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REGIONAL WATER SUPPLY AND SANITATION PROJECT IN BENI SUEF GOVERNORATE

SECTOR PLAN

07.01.1997

Report of the Water Supply Adviser Heimo Ojanen

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REGIONAL WATER SUPPLY AND SANITATION PROJECT IN BENI SUEF GOVERNORATE

Short Term Consultation of Water Supply Adviser Heimo Ojanen

MISSION REPORT

1. GENERAL

In accordance with the terms of reference dated 10.08.1996 and 04.11.1996 I visited Egypt on 13.08-17.09.1996 and 5.11-4.12 to initiate the existing situation with the Sector Plan of the ongoing Regional Water Supply and Sanitation Project in Beni Suef Governorate. The Sector Plan is included as a separate component (Component B) to the Project. During the missions I have had extensive discussions with project staff, local authorities and relevant consulting companies. In addition to discussions the mission included reviewing of various documents and several visits in the project area.

During both missions problems were found in getting the basic data. Several contradictions were also found in the data received from different sources. Certain most important reports, related to B-component, were not yet obtained to the Project before the missions. The copies of the most relevant parts of the reports, however, were received towards the end of the missions. However, only the Arabic versions of the reports were available. The most important parts were translated into English due to the tight time table of the missions. Translation and collection of other basic data are going on and will continue after the last mission as well. Consequently only tentative conclusions can be drawn in this phase.

2. OBJECTIVES OF THE MISSION

The objective of the project is to improve the health conditions of the population in markazes Beba, Sumusta and El Fashn in the governorate of Beni Suef by improving the water supply and sanitation services and developing the human resources.

Main objectives are: maintaining and developing existing Data bank, acquiring adequate information on water resources for planning water and waste water schemes and developing the existing Water Supply and Sanitation Plans into the Physical Development Plan.

The main purpose of the mission was to review the work of B-component completed up to now, assess the collected material and provide guidance for the preparation of the Physical Development Plan.

3.
OBSERVATIONS

3.1 Existing Water Supply and Sanitation System

3.11 Existing Water Supply System

Water Supply has been based mainly on the centralized piped system but some hand pump wells are in use as well. There are three different types of sources: surface water/ conventional treatment plants, surface water/compact units and ground water. Conventional treatment plants are available only in the capitals of the markazes. Conventional process usually consists of clarification, filtration and chlorination. Compact units are prefabricated package plants comprising normally full chemical treatment: primary settling, goagulation with aluminium sulphate, flocculation, sand filtration and chlorination.

Ground water is usually distributed to the consumers without treatment. There is only one ground water station, where iron and manganese are removed. The process consists of aeration, ph-adjusting by lime, pressure filtration and feed of potassium permagnate.

It is a problem to find correct and reliable capacity for the existing water supply system. Information is available from many different sources. A realistic total capacity of existing system can be estimated at around 110 000 -130 00 m3/d. The actual production in 1995 was approximately 90 000 - 100 000 m3/d.

The theoretical capacity of the conventional surface water treatment plants was in 1995 520 l/s, surface water by compact units 450 l/s and ground water stations 830 l/s, in all 1800 l/s. Additional capacity for surface water treatment is under construction in Beba and El Fashn, 200+200 l/s (total 34 000 m3/d). The elevated tanks are normally included to the system, with a varying capacity from 40 m3 to 200 m3 and height from 8 m to 35 m.

The quality of water varies due to the poor condition of compact units, incorrect structure of the ground water wells and partly also lack of proper operation and maintenance. The location of the water stations is shown in Appendix 2. Technical data of the water stations and elevated tanks is shown in Appendices 3 and 4.

Pumps are running in many pumping station at a very limited time and with limited capacity. Therefore during the missions pump capacities were checked and running hour records for the year 1995 were prepared by the local O&M-staff. See Appendix 6. Most of the small ground water stations are running daily less than 10 h/d, even 1-3 h/d.

Several reasons can be found as follows:

- staffing problems in some places/no evening and/or night time shift
- occasionally over big dimensioning/standard solutic s (eg. compact units)/over big pumps
- over loaded transformer. The same transformer is feeding both the water station and the surrounding village.

The record of the interruptions for Sumusta water stations in 1995 was prepared and results are shown in Appendix 7. The most usual reason for interruption is power cut. There are power cuts normally once or twice a week, usually caused by problems in the main distribution network.

The actual capacity of the water station is often less than 50 % of the theoretical capacity. Theoretical and actual capacity of the water stations in 1995 are shown in Appendix 8.

3.12 Existing Sanitation System

There are no centralized piped waste water systems in the project area. The Beni Suef City is the only place in the whole governorate, where a piped centralized waste water system exists. Waste water treatment is usually based on individual septic tanks, cess pools etc. A few more advanced on-site waste water treatment plants and approximately 150 compost latrines have been built by the project in several villages.

The Project has started to develop a solid waste management system in the pilot area of El Fashn.

The map of the sanitation system is shown in Appendix 9.

3.2 Existing Plans Available

3.21 General

There are two officially published relevant reports available which have a clear influence to the project. The older report is "Regional Master Plan for Water supply Network by Utilities Consulting Engineering in 1992. Actually this Master Plan consists of three separate plans based on three different main water sources Beba, El Fashen and Masaret Nasan. All markazes of Beni Suef have been partly included to the plan. The plan does not cover, however, the total water demand of all markazes.

The second relevant report is "Needs Assessment and Strategic Planning for Beni Suef Governorate" by Dr. Zaher Abdalla and Partners in 1993. The rural areas of the whole Beni Suef governorate has been included to the report.

During the first mission in September it was found in the meeting with Nopwasd, however, that Nopwasd was preparing a new plan "National Plan of Water Supply and Sanitation" for the whole Egypt including Beni Suef Governorate. The plan is now under finalization after receiving comments from the governorates.

During the second mission it was found again that a new plan was prepared by the Ministry of Planning in May 1996 "National Project for developing North Upper Egypt in 1997-2017. The plan consists of three markazes, El Fayoum, El Meniya and Beni Suef. The plan (Arabic language) has not yet arrived to the Beni Suef governorate. Copies of some most important pages were obtained, however, to the Project at the end of the second consultation. A summary of the existing plans officially available is shown in Appendix 10

I have concentrated in this context only on the three markazes related to the project, Beba, Sumusta and El Fashn.

3.22 Regional Master Plan for Water Supply Network

The maps (1:25 000) for the plan are available but not the whole design report. Only the general description of the project and design criteria for the water treatment plants are available but not the dimensioning criteria for the pipe network.

The on-going project, a large regional and centralized water supply system carrying out by Nopwasd, will distribute potable water for Beba, El Fashen and Sumusta markazes. See Appendix 11.

There are three big surface water treatment plants: El Fashn Beba and Masaret Nasan. The conventional treatment process consists of clarification, filtration and chlorination. The first phase for each plant is 200 l/s and second phase 400 l/s. The first phase of Masaret Nasan is already in use, El Fashn in test use and Beba under implementation. The first phase of main feeder pipes, approximately 10-15 km, is under implementation both in Beba and El Fashn.

The new surface water treatment plant in El Fashn delivers water for El Fashn and Sumusta markazes. The Beba surface water treatment plant delivers water for Beba.

Masaret Nasan is located in the neighbouring Ahnasia markaz (to the north from Beba) but according to the plans the network will be connected together with the network of Beba.

Note:
A large centralized water distribution system has its clear advantages but implementation cost will be quite high and the system will be complicated to control as well. The design of the controlling system has not yet been started. It might be necessary to construct some

booster stations and/floating valves for elevated tanks due to long distances and different levels of elevated tanks. In the most distant areas pressure may be high enough only during night time, but not daytime. Therefore the whole system needs further investigation.

3.23 Needs Assessment and Strategic Planning

Both water supply and sanitation have been included to the report. The plan covers the whole Beni Suef Governorate but it concentrates only on the rural areas. Three different alternatives have been studied for water supply and sanitation.

Water Supply

Recommendation for water supply is similar with above mentioned Regional Water Supply Master Plan. Water is distributed to whole area through the centralized distribution network. See Appendix 12. Water supply is based mainly on the surface water. The new surface water treatment plant in El Fashn delivers water for El Fashn and Sumusta markazes. Beba surface water treatment plant delivers water for Beba. Ground water is utilized only from the existing sources. Compact units are proposed to be abandoned on the western side of Nile.

Note:
Control system for large and centralized system might be complicated as mentioned above in the Chapter "Regional Master Plan for Water Distribution Network". System needs further investigation.

Sanitation

The centralized system is also recommended for waste water supply. See Appendix 6. Only one central treatment plant (city) is proposed to be constructed on the western side of the Nile for each markaz Sumusta, Beba and El Fashn. City treatment plants are proposed to serve also rural areas. The proposed process is conventional: primary sedimentation, trickling filter, final clarification and disinfection. Waste water is to be conveyed by piped collection system to the city treatment plants. Service area is circular of radius of 5 km from the treatment plant. Other western rural areas are served by piped collection system and desert treatment plant on the western side of Bahr Youssef Canal. The proposed process for desert treatment plants is stabilization pond (oxidation pond). Treated waste water is utilized for irrigation.

The similar desert treatment plants are proposed on the eastern side of the Nile as well. Waste water is proposed to be transported, however, by evacuation tank truck from the villages to the desert treatment plant. See Appendix 13.

A separate review for the report "Needs Assessment and Strategic Planning" is shown in Chapter 3.4 and Appendix 15.

Note:
Status of the Strategic Plan seems to be unclear. It should be officially approved but it is not completely followed. There are some contradicts as follows:

- New compact units have been built also in the western areas, not only in the eastern desert areas as proposed in the report.

- A decision to construct a separate waste water treatment plant for Mazoura instead of the centralized treatment plant together with Sumusta city.

3.24 Nopwasd National Plan (Draft)

Only a draft report in Arabic without maps is available. The report was translated into English during the consultations. The main guidelines are as follows:

Water Supply

- the main water supply system for the long run is based on surface water including a centralized distribution network

- extension of the existing Beba, El Fashn and Masaret Nasan surface treatment plants will be carried out after the year 2000.

- ground water of good quality is acceptable as a new source as well as surface water. At least three new ground water stations are to be constructed.

- the actual capacity of existing ground water supply will be increased by extending the running hours of the pumps

- salinity (TDS) < 1000 mg/l for ground water source

- minimum depth for pumping ground water should be 40 m from the ground level (contamination protection)

Sanitation

- the quantity of waste water is expected to be 80 % of the quantity of potable water

- two central waste treatment plants are proposed to be built for each markaz, Beba, Sumusta and El Fashn. In the first phase treatment plants will be constructed only for three markaz capitals. The treatment plants for Beba and El

Fashn are already under implementation. The contract for Sumusta has been signed as well.

- centralized waste water treatment plants for Nazlet El-Sheref in Beba, Delhanes in El Fashn and Dashtoot in Sumusta will be constructed in the second phase.

- treatment process in the first phase for the markaz capitals will be as follows: primary sedimentation, trickling filter, final clarification and disinfection. The treatment process for the plants of the second phase has not yet been specified.

- waste water treatment system according to the Law N:o 48

Location of the sanitation/waste water system is shown in Appendix 9.

It is under discussions between housing department, irrigation department and local units to change treatment system to stabilization pond. On the proposed sites is not, however, space enough for this system. Effluent water could be pumped to the desert or alternatively the treatment plants could be constructed into the desert. In both cases effluent could be disposed for irrigation (e.g. wood plantation).

It has been already agreed between the three partners that the effluent of waste treatment plant in agriculture land should be pumped to the desert and reuse in wood plantation.

Note:
Stabilization pond is very recommendable method in the climate of the high temperature as Egypt, if there is space enough (usually desert treatment plant). It is free of energy and simple and cheep from the operation and maintenance point of view. Ponds have also considerable advantages regarding the reuse of effluent water due to the efficient removal of faecal bacteria.

<u>Comments by Beni Suef Governorate to the National Plan</u>

The governorate has given several comments on the plan. The first comments were made in September and additional comments were given just at the end of the second mission in November. The most important comments made in Arabic were translated into English. The comments concerned the population forecasts and water consumption estimates.

- the population forecast is proposed to be based on the estimates of the Central Agency for General Mobilization and Statistics/Information Center Consequently the population forecast for the target year 2030 should be approximately 20 % higher than Nopwasd has expected. See Appendix 14.

- water consumption per capita is proposed to be for the cities 250 l/d and for the rural areas 200 l/d. Nopwasd has proposed consumption per capita for the cities 215 l/d and for the rural areas 100-125 l/d depending on the population of the village.

3.25 National Project for Developing North Upper Egypt in 1997-2017. Ministry of Planning

The plan has not yet arrived in Beni Suef Governorate. Only some of the most important pages have been obtained to the Project at the end of the second mission. Consequently it is now possible to give only the main guidelines of the plan.

The plan is comprised of three governorates, El Fayoum, El Meniya and Beni Suef. Several different sectors have been included to the plan: Education, Water Supply and Sanitation, Solid Wastes, Human Development and Social Services. In this context I have concentrated only on the Water Supply and Sanitation sector in Beni Suef Governorate.

Water Supply has been based on utilization of the existing and new ground water and surface water resources similar to Nopwasd National Plan. Detailed information is not yet available.

The proposal for sanitation is also similar to Nopwasd National Plan. More detailed information is not yet available.

3.26 Comparison of the Alternative Plans

Only limited comparison was possible to do between different plans due to lack of data and time (data collection and translation into English are still going on). There are several contradictions between different plans as follows:

<u>Target year</u>

- Target year for Nopwasd National Plan is 2030, for Strategic Plan 2020 and Regional Master Plan 2020 and Ministry of Planning 2017.

<u>Source of Water Supply</u>

- Nopwasd Draft National Plan and National Project of Ministry of Planning are partly based on the utilization both of the new surface water sources and the new ground water sources. The new ground water sources are not

included to the Strategic Plan and Regional Master Plan for Water Supply.

Forecasts for population and water consumption

- There are considerable differences between population and water consumption forecasts in different reports, which is caused by several reasons. One reason is different target years and another that the Strategic Plan covers only rural areas. There are differences between annual population growths as well.

- Water consumption figures per capita in the target year differ as follows:

  Regional Master Plan
  - cities 150 l/d
  - rural 80 l/d

  Needs Assessment and Strategic Planning

  - average 150 l/d

  Nopwasd National Plan
  - cities 215 l/d (250)
  - rural 100-125l/d (200)

  Governorate's proposal is given in brackets (above mentioned comment/Chapter 3.24)

  Ministry of Planning
  - cities 240 l/s
  - rural 200 l/s

- Comparison of estimated total water consumption is difficult because the Strategic Plan has shown only capacities (l/s) and the other plans m3/d. The differences between the other plans are, however, very big, almost 100 %, especially due to big differences in the water consumption per capita. See Appendix 14.

Proposed actions for the future

- Due to the lack of information comparison of the proposed detailed actions for the future was possible only between the Nopwasd National Plan and the Beni Suef Governorate's comments.
- There are considerable differences between proposed actions for water supply in the first phase before the year 2002. This is mainly due to very big differences between water consumption estimates:

- The Governorate's proposal: additional water 140 000 m3/d will be supplied partly by ground water and partly by surface water. According to the proposal 28 ground water borehole wells will be constructed, total capacity 80 000 m/d. Enlargement of Beba and EL Fashn surface water treatment plants, total 35 000 m3/d, will be implemented before the year 2002. Water loss reduction will give more capacity 25 000 m3/d.

- Nopwasd proposal: additional water will be needed only 20 000 m3/d. It will be supplied partly by utilizing the existing ground water stations more efficiently and partly by constructing new ground water wells. More pumps are to be run in the ground water stations at the same time. Three new ground water boreholes will be constructed before the year 2000.

- Two centralized waste water treatment plants are proposed by Nopwasd for each markaz, Sumusta, Beba and El Fashn. In the first phase only one plant for each markaz will be constructed. Only one central treatment plant for the long run is proposed in the Strategic Plan for each markaz and desert treatment plants for rural areas, far away from the cities. The proposal of the Ministry of Planning is similar to the proposal for the first phase of the Nopwasd; one treatment plant for each markaz. More detailed information for the future is not yet available.

3.3 Existing Data Bank Information

The Data bank is one part (Volume 2) of the Study " Needs and Assessment and Strategic Planning".

A big amount of technical and socio-economic data of the existing water supply and sanitation system was collected during the study. All the data has been computerized by database program FoxPro. The data is also in text form as an Appendix of the above mentioned main report. The Project did not obtain the Data bank information before the first mission.

A complete copy of the Data bank report (Arabic language), however, was obtained from the governorate at the end of first consultation. Disks were obtained between the consultations. Data was transferred during the second mission into the project's computer system. Translation into English (Draft) was completed at the end of the mission. It needs further editing.

Referring to the above, review of the Data bank was not yet possible to do. The final assessment will be carried out in the beginning of next

year. It can be said already now, that very comprehensive data is available. Especially the field survey results are very detailed concerning both technical and socio-economic issues. There are many parts now, however, already out of date, e.g. population, water consumption, capacity of the existing water stations etc. A lot of more up to date information is available from other sources. Information of the existing situation of sanitation is defective as well.

3.4 Review of the Report "Needs Assessment and Strategic Planning"

Only slight reassessment without any report has been done during the work by the project. Consequently the local project staff prepared a review during the missions. See Appendix 15.

There is no time table available for the implementation in the main report. The time table until 2003 is given in the appendices of the report. However, the implementation period will be very long probably from today until 2020...2030 due to the big size of the project. The cost estimate of the project for water supply is approximately 63 million L.E and for sanitation 82 million L.E. The cost estimates, prepared by Dr Zaher Abdalla, cover only rural areas in the 1993 price level. Consequently the cost level is out date today and needs reassessment. Financing has been approved only for the first phase of the water supply system, which is now under construction.

There are no cost calculations in the report for operation and maintenance.

Ground water as a new water source has been rejected based only on the results of a few samples in the existing wells. Consequently the plan is concentrating only on the utilization of the surface water resources.

Pipe dimensions are missing for both water Supply and Sanitation maps.

Although there are several deficiencies in the report, it will give a good basis for the further developing Sector Plan.

3.5 Socio-cultural Study

The study has already been completed. Two reports are available: "Baseline study" and "Living Conditions and the Environment".

3.6 Water Resources Inventory

The monitoring program for ground water and surface water is ready and the first sampling was carried out during the first mission. The second sampling will be carried out in January.

The Draft Interim Report for Ground Water Study and Surface Water Study is ready, prepared by the local consultant. Due to the tight schedule there was not enough time to concentrate on the report but the first finding is that the report is very comprehensive including a lot of theoretical general data. A little bit more practical approach and concentrating more on the project itself might be preferable.

According to the old water quality analysis iron and manganese contents vary quite a lot in the project area. The most highly concentrated area is in the central part of the project area, between the El Ibdrahim and Bahr Youssef canals (Iron 0.2-1.7 mg/l and Manganese 0.2-1.3 mg/l). TDS (600-5000 mg/l), sodium (100-750 mg/l), chlorides 100-1200 mg/l) and hardness (176-1504 mg/l) increase from the east to the west. All the above parameters exceed the WHO and the National Standards in the western part of the project area.

The tentative results of the new first water quality analysis are approximately similar to the old results. Consequently iron removal is not a big problem. The treatment method needs only simple technology. Manganese might be more problematic. In certain areas there is no need for treatment all. More information on the treatment methods is given in Chapter 4.3.

3.7 Physical Development Plan

The basic data comprises mainly the technical data of the existing water supply and sanitation system and the different plans available. See Chapters 3.1 and 3.2

Related to the options for the Physical development Plan a special study for mixing ground water and surface water in Sumusta was carried out in cooperation with the O & M team and the laboratory. See Appendix 19. Based on the results of water quality analyses in Sumusta a conclusion can be drawn that there will be quite small risks for calcium carbonate deposits inside the pipes. Some checkings will be done also in the other areas.

4. TENTATIVE RECOMMENDATIONS

Sector plan is suggested to be a collection of separate reports as follows:

- Data Bank
- Water Resources Inventory
- Socio-cultural Study
- Physical Development Plan

4.1 Review of Data Bank

The comprehensive Data bank of the Study "Needs Assessment and Strategic Planning" should be carefully utilized for further activities in developing the Sector Plan. Special emphasis should be put on the results of the comprehensive field survey and socio-economic data. On the other hand the technical data is already partly out of date and more up to date information is already available.

Therefore cooperation in combining and further developing all basic data available should be discussed with the governorate. The Housing Department of the Beni Suef Governorate has just recently collected a lot of updated basic data related to the comments on the National Plan (Nopwasd). A lot of basic data has also been collected by the Project in cooperation with the Housing department related to the Physical Development Plan. See Chapter 4.42.

4.2 Review of the Report Needs Assessment and Strategic Planning

A short reassessment has already been done by the project staff. See Chapter 3.4 and Appendix 15. Consequently it is no longer meaningful to revise the whole report. Only selected, the most applicable parts should be utilized for developing future activities, especially the very comprehensive basic data.

4.3 Water Resources Inventory

It was not possible to concentrate very much on the water resources inventory due to limited time. Some recommendations, however, can be given as follows:

- More detailed proposals for utilization of ground water could be given in January after the second sampling (winter period/low water table). After getting more results different water treatment methods should be carefully studied related to the Physical Development Plan.

- A suitable method for iron removal could be e.g. pressure filtration. Manganese removal needs more sophisticated technology. The additional treatment for iron removal could be e.g. feeding of potassium permagnate. (similar to Ezbet Shantoor). It would be better, however, to try to find more simplified low cost methods. Biological slow sand filtration would be a simple and good method for both iron and manganese from operation and maintenance point of view. Space might be problem for it.

- The first ideas given already by the local staff for the simplified methods for removal of iron and manganese are shown in

Appendix 17. These methods are based on slow sand filtration and aeration in the old elevated tanks. There are already experiences of these methods in Egypt. Consequently this is a good basis for further development of treatment methods.

- developing drilling methods and structures of ground water wells. The final structure will be defined case by case according to aquifers. The correct structure will reduce contamination and improve water quality from all points of quality, even including iron and manganese. See Appendix 18.

- ground water level is considered to be included to the monitoring program, from operational point of view on the sites of production wells. The O&M-team could start to measure the ground water level in Sumusta pilot area e.g once a week in the observation well near the production well

- an additional sampling point in Sumusta (a new production well on the site of old elevated tank) is proposed to be included to the regular monitoring program. All ground water stations are recommended to be included to the programme at least for the long run.

- new experimental wells are proposed to be constructed for the new optional ground water stations. See Master Plan, Chapter 4.44.

4.4 Physical Development Plan

4.41 General

The Physical Development Plan is proposed to be prepared mainly during the transition period in 1996 due to the on-going Nopwasd National Plan. Also the on-going water monitoring program will give more information during next year. Linking to the Nopwasd National Plan and the other relevant plans available will be carefully considered especially in close cooperation with Nopwasd.The most important other plans are:

- Regional Master Plan for Water Supply. Utilities Consulting Engineering 1992.
- Needs Assessment and Strategic Planning for Rural Water Supply and Waste Water. Beni Suef Governorate. Dr. Zaher Abdalla and Partners 1993.
- National Project for Developing North Upper Egypt in 1997-2017. Ministry of Planning 1996.

The above plans will give the basis for the Physical Development Plan. There are, however, several contradictions to be solved between the different plans as mentioned in Chapter 3.26

The important aim for the new Physical Development Plan will be to combine all relevant information from each plan and to develop the most economic and sustainable solutions for the future, taking into account not only the technical aspects but the role of community participation.

4.42 Existing Data

All information from different sources will be collected and combined. Data collection is already going on. The main part of the technical data of the existing water supply and sanitation system has already been collected. Some checkings should be done and certain contradictions are to be cleared up.

The main source for data collection are the Beni Suef Governorate and the local units.

Very comprehensive data from the Data bank of Needs Assessment and Strategic Planning (Dr. Zaher Abdalla) will be utilized as much as possible, especially the results of the field survey, water service level data, socio-economic data etc.

4.43 Forecasts for Population Growth and Water Consumption

Reassessment of population forecasts and water consumption will be among the key issues due to the remarkable differences between the different plans available. See Chapter 3.26 and Appendix 14. The official records, i.e. the annual statistics published by Information Center should be the basis for the reassessment of population growth.

One of the biggest problems is to find the correct water consumption per capita. Consumption figures per capita proposed by the National Plan and Regional Master plan are of the same magnitude and commonly in use in Egypt as well as internationally. Consumptions for rural areas proposed by the Ministry of Planning and Beni Suef governorate are higher than normally used. Slight adjustment of the consumption estimates could be, however, carefully considered taking into account the local conditions. The influence of industrial plants on water consumption should especially be studied.

Categories for different consumer groups for water consumption forecasts should be created. See sample, Appendix 20.

4.44 Tentative ideas for the options for Development of Water Supply and Sanitation

Referring to Chapter 4.4.3 it can be pointed out that the final population and water consumption forecast will have big influence also on the technical options for Water Supply and Sanitation.

In spite of different water consumption estimates, however, the final solution might be a combination of ground water and surface water:

- big surface water treatment plants (Masaret El Nasan, Beba and El Fashn) including at least a main distribution network on the eastern part of the project area.

- ground water at least for the areas far away from the big surface water treatment plants and the River Nile

- there is a problem that the water quality is generally better especially (hardness and salinity) in the areas close to the above mentioned new big surface water treatment plants and the River Nile. Hardness and salinity increases from the east to the west. Iron and manganese concentration is, however, highest in the central part of the project area. The lowest concentration is on the western bank of the Bahr Youssef canal.

- Referring to the above, mixing ground water and surface water could improve the qualify to water. It would solve the problems of salinity and hardness as well as iron and manganese. On the other hand turbidity might increase a little depending on surface water source. See test results in Sumusta. (Chapter 3.7) This idea should be further studied and developed.

- for the long run, the need of the possible enlargement of the Beba, El Fashn and Masaret Nasan surface water treatment plants and the new Sumusta plant will clearly depend on the final population and water consumption estimates. Another alternative is more efficient utilization of ground water resources.

- compact units should be closed little by little (except eastern side of Nile), at least after the year 2000.

- water quality of existing ground water stations should be checked. Existing data available should be collected and summarized (already under work). New analysis is needed for each water stations.

- capacity of the existing ground water stations should be utilized better than presently.
    - increase of running hours
    - more pumps running at same time
    - bore well rehabilitation/renewal

  - possibility to increase capacity will be clarified case by case
- new ground water stations will be constructed
  - partly rehabilitation/connection to the existing stations, partly new stations
  - the first step will be experimental wells, test pumpings and water quality analysis
  - developing more advanced structure for borehole wells. See Appendix 18.
  - the first new ground water well is proposed to be build in the Mazoura experimental well site. It could be a replacement for the compact unit for the long run.

- developing simplified iron and manganese removal methods. See Chapter 4.3 and Appendix 17.

- Action program for water loss reduction

- Cost comparison between the different alternatives, including the O&M cost should be carried out to find the most economic solution. Hydraulic calculation for distribution network is recommendable.

- combining collective waste water and water supply pipe lines by linking these projects together. Problems might be found in timing and financing (administrative and/or donor problems). For the long run the most economical way would be to construct both pipes at the same time (saving on excavation cost)

- due to the high cost level of contract tenders, recalculation of cost is recommended, as well as comparison between the alternatives of a separate Mazoura waste water treatment plant and a centralized treatment plant in the Sumusta city.

- for sanitation (waste water) development of alternative low cost solutions is proposed, e.g. on-site treatment plants for small villages (far away from main pipes). Experiences of the existing pilot plants will be utilized

5 FURTHER SUPPORT

- Short term consultation of hydrogeologist, 3 weeks, is proposed in February-March 1997 to assess more in detail the Water Resources Inventory and Monitoring Programme and assist to prepare the new test well programme.

- Short term consultations are proposed for Water Supply Adviser in January-February, April and July-June. The main objectives for the consultation are: checking of final basic data collection and

assessment of data collected so far, giving more detailed guidelines for Data bank development and assist the local staff in the preparation of the Physical Development Plan.

6. ACKNOWLEDGEMENTS

Finally I would like to thank the whole project staff and all authorities for their helpfulness and good cooperation. Special thanks I would like to give to Mr. Hassal Abdel Atty, who has taken the biggest responsibility in data collection.

APPENDICES

TERMS OF REFERENCE

REGIONAL WATER SUPPLY AND SANITATION PROJECT IN BENI SUEF GOVERNERATE **10.08.1996**

SECTOR PLANNING

SHORT TERM CONSULTATION OF MR. HEIMO OJANEN

TERMS OF REFERENCE

1. BACKROUND

Sector Planning is included as a separate Component (Component B) to the Project. Main objectives are as follows:

- to maintain and develope existing data bank for sectoral planning
- to acquire adequate information on surface and ground water resources for planning water and waste water schemes
- to develope the existing Water Supply and Sanitation Plans into alternative options for the years 1996-2005 (Master Plan)

2 PURPOSE OF THE CONSULTATION

The main purpose of this consultation is to review the work so far accomplished, asses the collected material and provide guidance for the preparation of the Sector Development Plan (Master Plan).

2. SCOPE OF WORK

The work will consist:

Assessement of the collected material

Assess the already collected material and data including the report "Needs Assessment and Strategic Planning" and make recommendations on the need additional or more detailed material and data.

Review of the ongoing and completed inventories

Review the quality and progress of the ongoing and completed inventories and give comments and recommendations for improvements and additions as necessary.

Data bank

Assess the work carried out developing data bank and make recommendation for additions and improvements as necessary.

Master Plan

Review and discuss with the project personnel the objectives and scope of the plan and give tentative guide lines for the further activities.

To accomplish the above the consultant shall review documents, hold discussions with the project staff and the relevant authorities.

3. TENTATIVE SCHEDULE

13.08.1996	Travel to Egypt.
14.08 - 14.09.1996	Activities in the project area.
14.09.1996	First Findings-report
15.09.1996	Return to Finland.
16-30.09.1996	Finalization of report in Finland.

REGIONAL WATER SUPPLY AND SANITATION PROJECT IN BENI SUEF GOVERNORATE 04.11.1996

SECTOR DEVELOPMENT PLAN

SHORT TERM CONSULTATION OF WATER SUPPLY CONSULTANT HEIMO OJANEN

TERMS OF REFERENCE

1. BACKGROUND

Sector Development Plan is included as a separate Component (Component B) to the Project. Main objectives are as follows:

- to maintain and develop existing data bank for sectoral planning
- to acquire adequate information on surface and ground water resources for planning water and waste water schemes
- to develop the existing Water Supply and Sanitation Plans into alternative options for the years 1996-2005 (Master Plan)

2 PURPOSE OF THE CONSULTATION

This consultation is the extension for the previous consultation in August-September 1996. All information was not available in that time and the language of most important data received during consultation was only in Arabic.

The main purpose is to review the work accomplished after previous consultation, to asses all collected data and provide guidelines for the preparation of the Master Plan by RWSSP (EGA).

2. SCOPE OF WORK

The work will consist:

Assessment of the collected material

Assess the already collected material including especially just received new Draft Nopwasd National Plan and the report "Needs Assessment and Strategic Planning" and make recommendations on the need

additional or more detailed material and data.

Review of the ongoing and completed inventories

Review the quality and progress of the ongoing and completed inventories and give comments and recommendations for improvements and additions as necessary.

Data bank

Assess the work carried out developing data bank and make recommendation for additions and improvements as necessary. It will be emphasized especially the assessment of the computerized databank for the report "Needs Assessment and Strategic Planning". Recommendations for combination of the data from different sources will be given.

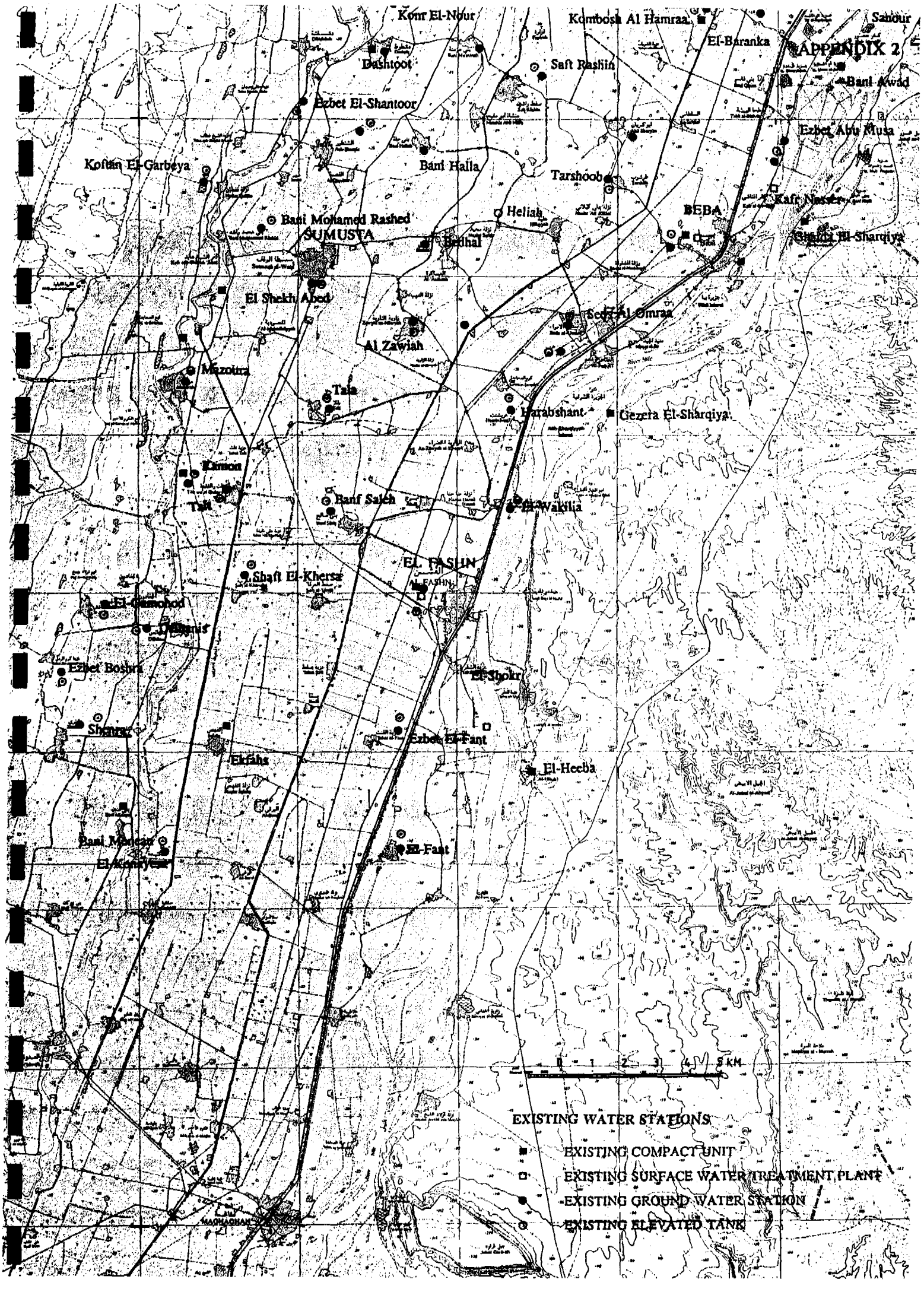
Master Plan

Review and discuss with the project personnel the objectives and scope of the plan and give ideas and tentative guidelines for the further activities. All existing Master Plans will be taken into account.

To accomplish the above the consultant shall review relevant documents, hold discussions with the project staff and the authorities.

3. TENTATIVE SCHEDULE

05.11.1996	Travel to Egypt.
06.11-03.12.1996	Activities in the project
04.12.1996	Return to Finland.
31.12.1996	Reporting


APPENDIX 2
Kom El-Nour
Kombosh Al Hamraa
El-Baranka
Sanour
Dashtoot
Saft Rashin
Bani Awad
Ezbet El-Shantoor
Ezbet Abu Musa
Koftan El-Garbeya
Bani Halla
Tarshoob
Kafr Nasser
Heliah
BEBA
Bani Mohamed Rashed
SUMUSTA
Badhal
Ghanda El-Sharqiya
El Sheikh Abed
Sedi Al Omraa
Al Zawiah
Mazoura
Tala
Harabshant
Gezeira El-Sharqiya
Kamoon
Tah
Banf Saleh
El Wakilia
EL FASHN
Shaft El-Khersa
El-Gamohod
Ezbet Boshra
El-Shokr
Shahra
Ezbet El-Fant
Ekfahs
El-Heeba
Bani Mansour
El-Kantiyeh
El-Fant
0 1 2 3 4 5 KM
EXISTING WATER STATIONS
EXISTING COMPACT UNIT
EXISTING SURFACE WATER TREATMENT PLANT
EXISTING GROUND WATER STATION
EXISTING ELEVATED TANK

ECHNICAL DATA OF WATER STATIONS IN 1996

MARKAZ/SITE		WATER SOURCE	TREATMENT SYSTEM	DESIGN CAPACITY (l/s)	YEAR OF CONSTR.
MUSTA					
Sumusta City (El Shekh Abed)		Surface water/canal	Compact unit 2	60	1985/1995
Sumusta old elevated tank		Ground water/deep well	No treatment	25	1996
dhal		Ground water/deep well	No treatment	25	1979/1981
dahl	Bani Halla	Ground water/deep well	No treatment	25	1970
Mazoura		Ground water/deep well	No treatment	25	1970
El-Shantoor		Ground water/deep well	Iron removal CU	25	1960
Shantoor	Ezbet El-Shantoor	Ground water/deep well	No treatment	25	1960
Shantoor	Koftan El-Garbeya	Ground water/deep well	No treatment	12	1968
El-Shantoor	Bani Mohamed Rashed	Ground water/deep well	No treatment	12	1970
shtoot		Ground water/deep well	No treatment	35	1960
shtoot	Kom El Nour	Ground water/deep well	No treatment	12	1960
Deshtoot		Surface water/canal	Compact Unit	30	under constr.
Mazoura		Surface water/canal	Compact Unit	30	1995
BA					
ba city		Surface water/canal	Compact unit 2	60	1988
Beba city		Ground water/deep well	No treatment	70	1989
Beba city		Surface water/canal	Conventional	60	1940
ba city		Surface water/River Nile	Conventional	200	test running
Gezeret Beba		Surface water/River Nile	Compact unit	30	1992
Gezeret Beba	Kafr Nasser	Ground water/deep well	No treatment	12	1958
ds		Ground water/deep well	No treatment	25	1955
ds	El-Fokaee	Ground water/deep well	No treatment	12	1956
Seds	Harabshant	Ground water/deep well	No treatment	25	1953
Helleh	Zayet El Naowya	Ground water/deep well	No treatment	25	1955
lleh	Tarshoub	Ground water/deep well	No treatment	25	1956
nsa Bani Malo	Bani Awad	Ground water/deep well	No treatment	35	1987
Tansa Bani Malo	El Baranka	Surface water/canal	Compact unit	30	1988
nsa Bani Malo	El Baranka	Ground water/deep well	No treatment	35	1953
ft Rashin		Ground water/deep well	No treatment	25	1955
Gezera El Sharqiya		Surface water/River Nile	Compact unit	30	1995
Ghaiada El Sharqiya		Surface water/River Nile	Compact unit	30	1996
FASHN					
Fashen city		Surface water/canal	Compact unit	30	1988
El Fashen city		Ground water/deep well	No treatment	140	1940
Fashen city		Surface water/canal	Conventional	60	1940
Fashen city		Surface water/River Nile	Conventional	200	under constr.
El- Fant		Ground water/deep well	No treatment	12	1961
El- Fant	El-Shokr	Ground water/deep well	No treatment	12	1955
Fant	El-Heeba	Surface water/canal	Compact unit	30	1992
fahs	El-Konayesa	Ground water/deep well	No treatment	25	1953
Ekfahast		Surface water/canal	Compact unit	30	1993
Delhanis		Ground water/deep well	No treatment	25	1960
lhanis	Shenra	Ground water/deep well	No treatment	12	1956
Delhanis	Bani Menean	Surface water/canal	Compact unit	30	1993
Delhanis	Ezbet Boshra	Ground water/deep well	No treatment	12	1960
lt		Ground water/deep well	No treatment	25	1969
lt	Kamon	Surface water/canal	Compact unit	30	1996
Talt	Tala	Ground water/deep well	No treatment	12	1955
Talt	Saft El-Khersa	Ground water/deep well	No treatment	25	1958
bsug	El-Wakleia	Ground water/deep well	No treatment	25	?
bsug	Bani Saleh	Ground water/deep well	No treatment	25	1958
El Gamohod		Ground water/deep well	No treatment	12	1960

TECHNICAL DATA OF ELEVATED WATER TANKS IN 1996 IN SUMUSTA, BEBA AND EL FASHEN MARKAZES

NAME OF THE VILLAGE/ WATER STATION		MARKAZ	CAPACITY (m3)	HEIGHT (m)	YEAR OF CONSTR.
SUMUSTA CITY		SUMUSTA	200	35	1960
SUMUSTA CITY		SUMUSTA	500	35	UNDER CONST.
BEDAHL		SUMUSTA	60	22	1955
MAZOURA		SUMUSTA	60	22	1958
EL SHANTOOR		SUMUSTA	60	22	1959
EL SHANTOOR	EZBET EL SHANTOOR	SUMUSTA	60	22	1955
EL SHANTOOR	KOFTAN EL GARBEYA	SUMUSTA	40	22	1956
EL SHANTOOR	BANI MOHAMMED RASHED	SUMUSTA	40	22	1956
DASHTOOT		SUMUSTA	200	30	1990
DASHTOOT	KOM EL NOUR	SUMUSTA	40	20	1958
BEBA CITY		BEBA	300	35	1960
BEBA CITY		BEBA	500	35	PROPOSED
BEBA CITY		BEBA	1000	35	PROPOSED
SEDS		BEBA	20	8	1955
SEDS	EL-FOKAEE	BEBA	30	12	1956
SEDS	HARABSHANT	BEBA	60	22	1953
HELLEH	ZAYET EL NAOWYA	BEBA	100	30	1994
HELLEH	TARSHOUB	BEBA	100	25	1956
TANSA BANI MALO	EL BARANKA	BEBA	200	30	1956
SAFT RASHIN		BEBA	100	25	1955
GEZERET BEBA	KAFR NASSER	BEBA	40	20	1958
EL FASHEN CITY		EL FASHEN	200	35	1959
EL FASHEN CITY		EL FASHEN	500		PROPOSED
EL FASHEN CITY		EL FASHEN	1000		PROPOSED
EL FANT		EL FASHEN	20	8	1961
EL FANT	EL SHOKR	EL FASHEN	40	20	1955
EKFAHS	EL KONAYESA	EL FASHEN	60	22	1953
DELHANIS		EL FASHEN	100	25	1955
DELHANIS	SHENRA	EL FASHEN	40	22	1956
DELHANIS	EZBET BOSHRA	EL FASHEN	40	20	1958
TALT		EL FASHEN	60	22	1955
TALT	TALA	EL FASHEN	40	20	1955
TALT	SAFT EL KHERSA	EL FASHEN	60	22	1955
ABSUG	BANI SALEH	EL FASHEN	40	20	1958
ABSUG	EL WAKLEIA	EL FASHEN	100	25	1956

LENGTH OF THE PIPE NETWORK IN 1996

DIAMETER (mm)	SUMUSTA (km)	BEBA (km)	EL FASHIR (km)	TOTAL (km)
100	112	165	49	326
125	7	0	5	12
150	20	57	6	83
200	8	18	2	28
250	8	17	4	29
300	0	0	8	8
TOTAL	155	257	74	486

The pipe material is mainly asbestos cement, partly PVC, cast iron and steel.

RUNNING HOUR RECORDS

RUNNING HOUR RECORD FOR THE WATER STATIONS IN SUMUSTA MARKAZ IN 1995

Name of the stations		AVERAGE DAILY RUNNING HOURS , CAPACITY AND DAILY PRODUCTION																																			
		Jenuary			February			March			April			May			June			July			August			September			October			November			December			Average	
		Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/d
Sumuste city		14.0	108.0	1512.0	7.0	108.0	756.0	14.0	108.0	1512.0	13.5	108.0	1458.0	13.8	108.0	1490.4	13.0	108.0	1404.0	13.4	108.0	1447.2	14.7	108.0	1587.6	15.8	108.0	1706.4	21.0	108.0	2268.0	20.0	108.0	2160.0	15.3	108.0	1780.4	15	1589
Bedahl		6.8	90.0	612.0	6.7	90.0	603.0	6.8	90.0	612.0	7.0	90.0	630.0	6.7	90.0	603.0	7.3	90.0	657.0	6.8	90.0	612.0	4.0	90.0	360.0	6.4	90.0	576.0	6.5	90.0	585.0	7.4	90.0	666.0	6.7	90.0	603	7	593
Bedahl Bani Halla		4.0	90.0	360.0	4.6	90.0	414.0	2.3	90.0	207.0	5.0	90.0	450.0	2.3	90.0	207.0	4.8	90.0	432.0	6.1	90.0	549.0	5.9	90.0	531.0	6.0	90.0	540.0	6.0	90.0	540.0	4.6	90.0	414.0	4.6	90.0	414	5	422
Mezoura		5.7	90.0	513.0	6.2	90.0	558.0	6.5	90.0	585.0	7.0	90.0	630.0	8.6	90.0	774.0	11.0	90.0	990.0	10.5	90.0	945.0	10.3	90.0	927.0	9.0	90.0	810.0	7.7	90.0	693.0	6.3	90.0	567.0	5.8	90.0	522	8	710
El Shantoor		6.4	90.0	576.0	6.3	90.0	567.0	6.6	90.0	594.0	6.7	90.0	603.0	6.5	90.0	585.0	7.3	90.0	657.0	8.0	90.0	720.0	8.9	90.0	801.0	3.0	90.0	270.0	6.0	90.0	540.0	6.4	90.0	576.0	6.3	90.0	567	7	588
El Shantoor Ezbet El Shantoor	diesel	1.4	90.0	126.0	2.6	90.0	234.0	2.7	90.0	243.0	7.0	43.0	301.0	8.0	43.0	344.0	2.0	90.0	180.0	3.2	90.0	288.0	3.3	90.0	297.0	6.3	43.0	270.9	1.6	21.0	33.6	3.0	90.0	270.0	3.0	90.0	270	4	238
	electric										2.1	90.0	189.0	2.7	90.0	243.0													4.9	43.0	210.7							3	214
El Shantoor Koftan El Garbeya	diesel	3.2	43.0	137.6	3.2	43.0	137.6	3.1	43.0	133.3	1.7	21.0	35.7	1.9	21.0	39.9	5.0	21.0	105.0	5.0	21.0	105.0	3.4	21.0	71.4	4.8	21.0	100.8	1.9	21.0	39.9	3.0	43.0	129.0	1.0	21.0	21	3	88
	electric										1.5	43.0	64.5	1.8	43.0	77.4							1.1	43.0	47.3				1.8	43.0	77.4				2.2	43.0	94.6	2	72
El Shantoor Bani Mohemed Rashed	diesel	3.2	43.0	137.6	3.3	43.0	141.9	2.5	43.0	107.5	2.7	21.0	56.7	4.4	21.0	92.4	8.8	21.0	184.8	2.7	21.0	56.7	2.7	21.0	56.7	6.3	43.0	270.9	1.6	21.0	33.6	2.0	21.0	42.0	2.1	21.0	44.1	4	102
	electric	2.1	21.0	44.1	2.0	21.0	42.0	2.8	21.0	58.8	2.6	43.0	111.8	7.2	43.0	309.6				3.9	43.0	167.7	4.1	43.0	176.3				4.9	43.0	210.7	4.0	43.0	172.0	4.1	43.0	176.3	4	147
Deshtoot		8.0	126.0	1008.0	8.0	126.0	1008.0	7.1	126.0	894.6	6.8	126.0	856.8	8.0	126.0	1008.0	6.9	43.0	382.7	9.0	126.0	1134.0	10.8	126.0	1360.8	10.0	126.0	1260.0	10.0	126.0	1260.0	10.0	126.0	1260.0	10.0	126.0	1260	9	1058
Deshtoot Kom El Nour		4.6	43.0	197.8	5.0	43.0	215.0	5.0	43.0	215.0	4.9	43.0	210.7	5.0	43.0	215.0	5.0	43.0	215.0	5.0	43.0	215.0	5.0	43.0	215.0	5.0	43.0	215.0	5.0	43.0	215.0	5.0	43.0	215.0	5.0	43.0	215	5	213

Running hours of diesel pumps are given separately if the capacities of electrical pumps and siesel pumps are different.

Appendix 6.1

RUNNING HOUR RECORD FOR THE WATER STATIONS IN BEBA MARKAZ IN 1995

Name of the stations		AVERAGE DAILY RUNNING HOURS , CAPACITY AND DAILY PRODUCTION																																			
		'January			'February			'March			April			'May			'June			July			'August			'September			'October			'November			December			Average	
		Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Production m3/d
Beba city		24.0	288.0	6912.0	24.0	288.0	6912.0	24.0	288.0	6912.0	24.0	288.0	6912.0	24.0	288.0	6912.0	24.0	288.0	6912.0	24.0	288.0	6912.0	24.0	288.0	6912.0	24.0	288.0	6912.0	24.0	288.0	6912.0	24.0	288.0	6912	24	6912
Beba city					0.25	216	54.0	0.35	216	75.6	2.5	216	540.0	3.0	216	648.0	4.0	216	864.0	5.0	216	1080.0	7.0	216	1512.0	5.7	216	1231.2	4.5	216	972.0	4.0	216	864.0				4	784
Beba city - villag. Sede-Tanea - Kompesh		20.0	216	4320.0	20.0	216	4320.0	20.0	216	4320.0	21.0	216	4536.0	21.6	216	4665.6	22.0	216	4752.0	24.0	216	5184.0	21.0	210	4410.0	19.5	216	4212.0	18.4	216	3974.4	17.3	216	3736.8	19.5	216	4212	20	4387
Gezert Beba		11.0	108.0	1188.0	10.7	108.0	1155.6	9.8	108.0	1058.4	10.8	108.0	1166.4	10.7	108.0	1155.6	7.8	108.0	842.4	10.0	108.0	1080.0	10.7	108.0	1155.6	10.8	108.0	1166.4	9.8	108.0	1058.4	11.0	108.0	1188.0	11.0	108.0	1188	10	1117
Gezert Beba - kafer Naser	electric	5.3	43.0	227.9	51.0	43.0	2193.0	5.3	43.0	227.9	6.0	43.0	258.0	6.0	43.0	258.0	6.9	43.0	296.7	6.9	43.0	296.7	8.0	43.0	344.0	5.8	43.0	249.4	5.2	43.0	223.8	6.2	43.0	266.6	5.9	43.0	253.7	10	425
	diesel	1.6	43.0	68.8	1.9	43.0	81.7	1.8	43.0	77.4	0.3	43.0	12.9	1.9	43.0	81.7	1.2	43.0	51.6	0.7	43.0	30.1				1.8	43.0	77.4	1.2	43.0	51.6	0.7	43.0	30.1	1.1	43.0	47.3	1	56
Seds	electric	3.0	90.0	270.0	3.0	90.0	270.0	3.4	90.0	306.0	4.0	90.0	360.0	2.5	90.0	225.0	3.0	90.0	270.0	2.6	90.0	234.0	3.0	90.0	270.0	2.7	90.0	243.0				3.6	90.0	324.0	4.3	90.0	387	3	287
	diesel	1.0	21.0	21.0	1.6	21.0	33.6	1.7	21.0	35.7	1.3	21.0	27.3	2.5	21.0	52.5	2.0	21.0	42.0	2.6	21.0	54.6	3.0	21.0	63.0	2.8	21.0	58.8	1.6	21.0	33.6	0.4	21.0	8.4	0.2	21.0	4.2	2	36
Seds El-Fokaee	electric	6.2	43.0	266.6	3.4	43.0	146.2	7.4	43.0	318.2	7.5	43.0	322.5	6.6	43.0	283.8	6.9	43.0	296.7	6.0	43.0	258.0	7.4	43.0	318.2	7.3	43.0	313.9	5.0	43.0	215.0	8.4	43.0	361.2	4.6	43.0	197.8	6	275
	diesel	1.4	90.0	126.0	4.4	90.0	396.0	0.4	90.0	36.0	0.7	90.0	63.0	1.2	90.0	108.0	1.2	90.0	108.0	1.3	90.0	117.0	0.9	90.0	81.0	1.6	90.0	144.0	3.4	90.0	306.0	0.1	90.0	9.0	2.7	90.0	243	2	145
Seds Herebshant	electric	4.0	90.0	360.0	3.0	90.0	270.0	3.8	90.0	324.0	3.9	90.0	351.0	3.8	90.0	342.0	5.0	90.0	450.0	4.8	90.0	432.0	4.8	90.0	432.0	5.4	90.0	486.0	3.9	90.0	351.0	4.1	90.0	369.0	3.8	90.0	342	4	376
	diesel	2.0	43.0	86.0	3.0	43.0	129.0	1.8	43.0	77.4	1.3	43.0	55.9	4.3	43.0	184.9	1.0	43.0	43.0	1.6	43.0	68.8	1.2	43.0	51.6	0.6	43.0	25.8	1.3	43.0	55.9	0.9	43.0	38.7	1.2	43.0	51.6	2	72
Helleh Zeyet El Naowya	electric	5.2	90.0	468.0	4.5	90.0	405.0	5.4	90.0	486.0	5.2	90.0	468.0	4.3	90.0	387.0	1.6	90.0	144.0	6.8	90.0	612.0	3.6	90.0	324.0	3.5	90.0	315.0	6.0	90.0	540.0	5.8	90.0	522.0	6.4	90.0	576	5	437
	diesel	2.6	43.0	111.8	3.2	43.0	137.6	2.4	43.0	103.2	2.6	43.0	111.8	4.3	43.0	184.9	2.9	43.0	124.7	1.7	43.0	73.1	3.6	43.0	154.8	3.5	43.0	150.5	2.0	43.0	86.0	3.8	43.0	163.4	1.6	43.0	68.8	3	123
Helleh Tarehoub	electric	10.6	90.0	972.0	5.6	90.0	504.0	11.4	90.0	1026.0	11.6	90.0	1044.0	11.2	90.0	1008.0	11.5	90.0	1035.0	11.2	90.0	1008.0	10.6	90.0	954.0	11.2	90.0	1008.0	10.4	90.0	936.0	11.9	90.0	1071.0	11.5	90.0	1044	11	988
	diesel	0.7	90.0	63.0	0.4	90.0	36.0	0.6	90.0	54.0										1.0	90.0	90.0	1.4	90.0	126.0	1.0	90.0	90.0	1.0	90.0	90.0							1	78
Tanea Beni Malo Beni Awed		16.0	126.0	2016.0	12.8	126.0	1612.8	15.5	126.0	1953.0	15.7	126.0	1978.2	15.0	126.0	1890.0	16.0	126.0	2016.0	13.6	126.0	1713.6	15.6	126.0	1965.6	15.5	126.0	1953.0	14.2	126.0	1789.2	14.5	126.0	1827.0	15.6	126.0	1965.6	15	1890
Tanea Beni Malo El Beranka		9.0	108.0	972.0	104.0	108.0	11232.0	4.9	108.0	529.2	5.6	108.0	604.8	8.8	108.0	950.4	11.5	108.0	1242.0	14.6	108.0	1576.8	10.3	108.0	1112.4	10.5	108.0	1134.0	10.3	108.0	1112.4	3.5	108.0	378.0	3.1	108.0	334.8	16	1765
Tanea Beni Malo El Beranka		12.5	126.0	1575.0	9.8	126.0	1234.8	13.4	126.0	1688.4	12.6	126.0	1587.6	12.7	126.0	1600.2	14.8	126.0	1864.8	11.7	126.0	1474.2	14.7	126.0	1852.2	13.7	126.0	1726.2	11.6	126.0	1461.6	3.6	126.0	453.6	11.9	126.0	1499.4	12	1502
Saft Reshin	electric	8.0	90.0	720.0	8.6	90.0	774.0	10.7	90.0	963.0	8.2	90.0	738.0	9.6	90.0	864.0	14.7	90.0	1323.0	15.4	90.0	1386.0	10.9	90.0	981.0	10.3	90.0	927.0	9.5	90.0	855.0	10.8	90.0	972.0	10.4	90.0	936	11	953
	diesel	0.5	90	45.0				0.1	90	9.0	0.5	90	54.0	0.3	90	27.0													0.1	90	9.0							0	29
Running hours of diesel pumps are given separately if the capacities of electric pumps and diesel pumps are different .																																							

Appendix 6.2

RUNNING HOUR RECORD FOR THE WATER STATIONS IN El FASHEN MARKAZ IN 1995

AVERAGE DAILY RUNNING HOURS , CAPACITY AND DAILY PRODUCTION

Name of the stations		'January			'February			March			April			'May			June			July			August			September			October			November			December			Average	
		Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Capacity m3/h	Production. m3/d	Runing. hours.	Production m3/d
Elfeshen City	Surface	3.0	216.0	648.0	13.0	216.0	2808.0	10.5	216.0	2268.0	12.3	216.0	2656.8	12.8	216.0	2764.8	6.0	216.0	1296.0	2.4	216.0	514.1	1.2	216.0	263.5	0.3	216.0	71.3	1.6	216.0	354.2	5.8	216.0	1259.3	1.5	216.0	313.2	6	1268
	water	1.61	216.0	347.8	0.0	216.0	0.0	2.7	216.0	583.2	1.1	216.0	244.1	5.7	216.0	1231.2	7.9	216.0	1712.9	11.6	216.0	2514.2	13.0	216.0	2808.0	13.9	216.0	2993.6	11.6	216.0	2505.6	6.8	216.0	1460.2	9.9	216.0	2131.92	7	1685
El Fashen City	Borehole	4.29	90	386.1	3.35	90	301.5	6.35	90	571.5	2.3	90	207.0	1.53	90	137.7	6.9	90	621.0	7.2	90	644.4	9.54	90	858.6	5.5	90	495.0	3.19	90	287.1	2.86	90	257.4	2.12	90	190.8	5	413
	Wells	8.61	90	774.9	0.82	90	73.8	2.41	90	216.9	2.86	90	257.4	8.96	90	806.4	14.4	90	1292.4	18	90	1639.8	8.54	90	768.6	11.8	90	1064.7	20	90	1800.0	18.6	90	1674.0	12.4	90	1111.5	11	957
		8.32	90	748.8	13.4	180	2403.0	9.87	180	1776.6	1.76	90	158.4	7.8	90	702.0	12.2	90	1098.0	6.6	90	597.6	3.96	90	356.4	2.63	90	236.7	12.2	180	2199.6	8.66	90	779.4	16.6	90	1492.2	9	1046
		0.12	90	10.8	2.35	180	423.0	4.83	180	869.4	9.53	180	1715.4	11.5	180	2061.0	11.5	180	2062.8	12	180	2160.0	1.06	90	95.4	12	90	1080.0	11.3	180	2025.0	1.5	90	135.0	5.19	90	467.1	7	1092
		15.4	180	2763.0							7.86	180	1414.8	7.19	180	1294.2	10.1	180	1823.4	11	180	1897.2	11.3	180	2037.6	11.8	180	2124.0				9.66	180	1738.8	13.5	180	2437.2	11	1948
		15.6	180	2809.8																			12.4	180	2228.4	15.1	180	2716.0				11.4	180	2044.6	5.12	180	921.6	12	2145
Elfeshen City	C.U	1.8	108	172.8	2.8	108	297.0	4.0	108	432.0	2.1	108	226.8	1.1	108	121.0	2.3	108	246.4	3.1	108	337.0	3.4	108	365.0	1.3	108	143.6	4.4	108	476.3	1.5	108	165.2	1.9	108	201.96	2	266
Elfent	electric	0.3	43.0	12.9	0.3	43.0	12.9	0.1	43.0	4.3	0.1	43.0	4.3	0.1	43.0	4.3	0.5	43.0	21.5	0.5	43.0	21.5	0.5	43.0	21.5	0.2	43.0	6.8	0.3	43.0	12.9	0.3	43.0	12.9	0.6	43.0	25.8	0	14
	diesel	0.1	21.0	2.1	0.1	21.0	2.1	0.4	21.0	8.4	0.5	21.0	10.5	0.3	21.0	6.3	0.1	21.0	2.1	0.3	21.0	6.3			0.0	0.1	21.0	2.1	0.1	21.0	2.1			0.0			0	0	5
El-Sholz		0.4	43.0	16.3	0.4	43.0	15.1	0.4	43.0	16.3	0.4	43.0	15.5	0.4	43.0	18.5	0.4	43.0	17.2	0.3	43.0	12.9	0.2	43.0	9.5	0.2	43.0	9.5	0.2	43.0	8.2	0.2	43.0	8.2	0.2	43.0	9.46	0	13
El-fent El-Heeba		5.7	108.0	615.6	5.0	108.0	535.7	6.0	108.0	648.0	6.4	108.0	686.9	5.6	108.0	602.6	5.1	108.0	550.8	4.6	108.0	494.6	6.4	108.0	691.2	6.1	108.0	658.8	7.0	108.0	756.0	7.0	108.0	756.0	7.0	108.0	756	6	638
Ekfehs El-Koneyese	electric	3.0	90.0	270.0	3.0	90.0	270.0	3.3	90.0	297.0	4.8	90.0	432.0	3.0	90.0	270.0	2.8	90.0	252.0	3.1	90.0	279.0	3.9	90.0	351.0	4.3	90.0	387.0	3.0	90.0	270.0	3.0	90.0	270.0	3.0	90.0	270	3	302
	diesel	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0.1	21.0	2.1	0	2
Delhenis	electric	3.0	90.0	270.0	2.5	90.0	225.0	1.5	90.0	135.0	1.5	90.0	135.0	3.4	90.0	306.0	1.0	90.0	90.0	2.1	90.0	189.0	6.3	90.0	567.0	3.4	90.0	306.0	0.9	90.0	81.0	2.0	90.0	180.0	1.1	90.0	99	2	215
	diesel	3.3	90.0	297.0	0.9	90.0	81.0	2.0	90.0	180.0	1.7	90.0	153.0	0.6	90.0	54.0	0.3	90.0	27.0	0.3	90.0	27.0			0.0	1.0	90.0	90.0	1.4	90.0	126.0	0.5	90.0	45.0			0	1	90
Delhenis Sherre	electric	0.3	43.0	12.9	0.2	43.0	8.6	0.2	43.0	8.6			0.0	0.1	43.0	4.3	0.1	43.0	4.3			0.0			0.0	0.1	21.0	2.1			0.0	0.1	43.0	2.6	0.1	43.0	2.58	0	4
	diesel	1.6	21.0	33.6	1.0	21.0	21.0	1.2	21.0	25.2	0.8	21.0	16.8	0.7	21.0	14.7	0.6	21.0	12.6	0.6	21.0	12.6	0.5	21.0	10.5	0.6	21.0	12.6	0.3	21.0	6.3			0.0			0	2	14
Delhenis Beni Meneen		Out of order this month			10.0	108.0	1080.0	10.0	108.0	1080.0	13	108.0	1404.0	11.9	108.0	1285.2	11.7	108.0	1263.6	10.0	108.0	1080.0	7.0	108.0	756.0	9.1	108.0	982.8	13.0	108.0	1404.0	12.5	108.0	1350.0	11.4	108.0	1231.2	11	1174
Delhenis Ezbet Beshra	electric	1.6	43.0	68.8	3.1	43.0	133.3	1.5	43.0	68.8	1.5	43.0	64.5	1.7	43.0	73.1	2.5	43.0	107.5	2.9	43.0	124.7	3.4	43.0	146.2	3.6	43.0	154.8	2.0	43.0	86.0	1.7	43.0	73.1	1.7	43.0	73.1	2	98
	diesel	1.3	21.0	27.3	1.0	21.0	21.0	0.7	21.0	14.7	1.0	21.0		0.9	21.0	18.9	0.5	21.0	10.5			0.0			0.0			0.0			0.0			0.0			0	1	9
Talt	electric	2.4	90.0	216.0	2.9	90.0	261.0	1.8	90.0	162.0	0.6	90.0	54.0	5.3	90.0	477.0	3.1	90.0	279.0	3.4	90.0	306.0	3.9	90.0	351.0	3.4	90.0	306.0	3.2	90.0	288.0	2.5	90.0	225.0	2.1	90.0	189	3	260
	diesel	1.0	43.0	43.0	1.2	43.0	51.6	2.4	43.0	103.2	3.4	43.0	146.2	0.1	43.0	4.3	0.8	43.0	25.8	0.4	43.0	17.2	0.7	43.0	30.1	0.6	43.0	25.8	0.8	43.0	34.4	0.3	43.0	12.9	0.3	43.0	12.9	1	42
Talt Tala	electric		43.0	0.0	1.8	43.0	77.4	1.7	43.0	73.1	1.8	43.0	25.8	1.7	43.0	73.1	2.4	43.0	103.2	3.2	43.0	137.6	2.0	43.0	86.0	1.2	43.0	51.6	3.0	43.0	129.0	1.6	43.0	68.8	1.6	43.0	68.6	2	75
	diesel	0.6	21.0	16.8	0.6	21.0	16.8	0.3	21.0	6.3	0.8	21.0	35.7	2.4	21.0	50.4	0.8	21.0	16.8	0.6	21.0	12.6	1.1	21.0	23.1	4.1	21.0	86.1			0.0	0.1	21.0	2.1	1.3	21.0	27.3	1	25
Talt Seft El-Kherse	electric	1.2	90	108.0	1.4	90	126.0	2.5	90	225.0	1.7	90	153.0	2.1	90	189.0	1.8	90	162.0	2	90	180.0	2.3	90	207.0	2.5	90	225.0	2	90	180.0	2	90	180.0	2.3	90	207	2	179
	diesel	1.6	43	68.8	2.4	43	103.2	1	43	43.0	2.3	43	98.9	0.06	43	2.6	0.3	43	12.9	0.3	43	10.8	0.3	43	12.9			0.0	1.1	43	47.3	0.06	43	2.6	0.6	43	25.8	1	36
Absug Beni Saleh	electric	4.2	90	378.0	5.8	90	522.0	6	90	540.0	6	90	540.0	4	90	360.0	5	90	450.0	5.7	90	513.0	5.7	90	513.0	4.8	90	432.0	5.4	90	486.0	5.8	90	522.0	5.6	90	504	5	480
	diesel	0.3	90	27.0			0.0			0.0			0.0	1.2	90	108.0	0.7	90	63.0	0.3	90	27.0	0.2	90	18.0	1	90	90.0	0.2	90	18.0	0.2	90	18.0	0.5	90	45	0	35
Absoug El- Waldeia		2.9	90	261.0	2.7	90	243.0	3.3	90	297.0	3	90	270.0	2.7	90	243.0	2	90	180.0	2	90	180.0	2.6	90	234.0	1.3	90	117.0	1.8	90	162.0	2	90	180.0	1.8	90	162	2	211

Running hours of diesel pumps are given separately if the capacities of electric pumps and diesel pumps are different .

Appendix 6.3

SUMINTR.XLS

RECORD OF INTERRUPTIONS FOR WATER STATIONS IN SUMUSTA MARKAZ IN 1995

Name of the stations	AVERAGE TIMES OF INTERRUPTION																								TOTAL	Average
	January		February		March		April		May		June		July		August		September		October		November		December			
	Times	Reason	Times	Reason	Times	Reason	Times	Reason	Times	Reason	Times	Reason	Times	Reason	Times	Reason	Times	Reason	Times	Reason	Times	Reason	Times	Reason		
Sumusta city	2	P	3	P	2	P					7	P	32	P	24	P	5	P	16	P	11	P	4	P	106	9
Bedahl	9	P	4	P	16	P	4	P	16	P	8	P	7	P	8	P	4	P	15	P	11	P	11	P	113	9
Bedahl Bani Halla	4	P	4	N	13	P	4	P	8	P	7	P	5	2P 3N	6	P	7	5P 2N	10	P	9	7P 2N	9	7P 2N	86	7
Mazoura	3	P																							3	0
El Shantoor							3	P			2	P	16	P	22	P	1	P			1	P			45	4
El Shantoor Ezbet El Shantoor	3	P	14	P	2	P	8	P	17	P	9	P	10	P	12	P	3	P			1	P	2	P	81	7
El Shantoor Koftan El Garbeya	5	P	5	P	6	P	14	P	23	P					21	P			19	P			8	P	101	8
El Shantoor Bani Mohamed Rashed	3	P	11	P	13	P	22	P	20	P	21	P	9	P	10	P	3	P	7	P	8	P	10	P	137	11
Dashtoot					6	P															2	P	8	P	16	1
Dashtoot Kom El Nour	2	P			1	P																	2	P	5	0

Reasons:

P= Power cut

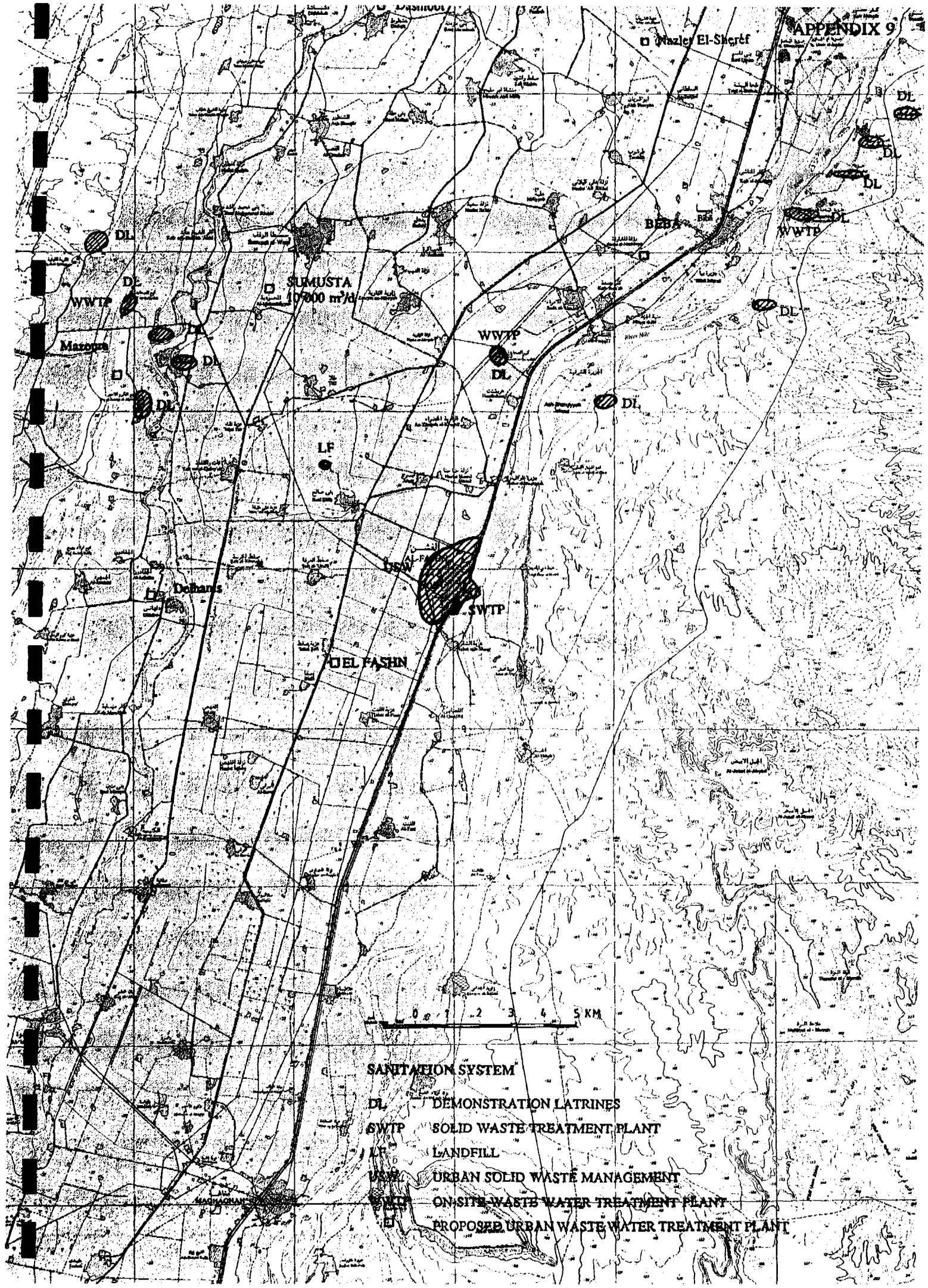
N= Broken pipe

Appendix 7

AVERAGE ACTUAL CAPACITY OF WATER STATIONS IN 1995

MARKAZ/SITE		TYPE	THEORET. CAPACITY		RUNNING HOURS	ACTUAL CAPACITY	PERFORM.
SUMUSTA			(l/s)	(m3/d)	(h/day)	(m3/d)	(%)
Sumusta City (El Shekh Abed)		CU	30	2160	15	1620	75
Bedhal		G	25	1440	7	630	44
Bedahl	Bani Halla	G	25	1440	5	450	31
Mazoura		G	25	1440	8	720	50
El-Shantoor		G	25	1440	7	630	44
El-Shantoor	Ezbet El-Shantoor	G	25	1440	7	630	44
El-Shantoor	Koftan El- Garbeya	G	12	691	5	216	31
El-Shantoor	Bani Moham. Rashed	G	12	691	4	173	25
Dashtoot		G	35	2016	9	1134	56
Dashtoot	Kom El Nour	G	12	691	5	216	31
BEBA							
Beba city		CU/G/S	140	12096	23	11592	96
Gezeret Beba		CU	30	2160	10	1080	50
Gezeret Beba	Kafr Nasser	G	12	691	11	475	69
Seds		G	25	1440	5	450	31
Seds	El-Fokaee	G	12	691	8	346	50
Seds	Harabshant	G	25	1440	6	540	38
Helleh	Zayet El Naowya	G	25	1440	8	720	50
Helleh	Tarshoub	G	25	1440	12	1080	75
Tansa Bani Malo	Bani Awad	G	35	2016	15	1890	94
Tansa Bani Malo	El Baranka	CU	30	2160	16	1728	80
Tansa Bani Malo	El Baranka	G	35	2016	12	1512	75
Saft Rashin		G	25	1440	11	990	69
EL FASHN							
El Fashen city		CU	30	2160	2	216	10
El Fashen city		G	140	8064	15	7560	94
El Fashen city		S	60	5184	13	2808	54
El- Fant		G	12	691	1	43	6
El- Fant	El-Shokr	G	12	691	1	43	6
El- Fant	El-Heeba	CU	30	2160	6	648	30
Ekfahs	El-Konayesa	G	25	1440	3	270	19
Delhanis		G	25	1440	2	180	13
Delhanis	Shenra	G	12	691	1	43	6
Delhanis	Bani Menean	CU	30	2160	11	1188	55
Delhanis	Ezbet Boshra	G	12	691	3	130	19
Talt		G	25	1440	4	360	25
Talt	Tala	G	12	691	3	130	19
Talt	Saft El-Khersa	G	25	1440	3	270	19
Absug	Bani Saleh	G	25	1440	5	450	31
Absug	El-Wakleia	G	25	1440	2	180	13

Expected theoretical running hours/day	Average hours/day
Conventional surface water treatment plant/clarification + filtration (S)	24
Compact unit (CU)	20
Ground water stations (G)	16


Nazlet El-Sherif
DL
BEBA
WWTP
SUMUSTA
10'000 m³/d
Mazoura
LF
USW
SWTP
Dolhams
EL FASHN
0 1 2 3 4 5 KM
SANITATION SYSTEM
DL DEMONSTRATION LATRINES
SWTP SOLID WASTE TREATMENT PLANT
LF LANDFILL
USW URBAN SOLID WASTE MANAGEMENT
WWTP ON-SITE WASTE WATER TREATMENT PLANT
PROPOSED URBAN WASTE WATER TREATMENT PLANT

MEMORANDUM

DATE : 05 / 09 / 1996
FROM : Dr. M. El Hosseiny
TO : Mr. Heimo
SUBJECT : List of The WS & WW projects in the project area

This list for the water supply and sanitation projects in Sumusta, Beba & el Fashn markazes:-

1- "Regional master plan for water supply network." by Utilities Consultant, for NOPWASD, 1993.

2- "Needs Assessment & Strategic Plan Study for Water supply and sanitation in rural areas for Beni- suef Governorate." by Dr. Zaher Abdulla consultant, For Governorate & LDIIp, 1993.

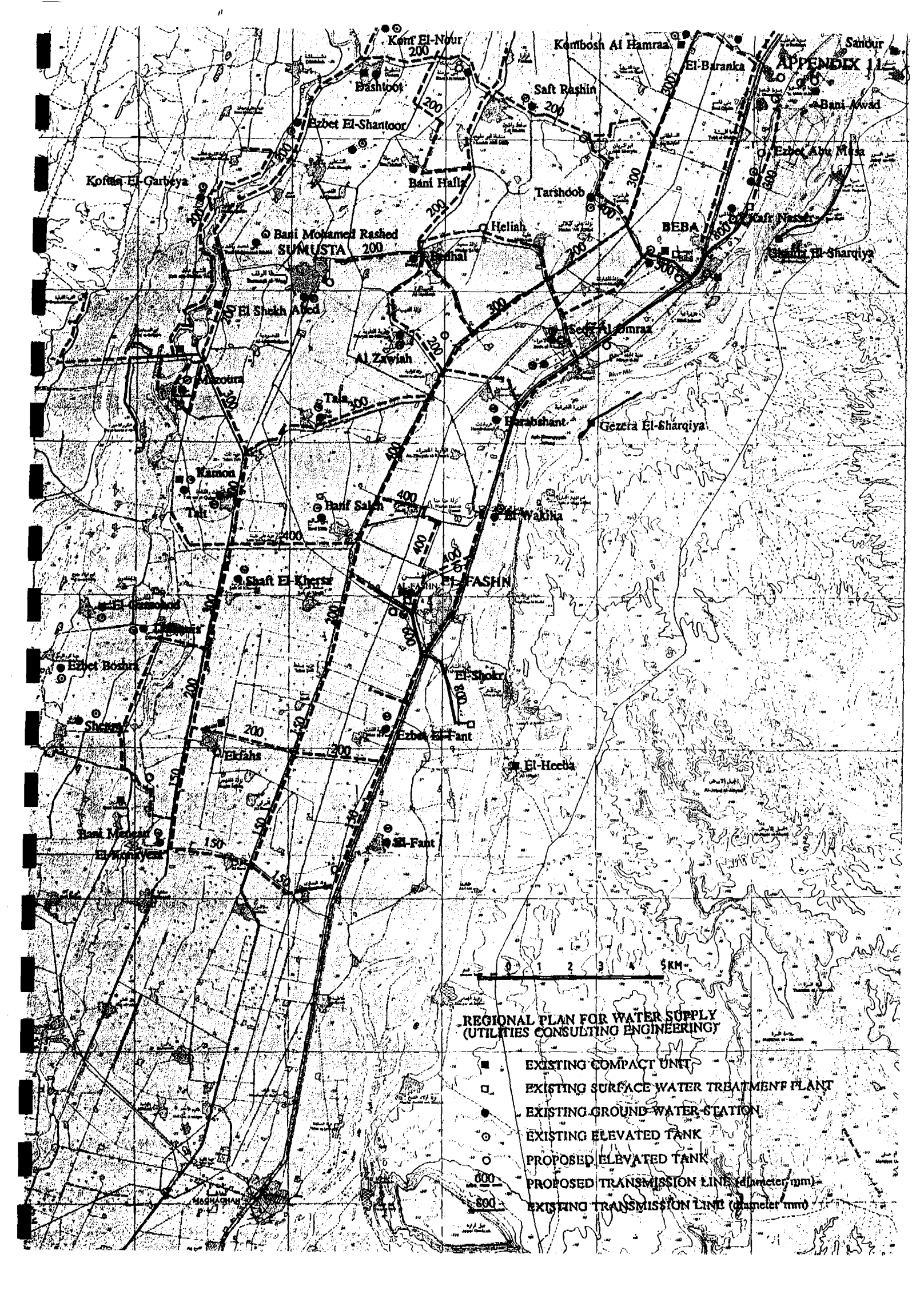
3- "Water supply project for El Fashn and its subsideries." by Utilities consultant, For NOPWASD, 1995.

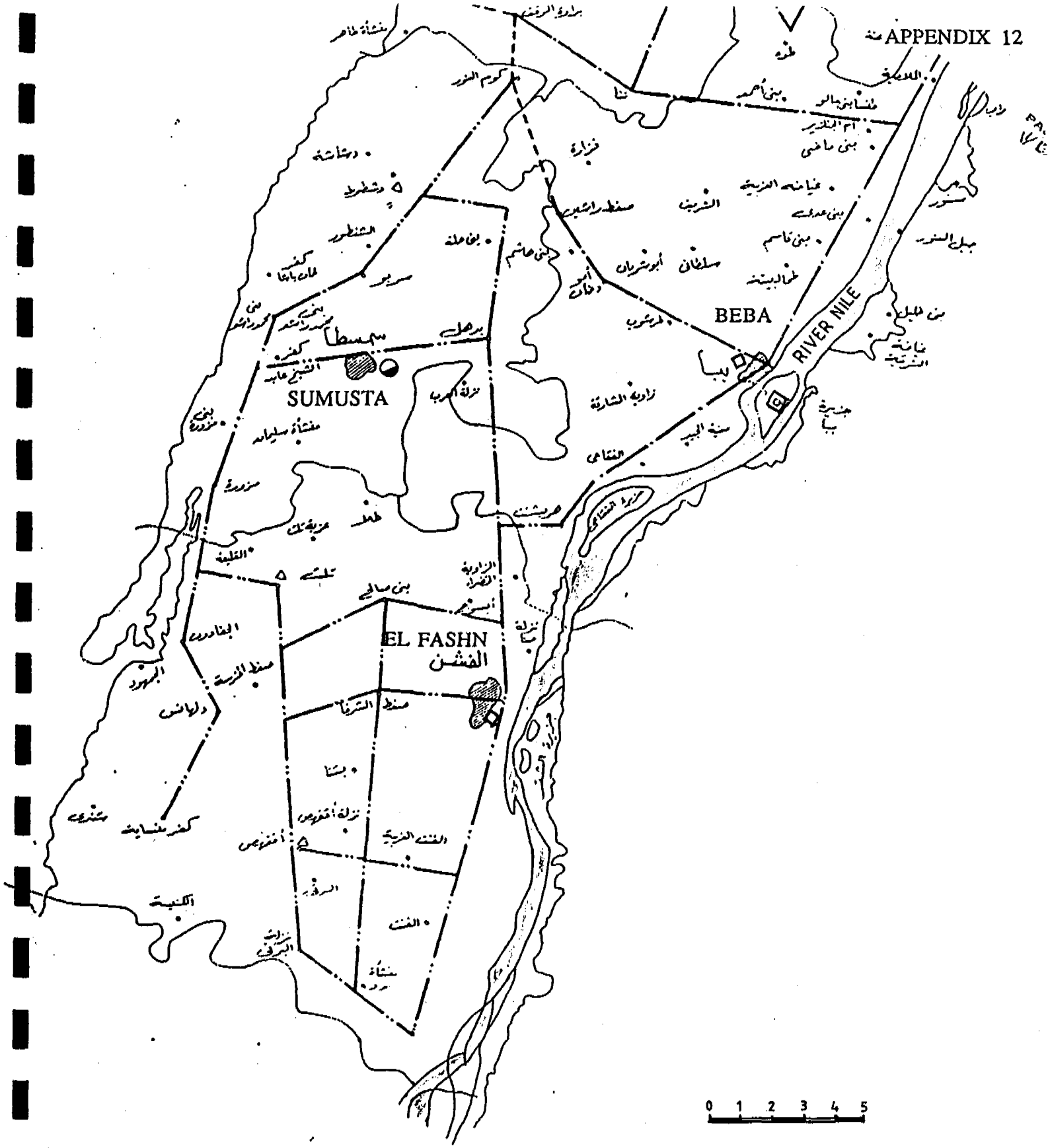
4- "Water supply project for Beba and its subsideries." by Utilities consultant, For NOPWASD, 1995.

5- "Wastewater project for Beba city." by Dr. Zaher Abdulla consultant, For Arab Contracting Company & NOPWASD, 1995.

6- "Wastewater project for el Fashn city." by Dr. Zaher Abdulla consultant, For Arab Contracting Company & NOPWASD, 1995.

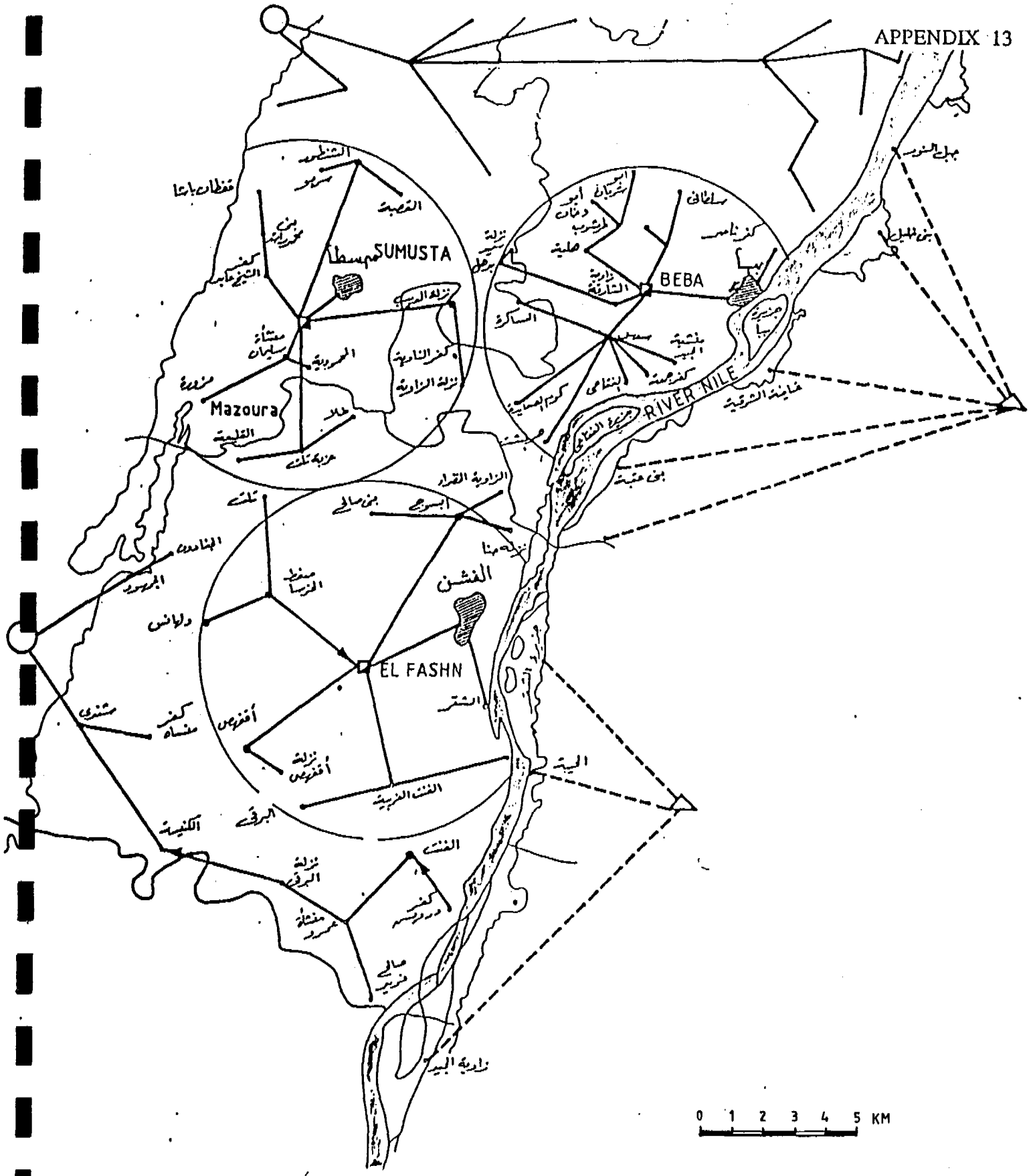
7- "Wastewater project for Sumusta city." by Dr. Zaher Abdulla consultant, For Arab Contracting Company & NOPWASD, 1995.


APPENDIX 11
Kom El-Nour
Kombosh Al Hamraa
Sanour
El-Baranka
Bashtoot
Saft Rashin
Bani Awad
Ezbet El-Shantoor
Ezbet Abu Musa
Koftan El-Garbeya
Bani Halla
Tarshoob
Kafr Nasser
Heliah
BEBA
Bani Mohamed Rashed
SUMUSTA
Shabhal
Gezeira El-Sharqiya
El Sheikh Abed
Seed Al Omraa
Al Zawiah
Mazoura
Tala
Barabshant
Gezeira El-Sharqiya
Kamon
Talt
Banf Salem
El Wakiha
Shaft El-Kherse
EL-FASHN
El-Ganadeel
Ezbet Boshra
El-Shokr
Shetnof
Ezbet El-Fant
Ekfahs
El-Heeba
Bani Metean
El-Konayeat
El-Fant
0 1 2 3 4 5KM
REGIONAL PLAN FOR WATER SUPPLY
(UTILITIES CONSULTING ENGINEERING)
EXISTING COMPACT UNIT
EXISTING SURFACE WATER TREATMENT PLANT
EXISTING GROUND WATER STATION
EXISTING ELEVATED TANK
PROPOSED ELEVATED TANK
PROPOSED TRANSMISSION LINE (diameter mm)
EXISTING TRANSMISSION LINE (diameter mm)



PROPOSED PLAN FOR WATER SUPPLY
(NEEDS ASSESSMENT AND STRATEGIC PLANNING)

- WATER TREATMENT PLANT UNDER CONSTRUCTION
- EXISTING COMPACT UNIT
- PROPOSED ALTERNATIVE WATER TREATMENT PLANT
- PROPOSED TRANSMISSION LINE FROM BEBA
- PROPOSED TRANSMISSION LINE FROM EL FASHN



PROPOSED PLAN FOR SANITATION
(NEEDS ASSESSMENT AND STRATEGIC PLANNING)

- PROPOSED CITY WASTE WATER TREATMENT PLANT
- PROPOSED DESERT WASTE WATER TREATMENT PLANT
- PROPOSED TRUNK SEWER
- PROPOSED PUMPING STATION
- TRANSPORT WAY FOR EVACUATION TANK TRUCK
- BOUNDARY OF SERVICE AREA

COMPARISON OF THE POPULATION AND WATER CONSUMPTION ESTIMATES FOR DIFFERENT PLANS

POPULATION ESTIMATES

BENI SUEF GOVERNORATE/NEEDS ASSESSMENT AND STRATEGIC PLANNING 1993

(RURAL AREAS ONLY)

MARKAZ/YEAR	1993	2020
Sumusta	72000	160000
El-Fashn	118000	262000
Beba	182000	404000
Total	372000	826000

NOPWASD NATIONAL PLAN 1996

MARKAZ/YEAR	1995	1995	1995	2020	2020	2020	2030	2030	2030
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Sumusta	26913	114914	141827	43224	184557	227781	52243	223066	275309
El-Fashn	51408	198117	249525	82564	318184	400748	99791	384575	484366
Beba	48231	204747	252978	77461	328832	406293	93624	397444	491068
Total	126552	517778	644330	203249	831573	1034822	245658	1005085	1250743

NEW GOVERNEMENT'S PROPOSAL FOR NATIONAL PLAN (NOVEMBER 1996)

MARKAZ/YEAR	1995	1995	1995	2020	2020	2020	2030	2030	2030
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Sumusta	122314	29617	151931	220199	28000	248199	281324	76745	358069
El-Fashn	209314	55279	264593	361158	99535	460693	457822	128536	586358
Beba	216318	49370	265688	382201	80537	462738	484497	98753	583250
Total	547946	134266	682212	963558	208072	1171630	1223643	304034	1527677

Appendix 14

WATER CONSUMPTION ESTIMATES (m3/d)

BENI SUEF GOVERNORATE/NEEDS ASSESSMENT AND STRATEGIC PLANNING 1993

MARKAZ/YEAR	1993	2020
		l/s
Sumusta		347
El-Fashn		570
Beba		875
Total		1792

NOPWASD DRAFT NATIONAL PLAN 1996

MARKAZ	1995 *	2020	2030
	m3/d	m3/d	m3/d
Sumusta	12842	29601	36074
El-Fashn	31945	54193	66294
Beba	30163	49896	67762
Total	74950	133690	170130

Existing capacity around 110 000-130 000 m3/d
Estimate for year 1995 also based on population and consumption per capita

NEW GOVERNEMENT'S PROPOSAL FOR NATIONAL PLAN (NOVEMBER 1996)

MARKAZ/YEAR	1995	1995	1995	2020	2020	2020	2030	2030	2030
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Sumusta	17913	5184	23097	44040	14500	58540	56265	19186	75451
El-Fashn	16805	25056	41861	72232	24884	97116	91565	32134	123699
Beba	23544	25056	48600	76440	20134	96574	96899	24688	121587
Total	58262	55296	113558	192712	59518	252230	244729	76008	320737

Year 1995 it is unclear: capacity or existing water consumption?

MINISTRY OF PLANNING 1996 (m3/d)

MARKAZ/YEAR	1995	1995	1995	2017
	Rural	Urban	Total	Total
Sumusta	5500	13800	19300	43800
El-Fashn	10300	23700	34000	76800
Beba	9400	24500	33900	77000
Total	25200	62000	87200	197600

MEMORANDUM

DATE : 03 / 12 / 1996
FROM : Dr. M. El Hosseiny
TO : Mr. Heimo
SUBJECT : Review of the strategic plan study

The submitted final shape for the study was consisted from final summary report as volume one, annexes report as volume two, maps and drawings as volume three in addition to the program diskettes and its operation manual as volume four.

The study in general was complied with the TOR requirements by about 90%, it had covered all the rural areas in the governorate of Beni - suef.

Several notes even in the production shape or in technical points could be discussed hereafter taking into consideration the RWS&S project needs, the possibility of having a new ideas and planning procedures and the Study TOR as a guideline and governor for the consultant during his preparation for the plan study.

1- GENERAL NOTES

* **The production of the final reports was not satisfactory with the study volume and the effort that had been made during its operation.**
* **The study had covered the rural areas only according to TOR needs without including the urban zones which actually may affect on its reliability and possibility for application and/or decrease its suitability as an planning study specially with the real that it is a study for utilities sectors.**
* **The summary report was not clear in several points specially in the following items:-**
  - **design parameters for both water supply and sanitation sectors.**
  - **The existing situation for both water supply and sanitation sectors.**
  - **The operation, maintenance and institutional costs.**
  - **The explanation of the project output tables.**
  - **The methods used for calculations for both technical and financial outputs products of the study for both water supply and sanitation.**
  - **The absence of the economy during projects choosing.**

* The collected data for wastewater sector was very low and not covered all the required information for this sector to obtain the most suitable options for this sector.
* The coverage for the water supply sector in the collected data was very satisfactory and useful for the study needs.
* The absence of groundwater data study was affecting on the general planing procedure and increase the costs needed for the proposed projects specially in the southern and west parts from the governorate.
* The dependence on NOPWASD plans prepared by Utilities consultant which started in some areas and still under construction in others decreased the possibility of applying the study plans.
* The long travel for sewage in the desert wastewater treatment plants served network may not be the happy solution for the governorate.
* The use of stabilization pond system for desert plants and the extension for the city plants showed a high economical thinking level for the consultant with good technical solution using all the benefits of the site and existing projects.
* The absence of groundwater as a source for water supply even it is polluted was a drop in the study for the treating of groundwater should not exceed half costs of surface water even in construction or running costs.

2- SUMMARY REPORT NOTES

Generally the submitted final report was only a summary report for the study steps. The main following general notes on this final report could be illustrated as follows :-

- The report did not indicate the main used design assumptions that the consultant had built his study on.

2- The report did not mentioned in several points the produced tables which illustrated in the annexes that may lead to decrease the possibility to under stand several steps and also to get the optimum benefit from the study.

3- The report did not illustrated the daily production capacity of each well site and also the daily working hours for them.

4- The report did not illustrated the difference between existing production sites and planned sites that might affects the execution priorities of the sub projects in both water supply and wastewater sectors.

5- The report mentioned the use of annual rate of increase for population growth of 2.7% as constant up to year 2020 which in my opinion should be decreased every 10 years by 0.2% at least.

6- The report had submitted a good illustration for the accumulative projects, their costs and their execution program.

7- The report needs more concentration on the existing design data and the proposed design assumptions for both sectors.

8- The report did not mentioned any thing about the possibilities for investments and or funding sources for the proposed projects.

9- The report missed the information of groundwater quality in the governorate and depends only on some reports that prepared by the local health ministry office in Beni Suef which were not complete and almostly not correct due to their made by the routine work (may be one sample each 6 month is correct and the rest is copy from it). This actually affected the whole study and direct it to depend on the surface water in all sites.

3- ANNEXES REPORT NOTES

Generally the submitted annexes report was illustrating report for all the study program products. The main following general notes on this report could be illustrated as follows :-

1- The tables were presented with out any explanation paragraphs or presentation to what is included or how it is obtained.

2- The data bank information were very good in quality and coverage all the essential points for the planner specially for water supply. The collected data for sanitation and its illustration in the data bank were not satisfactory with the planner needs due to the absence of the toilets availability, the method of disposal of wastewater from the domestic usage and the effect on groundwater in summer and winter periods.

3- The distribution of water supply information on four types of tables may make some data to be missed in the system design or in the data investigation.

4- The presentation of wastewater plants served zones was very satisfactory and useful. In the other hand nothing had been made for water projects illustration.

5- **The submittal maps are very schematic even it is a strategic planning level but the shortage in information about names, dimensioning and diameters was noticeable.**

6- **The absence of maps for illustrating the proposed implementation plans is also a point of weakness in the presented study.**

7- **The absence of maps for showing the existing situation affected on illustrating the proposed solutions.**

Summary of Ground Water Quality Analysis 1994-1996

Location/ Depth	Date	Peremeter																
		color Hazen units	pH	turb. N.T.U.	T.D.S. mg/l	cond. S/cm	hard.mg/l	alkal.mg/l	amonia mg/l	calcium mg/l	chloride mg/l	iron mg/l	Mn mg/l	sulp. mg/l	nitrate mg/l	nitrite mg/l	sodium mg/l	comments
SEDS W.S. -Beba (elect.)	29.07.96	<5	7.889	2.5	not tested	1500	277	667	0.2	89.5	112	1.94	0.3	not tested	0.75	0	not tested	S/C
Abd Elmonem W.(privet)-Sumusta	29.07.96	<5	7.185	0.5	4428	7000	1504	172.5	nil	407.4	188	0.5	0.1	700	8	0	95.6	S/C
ELFASHEN O.WS(4)	30.07.96	<5	7.078	0.8	550	900	176	473	nil	32	31.8	0.2	0.25	45	0.55	0	187.7	S/C
ElShaik abd EX.-Sumusta	30.07.96	5	7.8	6	"	1800	632	253	nil	123.5	490	0.56	0.7	"	nil	nil	not tested	S/C
ElWAQfia WS.-El Fashen	30.07.96	5	7.96	0.5	not tested	700	315	322	nil	61.5	59	nil	0.5	not tested	0.85	0	not tested	S/C
ELgendi EX.-Sumusta/16.7 m	31.07.96	<5	8.001	0.4	482.3	700	120	299	0.08	17.28	166.3	nil	0.3	44	nil	nil	156	S/C
BEDAHL WS.(4)-Beba	31.07.96	5	7.681	6.5	not tested	1500	529	264.5	0.2	62.3	274	1.8	1.3	not tested	nil	nil	not tested	S/C
SAFT ElOraafa WS.-Elfashen	31.07.96	5	8.075	5.1	not tested	1200	344	338.1	0.08	61.72	177.7	nil	0.35	"	nil	nil	"	S/C
S:Sumustalab.																		

Summary of Ground Water Quality Analysis 1994-1996

Location/ Depth	Date	Parameter																
		color Hazen units	pH	turb. N.T.U.	T.D.S. mg/l	cond. S/cm	hard.mg/l	alkal.mg/l	emonia mg/l	calcium mg/l	chloride mg/l	iron mg/l	Mn mg/l	sulp. mg/l	nitrate mg/l	nitrite mg/l	sodium mg/l	comments
El Gendi EX.-Sumusta/43 m	25.08.94	<5	7.55	0.5	"	700	164	268	0	"	44	0.05	nil	113	0.03	0	"	S/C/B
Nossair EX.-Sumusta /42 m	31.08.94	<5	7.55	7.34	"	1400	434	275	0	"	250	0.5	0.2	200	0.15	0	"	S/C/B.
Bani Khalil EX.-Sumusta/36 m	6.09.94	<5	7.5	11	"	2200	1110	285	0	"	1600	1	1.4	575	1	0	"	S/C/B
Elgezera EX.-Beba/16.7 m	12.09.94	<5	7.33	2.6	"	1200	282	423	0	"	52	0.3	nil	306	15.8	0	"	S/C/B
Sumusta C.U. EX./38 m	1.12.94	<5	not tested	1.7	"	1400	616	"	"	"	450	0.77	0.45	151.43	not tested	not tested	"	S/C/B
Sumusta C.U.EX./48 m	2.12.94	<5	"	0.2	"	not tested	576	"	"	"	550	0.73	0.44	153.9	"	"	"	S/C/B
Sumusta C.U.EX./26 m	3.12.94	<5	not tested	2.3	"	800	390	not tested	not tested	"	225	2.3	0.33	72.42	not tested	not tested	"	S/C/B
Sumusta high reserivoir EX./ 38 m	5.12.94	<5	7.8	0.22	"	2200	812	"	not tested	"	400	1.48	1.1	249.37	not tested	not tested	"	S/C/B
Elsheik Ali EX.-Sumusta/29 m	12.12.94	<5	7.3	2.9	"	1500	1000	"	ot teste	"	400	0.58	1.13	178.5	0.108	not tested	"	S/C/B
Elsheik Ali EX.-Sumusta/66 m	13.12.94	<5	7.08	15	" "	1000	818	" "	"	"	1200	1.24	0.27	319.4	0.194	"	"	S/C/B
Al EstadEX.-Sumusta/30 m	19.12.94	<5	7.39	5.7	"	2000	648	"	"	" "	380	0.77	0.6	226.5	0.14	"	"	S/C/B
Al Estad EX.-Sumusta/63 m	22.12.94	<5	7.04	9	"	2300	988	"	" "	"	950	1.8	0.37	227.9	0.146	"	" "	S/C/B
Al Salakana EX.-Sumusta /26 m	25.12.94	<5	7.24	3.2	"	1500	676	"	" "	" "	340	0.65	0.65	139.91	0.16	"	"	S/C/B
Al Salakana EX.-Sumusta /63 m	27.12.94	<5	7.29	0.8	"	1000	472	"	"	"	180	0.32	0.44	180	0.16	"	"	S/C/B
Sumusta high resservoir EX./51 m	25.03.95	<5	7.2	2	"	900	380	"	not tested	"	118	0.5	0.12	93.8	nil	nil	"	S/C
Bedahl WS.-Sumusta/ 45m	4.04.95	<5	7.36	4.7	"	1100	394	" "	0.54	" "	208	1	1.28	50.2	nil	nil	"	S/C
El Shantor WS.-Sumusta/ 40 m	11.04.95	<5	7.14	8	"	900	330	"	0.93	"	78	1.7	0.41	58.4	nil	nil	"	S/C
Bani Mohamed Rashed WS.-Sumusta/40m	16.04.95	<5	7.2	1.8	not tested	720	210	not tested	0.33	not tested	110	0.4	0.18	55.14	nil	nil	not tested	S/C
Bani Halla WS.-Sumusta/40 m	17.04.95	<5	7.52	1.3	"	600	284	"	0.66	"	42	0.4	0.41	30.45	nil	nil	"	S/C
Kom ElNor WS.-Sumusta/40 m	17.04.95	<5	7.15	8.8	"	1200	464	"	1.3	"	120	1.4	0.87	82.17	nil	nil	"	S/C
Dashtot WS.-Sumusta /40 m	18.04.95	,<5	7.34	1.8	"	not tested	376	"	0.78	"	94	0.6	0.68	51.8	nil	nil	"	S/C
El Santor ezzba WS.-Sumusta	19.04.95	<5	6.97	0.3	"	900	320	"	0.31	"	86	0.2	<0.05	42.8	nil	nil	"	S/C
Dashtot 2WS.-Sumusta /40 m	20.04.95	<5	7.23	2.1	"	850	376	"	0.71	"	68	0.4	0.41	59.3	nil	nil	"	S/C
Koftan WS.-Sumusta/40 m	20.04.95	<5	7.11	2	"	600	206	"	0.37	"	55	0.4	0.16	41.97	nil	nil	"	S/C
Sumusta P.W./62 m	8.05.96	5	7.48	3.2	1178	1200	520	300	not tested	96	425	0.6	0.17	120	0.012	not tested	285	S/C
BEBA O.WP(7)	29.07.96	<5	7.75	0.15	390	700	264	338	0.27	66.04	158	nil	0.4	28	0.81	0	60.8	S/C

Appendix 16

MEMORANDUM

FROM : Ashraf Farouk - Hydrogeology & Drilling Expert.

TO : Mr. Heimo Ojanen - Water Supply Short Term Consultant.

SUBJECT :Simplified Methods Of Iron and Manganese removal from Ground Water

DATE : 24/11/96

CC : HGC, PRO, Dr. El Housseiny.

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1. General

Most arid and rural areas in Egypt depend on ground water as a source of drinking (potable) water. although most of there waters are reliable from health aspects it may contain appreciable amount of iron and/or manganese which makes the water objectionable. In the project area (Beba, Sumusta and El Fashen) the iron concentration ranging between 0.2 to 1.7 ppm, while manganese ranging between 0.16 to 1.3 ppm. The highest concentration of iron and manganese is found in the central part of the aquifer specially around Sumusta markaz, while the lowest concentration is found in the area between River Nile and western bank of the El Ibrahemiya canal. Since the general acceptable limits for iron and manganese in drinking water are 1.0 ppm and 0.5 respectively according to the Egyptian standards and 0.3 ppm and 0.1 according the WHO recommendations, so its a big deal to fined out a simple and cheap method for iron and manganese removal to be applied instead of the conventional methods which needs a high capital and running coasts, in addition to high level of technicians for operation and maintenance which is not available in rural and desert areas.

2. The Use Of Lime And Limestone In Removal Of Iron And Manganese

This method is applied to investigate the removal of iron and manganese by limestone contactors (filters) followed by slow sand filters through a pilot plant study constructed within a ground water plant in Manyal Sheiha village, Giza governorat, where it financed through Overseas Development Agency program (ODA) over three years. A design for a full scale plant was developed to serve a population of 5000 person.

Lime ranks second as prime water treatment chemical after chlorine, and is used by many of water treatment plants to improve quality of their water for potable or industrial purposes, such softening, purification, coagulation, and neutralization of acidic water.

3. Aeration through elevated tanks in the well site.

The experiment was applied in Tahanob village (Qalubya governorate) elevated tank and had achieved a good result for iron removal by 86 % as average and for manganese removal by 92%. Any way this method had solved a lot of problems by achieving the high removal ratios, very low construction costs and very simple and easy method for erection and operation specially the tank bottom had been modified to ease the sediments removal.

This method is took place by using the existing water elevated tank in the well site an by modifying the inlet pipe creating a polygon ring spraying pipe on it . This spraying achieved enough aeration for iron and manganese oxidation and the tank gives the required volume for sedimentation.

The experiment was funded from the LDII program fund by USAID to develop the basic services for the villages of Egypt.

MEMORANDUM

FROM : Ashraf Farouk - Hydrogeology & Drilling Expert.

TO : Mr. Heimo Ojanen - Water Supply Short Term Consultant.

SUBJECT : Protection Of Ground Water Wells Against Contamination.

DATE : 18/11/96

CC : HGC, PRO, Dr. El Housseiny.

Background

Group of Exp. wells water drilled along Sumusta markaz by RWSSP, these type of wells were drilled in order to study the groundwater from the quantity and quality point of view, thus we can know the hydrogeological and the hydrogeochemical properties of the aquifer dependent on all these collected data and fined the best methods for use these wells, to develop suitable techniques of drilling production wells and simplified treatment methods for ground water.

The drilling is followed by group of random sampling of ground water of these wells for physical and chemical analysis under the supervision of the RWSSP and it was found that there high content of major and minor parameters (iron, manganese and total hardness) of the ground water specially in the central part of the aquifer (the area between west El Ibrahemiya canal and east Bahr Youssef). Also some wells show bacteriological contamination.

This random sampling program followed by data collection phase for hydrologeological and hydrogeochemical investigation along the study area as a part of groundwater resource inventory, then groundwater data collection phase followed by preliminary groundwater quality monitoring program as a second part of the area study, where the preliminary monitoring program indicate approximately the same results as the collected data and the random sampling program.

From all points of view the contamination (iron, manganese, chlorides, total hardness and bio. contamination) of the groundwater along the Quaternary aquifer is came from certain zones and not the whole formation, thus the technique of drilling, design and development of the ells along this aquifer play an important role in the protection potable wells from contamination.

So, the beginning is from the right location, suitable design, technique of drilling and professional implementation

General Observations

From all previous stages which were done through RWSSP and from the collected hydrogeological and quality data along the study area it was found that:

i. The aquifer type is semiconfined, where it is covered by semipervious layer consists of mud which consider as a sources of contamination for ground water aquifer by fertilizers and anaerobic bacteria.

ii. Piezometric surface decline east direction.

iii. Most wells along study area are without piezometers tube for sampling and draw down measurements.

iv. Most wells are partially penetrating the aquifer.

v. The iron and manganese content increase toward the central part of the aquifer due to :

* Presence of dense drains.
* Presence of Pyrite thin interbeds and manganese ores thin layers along the aquifer layers in the central part.
* Presence of cess poles .
* The reducing sedimentary environment of some aquifer zones, where that is indicted by presence of H_2S odor of the water and Gluconite needles in the sands of some beds

anionic exchange with clay lenses minerals which distributed along the central part.

vi. Most production wells have not any protection against contamination, i.e., have not cement grouts or plugs in the face of alluvium zone or iron and/or manganese ore layers. (unfavorable layers).

vii. All production wells have a perforated screens covered by wire mesh, where this type of screen increase the fraction losses of the well and rapidly coated by fines.

viii. All wells were drilled by manual cable drilling method with a temporary casing (14" in diameter) , while, the well casing and screen is(10"), i.e., the annular space around screen is insufficient for gravel pack.

ix. Most wells are without sand tarp and in the same time there is no filter pack , this led to make the well fill by sand in the case of wire mesh scratch or opening.

Adequacy Of Water Quantity

from pumping test data collection of about 25 well distributed along the area of study, which were used for calculation of the aquifer hydraulic parameters and from the time the ground water has been used as a source of water supply along the area of study, justify the assumption that adequate quantities of water be drawn from the wells.

Proposed Groundwater Well Design

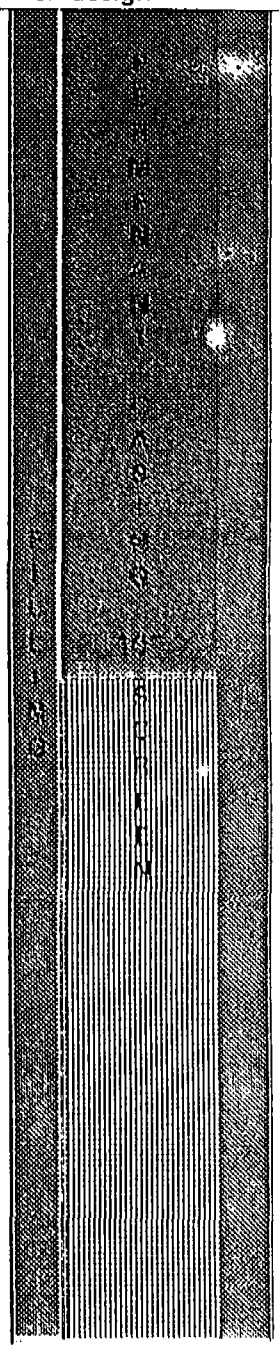
The area of study is divided into four sectors each of which has a different water quality, sedimentary environment and different aquifer thickness and thus every sector need a specified well design according to the lithology, aquifer thickness and environmental conditions.

Annex 1a, 1b, 2a, 2b, 3a, and 3b describe the difference between the present well designs and the proposed well designs that must be applied along the study area.

Location : Beba city
Wells number : 14 well
Maximum well depth : 39 m
Minimum well depth 36 m
Temporary casing diameter :14"
permanent casing :10"
Well purpose:potable water
Type of screen casing materials : galvanized iron
Type of screen openings: perforated and covered by wire mish.
Static water level :165 cm.

Depth	A.V.Th.	Litho.	Litho. Description
1 2 3	3.5m		Agricultural mud
4 5 6 7 8	5.5 m		Silty clay
9 10 11 12 13 14	6m		Fine to medium sand
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	22.5 m		Coarse sand to fine gravel
38 39	1.5 m		Coarse gravel to pebble.

well design



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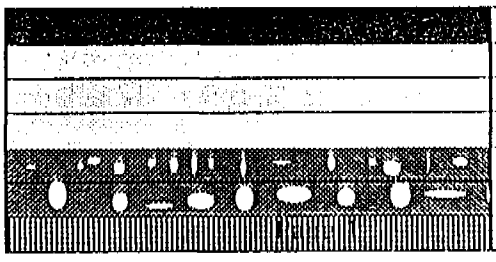


Mud
Silty clay
Fine to medium sand
Coarse sand
Gravels
Pebbles
Wire mish

Location : Beba city

Maximum well depth : 42 m BIBA.XLS

Technique of drilling :Rotary drilling

Drilling Diameter : 17 1/2 "

Production casing and screen :10"

Filter pack grain diameter :3-4 mm (well sorted gravel pack).

Well purpose:potable water

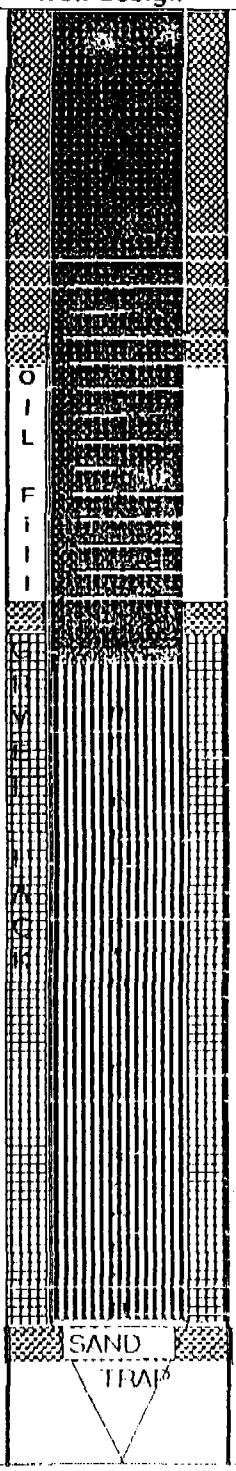
Type of screen casing materials : P.V.C.

Type of screen openings:bridge slotted - 1.2 mm

Static water level :165 cm.

Depth	A.V.Th.	Litho.	Litho. Description
1 2 3	3.5m		*Agricultural mud*
4 5 6 7 8	5.5 m		Silty clay
9 10 11 12 13 14	6m		Fine to medium sand
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	22.5 m		Coarse sand to fine gravel
38 39 40 41 42	1.5 m		Coarse gravel to pebble.

well design



Gravel Pack

Soil Filling

Mud

Silty clay

Fine to medium sand

Coarse sand

Gravels

Pebbles

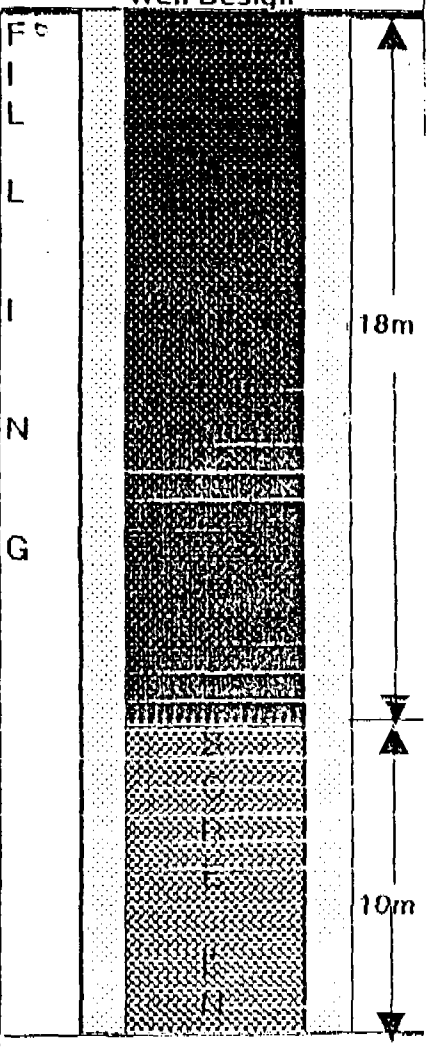
Breidge Slotted

Cement Grout

WELL DATA

Location :El-Fashen City - Water plant
Number of wells :8 wells with the same depth and design
Total depth for each well : 28 m
Temporary casing diamter : 14 inch
well casing and screen diameter: 10 inch
Casing length:18m
Screen length:10m
Type of casing and screen matrerial : Galvanized iron
Gravel pack: Absent
Type of screen perforation: Perforated and covered by wire mish
Discharge for each well : 25 l/s
Drilling technique : manual Cable drilling .

Depth	A.V.Th	Litho.	Litho. description
1 2 3 4 5 6 7 8 9 10	9 m		Agricultural soil
11 12 13 14 15	4 m		Fine Sand
16 17 18 19	3.5 m		Medium Sand
20 21 22 23 24 25 26 27 28	11.5m		Coarse Sand To Gravel



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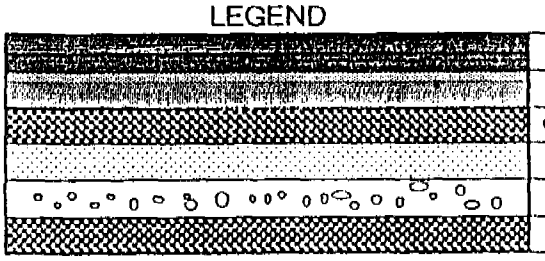
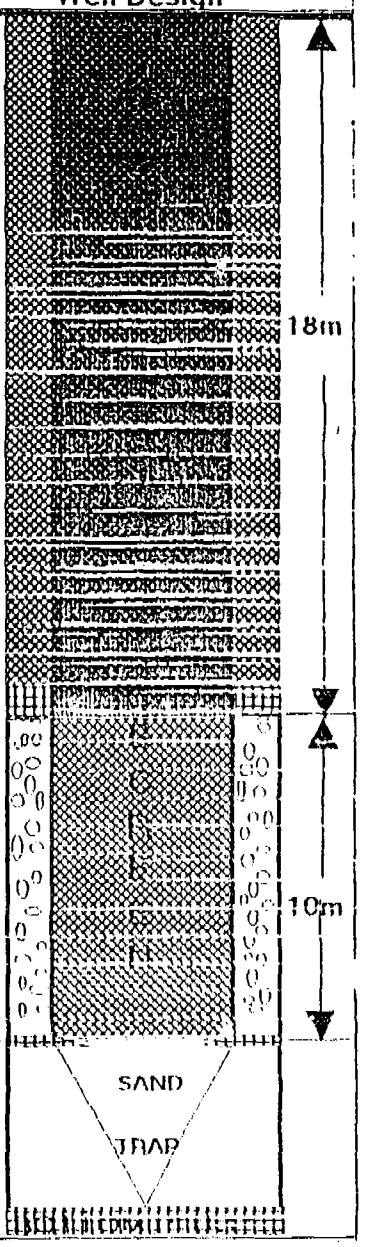


AGRICULTURAL SOIL
FINE SAND
MEDIUM SAND
COARSE SAND
GRAVEL
SCREEN

WELL DATA

Location :El-Fashen City - Water plant
Total depth: 32m
Drilling technique : mechanical rotary drilling
Open hole diameter :171/2 inch
well casing and screen diameter: 10 inch
Casing length:18m
Screen length:10m
Sand trap:4m
Type of casing and screen matrerial : P.V.C.
Gravel pack: well sorted gravel pack of 3-4 mm
Type of screen perforation:Bridge sloted screen with 1 mm open size

Depth	A.V.Th	Litho.	Litho. description
1–10	9 m		Agricultural soil
11–15	4 m		Fine Sand
16–19	3.5 m		Medium Sand
20–28	11.5m		Coarse Sand To Gravel
29–32			



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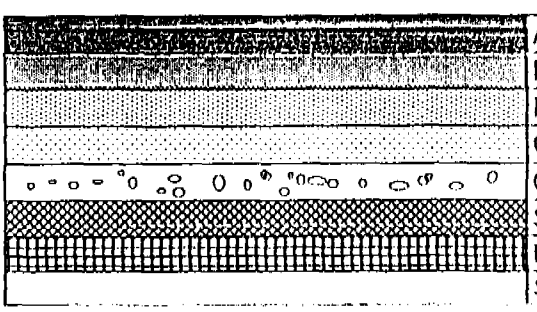
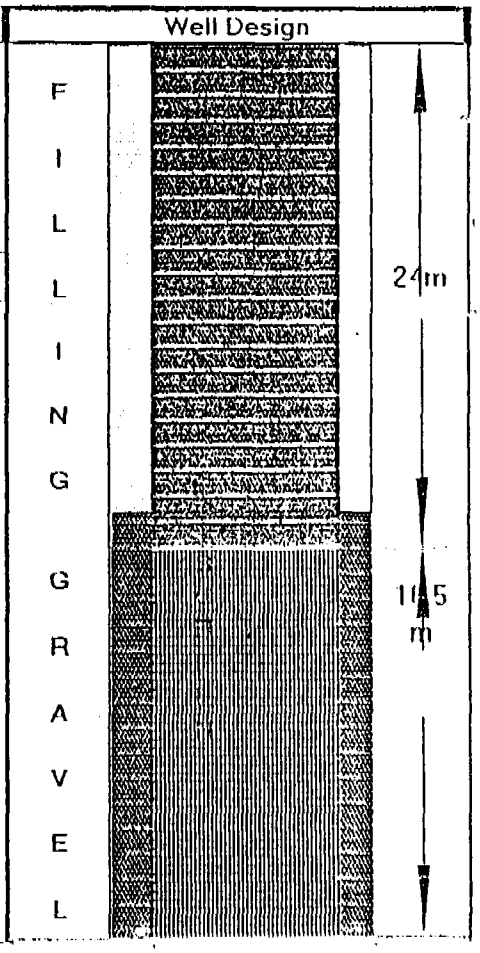


WELL DATA

Location: El Konisa village- El Fashn Markaz. (Annex 3a central sector)
Well Type : Production Well.
Purpose : Potable water.
Total Depth: 40.5 m
Drilling Technique :Cable drilling .
Diameter of the Temporary Casing: 16"
Diameter of Fixed casing and screen:12"
Type of Screen and Casing Materials : Galvenized iron
Type of Screen opening :Perforated and covered by wire mish.
Gravel pack: 3-5 mm.
Date Of Construction :5/6/1990

Depth	A.V.TH.	Litho.	Litho. Description
3	10.5m		Agricultural Soil
6			
9			
12	2 m		Fine Sand
15	7.5m		Medium to Soarse Sand
18			
21	20.5m		Coarse Sand to Gravel
24			
27			
30			
33			
36			
39			



LEGEND

AGRICULTURAL SOIL
FINE SAND
MEDIUM SAND
COARSE SAND
GRAVEL
WIRE MISH
GRAVEL PACK

WELL DATA

Location: El Konisa village- El Fashn Markaz. (Annex 3b central sector- proposed design)

Well Type : Production Well.

Purpose : Potable water.

Total Depth: 45.5 m

Drilling Technique :mechanical rotary drilling.

Diameter of the open hole: 24"

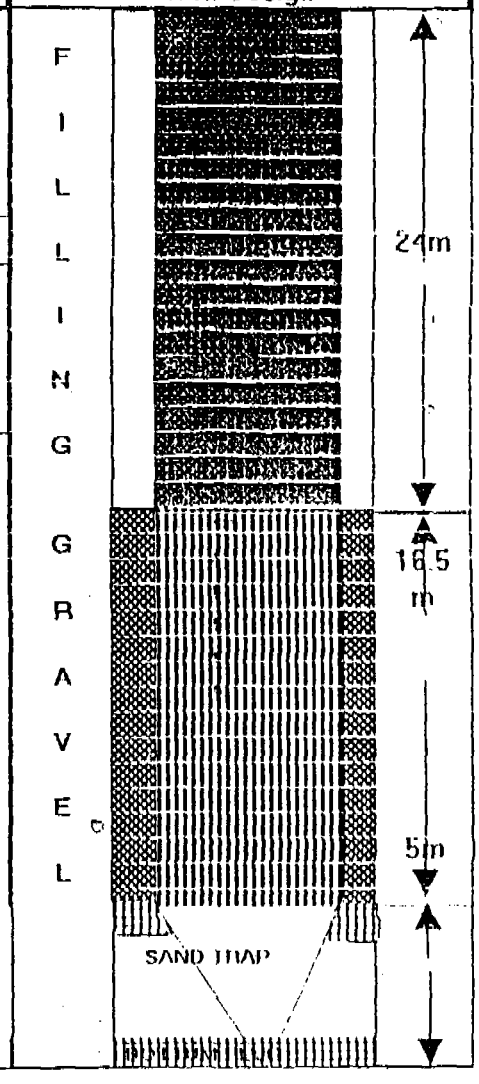
Diameter of Fixed casing and screen:12"

Type of Screen and Casing Materials : P.V.C.

Type of Screen opening :bridge slotted

Gravel pack: 3-5 mm.

Depth	A.V.TH.	Litho.	Litho. Description
3	10.5m		Agricultural Soil
6			
9			
12	2 m		Fine Sand
15	7.5m		Medium to Soarse Sand
18			
21	20.5m		Coarse Sand to Gravel
24			
27			
30			
33			
36			
39			
41			
43			
45			



LEGEND

	AGRICULTURAL SOIL
	FINE SAND
	MEDIUM SAND
	COARSE SAND
	GRAVEL
	BRIDGE SLOTTED SCREEN
	GRAVEL PACK
	BENTONIT CEMENT PLUG
	FILLING

Appendix 19

08.09.1996

PROGRAM FOR SPECIAL STUDY IN SUMUSTA FOR MIXING GROUND WATER AND SURFACE WATER

PART 1

Water quality analysis from the compact unit and ground water well

Parameters

- Temperature (on the field)
- ph
- Calcium or Calsium hardness
- Total hardness
- Alkalinity
- Sulphate
- Chloride
- Magnesium
- Sodium

Samples will be taken during the same day both compact unit (after treatment) and ground water well (site of the old high level tank)

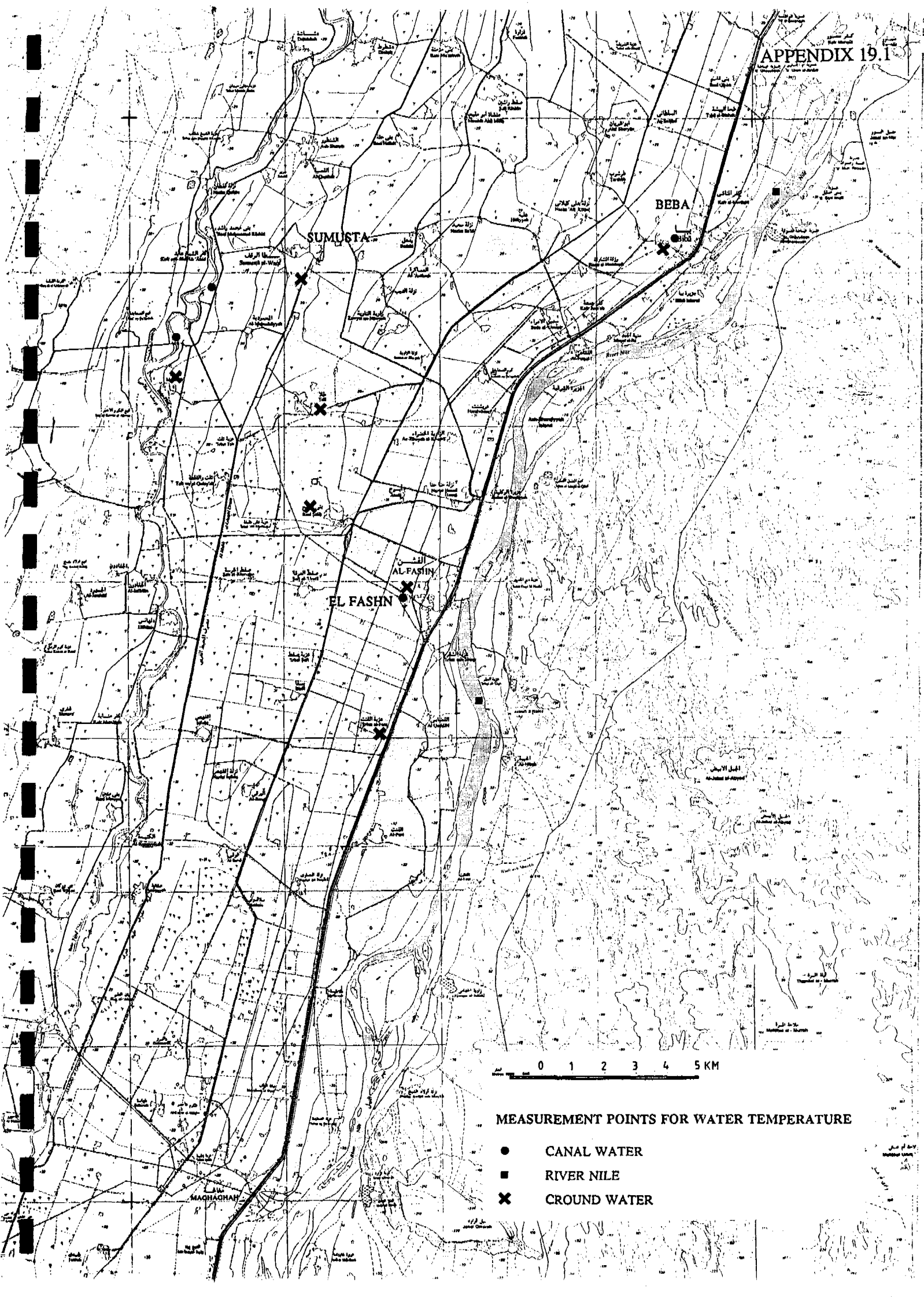
PART 2

Temperature of water in the distribution system and canals and River Nile

- temperature measurements in the field in the selected points (See Appendix 1)
- temperature will be checked also in the sampling points
- all measurements will be done during the same day, if possible

Heimo Ojanen
Water Supply Adviser

APPENDIX 19.1



MEMORANDUM

DATE : 03 / 09 / 1996

FROM : Dr. Mohamed El Hosseiny El Nadi

TO : Mr. Hemo

SUBJECT : Information for sector plan

The information about the water consumption for cities and villages due to standard of livimng and service could be as shown in the following table:

GRADE NO.	COMMUNITY TYPE	POPULATION CAPITA	LEVEL OF WATER SERVICE %	WATER CONSUMPTION L/C/D
A	BIG INDUSTRIAL CITY	>2 MILLION	> 80	250-350
B	MID. INDUSTRIAL CITY	0.5 -2 MILLION	70-80	250-300
C	MID. TOURISTIC CITY	0.3-1 MILLION	>75	250-300
D	CITY	0.3-1.3 MILLION	>70	250
E	BIG TOWN	0.1-0.8 MILLION	>70	200-250
F	TOWN	100-500 THOUSANDS	>70	180-220
G	SMALL TOWN	< 250 THOUSANDS	>70	150-180
H	BIG VILLAGE	>50 THOUSANDS	>75	100-150
I	BIG VILLAGE	>50 THOUSANDS	<50	60-80
J	VILLAGE	10-50 THOUSANDS	>75	80-120
K	VILLAGE	10-50 THOUSANDS	<50	50-80
L	VILLAGE	10-50 THOUSANDS	-	20-40
M	SMALL VILLAGE	<10 THOUSANDS	>75	80-100
N	SMALL VILLAGE	<10 THOUSANDS	<50	40-80
O	SMALL VILLAGE	<10 THOUSANDS	-	20-30

This classification had been prepared according to WWISP I project funded by USAID at 1992, Also some modifications had been added due to my personal experience during my working in LDII project.

Another classification had also been made by some foreign studies during 1985-1990 in Egypt and could be illustrated as follows:

Grade No.	Community Type	Level of water service	water consumption l/c/d
1	Cairo & Alex	complete Bathrooms and big industries with complete network	>300
2	big cities	complete bathrooms with some industrial activity with complete network	250-300
3	secondary cities	complete bathrooms with small industries with complete network	220-270
4	big towns	complete bathrooms with complete network	200-230
5	town	bathrooms and with 80% complete network	180-220
6	small town	bathrooms with 50% network	120-150
7	big village	bathrooms with more than 75% network	120-150
8	village	more than one tap in house with network for >50%	80-120
9	village	more than one tap in house with network for <50%	80-100
10	village	only one tape in house	60-80
11	village	with hand pump	40-60
12	village	with no direct connection (public Tapes)	20-30

Appendix 21

LIST OF THE MEETINGS

Date	Person	Authority/Company
19.08.1996	Houssien Abdel Quawi Mohammed National Director	Beni Suef Governorate
20.08.1996	Ms. Shamira Nicole	NOPWASD Cairo
20.08.1996	Project Development Officer Thomas L. Marr Consult Engineer Mostafa M. Dahi	USAID Cairo
20.08.1996	President Ahmad Gaber	Chemonics Egypt Ahmad Gaber and Associates Consultants
22.08.1996	Mostafa M. Dahi Consult Engineer	USAID
22.08.1996	Dr Zaher B. Abdalla Dr. Khaled Z. Abdalla Mr. Lofty El Fadaly	Sanitary Engineering Consulting Bureau Dr. Zaher Abdalla and Partners
22.08.1996	Juhani Kari Regional Director	Finnmap FM-International
26.08.1996	Dr Zaher B. Abdalla Dr. Khaled Z. Abdalla Mr. Lofty El Fadaly	Sanitary Engineering Consulting Bureau Dr. Zaher Abdalla and Partners

Date	Person	Authority/Company
28.08.1996	Mr.Adel Metry	El Fashn Water Works
29.08.1996	Mr. Amer Mahmoud	Beba New Surface Water Treatment Plant Nopwasd
29.08.1996	Mr. Wadeh Abou Gabal	Beba New Surface Water Treatment Plant Arab Contractors
01.09.1996	Mr. Ahmad El Sherey	Ahmed Oraby Waste Water Pumping Station
01.09.1996	Mr Mohamed Mambrovk	El Tahreer Waste Water Pumping Station
01.09.1996	Mr. Mohamed Abo El Kasem	Beni Suef Waste Water Treatment Plant
03.09.1996	Mr. Ramadan Ahmed Aly	Local Unit of El Fashn
03.09.1996	Mr Hazen El Sheikh	El Fashn New Surface Water Treatment Plant. Nopwasd
09.09.1996	General Manager Ossama Ashmawy Engineer Medhat Reda	Utilities Engineering Consultants
10.11.1996	Mohamed Fadaly Marzouk Supervisor	Main Maintenance Center Sumusta
11.11.1996	Ahmad Abdel Wahed Utility Engineer	Sumusta Water Utility
14.11.1996	Mr. Amer Mahmoud	Beba New Surface Water Treatment Plant. Nopwasd
14.11.1996	Mr Hazen El Sheikh	El Fashn New Surface Water Treatment Plant. Nopwasd

Date	Person	Authority/Company
15.11.1996	Ground Water Stations/Pump operators Dashtout, Dashtout Kom El-Nour, El-Shantour, Ezbet El-Shantour, El-Shantour Koftan El Garbeya El-Shantour Bani Mohamed Rashed Bedhal, Bedhal Banihalla, Mazoura	
18.11.1996	Cees Vulto Project Manager	IWACO Consultants El Azab Waterworks Fayoum
18.11.1996	Alaa El Din Saad Sanitation Expert	IWACO Consultants El Azab Waterworks Fayoum
18.11.1996	Hassan Abd El Gawad Chief of Waste Water Section	Economic General Authority El Fashn
24.11.1996	Houssien Abdel Quawi Mohammed National Director	Beni Suef Governorate
24.11.1996	Governor Mohammed Sabrey El-Kady	Beni Suef Governorate