LIMASSOL CASE STUDY

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1. BACKGROUND – THE LIMASSOL ENVIRONMENT

In many ways, Limassol presents the classical environmental problems of a modern city, lively and expanding city.

Continuing growth reflected in the increasing resource consumption and waste generation, noise and air pollution from traffic; construction sites and street work as the infrastructure struggles to cope with the growth; industry and housing attempting to live side by side and deterioration of the natural and built environment.

An added dimension is that Limassol is a costal city and the island's largest port. Growing cargo and passenger traffic through the expanding new port has environmental consequences in terms of marine and road traffic.

The third important environmental dimension is that Limassol is also thriving Mediterranean tourist resort. Last year more than half a million visitors were attracted to the city to enjoy its excellent climate and many other assets, adding to the pressure on the local environment.

1.1 THE SOCIO-ECONOMIC BACKGROUND

Limassol lies in the middle of the southern coast of Cyprus at the slaves of Troodos Mountains.

In 1998 the population of the Limassol Municipal area stood at 94,000 and the Greater Metropolitan area at 152,000.

Despite Cyprus still being classed as a Developing Country, there are not street beggars, nor poor housing ghettos, to be seen in Limassol and only 1.42% of the population below the established poverty line. There is no unemployment to speak of and in fact, a shortage of labor may well limit further economic expansion.

Although tourism is an important part of the local economy, the city has a diverse economic base including the port, wineries and a range of other small industries.

Over a period of 20 years the number of tourists visiting the city has grown from a few thousands to 900,000. Inevitably such a rapid growth of tourism has had a damaging effect on the environmental, cultural and social fabric of the city. Greater Limassol has reached, and probably exceeded, its carrying capacity for tourists. In the growth of the tourism is not controlled there is a likelihood of irreparable damage to the very environmental and cultural assets on which it depends.

2. THE SITUATION OF THE SEWAGE AND STROMWATER DRAINAGE

In Limassol, virtually all sewage generated is treated by individual septic tanks and absorption pits. Until the late 1960s, this decentralized approach caused few problems, due to the low population density. As the city's population increased, however, some problems began to surface: soils became saturated with effluent, contaminated groundwater began seeping into water supply boreholes, and some sewage overflowed into the streets.

The arrival of from the occupied territories and the consequent increase in construction coupled with the development of new industries in mixed areas and new industrial zones accelerated the problems created by the existing sewage disposal method. The problem was compounded by the development of the Limassol area as a tourist resort, leading to the construction of hotels and apartment complexes close to the coastline.

The 1974 study was updated in 1983, but delayed again due to the problems encountered with the selection of the plant site. The revision of the Master Plan and Feasibility Study for Sewage was completed finally in April 1990. The sewage system will be completed in two stages: stage I will include construction of a wastewater treatment plant and installation of the main trunk lines serving primarily the large hotels and apartment buildings along the coast road. During stage II, most of the remaining buildings in the Greater Limassol Area will be connected to the system.

Stage I has been successfully completed and the treatment plant went into the operation in 1996. Stage II is under way and most of the 10.000 buildings affected have been already connected with the sewage system. It is anticipated that stage II will be completed by March 2002.

Stage III – the final one – will start by the end of 2002.

3. THE SITUATION TILL 1996

3.1 COLLECTION AND TREATMENT

In Limassol, the only building permit requirement with regard to sanitation was the construction of a septic tank in conjunction with an absorption pit: the permit applicant need only show the design of the proposed the treatment and disposal system. The same requirements applied to the rest of the Greater Limassol Area. A regulation was passed in 1984 to protect the areas closed to the beaches and to control the use of a treatment plant effluent for lawns irrigation.

In the Municipality of Limassol, legislation concerning the sewage system has not always been strictly enforced. Since 1984, only 10 private secondary treatment plants were built in the Municipality. Some apartment buildings and hotels were constructed with absorption pits only; effluent often spilled into streets when the system malfunctioned. A few buildings connected illegally to the stormwater drainage system, resulting in sewage discharges to the sea.

There are 100 private tertiary treatment plants along the shore in the Greater Limassol Area, 80 with secondary treatment and 20 with tertiary treatment. Thirty private plants are under construction.

Many private wastewater treatment plants do not meet the standards for irrigation or lack absorption pits. Effluent from these plants is stored on-site prior to the transportation by tankers to the disposal lagoons at Vati. The private plants create problems: saturation of the soil from the absorption pits has affected adversely the quality of the water in the boreholes and in the sea. In addition, privately owned wastewater treatment plants (WWTP) often produce an effluent with variable quality due to the lack of suitably trained operators. Many of these problems will be reduced or eliminated when the new sewage system is completed sometime around the year 2002.

3.2 OPERATION AND MAINTENANCE OF TREATMENT SYSTEMS

Septic tanks should be cleaned periodically, approximately every two years, in order to operate properly. Otherwise, sludge will accumulate in the tank and solids will not be able to settle from the wastewater before entering the absorption pit. Blockage of the surrounding strata will occur making absorption ineffective. Maintenance of the septic tanks, which is the owner's responsibility, is not being done on regular bases. Generally cleaning the absorption pit and the septic tank occurs only when the sanitary system within a building is affected. Transportation of sludge from the septic tanks or the sewage from the pits occurs by private companies at a cost of 1,5 CYP per m3. Some of the septic tanks do not have access for maintenance.

Unskilled personnel on a part time basis operate some of the individual wastewater treatment plants. This leads to poor performance of the treatment and an effluent that does not meet the quality requirements. Biological treatment plants require operators familiar with the biological process and who are able to change the operating parameters as needed. The variations of flows and loads received by these plants make their operation more difficult. Some of the large hotels hire semi-qualified technicians who, along with other engineering responsibilities, are in charge of operating the plants. These technicians do not have proper training and must rely on the plant supplier's manual as a guide until they learn through practice. Some private companies employ experienced operators to run and maintain the plants.

3.3 TREATMENT SYSTEM MONITORING

There is no municipal or governmental control over cleaning and emptying septic tanks and absorption pits. The District's Public Health Engineer specifies the requirements for cleaning the tanks, but does not have adequate staff to ensure that the requirements are met. Inspections occur only when complains are received about the presence of sewage on the surface. Sometimes sewage effluent infiltrates the rainwater drainage system and eventually reaches the shore. This occurs primarily in the more densely populated areas and particularly during the summer. Monitoring of the treatment plants located in the Municipality of Limassol is the responsibility of the Municipality's Public Health Inspector. Again, due to lack of adequate staff, the plants are not inspected and no effluent samples are collected for analysis.

Inspection of the treatment plants located outside the Municipality of Limassol is the responsibility of the Public Health Engineer. Effluent samples are collected every week from the plants and sent to the State General Laboratory for

analysis. Plants with tertiary treatment using effluent to irrigate gardens and lawns are sampled most often. Since all the water and wastewater analysis for the four districts are performed at the laboratory, the number of samples taken is limited by the capacity of the laboratory, which is insufficient to monitor all the plants. The lab experiences regular delays in reporting the results of the analysis.

3.4 REGULATIONS FOR SEWAGE TREATMENT

The delay in the construction of a centralized sewage system made imperative the adoption, in 1984, of immediate measures to prevent sewage from polluting the beaches. Since the treatment plant study was underway at the time, no attempt was made to specify rigid requirements. Instead, criteria and requirements for effluent quality were established by the Limassol District Public Health Engineer according to a building's distance from the shore. The general requirements are as follows:

- 0 to 100 meters – No absorption pit is permitted. Secondary treatment must be provided, with maximum effluent concentrations of 20mg/l BOD5, 30mg/l SS, 50mg/l COD and 3000/100 ml of faecal coliforms. Treated water shall be stored and trucked to a suitable disposal site. If the effluent is to be used for irrigation, then tertiary treatment is required. In this case the concentrations are: 10mg/l BOD5, 10mg/l SS, 20mg/l COD and 100/100 ml of faecal coliforms.
- 100 to 250 meters – No absorption pit is allowed unless secondary treatment as defined above is provided. If the effluent is to be used for irrigation the treatment shall be tertiary as defined above. If the treatment for houses or small apartment building is not provided, wastewater shall be treated in a septic tank and the effluent stored and trucked away for proper disposal.
- Over 250 meters – Septic tanks followed by an absorption pit.

Similar requirements were implemented to protect Yiermasoyia boreholes.

Liquid wastes are discharged to the lagoons at Vati.

3.5 INDUSTRIAL SEWAGE

The principal areas within the Greater Limassol can be grouped into four zones:

- Ypsonas Industrial Estate at the west boundaries of the Municipality of Limassol
- Linopetra Industrial Estate in the Municipality of Ayios Athanasios
- Four wineries and a brewery located between the new port and the old port.
- A soft drink factory, Kean, east of the Municipality of Limassol.

Below is a description of the industrial wastewater generated at each zone and the type of treatment provided.

3.5.1 YIPSONAS INDUSTRIAL ESTATE

The Yipsonas Industrial Estate includes 58 companies of different nature. Wastewater generated from these industries falls into two categories: industrial effluents generated during the process and domestic sewage. The types of factories with industrial wastewater are:

- Pharmaceutical industries
- Detergents
- Anodizing and painting of aluminum
- Dying and bleaching of textiles
- Laundries
- Perfume industries
- Electroplating of metals
- Food industries

Initially these factories were built without proper wastewater treatment. Some leases signed with the Ministry of Industry and Commerce specified that the government was responsible for providing treatment, although it never did. Lack of proper treatment facilities created numerous hazards, for example, effluent from some of the factories would sometimes flood the streets. Finally some of the major factories, with the advice of a member of the Department of Industry, decided to build and operate their own centralized wastewater treatment plant. Those industries not connected to the centralized system use septic tanks and absorption pits instead.

The centralized plant was designed to treat effluent, containing both hazardous and biological wastes, from different factories. The participating factories divided the construction, operation and maintenance costs. The plant costs about 280,000 CYP to construct and about 0,16CYP/m3 to operate and maintain it. The components of the plant, which treats 1000 to 1200 m3/day, is as follows:

- Pumping, screening and balancing tank
- Physical- chemical treatment: lime, aluminum sulphate, polyelectrolyte and sulphuric acid for Ph adjustment.
- Biological treatment with nutrients addition
- Effluent storage in lagoons located at the site. The possibility of using the water from the lagoons is under investigation.

Until mid-May, liquid sludge removed after primary and secondary treatment was trucked to a lagoon allocated for industrial waste storage at Vati disposal site. While this audit was carried out, disposal of industrial sludge at Vati was banned due to a spill from the lagoon. Talks are being carried out between the Ministry of Interior and the Department of Industry to create a controlled landfill for industrial waste. The sludge shall be dewatered to 25% solids prior to

disposal. Dewatering should reduce the volume of industrial wastes disposed at Vati.

A full time operator monitors the plant. In addition, the Public Health Engineer takes samples regularly at the balancing tank, the effluent line, and the lagoon, analyzing for BOD5, SS, COD and faecal bacteria. The results of the lagoon samples show that the concentration of faecal coliforms exceed the levels allowed for irrigation. Therefore, the effluent should be disinfected before being used for irrigation. In some cases, concentration of BOD5 and SS also exceeded the standards. Full chemical analyses are done every three months.

3.5.2 LINOPETRA INDUSTRIAL ESTATE

The Linopetra Industrial estate has 107 companies. The wastewater is composed primarily of domestic sewage rather than industrial effluents. A large diary factory, Kristies, takes its effluent to its own lagoon at the Vati disposal site. The company's on-site treatment plant was taken out of service because of poor performance. Kristies generates 140m3/day of wastewater with an average BOD5 concentration of 3660mg/l. the company has its own trucks to transport the wastewater to the lagoon of Vati.

3.5.3 WINERIES, BREWERIEY AND SOFT DRINK FACTORIES

There are four wineries (Keo, Loel, Sodap, Etko) and a brewery (Keo) along the shore between the old and the new ports. In addition, a soft drink factory (Kean) is located near the shore in Yiermasoyia. The wineries and the brewery discharge wastewater, which includes uncontaminated water from the cooling and refrigeration operations, directly to the sea. Water for cooling and refrigeration is taken from their own boreholes. The companies have experienced some problems with saline intrusion to the boreholes.

The four wineries and the brewery consume annually about 542,000 m3 of water supply by the Water Board. Kean, which consumes about 119,000 m3 per year of water from the Board, discharges all its liquid effluent to the sea.

Based on the information provided by the Fishing Department, in 1990, the volume of liquid wastes discharged to the sea from these industries was as follows:

- Keo: 600,000 m^3
- Loel: 500,000 m^3
- Etko: 750,000 m^3
- Sodap: 480,000 m^3
- Kean: 200,000 m^3

Discharges from these industries affect the quality of the seawater. In the future, the industries will be required to pretreat their liquid waste before discharging it to the new sewer system. To reduce the wastewater flows to the new WWTP, the industries should separate contaminated from uncontaminated effluent.

3.6 STORMWATER DRAINAGE SYSTEM

The existing stormwater drainage covers the areas south of Gladstone Street, east of Ayios Nikolaos and west of the Churchill Hotel. Most of the drainage system was installed between 1965 and 1980 and was indeed to cover the most affected areas. The charges in the greater Limassol Area with the rapid expansion of the paved surfaces drastically increasing the storm water flows in the city. In some cases, blocking the natural watercourses has left the existing drainage system unable to meet the new demands. The drainage inlet structures do not function properly and they are easily clogged.

Flooding is a major issue in Limassol. The low-lying areas are flooded regularly during the rainy season, particularly in the Old Town and the area at the west border of Limassol Municipality. The Municipality of Limassol estimated that flooding causes about two days of lost production each year, representing approximately 1,5 million CYP.

The Storm Water Drainage Plan identified three Phases of construction with the following costs and the time frame:

	Phase I	Phase II	Phase III
Construction time	1992-1995	1995-1997	1997-2001
Capital costs (mil. CYP)	16,49	6,41	10,64

Phases II and I cover the priority work areas serviced by the Stage I sewer systems, areas east and west of the Yiermasoyia, lower areas of the Garyllis and areas with acute flooding problems in the SBLA borders. The work has been delayed due to financial constrains. Some laterals are being installed simultaneously with the sewer system at a cost of 1,5 to 2,0 million CYP. That money was part of a 12,5 million CYP loan from the World Bank for the Drainage and Sewer Systems at the WWTP. The laterals will discharge in the riverbeds or in the existing drainage system which discharges into the sea. Talks between the Government and the SBLA are being carried out to procure Government funds for the project. The Municipality is asking the World Bank for 12 million CYP to finance the drainage scheme.

3.7 LAND BASED POLLUTION AT SEA

There are two major sources of land based sea pollution:

- Industrial waste water from the wineries, the brewery and the soft drink manufacturers
- Domestic wastewater from the sewage infiltrating the groundwater from the absorption pits near the shore and from unauthorized discharges through the storm water drainage.

Analysis of the faecal coliforms in the sea water were and are still carried out on regular bases by two departments:

1. The Public Health Engineer, in cooperation with the Ministry of Health, takes samples every month but not all sampling station. There are 37 sampling stations within the Greater Limassol of which 10 are within the Municipality of Limassol.

2. The Public Health Inspector from the Limassol Municipality takes samples every week from May to September. There are 6 sampling stations along the municipal beaches and 4 sampling stations along the wineries area. Sampling from the wineries area was stopped in 1990 because of the concentrations of faecal coliforms consistently were high, partly due to the effluent discharge from the slaughterhouse that closed in 1989. This year the area will be analyzed again to check if there has been a reduction since the slaughterhouse closed. Samples at the beach are taken at 3 am from the shore.

The European Community Bathing Water Directive established the following requirements: faecal coliforms must not exceed 2,000counts/100ml for 95% of samples (mandatory) and 100 counts/100 ml for 80% of samples (guideline). The results for the Limassol Municipality beaches for 1991 and 1992 indicate that the faecal coliforms counts complied with the mandatory regulation but exceeded the guideline in 15% of the samples in 1991 and about 19% in 1992.

In general the counts were below 400/100ml. For the beaches of the Greater Limassol area outside the Municipality of the Limassol, the faecal coliforms counts were within the guideline requirements.

Since 1998 the results are well bellow the EU requirements.

3.8 NEW SEWAGE COLLECTION, TREATMENT AND DISPOSAL

After several delays, installation of the sewer system, including WWTP, is underway. The first stage of the sewer system was scheduled to be completed by May 1995 and the WWTP by October the same year. The Sewage Board plan was to connect the areas with the largest sewage generation first and gradually connect with other areas, something has been achieved. The Board estimated that it would take about 6 years to connect the 10,000 properties to the new sewer system. Stage I covers the high density areas of Limassol, the two industrial Estates, the industries along the shore, the strip of land along Garyllis and the Yiermasoyia boreholes, the existing and planned hotels in the Amathus area and the Yiermasoyia Village. The SBLA estimates that wastewater flows to the plant during the first months of operation will be around 1000 – 2000 m3/day. The plant, located eight km east of Amathus and adjacent to the Moni cement works, will have a design capacity 22,000 m3 under Stage I. The design capacity for Stage II is 48,200m3/day.

The cost of the treatment plant and the sewer system is estimated at 30 million CYP.

The sewer system consists of a network of laterals and main sewers discharging to a main collector. The collector will extend 11 kilometers of force main with two pumping stations.

3.8.1 WASTEWATER TREATMENT PLANT

The plant will be divided in two parts and will be operated by two authorities:

- The SBLA is responsible for the operation of the treatment plant up to and including the secondary treatment. It will be responsible for delivering a secondary effluent with maximum concentrations of 20 mg/l BOD5 and 20mg/l of suspended solids (SS) to the tertiary treatment plant. The expected total nitrogen concentration is 10 mg/l.

- The Water Development Department (WDD) will be responsible for the tertiary treatment of the secondary effluent and the reuse program.

The initial Sewage Treatment Plant called for constructing a secondary treatment plant with an effluent quality of 20mg / BOD5 and 20 mg/l of suspended solids and 10 mg/l of total nitrogen and a sea outfall as a means of effluent disposal. Following the governmental policy of eliminating all effluent discharges to the sea, the Department of Agriculture decided to reuse the effluent after tertiary treatment. The Water Development Department (WDD) is in charge of the design of the tertiary treatment and the reutilization scheme in coordination with the Department of Agriculture. Both are under the Ministry of Agriculture and Natural Resources. Their present action plan is as follows:

- Develop, by December 1994, a land based, effluent reuse demonstration program using the effluent from the secondary treatment plant with an effluent quality of 20 mg/l BOD5 and 20 mg/l SS. The program would be based on the expected initial low flows of 1000-2000 m3/day.

- Complete, by August 1995, the tertiary treatment plant with contact filtration and chlorination, 5-10 mg/l BOD5 and 5-15 mg/l SS. Reuse the effluent on land acquired by the Department of Agriculture for this purpose. Develop a program to sell this water to nearby villages.
- Complete by 1996 the construction of a 1,5 million m3 reservoir to store the effluent during the low water demand periods.
- Investigate the possibility of using excess effluent not needed for irrigation to recharge the Akrotiri aquifer.

A report was commissioned by SBLA to investigate the optimal disposal of secondary plant effluent in the event of delays in the implantation of the reuse program, seasonal variations in effluent demand for reuse, or temporary disruption in the operation of the WWTP. The recommendation of the report was to construct a 1,2 km outfall with a cost of 2,39 million CYP. Presently the SBLA is investigating the possibility of on-land storage of the secondary effluent during potential breakdowns in the biological treatment. The effluent would be stored and pumped back to the head of the plant for proper treatment.

In general, the treatment plant will feature the following treatment units:

- Mechanical screen: 2 units
- Aerated grit chamber: 2 units
- Primary settling tanks: 2 circular units
- Aeration tanks using the Krueger Bio-Denitro extended aeration activated sludge system: 2 tanks
- Final settling tanks: 2 circular units
- Sludge removal, anaerobic digestion, storage and belt filter press dewatering.

At the beginning of its operation, the plant will need only one line in service, except for the aeration tanks, which will require (because of the intermittent operation of the Krueger system) the use of two tanks. Since the estimated initial flows are only 1000 or 2000 m3/day, 5 to 10% of the design capacity, it is unlikely that an effluent with concentrations below 20mg/l BOD5 and 20 mg/l SS can be ensured on regular basis. The operation of the biological process would have to be changed so that only one tank is used. The possibility of increasing the number of initial connections to the sewer system to have flows should be investigated to improve the performance and comply with the effluent requirements.

While an increase of the wastewater flow to the plant over the estimated initial flows is desirable to ensure the required effluent quality for the land demonstration reuse program, the WDD might not be able to reuse the additional flow over the presently estimated initial flows of 1000 m3/day, thereby creating a disposal problem with the effluent. Therefore this issue needs a detail analysis taking into consideration all the factors and identifying realistic solutions for the operation of the sewage treatment plant and the effluent reuse

and/or disposal during the first years. The plant start up could be delayed if this is not resolved.

3.9 VATI DISPOSAL SITE

Sewage collected from the Greater Limassol Area is treated at the lagoons of Vati. Some of the lagoons are unlined. The first anaerobic lagoons started operating in 1977. Since then, new lagoons were added including an aerated lagoon with coarse bubble diffusers five years ago.

During the winter, approximately 1,200 m3/day of sewage were received at the lagoons and 2000 m3/day during the summer. In addition, the dairy industry, Kristies, has its own anaerobic lagoon at Vati to partially treat its 140m3/day of liquid waste before entering the other lagoons.

Because of the high flows, the lagoons are only able to treat partially the incoming sewage. The average effluent concentrations for the last eight months ranges from 70 to 100 mg/l BOD5, 90 to 150 mg/l SS and 120 to 280 mg/l COD. The faecal coliforms counts range from 2 500 to 88 000 / 100ml. The effluent discharges into a stream that leads to the Polimedhia Dam 5 km downstream. Farmers sometimes use water from the stream illegally for irrigation with land in the immediate area.

Deterioration of the water quality at the Polimedhia Dam caused by the effluent from the industrial lagoon and the sewage lagoons and from the leachate from the landfill. Approximately 70% of the liquid waste going to the lagoons is coming from the area that will be served by the sewage system under Stage I.

The Department of Town Planning and Housing has plans to construct a new lagoon in the near future using reed beds to improve the quality of the effluent.

After the Stage I has been completed, the volume of effluent discharged at the lagoons fall by about 70%, which affected the performance of the lagoons and the suitability of water from Polimedhia Dam for irrigation. A study is currently in process to evaluate the situation.

4. TECHNICAL DATA

4.1 PROJECT COMPONENTS

The Limassol sewage collection system is consisting of:

1. 152 kilometers of laterals and main sewers, in sizes from 150-300 millimeters diameter and about 9 000 service connections
2. A collector sewer, i.e. main interceptor/ force main consisting of about 20 km of sewer pipe varying in size from 400 – 1300 mm diameter
3. Five pumping (sewage lift) stations
4. Sewage treatment plant of 23 600 m3/day maximum capacity
5. A 900 mm diameter sea outfall, of a total length 2 100m (1 500 m land, 600 m sea section)

6. Upgrading of the existing storm drainage system by provision of about 21 km of storm drains throughout the SBLA area, and improvements to existing drainage catch basis and inlet structures to drains
7. Operation and maintenance equipment for the sewage and drainage systems
8. Consultant services for project implementation, including institutional development of SBLA and updating of the master plan for drainage
9. Studies of:

- The environmental impact on the effluent outfall
- Effluent and sludge reuse, including pilot demonstration projects
- Rural sanitation

4.2 PROJECT OBJECTIVES

The project main objectives are:

1. To provide a safe, reliable system for the disposal of human, commercial and industrial waste water: thereby eliminate the nuisance and the health risks, including the threat to the area's water supply and important tourist industry, that arise from the present unsatisfactory disposal arrangements
2. To provide key elements of a storm water drainage system in areas subject to severe flooding during the rainy season, which causes damage and disrupts commercial, industrial and other activities
3. To contribute to improve environmental management by identifying and promoting the optimum use of sewage effluent and sewage sludge in the project area
4. To strengthen the institutional capacity of the SBLA (thing already achieved).

5. FINDINGS AND CONCLUSIONS

No politician wishes to impose whatsoever any direct taxes, rates or any other kind of revenue on the shoulders of the tax payers and no tax payer is willing to pay those taxes regardless whether they are right, correct and lawful or not.

But for the local authorities to survive and to expand and fulfill their duties and obligation as mentioned and enumerated in the relevant legislation of each country, they have to follow strictly the principle that the one who is served and who benefits either directly or indirectly from any service provided by the local authority, i.e., the citizen, has to pay and cover the burden. Local authorities in calculating out and distributing these costs amongst other criteria have to take into consideration the social standing of the individual and the one who has the means and is capable, has to cover at least slide portion of the cost for those they are unable to.

With these general ideas, I proceed to explain what we have done in our city in Limassol towards financing the sewerage project and in Cost Recovery.

5.1 SEWERAGE BOARD – TARIFF STRUCTURE

The Sewerage and Drainage System of Greater Limassol. The largest in Cyprus is being developed in phases. The population to be served during this Phase is about 70.000 people and at ultimate stage the number of people to be served is expected to reach 200.000, i.e. the whole of Limassol Greater Area.

The Sewerage Board of Limassol Amathus known as "SBLA" has been entrusted with the responsibility of development, operation and maintenance of the sewerage system. SBLA is a public utility and is governed by the Sewerage and Drainage Law of 1971 and other enactments and by-laws.

5.2 RATES AND CHARGES

The Sewerage and Drainage Law of 1971 provides the main legal framework within which the SBLA operates the basic clauses of the Law, with respect to rates and charges are summarized below:

Subject to the provisions of the Law, it shall be within the powers of the SBLA to impose and collect within the limits of its area in respect of such period a payable in such manner as may be prescribed:

(a) A connection charge upon owners or occupiers of immovable property to defray all or part of the cost of connecting and laying building sewers for sanitary waters and to fix the terms and conditions of such payment

(b) A rate from owners or occupiers of immovable property who are served or will be served or may be served by the sewage or drainage works or who are benefited or will or may benefit from such works either by a uniform rating on every pound or fractional part thereof of the assessed value of the immovable property in respect whereof the sum is payable or by a graduated scale of charges based on such value.

(c) A rate, in addition to the rate in paragraph (b), from owners or occupiers of immovable property for the use of the sewage works based on the supply within such property of any water used for domestic or other purposes and discharged into the public sewer.

(d) A rate, in addition to the rate in paragraph (b), from owners or occupiers of immovable property for the use of the drainage works based on the extent of the surface area or the assessed value of the immovable property in respect whereof the sum is payable.

The rates in subsection (1) shall be fixed on such scale that the revenue derived there from by the SBLA in any year together with its revenue, if any, in such year from other sources, will be sufficient and only sufficient, as nearly as might be to pay all expenses and meet all obligations of the SBLA properly charged to income in that year; in such expenses and liabilities shall be included the payments that will be made by the SBLA during such year in respect of interest on, or payment of the principal of any money borrowed by the SBLA and provision for the redemption of securities or bonds issued by the Board under

this Law and such sums as the SBLA may think proper to preserve in that year for reserve capital, extensions, renewals, depreciation, loans and other like purposes.

5.3 PROPERTY VALUATION

The Sewerage and Drainage Law of 1971 provides also the power for using the assessed property valuation for the purpose of imposing the sewerage charges, In particular the following clause is applicable.

Notwithstanding the precision of any other Law in force for the time being, when the Council of Ministers is satisfied that for purposes of imposing and collecting any rate or charge on immovable property under section 30 an up to-date and uniform valuation of immovable property is necessary in the areas established under this Law it may, by Order, published in the official gazette of the Republic, order a general valuation to be made by the Director of Lands and Surveys of the immovable property in such areas and thereupon the provisions of the Immovable Property (Tenure, Registration and Valuation) Law relating to valuation under Section 69 of that Law shall apply mutatis mutandis to valuation under this section.

5.4 FINANCIAL ISSUES

SBLA has developed its own accounting and budgeting system, on the basis of acceptable accounting principles in accordance with the International Accounting Standards and Guidelines and in line with the provisions of the Sewerage and Drainage Law of 1971.

Most functions of the Accounting Department have been fully computerized. The Billing System, General Ledger, Receivables, Collections, Budgeting etc have been computerized through a fully integrated system.

Financial Statements consisting of Balance Sheet, Income and Expenditure Account, Sources and Application of Funds Statement etc prepared annually.

The Auditor General of the Republic of Cyprus systematically carries out annual audits of the Financial Statements.

Billing and collection of Sewerage Charges has started in 1991 in accordance with the procedures and the details that have been agreed with the European Bank of Reconstruction and Development. Billing and collection of Service Charges on water consumption has also started in 1995 as properties are connected to the system.

5.5 RATE STRUCTURE AND REVENUES

Financial viability and self sustainment of a project during implementation and later during its operation is crucial when taking the decision for implementing a project.

An agreed rate structure has been applied and implemented as from 1991. In order to meet its financial objectives and maintain its viability, the SBLA has also reviewed and revised its rate structure continuously, over the last six years.

During the implementation period, the revenues of the SBLA have been increased from $3 million in 1991 to $8 million in 1995. In 1996 revenues have been increased to $10 million and in 2000 revenues have risen to $14 million.

As from 1997, the Board has approved the introduction of another charge, known as the “Drainage charge” with the main objective of financing the new Storm Drainage Works to be constructed in the next five years (1997-2001) of total cost of about $15 million.

The main sources of Revenues of SBLA are summarized as follows:

(i) Sewer rates on property assessed values

(ii) Sewerage surcharge on water consumption (Service Charge)

(iii) Drainage rates on property assessed values

(iv) Extra house connections requested from the public

(v) Connection fees

(vi) Interest receivable

(vii) Other Income

On the basis of a study, a differential or discriminatory rate structure has been imposed with higher rates imposed on Hotels and lower rates on industrial areas and even lower rate on other properties situated in Phase B areas.

As from year 1995 onwards another classification of rates has also been introduced so as to impose higher rates on properties situated in areas where the system is to be expanded within the next five years.

Having said the above however, it should not be considered that no problems have been encountered at all. A serious problem, which distorts the SBLA’s financial affairs, is the cash flow problem, which is solely created by the high level of receivables. By the end of 1999 the total receivables of SBLA from sewerage charges amounted to $18 million. The largest debtors of SBLA are the Hotels with a total debt of more than $15 million. Legal actions have been taken against all hotels for their debt. The issue was finally resolved by the Supreme Courts decision on March 2001whereby the hoteliers were sentenced and obliged to pay all rates imposed by SBLA.

5.6 SEWERAGE BOARD OF LIMASSOL – AMATHUS

NOTES TO THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31 DECEMBER 1999

For financing part of the expenditure for the Construction of the Sewerage System, the Sewerage Board of Limassol-Amathus has secured long-term

loans from the following sources:

	Financing Body				
	Internat. Bank for Reconstr. & Develop.	Council of Europe Bank		European Investment Bank	TOTAL
LOAN NO.	Ln 3222-CY	FP 335 (82)	(98)	Ln 1.8354	
	USD '000	USD '000	USD '000	USD '000	USD '000
Agreed amount in USD	25,000	42,115	34,850	10,070	112,035
Amount withdrawn in USD, period to 31/12/98	25,000	42,115	_	_	67,115
In the year 1999	_	_	2,316	2,125	4,441
Total amount withdrawn	25,000	42,115	2,316	2,125	71,556
Available Balance As at 31/12/1999	_	_	32,534	7,945	40,479

Further a grant amounting to CYP 6, 000,000 – was obtained by the Government of Cyprus, and finally SBLA was the annual surpluses toward financing the project.

6. SUMMARY OF FINDINGS/ CONCLUSIONS

The Sewage scheme of Limassol Amathus has proved to be a success story. It has been designed to be robust and have low environmental impact, and so it is.

It provides modern sanitation, recover valuable resources (water, fertilizer, energy) and creates esthetically and financially amenities.

It meets 100% the EU Council directives 76/160 and 86/287 and the ever-increasing tourists number is a living and sound prove.

The local inhabitants are nowadays urging SBLA to proceed with all arrangements so that to be connected with the sewage system the soonest possible.

Limassol city has gained tremendous out of this exercise and applies this expertise to other projects i.e. Reuse Recycling, and definitely is ready to share it with other cities which are faced with similar problems.

Table of various accounting and technical parameters for the last six years.

	1995	1996	1997	1998	1999	2000
SEWERAGE CHARGES-PHASE A ON IMMOVABLE PROPERTY VALUATION						
Hotels %	8.8	8.8	8.8	8.8	10	10
Industries %	4.4	4.4	4.4	4.4	10	10
Other properties %	2.2	2.2	2.2	2.2	2.6	2.6
PRE-ACCESSION PHASE						
All properties %	1.25	1.25	1.25	1.25	1.25	1.25
PHASE B						
All properties %	0.6	0.6	0.6	0.6	0.6	0.6
DRAINAGE CHARGES						
On all properties within SBLA Boundaries %	-	-	0.5	0.5	0.5	0.5
SEWERAGE SERVICES CHARGES ƒ/m^3						
Imposed on connected properties	0.10	0.10	0.10	0.10	0.15	0.15
Total ownership within SBLA area	85.824	87.456	88.834	90.270	93.762	93.961
Total assessed property value-SBLA area ƒ'000	1.618.226	1.634.543	1.641.812	1.655.953	1.673.066	1.836.496
Total revenues ƒ	4.126.475	4.446.387	5.566.421	5.318.496	7.479.635	7.724.395
Operat./Admin. Expenses ƒ	2.281.171	5.279.978	5.260.096	5.568.799	5.581.329	5.488.058
Total capital expenditure ƒ	43.954.553	44.805.588	45.229.544	47.089.509	48.371.787	53.247.848
Long Term Loans ƒ	32.241.538	32.765.043	35.775.164	33.707.668	35.892.539	33.145.549
Sewers length in Km	200	200	210	210	210	260
Households connected to the System	900	3.300	4.200	4.700	5.500	5.600
Admin. Staff-Permanent	21	22	22	22	25	25
Admin. Staff-Permanent	6	12	13	14	13	13
Workers	4	5	5	13	13	13