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**Government of Egypt
Governorate of Alexandria**

**Feasibility Study for Private Sector Participation (PSP)
in the Operation & Maintenance of the Alexandria
Water & Wastewater System**

**AGOSD
NEEDS ASSESSMENT & PRE-FEASIBILITY REPORT
SEPTAGE HANDLING, SITE 9N & TRANSPORT OF
WASTE MATERIALS**

By

SEGURA/IP3 Partners LLC



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**ALEXANDRIA
PRIVATE SECTOR PARTICIPATION IN
WATER AND SANITATION SERVICES
AGOSD
NEEDS ASSESSMENT AND PRE-FEASIBILITY REPORT**

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**ALEXANDRIA
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Executive Summary**

This report has been prepared in response to the direction provided to the consultants at a workshop held on June 3, 2004 with representatives of AWGA, AGOSD, the Secretary General of the Alexandria Governorate and USAID. At the workshop government authorities indicated to the consultants that they would like to follow a long-term approach to PSP and therefore decided to implement, in the short term, service contracts with private operators to fully understand and assess the implications of PSP.

AWGA chose a pilot project for metering, billing and collection services in the western part of its service area (feasibility analysis under a separate report). AGOSD sought advice on how to structure service contracts for (a) septage collection and disposal; (b) operation of Site 9N including composting; and (c) transportation of dewatered sludge and other wastewater byproducts to this site. The pre-feasibility of AGOSD's potential service contracts is developed in this report.

1. Septage collection and disposal.

Consultants have considered two basic alternatives to promote private sector participation in the collection and safe disposal of septage: 1) service contracts; and 2) licensing of private operators.

Service contracts. Under this alternative, AGOSD would delegate the collection and disposal of septage to private operators. The contracts can be structured along two basic options: 1) each area (or branch) is served by a pre-determined number of contractors; or 2) contractors are free to operate anywhere in the city. Under both options, a minimum number of operators should be selected to insure competition. Service fees are determined by AGOSD and operators collect them on its behalf.

Under both options contractors would operate under exclusive service conditions. Therefore AGOSD has to strictly enforce control of "illegal" operators, and to develop regulatory and supervisory functions to ensure that service contracts perform as intended.

AGOSD's organization has had severe difficulties in managing the existing collection and disposal of septage by its own forces, including rent-seeking opportunities that affect its revenues. Therefore, it is unlikely that it will be successful in implementing and monitoring these service contracts whose characteristics mirror, to some extent, existing operations. Moreover, AGOSD lacks adequate operational data on the number and location of septic tanks and frequency of service to make an informed decision on the optimal size of the trucking fleet and thus on service fees to be charged to ensure the financial viability of the operation. The danger if fees are set too low, is that some areas

of the city are not likely to receive service thus encouraging “illegal” operations or rent seeking.

Licensing. This policy approach, widely used in other countries, involves the transfer of responsibility of septic collection and disposal from AGOSD to licensed operators. Operators would keep the fees collected but should be required to pay a tipping fee (determined by AGOSD) to compensate AGOSD for the costs incurred in processing these wastes.

Under this alternative, a pre-selected number of licensed contractors would operate in any area of the city. It is important to promote adequate competition in the market to ensure reasonable prices for service. This competition would eliminate, to a large extent, the need to control prices.

Pre-selection of contractors can be carried out on a competitive basis and based on the initial premium bidders are willing to pay over a minimum preset license fee. Licenses could be granted for two-three years and the license fee established (including the premium in the initial bidding), to cover as a minimum, AGOSD’s regulatory and supervisory functions. At the expiration of the license, AGOSD can use the opportunity to ascertain if additional operators are needed to foster competition and keep prices at a reasonable level.

AGOSD regulatory and supervisory functions include: a) licensing operators; b) monitoring their performance; and c) exercising the right to revoke licenses if operators do not comply with service standards. Under this alternative, AGOSD supervisory functions will be simplified, as it will not be directly involved in the collection and disposal of septage or with the collection of fees.

AGOSD should consider granting licenses to employees now working in this activity in exchange for retiring from service. Such employees could purchase or lease trucks from AGOSD under special terms and conditions. USAID may be able to assist with the financing through its Development Credit Authority (DCA) facility.

The consultants recommend the licensing option as it would eliminate AGOSD’s operating losses and reduce illegal dumping. However, this option would require the creation in AGOSD of a supervisory unit and the training of this staff. This unit would monitor performance of operators and maintain adequate competition to ensure a fair pricing system determined on the basis of supply-demand forces. It is important for AGOSD to improve the quality of existing information, in particular the location of septic tanks and characterization of septage (domestic, industrial and commercial), to reduce information risks detrimental to AGOSD’s interests. The estimated time to implement the licensing option is about 8 to 9 months.

2. Operation of Site 9N.

There are two basic alternatives to delegate the operation of site 9N to a private operator: a management contract and a lease contract. These two alternatives are quite similar in scope but differ in the way decisions are made to price and sell compost and other by-products, on the risks assumed by the contractor on the sale of compost and on the bidding strategy.

Management contract. This contract can be structured for a 5 to 10 year period and interested contractors bid on the fee to manage the operation. Under this contract, pricing decisions are made by AGOSD, and the main responsibility of the contractor is to operate the facilities as specified in the bidding documents. Marketing decisions can be delegated to the operator including incentives to reward its efforts to improve sales and reduce costs. Investments, replacement, and maintenance costs are the responsibility of AGOSD. It is possible however, to structure the transaction assigning some of these costs to the operator, but this decision is likely to extend the length of the contract, increase the management fee or both.

Leasing contract. This contract can be structured for a 10 to 15 year period, and interested contractors will bid on an annual fee to be paid to AGOSD for the use of this facility, including the equipment. Leasing fees can be tailored to benefit AGOSD in response to the financial performance of the operator.

Under this alternative, sales and price decisions are the responsibility of the private operator as well as investments (like reception facilities to handle septage and other improvements deemed necessary) and maintenance costs.

Consultants recommend to AGOSD the lease alternative as it gives more incentives to the private operator to fully optimize the use of this facility, to be more proactive in the search for new customers and products (such as enhancing compost by adding nutrients such as potassium) and to tailor prices to competitive products. These advantages, in turn should benefit AGOSD as it can expect higher financial returns from the leased operation.

The consultants also recommend that AGOSD makes an effort to improve the information including projections of the supply of different waste materials to site 9N. The consultants estimate that about 7-8 months are required for the full implementation of this option.

3. Transport of waste materials to Site 9N.

Transportation of waste by-products and operation of site 9N are two different types of businesses that require different managerial skills and equipment. Moreover, transportation costs of dewatered sludge, scum and grit are significant compared to the operating costs of Site 9N.

Consultants recommend not to incorporate the transport of these materials into the operation of site 9N, since this could make the combined contract not financially attractive and will likely limit competition to the detriment of AGOSD.

Nonetheless, AGOSD has two basic options to deal with the transport of these materials from the wastewater treatment plants, sewage pumping stations, and sewer cleaning operations to Site 9N: 1) transporting these materials using its own resources; and 2) delegating this activity to private operators under separate service contracts.

In both cases, there is a need to develop contractual operational arrangement between AGOSD and the Site 9N operator; for instance, minimum quantities of materials delivered to the site and hours of delivery.

Alternative one is a continuation of present practices where the possibilities of cost reductions are not obvious. Alternative two presents coordination issues between the operator and AGOSD. AGOSD needs to decide on the use of transport and handling equipment that contractors would be operating. AGOSD can also delegate maintenance costs of the vehicles to operators. Option two offers the potential for cost reductions through competition for and within the market and therefore, our consultants recommend it. The time required to implement the recommended option is about 6 months.

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“The city of Alexandria... situated at the crossroads of cultural and economic traffic between the Middle East and Europe enjoys a unique advantage among Mediterranean cities... Alexandria has been a vibrant center of intellectual interaction, scientific research and medical sciences since its foundation in the 3rd century BCE by Alexander the Great.”¹

Section A. Water and Wastewater services

1. Background

The first two reports submitted by SEGURA IP3 consultants, provided information to the authorities in Alexandria, the newly created holding company under Presidential Decree 135 and AWGA and AGOSD officials with options to attract private sector participation (PSP) in the sector, as well as policy recommendations to help further improve the quality and efficiency of services. During a workshop held on June 3, 2004, government authorities indicated to the consultants that they would like to follow a long-term approach to PSP and therefore decided to implement, in the short term, service contracts with private operators to fully understand and assess the implications of PSP. AWGA indicated its interest in a metering, billing and collection contract in a pilot area (analyzed under a separate report). AGOSD indicated that it would like to consider the following operational contracts:

- Collection and disposal of septage in the city of Alexandria.
- Operation of Site 9N disposal facility for wastewater by products and composting and
- Transport of wastewater by-products to this site.

¹ From exhibit at the Library of Alexandria.

2. Purpose of the report

This report evaluates, at the pre-feasibility level, the potential participation of the private sector in service contracts for the AGOSD services indicated above, and the needs assessment to develop these contracts. The report also presents recommendations to implement them successfully.

3. Overview of the service area

Given the close interaction between water supply and sewerage services, managed by AWGA and AGOSD respectively, this section has been developed to provide the reader with an overview of both services and organizations in Alexandria.

3.1 Alexandria and surrounding communities

The city of Alexandria is built on a strip of land that separates the Mediterranean from Lake Mariout on the south, and the peninsula forming harbors east and west. Alexandria is situated on the western part of the Nile delta some 210 kms from Cairo.

Alexandria’s metropolitan area harbors a population of some 4.5 million that represents about 6 percent of the total population of the country. By the year 2022, population is projected to increase to 6.8 million². The city of Alexandria proper has a population of some 3.7 million, projected to increase to about 6 million by 2022 (Table 1A).

Table 1 A. Population in the service area

Year	Population – millions				
	Year Round				Total
	Alex.	Matruh	Beheira	Total	Peak Summer
2000	3.69	0.22	0.24	4.14	4.78
2007	4.51	0.27	0.29	5.07	5.22
2012	5.01	0.32	0.32	5.65	7.09
2017	5.52	0.37	0.36	6.25	7.88
2022	6.01	0.43	0.42	6.86	8.45

Source: Water Master Plan (cited)

Note: Totals may not add because of rounding.

² Camp, Dresser and McKee. Water Master Plan, 2000

The city, known for its mild climate both in summer and winter as well as its extensive and pleasant beaches, has developed a vibrant tourism industry that attracts over 1 million visitors during the summer months. In addition, the city has a growing industrial complex that includes cement, steel and petrochemical factories and paper, textile and electronics. These industries represent about one third of industries in Egypt.

4. Drinking water supply services

4.1 Institutional arrangements

Brief history and current status. Two private water companies provided water supply services in Alexandria until 1867, when the government of Egypt bought one of the companies. A few years later (1879) the government sold its water supply installations to the private company and the Alexandria Water Company became the sole provider of water services in the city. Years later, in 1961, the government nationalized the Alexandria Water Company, and in 1968 it created the Alexandria Water General Authority (AWGA), reporting to the Ministry of Housing, Public Utilities and Urban Communities (MH) (Presidential Decree 1639/1968).

On April 2004 the government issued two presidential decrees (135 and 136) establishing a national holding company and a regulatory agency for the water supply and sanitation sector. AWGA became one of the fourteen subsidiaries of the holding company. Both the holding company and the regulatory agency report to the MH and are headquartered in Cairo.

AWGA, with the help of consultants financed by USAID (PA Government Services), is actively working to improve, among others, information systems and automation of meter reading, billing and collection.

4.2 The services

AWGA provides services to Alexandria, Marsa Matruh, and parts of the Beheira Governorate. The area of service is quite extensive as it stretches 340 kms from east to west and 125 kms to the south.

AWGA's sources of water are the Mahmodia and Noubaria canals fed by the Rosetta branch of the river Nile. Water is treated in eight treatment plants with a total design capacity of 3.2 million m³/day (mM³/day) (Table 2A). Drinking water quality meets government standards; however, intermittent service in some areas as well as the extensive use of house water storage tanks compromise water quality³.

³ Concerns about water quality have led many countries to ban the use of house storage tanks. (G. Yepes, Ringskog, K. Sarkar, S. The high costs of intermittent water service. Journal of Indian Water Works Association, April-June 2001).

Table 2 A. Water Treatment Capacity and Utilization (2003)

Water treatment plant	Average flows, (000) m3 per day		
	Design capacity	Operation	Utilization %
1. Siouf	980	605	62
2. Rond Point (Bab Sharki)	720	380	53
3. Manshiya	380	515	136
4. Maamoura	260	125	48
5. Nozha	180	(not operational)	0
6. Noubaria	315	275	87
7. Borg El Arab	566 a/	335	103
8. Forn El Geraiya	50	40	80
TOTAL	3,450	2,275	66

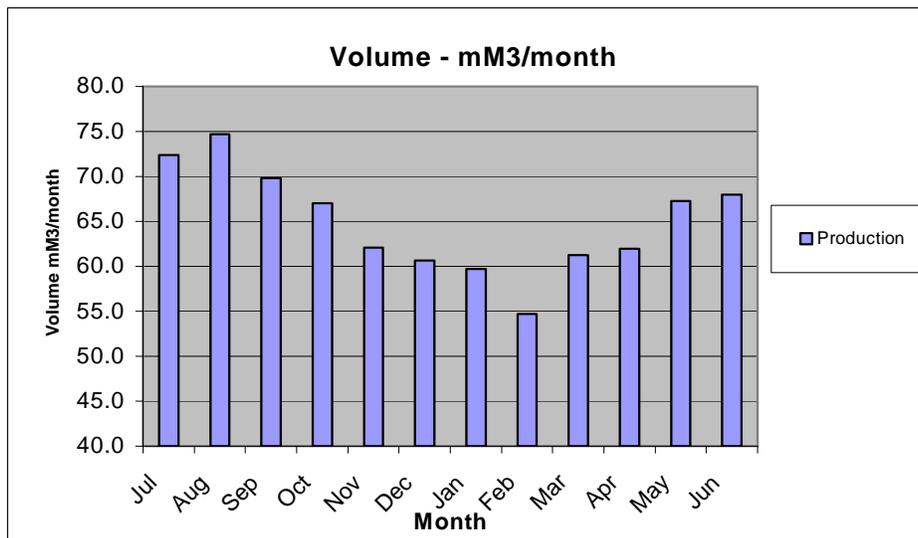
Source: AWGA

a/ Expanded capacity entering into operation in June 2004.

Water production varies seasonally, being the highest in the months of July to September and the lowest in January to March (Graph 1A).

The Water Master Plan indicates that projected population growth in Alexandria and other cities points out to an “increased competition for water in the Nile and its canal system” and that water withdrawn by AWGA being downstream of almost all other users is “seriously threatened from both a water quality and quantity perspective”.

Graph 1 A. Average Water Production (2000-2003)



Close to 99 % of the population is connected to the water distribution system; but some areas of the city receive water less than 24 hours a day or at low pressures. The distribution system is a network that includes 6,500 kms of water mains with diameters from 75 mm to 1,500 mm; 43 pumping stations and 250,000 m³ of storage capacity. Most of consumption is metered but it is estimated, according to AWGA, that about 5% of meters are inoperative. In the last four years (2000-2003) water losses have remained at about 37 % of production.

Table 3A shows some of the main operational indicators of the water distribution system.

Table 3 A. Water Distribution Network Operational Indicators

Indicator	AWGA	Other cities ^{4/}
Mts of pipe/account	6.7	6 – 24
Storage capacity/account; m ³ /acc.	0.3	0.7 – 3.0
Water losses; %	37	< 20 (best practice)
Pipe bursts; total per 100 km/year ⁵	630	<20 (best practice)

These indicators suggest:

- A densely populated area reflected in the low level of meters of pipe per account;
- A low volume of storage capacity that may be hindering an adequate operation of the distribution system;
- A high level of pipe bursts (distribution and house connections) that argue the need for a more pro active maintenance program; and
- A high level of water losses (physical and commercial) that should be of concern.

Customer services are decentralized in 12 branches (Table 4 A). Most meters are read every two months, but AWGA management is considering reading meters monthly. Service bills are delivered and collected by AWGA staff.

⁴ Yepes, Guillermo & Augusta Dianderas. Water and wastewater utilities. Indicators. TWUWS, The World Bank. 1996.

⁵ Based on information on ten branches. Not including Borg El Arab and Sahel.

Table 4 A. Service Branches

Branch	Service accounts (2003) (thousands)
Abukir	24
Mandara	148
Sidi Bishr	133
Ramleh	147
Ibrahimieh	88
Balad	63
Maharram Bey	92
Gabbary	71
Agamy	87
Ameriya *	74
Borg el Arab *	24
El Sahel (north coast) *	27
Total	978

Source: AWGA

Notes: 1. Totals may not add because of rounding.

2. AWGA's branches for the pilot metering project are marked by an asterisk.

4.3 AWGA's finances

Past financial performance. During the period 2002-2004 AWGA has done a good job in balancing its cash flows so as to be able to service most of its debt⁶ and to cover its cash operational expenditures. Most AWGA investments are financed with loans from the National Investment Bank. A smaller portion is financed by grants and customer contributions to investment.

AWGA's bill collection effectiveness varied from 85% (2002) to 74% (2003) and 78% (2004). The weighted average for the three years is 79% (this efficiency indicator has been calculated as total collection in the year divided by billing in the same year).⁷ Further information on AWGA's financial performance is shown in Attachment 1 A.

Tariffs. The tariffs per cubic meter vary according to the type of customer, as shown in the table below and in Attachment 3A.

⁶ A portion of the interest owed by AWGA to the National Investment Bank is converted into long-term debt. Of an average yearly interest of L.E. 41 million, L.E. 13 million/year has been converted into long-term debt between FY 2002 and FY 2004.

⁷ Bill collection effectiveness as a percentage of the sum of the amount billed during the year and the accounts receivable at the beginning of the year was: 44% (2002); 42% (2003); and 39% (2003).

Table 5A. Tariff Structure ⁸

Type of Customer	Tariff Range	Sewerage surcharge
	P.T./m ³	%
Domestic	23-35	35
Non domestic	42-100	35-70
Companies and enterprises	70-80	70
Tourism industry and private hospitals	115	70
Government housing	300-600/month	-
Government	65	70

Notes: P.T.: Piasters

5. Wastewater services

5.1 Institutional arrangements.

Brief history and current status. Until late in the nineteen century, Alexandria wastewaters were discharged into near drains. In 1908, the city wastewater facilities were planned as a combined sanitary/storm system for the area now known as “downtown”. A separate sewer system was proposed for the northern area.

The government of Egypt established in AGOSD (Alexandria General Organization for Sanitary Drainage) in 1979, to provide wastewater collection, treatment and storm drainage system for the city of Alexandria and its surrounding areas.

AGOSD’s wastewater collection and disposal system serves some 83 % of Alexandria population and includes:

- A pipe collection network of 2,390 kms with diameters between 200 and 2,750 mms
- Seventy two (72) pumping stations;
- Two primary wastewater treatment plants with a design capacity of 1.20 million m³/day. Sludge from both plants is dewatered at the West treatment plant; and
- Site N9 for the reception and disposal of waste by-products transported by truck. Composting operations also take place at this facility.

⁸ Effective since June 2003.

Treated and untreated wastewater flows are discharged into Lake Mariout, south of the city, without complying with the provisions of Law 48, which establishes standards for wastewater effluents and mandates secondary treatment, chlorination and post aeration⁹. Lake Mariout is a shallow body of water with a total area of some 5,000 hectares. Population living close to Lake Mariout is affected by foul odors.

5.2 AGOSD’s finances

Past financial performance. AGOSD’s cash flows have been clearly insufficient to cover its cash requirements. This is the result of tariff levels, which are insufficient to cover even its cash operational expenditures. AGOSD’s cash deficits have been covered by government contributions to finance current expenditures and by arrears on its debts with the National Investment Bank. As in the case of AWGA, AGOSD finances its capital expenditures program with loans from the National Investment Bank. AGOSD’s financial statements are shown in Attachment 2 A.

Tariffs. As indicated before, AGOSD tariffs are calculated as a percentage of the water bill and the resulting charges are included in AWGA’s bills. AGOSD’s sewerage charges range from 35% to 70% depending on the type of customer (Table 5A and Attachment 3A).

6. Future demand for water and sewer services

The Water Master Plan (cited) projects a “significant growth along the periphery of Alexandria City, in Ameriya and west of Alexandria. New highways around the city, new industrial zones in Ameriya and Borg El Arab City, and tourism development to the west will all drive future growth”

The projected population and water production growth is presented in Table 6.

Table 6 A. Population and Water Production Projections

Year	Population (millions)		Maximum day demand (000 m3/day)
	Average	Peak summer day	
2000	4.14	5.22	1,950 a/
2007	5.07	6.30	2,800
2012	5.65	7.09	3,200
2017	6.25	7.88	3,600
2022	6.86	8.45	4,040

Source: CDM Master Plan (cited)

a/ Average production (AWGA)

⁹ WWGC. Alexandria Wastewater Program. Master Plan Update 1992.

It is worth noting that the Wastewater Master Plan of 1992 (cited) projects for the year 2020 a population of 4.1 million for the city of Alexandria alone. This projection is substantially lower than the projected population under the Water Master Plan of 6.0 million in 2022, which would suggest the need to update the wastewater master plan.

7. Investment requirements

Recent updates of investment needs¹⁰ indicate that in order to meet full service levels by 2022 AWGA will need to invest some L.E. 4,900 million. Similarly AGOSD will need to invest L.E. 3,300 million over the same period.

Based on these recent investment estimates, consultants have estimated the economic and financial costs (Average Incremental Cost-AIC-)¹¹. Economic costs are presented in Table 7A.

Table 7A. Economic costs of services, L.E. per m³

Service	AIC	O&M	Total costs
Water supply	1.20	0.22	1.42
Sanitary drainage	0.80	0.09	0.89
Water and drainage	2.00	0.31	2.31

Source: Policy Statement, June 2004

Clearly, both AWGA and AGOSD face a daunting challenge to recover all costs, meet projected demand and improve the quality of services.

¹⁰ CDM: Water Master Plan for the Alexandria Water General Authority, 2000; and Nathan-Deloitte: Alexandria Water and Wastewater PSP project. November 2002

¹¹ SEGURA-IP3. Alexandria Water and Wastewater Services. Policy Statement, June 2004.

Section B. AGOSD's Projects Pre-feasibility analysis

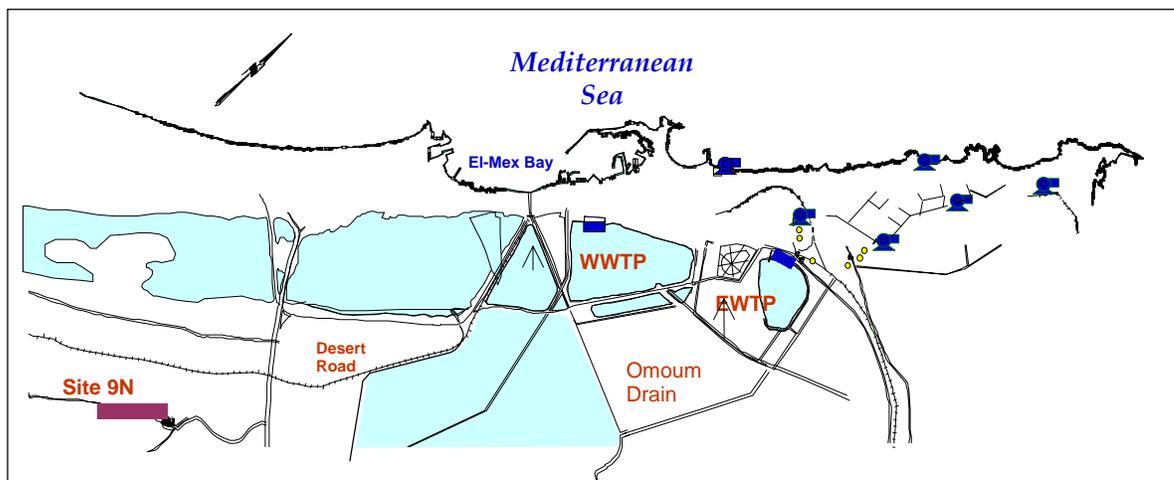
1. Project objectives

AGOSD has identified three operational activities where it would like to assess the viability of private sector participation (PSP) through service contracts:

1. Collection and disposal of septage
2. Operation of Site 9N waste disposal facility for wastewater by-products and sludge composting; and
3. Transport of waste byproducts to site 9N.

This pre-feasibility report elaborates on potential private sector options and on the needs assessment to carry these PSP projects forward. It also presents recommendations to fully develop these projects to elicit a responsive and competitive participation of private operators. These projects can be structured to provide incentives to the private operators to reduce AGOSD costs and/or increase revenues, and to affect AGOSD labor force as little as possible.

Map 1B. Location of main wastewater treatment plants and Site 9N



Source: Metcalf & Eddy (Alexandria)

2. Project 1. Collection and disposal of septage

2.1 Background

AGOSD provides collection and disposal of septic tank waste to residents and business within its area of operations on a fee basis.

This activity was assessed by CH2MHILL in a 2000 report (the report)¹². The report estimates that there are about 180,000 septic tanks¹³ in Alexandria, most of them serviced by an AGOSD fleet of some 140 trucks of varying size¹⁴. Septage collection and disposal is also provided by an unknown number of private operators whose operation is considered illegal.

AGOSD trucks are dispatched on a request or pre-set schedule basis to pump out the contents of septic tanks (assumed in the report as once a year on average) and deliver the waste material to authorized receiving sites. However, the report indicates that “in some cases, sewage is discharged directly into the sewer system at street manholes sites”, with undesirable consequences on the operation of the sewerage system. The consultants understand the situation today has changed little as not all septage is discharged to the sewerage collection system with possible illegal discharges to local waterways. This outcome likely applies also to illegal operators.

The report also indicates that AGOSD’s septage program is also affected by “a general lack of detailed operations” and suffers from “the absence of an accounting system which does not permit concise control systems to exist or provide accountability to [its] managers”. The report also recognizes that in spite of assistance received from AGOSD personnel, “it was necessary to proceed with minimal data. This was particularly true in determining the number of septic systems in the service area and the detailed cost for [the] vehicles assigned to the septic program”. These information shortcomings persist today.

The present outcome of the septage operation strongly suggests that AGOSD has severe limitations to control the staff in charge of providing this service, as well as the safe discharge of the septage. It is also clear, as discussed further in this report that this

¹² CH2MHILL. Privatizing the AGOSD Septic System, Cleaning & Hauling Program. January 2000.

¹³ Other estimates put this figure at 200,000. However, it is likely that there are fewer septic tanks today as the population served by a sewer connection has increased from about 80% in 1999 to 87% in 2003. The number of septic tanks to be serviced in the future will be affected by AGOSD’s investment decisions related to the expansion of the sewerage network.

¹⁴ The number of trucks and equipment, as of August 2004, is reported as 206: 116 suction trucks; other trucks 53; miscellaneous equipment including loaders and cranes: 37. However, some of this equipment is used for the transport of other waste materials (e.g. grease). No detailed information is available on the condition of this fleet. A rapid inspection in two zones (East and Middle) indicated that 10 vehicles, out of a total of 43 vehicles, were not operational (23%).

operation, as presently implemented, represents a heavy drain on AGOSD financial resources.

2.2 Private sector participation alternatives

Consultants have considered two basic alternatives to promote private sector participation in the collections and safe disposal of septage: 1) service management contracts; and 2) licensing of private operators.

2.2.1 Service management contracts

Under this alternative, AGOSD would delegate the collection and disposal of septage to private operators. These contracts can be structured along two basic options:

1. Each area (or branch) is served by a pre-determined number of contractors¹⁵ and trucks to foster competition.
2. Contractors are free to operate anywhere in the city.

Under both options contractors charge the price defined by AGOSD (under clear and specified criteria), operate under exclusive service conditions and collect fees on behalf of AGOSD. Contractors, in turn would be paid by AGOSD for services rendered.

AGOSD main responsibilities would be to: a) control “illegal” operators; and b) supervise operations and enforce applicable laws and regulations to ensure that service contracts perform as intended, including the safe disposal of septage.

Under present conditions, service management contracts can be problematic to implement as:

1. AGOSD’s organization is not adequately prepared to monitor payments to contractors and thus to ensure that it will receive all the proceeds from this operation.
2. AGOSD lacks adequate operational data on the number and location of septic tanks and frequency of service to make an informed decision on the adequate size of the trucking fleet. However, this decision will affect the financial viability of the operation¹⁶. Moreover, AGOSD is also in a weak position to determine, ex-ante, the service fee operators can charge in each area. In particular, if fees are too low it risks that some zones will not receive service, thus encouraging “illegal” operations or rent seeking.

¹⁵ Contracting this service with only one operator for the whole city or for one particular zone will remove any competition in the market to the detriment of service.

¹⁶ For instance, the report estimates that a fleet of 150 trucks is necessary (assuming 180,000 tanks emptied per year, four round trips per truck per day and 300 working days per year); but if the number of serviced tanks is halved the number of trucks would be cut in half.

2.2.2 Licensing

This alternative, also involving the private sector, is widely used in many countries¹⁷. Under this alternative, a pre-selected and adequate number of licensed contractors, to promote competition for services, operate in any area of the city. This competition is essential to ensure good services and to eliminate, to a large extent, the need to control prices¹⁸. Service fees are collected and kept by the licensee and AGOSD receives the license fee.

The license fee can be established to cover as a minimum, AGOSD's regulatory and supervisory functions. Selection of contractors can be carried out on a competitive basis and based on the initial premium bidders are willing to pay over a minimum preset license fee. Licenses could be granted for two to three years.

AGOSD should have the right to revoke the license at any time for lack of compliance with operating norms, including serious complaints from customers (reasons for revoking the license need to be clearly spelled out). At the expiration of the license, AGOSD can use the opportunity not to renew the license of poor performers and to ascertain if additional operators are needed to foster competition and keep prices at a reasonable level.

Under this alternative, AGOSD supervisory functions will be simplified, as it will not be directly involved in the collection and disposal of septage or with the collection of fees. Its primary role will be as grantor of the licenses and regulator and supervisor of service quality.

AGOSD should consider granting licenses to its employees working in this activity, in return from them leaving the company, and to lease or sell them the vehicles under special terms and conditions. USAID may be able to assist with the financing through its Credit Development Facility (CDF).

Under both alternatives AGOSD needs to define:

1. The number of trucks, if any, that it is prepared to lease or sell to interested operators, and
2. The relocation of staff working in this service, or the conditions imposed on operators for the incorporation of this manpower in their labor force.

¹⁷ Consultation with our legal advisor indicates that AGOSD can receive authorization from government authorities to exercise the regulatory functions associated with this alternative.

¹⁸ The exception could be in the initial 2-3 years of the contract to ensure a smooth transition and wider acceptance of users to the license system.

For the latter, the private operator should have full control over these employees. Otherwise, protracted discussions are likely to occur, as inadequate control of personnel is detrimental to the efficiency and quality of service.

2.3 Safe disposal and environmental aspects

Septage wastes pose several environmental risks that require careful handling and disposal. Septage, particularly from industrial or commercial activities can contain harmful or toxic substances to humans, crops and the environment at large. Similarly wastes from hospitals can contain highly infectious virus and bacteria and radioactive materials¹⁹. Nonetheless, a systematic characterization and monitoring of septage program from these institutions needs to be developed and enforced (law 37 of 1967)²⁰, and non-approved establishments should be mandated to dispose these wastes at specified sites and under tight and controlled conditions.

Consultants were not able to obtain information on the characterization of septage material in Alexandria. For information purposes only, information on the characteristics of domestic septage is presented in Attachment 1B (Table 1B) with typical values in the United States.

Existing AGOSD sewerage infrastructure provides several non-exclusionary alternatives for the proper disposal of septage; they include:

1. Addition to both wastewater treatment plant head works²¹.
 - At a point immediately upstream of the screening and grit removal processes, or
 - At selected manholes to large drainage pipes upstream of the treatment plants (current disposal practice in Alexandria).

In this alternative, it might be necessary to impose septage discharge restrictions at each wastewater treatment plant, to prevent overloading or operational disruptions.

2. Disposal at Site 9N
Septage would be delivered to a holding pond to improve dewatering²² and handling at peak flows.
3. Direct addition to the sludge dewatering facility.

¹⁹ The factor that differentiates commercial and industrial from domestic septage is not the type of establishment generating the waste; rather it is the type of wastage being produced.

²⁰ The Ministries of Agriculture and of Environmental Affairs regulate the disposal of these wastes.

²¹ A survey in California (California Wastewater Training and Research Center, December 17, 2002) indicates that more than 90% of total septage is disposed at wastewater treatment facilities.

²² Septage receiving ponds can be operated as evaporation ponds to promote dewatering; the remaining solids can undergo additional decomposition in the pond and then composted.

Direct addition of septage to the dewatering facility reduces the loading to the primary treatment process thus eliminating potential problems that could affect the quality of the primary treatment system. However, as septage is resistant to dewatering, it can also complicate the operation of the MDF and increase the wear of pumps, if septage is not previously screened and de-gritted.

Alternatives 1 and 2 are the most promising and should be studied in more detail to determine the location, characteristics of receiving facilities and loading parameters. Consultants cannot recommend alternative 3 at this time for lack of adequate operational information. If this alternative is of interest to AGOSD, consultants suggest field tests for a representative period of time (3-6 months) to assess its overall feasibility.

2.4 Financial considerations

The CH2MHILL report also indicates that AGOSD was charging in FY-99, on average, L.E. 10 to 25 per service or about L.E. 2.5 to 3.00 per m³ (since L.E. 3.25 per m³ and up per service). In contrast, and according to unconfirmed reports, private operators charge, on average, for the same service about L.E. 100 per trip (about L.E. 25 per m³).

The report estimates that in 1999 the cost of this service for AGOSD was about L.E. 7.3 million per year (1999 prices) and actual revenues L.E. 600,000, for a net loss of L.E. 6.7 million. More recent information seems to confirm that there has been little change; in FY 2004 for instance, operating costs were reported as L.E. 7.7 million; no information was available on revenues.

The report assumes that septic tanks are emptied, on average once a year. Therefore, the difference between actual (L.E. 600,000) and potential revenues (L.E. 1,800,000 ~ 10 x 180,000) suggest several possibilities: 1) rent seeking; 2) a much lower number of septic tanks to be served or emptied per year; 3) a significant number of “illegal” operators”; or 4) a combination of the three.

Unconfirmed reports indicate that indeed there are rent seeking opportunities associated with this service as AGOSD operators are said to charge about L.E. 50 (2003) per service and keep the difference. These reports also indicate that staff under informal arrangements, perform some maintenance on the trucks at their cost.

A cost-benefit optimization is particularly sensitive to the distance between septage collection and disposal (see Attachment 2B), the number of septic tanks and volume emptied per year. Therefore with the scant information available, the financial viability of the two proposed alternatives and the impact on potential private operators and AGOSD cannot be developed with any degree of confidence. For instance, using the report's assumption of septic tanks emptied on average every year, an average fee of about L.E. 40 per trip would cover AGOSD operating costs (1999 prices) and most likely those of a private operator, from whom a better operational efficiency should be expected. However, if the fleet remains unchanged and the tanks were to be emptied every two years on average, the average fee would double to about L.E. 80 per trip.

2.5 Recommendations

SEGURA IP3 considers that the licensing alternative is the most desirable option for AGOSD. This alternative has major advantages over a service contract approach, including:

1. AGOSD will be able to cut operational losses of over L.E. 6 million per year almost immediately.
2. AGOSD does not need to control prices, as the presence of an adequate number of certified operators will promote competition in the market and thus fair pricing.
3. AGOSD needs only to create a supervisory unit to provide information to potential users and receive feed back from them, and to ensure that that licensed operators meet required standards of service, and customers receive a satisfactory service.
4. The licensing fee can be easily adjusted to cover the cost of the supervisory unit and even produce a surplus for AGOSD.
5. Illegal operators can be brought under control, as licensees will likely report them to proper authorities.
6. The period of time between license renewals can be set to promote healthy competition

If this alternative is selected AGOSD needs to:

1. Develop a regulatory framework and operating policies and the organization and functions of the supervisory unit.
2. Determine the level of tipping fees that private operators should pay at points of discharge to cover handling costs at receiving stations.
3. Make an informed decision about the possible auction or leasing of unneeded service trucks to potential licensees.
4. Develop a political acceptable policy to deal with staff working in septage collection activities.

2.6 Needs assessment and next steps

To proceed with the licensing of private operators for septage collection and disposal AGOSD needs to start developing reliable information and clear policies of engagement. The main areas where additional preparatory work is needed are presented in Table 1B.

Table 1B. Septage, Needs assessment

Area Information & policy	Scope of work
<i>Census of septic tanks</i>	<ul style="list-style-type: none"> ○ Location and volume ○ Projections (say 10-15 years) to ascertain the effect of further development of the sewerage system on the number of septic tanks.
<i>Characterization of septage</i>	<ul style="list-style-type: none"> ○ Domestic, industrial and commercial
<i>Septage points of discharge</i>	<ul style="list-style-type: none"> ○ Preliminary design of facilities to minimize environmental effects ○ Control of discharges ○ Tipping fee
<i>Truck fleet</i>	<ul style="list-style-type: none"> ○ Condition of fleet ○ Decision on number of trucks AGOSD is willing to sell or lease and conditions
<i>Staff policy</i>	<ul style="list-style-type: none"> ○ Relocation of staff ○ Incorporation of staff by operators
<i>Regulation</i>	<ul style="list-style-type: none"> ○ Regulatory policy ○ Handling and disposal of hazardous waste ○ Licensing – rights and obligations – ○ Licensing procedures ○ Creation and staffing of supervisory unit ○ Training requirements

The estimated time to develop this information is present in Table 2B

Table 2B. Preparation timetable

Activity	Time, months								
	1	2	3	4	5	6	7	8	9
Census of septic tanks	≡	≡	≡	≡	≡	≡			
Characterization of septage			≡	≡	≡				
Septage points of discharge				≡	≡	≡			
Truck fleet					≡	≡	≡		
Public awareness campaigns				≡	≡	≡	≡	≡	≡
Staff policy						≡	≡		
Regulation					≡	≡	≡		
Transaction and implementation							≡	≡	≡

Consultants recommend that AGOSD undertake in earnest and with its own forces: a) the census of septic tanks (in close coordination with AWGA)²³; and b) characterization of septage. The timetable presented in Table 2B assumes that all activities indicated will start once AGOSD has taken a firm decision to proceed along the recommendations made in this report. Taking into account overlaps with other preparation activities, the consultants estimate that the total time needed to bring this project to bidding status is about 9 months.

3. Project 2. Operation of Site 9N

3.1 Background

Site 9N is located some 40 kilometers south west of WWTP (Map 1B) and has an area of about 150 hectares (360 feddans). Facilities at the site include administration building, warehouse, maintenance area, operational equipment and pilot green areas. Some 60 staff works at this facility.

Site 9N receives dewatered sludge, grit, scum and screenings from the two major wastewater treatment plants (East and West) and sewage pumping stations, as well as oil, grease and screenings from industries and commercial establishments. Grit and scum loads represent about 25 percent of the total handled at this site. Site 9N could also be adapted to receive and compost septage.

²³ This information should be incorporated into the billing and collection system, and thus benefits both AWGA and AGOSD as illegal connections will be identified in the process.

Operations at Site 9N include: a) composting of dewatered sludge transported by truck from the mechanical dewatering facility (MDF)²⁴ at the West wastewater primary treatment plant (WWTP); b) grit treatment; and c) sanitary landfill of for industrial wastes. One of the local uses of compost and treated grit is to improve the conditions of calcareous soils, common in the area.

The manager of Site 9N operations indicated that during FY 2004, this site received from AGOSD's operations about 300 tons/day of dewatered sludge, 30 m³/day of grit, 20-30 m³/day of screenings and 20 m³/day of scum. It also received about 20m³/month of industrial wastes, mainly from three companies. Indicative information of sewage flows at the two wastewater treatment plants and sludge received and processed at the MDF and quantities of other waste material generated in other sewerage operations is presented in Attachment 1B (Tables 2B and 3B). As indicated in the previous section, the volume of septage is not known as there is no reliable information on the number and volume of septic tanks in the area and how often, on average, they are served.

3.2 Composting²⁵

In this method of treatment, dried sludge and septage are mixed with a bulking agent (e.g., wood chips, sawdust) and aerated mechanically or by turning. During the composting process, the biological activity generates temperatures that are sufficiently high to destroy pathogens and transform the waste into a stable, humus material that can be used as a soil conditioner. To avoid odor problems, this process needs to be carefully monitored and operated. During FY 2004, some 30,000 m³ of compost were produced at this site²⁶ and 100,000 m³ were sold (compost reserves were reduced).

3.3 Private sector alternatives

There are two basic alternatives to delegate operation of site 9N to a private operator: a) a management contract, and b) a lease contract. These two alternatives are quite similar in scope but differ in the way decisions are made to price and sell compost and other by products, and on the bidding strategy.

²⁴ Raw sludge from the East wastewater primary treatment plant (EWTP) is also pumped to the MDF. This facility is being rehabilitated.

²⁵ The Ministry of Agriculture regulates the application of compost to crops.

²⁶ The manager of Site 9N indicated that the ratio of compost produced to dewatered sludge is about 1:4

Management contract. This contract can be structured for a 5 to 10 year period and interested contractors bid on the fee to manage the operation. Under this alternative, pricing decisions are made by AGOSD.

The main responsibility of the contractor would be to operate the facilities as specified in the bidding documents. Marketing decisions can be delegated to the operator including incentives to reward its efforts to improve sales and reduce costs. Investments, replacement, and maintenance costs are the responsibility of AGOSD. It is possible however, to structure the transaction to assign some of these costs to the operator, but this decision is likely to extend the length of the contract, increase the management fee or both.

Leasing contract. This contract can be structured for 10 to 15 year period, and interested contractors will bid on an annual fee to be paid to AGOSD for the use of this facility, including equipment. This fee can be set to provide additional benefits to AGOSD if operating results are substantially better than anticipated and adjusted periodically for inflation.

Under this alternative, sales and price decisions are the responsibility of the private operator as well as investments (like reception facilities to handle septage and other improvements deemed necessary) and maintenance costs.

3.4 Financial considerations

The operating manager of this site indicated that during FY2004 some 100,000²⁷ m³ of compost were produced. Production costs for FY 2003 are presented in Table 3B:

Table 3B. Site 9N operational costs

Concept	Cost in L.E. (000)	Cost as %
Salaries	896.7	39
Power, fuel and oil	85.0	4
Spare parts and materials	61.6	3
Other, miscellaneous	22.0	1
Depreciation	1,245.3	54
Total costs	2,310.6	100

²⁷ Other reports from AGOSD indicate a compost production of 116,000 m³ for the same year

These operational costs do not include L.E. 5.14 million in transport costs of the dewatered sludge from the MDF. Operational revenues were L.E. 0.95 million (unit prices vary from L.E. 10 for large quantities to farmers or big clients that constitute more than 99% of sales to L.E. 15 for small quantities to individuals)²⁸.

These numbers suggest that under a stricter control by a private operator this operation could break even for compost prices around L.E. 20-25 per m³ and would be profitable if compost can be sold at higher prices. However, to set realistic bidding conditions and reduce risks, there is a need to have better information on the supply and demand (market assessment) to assess the sales potential of a full-fledged operation. This market analysis should include price comparison with alternative fertilizer products as well as an input analysis to ascertain with greater confidence the amounts of dewatered sludge and septage that can be expected during the life of the contract.

In addition to the market assessment, the financial and economic viability of such contract can be enhanced if:

1. A tipping fee for the reception of septage, grease and any other acceptable waste material is imposed (most likely this would be determined by AGOSD as there is no competition for this service)
2. Reception of waste materials is open to other governorates; and
3. AGOSD can guarantee a minimum amount of dewatered sludge and enforce adequate disposal of septage.

3.5 Recommendations

Contracting the operation of Site 9N and the production of composting can be a win-win situation for AGOSD and a private operator. AGOSD can benefit financially from a more efficient operation and a more aggressive marketing approach. A private operator can also bring needed know-how and more streamlined management practices that are likely to reduce costs and thus increase net revenues. On the other hand, AGOSD's supervisory functions would be simplified if the operator is given a free hand to decide on the selling price of its products or production of enhanced compost.

Based on this pre-feasibility analysis, the consultants recommend therefore adopting the lease alternative as it gives more incentives to the private operator to fully optimize the use of this facility including equipment, to be more proactive in the search for customers and in tailoring prices to competitive products. These advantages, in turn should benefit AGOSD as it can expect higher financial returns from a lease operation.

²⁸ Buyers pick up the compost at the site.

Allocation of information risks. It is important to reduce information risks to improve the response of interested bidders for the operation of Site 9N. The experience of consultants in other international contracts, indicates that perceived information deficiencies by prospective bidders tend to lower the price (lease fee) they would be willing to offer at bidding time. This negative perception would be detrimental to the stream of financial benefits to AGOSD. As the size of this contract is small, it does not seem practical to expect that interested bidders make a significant investment (due diligence) to ascertain inputs over which they have no control (projection of quantities and characteristics of materials delivered to the site) and market opportunities for the compost. Therefore, the bidding outcome will be greatly enhanced if AGOSD undertakes this input and market analysis.

3.6 Needs assessment and next steps

In order to proceed with preparation of a long term lease contract there is the need to improve the quality of information of major supply and demand factors and make decisions on several policy aspects as indicated in Table 3B.

Table 3B. Needs assessment for Site 9N

Area Information and policy	Scope of work
<i>Market research</i>	<ul style="list-style-type: none"> ○ Sales potential (quantities and price) ○ Competing products ○ Seasonal variations in demand
<i>Inputs</i>	<ul style="list-style-type: none"> ○ Projection of dewatered sludge, septage and other products ○ Guaranteed minimum amounts and quality of septage ○ Availability of composting enhancing products and season availability
<i>Reception facilities</i>	<ul style="list-style-type: none"> ○ Concept design of septage reception facilities
<i>Existing equipment</i>	<ul style="list-style-type: none"> ○ Assessment of condition and asset value ○ Leasing conditions of equipment
<i>Operational policy</i>	<ul style="list-style-type: none"> ○ Restrictions on incoming wastes ○ Monitoring requirements
<i>Staff policy</i>	<ul style="list-style-type: none"> ○ Actions to relocate staff ○ Incorporation of staff by operator
<i>Administrative tasks</i>	<ul style="list-style-type: none"> ○ Creation and staffing of supervisory unit ○ Training requirements
<i>Revenue enhancement actions</i>	<ul style="list-style-type: none"> ○ A tipping fee for the reception of waste materials ○ Opening facility to receive wastes from other governorates

The estimated time to develop this information is presented in Table 4B below.

Table 4B. Preparation timetable

Activity	Time, months							
	1	2	3	4	5	6	7	8
Market research	≡	≡	≡					
Input analysis			≡	≡	≡			
Reception facilities					≡	≡		
Existing equipment					≡	≡	≡	
Operational policies							≡	≡
Staff policy					≡	≡	≡	
Administrative tasks							≡	≡
Transaction and implementation							≡	≡

This timetable assumes that all activities indicated will start once AGOSD has taken a firm decision to proceed. Taking into account overlaps with other preparation activities, the consultants estimate that the total time needed to bring this project to bidding status is about 8 months.

4. Transport of dewatered sludge and other wastes to Site 9N

Transportation of waste by-products and operation of site 9N are two different type of business requiring different managerial skills and equipment. Moreover, transportation costs of dewatered sludge, scum and grit are significant compared to the operating costs of Site 9N (Section B, par. 3.4). Therefore, consultants recommend not incorporating the transport of these materials into the lease operation of site 9N, as this incorporation will make the combined contract not financially attractive and will likely limit competition to the detriment of AGOSD.

Nonetheless, AGOSD has two basic options to deal with the transport of these materials the wastewater treatment plants and sewage pumping stations to Site 9N:

1. Transporting these materials it using its own resources and at its own cost.
2. Delegating this activity to private operators under separate service contracts.

Alternative one is a continuation of present practices, where the possibilities of cost reductions are not obvious. Alternative two should contemplate hiring at least 2-4 operators to ensure adequate competition. However, this alternative poses coordination issues between the operator and AGOSD. Nonetheless, this alternative offers the potential for cost reductions through competition for and within the market and therefore consultants recommend this option.

In both cases, there is the need to develop contractual operational arrangement between AGOSD and site 9N operator. For instance, minimum quantities of materials delivered to Site 9N and hours of transport, collection and delivery.

4.1 Recommendations

The consultants recommend that AGOSD delegates responsibility for the transport of dewatered sludge and other waste materials to site 9N, to private operators under separate service contracts.

4.2 Needs assessment and next steps

In order to proceed with preparation of service contracts there is the need to improve the quality of information of the amount of materials to be transported and the condition of the equipment as indicated in Table 5B

Table 5B. Needs assessment for the transport of materials to Site 9N

Area Information and policy	Scope of work
<i>Quantity of materials Dewatered sludge; grit, screenings and scum from:</i> <ul style="list-style-type: none"> ○ <i>Two wastewater treatment plants</i> ○ <i>Seventy two pumping stations</i> ○ <i>Cleaning of sewers</i> 	<ul style="list-style-type: none"> ○ Projection of quantities ○ Definition of collection points and frequency of collection
<i>Existing equipment</i>	<ul style="list-style-type: none"> ○ Assessment of condition and asset value ○ Decision on trucks and equipment to be operated by contractors
<i>Operational policy</i>	<ul style="list-style-type: none"> ○ Restrictions on incoming wastes ○ Monitoring and reporting requirements
<i>Staff policy</i>	<ul style="list-style-type: none"> ○ Actions to relocate staff ○ Incorporation of staff by operator
<i>Administrative tasks</i>	<ul style="list-style-type: none"> ○ Creation and staffing of supervisory unit ○ Training requirements

The estimated time to develop this information is present in Table 6B below.

Table 4B. Transport of materials to Site 9N

Activity	Time, months					
	1	2	3	4	5	6
Quantity of materials	≡	≡				
Assessment of existing equipment	≡	≡				
Operational policies			≡	≡		
Staff policy			≡	≡	≡	
Administrative tasks			≡	≡	≡	
Transaction and implementation				≡	≡	≡

Consultants recommend that AGOSD initiates the assessment of exiting equipment with its own forces. This timetable assumes that all activities indicated will start once AGOSD has taken a firm decision to proceed. Taking into account overlaps with other preparation activities, the consultants estimate that the total time needed to bring this project to bidding status is about 6 months.

**Attachment 1A
(Page 1 of 3)**

**AWGA
Income Statement
(L.E. Million)**

Concept	FY 04	FY 03	FY 02
Operating revenue			
Water sales	196	217	204
Services and miscellaneous	13	16	14
Total operating revenues (A)	209	233	218
Operating expenses			
Salaries and benefits	52	58	54
Energy	47	53	51
Chemicals, fuel oil, lubricants	15	16	13
Mat., maintenance, subcontractors. 1/	13	14	12
Administrative	5	6	5
Depreciation	33	37	35
Total op. expenses plus dep. (B)	165	185	172
Operating profit (A-B)	44	49	47
Non-operating revenue 1/	11	13	16
Non-operating expenses 2/	-23	-4	-5
Income before interest accrued	31	58	57
Interest debit	32	45	45
Income taxes	0	5	5
Net income	0	8	8

1/ Includes interest credit, previous year's revenues and other minor items.

2/ The predominant item corresponds to previous year expenses.

Attachment 1A
(Page 2 of 3)

AWGA
Balance Statement 1/
(L.E. Million)

Assets	FY 04	FY 03	FY 02
Current assets			
Cash and cash equivalents	111	108	124
Accounts receivable	284	262	214
Provision for doubtful accounts (-)	-12	-13	-13
Debit balances and other	38	22	52
Inventory (net)	26	26	23
Total current assets	447	405	400
Fixed assets			
Gross fixed assets	1,038	950	900
Accumulated depreciation (-)	-394	-362	-327
Net fixed assets in operations	645	588	573
Work in progress	266	258	205
Total fixed assets and W.P	911	846	778
Total Assets	1,358	1,250	1,178
Liabilities			
Current liabilities			
Suppliers and others	307	283	272
Provisions	27	7	8
Total current liabilities	334	290	280
Long-term loans			
Ministry of Finance	43	31	31
National Investment Bank	424	374	349
Total long-term loans	467	405	380
Equity			
Capital and government cont.	528	364	364
Reserves	29	390	353
Accumulated losses (-)	0	-198	-198
Total equity	557	555	518
Total Equity and Liabilities	1,358	1,250	1,178

1/ Balance sheets as of June 30 for FY 02 and 03. The balance sheet for FY04 is as of April 29 when AWGA was converted into a Public Business Sector Company (P.D. 135/2004).

**Attachment 1A
(Page 3 of 3)**

**AWGA
Selected Cash Flow Figures**

Concept	FY 04	FY 03	FY 02
Funds from operations			
Net income before after taxes and before int.	31	28	52
Plus, depreciation	33	37	35
Decreases (increases) in working cap. 1/	5	-11	-3
Funds from operations (A)	70	54	84
Debt service			
Principal	19	63	58
Debit interest	32	45	45
Debt Service (B)	51	108	103
Net internal cash generation (A-B)	19	-54	-19
Loans and grants			
NIB loans for investment 2/	57	75	57
NIB loans to cover debit interest 2/	12	13	13
Grants	4	5	6
Total loans and grants	73	92	76
Capital expenditures	90	102	83

1/ Excluding cash.

2/ NIB: National Investment Bank

Attachment 2A

**AGOSD
Income Statement FY 03**

Concept	L.E. Million
<i>Operating revenues</i>	42
Operating expenses (excluding depreciation)	61
<i>Operating profit before depreciation</i>	(19)
Depreciation	56
<i>Operating profit</i>	(75)
Interest	56
<i>Profit before taxes</i>	(131)
Income taxes	0
<i>Net income</i>	(131)

Attachment 3A

Tariff Schedule (January 2003)

Customer category	Water Tariff a/ P.T./m3	Wastewater surcharge a / %	Implicit unit subsidy ²⁹ P.T./m3
Domestic			
o < 10 m3/month (minimum)	23	35	199
o 11-30 m3/month	25	35	196
o > 30 m3/month	35	35	183
Building and const.	80	70	94
Non domestic			
o Places of worship	42	35	173
o Sport clubs	48	35	164
o Clubs A-super	100	70	60
Companies & enterprises			
o Small factories	70	70	111
o Large factories	80	70	94
Production & investment			
o Tourism industry, private hospitals	115	70	35
Distilled water	22	0	n.a.
Flat rate Governorate housing			
o One bedroom	300/month	35	Undetermined
o Two bedroom	360/month	35	“
o Three bedroom	480/month	35	“
o More than 3 br.	600/month	35	“
Government	65	70	120
Average subsidy	(average rate 34/m3)		166

a/ source: AWGA; n.a. not applicable

²⁹ The unit subsidy is calculated as the difference between the economic cost of services (2.30/m3) and the price paid (indicated in the table). Refer to Annex 1 for economic and financial cost estimates

**Table 1B Characterization of septage and sewage sludge
Selected parameters**

CHARACTERISTICS OF SEPTAGE AND SEWAGE SLUDGE				
Parameter	EPA ³⁰		ASCE-WEF ³¹	
	Minimum	Maximum	Septage	Sewage sludge (primary)
Total suspended solids	1,132	130,475	40,000	1,040
Total inert solids	-	-	15,000	-
Grease	208	23,336	-	-
BOD ₅	440	78,600	5,000	-
Total Nitrogen	667	1,060	700	1.5-4% a/
Total phosphorous	20	760	250	0.8-2.8% a/
pH	1.5	12.6	-	5-8
Total coliforms /100 ml	10 ⁷	10 ⁹	-	-

Notes: Concentrations in mg/l, except pH or as noted;
a/ As a percentage of dry solids

Table 2B. Average wastewater flows

Month/year	Average monthly flows (000 m3/day)		
	WWTP	EWTP	Total
August/03	328	439	767
September/03	332	455	787
October/03	323	460	783
November/03	314	419	733
December/04	306	391	697
January/04	340	413	753
February/04	349	405	763
March/04	319	391	710
April/04	300	398	698
May/04	310	394	704
June/04	333	407	740
July/04	316	410	726
Average	323	416	738

Source: AGOSD

³⁰ EPA. Decentralized System Technology Data Fact Sheet. Septage treatment/disposal. September 1999

³¹ ASCE-WEF. Design of Municipal Wastewater treatment Plants, 1992

Table 3B. Average volume of sludge received by the MDF³²

Month (2004)	Total waste flow (000 m3/day)	Raw sludge (m3/day)	Dried sludge (tons/day)	
			Wet	Dry a/
April	698	1,283	219	68
May	704	1,297	223	71
June	740	1,812	312	100
July	766	2,066	356	103
Average	727	1,515	278	86

Source: AGOSD

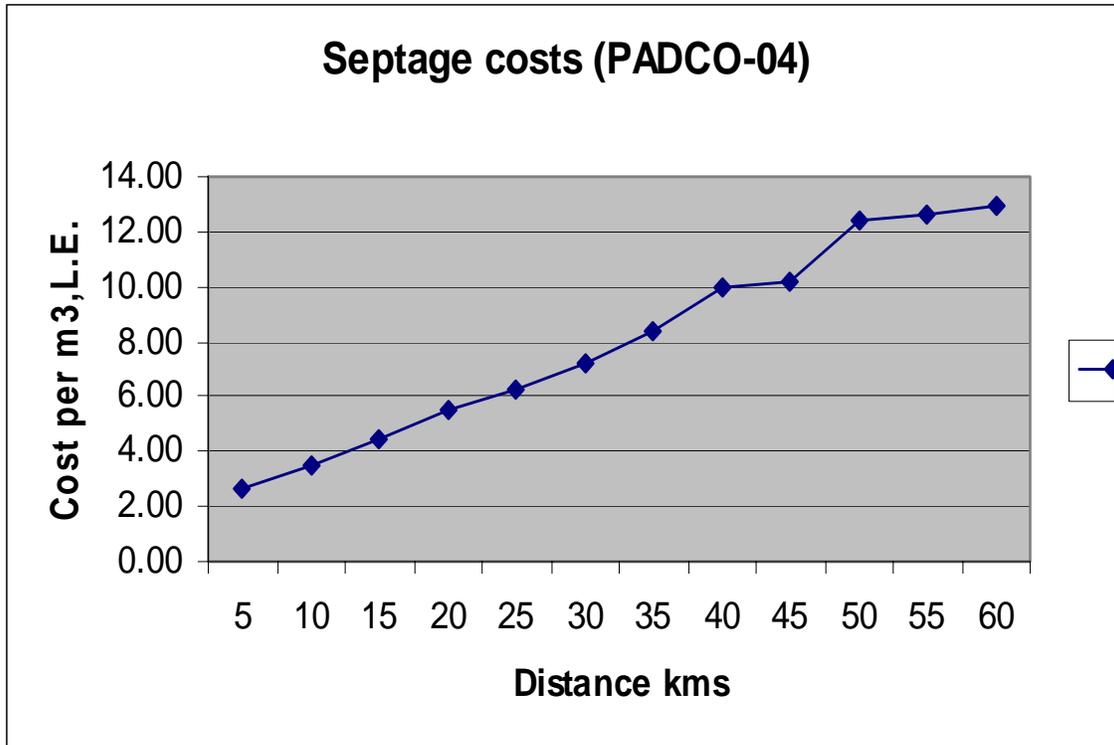
a/ Moisture content is about 30%.

³² AGOSD, with the support from USAID, is in the process of rehabilitating the MDF. This unit process includes 12 filter presses with a theoretical capacity of 1.2 tons/day of dry sludge per hour (345 tons/day).

Attachment 2B

Septage Hauling Costs as a Function of Distance

(Source: Feasibility Study to determine the price of septic tank evacuation and waste disposal outside residential areas. Report by PADCO, March 2004)



Consultant's comments:

1. The above cost function was developed by PADCO consultants, based on an average truck speed of 40-kms/per hour. In Alexandria, transport costs will probably be higher as average speed is likely to be lower.
2. This cost function highlights the importance of setting collection fees, at least on a zone basis. Otherwise customers that impose costs higher than the average tariff are unlikely to be served.