90,304)	(60,884)	32,541	32,493	32,990	33,477	33,951	35,300	36,686	38,112	39,578	41,086	660,876
MULATIVE BENEFITS	(12,630)	(25,260)	(67,040)	(152,040)	(242,344)	(293,328)	(260,787)	(228,294)	(195,304)	(161,828)	(127,876)	(92,577)	(55,891)	(17,779)	21,800	62,886	723,761

ONOMIC VIABILITY INDICATORS

ONOMIC RATE OF RETURN	12.6%
T PRESENT VALUE (LE'000)	175,087
NEFIT / COST RATIO	5.4

Chapter 7

INSTITUTIONAL & ADMINISTRATIVE ANALYSES

7.1 Introduction

The institutional and administrative analyses take into consideration the operation and maintenance requirements of the recommended interventions based on the existing administrative and institutional arrangements in each location. The technical and financial information for each location is presented in chapters 4 and 5 of the report.

The objective of the analyses is to develop for each location under study an institutional arrangement that supports long term sustainability. The analyses defines the parameters of long term sustainability in terms of the characteristics of a well run, i.e. highly efficient and effective utility able to set its tariffs and retain its revenues. It examines the existing administrative and institutional mechanisms in each location to identify the institutional gap between the actual conditions and the long term goal.

The analyses recognize that the long term goal will have to be reached through a series of development steps and therefore it shifts the focus to a shorter time frame and considers a transition stage. It recognizes that several paths exist to the ultimate goal of long term sustainability. It defines various options to organize the provision of water and wastewater service to achieve O&M cost recovery, revenue retention and control over resources. These options are compared based on their acceptability and likelihood of achieving institutional results and a recommended option is advanced for each location.

Finally, the preferred option is reviewed in relation to the existing conditions. Technical, institutional and policy constraints that may inhibit the realization of the sustainability goals are identified. Remedies for addressing these constraints are also suggested.

7.2 Definition of Long Term Sustainability

To achieve long term sustainability, the service providers should:

have control over production, staff, and resources;
be financially viable, i.e. operating efficiently and able to mobilize and retain adequate revenues; and
be responsive to the institutional and administrative environment.

This implies that the entity providing the service has the following institutional features:

AUTONOMY

The entity should be independent from central control so as to be responsive to its stake holders namely its owners and customers.

The entity should have the ability to determine its own destiny. This entails that the resources necessary to perform the service all be grouped under a single entity.

ASSET OWNERSHIP

Autonomy implies full control of the entity's assets to utilize, leverage -i.e. use as collateral to borrow capital from banks, etc. This control will obviousiy have political, social as well as legal implications for water and wastewater utilities in the secondary cities and would have to be considered more fully during project implementation.

SCOPE

The scope of service to be provided by the utility should be determined by efficiency considerations based on capabilities, economies of scale, and responsiveness to the community considerations. Such considerations will impact the geographic scope of service for the utility as well as whether it should include the provision of both potable water and wastewater services.

These technical and institutional considerations will have to take into account the obvious economies of scale associated with grouping support functions such as billing, and procurement. The similarity and complementarity of providing the services to the same customers together with the abilities of the existing resources and the cost to the stake holders also must be considered.

The feasibility of combining services is an area that will have to be studied more closely in subsequent technical to the Secondary Cities Project. This will assist in determining the ability of existing resources, the costs involved in more detail, as well as political acceptance.

FINANCIAL VIABILITY

The entity should have the ability to raise and retain enough financial resources to perform the services efficiently. This will mean ability to set, collect and retain tariffs for its services.

This by necessity also implies that the entity will have adequate management systems that ensure performance. This will include: personnel, human resource development, accounting information, internal control, and other management systems.

SOCIAL RESPONSIBILITY

Since the entity is providing a service it will have to maintain a position of responsiveness to its served customers. It will have to respond to the political and social considerations of the communities served not only in terms of oversight, but also in terms of expansion of service and in terms of dealing with delinquencies and ability of certain groups to pay for service.

The features of a well functioning utility just described are not exhibited in any organization

providing water and wastewater services anywhere in the locations under study or for that matter, in any other location in Egypt. It will therefore take a significant amount of time, effort and institutional change to satisfy all these requirements.

Sizable efforts are underway by several donors, in addition to USAID, in the Egyptian water and wastewater sector, focusing on autonomy and cost recovery -a brief review of the status of several of these projects is included in the Institutional Annex.

Negotiations between the GOE and USAID should establish the institutional arrangements to be in place at the end of the project. This should include measurements of progress and milestones to be achieved.

For the purpose of the current analysis however, we have taken the year 2010 as being the long term sustainability date; and the year 2001, the date after the facilities have been completed, as the end date for the transition period. We are assuming that at that date:

- the facilities in each of these locations will be operated and maintained efficiently,and
- that the entity responsible for the provision of service will have control over adequate resources to perform its functions (money to cover O&M, as well as qualified. motivated, and trained staff) correctly.

7.3 Existing Water and Wastewater Arrangements

In general, service in the cities under consideration is provided by what the World Bank report on the sector refers to as Category IV Organizations: governmental divisions within the organizational structure of the local entity, with engineering departments reporting to the markaz organization or local departments of the Ministry of Housing and Public Utilities.

In all the cities and governorates visited, specific organizations for water supply and sanitary drainage do not exist. At the governorate level the service is only one of a number of services provided by the Housing Directorate. A similar situation exists at the city level. There are, however. interesting variations in the way each city provides water and wastewater services.

Table 7.1 provides a summary of the existing organizations responsible for delivering water and wastewater services in each of the visited locations. Detailed information and background data are presented in the Institutional Annex to this report.

7.3.1 Mansoura

Both potable water and wastewater services are provided in Mansoura. The systems are extensive and old. There are about 90,000 water connections in the city of Mansoura alone. Most of these are residential customers. Water treatment facilities in the city of Mansoura provide potable water to the city, to the entire markaz of Mansoura- i.e. the outlying villages

TABLE 7.1

EXISTING INSTITUTIONAL SITUATION FOR WATER AND WASTEWATER SERVICES IN THE SECONDARY CITIES

	Location	MANSOURA	MAHALLA	NUWEIBA	SHARM EL SHEIKH
Service Provided:	Water / Wastewater				
	Both	Both	Both	Both	Both
	By Single Entity	No	No	No	Yes
Complexity of Service:	W T complex	Normal/Large	Normal/Large	Complex/Small	Complex/Small
	W Net Extensive	Yes	Yes	No	No
	W Net Old	Yes	Yes	NO	NO
	W W T. Complex	Yes/Normal	Yes/Normal	No	No
	W.W Net Extensive	Yes	Yes	No	No
	W W Net Old	Yes	Yes	No	No
Service Boundary Definition	City				
	City + Markaz			X	
	Markaz / Other Cities	X	X		X
Assets Ownership:	Plants	Governorate, NOPWASD	Governorate	Governorate/Min Recon	Governorate/Min Recon
	Networks	Markaz	Markaz	City	City
Est. Replacement Cost in 1994 LE (Million)		246	133	N/A	N/A
Approx. # Water Connections in 1993		90,000	50,000	250	700
Organization:	Type	Governmental	Governmental	Governmental	Governmental
	Authority/Respon	Not Matched	Marginal	Marginally Adequate	Marginally Adequate
	Responsiveness	Not Responsive	Not Responsive	Adequate	Adequate
Staffing	Source of Staff	Government employees	Government employees	Government employees	Government employees
	Personnel Policies	Gov't, low incentive	Gov't, low incentive	Gov't, low incentive	Gov't, low incentive
	1993 Number (App.)	724	1016	9	8
Governing Law:		Local Govt. & Other Laws	Local Govt. & Other Laws	Local Govt. & Other Laws	Local Govt. & Other Laws
Responsibility:	Operation	District Chief	City Chief	City Chief	Local Government
	Who performs	Local Government Dept.	Local Government Dept.	Private & Public Cos.	Private & Public Cos.
	Maintainance	District Chief	City Chief	Private & Public Cos.	Private & Public Cos.
	Who performs	Local Government Dept.	Local Government Dept.	Private & Public Cos.	Private & Public Cos.
	Quality of Service	District Chief	City Chief	City Chief	City Chief
	Who Controls	District Chief	City Chief	Private & Public Cos.	Private & Public Cos.
	Replacements	Governorate/NOPWASD	Governorate/NOPWASD	Governorate/NOPWASD	Governorate/NOPWASD
	Expansions	Governorate/NOPWASD	Governorate/NOPWASD	Governorate/NOPWASD	Governorate/NOPWASD
	Cost of Service	City /Costs Not Known	City /Costs Not Known	Operator Knows Costs	Operator Knows Costs
	Tariff Setting				
	Propose	MHPU/NOPWASD	MHPU/NOPWASD	MHPU/NOPWASD	MHPU/NOPWASD
	Approve	Cabinet	Cabinet	Cabinet	Cabinet
Revenues:	Collection System	City – not efficient	City – not efficient	City – efficient	City – efficient
	1993 Amount (App.) LE	2,550,000	2,100,000	N/A	610,000
	Retention	Limited – Service Fund	None	Limited – Service Fund	Limited – Local Service Fund
	Cover O&M Costs	Difficult to Determine	Difficult to Determine	Large portion	Large portion
Oversight:	Financial	Finance Min.	Finance Min.	Finance Min.	Finance Min.
	Strategic	Popular Council	Popular Council	Popular Council	Popular Council
	Management	City Executive Council	City Executive Council	City Executive Council	City Executive Council
	Technical/Product	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU
	Day-to-Day operation	Local Government Dept.	Local Government Dept.	Private & Public Cos.	Private & Public Cos.

TABLE 7.1

EXISTING INSTITUTIONAL SITUATION FOR WATER AND WASTEWATER SERVICES IN THE SECONDARY CITIES (CONTINUED)

	Location		HURGHADA	LUXOR	ARMANT	ISNA
Service Provided:	Water / Wastewater				Water	Water
	Both		Both	Both		
	By Single Entity		No	No	Yes	Yes
Complexity of Service:	W.T. complex		Complex/Small	Normal/Large	Normal/Small	Normal/Medium
	W.Net. Extensive		No	Yes	No	No
	W.Net. Old		NO	yes	Yes	Yes
	W.W.T. Complex		No	Normal	N/A	N/A
	W.W.Net. Extensive		No	No	N/A	N/A
	W.W.Net. Old		No	Yes	N/A	N/A
Service Boundary Definition:	City		x	x	x	x
	City + Markaz					
	Markaz + Other Cities					
Assets Ownership:	Plants		Governorate/Min.Recon.	City, NOPWASD	City	Governorate, NOPWASD
	Networks		City	City	City	Markaz
Est. Replacement Cost in 1994 LE (Million):			N/A	189	9	17
Approx. # Water Connections in 1993			N/A	WCS 23,000	6,200	8,500
Organization:	Type		Governmental	Governmental	Governmental	Governmental
	Authority/Respon		Marginally Adequate	Marginally Adequate	Relatively Matched	Not Matched
	Responsiveness'		Adequate	Not Responsive	Not Responsive	Not Responsive
Staffing:	Source of Staff		Government employees	Government employees	Government employees	Government employees
	Personnel Policies		Gov't, low incentive	Gov't, low incentive	Gov't, low incentive	Gov't, low incentive
	1993 Number (App.)		94	358	85	106
Governing Law:			Local Govt. & Other Laws	Local Govt. & Other Laws	Local Govt. & Other Laws	Local Govt. & Other Laws
Responsibility:	Operation		Local Government	Local Government	Local Government	Local Government
	Maintainance	Who performs	Private & Public Cos.	Local Government Dept.	Local Government Dept.	Local Government Dept.
	Quality of Service	Who performs	Private & Public Cos.	Local Government	Local Government	Local Government
	Replacements	Who Controls	City Chief	Local Government Dept.	Local Government Dept.	Local Government Dept.
	Expansions		Private & Public Cos.	City Chief	City Chief	City Chief
	Cost of Service		Governorate/NOPWASD	City/NOPWASD	Governorate/NOPWASD	Governorate/NOPWASD
	Tariff Setting		Governorate/NOPWASD	City/NOPWASD	Governorate/NOPWASD	Governorate/NOPWASD
		Propose	City /Costs Not Known	City /Costs Not Known	City /Costs Not Known	City Dep./Costs Not Known
		Approve	MHPU/NOPWASD	MHPU/NOPWASD	MHPU/NOPWASD	MHPU/NOPWASD
			Cabinet	Cabinet	Cabinet	Cabinet
Revenues:	Collection System		City – efficient	City – efficient	City – not efficient	City – not efficient
	1993 Amount (App.) LE		1,750,000	2,500,000	115,000	160,000
	Retention		Limited – Local Service Fund	Limited – Local Service Fund	None	None
	Cover O&M Costs		Large portion	Significant portion	Difficult to Determine	Small portion
Oversight:	Financial		Finance Min.	Finance Min.	Finance Min.	Finance Min.
	Strategic		Popular Council	Popular Council	Popular Council	Popular Council
	Management		City Executive Council	City Executive Council	City Executive Council	City Executive Council
	Technical/Product		MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU
	Day-to-Day operation		Private & Public Cos	Local Government Dept	Local Government Dept.	Local Government Dept.

TABLE 7.1

EXISTING INSTITUTIONAL SITUATION FOR WATER AND WASTEWATER SERVICES IN THE SECONDARY CITIES (CONTINUED)

	Location		KOM OMBO	DARAWO	NASR
Service Provided:	Water / Wastewater		Water	Water	
	Both		No	No	Both (WW Collect only)
	By Single Entity				Yes
Complexity of Service:	W T complex		Normal/Medium	Normal/Small	
	W Net Extensive		Yes	Yes	N/A
	W Net Old		Yes	Yes	No
	W W T Complex		N/A	N/A	Yes
	W W Net Extensive		N/A	N/A	N/A
	W W Net Old		N/A	N/A	No
					Yes
Service Boundary: Definition	City				
	City + Markaz		X	X	X
	Markaz + Other Cities				
Assets Ownership:	Plants		Governorate, NOPWASD	Governorate, NOPWASD	
	Networks		Markaz	Markaz	None
					Markaz
Est. Replacement Cost in 1994 LE (Million)			26	10	5.5
Approx. # Water Connections in 1993			8,900	4,800	1,500
Organization:	Type		Governmental	Governmental	Governmental
	Authority/Respon		Defused	Defused	Defused
	Responsiveness		Not Responsive	Not Responsive	Not Responsive
Staffing:	Source of Staff		Government employees	Government employees	Government employees
	Personnel Policies		Gov't, low incentive	Gov't, low incentive	Gov't, low incentive
	1993 Number (App.)		184	90	30
Governing Law:			Local Govt. & Other Laws	Local Govt. & Other Laws	Local Govt. & Other Laws
Responsibility:	Operation	Who performs	Local Government	Local Government	Local Government
	Maintainance		Local Government Dept.	Local Government Dept.	Local Government Dept.
		Who performs	Local Government	Local Government	Local Government
	Quality of Service		Local Government Dept.	Local Government Dept.	Local Government Dept.
		Who Controls	City Chief	City Chief	City Chief
	Replacements		Governorate/NOPWASD	Governorate/NOPWASD	Governorate/NOPWASD
	Expansions		Governorate/NOPWASD	Governorate/NOPWASD	Governorate/NOPWASD
	Cost of Service		City Dep./Costs Not Known	City Dep./Costs Not Known	City Dep./Costs Not Known
	Tariff Setting	Propose	MHPU/NOPWASD	MHPU/NOPWASD	MHPU/NOPWASD
		Approve	Cabinet	Cabinet	Cabinet
Revenues:	Collection System		City – not efficient	City – not efficient	City – not efficient
	1993 Amount (App.) LE		135,000	85,000	16,000
	Retention		None	None	None
	Cover O&M Costs		Difficult to Determine	Difficult to Determine	Difficult to Determine
Oversight:	Financial		Finance Min.	Finance Min.	Finance Min.
	Strategic		Popular Council	Popular Council	Popular Council
	Management		City Executive Council	City Executive Council	City Executive Council
	Technical/Product		MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU
	Day-to-Day operation		Local Government Dept.	Local Government Dept.	Local Government Dept.

TABLE 7.2

ANALYSIS OF EXISTING CONDITIONS

LOCATION		MANSOURA	MAHALLA	NUWEIBA	SHARM EL SHEIKH
REPORTED REVENUES	1993 (App) LE	2,550,000	2,100,000	N/A	610,000
PRODUCTION	WATER M3/D	54,000	59,600	2,670	3,615
	WASTEWATER M3/D	26,200	44,700	1,000	2,365
NETWORK	WATER KMS	650	420	54	24
	WASTEWATER KMS	450	168	N/A	20
ACTUAL ALLOCATIONS	BAB I, 1992/93	2,151,300	2,616,000	N/A	24,000
	BAB II, 1992/93	143,550	168,100	N/A	18,600
	TOTAL (APPROX)	2,294,850	2,784,100		42,600
STAFFING	WATER	406	657	7	6
	WASTEWATER	318	359	2	2
	TOTAL	724	1,016	9	8
	PROFESSIONAL	80	N/A	2	2
	TECHNICIAN	211	N/A	0	0
CONNECTIONS NO		90,000 00	50,000 00	250 00	700 00
INDICATORS					
WORKERS PER 1000 CONNECTIONS		8	20	36	11
WORKERS PER KM OF PIPE	WATER	0 62	1 56	0 13	0 25
	WASTEWATER	0 71	2 14	N/A	0 10
PERCENT PROFESSIONALS		11 05	0 00	22 22	25 00
PERCENT TECHNICIANS		29 14	0 00	0 00	0 00
AVERAGE MONTHLY SALARY PER EMPLOYEE		247 62	214 57	0 00	250 00
AVERAGE YEARLY SALARY/EMPLOYEE (LE P A)		2,971 41	2,574 80	0 00	3,000 00
REVENUE PER M3 WATER PRODUCED (PT/M3 W)		12 94	9 65	0 00	46 23
REVENUE PER CONNECTION (LE/MONTH)		2 36	3 50	0 00	72 62
SALARY PER M3 TREATED (W&WW) LE/M3		0 07	0 07	0 00	0 01
SIZE OF INSTITUTIONAL GAP					
DEGREE OF CONTROL		GOOD	FAIR	BEST	GOOD
COST RECOVERY		FAIR	FAIR	BEST	BEST
STAFFING ADEQUACY		GOOD	GOOD	FAIR	FAIR
MAMAGEMENT SYSTEMS		GOOD	GOOD	FAIR	FAIR
	OVERALL GAP	SMALLEST	INTERMEDIATE	SMALLEST	SMALLEST

TABLE 7.2

ANALYSIS OF EXISTING CONDITIONS (Continued)

LOCATION		LUXOR	ARMANT	ISNA	KOM OMBO	DARAWO	NASR	ASWAN GROUP
REPORTED REVENUES	1993 (App) LE	2,500,000	115,000	160,000	135,000	85,000	16,000	236,000
PRODUCTION	WATER M3/D	45,000	8,600	8,600	19,680	5,700	0	25,380
	WASTEWATER M3/D	11,200	0	0	0	0	0	0
NETWORK	WATER KMS	360	40	60	60	44	34	138
	WASTEWATER KMS	180	0	0	0	0	N/A	0
ACT ALLOCATIONS	BAB I, 1992/93	N/A	138,500	504,500	754,500	374,850	108,290	1,237,640
	BAB II, 1992/93	1,207,000	500	1,100	249,000	N/A	N/A	249,000
	TOTAL (APPROX)	N/A	139,000	505,600	1,003,500	374,850	108,290	1,486,640
STAFFING	WATER	172	85	106	317	82	35	434
	WASTEWATER	186	0	0	0	0	0	0
	TOTAL	358	85	106	317	82	35	434
	PROFESSIONAL	4	0	1	11	1	0	12
	TECHNICIAN	71	35	15	108	11	0	119
CONNECTIONS NO		23,000	6,200	8,500	8,900	4,800	1,500	15,200
INDICATORS								
WORKERS PER 1000 CONNECTIONS		16	14	12	36	17	23	29
WORKERS PER KM OF PIPE	WATER	0 48	2 13	1 77	5 26	1 86	1 03	3 14
	WASTEWATER	1 03						
PERCENT PROFESSIONALS		1 12	0 00	0 94	3 47	1 22	0 00	2 76
PERCENT TECHNICIANS		19 83	41 18	14 15	34 07	13 41	0 00	27 42
AVERAGE MONTHLY SALARY PER EMPLOYEE		0 00	135.78	396 62	198 34	380 95	257 83	237 64
AVERAGE YEARLY SALARY/EMPLOYEE (LE P.A)		0 00	1,629 41	4,759 43	2,380 13	4,571 34	3,094 00	2,851.71
REVENUE PER M3 WATER PRODUCED (PT/M3 W)		15 22	3 66	5 10	1 88	4 09	ERR	2 55
REVENUE PER CONNECTION (LE/MONTH)		9 06	1 55	1 57	1 26	1 48	0 89	1 29
SALARY PER M3 TREATED (W&WW) LE/M3		0 00	0 04	0 16	0 11	0 18	ERR	0 13
SIZE OF INSTITUTIONAL GAP								
DEGREE OF CONTROL		GOOD	FAIR	FAIR	GOOD	POOR	POOR	
COST RECOVERY		VERY GOOD	POOR	POOR	POOR	POOR	POOR	
STAFFING ADEQUACY		GOOD	FAIR	FAIR	FAIR	POOR	POOR	
MANAGEMENT SYSTEMS		FAIR	FAIR	FAIR	FAIR	FAIR	POOR	
	OVERALL GAP	INTRMEDIATE	LARGEST	LARGEST	LARGEST	LARGEST	LARGEST	

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within the administrative boundaries of the markaz, and to the city of Talkha across the Damietta branch of the river Nile.

In Mansoura, the overall administrative responsibility for the provision of service is divided between two districts, East and West, each being an independent local unit. The chief of each district reports directly to the governor and has a manager of utilities reporting to him.

These utilities managers, however, only control technical and administrative functions. Payroll, revenues, procurement, warehousing and other support functions are controlled by other departments. Each utility manager is responsible for the operation and maintenance of the treatment facilities and the networks in his jurisdiction. Potable water treatment is in the East District while the West District manager is responsible for wastewater treatment because the existing plant is in his district.

An extensive number of over 700 individuals compose the technical, administrative and support staff associated with the provision of water and wastewater services in Mansoura. Considering the condition of the infrastructure and the conditions of employment the overall performance of the staff is good.

The revenues from water and wastewater in Mansoura are sizable compared to other secondary cities, and 1993 reported revenues amounted to a little over LE 2,500,000. The city turns over that money to the central government. However, the city established utility fund apparently has had revenues of about LE 2,500,000 a year spent on operation and maintenance of the utilities.

NOPWASD is very much involved with the utilities in Mansoura. They are currently commissioning a large activated sludge wastewater treatment plant, have built a 900 l/s water treatment plant, and have provided the city with three packaged water treatment plant units. Two package units are also located in the city of Talkha.

7.3.2 Mahalla El Kobra

Both water and wastewater services are provided in the city of Mahalla. The systems are also extensive and old. There are about 50,500 water connections in the city. The system serves the city and its outlying villages. A large number of the population served live in the markaz outside the city limits. Most of the system customers are residential users. The larger industries in the city provide their own water and wastewater services.

The organization of the provision of service is the standard government arrangement and all support services belong to the city government. More than 1000 employees work for the city in the water and wastewater services. The overall performance of the utility in Mahalla is relatively good to average given the condition of the existing utilities and the quality of the staff.

Revenues in Mahalla are sizable. 1993 reported revenue was a little over LE 2,000,000. All the money is transferred to the central government. Mahalla does not have a utility fund.

7.3.3 Nuweiba

Both water and wastewater services are provided for the population in the city of Nuweiba. The systems are fairly new, complex and small. There are about 250 water connections registered with the city council.

Potable water is produced from a desalinization plant. The governorate has entered into an O&M contract with El Timsah Co., a Suez Canal Authority subsidiary to operate the plant. Wells are used as the source of brackish water piped to the desalinization units. Another public sector company. Regwa, operates this facility on behalf of the governorate. The potable water and wastewater networks are also being operated and maintained on behalf of the city by CARE Services Contractors. The same firm operates the wastewater treatment plant in the city of Nuweiba.

The operation and maintenance contracts have all been negotiated and signed by the South Sinai Governorate. The two agreements provide for compensation to the firms based on payment for labor. All costs for major spare parts, energy (fuel and electricity) are born directly by the governorate.

Limited staff work for the city in water and wastewater services. There are nine employees including four support staff. There is a high rate of turnover in staff stated to result from the limited benefits of government employment in the location.

South Sinai has followed the 1993 national water tariff with some modifications. Rates for all non-domestic consumption are significantly higher than the national tariff. For example, for luxury and tourist use the rate is LE 6.00 per cu.m. compared to LE 0.75 in Nile valley governorates. A new category of domestic consumption, not reflected in the national tariff, that for consumption in excess of 50 m3 at a rate of LE 1.00 per cu.m. is included. The wastewater surcharge was maintained at the national percentage of 35 percent for domestic users and increased for tourist users from 60 percent to 65 percent. This is a change from their previous practice of collecting a 50 percent surcharge for wastewater from all water bills.

In addition, the Nuweiba Local Council has, since August 1993, decreed to add LE 0.50 to every water bill to support the governorate's development fund. These funds are retained at the governorate. It is not clear whether the city council has reduced the price for domestic consumption to a flat rate of LE 0.18 or has just maintained the above mentioned South Sinai types of consumption.

7.3.4 Sharm El Sheikh

Both water and wastewater services are being provided in Sharm. Like Nuweiba the system is fairly complex and small. About 700 connections are registered with the city council.

O&M services for all facilities are provided through contractors. CARE services operates the desalinization plant, the water and wastewater networks,as well as the wastewater treatment facility. The terms of their contract with the governorate are the same as for Nuweiba. The El Tur pipeline is operated by the Egyptian Armed Forces who are trying to

turn it over to the city. The city does not have adequate resources to directly operate the wells and the pipeline.

The city has a total of eight people working in the utility related functions, five in the utilities department and three in support functions.

Revenues from water and wastewater in Sharm El Sheikh totaled about LE 610,000 per year. The money is turned over to the Ministry of Finance which allocates money for the operation and maintenance contracts in the governorate budget.

7.3.5 Luxor

Both water and wastewater services are provided. The systems are old and large. The city has about 23,000 connections. Water production is adequate. Staff is experienced. Revenues are sizable, 1993 LE 2,500,000 collected. All revenue are turned over to the ministry of finance. The water tariff applied in Luxor is the national tariff even for tourist consumption. Hotels and restaurants pay LE 0.75 per M3.

7.3.6 Armant

Only water service is provided. The system is small and fairly old. There are about 6,000 service connections in the city. The service extends only to the markaz. The quality of the existing staff is fair and their overall performance is average. Revenues are small, LE 115,000 in 1993. Allocations of Bab I and II in 1993 amounted to LE 140,000.

7.3.7 Isna

Only water service is provided. The system is old and medium sized and serves the entire markaz and several of the surrounding villages. There are about 8,500 connections in the city. Staff is about the same as in Armant, 100 people provide the service. The overall quality of service however, is below average. Revenues in 1993 were LE 160,000. Bab I and II allocations from finance for 1993 amounted to LE 505,000.

7.3.8 Kom Ombo, Darawo, Nasr

Only potable water service is provided regionally. The current system functions as one interlinked system. There are about 16,000 water connections in the three locations with 9,000 in Kom Ombo. The system is old and medium sized and will have significant capacity increase when a regional NOPWASD plant under construction is finished.

Currently water production and treatment facilities exist in Kom Ombo and Darawo. The responsibility for controlling production lies with the housing department in Kom Ombo, even for the Darawo plant. The Darawo plant has its own staff to operate and maintain but they rely on Kom Ombo for support functions such as procurement and transportation. The water plant in Kom Ombo provides water to Nasr which only has staff to maintain the networks including a very limited privately installed wastewater network discharging to drains.

There is a sizable staff of about 250 involved in the provision of water and wastewater services in the three cities. Revenues however only totalled a little over LE 230,000 in 1993, while total salaries and Bab II allocations from the ministry of finance for the three cities in 1992 totalled LE 1,440,000.

Currently an institutional development effort that will affect the Kom Ombo region is under way. The governorate of Aswan with assistance from DANIDA is in the process of establishing a governorate wide general authority for water supply and sanitary drainage.

7.4 Definition of the Institutional Gap in the Cities

Table 7.2, derived from the analysis of the conditions in each location, presents various indicators of performance reviewed in the Institutional Annex. It further provides an attempt at defining and measuring the gap between the existing condition of service provision in each location and the desired or optimum long term system that achieves the ultimate goal. Based on available information, comparison can be made regarding the size of the "institutional gap" in each of the locations under consideration. Four measurements have been used to quantity the gap:

- Degree of Control or Independence exhibited by the local authorities in their dealings with the central government in the water and wastewater sector. The more independent are the local authorities the stronger the likelihood of their being able to move forward.

- Degree of Cost Recovery. Based on the estimates of the team, the ability of the local system to cover its O&M costs. The smaller the jump the easier it will be to achieve sustainability.

- Staffing Adequacy. The better the quality and composition of the staff of the location the easier the retraining.

- Management Systems Performance. The better the workings of the existing system the smaller the required changes.

A review of the information presented in Table 7.2 suggests the following grouping as to the size of the "institutional gap".

SMALLEST GAP	INTERMEDIATE GAP	LARGEST GAP
Mansoura	Luxor	Armant
Nuweiba	Mahalla El Kobra	Isna
Sharm El Sheikh		Kom Ombo, Darawo, and Nasr City

From the forgoing it is evident that the candidate with institutional development promise in the delta is Mansoura, closely followed by Mahalla; in the Sinai, both Nuweiba and Sharm offer potential; while in upper Egypt, Luxor offers an opportunity for change, while Kom Ombo, Isna and Armant have the largest gap to close in order to improve institutionally.

TABLE 7.5.A

INSTITUTIONAL AND ADMINISTRATIVE TRANSITION
LOCATION: MANSOURA

MEASURE	EXISTING CONDITION	CONDITION AT YR 2001	CONDITION AT YR 2010	CONSTRAINTS	RECOMMENDED ACTIONS
Service Provided: Water / Wastewater	Both	BOTH	BOTH	DIFFICULT TO COMBINE W&WW	CONSULTANT TO:
Both	No	NO	MAYBES		STUDY COMBINATION OF W&WW
By Single Entity				IMPLEMENTATION DELAYS	
	Normal/Large/Old	ADD LRG CAPAC /REHAB EXIST			IMPLEMENTATION PLAN TO STUDY
Complexity of Service: W T complex	850lms/Old	FIX/EXPAND 130KMS			PACKAGING & CONST. MGT.
W Net Extensive	Normal/Large/Old	ADD LRG CAPACITY			
W W T Complex	450lms/Old	EXPAND SYS 130KMS			
W W Net Extensive					
Service Boundary Definition: City					
City + Markaz	Yes	YES	YES	ADMINISTRATIVE/JURISDICTION CONFLICT	IMPLEMENTATION CONSULTANT TO:
Markaz + Other Cities					PREPARE BACKGROUND DOCUMENTS
W&WW Entity Definition	Several Depts & Laws	REG GEN AUTH	INDEPENDENT COMPANY	LEGAL STEPS/PRESIDENT DECREE	ACTION PLANS, ASSET VALUATION
Assets Ownership: Lands					LEGAL ANALYSIS, DRAFT DECREES
Networks	(overlapping Rel W&S)	GEN AUTHORITY	AUTONOMOUS ENTITY	RESISTANCE TO LOSS OF CONTROL	AND ADVICE ON NEGOTIATION
	Markaz	GEN AUTHORITY	AUTONOMOUS ENTITY	ASSET VALUATION	
Est. Replacement Cost in 1994 LE:	24 Installations			LEGAL STEPS REQUIRED	LOCAL OFFICIALS TO
Required Improvements in 1994 LE		12 Installations			LOBBY MHPU & NEGOTIATE WITH
Est. O&M Costs in 1994 LE:					MLA, MOF, NOPWASD, MOH, ETC
Water	6 800 000 00	12 900 000 00	19 400 000 00	ADEQUATE KNOWLEDGE OF O&M COSTS	
Wastewater	3 400 000 00	4 800 000 00	8 200 000 00		CONDUCT O&M COSTING ANALYSIS
	3 400 000 00	8 100 000 00	11 200 000 00		PLAN FOR IMPLEMENTATION OF
Approx. # Water Connections in 1993.	90				IMPROVED O&M PROCEDURES INCLUDING
					TRAINING PLAN
Organization: Type	Governmental	CONFORMS TO RULES	INTERNAL	FLEXIBILITY IN PERSONNEL POLICIES	
Authority/Respon	Not Matched	BETTER THAN GOVT	MATCHED		PERFORM PROPER STAFFING ANALYSIS
Responsiveness	Not Responsive	CONFORMS TO GOE RULES	FLEXIBLE		DETAIL STAFF TRANSITION PLAN, INCLUD
					FINANCIAL IMPLICATIONS
Staffing: Source of Staff	Government employees	EXISTING POOL	MARKET	LABOR LAWS, CONF. TO OTHER AGENCIES	
Personnel Policies	Govt low incentive	AV SALARY UP 100% IN 1994 L E	MARKET RATES	O&M PRACTICES	CLARITY OF BYLAWS ON:
1993 Number (App.)				MONEY TO PAY FOR TRAINING	PERSONNEL
Water	724	632	702	QUALITY & AVAILABILITY OF TRAINING	REVENUE RETENTION
Wastewater	406	260	309		FINANCE & CONTROL
	318	372	393		
Governing Law:	Local Govt & Other Laws	GEN AUTH & GOE LAWS	GOE LAWS	CLARITY OF BYLAWS	
Responsibility: Operation					ESTABLISH MGT. SYSTEMS:
Who performs	District Chief	CHAIRMAN	CHIEF EXEC. OFFICER	MANAGEMENT INFORMATION SYSTEMS	COST ACCTG
Maintenance	Local Government Dept	GEN. AUTH. STAFF		ACCOUNTING PROCEDURES AND COST CONTROL	PROCUREMENT
Who performs	District Chief	GEN. AUTH. STAFF		PROCUREMENT AND WAREHOUSING	CONSUMER RELATION
Quality of Service	Local Government Dept	GEN. AUTH. STAFF		CONSUMER ORIENTATION/COMMUNITY RELATION	PLANNING FINANCE SERVICE
Who Controls	District Chief	CHAIRMAN/BOARD OF DIRECT	CHIEF EXEC. OFFICER		BILLING & COLLECTION
Replacements	District Chief	CHAIRMAN	CEO		
Expansions	Governorate/NOPWASD	BOARD OF DIRECTORS	BOARD OF DIRECTORS	SYSTEM EXPANSION PLANS	
Cost of Service	Governorate/NOPWASD	BOARD/GOVER/CENTRAL	BOARD OF DIRECTORS		
Tariff Setting	City/Costs Not Known	L E 12,900,000	L E 19,400,000		
Propose	MHPU/NOPWASD	BOARD	BOARD	RESIST LOSS OF CONTROL & REVENUES	
Approve	Cabinet	LOCAL COUNCIL/GOVERNOR	LOCAL COUNCIL		PREPARE ACTION PLAN FOR:
Revenues: Collection System	City – not efficient	GEN. AUTH.		ABILITY/WILLINGNESS TO PAY FOR SERVICE	FINANCIAL INDEPENDENCE
1993 Amount (App.) LE	2,550,000 00	>L E. 1 3 MILLION	>L E. 20 MILLION		AUTONOMY
Retention	Limited – Service Fund	100%	100%		TO INCLUDE TARIFF STUDY
Cover O&M Costs	Difficult to Determine	100%	100%	LEGAL STEPS REQUIRED	ALTER MECHANISMS FOR SUBSIDEY
					AND RATE SETTING SYSTEM
Oversight: Financial	Finance Min.	CAA, CENTRAL AUTH.	INDEP. AUDITS		
Strategic	Popular Council	LOCAL COUNCIL GOVERNOR	LOCAL COUNCIL	LOSS OF CONTROL, ADMIN. STEPS REQUIRED	
Management	City Executive Council	BOARD OF DIRECTORS	BOARD OF DIRECTORS		
Technical/Product	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	EGYPT EPA (MAYBE)	MULTITUDE OF AGENCIES INVOLVED	
Day-to-Day operation	Local Government Dept	CHAIRMAN	CEO		
Subsidies: Who Decides	MHPU/Cabinet	MHPU/Cabinet	LOCAL COUNCIL	OUTSIDE CONTROL OF ENTITY	
How to pay for Subsidy	Finance Min.	Finance Min.	LOCAL REV. + TRANSFERS	OUTSIDE CONTROL OF SERVICE PROVIDED	

TABLE 7.5.B

INSTITUTIONAL AND ADMINISTRATIVE TRANSITION
LOCATION: MAHALLA

MEASURE		EXISTING CONDITION	CONDITION AT YR 2001	CONDITION AT YR 2010	CONSTRAINTS	RECOMMENDED ACTIONS
Service Provided:	Water / Wastewater Both By Single Entity	BOTH No	BOTH NO	BOTH MAYBE YES	DIFFICULT TO COMBINE W&WW	CONSULTANT TO STUDY COMBINATION OF W&WW
Complexity of Service:	W T complex W Net. Extensive W W.T Complex W W Net Extensive	Normal/Large/Old 450 kms/Old Normal/Large/Old 250 kms/Old	ADD TRG CAP.,REHAB EXIST. FIX/EXPAND 100 KMS ADD LRRRRG CAPACITY EXPAND SYS 120KMS		IMPLEMENTATION DELAYS	IMPLEMENTATION PLAN TO STUDY PACKAGING & CONST. MGT
Service Boundary Definition:	City City + Markaz Markaz + Other Cities	Yes	YES	YES	ADMINISTRATIVE/JURISDICTION CONFLICT	IMPLEMENTATION CONSULTANT TO: PREPARE BACKGROUND DOCUMENTS, ACTION PLANS, ASSET VALUATION, LEGAL ANALYSIS, DRAFT DECREES, ADVICE ON NEGOTIATIONSTRATEGY
W&WW Entity Definition		Several Markaz Depts	MARKAZ GEN AUTH	INDEPENDENT COMPANY	LEGAL STEPS/PRESIDENT DECREE	
Assets Ownership:	Plants Networks	Governorate Markaz	GEN AUTH GEN AUTH	AUTONOMOUS ENTITY AUTONOMUS ENTITY	RESISTANCE TO LOSS OF CONTROL ASSET VALUATION LEGAL STEPS REQUIRED	LOCAL OFFICIALS TO LOBBY MHPU, NEGOTIATE WITH MLA, MOF, NOPWASD, MOH, ETC
Est. Replacement Cost in 1994 LE		[illegible]	[illegible]			
Required Improvements in 1994 LE			[illegible]			
Est. O&M Costs in 1994 LE (000's).						
	Water	6 400 000 00	11,500 000 00	19 400 000 00	ADEQUATE KNOWLEDGE OF O&M COSTS	CONDUCT O&M COSTING ANALYSIS PLAN FOR IMPLEMENTATION OF IMPROVED O&M PROCEDURES INCLUDING TRAINING PLAN
	Wastewater	3 900 000 00 2 500 000 00	6 400 000 00 5 100 000 00	11 800 000 00 7 800 000 00		
Approx. # Water Connections in 1993		50 000				
Organization:	Type	Governmental	CONFORMS TO GEN AUTH	INTERNAL CONTROL	FLEXIBILITY IN PERSONNEL POLICIES	PERFORM PROPER STAFFING ANALYSIS DETAIL STAFF TRANSITION PLAN, INCLUD FINANCIAL IMPLECATIONS
	Authority/Respon	Marginal	BETTER THAN GOVT	MATCHED		
	Responsiveness	Not Responsive	CONFORMS TO GOE RULES.	FLEXIBLE		
Staffing:	Source of Staff	Government employees	EXISTING POOL	MARKET	LABOR LAWS, CONF. TO OTHER AGENCIES	ENSURE CLARITY OF BYLAWS ON PERSONNEL REVENUE RETENTION FINANCE & CONTROL
	Personnel Policies	Govt. low incentive	AV. SALARY UP 100% IN 1994 L.E.	MARKET RATES	O&M PRACTICES	
	1993 Number (App.)	1016	384	426	MONEY TO PAY FOR TRAINING	
	Water	657	208	230	QUALITY AND AVAILABILITY OF TRAINING	
	Wastewater	359	176	196		
Governing Law:		Local Govt. & Other Laws	GEN. AUTH. & OTHER LAWS	GOE LAWS	CLARITY IN ENTITY'S BYLAWS	ESTABLISH MGT. SYSTEMS:
Responsibility.	Operation	City Chief	CHAIRMAN			
	Who performs	Local Governmental Dept.	GEN. AUTH. STAFF	CHIEF EXEC. OFFICER	MANAGEMENT INFORMATION SYSTEMS	COST ACCTG. PROCUREMENT CONSUMER RELATION PLANNING FINANCE SERVICE BILLING & COLLECTION
	Maintainance	City Chief	CHAIRMAN		ACCOUNTING PROCEDURES AND COST CONTROL	
	Who performs	Local Governmental Dept.	GEN. AUTH. STAFF	CHIEF EXEC. OFFICER	PROCUREMENT AND WAREHOUSING	
	Quality of Service	City Chief	CHAIRMAN/BOARD OF DIRECT.		CONSUMER ORIENTATION/COMMUNITY RELATION	
	Who Controls	City Chief	CHAIRMAN			
	Replacements	Governorate/NOPWASD	BOARD OF DIRECTORS	CHIEF EXEC. OFFICER	SYSTEM EXPANSION PLANS	
	Expansions	Governorate/NOPWASD	BOARD/GOVR./CENTRAL			
	Cost of Service	City/Costs Not Known	11,500,000 00	19,400 000 00		
	Tariff Setting				RESIST LOSS OF CONTROL & REVENUES	
	Propose	MHPU/NOPWASD	BOARD	BOARD		
	Approve	Cabinet	LOCAL COUNCIL/GOVER/CENTRAL	LOCAL COUNCIL	ABILITY/WILLINGNESS TO PAY FOR SERVICE	PREPARE ACTION PLAN FOR: FINANCIAL INDEPENDENCE AUTONOMY TO INCLUDE TARIFF STUDY ALTER. MECHANISMS FOR SUBSIDY AND RATE SETTING SYSTEM
Revenues:	Collection System	City – not efficient	GEN. AUTH.			
	1993 Amount (App.) LE	2,100 000 00	>L.E. 11.5 MILLION	>L.E. 19.5 MILLION		
	Retention	none	100%	100%		
	Cover O&M Costs	Difficult to Determine	100%	100% + PART CAPITAL	LEGAL STEPS REQUIRED	
Oversight:	Financial	Finance Min.	CAA/CENTRAL AUTH.			
	Strategic	Popular Council	LOCAL COUNCIL/GOVERNOR	INDEP. AUDITS	LOSS OF CONTROL, ADMIN. STEPS REQUIRED	
	Management	City Executive Council	BOARD OF DIRECTORS	LOCAL COUNCIL		
	Technical/Product	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	BOARD OF DIRECTORS		
	Day-to-Day operation	Local Government Dept.	CHAIRMAN	EGYPT EPA (MAYBE)	MULTITUDE OF AGENCIES INVOLVED	
				CEO		OUTSIDE CONTROL OF ENTITY
Subsidies:	Who Decides	MHPU/Cabinet	MHPU/Cabinet			
	How to pay for Subsidy	Finance Min.	Finance Min.	LOCAL COUNCIL LOCAL REV. + TRANSFERS	OUTSIDE CONTROL OF SERVICE PROVIDER	OUTSIDE CONTROL OF ENTITY

INSTITUTIONAL AND ADMINISTRATIVE TRANSITION
LOCATION: NUWEIBA

TABLE 7.5.C

MEASURE	EXISTING CONDITION	CONDITION AT YR 2001	CONDITION AT YR 2010	CONSTRAINTS	RECOMMENDED ACTIONS
Service Provided: Water / Wastewater	BOTH	BOTH	BOTH		
Both	NO	YES	YES		
By Supply Entity				IMPLEMENTATION DELAYS POTENTIAL	IMPLEMENTATION PLAN TO STUDY PACKAGING & CONST MGT
Complexity of Service: W T complex	Wells +Desal/Complex/Small	NLW WELLS NO DESAL			
W Not Extensive	Not Extensive/New	ADD 160 KMS			
W W T Complex	Not Complex/Small	ADD LRG CAP SIMPLE			
W W Not Extensive	Not Extensive/New	ADD 110 KMS			
Service Boundary Definition: City	Yes				
City + Markaz		YES	YES		
Markaz + Other Cities					IMPLEMENTATION CONSULTANT TO: PREPARE BACKGROUND DOCUMENTS, ACTION PLANS, ASSET VALUATION, LEGAL ANALYSIS, DRAFT DECREES, ADVICE ON NEGOTIATIONSTRATEGY
W&WW Entity Definition					
Assets Ownership:	City Dept + O&M Co	O&M CONTRACTS	AUTONOMOUS ENTITY	AGREE O&M CONT TO COVER SPARE PARTS	
Plant	Governorate-Markaz	GOVERNORATE CO			
Networks	City	GOVERNORATE CO	AUT ENTITY	RESISTANCE TO LOSS OF CONTROL	
			AUT ENTITY	LEGAL STEPS REQUIRED	
Est. Replacement Cost in 1994 LE:	N/A			ASSET VALUATION AGREEMENT	LOCAL OFFICIALS TO LOBBY MIN RECON , RECONST AUTH NEGOTIATE WITH MOF, ETC
Present Improvements in 1994 LE					
Est. O&M Costs in 1994 LE (000's)		47 (NATIONAL)			
Water		362 000 00	558 000 00	ADEQUATE KNOWLEDGE OF O&M COSTS	
Wastewater	20 35	246 000 00	427 000 00	ABILITY TO GENERATE FUNDS	CONDUCT O&M COSTING ANALYSIS
	0 00				PLAN FOR IMPLEMENTATION OF IMPROVED O&M PROCEDURES INCLUDING TRAINING PLAN
Approx. # Water Connections in 1993	250				
Organization: Type	Governmental	CONFORM TO GOV CO	INTERNAL CONTROL		
Authority/Respon	Marginally Adequate	ADEQUATE	ADEQUATE		
Responsiveness	Adequate	RESPONSIVE	RESPONSIVE		IMPLEMENTATION CONSULTANT TO PERFORM DETAILED STAFFING ANALYSIS DETAIL STAFF TRANSITION PLAN, INCLUD STUDY LABOR CONDITION & COMPENSATION
Staffing: Source of Staff	Government employees	MARKET	MARKET		
Personnel Policies	Govt low incentive	MARKET RATES	MARKET RATES	LABOR LAWS CONF. TO OTHER AGENCIES	
1993 Number (App.)	9	0	0	AVAILABILITY OF LABOR	ENSURE CLARITY OF BYLAWS ON: PERSONNEL, REVENUE RETENTION, FINANCE & CONTROL, COMPOSITION OF BOARD
Water	7	60	64	QUALITY & AVAILABILITY OF TRAINING	
Wastewater	2	65	78		
Governing Law:	Local Govt & Other Laws	GOE LAWS	GOE LAWS	CLARITY OF BYLAWS	
Responsibility: Operation	City Chief	CHAIRMAN	CEO		
Who performs	Private & Public Cos	O&M CONTRACTOR	ENTITY STAFF	COMPOSITION OF BOARD OF DIRECTORS	ESTABLISH MGT SYSTEMS: COST ACCTG, PROCUREMENT, CONSUMER RELATION, ...NING FINANCE SERVICE, ...LING & COLLECTION
Maintainance	Private & Public Cos	O&M CONTRACTOR	ENTITY STAFF	MANAGEMENT INFORMATION SYSTEMS	
Who performs	Private & Public Cos	O&M CONTRACTOR	ENTITY STAFF	ACCOUNTING PROCEDURES & COST CONTROL	
Quality of Service	City Chief	CHAIRMAN	CEO	PROCUREMENT & WAREHOUSING PROCEDURES	
Who Controls	Private & Public Cos	O&M CONTRACTOR	ENTITY STAFF	CONSUMER ORIENTATION/COMMUNITY RELATION	
Replacements	Governorate/MIN REC	BOARD OF DIRECTORS	BOARD OF DIRECTORS		
Expansions	Governorate/MIN REC	BOARD/GOVRN /MIN REC	BOARD OF DIRECTORS	SYSTEM EXPANSION PLANS	
Cost of Service	Operator Knows Costs				
Tariff Setting	MIN REC /MHPU	GOVERNOR/MIN REC /MHPU	BOARD OF DIRECTORS		
Propose	Cabinet	LOCAL COUNCIL/CENTR GOVT	LOCAL COUNCIL	RESIST LOSS OF CONTROL & REVENUES	
Approve					
Revenues: Collection System	City – efficient	ENTITY	ENTITY		PREPARE ACTION PLAN FOR: FINANCIAL INDEPENDENCE, AUTONOMY, TO INCLUDE: TARIFF STUDY, ALT. MECHAN FOR SUBSDY, RATE SETTING SYSTEM
1993 Amount (App.) LE	N/A				
Retention	Limited – Service Fund	100%	100%	COMMERCIAL ORIENTATION	
Cover O&M Costs	Large Portion	100%	100% + PART CAPITAL	ABILITY & WILLINGNESS TO PAY FOR SERVICE	
				LEGAL STEPS REQUIRED	
Oversight: Financial	Finance Min	CAA/CENTRAL AUTH	INDEP AUDITS		
Strategic	Popular Council	LOCAL COUNCIL/GOVERNOR	LOCAL COUNCIL	LOSS OF CONTROL, ADMIN STEPS REQUIRED	
Management	City Executive Council	BOARD OF DIRECTORS	BOARD OF DIRECTORS		
Technical/Product	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	EGYPT EPA (MAYBE)	MULTITUDE OF AGENCIES INVOLVED	
Day-to-Day operation	Private & Public Cos.	CHAIRMAN	CEO		OUTSIDE CONTROL OF ENTITY
Subsidies: Who Decides	MHPU/Cabinet	MHPU/Cabinet	LOCAL COUNCIL		
How to pay for Subsidy	Finance Min	Finance Min	LOCAL REV + TRANSFERS	OUTSIDE CONTROL OF SERVICE PROVIDER	OUTSIDE CONTROL OF ENTITY

TABLE 7.5.D

INSTITUTIONAL AND ADMINISTRATIVE TRANSITION
LOCATION: SHARM EL SHEIKH

MEASURE	EXISTING CONDITION	CONDITION AT YR 2001	CONDITION AT YR 2010	CONSTRAINTS	RECOMMENDED ACTIONS
Service Provided: Water / Wastewater	BOTH	BOTH	BOTH		
Both	YES	YES	YES		
By Single Entity					
Complexity of Service: W T complex	Desal+Pipeline/Small	NEW PIPE 100 KMS/NO DESAL		IMPLEMENTATION DELAYS POTENTIAL	IMPLEMENTATION PLAN TO STUDY PACKAGING & CONST. MGT.
W Net Extensive	Not Extensive	EXPAND & FIX			
W W T Complex	Not Complex/Small	ADD LRG. CAP. SIMPLE SYS			
W W Net Extensive	Not Extensive	ADD 75 KMS			
Service Boundary Delineation: City	Yes				
City + Market		YES	YES		IMPLEMENTATION CONSULTANT TO PREPARE BACKGROUND DOCUMENTS, ACTION PLANS, ASSET VALUATION, LEGAL ANALYSIS, DRAFT DECREES, ADVICE ON NEGOTIATION STRATEGY
Market + Other Cities					
W&WW Lobby Delineation.	City Dept + O&M Co + Army	O&M CONTRACTS	AUTONOMOUS ENTITY	AGRLE O&M CONT TO COVER SPARE PARTS	
Assets Ownership: Plants	Governorate/Min Recon	GOVERNORATE CO	AUT ENTITY	RESISTANCE TO LOSS OF CONTROL	LOCAL OFFICIALS TO LOBBY MIN RECON., RECONST AUTH NEGOTIATE WITH MOF, ETC.
Networks	City	GOVERNORATE CO	AUT ENTITY	LEGAL STEPS REQUIRED	
	EEA			ASSET VALUATION AGREEMENT	
Est Replacement Cost in 1994 LE:	Not estimated	Not estimated			
Present Improvements in 1994 LE					
Est O&M Costs in 1994 LE (000's):					
Water	350 00	569 000 00	131 100 00	ADEQUATE KNOWLEDGE OF O&M COSTS	CONDUCT O&M COSTING ANALYSIS
Wastewater	90 00	366 000 00	577 000 00	ABILITY TO GENERATE FUNDS	PLAN FOR IMPLEMENTATION OF IMPROVED O&M PROCEDURES INCLUDING TRAINING PLAN
Approx. # Water Connections in 1993:	700				
Organization Type	Governmental	CONFORM TO GOV CO	INTERNAL CONTROL		IMPLEMENTATION CONSULTANT TO PERFORM DETAILED STAFFING ANALYSIS DETAIL STAFF TRANSITION PLAN, INCLUD STUDY LABOR CONDITION & COMPENSATION
Authority Respon	Marginally Ade	ADEQUATE	ADEQUATE		
Responsiveness	Adequate	RESPONSIVE	RESPONSIVE		
Staffing Source of Staff	Government emp	MARKET	MARKET	LABOR LAWS CONF TO OTHER AGENCIES	ENSURE CLARITY OF BYLAWS ON PERSONNEL REVENUE RETENTION FINANCE & CONTROL COMPOSITION OF BOARD
Personnel Policies	Govt low incentive	MARKET RATES	MARKET RATES	AVAILABILITY OF LABOR	
1993 Number (App.)	8		65	QUALITY & AVAILABILITY OF TRAINING	
Water			75		
Wastewater					
Governing Law:	Local Govt & Other Laws	GOE LAWS	GOE LAWS	CLARITY OF BYLAWS	
Responsibility: Operation	Local Government	CHAIRMAN	CEO		ESTABLISH MGT SYSTEMS: COST ACCTG PROCUREMENT CONSUMER RELATION PLANNING FINANCE SERVICE BILLING & COLLECTION
Who performs	Private & Public Cos	O&M CONTRACTOR	ENTITY STAFF	COMPOSITION OF BOARD OF DIRECTORS	
Maintainance	Private & Public Cos	O&M CONTRACTOR	ENTITY STAFF	MANAGEMENT INFORMATION SYSTEMS	
Who performs	Private & Public Cos	O&M CONTRACTOR	ENTITY STAFF	ACCOUNTING PROCEDURES & COST CONTROL	
Quality of Service	City Chief	CHAIRMAN	CEO	PROCUREMENT & WAREHOUSING PROCEDURES	
Who Controls	Private & Public Cos	O&M CONTRACTOR	ENTITY STAFF	CONSUMER ORIENTATION/COMMUNITY RELATION	
Replacements	Governorate/NOPWASD	BOARD OF DIRECTORS	BOARD OF DIRECTORS		
Expansions	Governorate/NOPWASD	BOARD/GOVRN /MIN REC	BOARD OF DIRECTORS	SYSTEM EXPANSION PLANS	
Cost of Service	Operator Knows Costs				
Tariff Setting	MHPU/NOPWASD	GOVERNOR/MIN REC /MHPU	BOARD OF DIRECTORS		
Propose	Cabinet	LOCAL COUNCIL/CENTR GOVT	LOCAL COUNCIL	RESIST LOSS OF CONTROL & REVENUES	PREPARE ACTION PLAN FOR: FINANCIAL INDEPENDENCE AUTONOMY TO INCLUDE TARIFF STUDY ALT. MECHAN FOR SUBSIDY RATE SETTING SYSTEM
Approve	City – efficient	ENTITY	ENTITY		
Revenues: Collection System	$10,000 00			COMMERCIAL ORIENTATION	
1993 Amount (App.) LE	Limited – Local Service Fund	100%	100%	ABILITY & WILLINGNESS TO PAY FOR SERVICE	
Retention	Large Portion	100%	100% + PART CAPITAL	LEGAL STEPS REQUIRED	
Cover O&M Costs					
Oversight: Financial	Finance Min	CAA/CENTRAL AUTH	INDEP. AUDITS		
Strategic	Popular Council	LOCAL COUNCIL/GOVERNOR	LOCAL COUNCIL	LOSS OF CONTROL, ADMIN STEPS REQUIRED	
Management	City Executive Council	BOARD OF DIRECTORS	BOARD OF DIRECTORS		
Technical/Product	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	EGYPT EPA (MAYBE)	MULTITUDE OF AGENCIES INVOLVED	OUTSIDE CONTROL OF ENTITY
Day-to-Day operation	Private & Public Cos.	CHAIRMAN	CEO		
Subsidies: Who Decides	MHPU/Cabinet	MHPU/Cabinet	LOCAL COUNCIL	OUTSIDE CONTROL OF SERVICE PROVIDER	OUTSIDE CONTROL OF ENTITY
How to pay for Subsidy	Finance Min	Finance Min	LOCAL REV + TRANSFERS		

TABLE 7.5.E

INSTITUTIONAL AND ADMINISTRATIVE TRANSITION
LOCATION: LUXOR

	MEASURE	EXISTING CONDITION	CONDITION AT YR 2001	CONDITION AT YR 2010	CONSTRAINTS	RECOMMENDED ACTIONS
Service Provided:	Water / Wastewater	Both	BOTH	BOTH		
	Both	No	NO	MAYBE	DIFFICULT TO COMBINE W&WW	CONSULTANT TO: STUDY COMBINATION OF W&WW
	By Single Entity				IMPLEMENTATION DELAYS	IMPLEMENTATION PLAN TO STUDY PACKAGING & CONST. MGT.
Complexity of Service:	W T complex	Normal/Large	ADD LRG CAP /REHAB EXIST			
	W Net Extensive	Extensive/Old	FIX/EXPAND 100KMS			
	W W.T Complex	Normal/Old	ADD LRRRRG CAPACITY			
	W W Net Extensive	Medium Cover /Old	EXPAND SYS 120KMS			
	W W Net OID	No				
		Yes	MARKAZ GEN AUTH	INDEPENDENT COMPANY		IMPLEMENTATION CONSULTANT TO: PREPARE BACKGROUND DOCUMENTS ACTION PLANS, ASSET VALUATION, LEGAL ANALYSIS, DRAFT DECREES, AND ADVICE ON NEGOTIATION
Service Boundary Definition:	City	Yes				
	City + Markaz		YES	YES	ADMINISTRATIVE/JURISDICTION CONFLICT	
	Markaz + Other Cities				LEGAL STEPS/PRESIDENT DECREE	
Assets Ownership:	Plants	City, NOPWASD	GEN AUTH	AUTONOMOUS ENTITY	RESISTANCE TO LOSS OF CONTROL	
	Networks	City	GEN AUTH	AUTONOMOUS ENTITY	ASSET VALUATION	
					LEGAL STEPS REQUIRED	LOCAL OFFICIALS TO LOBBY MHPU & NEGOTIATE WITH MLA, MOF, NOPWASD, MOH, ETC
Est. Replacement Cost in 1994 LE:		[illegible]	[illegible]			
Project Improvements in 1994 LE						
Est. O&M Costs in 1994 LE:						
	Water	5 400 000 00	6 800 000 00	8 000,000 00	ADEQUATE KNOWLEDGE OF O&M COSTS	
	Wastewater	4 100,000 00	5 300 000 00	4 000,000 00		CONDUCT O&M COSTING ANALYSIS PLAN FOR IMPLEMENTATION OF IMPROVED O&M PROCEDURES INCLUDING TRAINING PLAN
		1 300 000 00	1 500 000 00	2 000,000 00		
Approx. # Water Connections in 1993:		23,000				
Organization:	Type	Governmental	CONFORMS TO GEN AUTH			
	Authority/Respon	Marginally Adequate	BETTER THAN GOVT	INTERNAL CONTROL		
	Responsiveness	Not Responsive	CONFORMS TO GOE RULES	MATCHED		
				FLEXIBLE	FLEXIBILITY IN PERSONNEL POLICIES	
Staffing:	Source of Staff	Government employees	EXISTING POOL			PERFORM DET STAFFING ANALYSIS
	Personnel Policies	Govt. low incentive	AV. SALARY UP 100% IN 1994 L.E.	MARKET		DETAIL STAFF TRANSITION PLAN, INCLUD FINANCIAL IMPLICATIONS
	1993 Number (App.)			MARKET RATES		
	Water	358	307	353	LABOR LAWS CONFORM TO OTHER AGENCIES	ENSURE CLARITY OF BYLAWS ON PERSONNEL
	Wastewater	172	151	164	O&M PRACTICES	REVENUE RETENTION
		186	156	189	MONEY TO PAY FOR TRAINING	FINANCE & CONTROL
Governing Law:		Local Govt & Other Laws	GEN AUTH & OTHER LAWS	GOE LAWS	QUALITY & AVAILABILITY OF TRAINING	
Responsibility:	Operation		CHAIRMAN			
	Who performs	Local Government	GEN AUTH STAFF	CHIEF EXEC OFFICER	CLARITY OF BYLAWS	
	Maintenance	Local Government Dept	CHAIRMAN			
	Who performs	Local Government	GEN AUTH STAFF	CHIEF EXEC OFFICER	MANAGEMENT INFORMATION SERVICES	
	Quality of Service	Local Government Dept	CHAIRMAN/BOARD OF DIRECT		ACCOUNTING PROCEDURES & COST CONTROL	ESTABLISH MGT. SYSTEMS,
	Who Controls	City Chief	CHAIRMAN		PROCUREMENT & WAREHOUSING PROCEDURES	COST ACCTG
	Replacements		BOARD OF DIRECTORS	CHIEF EXEC OFFICER	CONSUMER ORIENTATION/COMMUNITY RELATION	PROCUREMENT
	Expansions	City/NOPWASD	BOARD/GOVER./CENTRAL		SYSTEM EXPANSION PLANS	CONSUMER RELATION
	Cost of Service	City/NOPWASD	L.E 6,800,000 00	L.E. 6,000,000	ABILITY/WILLINGNESS TO PAY FOR SERVICE	
	Tariff Setting	City/Costs Not Known				
	Propose	MHPU/NOPWASD	BOARD	BOARD		
	Approve	Cabinet	LOCAL COUNCIL/GOVER/CENT.	LOCAL COUNCIL	RESIST LOSS OF CONTROL & REVENUES	
Revenues:	Collection System	City – efficient	GEN AUTH			PREPARE ACTION PLAN FOR: FINANCIAL INDEPENDENCE AUTONOMY
	1993 Amount (App.) LE	2,500 000 00	>L.E. 6.6 MILLION	>L.E. 6.0 MILLION		
	Retention	Limited – Local Service Fund	100%	100%		
	Cover O&M Costs	Significant Portion	100%	100% + PART CAPITAL	LEGAL STEPS REQUIRED	TO INCLUDE TARIFF STUDY
						ALT. MECHAN. FOR SUBSIDY
Oversight:	Financial	Finance Min.	CAA, CENTRAL AUTH	INDEP. AUDITS		RATE SETTING SYSTEM
	Strategic	Popular Council	LOCAL COUNCIL GOVERNOR	LOCAL COUNCIL	LOSS OF CONTROL, ADMIN. STEPS REQUIRED	
	Management	City Executive Council	BOARD OF DIRECTORS	BOARD OF DIRECTORS		
	Technical/Product	MPW, MOH, NOPWASD, MHPU	MPW, MOH, NOPWASD, MHPU	EGYPT EPA (MAYBE)	MULTITUDE OF AGENCIES INVOLVED	
	Day-to-Day operation	Local Government Dept.	CHAIRMAN	CEO		OUTSIDE CONTROL OF ENTITY
Subsidies:	Who Decides	MHPU/Cabinet	MHPU/Cabinet	LOCAL COUNCIL		
	How to pay for Subsidy	Finance Min.	Finance Min.	LOCAL REV. + TRANSFERS	OUTSIDE CONTROL OF SERVICE PROVIDED	OUTSIDE CONTROL OF ENTITY

TABLE 7.5.F

INSTITUTIONAL AND ADMINISTRATIVE TRANSITION
LOCATION: ARMANT

MEASURE		EXISTING CONDITION	CONDITION AT YR 2001	CONDITION AT YR 2010	CONSTRAINTS	RECOMMENDED ACTIONS
Service Provided:	Water / Wastewater Both By Single Entity	Water Only Yes	BOTH YES	BOTH YES	LOCAL CAPACITY	CONSULTANT TO STUDY LOCAL CAPACITY
Complexity of Service:	W I complex W Not Extensive W W T Complex W W Not Extensive	Complex/Small Limited/40 Kms/AVG N/A N/A	ADDITIONAL CAPABILITIES EXIST FIX/EXPAND 30 KMS NEW STAB POND NEW SYSTEM		IMPLEMENTATION DELAYS	IMPLEMENTATION PLAN TO STUDY PACKAGING & CONST MGT
Service Boundary Definition:	City City + Markaz Markaz + Other Cities	Yes	YES	YES	ADMINISTRATIVE CONFLICTS	IMPLEMENTATION CONSULTANT TO PREPARE BACKGROUND DOCUMENTS, ACTION PLANS ASSET VALUATION, LEGAL ANALYSIS, DRAFT DECREES, ADVICE ON NEGOTIATIONSTRATEGY
W&WW Entity Definition		SEVERAL CITY CLERKS	PART OF IND GEN AUTH	IND ENTITY MAYBE	ADMINISTRATIVE CONFLICTS/PRESIDENT DECREE	
Assets Ownership:	Plants Networks	City City	GEN AUTH GEN AUTH		RESISTANCE TO LOSS OF CONTROL LEGAL STEPS REQUIRED ASSET VALUATION AGREEMENT	LOCAL OFFICIALS TO LOBBY MHPU & NEGOTIATE WITH MLA ETC
Est Replacement Cost in 1994 LE:		6 000 000 00	100 000 000 00			
Project Improvements in 1994 LE						
Est. O&M Costs in 1994 LE:	Water Wastewater	134 000 00 134 000 00 0 00	941 000 00 768 000 00 173 000 00	2 058 000 00 1 982 000 00 898 000 00	ADEQUATE KNOWLEDGE OF O&M COSTS ABILITY TO GENERATE FUNDS	CONDUCT O&M COSTING ANALYSIS PLAN FOR IMPLEMENTATION OF IMPROVED O&M PROCEDURES INCLUDING TRAINING PLAN
Approx. # Water Connections in 1993		6 200				
Organization:	Type Authority Respon Responsiveness	Governmental Relatively Matched Not Responsive	CONFORMS TO GEN AUTH RULES BETTER THAN GOVT CONFORMS TO GOE RULES	INTERNAL CONTROL MATCHED FLEXIBLE	FLEXIBILITY IN PERSONNEL POLICIES	PERFORM DET STAFFING ANALYSIS DETAIL STAFF TRANSITION PLAN, INCLUD FINANCIAL IMPLICATIONS
Staffing:	Source of Staff Personnel Policies 1993 Number (App.) Water Wastewater	Government employees Govt. low incentive 85 85 9	EXISTING POOL AV SALARY UP 100% IN 1994 L E 87 53 91	MARKET MARKET RATES 121 84 87	LABOR LAWS CONF. TO OTHER AGENCIES O&M PRACTICES QUALITY & AVAILABILITY OF TRAINING	ENSURE CLARITY OF BYLAWS ON: PERSONNEL REVENUE RETENTION FINANCE & CONTROL COMPOSITION OF BOARD
Governing Law:		Local Govt & Other Laws	GEN AUTH & OTHER GOE LAWS	GOE LAWS	CLARITY OF BYLAWS	
Responsibility:	Operation Who performs Maintenance Who performs Quality of Service Who Controls Replacements Expansions Cost of Service Tariff Setting Propose Approve	Local Government Local Government Dept Local Government Local Government Dept City Chief Governorate/NOPWASD Governorate/NOPWASD City /Costs Not Known MHPU/NOPWASD Cabinet	CEO GEN AUTH ARMANT REGION CEO GEN AUTH ARMANT REGION CEO/BOARD OF DIRECT. CHAIRMAN BOARD OF DIRECTORS BOARD/GOVER CENT GOVT L E 941,000 BOARD LOCAL COUNC/GOVER CENT GOV	CEO CEO CEO/BOARD OF DIRECT CEO BOARD OF DIRECTORS BOARD OF DIRECTORS L E 2,100,000 BOARD LOCAL COUNCIL	COMPOSITION OF BOARD OF DIRECTORS MANAGEMENT INFORMATION SERVICES ACCOUNTING PROCEDURES & COST CONTROL PROCUREMENT & WAREHOUSING PROCEDURES CONSUMER ORIENTATION/COMMUNITY RELATION SYSTEM EXPANSION PLANS RESIST LOSS OF CONTROL & REVENUES	ESTABLISH MGT SYSTEMS: COST ACCTG PROCUREMENT CONSUMER RELATION PLANNING FINANCE SERVICE BILLING & COLLECTION
Revenues:	Collection System 1993 Amount (App.) LE Retention Cover O&M Costs	City – not efficient 115,000 00 None Difficult to Determine	GEN AUTH >L E 940,000 100% 100%	ENTITY >L E 2,100,000 100% 100% + PART CAPITAL	COMMERCIAL ORIENTATION ABILITY & WILLINGNESS TO PAY FOR SERVICE LEGAL STEPS REQUIRED	PREPARE ACTION PLAN FOR: FINANCIAL INDEPENDENCE AUTONOMY TO INCLUDE TARIFF STUDY ALT MECHAN FOR SUBSDY RATE SETTING SYSTEM
Oversight:	Financial Strategic Management Technical/Product Day-to-Day operation	Finance Min Popular Council City Executive Council MPW, MOH, NOPWASD, MHPU Local Government Dept	CAA CENTRAL AUTH LOCAL COUNCIL GOVERNOR BOARD OF DIRECTORS MPW, MOH, NOPWASD, MHPU CEO	INDEP AUDITS LOCAL COUNCIL BOARD OF DIRECTORS EGYPT EPA (MAYBE) CEO	LOSS OF CONTROL ADMIN STEPS REQUIRED MULTITUDE OF AGENCIES INVOLVED	OUTSIDE CONTROL OF ENTITY
Subsidies:	Who Decides How to pay for Subsidy	MHPU/Cabinet Finance Min	MHPU/Cabinet Finance Min	LOCAL COUNCIL LOCAL REV + TRANSFERS	OUTSIDE CONTROL OF SERVICE PROVIDED	OUTSIDE CONTROL OF ENTITY

TABLE 7.5.G

INSTITUTIONAL AND ADMINISTRATIVE TRANSITION
LOCATION: ISNA

MEASURE		EXISTING CONDITION	CONDITION AT YR 2001	CONDITION AT YR 2010	CONSTRAINTS	RECOMMENDED ACTIONS
Service Provided:	Water / Wastewater Both By Single Entity	Water Yes	BOTH YES	BOTH YES	LOCAL CAPACITY	CONSULTANT TO: STUDY LOCAL CAPACITY
Complexity of Service:	WT complex W Net Extensive WWT Complex WW Net Extensive	Normal/Medium Not Extensive/Old N/A N/A	ADD LRG CAP AC /RETAIN EXIST FIX/EXPAND 20 KMS NEW MED /SIMPLE SYS NEW NET 50KMS		IMPLEMENTATION DELAYS ADMIN CONFLICT/PRESIDENT DECREE	IMPLEMENTATION PLAN TO STUDY PACKAGING & CONST. MGT
WS & WW ENTITY DEFINITION:		Several Market Depts	PART OF GOVH WIDE GEN AUTH	AUTONOMOUS ENTITY		
Service Boundary Definition:	City City + Markaz Markaz + Other Cities	Yes	YES	YES	ADMINISTRATIVE CONFLICTS	IMPLEMENTATION CONSULTANT TO: PREPARE BACKGROUND DOCUMENTS, ACTION PLANS, ASSET VALUATION, LEGAL ANALYSIS, DRAFT DECREES, ADVICE ON NEGOTIATION STRATEGY
Assets Ownership:	Plants Networks	Governorate /NOPWASD Markaz	GEN AUTH GEN AUTH		ADMINISTRATIVE CONFLICT/PRESIDENT DECREE RESISTANCE TO LOSS OF CONTROL LEGAL STEPS REQUIRED ASSET VALUATION AGREEMENT	LOCAL OFFICIALS TO: LOBBY MHPU & NEGOTIATE WITH MLA ETC
Est. Replacement Cost in 1994 LE		[illegible]	[illegible]			
Required Improvements in 1994 LE						
Est. O&M Costs in 1994 LE:	Water Wastewater	486 000 00 486 000 00 0 00	1 568 000 00 1 290 000 00 278 000 00	3 455 000 00 2 598 000 00 858 000 00	ADEQUATE KNOWLEDGE OF O&M COSTS ARILITY TO GENERATE FUNDS	CONDUCT O&M COSTING ANALYSIS PLAN FOR IMPLEMENTATION OF IMPROVED O&M PROCEDURES INCLUDING TRAINING PLAN
Approx. # Water Connections in 1993:		8 500				
Organization:	Type Authority Respon Responsiveness	Governmental Not Matched Not Responsive	CONFORMS TO GEN AUTH RULES BETTER THAN GOVT CONFORMS TO GOE RULES	INTERNAL CONTROL MATCHED FLEXIBLE	FLEXIBILITY IN PERSONNEL POLICIES	PERFORM DET. STAFFING ANALYSIS DETAIL STAFF TRANSITION PLAN, INCLUD FINANCIAL IMPLICATIONS
Staffing:	Source of Staff Personnel Policies 1993 Number (App.) Water Wastewater	Government employees Govt. low incentive 100 108 0	EXISTING POOL AV. SALARY UP 100% IN 1994 LE 130 98 34	MARKET MARKET RATES 166 113 53	LABOR LAWS, CONF. TO OTHER AGENCIES O&M PRACTICES QUALITY & AVAILABILITY OF TRAINING	ENSURE CLARITY OF BYLAWS ON: PERSONNEL REVENUE RETENTION FINANCE & CONTROL COMPOSITION OF BOARD
Governing Law:		Local Govt & Other Laws	GEN AUTH & OTHER GOE LAWS	GOE LAWS	CLARITY OF BYLAWS	
Responsibility:	Operation Who performs Maintainance Who performs Quality of Service Who Controls Replacements Expansions Cost of Service Tariff Setting Propose Approve	Local Government Local Government Dept Local Government Local Government Dept City Chief Governorate/NOPWASD Governorate/NOPWASD City Dep /Costs Not Known MHPU/NOPWASD Cabinet	CEO GEN AUTH ARMANT REGION CEO GEN. AUTH. ARMANT REGION CEO/BOARD OF DIRECT CHAIRMAN BOARD OF DIRECTORS BOARD/GOVER. CENT. GOVT. L.E. 1,800,000 BOARD LOCAL COUNC /GOVER CENT GOV	CEO CEO CEO/BOARD OF DIRECT CEO BOARD OF DIRECTORS BOARD OF DIRECTORS L.E. 3,500,000 BOARD LOCAL COUNCIL	COMPOSITION OF BOARD OF DIRECTORS MANAGEMENT INFORMATION SERVICES ACCOUNTING PROCEDURES & COST CONTROL PROCUREMENT & WAREHOUSING PROCEDURES CONSUMER ORIENTATION/COMMUNITY RELATION SYSTEM EXPANSION PLANS	ESTABLISH MGT. SYSTEMS: COST ACCTG PROCUREMENT CONSUMER RELATION PLANNING FINANCE SERVICE BILLING & COLLECTION
Revenues:	Collection System 1993 Amount (App.) LE Retention Cover O&M Costs	City – not efficient 160,000 00 None Small Portion	GEN AUTH >L.E. 1.6 MILLION 100% 100%	ENTITY >L.E. 3.5 MILLION 100% 100% + PART CAPITAL	RESIST LOSS OF CONTROL & REVENUES COMMERCIAL ORIENTATION ABILITY & WILLINGNESS TO PAY FOR SERVICE LEGAL STEPS REQUIRED	PREPARE ACTION PLAN FOR: FINANCIAL INDEPENDENCE AUTONOMY TO INCLUDE TARIFF STUDY ALT. MECHAN. FOR SUBSIDY RATE SETTING SYSTEM
Oversight:	Financial Strategic Management Technical/Product Day-to-Day operation	Finance Min. Popular Council City Executive Council MPW, MOH, NOPWASD, MHPU Local Government Dept	CAA CENTRAL AUTH LOCAL COUNCIL GOVERNOR BOARD OF DIRECTORS MPW MOH NOPWASD, MHPU CEO	INDEP. AUDITS LOCAL COUNCIL BOARD OF DIRECTORS EGYPT EPA (MAYBE) CEO	LOSS OF CONTROL, ADMIN. STEPS REQUIRED MULTITUDE OF AGENCIES INVOLVED	OUTSIDE CONTROL OF ENTITY
Subsidies:	Who Decides How to pay for Subsidy	MHPU/Cabinet Finance Min.	MHPU/Cabinet Finance Min.	LOCAL COUNCIL LOCAL REV. + TRANSFERS	OUTSIDE CONTROL OF SERVICE PROVIDED	OUTSIDE CONTROL OF ENTITY

INSTITUTIONAL AND ADMINISTRATIVE TRANSITION
LOCATION: ASWAN GROUP

TABLE 7.5.H

MEASURE		EXISTING CONDITION: KOM OMBO	EXISTING CONDITION: DARAWO	EXISTING CONDITION: NASR	EXISTING CONDITION: REGION	CONDITION AT YR 2001	CONDITION AT YR 2010	CONSTRAINTS	RECOMMENDED ACTIONS
Service Provided	Water + Wastewater Both By Single Entity	Water Yes	Water Yes	Both (WW Collect) Yes	Water Yes	BOTH YES		LOCAL CAPACITY	CONSULTANT TO STUDY LOCAL CAPACITY
Complexity of Service:	W T complex W Not Extensive W W T Complex W W Not Extensive	Normal Medium Not Extensive NA NA	Normal Small Not Extensive NA NA	NA No NA No	Normal-Medium Size Not Extensive NA NA	ADD CAP /REHAB EXIST ADD 170KMS/FIX EXIST NEW PLANTS 6TB POS NEW 370KMS + PUMPS		IMPLEMENTATION DELAYS	IMPLEMENTATION PLAN TO STUDY PACKAGING & CONST MGT
WSSWW ENTITY DEFINITION									
Service Boundary Definition	City City - Markaz Markaz + Other Cities	Yes	Yes	Yes	Yes	PART OF IND GEN AUTH	INDEPENDENT ENTITY	ADMINISTRATIVE CONFLICTS	PREPARE BACKGROUND DOCUMENTS, ACTION PLANS, ASSET VALUATION, LEGAL ANALYSIS, DRAFT DECREES, ADVICE ON NEGOTIATION STRATEGY
Assets Ownership	Plants Networks	Governorate NOPWASD Markaz	Governorate NOPWASD Markaz	None Markaz	Governorate NOPWASD Each Market Separate	YES GEN AUTHORITY GEN AUTHORITY	YES IND ENTITY IND ENTITY	ADMINISTRATIVE CONFLICTS-PRESIDENT DECREE RESISTANCE TO LOSS OF CONTROL LEGAL STEPS REQUIRED ASSET VALUATION AGREEMENT	LOCAL OFFICIALS TO LOBBY MHPU & NEGOTIATE WITH MLA ETC
Est Replacement Cost in 1994 LE		26 000 000 est	10 000 000 est	5 500 000 00	41 500 000 00	4 170 000 00 2 810 000 00 1 200 000 00	7 810 000 00 4 830 000 00 3 180 000 00	ADEQUATE KNOWLEDGE OF O&M COSTS ABILITY TO GENERATE FUNDS	CONDUCT O&M COSTING ANALYSIS PLAN FOR IMPLEMENTATION OF IMPROVED O&M PROCEDURES INCLUDING TRAINING PLAN
Project Improvements in 1994 LE		181 000 000 est	70 000 000 est	65 000 000					
Est O&M Costs in 1994 LE Water Wastewater		1 230 000 00 1 230 000 00 0 00	307 000 00 307 000 00 0 00	317 000 00 317 000 00 0 00	2 154 000 00 2 154 000 00 0 00				
Approx # Water Connections in 1993		9 000	4 000	1 500					
Organization Type Authority Region Responsiveness					Governmental Delayed Not Responsive	CONFORMS TO GEN AUTH BETTER THAN GOVT CONFORMS TO GOE RULES	INTERNAL CONTROL MATCHED FLEXIBLE	FLEXIBILITY IN PERSONNEL POLICIES	PERFORM PROPER STAFFING ANALYSIS DETAIL STAFF TRANSITION PLAN, INCLUD FINANCIAL IMPLICATIONS
Staffing Source of Staff Personnel Policies 1993 Number (App.) Water Wastewater		Government employees 184 184 0	Gov't low income 80 80 0	30 30 0	304 304 0	EXISTING POOL AV SALARY UP 10% IN TABLE	314 130 175	LABOR LAWS CONF TO OTHER AGENCIES O&M PRACTICES QUALITY & AVAILABILITY OF TRAINING	ENSURE CLARITY OF BYLAWS ON PERSONNEL REVENUE RETENTION FINANCE & CONTROL COMPOSITION OF BOARD
Governing Law					Local Govt & Other Laws	GEN AUTH & GOE LAWS	GOE LAWS	CLARITY OF BYLAWS	
Responsibility: Operation Who performs Maintenance Who performs Quality of Service Who Controls Replacements Expansions Cost of Service Tariff Setting Propose Approve					Local Government Local Government Dept Local Government Local Government Dept City Chiefs Mostly Kom Ombo Local Government Dept Governorate/NOPWASD Governorate/NOPWASD City Dept/Costs Not Known MHPU/NOPWASD Cabinet	CEO GEN AUTH KOM OMBO REGION CEO GEN AUTH KOM OMBO REGION CEO/BOARD OF DIRECT CHAIRMAN BOARD OF DIRECTORS BOARD/GOVR/CENTRAL 4,170,000 00 BOARD LOCAL COUNCIL/GOVERNOR/CENT	CEO CEO CEO/BOARD OF DIRECT CEO BOARD OF DIRECTORS BOARD OF DIRECTORS 7,810,000 00 BOARD LOCAL COUNCIL	COMPOSITION OF BOARD OF DIRECTORS MANAGEMENT INFORMATION SYSTEMS ACCOUNTING PROCEDURES AND COST CONTROL PROCUREMENT AND WAREHOUSING CONSUMER ORIENTATION/COMMUNITY RELATION SYSTEM EXPANSION PLANS RESIST LOSS OF CONTROL & REVENUES	ESTABLISH MGT SYSTEMS COST ACCTG PROCUREMENT CONSUMER RELATION PLANNING FINANCE SERVICE BILLING & COLLECTION
Revenues Collection System 1993 Amount (App.) LE Retention Cover O&M Costs		135 000 00	65 000 00	10 000 00	City - not efficient 230,000 00 None Difficult to Determine	GEN AUTH >LE 4,170,000 100% 100%	ENTITY >LE 37 200 000 100% 100% + PART CAPITAL	COMMERCIAL ORIENTATION ABILITY & WILLINGNESS TO PAY FOR SERVICE LEGAL STEPS REQUIRED	PREPARE ACTION PLAN FOR FINANCIAL INDEPENDENCE AUTONOMY TO INCLUDE TARIFF STUDY ALTER MECHANISMS FOR SUBSIDEY AND RATE SETTING SYSTEM
Oversight: Financial Strategic Management Technical/Product Day - to - Day operation					Finance Min Popular Council City Executive Council MPW, MOH, NOPWASD, MHPU Local Government Dept	CAA CENTRAL AUTH LOCAL COUNCIL GOVERNOR BOARD OF DIRECTORS MPW, MOH, NOPWASD, MHPU CHAIRMAN	INDEP AUDITS LOCAL COUNCIL BOARD OF DIRECTORS EGYPT EPA (MAYBE) CEO	LOSS OF CONTROL, ADMIN STEPS REQUIRED	
Subsidies: Who Decides How to pay for Subsidy					MHPU/Cabinet Finance Min	MHPU/Cabinet Finance Min	LOCAL COUNCIL LOCAL REV + TRANSFERS	MULTITUDE OF AGENCIES INVOLVED OUTSIDE CONTROL OF SERVICE PROVIDED	OUTSIDE CONTROL OF ENTITY OUTSIDE CONTROL OF ENTITY

7.5 Options For Improving the Short Term Institutional Situation

It is recognized that progress towards the long term goal is critical and that the activities to achieving that goal are numerous. Several options have been identified for improving the performance of providing of water and wastewater services in each of the secondary cities. These options differ in terms of types and ownership of the facilities delivering the service, the operation and maintenance approaches, the systems for setting and collecting tariffs and revenues, personnel systems, etc.

Table 7.3 presents four administrative options for consideration in the secondary cities and describes their features. These options have either been advanced previously in Egypt or have already been experimented within some location of the country. The final option that would emerge under the project in each location will have to be further analyzed by the parties involved in project implementation. In all likelihood it will be subject to negotiations between USAID and the GOE. The various options for consideration are outlined below:

- Option 1 Governmental authority responsible for
  - 1-A Water or wastewater service
  - 1-B Water and wastewater service
- Option 2 Public sector company responsible for service
- Option 3 O&M contracted out to a public or private company
- Option 4 Private sector company responsible for service

Note: all options have four variables:

Separate systems -	A-i	City level.
	A-ii	Regional level, which could be a governorate, or subdivision thereof.
Combined systems -	B-i	City level
	B-ii	Regional level

7.6 Preliminary Screening of Options

The cities being considered for the project are different not only in size and per capita income, but they exhibit differences in density of population and access to skilled work force. The cities can be grouped into three distinct categories:

- Large centers with extensive, old, established water and wastewater systems,

TABLE 7.3

FEATURES OF DIFFERENT INSTITUTIONAL OPTIONS FOR MANAGING WATER AND WASTEWATER SYSTEMS IN SECONDARY CITIES

FEATURES	OPTION 1 GOVERNMENTAL AUTHORITY	OPTION 2 PUBLIC SECTOR COMPANY	OPTION 3 O&M LEASED TO PRIVATE OR PUBLIC SECTOR COMPANIES	OPTION 4 PRIVATE SECTOR COMPANY
1. Entity Provides: (A) Water OR Wastewater (B) Water AND Wastewater	(A) (B)	(A) (B)	(A) (B)	(A) (B)
2. Service Boundary Definition: (i) Local (City) (ii) Regional (City + Others)	(i) (ii)	(i) (ii)	(i) (ii)	(i) (ii)
3. Assets Ownership: Plants Networks	Organization Organization	Organization Organization	Governorate Governorate	Company Company
4. Organization: Type Authority/Responsibility Flexibility/Responsiveness	Governmental Defined Changes Possible CAOA Role Key	Public Sector Defined Less CAOA control	Private/Public Defined Flexible to meet actual needs	Private Defined Flexible to meet actual needs
5. Staffing: Source of Staff Personnel Policies Compensation	Selected from Government Modified Civil Service Government but better incentives	Selected from the market Public Sector better Salary+incentives	Selected from the market Public/Private Sector Market rates – Good	Selected from the market Private Sector Market rates – Good
6. Establishment: Authority Mechanism Governing Law	President Decree Law 61/1963 as amended	Cabinet Governor/Minister Decree Law 97/1983 as amended	Governor Contract Procurement Laws as amended	Cabinet Ministerial Decree Law 159/1981
7. Responsibility for: Operation	Authority	Company	Company	Company
Who performs	Authority	Company	Company	Company
Maintainance	Authority	Company	Company/Governorate	Company
Who performs	Authority	Company	Company	Company
Quality of Service	Chief Executive Council	Company	Governorate	Company
Replacements	Authority	Organ /NOPWASD	Governorate	Company
Expansions	Authority	Organ /NOPWASD	Governorate	Company
Cost Control	Organization/Costs Known	Organ /Costs better Known	Operator	Company
Tariff Setting	Authority	Organization	Governorate	Company
Propose	Popular Council	Popular Council	Popular Council	Management/Costs known
Approve				
8. Revenues: Collection System	Fairly efficient	Fairly efficient	Governorate – not efficient	Company
Retention	100% Revenue + Any Transfers	100% Revenue + Any Transfers	Not Applicable	Popular Council
Coverage of O&M Costs	Easier to Determine	Easier to Determine	Not Applicable	Company – Very efficient
9. Oversight: Financial	CAA	CAA	CAA	100% Revenue
Strategic	Governor/Minister	Governor/Minister	Popular Council	Yes
Management	Board of Directors	Board of Directors	Executive Council	Auditor/Share Holders
Technical/Product	Min. PW, Health, NOPWASD, MHPU	Min. PW, Health, NOPWASD, MHPU	Min. PW, Health, NOPWASD, MHPU	Share Holders
Day-to-Day operation	Chairman	Chairman	Not Applicable	Board of Directors
10. Subsidies: Who Decides	Organ /Governor	Organ /Governor	Governor/Cabinet	Min. PW, Health, NOPWASD, MHPU
How to pay for Subsidy	Finance Min./Own Resources	Finance Min./Own Resources	Not Applicable	Chairman
				Organ /Governor
				Share Holders/ Finance Min.

Remarks:

1. Option 2-A-ii is implemented in Behera, Kafr el Sheikh & Damietta also under consideration in Fayoum and Aswan
2. Option 3-A-i is implemented in South Sinai Governorate. O&M for water and wastewater plants and network are contracted with both public and private sector companies
3. Option 4-A-i is partially implemented in Hurgada. A private sector company owns and operates a desalination plant. Production is sold completely to the City Council at a reasonable price (L.E. 5.65 km/m3).

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- Small, low density centers with newer water and wastewater systems, and
- Smaller size urban centers in rural governorates with small-scale, marginally established systems.

Mansoura, Mahalla and Luxor are part of rural governorates that presently are a part of regional potable water supply systems. They have access to large pools of skilled workers and have extensive, old and established potable water and wastewater facilities. Furthermore each in its own way generates sizable revenues to the central government; Mansoura from commerce and small industry, Mahalla with its industrial activities and Luxor from tourism.

Nuweiba, and Sharm el Sheikh are small, low population density, and tourism based urban centers. They all have small, expensive systems for potable water, and a conventional wastewater system. They also generate sizable revenue for the central government and a very large portion of the demand for water and wastewater services is generated from transient population - tourists. The private sector also plays a significant role in the economy of these cities.

Finally, the cities of **Armant, Isna, Kom Ombo, Darawo and Nasr** are all in rural governorates that rely on agriculture to a significant degree. These governorates traditionally had lower average per capita incomes than the delta governorates. Their water and wastewater facilities are smaller and the utilities are mostly staffed by technicians, and the larger facilities are managed regionally. The private sector plays a role in these cities but it is limited to low technology interventions such as pipelaying.

This suggests that the procedures for dealing with the provision of potable water and wastewater needs of the cities will have to differ depending on the grouping suggested above. On this basis several of the generic options presented earlier can be eliminated from consideration. In some cases there are issues that merit further consideration during project implementation.

In Mansoura, Mahalla and Luxor, based on the extent and age of the existing system the variable of setting up a single entity responsible for both water and wastewater facilities can be eliminated. Option 4, the setting up of a totally private for profit company to operate the services can also be disregarded at this time, because of the existing condition of the system and the financial picture of the investment in those locations. Also operation and maintenance leases in these cities will probably work better if they are limited to any new facilities being constructed or completely rehabilitated under the project.

An issue that requires further consideration during the subsequent feasibility and design studies is the extent of the service areas, whether governorate or city level entities. This applies in particular to Mansoura, Mahalla El Kobra, and Luxor.

For Nuweiba and Sharm el Sheikh an organizational arrangement calling for staffing on a governmental basis would not be desirable, and option 1 need not be considered. The situation in these cities does open possibilities for a significant private sector role in water and wastewater and should be investigated further. As far as the issue of municipal versus governorate wide control of utility services is concerned, a case can be made for

regional control because of the size of the cities and the local capability in terms of personnel, access to labor and other resources to perform the services. The municipal level variable can be eliminated from consideration.

For Armant, Isna and the Kom Ombo, Darawo and Nasr, it does not seem feasible to consider establishing local level entities to provide water and wastewater services. Nor is it worthwhile to consider Option 4, private management of the services, given the low financial attractiveness of the investment and the size of the service area. These cities, because they do not have wastewater service, provide an opportunity to consider combining the water and wastewater services in one entity. The Secondary Cities Project should consider investigating this further.

7.7 Preferred Administrative Option for Institutional Change

The options screened in section 7.6 above, are further analyzed and compared in terms of their suitability and acceptability for each location based on the following factors:

FACTORS		WEIGHT
• Ability to mobilize resources		20
Financial autonomy (Retain revenue)	10	
Financial viability (Cover O&M costs)	10	
• Financial cost to customers (High tariffs)		10
• Quality of service		10
• Political acceptability, including		20
Equality and Subsidies	10	
Oversight by government & NOPWASD	10	
• Leadership commitment, including		15
The utility managers preference	05	
The local officials, governors	10	
• Ease of transition, including		25
Size of the current institutional gap	10	
Cost to the government	08	
Complexity of the legal steps	07	
TOTAL		100

The individual comparison tables are attached for reference in the Institutional Annex. An

example of the ranking of these options is shown in Table 7.4. The preferred option for each location is noted below:

Governmental authority/separate water and wastewater/regional basis
(Option 1A-ii)

Mansoura
Mahalla El Kobra

Governmental authority/separate water and wastewater/city basis
(Option 1A-i)

Luxor

Governmental authority/combined water and wastewater/regional basis
(Option 1B-ii)

Armant
Isna
Kom Ombo Region

Contract O&M/combined water and wastewater/city basis
(Option 3B-i)

Nuweiba

Contract O&M/combined water and wastewater/regional basis
(Option 3B-ii)

Sharm El Sheikh

7.8 Recommended Actions to Achieving Sustainability

The measurements used to quantify the variance between the existing condition and the desired option to improve sustainability at the end of the project are presented in Table 7.5. It also identifies for each location potential project implementation, technical, managerial, institutional and policy constraints that might impede achieving sustainability. Recommended actions to address these constraints are also advanced. In this section the three most important actions needed to achieve any degree of sustainability for the projects are highlighted.

7.8.1 Establishing the Water and Wastewater Entities

The demonstration of commitment to institutional change will have to be measured by how fast the GOE and USAID can reach agreement on the administrative arrangements that will be implemented to ensure sustainability and the schedule for implementation. The conditions precedent and covenants inserted in the project agreement will have to take these into consideration. Action plans will then have to be prepared to reflect the legal steps required, the milestones, and measurement of progress.

TABLE 7.4.A

COMPARISON OF OPTIONS FOR IMPROVED SUSTAINABILITY OF WATER AND WASTEWATER SYSTEMS IN SECONDARY CITIES

MANSOURA

FACTORS	WEIGHT	OPTION 1 SEPARATE A–i CITY	OPTION 1 SEPARATE A–ii REG.	OPTION 2 SEPARATE A–i CITY	OPTION 2 SEPARATE A–ii REG.	OPTION 3 SEPARATE A–i CITY	OPTION 3 SEPARATE A–ii REG.
ABILITY TO MOBILIZE RESOURCES	20						
AUTONOMY	10	3	N/A	4	N/A	10	N/A
EFFICIENCY	10	4		6		8	
CUSTOMERS FINANCIAL COST	10	8		6		4	
QUALITY OF SERVICE	10	4		6		8	
POLITICAL ACCEPTABILITY	20						
EQUALITY ISSUES	10	8		6		2	
OVERSIGHT	10	8		6		2	
LEADERSHIP COMMITMENT	15						
UTILITY MANAGERS	5	3		4		1	
LOCAL OFFICIALS	10	7		5		2	
EASE OF TRANSITION	25						
OVERALL GAP TO CLOSE	10	7		5		8	
COST TO GOVERNMENT	8	6		4		1	
LEGAL STEPS INVOLVED	7	6		4		2	
TOTAL SCORE	100	64	0	56	0	48	0

TABLE 7.4.B

COMPARISON OF OPTIONS FOR IMPROVED SUSTAINABILITY OF WATER AND WASTEWATER SYSTEMS IN SECONDARY CITIES

MAHALLA

FACTORS	WEIGHT	OPTION 1 SEPARATE A–i CITY	OPTION 1 SEPARATE A–ii REG.	OPTION 2 SEPARATE A–i CITY	OPTION 2 SEPARATE A–ii REG.	OPTION 3 SEPARATE A–i CITY	OPTION 3 SEPARATE A–ii REG.
ABILITY TO MOBILIZE RESOURCES	20						
AUTONOMY	10	3	N/A	4	N/A	10	N/A
EFFICIENCY	10	4		6		8	
CUSTOMERS FINANCIAL COST	10	8		6		4	
QUALITY OF SERVICE	10	4		6		8	
POLITICAL ACCEPTABILITY	20						
EQUALITY ISSUES	10	8		6		2	
OVERSIGHT	10	8		6		2	
LEADERSHIP COMMITMENT	15						
UTILITY MANAGERS	5	3		4		1	
LOCAL OFFICIALS	10	7		5		2	
EASE OF TRANSITION	25						
OVERALL GAP TO CLOSE	10	6		4		8	
COST TO GOVERNMENT	8	6		4		1	
LEGAL STEPS INVOLVED	7	6		4		2	
TOTAL SCORE	100	63	0	55	0	48	0

TABLE 7.4.C

COMPARISON OF OPTIONS FOR IMPROVED SUSTAINABILITY OF WATER AND WASTEWATER SYSTEMS IN SECONDARY CITIES

NUWEIBA

FACTORS	WEIGHT	OPTION 2		OPTION 3				OPTION 4			
		SEPAR.	COMB.	SEPARATE		COMBINED		SEPARATE		COMBINED	
		A–ii REG	B–ii REG	A–i CITY	A–ii REG	B–i CITY	B–ii REG	A–i CITY	A–ii REG	B–i CITY	B–ii REG
ABILITY TO MOBILIZE RESOURCES	20										
AUTONOMY	10	6	6	10	10	10	10	10	10	10	10
EFFICIENCY	10	5	6	7	8	8	9	10	10	10	10
CUSTOMERS FINANCIAL COST	10	6	7	5	6	4	5	2	3	1	2
QUALITY OF SERVICE	10	7	8	8	9	9	9	10	10	10	10
POLITICAL ACCEPTABILITY	20										
EQUALITY ISSUES	10	6	6	2	2	2	2	1	1	1	1
OVERSIGHT	10	6	6	5	5	5	5	3	3	3	3
LEADERSHIP COMMITMENT	15										
UTILITY MANAGERS	5	2	2	4	3	5	4	3	3	3	3
LOCAL OFFICIALS	10	6	6	4	6	5	6	3	3	3	3
EASE OF TRANSITION	25										
OVERALL GAP TO CLOSE	10	1	1	9	9	9	9	2	4	1	3
COST TO GOVERNMENT	8	1	1	4	3	4	3	5	4	5	4
LEGAL STEPS INVOLVED	7	2	2	7	7	7	7	2	2	2	2
TOTAL SCORE	100	48	51	65	68	68	69	51	53	49	51

TABLE 7.4.D

COMPARISON OF OPTIONS FOR IMPROVED SUSTAINABILITY OF WATER AND WASTEWATER SYSTEMS IN SECONDARY CITIES

SHARM EL SHEIKH

FACTORS	WEIGHT	OPTION 2		OPTION 3				OPTION 4			
		SEPAR.	COMB	SEPARATE		COMBINED		SEPARATE		COMBINED	
		A-ii REG	B-ii REG	A-i CITY	A-ii REG	B-i CITY	B-ii REG	A-i CITY	A-ii REG	B-i CITY	B-ii REG
ABILITY TO MOBILIZE RESOURCES	20										
AUTONOMY	10	6	6	10	10	10	10	10	10	10	10
EFFICIENCY	10	5	6	7	8	8	9	10	10	10	10
CUSTOMERS FINANCIAL COST	10	6	7	5	6	4	5	2	3	1	2
QUALITY OF SERVICE	10	7	8	8	9	9	9	10	10	10	10
POLITICAL ACCEPTABILITY	20										
EQUALITY ISSUES	10	6	6	2	2	2	2	1	1	1	1
OVERSIGHT	10	6	6	5	5	5	5	3	3	3	3
LEADERSHIP COMMITMENT	15										
UTILITY MANAGERS	5	2	2	4	3	5	4	3	3	3	3
LOCAL OFFICIALS	10	6	6	4	6	5	6	3	3	3	3
EASE OF TRANSITION	25										
OVERALL GAP TO CLOSE	10	1	1	9	9	9	9	2	4	1	3
COST TO GOVERNMENT	8	1	1	4	3	4	3	5	4	5	4
LEGAL STEPS INVOLVED	7	2	2	7	7	7	7	2	2	2	2
TOTAL SCORE	100	48	51	65	68	68	69	51	53	49	51

TABLE 7.4.E

COMPARISON OF OPTIONS FOR IMPROVED SUSTAINABILITY OF WATER AND WASTEWATER SYSTEMS IN SECONDARY CITIES

LUXOR

FACTORS	WEIGHT	OPTION 1 SEPARATE A–i CITY	OPTION 1 SEPARATE A–ii REG.	OPTION 2 SEPARATE A–i CITY	OPTION 2 SEPARATE A–ii REG.	OPTION 3 SEPARATE A–i CITY	OPTION 3 SEPARATE A–ii REG.
ABILITY TO MOBILIZE RESOURCES	20						
AUTONOMY	10	3	N/A	4	N/A	10	N/A
EFFICIENCY	10	4		6		8	
CUSTOMERS FINANCIAL COST	10	8		6		4	
QUALITY OF SERVICE	10	4		6		8	
POLITICAL ACCEPTABILITY	20						
EQUALITY ISSUES	10	8		6		2	
OVERSIGHT	10	8		6		2	
LEADERSHIP COMMITMENT	15						
UTILITY MANAGERS	5	3		4		1	
LOCAL OFFICIALS	10	7		5		2	
EASE OF TRANSITION	25						
OVERALL GAP TO CLOSE	10	6		5		8	
COST TO GOVERNMENT	8	6		4		1	
LEGAL STEPS INVOLVED	7	6		4		2	
TOTAL SCORE	100	63	0	56	0	48	0

TABLE 7.4.F

COMPARISON OF OPTIONS FOR IMPROVED SUSTAINABILITY OF WATER AND WASTEWATER SYSTEMS IN SECONDARY CITIES

ARMANT

FACTORS	WEIGHT	OPTION 1 SEPAR. A–ii REG	OPTION 1 COMBI. B–ii REG	OPTION 2 SEPAR. A–ii REG	OPTION 2 COMBI. B - ii REG	OPTION 3 SEPAR. A–ii REG	OPTION 3 COMBI. B–ii REG
ABILITY TO MOBILIZE RESOURCES	20						
AUTONOMY	10	4	4	5	6	8	8
EFFICIENCY	10	2	3	5	6	8	8
CUSTOMERS FINANCIAL COST	10	7	8	6	7	3	4
QUALITY OF SERVICE	10	2	3	5	6	8	8
POLITICAL ACCEPTABILITY	20						
EQUALITY ISSUES	10	7	7	3	4	1	1
OVERSIGHT	10	7	7	6	6	2	2
LEADERSHIP COMMITMENT	15						
UTILITY MANAGERS	5	3	3	4	4	1	1
LOCAL OFFICIALS	10	7	7	7	8	1	1
EASE OF TRANSITION	25						
OVERALL GAP TO CLOSE	10	6	6	5	5	7	7
COST TO GOVERNMENT	8	6	7	6	5	3	2
LEGAL STEPS INVOLVED	7	5	5	3	3	2	2
TOTAL SCORE	100	56	60	55	60	44	44

TABLE 7.4.G

COMPARISON OF OPTIONS FOR IMPROVED SUSTAINABILITY OF WATER AND WASTEWATER SYSTEMS IN SECONDARY CITIES

ISNA		OPTION 1		OPTION 2		OPTION 3	
FACTORS	WEIGHT	SEPAR. A–ii REG.	COMBI. B–ii REG.	SEPAR. A–ii REG.	COMBI. B–ii REG.	SEPAR. A–ii REG.	COMBI. B–ii REG.
ABILITY TO MOBILIZE RESOURCES	20						
AUTONOMY	10	4	4	5	6	8	8
EFFICIENCY	10	2	3	5	6	8	8
CUSTOMERS FINANCIAL COST	10	7	8	6	7	3	4
QUALITY OF SERVICE	10	2	3	5	6	8	8
POLITICAL ACCEPTABILITY	20						
EQUALITY ISSUES	10	7	7	3	4	1	1
OVERSIGHT	10	7	7	6	6	2	2
LEADERSHIP COMMITMENT	15						
UTILITY MANAGERS	5	3	3	4	4	1	1
LOCAL OFFICIALS	10	7	7	7	8	1	1
EASE OF TRANSITION	25						
OVERALL GAP TO CLOSE	10	7	7	6	6	7	7
COST TO GOVERNMENT	8	7	6	6	5	3	2
LEGAL STEPS INVOLVED	7	5	5	3	3	2	2
TOTAL SCORE	100	58	60	56	61	44	44

The two most important areas of control of these entities will have to be the degree of their freedom to set and retain revenue and to manage their staffing needs. These will form the heart of the ability to have a sustainable utility at the end of the project.

7.8.2 Operation and Maintenance Cost Recovery

The analysis has attempted to estimate the cost of proper operation and maintenance of the facilities and has attempted to show how much revenues are required to cover these costs. An important element in this process will be to confirm and modify the estimates operation and maintenance costs as greater experience os obtained. During project design and implementation the numbers will be revised to reflect better estimates of the costs. It is also proposed that a detailed study of the O&M costs be carried out during project implementation. The financial model developed under this study however, will easily be able to reflect these changes.

USAID and the GOE will have to agree on the acceptable mechanisms for raising the required revenues and the bylaws of the entity will have to be drafted to allow for it to play significant role in the setting of the tariffs in addition of retaining of revenues. This will also be part of the negotiation process and the agreements will have to be reflected in the action plans for sustainability.

7.8.3 Staffing Strategies

A major element of O&M costs is labor cost, which is a function of staffing, productivity and salary. Since the water and wastewater organizations in most of the locations have staff sizes that do not reflect their responsibilities, the staffing and personnel policies of the entities is of critical importance to the goal of achieving sustainability.

The current study has developed a strategy that relies on a combination of a hiring freeze, transfers and retraining, as well as a substantial increase in the base salaries. This strategy was outlined in chapter 5 of the report and is fully reflected in the financial analysis of each location. Similar to the O&M cost model the salary and wages schedule model can accommodate any changes that may come about as a result of negotiations between USAID and the GOE or on the availability of more accurate data.

The entities established under the project will require the degree of flexibility suggested in this report to be incorporated in their bylaws. This is going to be a difficult issue for negotiation. A detailed action plan and strategy will have to be developed under the project for this element of sustainability. The proposed strategy however, is feasible and the estimated numbers required to properly staff the utilities did not, for many locations, show major permanent long term reduction in staffing.

7.9 Technical Assistance and Training

7.9.1 Role of Technical assistance

The analysis of the constraints and recommended actions highlights several areas where

TABLE 7.4.H

COMPARISON OF OPTIONS FOR IMPROVED SUSTAINABILITY OF WATER AND WASTEWATER SYSTEMS IN SECONDARY CITIES

ASWAN GROUP

FACTORS	WEIGHT	OPTION 1 SEPAR. A–ii REG	OPTION 1 COMBI. B–ii REG	OPTION 2 SEPAR. A–ii REG.	OPTION 2 COMBI. B–ii REG.	OPTION 3 SEPAR. A–ii REG.	OPTION 3 COMBI. B–ii REG.
ABILITY TO MOBILIZE RESOURCES	20						
AUTONOMY	10	4	4	5	6	8	8
EFFICIENCY	10	2	3	5	6	8	8
CUSTOMERS FINANCIAL COST	10	7	8	6	7	3	4
QUALITY OF SERVICE	10	2	3	5	6	8	8
POLITICAL ACCEPTABILITY	20						
EQUALITY ISSUES	10	7	7	3	4	1	1
OVERSIGHT	10	7	7	6	6	2	2
LEADERSHIP COMMITMENT	15						
UTILITY MANAGERS	5	3	3	4	4	1	1
LOCAL OFFICIALS	10	7	7	7	8	1	1
EASE OF TRANSITION	25						
OVERALL GAP TO CLOSE	10	8	8	7	7	7	7
COST TO GOVERNMENT	8	7	6	6	5	2	2
LEGAL STEPS INVOLVED	7	5	5	3	3	2	2
TOTAL SCORE	100	59	61	57	62	43	44

technical assistance and training have a role to play in the successful implementation of the project. These include:

- providing background data and studies, action plans and advice on the administrative and institutional aspects of the provision of service,
- developing the required management systems and procedures to efficiently operate the new utilities, and
- identifying and conducting needed operation and maintenance training for the staff managing the old and new systems.

7.9.2 Training

The study did not evaluate the detailed training needs in every location. However, estimates were made of the quality and numbers of staff required to properly operate both the existing and the expanded systems in each location. These numbers were used to estimate the level of both O&M training as well commercial training in each location.

7.9.3 Technical Assistance and Training

The cost of technical assistance and training was estimated and was included as part of the total project cost. This was because the objective of creating sustainability will require expanding the activities of the current organizations especially in the commercial and financial domain.

The institutional support costs are assumed to cover the training and equipment needed to operate the existing physical systems and to organize the commercial sections required to support the water and wastewater activities in each of these locations.

A modular approach was utilized in estimating the costs of technical assistance.

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Chapter 8

SOCIAL SOUNDNESS ANALYSIS

8.1 Introduction

The urban scene in Egypt, as in many Arab countries, is dominated by 'Primate Cities'. Cairo, the capital, and Alexandria, the principal port, dominate both the hinterland and other smaller urban settlements. This 'urban domination' is not only reflected in population size, but also in the range and quality of services available to the residents of what have become known as 'Secondary Cities'. The distribution of both population and services among Primate and Secondary Cities is uneven. The perpetuation of poverty in Secondary Cities, and the deterioration of the quality of life in Primate Cities, are but a few of the problems created by this urban imbalance. The implications for the national economy and security have proved significant enough to warrant the attention of the government and development agencies who through various infrastructure and community development projects, are attempting to restore some balance to Egypt's urban scene.

8.2 The Secondary Cities Project

The purpose of the proposed project as stated in the project document, is to "expand and develop sustainable water and waste water treatment facilities in selected urban population centers of Egypt". The objective of such a project is to improve the quality of life of the residents in six selected Secondary Cities. The government of Egypt (GOE) through its National Organization for Potable Water and Sanitary Drainage (NOPSWAD) has identified two hundred Secondary Cities in need of improved water and waste water facilities. The proposed project has identified eight sites, six of which will be selected as pilots for more generalized implementation.

The eight sites or cities have been grouped among three zones: The Nile Delta (Mansoura, Mahalla El Kobra). Upper Egypt (Luxor, Kom Ombo/Nasr City/Darawo, Isna/Armant). The Sinai Red Sea (Nuweiba, Sharm Al Sheikh, Hurghada). Due to the fact that project formulation did not provide for detailed investigation of the social characteristics of each of these cities, the present analysis is a general one based on the above-mentioned grouping, and mostly relying on available statistical information and secondary data.

8.3 General Approach

Successful projects are those that are designed based on the recognition that appropriate technology is that which takes both the physical and human/social environment into consideration. It is known that safe water and sanitation are vital to the health of people everywhere; nevertheless, it is the awareness of people in terms of both knowledge and practices which will determine the degree to which they will recognize the value of the project and therefore benefit from it. Project design and approach to implementation should make

allowances not only for physical and environmental variations, but also for cultural and socio-economic variations. It is unthinkable, for example, to expect that the level of awareness of health or sanitation issues in a community where the level of illiteracy is high and where exposure to different ideas and practices is minimal, to be the same as that of a more literate community that is more exposed to external influences. Moreover, it is unrealistic to expect from all communities, even depressed ones in dire need of water and sanitation facilities, a similar perception and consequent ranking of needs. For the proposed project to be successful, it must be linked with people's ranking of priority needs.

Another important element contributing to project success is community participation. Although desirable in itself because of its empowerment effect, community participation is recognized as vital to project sustainability and consequent success. It is true, however, that not all projects require or are dependent on the same level of community participation. Nevertheless, it has been found that the benefits of water and sanitation projects, especially in countries like Egypt where the government lacks the resources to install, maintain or upgrade water facilities, are optimized when the community is involved. However, for community participation to be effective, it must be based on the understanding that it would not be realistic to expect the same level or type of contribution from all communities. For the proposed project to succeed, it must focus on tapping accessible or disposable rather than available resources; accessibility in this context meaning willingness to contribute. The Secondary Cities project is not seeking community participation in the design or construction phase; however, households will have to finance the hook-up phase. In this case, willingness to pay is determined by ability to pay, which entails more than income, for it includes what the household actually spends, or expects to spend in the near future, on perceived priority needs. Willingness to pay is also determined by what is spent on the service actually provided, the problems with this service, expectations concerning the improvements being proposed, and income expectations for the near future. Moreover, community mobilization entails more than an assessment of available or accessible resources. Effective community mobilization is dependent on an understanding of community dynamics. Although the project is gender neutral, it recognizes that on the household level, women are the prime consumers of water and producers of waste water. Project messages should therefore target women, and appropriate communication channels should be identified. Such channels differ from one community to another; in certain cases it can be the husband or school children, while in other cases it could be the midwife or an existing NGO. All possible channels have to tapped through a comprehensive communication strategy.

Finally, community mobilization is a time-consuming, complex, and very volatile process which is often discouraged or curtailed by bureaucratic blockages. The proposed project as formulated recognizes that its success is contingent on government support and commitment to policy reform in the water/waste water sector, and that an understanding of the local institutional set-up related to that sector is necessary; hence, its framework for partnership is bilateral than multi-lateral, where interaction is seen as being mainly between the project staff and the formal sector. A more comprehensive approach involving the informal sector and the community would definitely promote project success. The community should be perceived as a catalytic agent rather than a passive recipient of project benefits.

8.4 Overview of the Candidate Cities

A poverty ranking based on the four socio-economic indicators of unemployment, female, illiteracy, infant mortality, and household access to piped water, indicates that in general the Nile Delta governorates are faring better than the Upper Egypt governorates. The cities of both Mansoura and Mahalla are densely populated due to thriving commercial activities in the former, and industrial activities in the latter. According to the 1986 census, over 95% of households in the urban centers of Mansoura and Mahalla have access to piped water. However, the actual water and waste water facilities are in need of upgrading. Enlisting the support of private businesses in both Mansoura and Mahalla could be a factor promoting project success. Moreover, the existence of a university in Mansoura could be capitalized upon. The university facilities (labs, equipment) could be used to support those available in the water and waste water sector. Technical assistance at the local level is also more accessible. Furthermore, the very existence of a university is an added incentive for the government to expedite the policy and administrative reforms needed in the water/waste water sector. In addition, a university increases the surrounding community's level of exposure to different ideas and practices, thereby enhancing its adaptive capacity. This adaptive potential means that behavior and practices which are detrimental to health and sanitation can be changed more rapidly in these areas than in other, less exposed areas.

Furthermore, both Mansoura and Mahalla have an extensive pool of technical labor that can be relied upon for the operation and maintenance (O & M) of the household hook-ups. Responsibility for negotiating and contracting to private entrepreneurs for O & M of these hook-ups could be assumed by a Community Development Association (CDA) in both these areas.

One of the main advantages of working with CDA's is that they are generally sensitive to local needs and priorities, and are better equipped to communicate effectively with local residents to harness their support for a project such as the one intended.

Finally, both Mansoura and Mahalla have renowned families of notables that are actively involved in the politics and/or economic life of the community. These families have residences in the city in which they spend a considerable part of their time. They still exert substantial influence on the life of the community, patronizing many of its activities, and contributing to its well-being by providing employment over the years to whole families. Enlisting the support of these families should be considered, as they could facilitate communication both with the local authorities and with the community at large.

In the case of Upper Egypt, the poverty ranking indicates that its governorates are less privileged than those of Lower Egypt. Two of the identified project locations, Luxor and Isna/Armant are found in Qena, one of the poorest governorates in Egypt. Household access to piped water is more limited in the candidate cities of Qena than in those of the governorate of Aswan. The breakdown indicates that while 70% of households in Luxor city have access to piped water, only 60% of the households in Isna and 36% of the households in Armant are serviced. In Nasr City, over 90% of the households have access to piped water; and approximately 80% of

household in Komombo and Darawo are serviced. It is the waste water system which is inadequate or even non-existent most of these cities, Luxor excepted.

An overview of the Upper Egypt grouping of candidate cities reveals that several of these, some more extensively than others, are involved in tourism or tourism-related industries. In these cities, as opposed to other, more isolated Upper Egyptian cities, the level of exposure to different ideas and practices is relatively high, thereby enhancing the community's adaptive potential. Moreover, the existence in Luxor of several hotels and tourist resorts has helped develop a certain amount of technical expertise which could be tapped for O & M operations. The support of the owners of these hotels and resorts should be enlisted, as they represent pressure groups which could prevail upon the government to expedite needed reforms.

Willingness to pay for household connections should not constitute a problem in the cities where the tourist industry is thriving. However, inappropriate timing could definitely detract from project success; the recent attacks on tourists having greatly affected the flow of tourism to Egypt, peoples' willingness to accept the incurring of new expenditures is bound to decrease. A saving grace, however, is that the candidate cities in the Upper Egypt zone that work in industries related to tourism are also involved in other commercial or agricultural activities. The case of such cities where the economy is somewhat diversified is very different from the cities of the Sinai/Red Sea zone which are becoming almost totally dependent on the tourist industry.

In the Upper Egyptian cities of Darawo, Nasr, and Armant, the entry points to enlisting community support are less numerous than in the more active, more exposed cities. Moreover, awareness of health and sanitation issues is probably limited. Special efforts will have to be exerted in identifying and enlisting the support of both formal and informal leaders, who can constitute entry points to the community. Access to women is more restricted by local values than in the more exposed communities; however, in view of women's vital role in water and sanitation issues at the household level, difficult access should not deter the project team from enlisting their support. Moreover, due consideration should be given to identifying the appropriate channels of communicating with women without upsetting community values and customs.

The cities of the Sinai/Red Sea zone are small, but growing; and the water and waste water systems require upgrading in order to accommodate the growing tourist industry and construction boom that these areas are witnessing. Sharm el Sheikh is a case in point. Located at the southern tip of the South Sinai governorate, it is a major tourist resort. Its fine weather, good beaches and abundant sea life have encouraged a wide range of water activities, such as scuba diving, snorkeling, swimming, fishing, etc. Sharm el Sheikh also provides an ideal setting for therapeutic tourism because of its tranquillity and low humidity level. The attraction of the area is not restricted to international tourism, but it also extends to local tourism; in addition, Egyptians are increasingly eager to acquire property in Red Sea resorts such as Hurghada, Nuweiba and Sharm el Sheikh, which means that the private desalination plants installed by hotels are only a temporary solution to the deficiency of the water system. Both the water and waste water systems need upgrading to accommodate the needs of both the actual resident and

the transient population of a city such as Sharm el Sheikh, let alone the expected future increase in demand. Moreover, the service expectations of Egyptian investors are generally higher than those of transient tourists because their investment in the area is higher, which requires that problems related to utilities be resolved. The fact that local investment, and local tourism, have come to constitute a significant and considerably less volatile portion of the area's quota of tourism, in itself puts pressure on local authorities to speed up needed reforms in the water and waste water sectors, a situation which should be capitalized upon. Finally, the facts mentioned previously in the case of Upper Egyptian cities involved in tourism apply even more thoroughly to Sinai/Red Sea zone cities, as their economies - with the exception of Nuweiba - rely almost exclusively on tourism. However, an important difference between the Upper Egyptian and Sinai/Red Sea zones is that the latter are, for the most part, relatively new communities that are more flexible than those of Upper Egypt. Enlisting support for the project should not be a problem, unless the recent setback affecting tourism is perceived as more than a transient situation, which could affect both local and international tourism.

8.5 Conclusion

The installation or upgrading of water and sanitation facilities will have a significant impact on people's lives only if they recognize the value of these facilities and learn how to use them. There are significant differences in terms of literacy, awareness and economic status between urban and rural regions; and while the Secondary Cities project is to all intents and purposes an urban project, the project sites are located in rural governorates. Project staff should therefore be sensitive to the fact that the communities living in these target cities are highly illiterate and are often set in their ways. For any change in behaviour to be effected, an understanding of the limits - and potentialities - of community resources, and of the rationale behind community decisions, must be attained. Only if the project is perceived by the community as a means of furthering its well-being will it be able to achieve its full range of objectives. The perception of project benefits will undoubtedly be enhanced if the project is linked to other interventions targeting the community's body of knowledge concerning health practices, sanitation and their effect on overall productivity. Communication strategies should be flexible and appropriate to the community's socio-economic status and value systems.

Finally, the presence of the Social Fund for Development (SFD) in most governorate should be capitalized upon. Attempts should be made to link the Secondary Cities project with relevant projects or training programs sponsored by the SFD.

CHAPTER 9

ANALYSIS CONSOLIDATION

9.1 Introduction

The information and data gathered along with the technical, financial, economic, institutional, and administrative analyses are consolidated in the following sections. The consolidation has been structured to provide data and results by location and by the type of intervention.

9.2 Technical Consolidation

Basic project design information for the eight locations selected for financial, economic, institutional, and administrative analyses is included in Table 9.1. This includes information regarding the estimated existing and future population (2010), existing and future water production information, and existing and projected wastewater flows.

Based on the projected needs for improved water and wastewater services, the proposed interventions have been conceptually developed and preliminary costs estimates prepared. The estimated total cost for the water supply interventions range from more than $40 million (equivalent U.S.dollars and Egyptian pounds) in Mansoura and Mahalla El Kobra, down to approximately $10 million in Nuweiba. The proposed wastewater projects range in cost from more than $40 million in Luxor down to $6 million in Nuweiba and Sharm El Sheikh. The summary of the estimated total project costs by location and intervention is shown in Table 9.2. The costs are shown in both Egyptian pounds and in U.S. dollars. The total for all projects is approximately $493 million.

The components of the total project cost include: construction, contingencies, construction management, supervision, design, and institutional support. A summary of the cost for these components by type of intervention is provided in Table 9.3.

9.3 Financial Consolidation

The financial analysis consisted of a series of schedules, each forming the bases of, or providing input to the successive schedule. The output of the spreadsheet model is comprised of the following schedules for the projects in each location:

- Capital investment summary
- Demand forecast
- Staffing level analysis

TABLE 9.1 – SUMMARY OF EXISTING & PROJECTED POPULATION, WATER PRODUCTION AND WASTEWATER FLOWS

LOCATION	POPULATION		WATER PRODUCTION		WASTEWATER FLOWS	
	1994	2010	1994 m3/day	2010 m3/day	1994 m3/day	2010 m3/day
*MANSOURA**	478,095	715,506	54,000 R	182,407	24,800	103,940
MAHALLA EL KOBRA	422,215	664,097	59,616 R	183,250	35,885	114,900
NUWEIBA	11,715	21,025	2,670	8,442	984	5,558
SHARM EL SHEIKH	6,770	11,376	3,615	10,320	2,365	6,933
LUXOR	152,100	243,227	44,928	69,505	11,183	49,158
ARMANT	66,265	105,966	8,640	20,431	0	14,367
ISNA	52,235	83,530	8,640 R	30,706 R	0	12,574
ASWAN GROUP	104,600	161,823	25,400 R	76,029 R	0	23,027
TOTALS	1,293,995	2,006,550	207,509	581,090	75,217	330,457

* *Includes Talkha City.*
R *Regional Water Supply System.*

TABLE 9.2 – SUMMARY OF ESTIMATED TOTAL PROJECT COSTS (BY LOCATION)

LOCATION	INTERVENTION	ESTIMATED COST USING EGYPTIAN CONTRACTORS L.E.	ESTIMATED COST USING U.S. AND EGYPTIAN CONTRACTORS					
			EXPRESSED IN L.E. (MILLION)			EXPRESSED IN U.S.$ (MILLIONS)		
			FOREIGN	LOCAL	TOTAL	FOREIGN	LOCAL	TOTAL
MANSOURA	Water	174.7	209.7	33.3	243.0	62.4	9.9	72.3
	Wastewater	102.0	80.5	45.1	125.6	24.0	13.4	37.4
	Sub–total	276.7	290.2	78.4	368.6	86.4	23.3	109.7
MAHALLA	Water	173.4	231.6	18.4	250.0	68.9	5.5	74.4
	Wastewater	88.4	92.5	27.3	119.8	27.5	8.1	35.7
	Sub–total	261.8	324.1	45.7	369.8	96.5	13.6	110.1
NUWEIBA	Water	27.2	21.9	12.4	34.3	6.5	3.7	10.2
	Wastewater	20.4	4.7	16.8	21.5	1.4	5.0	6.4
	Sub–total	47.6	26.6	29.2	55.8	7.9	8.7	16.6
SHARM EL SHEIKH	Water	83.3	96.7	19.8	116.5	28.8	5.9	34.7
	Wastewater	20.0	6.2	15.3	21.5	1.8	4.6	6.4
	Sub–total	103.3	102.9	35.1	138.0	30.6	10.4	41.1
LUXOR	Water	44.8	41.0	16.0	57.0	12.2	4.8	17.0
	Wastewater	106.6	117.8	27.0	144.8	35.1	8.0	43.1
	Sub–total	151.4	158.8	43.0	201.8	47.3	12.8	60.1
ARMANT	Water	52.0	58.6	11.9	70.5	17.4	3.5	21.0
	Wastewater	55.2	11.2	45.0	56.2	3.3	13.4	16.7
	Sub–total	107.2	69.8	56.9	126.7	20.8	16.9	37.7
ISNA	Water	57.1	64.1	13.3	77.4	19.1	4.0	23.0
	Wastewater	50.1	12.7	38.3	51.0	3.8	11.4	15.2
	Sub–total	107.2	76.8	51.6	128.4	22.9	15.4	38.2
ASWAN GROUP	Water	96.7	72.1	44.2	116.3	21.5	13.2	34.6
	Wastewater	146.9	30.8	120.0	150.8	9.2	35.7	44.9
	Sub–total	243.6	102.9	164.2	267.1	30.6	48.9	79.5
TOTALS	Water	709.2	795.7	169.3	965.0	236.8	50.4	287.2
	Wastewater	589.6	356.4	334.8	691.2	106.1	99.6	205.7
	ALL PROJECTS	L.E. 1,298.8	L.E. 1,152.1	L.E. 504.1	L.E. 1,656.2	$342.9	$150.0	$492.9

TABLE 9.3 – COMBINED PROJECT COSTS UNDER VARIOUS CONTRACTOR ALTERNATIVES

CONSOLIDATION

COSTS EXPRESSED IN MILLIONS

	LOCAL CONTRACTORS ONLY	COST USING U.S. & LOCAL CONTRACTORS					
		EXPRESSED IN L.E.			EXPRESSED IN US$		
SECTOR: POTABLE WATER		FOREIGN	LOCAL	TOTAL	FOREIGN	LOCAL	TOTAL
Total Capital Construction	503.9	620.2	116.1	736.3	184.6	34.6	219.1
Contingency (10%)	50.4	62.0	11.6	73.6	18.5	3.5	21.9
Construction Management (3%)	16.6	11.6	5.0	16.6	3.5	1.5	4.9
Supervision (4%)	22.2	11.1	11.1	22.2	3.3	3.3	6.6
Design (11%)	61.0	42.7	18.3	61.0	12.7	5.4	18.1
Institutional Support	55.2	48.0	7.2	55.2	14.3	2.1	16.4
Total Project Expenditure	709.2	795.6	169.2	964.9	236.8	50.4	287.2
SECTOR: WASTEWATER							
Total Capital Construction	421.3	240.5	273.4	513.9	71.6	81.4	152.9
Contingency (10%)	42.1	24.1	27.3	51.4	7.2	8.1	15.3
Construction Management (3%)	13.9	9.7	4.2	13.9	2.9	1.2	4.1
Supervision (4%)	18.5	9.3	9.3	18.5	2.8	2.8	5.5
Design (11%)	51.0	35.7	15.3	51.0	10.6	4.6	15.2
Institutional Support	42.7	37.1	5.6	42.7	11.1	1.7	12.7
Total Project Expenditure	589.5	356.4	335.0	691.4	106.1	99.7	205.8
Combined Project Expenditure	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

- Projected salaries and wages
- O&M unit cost calculations
- Cost of production
- Tariff analysis

A summary of the unit production cost for water supply and processing cost of wastewater in all of the eight locations is included in Table 9.4. The unit production cost in the year 2010 for water varies from 46 Pt/m3 in Luxor to 86 Pt/m3 in Isna. The unit cost for wastewater in 2010 averages approximate Pt/m3.

In a similar manner, a summary of the projected water and wastewater tariffs for all eight locations is presented in Table 9.5.

The tariff levels as indicated appear reasonable for all of the proposed projects. A family of four using from 70 to 100 lpcd would be charged for approximately 9 to 18 cubic meters per month for water supply, and about 7.5 to 15 cubic meters per month for wastewater. The water and wastewater charges at various tariff levels would be as follows:

- at Pt15/cubic meter, the total bill would range from LE2.5 to LE5.0 per month
- at Pt30/cubic meter, the [illegible]l would range from LE5.0 to LE10.0 per month

These do not appear unreasonable char[illegible]d the range of Pt15 to Pt30 per cubic meter covers most of the proposed facilities.

9.4 Economic Consolidation

A preliminary economic analysis of the eight selected locations has been carried out to trace the contribution to the Egyptian society and to assess their economic viability.

The proposed interventions will enable the utilities to provide benefits through enhancement of both water and wastewater systems. The measurable major water system benefits are expected to come from greater access to water by households and businesses that already are served, higher quality water services, and lower cost production of water services. Only limited benefits will result as extensions of water distribution systems connect new households to water, since most households are already connected to system. The primary benefits from wastewater system enhancements will come from more households and businesses being connected to wastewater system.

The following information was developed in order to quantify the economic benefits and to calculate the economic viability at each location as measured in terms of economic rate of return,

TABLE 9.4 – SUMMARY OF TOTAL PRODUCTION COSTS – WATER & WASTEWATER

LOCATION	WATER COST OF PRODUCTION (PT/m3)				WASTEWATER COST OF PROCESSING (PT/m3)			
	1995	2000	2005	2010	1995	2000	2005	2010
MANSOURA	15.16	17.28	12.62	12.27	42.32	62.15	29.16	28.22
MAHALLA EL KOBRA	8.91	10.55	15.15	14.99	22.34	27.93	16.50	15.43
NUWEIBA	285.00	301.00	27.00	20.00	9.00	7.00	32.00	23.00
SHARM EL SHEIKH	34.00	49.00	46.00	38.00	15.00	40.00	33.00	26.00
LUXOR	26.08	31.56	30.33	45.94	29.29	23.77	14.78	32.63
ARMANT	11.20	14.40	18.50	18.10	0.00	0.00	13.10	13.20
ISNA	15.00	17.00	25.00	24.00	0.00	7.00	73.00	86.00
ASWAN GROUP	22.68	18.51	15.27	14.42	0.00	0.00	28.00	36.88

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TABLE 9.6 – SUMMARY OF ECONOMIC VIABILITY INDICATORS

LOCATION	INTERVENTION	ECONOMIC RATE OF RETURN (PERCENT)	NET PRESENT VALUE (L.E. 000)	BENEFIT/ COST RATIO	PRESENT VALUE OF PROJECT*
MANSOURA	Water	13.9	135,005	8.6	Positive
	Wastewater	10.8	40,082	3.2	Positive
	Combined	12.8	175,087	5.4	Positive
MAHALLA	Water	11.6	86,230	3.8	Positive
	Wastewater	13.6	65,503	3.4	Positive
	Combined	12.3	151,733	5.2	Positive
NUWEIBA	Water	26.2	78,865	37.2	Positive
	Wastewater	(14.1)	(15,512)	1.5	Positive
	Combined	18.0	63,353	20.3	Positive
SHARM EL SHEIKH	Water	17.9	111,083	30.9	Positive
	Wastewater	(30.0)	(18,197)	0.2	Positive
	Combined	15.0	92,886	19.3	Positive
LUXOR	Water	15.3	47,806	1.8	Positive
	Wastewater	1.5	(34,525)	2.8	Positive
	Combined	7.5	(13,281)	4.4	Positive
ARMANT	Water	5.8	(2,954)	7.5	Positive
	Wastewater	3.2	(10,874)	12.5	Positive
	Combined	4.6	(13,828)	9.0	Positive
ISNA	Water	(1.2)	(23,524)	2.7	Positive
	Wastewater	(0.6)	(20,079)	6.3	Positive
	Combined	(0.9)	(43,603)	3.6	Positive
ASWAN GROUP	Water	(1.0)	(50,709)	3.1	Positive
	Wastewater	(9.9)	(112,766)	2.7	Positive
	Combined	(5.2)	163,475	2.9	Positive

* The present economic value of the project is positive if the benefits cover the costs of operation and maintenance.

- Comparison of options and selection of preferred option (See Table 7.4)
- Recommended actions to achieve sustainability (See Table 7.5)

For Mansoura and Mahalla El Kobra, the preferred option is for governmental authorities providing separate water and wastewater services on a regional basis.

For Luxor, the preferred option is a governmental authority providing water and wastewater services on a municipal basis.

For Armant, Isna, and the Aswan Group the preferred option would be a combined authority for water and wastewater on a regional basis.

For Nuweiba, a combined water and wastewater authority on a city basis; and for Sharm El Sheikh, a combined water and wastewater authority on a regional basis; and providing for contract operations and maintenance in both locations.

9.6 Assessment of Potential for Long Term Sustainability

9.6.1 Introduction

As noted in the Project Identification Document(PID), the Secondary Cities project will require specified commitments from the GOE and/or the local government agency before USAID commits funds for each subsequent stage of work. A precondition to the Secondary Cities project calls for the GOE to issue a presidential decree authorizing the fiscal and administrative autonomy of its wastewater agency in Alexandria. The PID notes that the level and extent of policy reform in the context of conditions and covenants will be examined during project development. Conditionality will be based on progress toward implementation of policy reforms and physical construction progress.

A suggested scoring system has been developed based on the assumption that a willingness to make the institutional changes has been confirmed by issuance of a presidential degree related to the Alexandria wastewater agency.

9.6.2 Evaluation Components

In order to enable an initial comparison to be made among the selected locations, the following primary measurements have been used: institutional arrangements, political acceptance, social acceptance, technical merit, environmental impact, and financial/economic considerations. A discussion of the criteria within each measurement is provided in the following sections.

Institutional Arrangements

Strength of Local Institution

net present value, and benefit/cost ratio:

- Financial capital cost
- Economic capital cost
- Time schedule for capital investment
- Schedule of O&M costs
- Schedule of projected benefits

Table 9.6 provides a summary of the economic viability indicators by location.

9.5 Institutional and Administrative Consolidation

The institutional and administrative analyses take into consideration the operation and maintenance requirements of the recommended interventions based on the existing administrative and institutional arrangements in each location.

The analysis defines the parameters of long term sustainability in terms of the characteristics of a well run, efficient, and effective utility able to set its tariffs and retain its revenues. It examines the existing administrative and institutional mechanisms in each location to identify the institutional gap between the actual conditions and the long term goal.

Various options are developed for the organization to provide water and wastewater services, and to achieve cost recover revenue retention, and control over resources. These options are compared based on their acceptability and likelihood to achieving institutional results and a recommended option is advanced for each location. The preferred option is reviewed in relation to the existing conditions. Technical, institutional, and policy constraints that may inhibit the realization of the sustainability goals are identified. Remedies for addressing these constraints are also suggested.

In performing the above analysis, the following schedules were developed to facilitate a step by step assessment of the existing condition, the identification of needs, and the selection of the preferred arrangements:

- Summary of existing arrangements (See Table 7.1)
- Assessment based on selected performance indicators (See Table 7.2)
- Four options for administrative arrangements to achieve long term sustainability (See Table 7.3)

TABLE 9.5 – SUMMARY OF PROJECTED TARIFFS (PE/m3)

EGYPT SECONDARY CITIES PROJECT	POTABLE WATER				WASTEWATER				COMBINED RATE				WASTE/POTABLE (%)			
CONSTANT PT	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010
Average Required Revenue Yield (PI/M3)																
Mansoura	16 85	19 20	14 03	13 83	37 81	52 43	31 84	29 17	54 45	71 62	45 87	42 80	223	273	227	214
Mahalla	9 90	11 72	16 83	16 66	17 29	22 76	18 14	17 10	27 18	34 48	34 97	33 76	175	194	108	103
Nuweiba	316 33	334 20	30 40	21 74	7 94	40 96	34 06	25 94	324 27	375 16	64 46	47 68	3	12	112	119
Sharm El Sheikh	37.44	54 24	50 81	42 20	13.14	35.42	35 44	29 03	50 59	89 67	86 25	71.22	35	65	70	69
Luxor	28 98	35 07	33 70	51 05	18 08	14 67	18 24	40 28	47 06	49.74	51 94	91 33	62	42	54	79
Armant	12 49	16 00	20 55	20 16	0 00	5 76	17 58	17 57	12 49	21 75	38 13	37 73	0	36	86	87
Isna	16 59	16 59	27 50	27 06	0 00	2 72	13 74	13 30	16 59	19 31	41 23	40 36	0	16	50	49
Kom Ombo Region	24 72	20 58	16 96	16 02	0 00	3 39	23 01	21 96	24 72	23 95	39 97	37 98	0	16	136	137

A key factor supporting the sustainability of water and sanitation activities is the strength of the responsible institutions and community groups. Experience indicates the overall project usually fails if the institutions charged with the responsibility are not given adequate authority. The scoring system for this report gives higher scores to projects where it is anticipated that greater support will be provided.

Ability for Responsible Managers

A project cannot be a successful without the leadership possessing adequate skills and recognizing how to effect the required operation and maintenance, financing, and the choice of technologies used. The technical skill levels presently demonstrated by the staff at a location is critical. If the staff already possess the necessary basic experience, the chances for success are greater and the training requirements are less severe. A location using an outside operations contractor, or in cases in which existing facilities are being poorly operated are considered to require the same level of development as new staff (although "unlearning" old practices may prove more difficult). Locations where staff demonstrate high levels of capability are rated higher than those with only a modest capability.

Administrative Acceptance

Central Government

Measurement of the acceptance of the GOE to undertake necessary institutional change has been previously linked to the issuance of a presidential degree. Administrative acceptance by currently involved ministries and authorities such as NOPWASD remains to be demonstrated and essentially the same score has been assigned to all locations.

Governorate and Local Authorities

Recognition and actions by the governor and local officials to undertake necessary institutional changes are major factors in achieving success of new water and wastewater projects. In some locations, officials have already taken action to effect administrative changes. For this item, highest levels of local initiative have been assigned the higher scores.

Social Acceptance

Cultural Acceptance

Water and sanitation systems that build upon culturally acceptable technologies already being used within the community or in the country have a much better chance of being adopted, fully utilized, and sustained. Radical approaches are often met with skepticism and a lack of enthusiasm. In order to select technologies based on perceived community needs planners must provide consumers with a clear understanding of the interventions being implemented. Those locations where community leaders have demonstrated the importance in projects being social

sound have been given the higher score.

Community Involvement

Since local operation and maintenance is often the key to sustainability and to the appropriateness of the technology selected, members of the community should be involved in making technical decisions. Convenience is often the most significant factor governing community interest in and the use of new facilities. As an example, it is often more important to most users to have a water supply nearby than to have clean water. Locations where community participation has been demonstrated in interventions in other sectors have been given a higher score.

Technical Merit

Appropriateness of Proposed Technology

In considering water and wastewater treatment interventions, the technical approach has been to select the most appropriate level of treatment using the most processes. These will afford the greatest chance for long-term reliable operations and will require the lowest level of institutional support. Efforts have been made to keep the level of treatment technology as simple as possible.to a minimum. Recommendations for the construction of new facilities have been treated as more complex than those based on the rehabilitation of existing facilities.

Recommendations for distribution and collection system improvements are based, as much as possible, on a low maintenance/easy operation approach. For a technology to be suitable for use in a particular location, it should be conceptually and physically within the capabilities of those responsible for the operation and repair. Interventions which offer the simplest technology have been given the higher score.

Ability to Obtain Quality of Design and Construction

In Egypt, poor engineering practices and low-quality construction are more common problems than overly complicated technologies. Many systems are poorly, and sometimes incorrectly designed, reflecting fundamental misunderstandings of basic engineering principles. In part, this is the caused by a lack practical skills and experience. On the construction side, failure to build according to design specifications, poor quality materials, and inadequate supervision are commonplace. Those locations where the local authorities have demonstrated the greater interest in upgrading the level of design and construction, and have an appreciation of the value to be achieved by the rehabilitation of existing facilities have been given the higher scores.

Environmental Impact

At each location, the recommended intervention(s) impact on the environment. Environmental issues which arise from technological factors (increased power consumption or use of dangerous

processes or chemicals), product disposal (sludges and wastewater effluent), and construction effects must be assessed against short and long term environmental impacts on marine and terrestrial ecosystems, air quality, public health, land use, transportation/traffic, antiquities, and local economics. In this assessment, each of these topics (and the level of mitigation) is assumed to be of equal importance. For a particular location, interventions which generally represent the lowest overall negative environmental impact have been given the higher score.

Financial and Economic Considerations

Ability to Recover Recurrent Costs

The capital costs of the proposed facilities will be a major factor in determining the number and size of interventions that can be undertaken under the secondary cities project. The assessment used in this comparison is based on the principle that the utility achieve 100 percent cost recovery for recurrent costs. Those locations that demonstrate a greater ability to achieve cost recovery are given the higher score.

Economic Rate of Return

Although the economic analysis showed that the economic rate of return ranged from approximately 12 to 18 percent in Mahalla El Kobra, Mansoura, Nuweiba, and Sharm El Sheikh, and down to a negative return in Isna and the Aswan Group, the present economic value of each project was adequate to cover the costs of operation and maintenance. Low scores were therefore applied to Isna, Aswan Group, and Armant, an intermediate score to Luxor, and the highest scores to Mansoura, Mahalla El Kobra, Nuweiba, and Sharm El Sheikh; based on the relative economic rate of return for each location.

The assessment of the potential for long term sustainability has been scored using the above measurements and is tabulated in Table 9.7. The ranking of projects and their scores is as follows:

Rank	LOCATION	SCORE
1	Mansoura	74
2	Mahalla El Kobra	73
3	Nuweiba	72
4	Luxor	71
5	Sharm El Sheikh	71
6	Aswan Group	53
7	Armant	51
8	Isna	51

TABLE 9.7 – EVALUATION OF PROPOSED SECONDARY CITIES LOCATIONS

MEASUREMENT	POINTS	MANSOURA	MAHALLA EL KOBRA	NUWEIBA	SHARM EL SHEIKH	LUXOR	ARMANT	ISNA	KOM OMBO/ DARAWO/ NASR CITY
1. INSTITUTIONAL ARRANGEMENTS	30	22	21	17	17	18	13	13	14
1 1 Strength of Local Institution	15	12	11	9	9	9	7	7	7
1 2 Ability of Responsible Manager	15	10	10	8	8	9	6	6	7
2. ADMINISTRATIVE ACCEPTANCE	20	15	15	16	15	16	10	10	11
2 1 GOE (NOPWASD, MOH, MLA)	10	5	5	6	6	6	5	5	5
2 2 Governorate and Local	10	10	10	10	9	10	5	5	6
3. SOCIAL ACCEPTANCE	10	7	7	7	7	7	5	5	5
3 1 Cultural Acceptance	5	4	4	4	4	4	3	3	3
3 2 Community Involvement	5	3	3	3	3	3	2	2	2
4 TECHNICAL MERIT	15	11	11	11	11	11	9	9	9
4 1 Appropriateness	10	7	7	7	7	7	6	6	6
4 2 Ability to Obtain Quality Design and Construction	5	4	4	4	4	4	3	3	3
5 ENVIRONMENTAL IMPACT	10	7	7	8	8	8	8	8	8
6. FINANCIAL/ECONOMIC CONSIDERATIONS	15	12	12	12	12	11	8	8	8
6 1 Recover Recurring Costs	10	8	8	8	8	8	4	4	4
6 2 Economic Rate of Return	5	4	4	4	4	3	2	2	2
TOTAL POINTS	100 100	74	73	72	71	71	51	51	55
RANK		1	2	3/4	5	3/4	7/8	7/8	6

9.7 Options for Implementation

The estimated project budget for the secondary cities totals US$ 200 million, excluding GOE contributions for land, buildings, and other resources. Based on the relative ranking of the projects as assessed in Section 9.6 various options for selection of the recommended projects to be included in the project paper were considered.

Option A would include all eight locations on the assumption that there was no limitation on the amount of funding available. The estimated total costs of the project would be $493 million, approximately 2.5 times greater than the proposed budget.

Option B would include the highest priority projects to the extent that approximately $200 million funding is available. This approach would provide improved water and wastewater services to the greatest number of people since Mansoura and Mahalla El Kobra are the two highest ranked locations. However, there would not be adequate funds for any other projects, or to address the issue of long term sustainability in other settings in Egypt.

Option C would be based on the exclusion of Mansoura and Mahalla El Kobra based on their relatively high costs, and would enable projects to proceed in most of the remaining locations. This approach would not address the sustainability issue in the delta where most of the people of Egypt live.

Option D would not have locations selected based on the relative sustainability ranking alone but would also be based on obtaining the most favorable geographic distribution and as close to the overall budget as possible. The option would include one or more locations in each setting and would have an approximate cost of $300 million. It would be the preferred option if adequate funding is available.

Option E is based on a reduced level of sewerage coverage in some locations, and might be considered if funding cannot be extended to cover the full interventions that have been developed. Reduced sewerage coverage would assume that some areas with water service would have sewerage services staged, and require the extended use of vaults and hauling for five to ten year. Reduced sewerage coverage would also result in lower water consumption in the areas not served by conventional sewer systems. The locations that could be considered for this reduced level of service would include the new areas of Luxor scheduled for sewerage, and the Aswan Group of cities. The estimated cost after this reduction, assuming that the initial sewerage intervention would be reduced by 50 percent, is approximately $250 million.

The location and costs of the projects included in the various options are shown in Table 9.8.

TABLE 9.8 – ESTIMATED COST FOR SELECTED OPTIONS

LOCATION	TOTAL COST ($ Million)				
	OPTIONS				
	A	B	C	D	E
1.Mansoura	109.7	109.7		109.7	109.7
2.Mahalla	110.1	110.1			
3.Nuweiba	16.6		16.6	16.6	16.6
4.Sharm	41.1		41.1	41.1	40.5
5.Luxor	60.1		60.1	60.1	31.0
6.Armant	37.7		37.7		
7.Isna	38.2		38.2		
8.Aswan Group	79.5		79.5	79.5	51.1
TOTAL COST	***$493.0***	***$219.8***	***$273.2***	***$307.0***	***$248.9***

Chapter 10

IMPLEMENTATION PROGRAM

10.1 Construction Contractors

10.1.1 Construction Contractor Competence

The proposed interventions will require a level of construction capabilities and experience of the potential contractors that is appropriate and has been demonstrated. This approach will maximize the likelihood that the work will be done properly, will be of high quality, and that the construction schedule will be maintained. While the construction documents will be written to require the best possible performance from each contractor, and provisions for resident engineering services during construction will promote high-quality construction. Expectations for acceptable work hinge on securing experienced, active contractors who understand how to get the work done, particularly in the installation of water and sewerage networks in areas of high population density and narrow streets.

There are many US contractors with demonstrated construction competence, experience, and familiarity with working conditions in Egypt, who would be capable of executing the construction work. However, the costs for construction performed by US contractors are, almost with out exception, significantly higher than similar types of work performed by local contractors. Use of foreign labor, importation of construction plant and support, and USAID source and origin requirements all contribute to the cost differential. In an effort to keep costs down, US contractors have often used local firms for the civil and other components of work; and the performance of local subcontractors has generally been acceptable.

10.1.2 Fixed Amount Reimbursement Contractors

In recent years, USAID has instituted a program to improve in-county construction and construction management skills, particularly in the private sector. Through a fixed-amount reimbursement (FAR) approach, USAID agreed to provide financial support for construction of USAID-funded design projects. In exchange, local governmental agencies committed to using a significant level of private sector contractors; and improvements in the technical and management skills of participating contractors were promoted through training workshops for technical and management staff, and through resident supervision by US construction engineers.

USAID's FAR program has been in operation in conjunction with the Greater Cairo Wastewater Organization's program for rehabilitation and expansion of sewerage facilities on the West Bank. Since 1989 local contractors have been awarded 57 contracts worth more than LE 467 million. Over 40 contracts of have been completed having a cost of LE 356 million. The remaining contracts are scheduled to be completed by 1996. The projects have been for the provision of sewerage in the Embaba, Pyramids, Zenein, and outer village areas on the West Bank in Cairo.

Typically up to four public sector contractors and 10 private sector contractors have been prequalified for the work. Work has included trunk sewers, street laterals, house connections, and small pump stations. The quality of construction has improved steadily and construction costs have been controlled. Adherence to construction schedules still requires improvement. In general, the program has been successful in raising the technical and management skills of local construction firms.

10.1.3 Capacity of Local Contractors

During the next three years there will be a total of 20 contracts to complete the currently projected FAR program in Cairo. Since the estimated construction program for the Secondary Cities projects will not require work to commence until 1996 or later local construction firms participating in the FAR program presently appear to have the capacity to undertake additional work.

Under the Secondary Cities projects, work will include a substantial component of wastewater systems' rehabilitation and expansion; a total of approximately LE 150 million has been estimated for this portion of the work. In addition, the projects will require a similar amount for water systems' rehabilitation and expansion. Much of the water systems work is similar in nature to the sewerage system work using similar types of locally-manufactured products. The experience which FAR-type contractors have demonstrated for sewerage systems work can be directly applied to the water systems work. Therefore, local FAR-type projects will total approximately LE 300 million. At an average FAR contract size of LE 5 to 10 million, approximately 30 to 60 FAR type contract packages could be expected.

A total of 10 contractors working in the water and wastewater sector were contacted to determine their capacity for construction throughout Egypt. This included 2 public sector firms and 8 private sector contractors. Fifty percent of the firms had previously worked on FAR contracts for the Cairo Wastewater Project. The total current work load, projected work load and work load capacity of the 10 firms is as follows:

- Contracts in hand — LE 830 million
- Additional work expected (in 3 years) — LE 880 million
- Total capacity based on equipment, resources, and senior staff — LE 5 billion

The survey of the contractors confirmed that these contractors working in the water and wastewater sector would actively pursue the proposed Secondary Cities FAR-packaged contracts even though the projects will be outside the Cairo area. If it were necessary to utilize contractors operating in specific areas, the FAR training program which proved to be effective at the start of the West Bank work could be reactivated to provide other contractors outside of Cairo with the basic training to perform on the FAR contracts.

In addition to water and sewerage systems' work components, local FAR-experienced contractors could also be considered for other civil-type construction work; for example, construction of waste stabilization ponds and water storage tanks. When necessary, such as with pond liner installation, technical assistance could be provided through contract provisions for a factory installation representative.

Some of the rehabilitation work, whether water or wastewater, can also be performed by local contractors. However, the degree of construction schedule management required by an individual project (or project subtasks), especially relating to minimizing disruptions to service, must be carefully considered on a case-by-case basis.

10.1.4 Recommended Contractor Assignments

Egyptian construction contracting firms have demonstrated the ability to successfully execute a variety of work using FAR procedures. The categories of work which have been executed are similar to many of the work components expected to be required in the proposed Secondary Cities project. It is assumed that US construction contracting firms with previous experience in Egypt would be able to perform all the work categories.

Table 10.1 presents a summary of work categories and an evaluation of local FAR-experienced firms to successfully execute the work.

10.2 Packaging Contracts

The development of contract packages for the Secondary Cities projects must address what will be attractive to prospective bidders, promote the best possible construction, and obtain the most competitive prices. Contracts can be grouped, or "packaged", on either a technical or a geographic basis. Each approach is considered.

For the Secondary Cities, the ranking system, discussed in Chapter 9, provided the basis for selection of projects which should be undertaken. The Mansoura and Mahalla El Kobra projects, ranked 1 and 2, will utilize the bulk of available $200 million in funding. However, since both of these projects represent a reproducible model which would have wider application throughout Egypt, one of these projects could be eliminated. The money released has been distributed to achieve a suggested geographical distribution and a representative mix of projects.

10.2.1 Technical Distribution

Assuming that counterpart components of water and wastewater systems can be considered as technically equivalent from a construction viewpoint, the proposed work can be grouped technically into the following general categories:

TABLE 10.1 SUMMARY OF WORK CATEGORIES AND ASSESSMENT OF LOCAL FIRMS

Work Category	Type of Construction or Assistance	Egyptian Firms with FAR experience	Assessment of Egyptian Firms Abilities to Perform the Work	
			Satisfactory	Limited
Water Systems	Distribution Piping/House Connections	X	X	
	Pump Stations and Force Mains			X
	Rapid Sand Filtration Plants		X	
	Storage Tanks	X	X	
Wastewater Systems	Collection Piping/House Connections	X	X	
	Lift Substations and Force Mains	X	X	
	Pump Stations and Force Mains			X
	Stabilization Ponds		X	
	Activated Sludge Plants			X
	Effluent Disposal Systems		X	
General	Hydraulic Analyses		X	
	Leakage Detection Programs			X
	System Operations Plans			X
	Water Meter Repairs			X
	Technical Assistance			X

- Pipeline Work - water lines and sewers, both new and rehabilitation
- Pump Station Work - including force mains
- Treatment Plant Work - water and wastewater, including storage tanks and incidental buildings
- Technical Assistance - hydraulic analyses, leakage detection programs, systems operations plans, operations and maintenance assistance

From the cost information and project ranking presented in Chapter 9, the potential project costs associated with the technical categories are shown in Table 10.2.

TABLE 10.2 SUMMARY OF PROJECT COSTS BY TECHNICAL GROUPING

Technical Category	Total Cost for All Projects, million LE	Percent of Total Cost	Total Cost for Recommended Projects, million LE	Percent of Total Cost
Pipeline Work	333.7	35.8	276.2	46.3
Pump Station Work	69.2	7.4	53.7	9.0
Treatment Plant Work	490.0	52.6	234.5	39.3
Technical Assistance	38.7	4.2	32.3	5.4
TOTALS	931.6	100.0	596.7	100.0

Note 1: Assumes all work performed at local rates; no US contractor involvement

Each of these grouping requires different, specific capabilities and experience. Of course, some contractors will be competent in all phases. Grouping the work technically will enable contractors to focus on the types of work for which they are most qualified. This approach also allows local contractors with FAR experience to bid on work for which they have demonstrated ability.

10.2.2 Geographic Distribution

Because of the wide geographic spread of the work throughout Egypt, it will be practical to group work packages geographically. The work could be divided as follows:

- The Delta Cities - Mansoura and Mahalla El Kobra
- The Eastern Coastal Cities - Nuweiba and Sharm El Sheikh
- The Luxor Group - Luxor, Armant and Isna
- The Aswan Group - Kom Ombo, Darawo and Nasr City

From the cost information and project ranking presented in Chapter 9, the potential project costs associated with the geographical division is shown in Table 10.3. Work performed in a single geographic area by a single contractor will increase accountability, reduce contract administration, reduce contractor interferences, and will encourage competitive prices through economies of scale.

TABLE 10.3 SUMMARY OF PROJECT COSTS BY GEOGRAPHIC DIVISION

Geographic Division	Total Cost for All Projects, million LE[1]	Percent of Total Cost	Total Cost for Recommended Projects, million LE[1]	Percent of Total Cost
Delta Cities	382.0	41.0	196.0	32.8
Eastern Coastal Cities	116.3	12.5	116.3	19.5
Luxor Group	261.4	28.1	112.5	18.9
Aswan Group	171.9	18.4	171.9	28.8
TOTALS	931.6	100.0	596.7	100.0

Note 1: Assumes all work performed at local rates; no US contractor involvement.

10.2.3 Construction Staging

The work has been priced assuming that the entire project will be constructed at the same time. This approach has been taken because of the relatively short design horizon. However, since the total costs of construction cannot be met by the available $200 million in USAID funds, it may be prudent to consider phased construction of specific facilities, thereby freeing up money for other projects. These decisions involve a significant level of non-technical factors.

Projects which could be technically staged include piping systems and treatment plants. Pump stations and force work and technical assistance do not always lend themselves to staging. The level of staging often may be arbitrary; the extent to which wastewater treatment could be provided may be based on the amount of funding available, and technically logical cut-off point is determined based on funding limitations. In addition, the relationship between water and wastewater projects must be acknowledged, and the goal of coordinating adequate wastewater capacity with water system delivery must be maintained.

10.2.4 Proposed Contract Packages

Integrating the information from Chapter 9 and the recommendations on contracting assignments discussed in this chapter, a proposed distribution of contract packages is summarized in Tables 10.4 through 10.7. US contractor costs are assumed to be approximately 1.6[1] times local costs. Scenario "D" of Chapter 9, which integrates projects diverse in both technical scope and geographic distribution, has been used as the basis for developing the tables.

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[1] The coefficient for conversion of local costs to costs for work to be performed by a U.S. contractor was based on a comparison of the costs for construction of a conventional rapid sand filtration plant. The approximate cost of a 300 lps water treatment plant constructed by a USAID funded contractor was approximately $12 million in 1989. Escalating this cost to 1994 costs (say $16 million) results in a cost approximately 1.6 times greater than the current estimated cost for construction of a similar plant by Egyptian contractors.

TABLE 10.4

CONSTRUCTION CONTRACT BREAKDOWN FOR

MANSOURA

SITE	WORK PACKAGES	TOTAL CONTRACTS	TOTAL VALUE, millions US	EGYPTIAN	COMMENTS
MANSOURA	Hydraulic Analysis; Leakage Detection Program	1	$1.3	–	Regional and local; part of national contract
	Water Treatment Improvements	1	$48.0	–	New water treatment plant; rehab existing plant
	Rehab Compact Units	1	–	LE 2.0	Could combine w/ water treatment plant contract
	Water System Improvements	4	–	LE 19.5	Regional and local; incl meter repair/facility; uses FAR contractors; could combine w/ water work
	Systems Operations Plans	1	$1.0	–	Water and wastewater systems; part of national contract
	Wastewater Treatment Improvements	1	$16.5	–	New Talkha plant; technical assistance for Mansoura/Talkha
	Wastewater System Improvements	7	–	LE 35.5	Mansoura and Talkha; uses FAR contractors
	TOTALS	16	66.8	LE 57.0	

TABLE 10.5

CONSTRUCTION CONTRACT BREAKDOWN FOR

NUWEIBA/SHARM EL SHEIKH

SITE	WORK PACKAGES	TOTAL CONTRACTS	TOTAL VALUE, millions US	TOTAL VALUE, millions EGYPTIAN	COMMENTS
NUWEIBA/ SHARM EL SHEIKH	Hydraulic Analysis; Leakage Detection Program	1	$0.5	–	Nuweiba and Sharm; part of national contract
	Water Supply Improvements	1	$5.3 $24.0	– –	Nuweiba: wells, pump station, transmission pipe; storage tank Sharm: transmission pipe; well pumps
	Systems Operations Plans	1	$2.0	–	Nuweiba and Sharm; water and wastewater systems; part of national contract
	Water System Improvements	5	– –	LE 9.7 LE 14.2	Nuweiba: 2 FAR contractors; incl meter repairs/facility Sharm: 3 FAR contractors; incl meter repairs/facility; storage
	Wastewater System Improvements	6	– –	LE 14 3 LE 13.4	Nuweiba: 1 contractor for both ponds; 2 FAR contractors for pipes Sharm: 1 contractor for pond; 2 FAR contractors for pump station/force main and pipes
	TOTALS	14	$31.8	LE 51.6	

TABLE 10.6

CONSTRUCTION CONTRACT BREAKDOWN FOR

LUXOR

SITE	WORK PACKAGES	TOTAL CONTRACTS	TOTAL VALUE, millions		COMMENTS
			US	EGYPTIAN	
LUXOR	Hydraulic Analysis; Leakage Detection Program	1	$1.0	–	Regional and local systems; part of national contract
	Water System Improvements	5	–	LE 27.0	Regional and local systems; incl meter repair/facility; uses FAR contractors
	Systems Operations Plans	1	$1.0	–	Water and wastewater systems; part of national contract
	Wastewater Treatment Improvments	1	$29.5	–	Rehab existing plant; new pump station/force main; technical assistance; new ponds; effluent disposal system
	Wastewater System Improvements	4	–	LE 19.0	Incl lift stations, sewerage; uses FAR contractors
	TOTALS	12	$31.5	LE 46.0	

TABLE 10.7

CONSTRUCTION CONTRACT BREAKDOWN FOR

KOM OMBO/DARAWO/NASR CITY

SITE	WORK PACKAGES	TOTAL CONTRACTS	TOTAL VALUE, millions US	TOTAL VALUE, millions EGYPTIAN	COMMENTS
KOM OMBO/ DARAWO/ NASR CITY	Hydraulic Analysis; Leakage Detection Program	1	$1.9	–	Regional and local; part of national contract
	Water Treatment Improvements	1	$14.1	–	Rehab/expand Kom Ombo Plant; rehab Darawo Plant; water storage in Nasr City
	Systems Operations Plans	1	$3.0	–	Water and wastewater systems; part of national contract
	Water System Improvements	7	–	LE 34.3	Regional and local; 1 contract for regional, 6 contracts for local; uses FAR contracts
	Wastewater Treatment Improvements (Kom Ombo, Darawo)	1	$17.8	–	Ponds for Kom Ombo, Darawo; incl pump stations/force mains
	Wastewater Treatment Improvements (Nasr City)	1	–	LE 11.0	Pond for Nasr City; incl pump station/force main
	Wastewater System Improvements	11	–	LE 54.7	Uses FAR contractors
	TOTALS	23	$36.8	LE 100.0	

As indicated in Tables 10.4 through 10.7, the US contracts packages are sufficiently large to attract the interest of potential bidders. The packages are also large enough to justify US contractor mobilization to these sites. The table also indicates that approximately 51 local contracts will be required, 47 of which will be for FAR-type water and sewerage work. Compared with information in section 10.1, this level of activity does not appear to be outside of the contractors' capacity to perform the work. In developing FAR contract packages, an average value of LE 5 million has been assumed for each contract.

In addition, separate contracts to provide services nationally are recommended for hydraulic analyses/leakage detection programs and for systems operations plans. This approach will promote consistency in information and document development. Assessments of the water systems, which must commence as soon as possible, can move forward without being connected to a larger design contract. The contract for development of systems operations plans should also include the necessary technical training during start-up and an initial period of operations; document development would be coordinated with the operations and maintenance manuals which will be developed by the construction contractors.

10.3 Construction Schedules

10.3.1 Individual Contract Packages

Preliminary execution schedules have been developed for all projects planned at each particular location. These schedules have been based on the work components shown in tables in Chapter 4 for each location and on the detailed subproject descriptions presented in the technical annex.

Schedules for execution of the individual contract packages have been based on a traditional design/bid/build approach. This strategy will allow the project to develop in stages, each of which will be self-contained. Fulfillment of the pre-conditions sought by USAID will permit subsequent stages to proceed. Should all pre-conditions be met by the time the project is ready to proceed, consideration of alterative contracting strategies, such as design/build, could be considered.

Preliminary design will be taken to approximately 30 percent; final design documents will then be completed. Each schedule covers the preliminary design, final design, contractor selection, construction and post-construction phases. Reasonable levels of effort for performance of tasks has been assumed. Schedules also assume that land acquisition, rights-of-way permissions and power availability will be ready when required. The individual contract package schedules for Mansoura, Nuweiba/Sharm El Sheikh, Luxor and the Aswan cities are presented in Figures 10.1 through 10.4.

FIGURE : (10-1)

MANSOURA PROJECT SCHEDULE

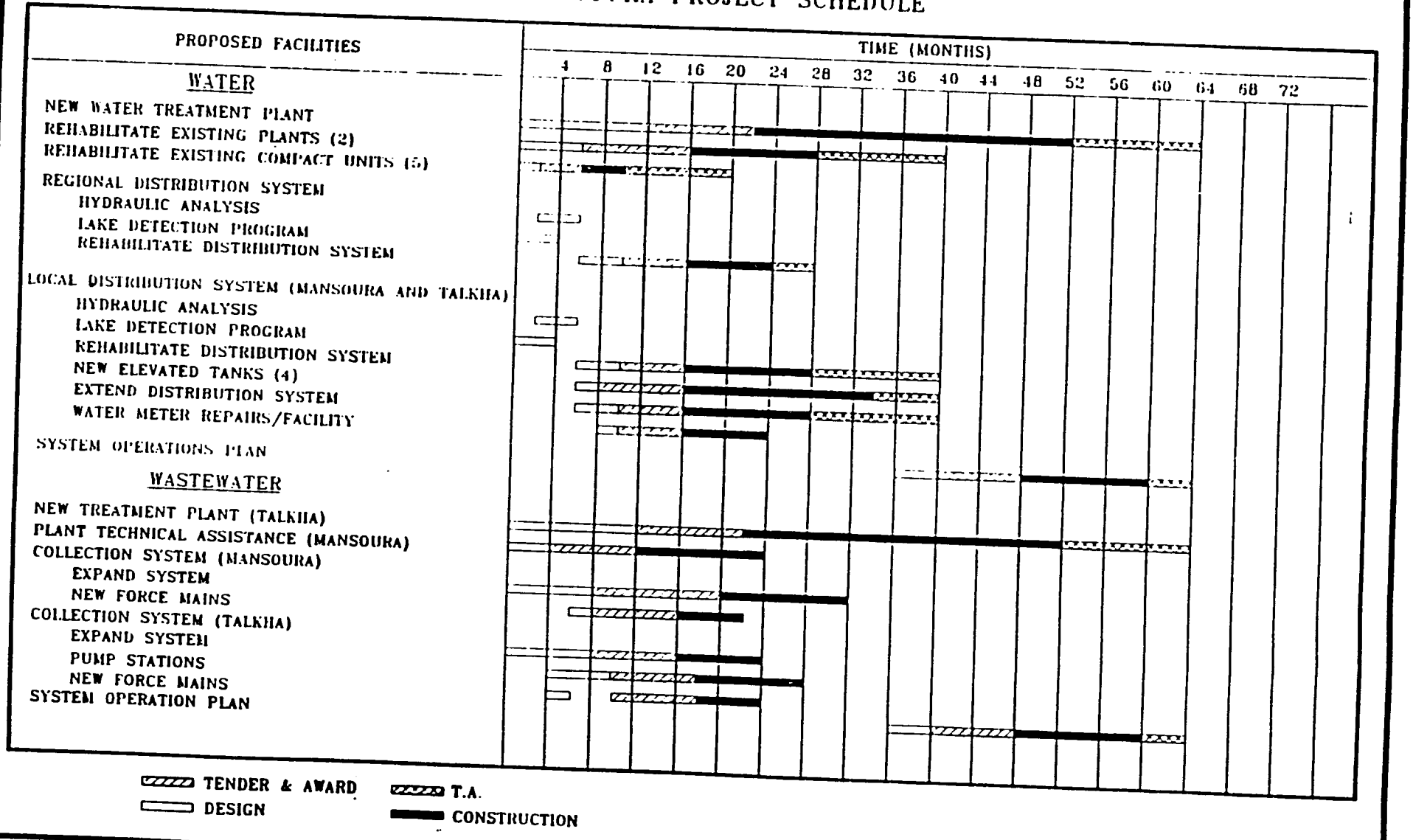

FIGURE (10-2.a)

NUWEIBA PROJECT SCHEDULE

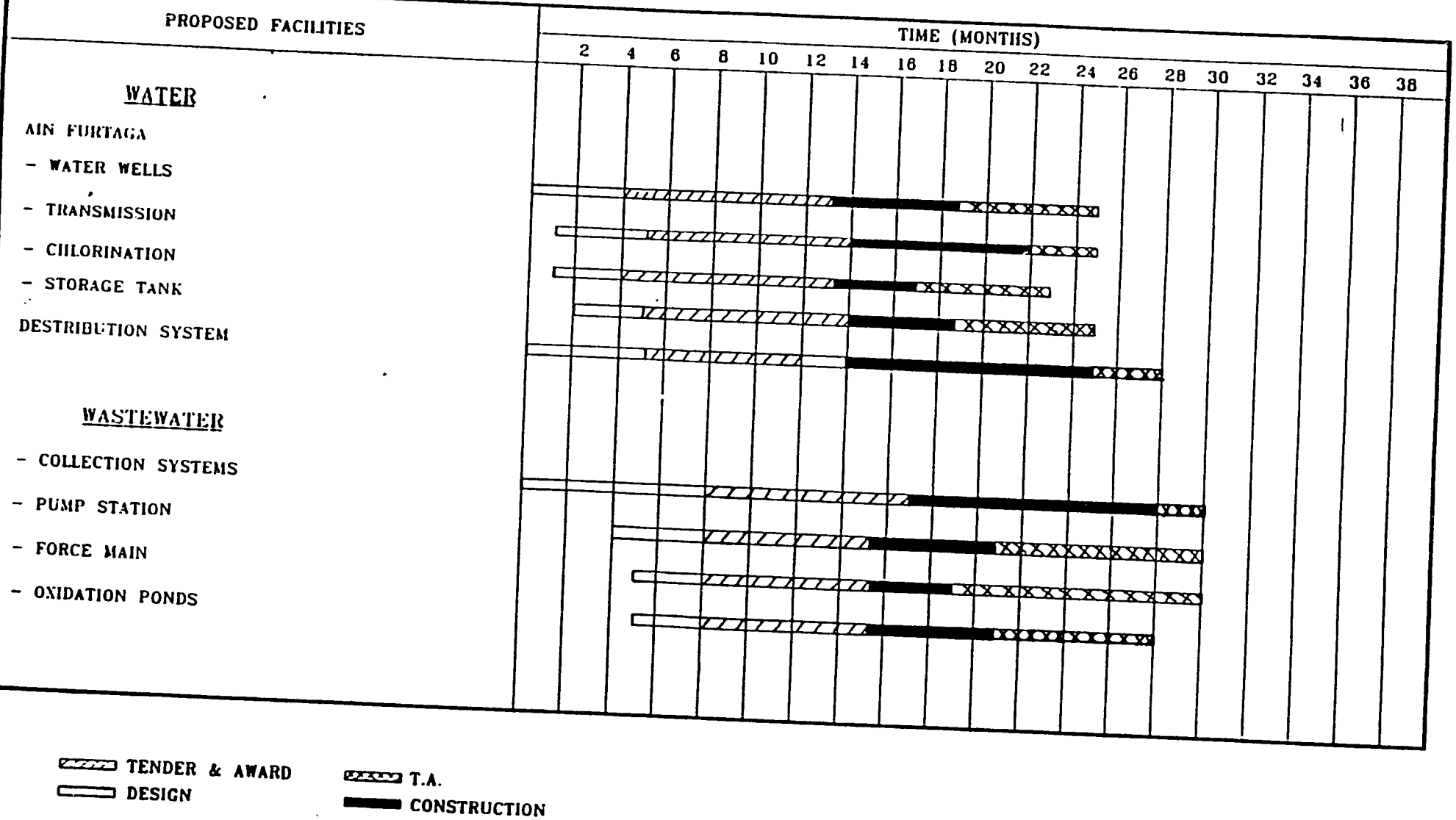

FIGURE (10-2.b)

SHARM EL SHEKH PROJECT SCHEDULE

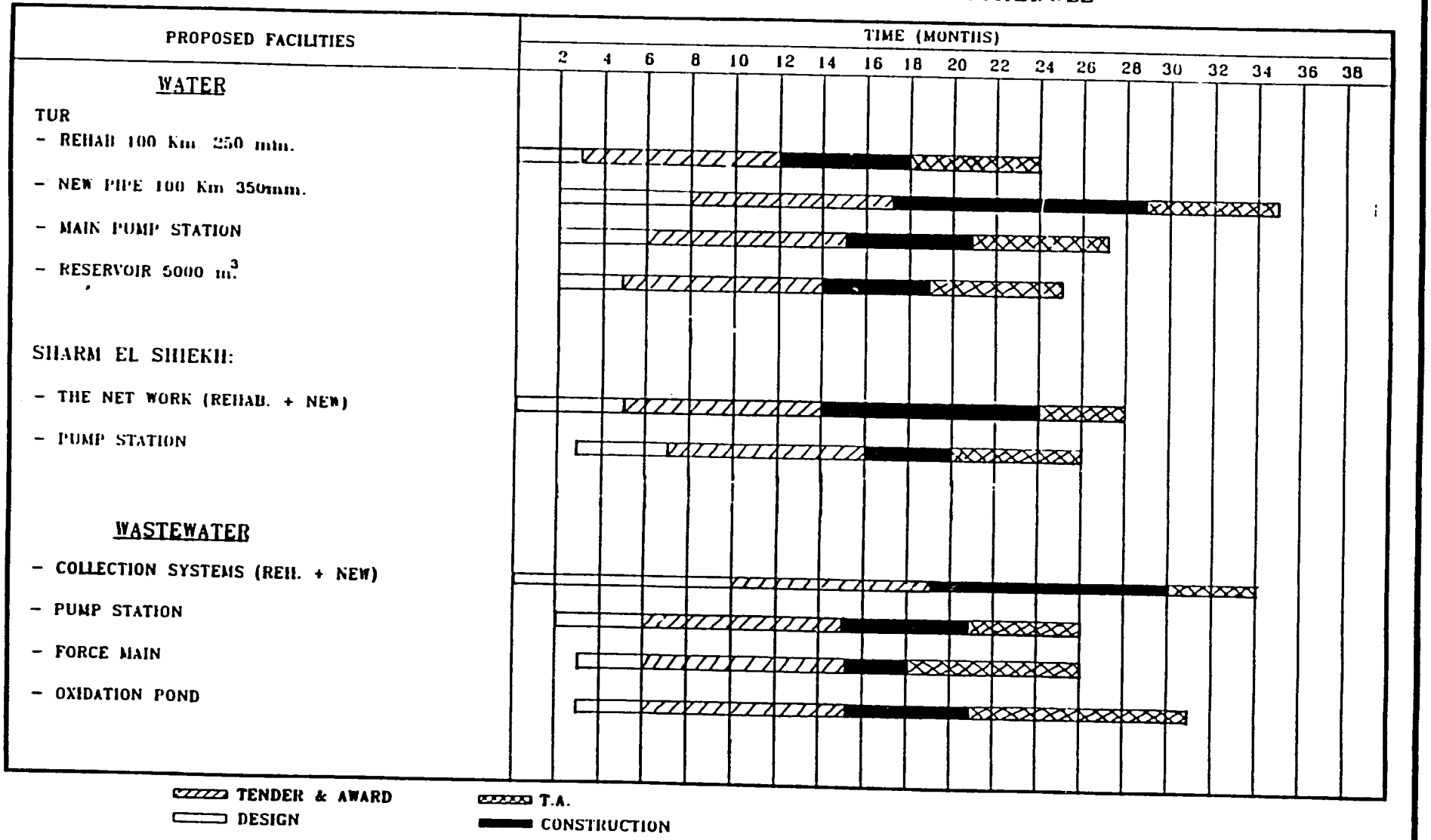

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FIGURE (10-3)

LUXOR PROJECT SCHEDULE

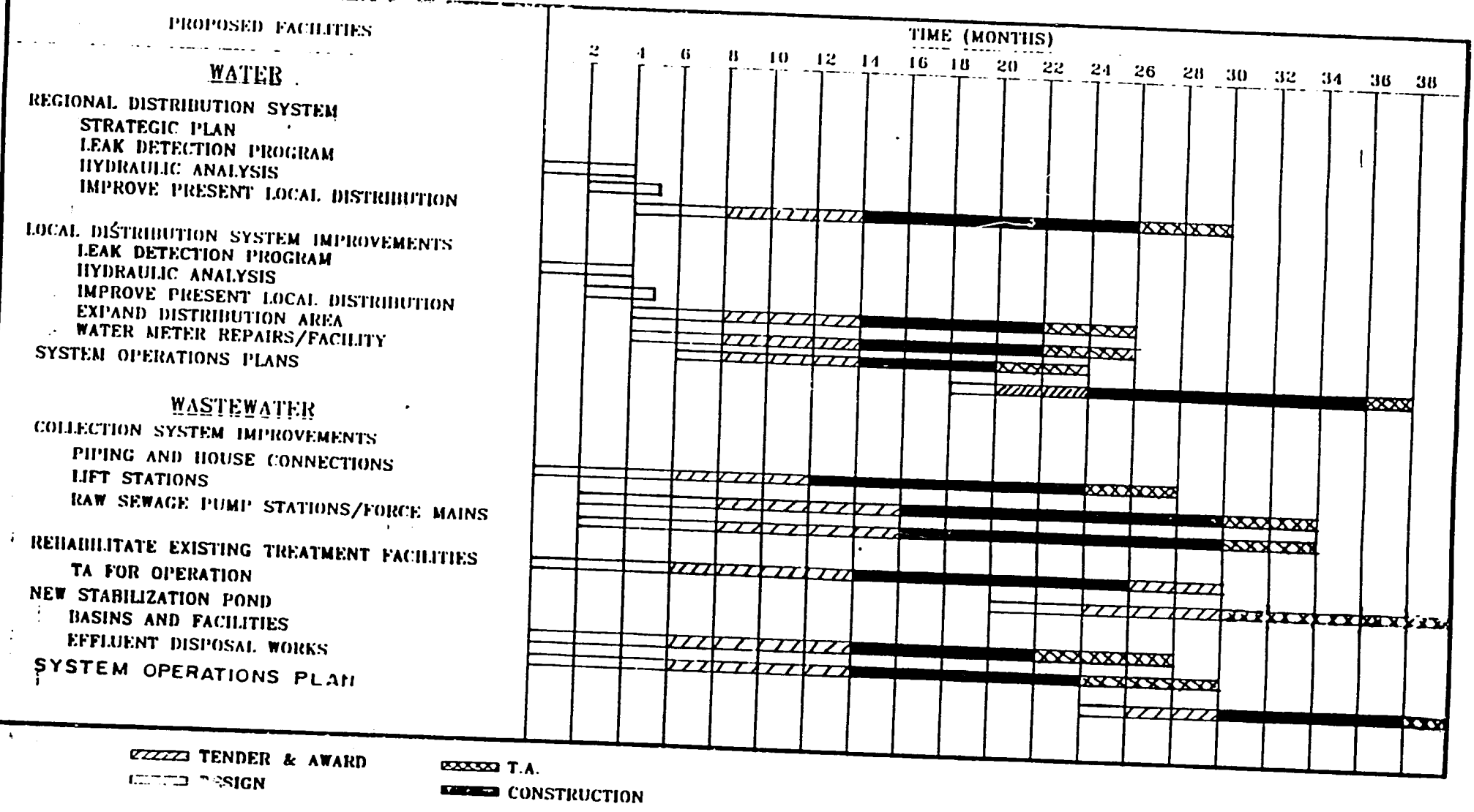

FIGURE (10-4.a)

KOM OMBO PROJECT SCHEDULE

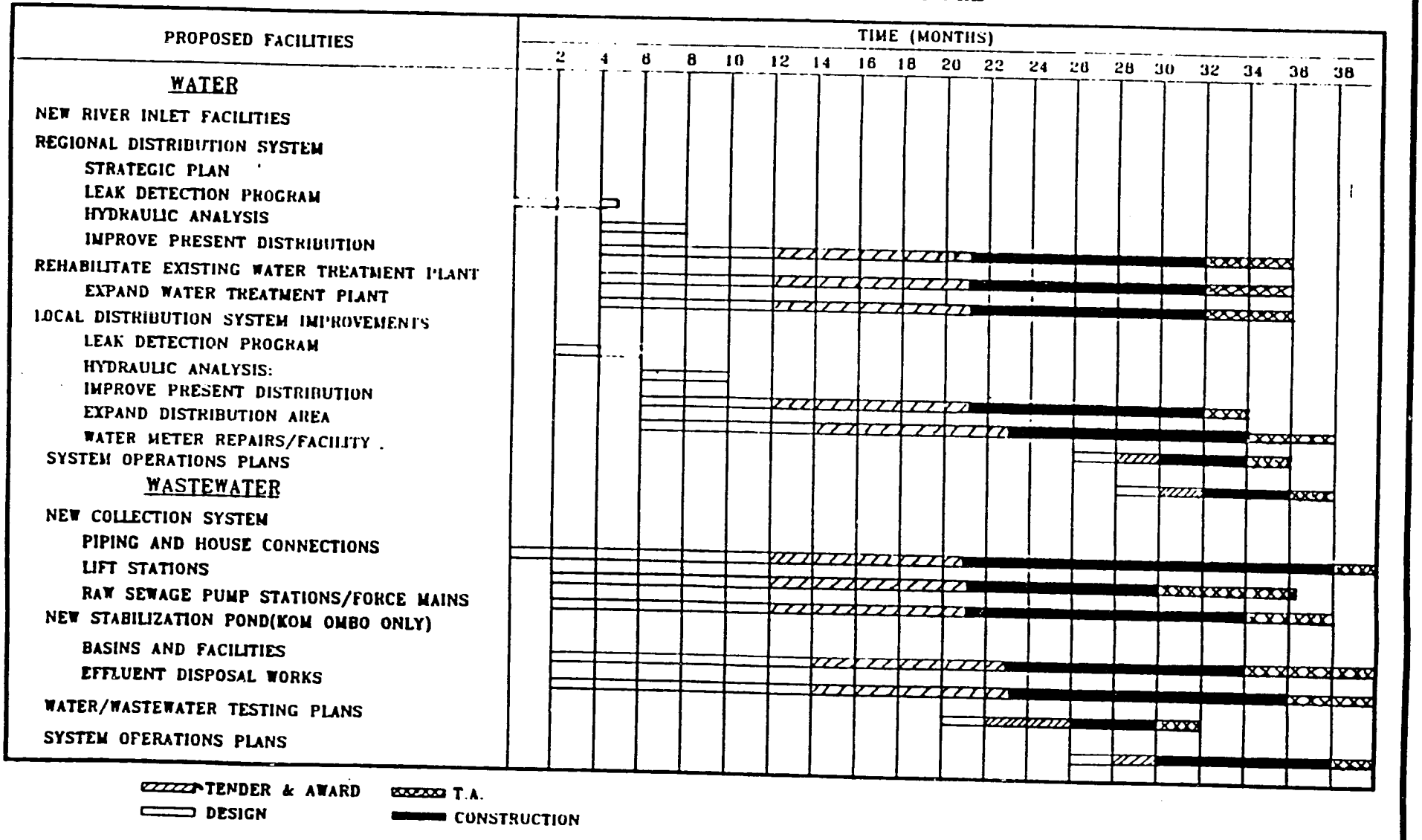

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FIGURE (10-4.i)

DARAWO PROJECT SCHEDULE

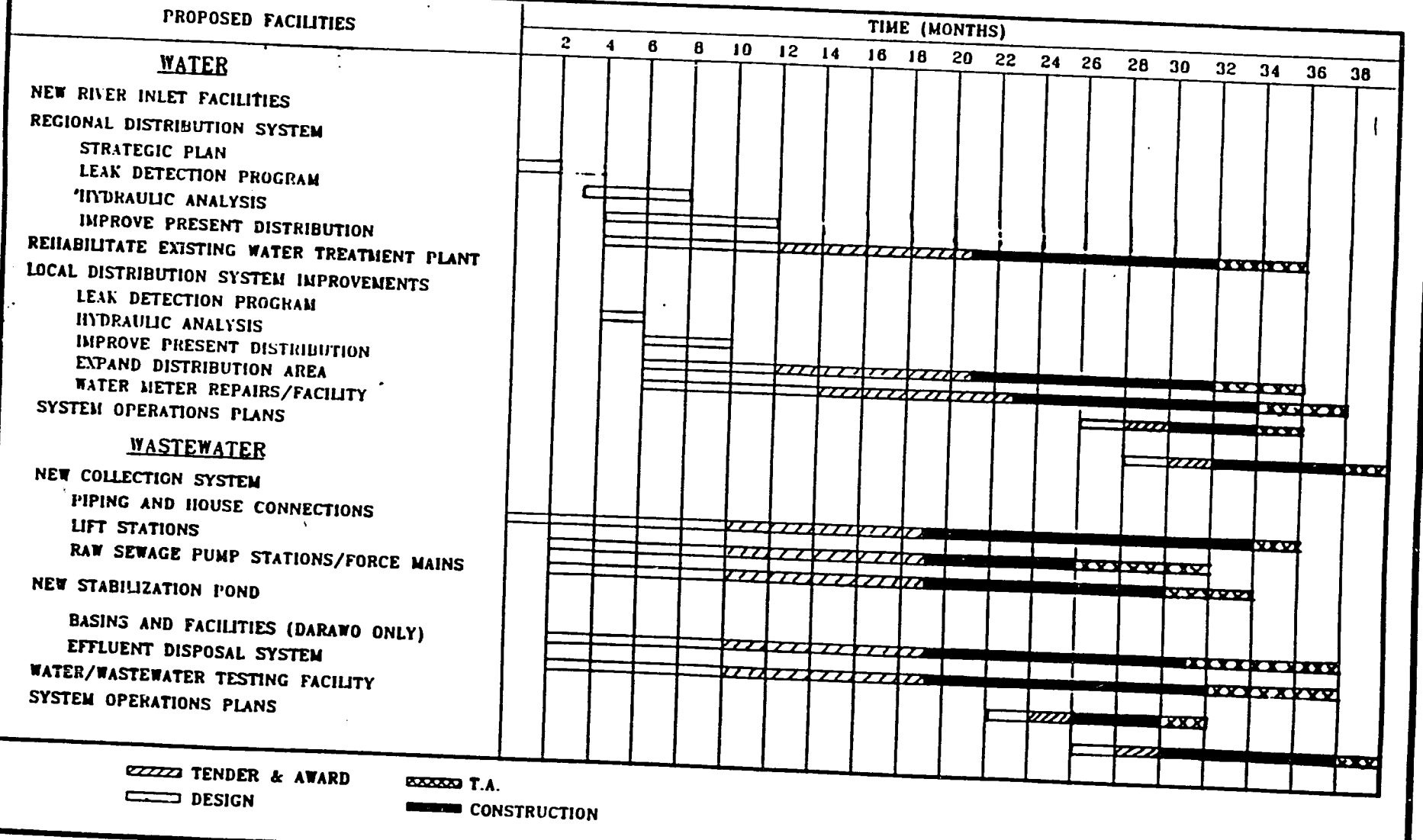
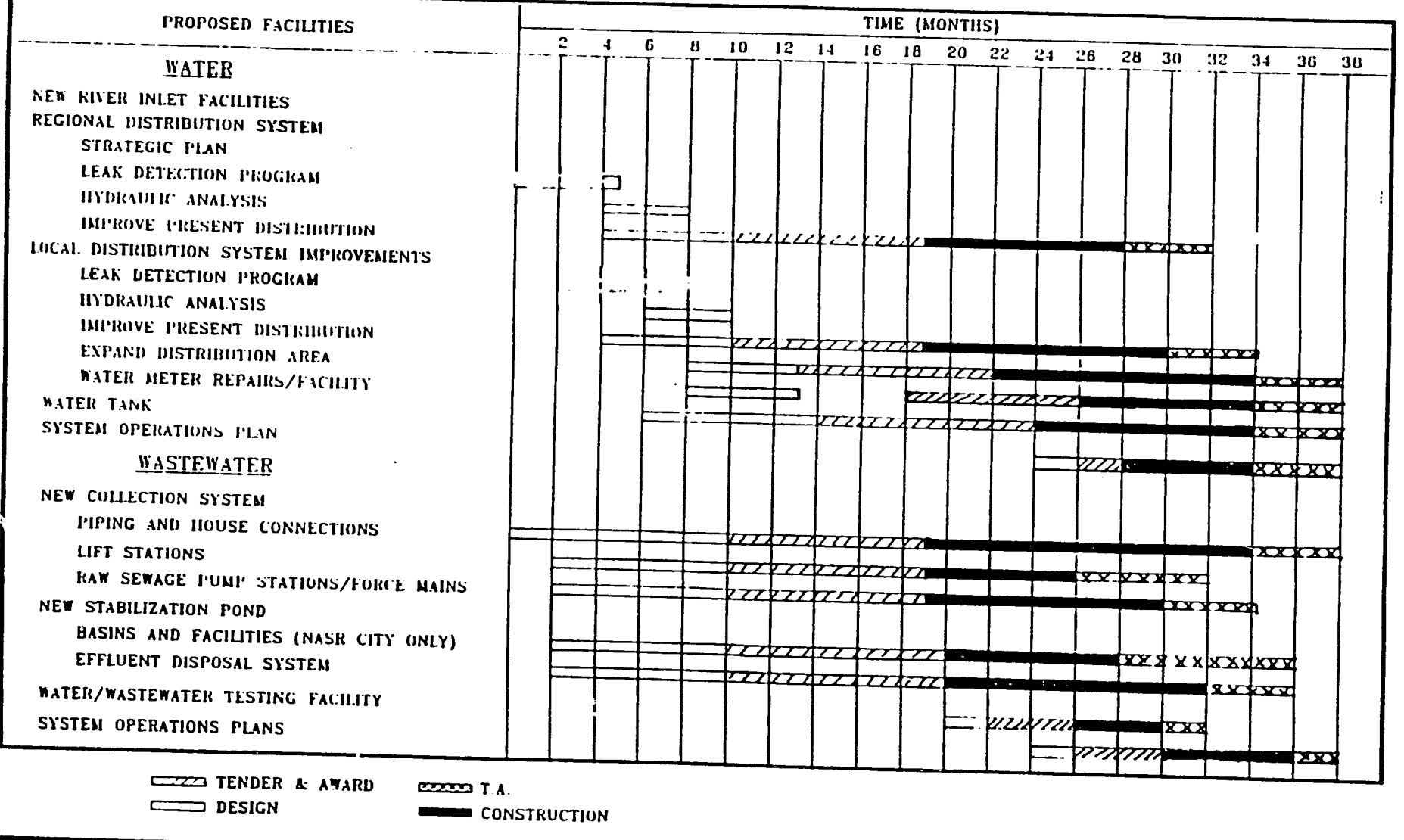


FIGURE (10-4.c)

NASR CITY PROJECT SCHEDULE



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10.3.2 Consolidated Program Schedule

The individual contract package schedules have been compiled to produce a consolidated project schedule for each particular location. Individual schedules have been aligned, where appropriate, to reflect the relationships between contracts; for example, the wastewater treatment facilities must be substantially complete and operable before the collection system, specifically the house connections can be made.

The consolidated program schedule integrates the four consolidated project schedules for the Secondary Cities program. Program schedule activities include selection of the designer/program manager; the hydraulic analyses/leakage detection program, including contractor selection; preliminary design; construction contractor prequalification; final design; construction contractor selection; resident engineering services; construction schedules; systems operations plan activities, including contractor selection; and final completion. Figure 10.5 presents the consolidated program schedule.

10.4 Program/Construction Management

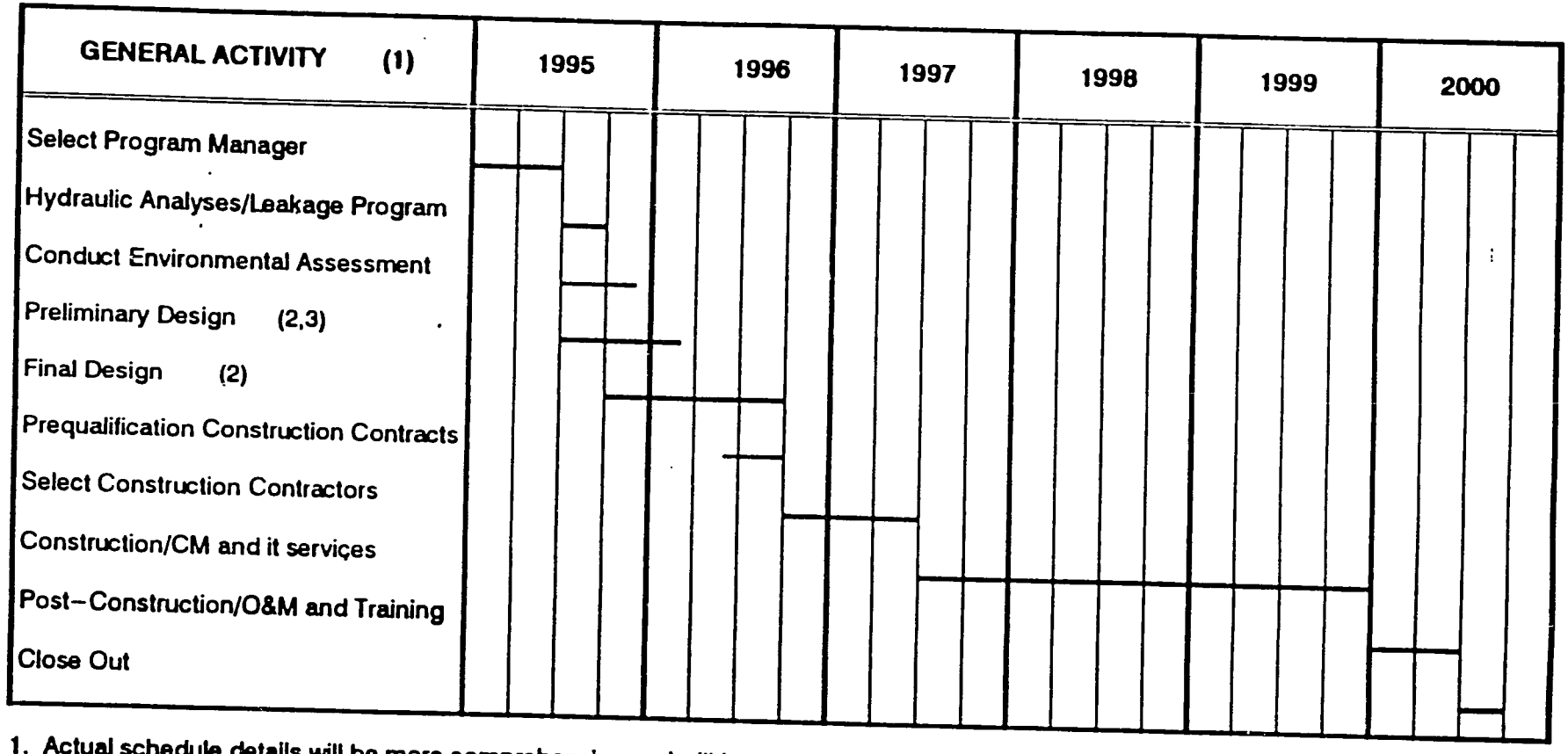
10.4.1 Extent of Services

As indicated in Chapter 10.3.2, the Secondary Cities program must be guided throughout its duration to ensure satisfactory completion of all the projects. The program/construction manager will monitor the overall execution program. In addition, the program/construction manager will perform the following tasks:

- Provide overall project management
- Assist in selection of hydraulic analyses/leakage detection contractor
- Coordinate hydraulic analyses/leakage detection program
- Provide preliminary and final design services
- Assist in construction contractor pre-qualification
- Assist in construction contractor selection
- Provide resident engineering services
- Coordinate and provide construction management services
- Assist in selection of systems operations plans contractor
- Coordinate O/M manual development, systems operations plans and training programs
- Assist in final project close-out

FIGURE 10.5

CONSOLIDATED SCHEDULE



1. Actual schedule details will be more comprehensive and will be determined once USAID has selected projects to be taken forward.
2. Assume Mansoura/Talkha WWTP WWTP as a baseline schedule.
3. Design of water distribution systems will begin when hydraulic/leakage programs are completed.

Chapter 11

SOLID WASTE MANAGEMENT CONSIDERATIONS

11.1 Identification of Issues

Poor solid waste management practices can have detrimental impacts on water and wastewater services, in addition to the creating of serious environmental concerns from inadequate disposal facilities and procedures. In Egyptian cities where there is not a regular solid waste collection service, people tend to dispose of their waste materials at the most convenient location. In many instances this can be the manholes in the sewerage system creating problems of blockage, reduced capacity, and the flooding of streets with sewage. The dumping of solid waste in open dump sites can also lead to contamination of the groundwater and reduce sources of potable water service in areas not adequately served by piped water service.

Very little is being done in the cities under review from the standpoint of solid waste disposal. In most instances the practice is unplanned scattered solid waste dumping sites surrounding the cities and tourist villages, with virtually no control. The unsatisfactory environmental and nuisance conditions that result could be eliminated with the provision of improved collection services and the provision of sanitary landfills.

The following sections describe the existing conditions in the three geographical settings for the cities being evaluated, followed by recommendations and suggested actions. The three categories are as follows:

Coastal Cities

Cities located on the coast of the Red Sea or the Gulf of Aqaba including the touristic resorts such as Sharm el Sheikh, Nuweiba, and Hurghada. This category is considered to have the highest priority for action based on the possibility of negative impact on tourism.

Delta Cities

Cities located in the Nile delta including Mahalla el Kobra, and Mansoura.

Nile Valley Cities

Cities located in upper Egypt along the Nile River including Luxor, Kom Ombo, Armant, Isan, Darawo, and Nasr City.

11.2 Summary of Present Conditions

11.2.1 Touristic Resorts

The following characteristics are common to these locations as regards to solid waste practices:

- The locations are usually divided into two main areas, one residential, and the touristic villages and hotels.

- Most of those who live in the residential area are employed in the hotels and resorts, or the related service establishments.

- A significant portion of the residential population have come from other governorates throughout Egypt.

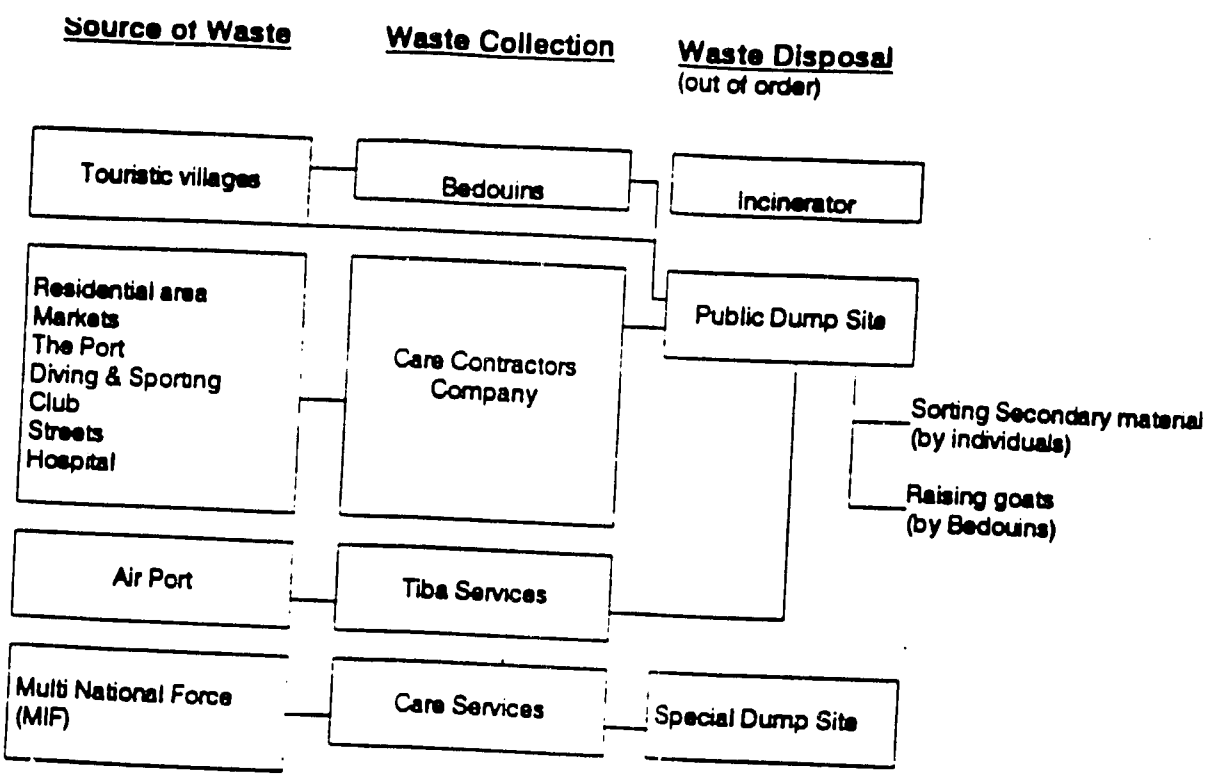
- The wastes for the touristic areas are significantly different in quantities and composition than waste from the residential areas.

- There are not formal programs for solid waste disposal, however, there are some informal activities for sorting of wastes and dealers for the salvaged components. The process of waste sorting is made in desert areas or the mountains in and around the touristic areas. The concentration of waste sorting activities is with the waste generated at the touristic resorts and hotels. The rest of the waste is either left in uncontrolled open dumps or burned in open areas.

- It is assumed that the financial capability of the touristic villages and hotels is such that environmentally sound waste collection and disposal facilities could be supported. There have been informal discussions among the owners and managers of the hotels and villages, however, a well planned program for collection and disposal remains to be adopted and implemented.

Sharm El Sheikh

Sharm El Sheikh as an example of a touristic resort city, and the following information describes the existing situation in detail. The following flow diagram represents the solid waste system in Sharm El Sheikh.



Touristic Villages: Generate about 3 tons of waste per day, mostly from kitchens. The hotels and touristic villages make an effort to keep waste in cool room before collection to delay the decomposition of the organic matter. Waste is collected by individuals using small trucks.

Residential Area: Located approximately 15 to 20 kms from the villages. Streets are equipped with 1 m3 dust bins. The residential area generates almost 1.5 tons of solid wastes per day. This area is serviced by CARE Services.

Diving Club: This club provides many services to divers and those who are interested in sea activities. The club generates approximately 0.3 tons of waste per day and it is collected by CARE Services.

Hospital: The hospital has 14 beds and about 70 outpatients per day. It generates only four kilograms of hospital and hazardous waste per day. The hospital does not have an incinerator. Wastes are collected by CARE Services.

Markets: The market is located in the downtown city area and generates almost 1 ton of wastes per day. It is collected by CARE Services.

The Port: The port generates about 0.5 tons of waste similar to the waste of the touristic villages. The waste is generated from the ships using the port facilities. Collection is

provided by CARE Services.

Streets: Because of the major construction activities with many new buildings, extension of the residential area, new touristic villages, the composition of street wastes is primarily construction wastes. This presents are problem for collection and disposal.

MIF: The MIF has a camp that generates almost 0.5 tons of wastes per day. similar to the waste of the touristic villages. It is collected by CARE Services. The wastes are disposed of in a separate sanitary landfill.

Airport: The waste from the airport is collected by Tiba Services. The amount is about 0.25 tons per day, primarily kitchen wastes.

All of the above wastes, except for the MIF, are discharged at an uncontrolled dump site 10 km from the city. The organic material is fed to goats. and there is sorting of materials such as bottles, paper, boxes, and plastic. The remaining material is left in an open dump. At one time there was an incinerator available. It is not operable and is considered to be too expensive to operate if it could be placed into operation.

The principal problems with the current situation at Sharm El Sheikh are as follows:

- Material being transported by the private carriers is not covered and spillage and loss occur during transport
- The amount of solid waste being generated by the rapidly increasing residential population is greater that the amount to be collected under the contract with CARE Services
- The rapid pace of construction generates an extremely large amount of solid wastes stored on the streets and open lots
- Hospital wastes are mixed with other wastes
- There is a lack of plan and budget for the installation and operation of a properly designed sanitary landfill.

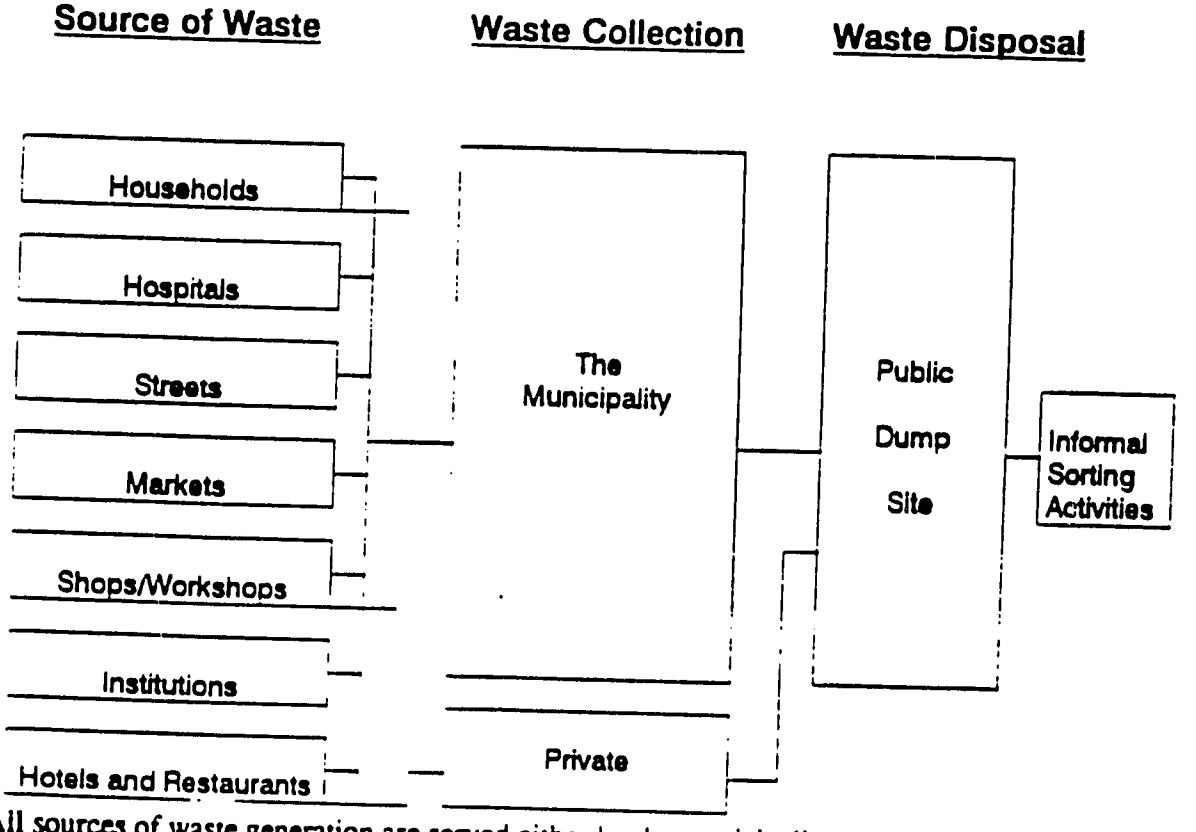
Information regarding the composition of the average household waste, expressed in percentages, is as follows: organic matter 65.1, paper 6.9, plastics 9.3, metals 3.1, rags 1.1, and glass 14.5.

11.2.2 Delta Cities

This category includes Mahalla El Kobra and Mansoura, two cities that have almost the same conditions as to waste collection and disposal. Similar characteristics include: waste composition includes a large percentage of organic material, the city is the principal organization involved in collection and disposal, there is no formal waste disposal facility, however, there are informal waste sorting and marketing activities.

Mahalla El Kobra as an example of a city in the delta.

Mahalla El Kobra, located in Gharbiya governorate, is one of the largest cities in the delta. It consists of two urban kisms and one rural markaz with populations of approximately 174,000; 185,000; and 383,000 respectively. These populations generate daily household waste of approximately 87, 93, and 197 tons per day respectively. The following is the typical solid waste management diagram for Mahalla El Kobra:



All sources of waste generation are served either by the municipality or a few private carriers serving hotels and restaurants. The waste is dumped in an uncontrolled manner at a public site located between Mahalla and Tanta.

This dump site did at one time have incinerators. It is reported that the nature of the solid wastes is significantly different than that for which the incinerators were designed. The inappropriate design, lack of operating capability, lack of funds, and other bureaucratic problems has resulted in the non-operation of the incinerators.
The existing dump site is nothing but an open area for waste dumping with all of the inherent environmental problems associated with flies, rats, odors, smoke for ignition of dried organic material. There are waste sorters and dealers of sorted material. Major problems are as follows:

- The current system of solid waste collection is ineffective. The system does not cover the entire area due to the lack of inadequate funds, human resources, and equipment.

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- Due to the inefficiency of the system, people tend to dump waste on vacant lots, street corners, open areas, and into sewerage system manholes.

- A satisfactory method of disposal does not exist

The following is the average composition of the household wastes from Mahalla El Kobra, expressed in percentages: organic 70, paper 12, plastics 2.5, metals 1.8, bones 0.5, rags 2.7, glass 1.5.

11.2.3 Upper Egypt Cities

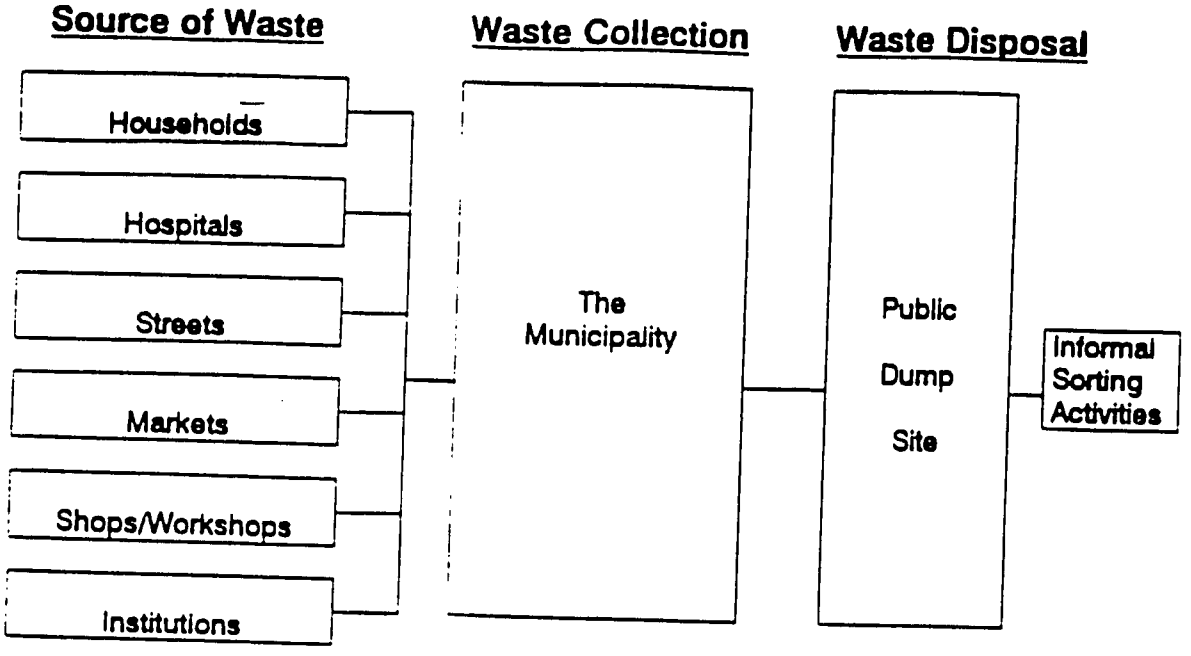
This category includes Kom Ombo, Isna, Armant, Luxor, Darawo, and Nasr City. These cities have similar features regarding life style and waste management systems. Other than in Luxor, the degree of infrastructure in these urbanized areas is not as advanced as in the delta. This applies to roads, water, sanitation, electricity and similar services. The degree of public awareness concerning environmental issues is low compared to those who are living in Cairo or Alexandria. These cities are some distance from the main centers of industry where there are extensive enterprises and systems for the handling of waste components by one way or another.
The rate of unemployment is higher than in delta cities. Waste collection is done entirely by the municipality. Waste material is dumped at uncontrolled sites in the desert area surrounding the cities. There is some sorting at the dump and the site of dust bins for paper, plastic, glass, and metal.

ISNA

Isna is a large markaz in Qena Governorate and is located on the border between Qena and Aswan Governorates. As a rural markaz, the urban population is 43,000 while the rural population is 180,000. It is estimated that 10,000 are employed in the urban areas, and 45,000 are employed in the rural areas, representing a total of 25 percent of the population being employed. The majority of the labor in urban area is concentrated in agriculture, trade and public services.

The amount of waste generated is approximately 0.5 kg/capita/day in the urban areas, and 0.3 kg/capita/day in the rural areas. It is estimated that about 22 tons of solid waste is generated in the urban areas and about 60 tons per day in the rural areas.

The waste management system of Isna is very simply shown on the following flow chart:



The composition of the waste in Isna, expressed as percentages, is as follows: organic matter 65, paper 15, glass 1, plastics 8, metals 1, sand and dust 10.

The main problems in the case of Isna are:

- The rate of waste collection is very low compared to the total waste generated, resulting in large accumulations of solid wastes on the streets and in vacant lots.
- The uncontrolled open dumping creates environmental problems as previously described.

11.3 Proposed Action Plan

11.3.1 Sharm El Sheikh (typical for resort cities)

The following recommended actions are presented with the objective of achieving an environmental sound and financial viable program for solid waste collection and disposal in Sharm El Sheikh:

- It is proposed that the community of hotel and touristic village owners participate in financially supporting a city program for the provision of adequate collection facilities including dust bins, tools, and equipment.
- Provisions should be made to maximize the resource recovery potential of waste by marketing recyclable materials. Consideration should also be given to the potential of separating waste materials at the source to promote recycling, conserve resources, and reduce waste disposal costs.
- Encourage the start of a public relations program to encourage the use of recycling measures. Such a program to be supported by public organizations including the youth of the city.

- Raise the fees levied by the municipality, particularly for the touristic villages and hotels, in order to cover the operating and maintenance costs for solid wastes collection and disposal.

- Construction of a sanitary landfill and the provision of equipment for proper operation. The landfill site should be fenced and equipped with a weigh bridge to control access and to record the amount of waste delivered to the site. A maintenance garage to service vehicles and equipment should be provided. The estimated cost of such a facility with equipment is estimated to be $500,000. The annual cost for operation and maintenance is estimated to be $50,000.

11.3.2 Mahalla El Kobra (Typical for delta cities)

The following recommendations are presented for Mahalla El Kobra, and represent the type of action program to be implemented in cities in the Nile delta.

- It is recommended that the private sector be encouraged to provide the services for solid waste collection serving households, institutions, hospitals, shops, workshops, hotels, and restaurants; while the municipality concentrate on the collection of street wastes.

- Provisions should be made to maximize the resource recovery potential of waste by marketing recyclable materials. Consideration should also be given to the potential of separating waste materials at the source to promote recycling, conserve resources, and reduce waste disposal costs.

- The provision of a composting facility similar to the facilities now in operation in Alexandria, and Damietta. The estimated cost for construction and equipment is $7,000,000. The estimated annual operation and maintenance cost is estimated to be $700,000.

11.3.3 Isna (Typical for upper Egypt cities)

The following recommendations are presented for Isna and represent the type of actions required for other cities in upper Egypt.

- It is proposed than a NGO with funding from an international donor or funding agency organize a program for the collection and sanitary disposal of solid wastes.

- The use of a revolving fund to encourage the development of recycling business by the unemployed. Establish a market for the recovered materials such as plastic, metal, paper, and glass.

- Provision of a sanitary landfill as proposed for Sharm El Sheikh. The estimated cost for construction and equipment is $1,000,000, with annual operation and maintenance cost of $100,000.

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