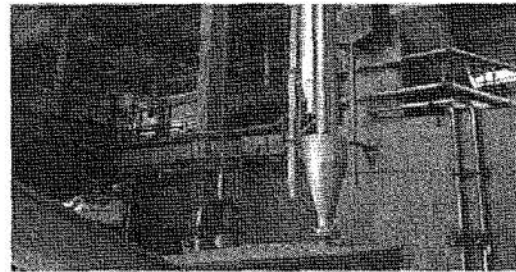
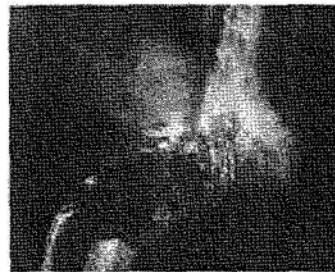
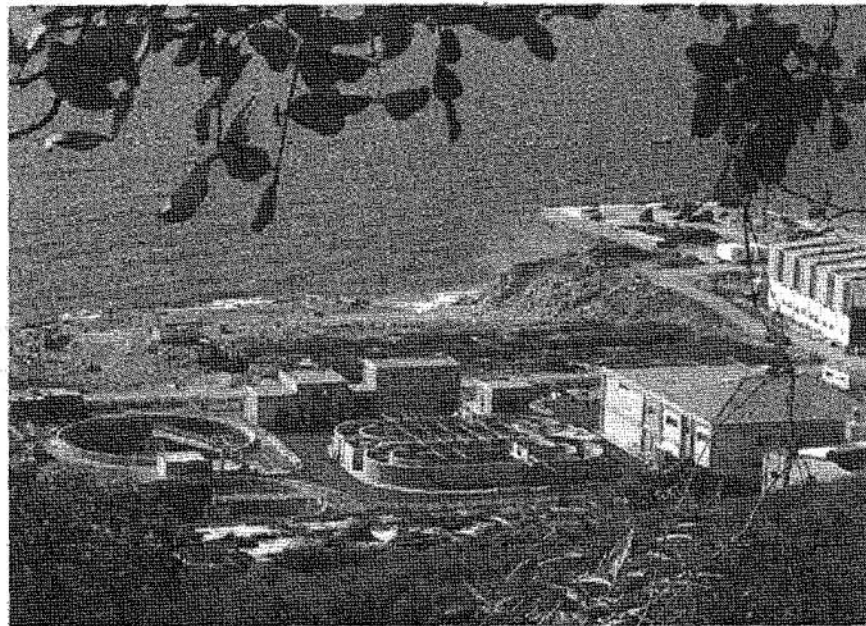




LEBANESE REPUBLIC
**MINISTRY OF ENERGY
AND WATER**

NATIONAL STRATEGY FOR THE WASTEWATER SECTOR



Ministry of Energy and Water
Lebanese Government (Resolution No. 35, Date 17/10/2012)

Not to Waste our Water

Wastewater percolates into the ground or is discharged into the sea, polluting our ground, underground, rivers and beautiful shores,

60% of the population is covered with collection networks without any treatment facilities,

Wastewater treatment plants are scattered along the coast without being connected to collection networks,

More than a billion US Dollars have been invested in the wastewater sector and only 8% of the generated wastewater is treated,

No budget was allocated for the funding of wastewater projects when we took over the Ministry of Energy and Water,

Unclear responsibilities lost between, Municipalities, Organizations, Councils, Water Establishments and Ministry.

With that grim reality at hand, we developed this strategy in coordination with all concerned national and international organizations and bodies and the approval of the council of Ministers, in order for Lebanon to have one policy, and a clear path for the collection and treatment of wastewater; and in implementation of our upheld principle: "polluter pays" for the citizen to honor his financial duties toward the state and, in return, for the state to accomplish its basic mission towards the citizens and spare Lebanon the evil of pollution.

Gebran Bassil
Minister of Energy and Water

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Investment Program

Total Investment Requirements

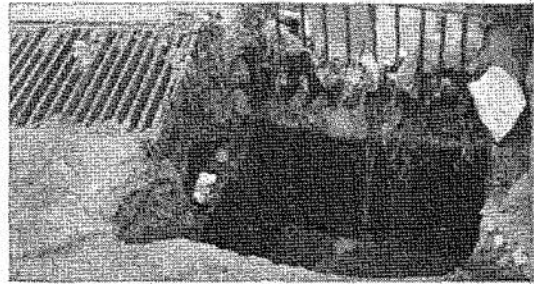
Annex A

Background: Lebanon's water sector and strategy

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Lebanon is experiencing critical problems in all parts of its water sector. In water resources, the country is already using three quarters of its available water resources and demand is rising fast. Dry season shortages are emerging and water quality is deteriorating. Institutional capacity for water resources management is weak. Despite institutional reforms and high levels of investment, public network service delivery standards in water supply are poor, and households spend three times more sourcing water from private suppliers than from the utilities. Water Establishments lack the autonomy, technical capacity and financial resources to improve service standards. Despite massive investment, very little wastewater is being treated, causing severe environmental damage. The investment program has been poorly coordinated, and reforms to transfer institutional and financial responsibility for wastewater management to the WEs have been only very partially implemented. The irrigation sector has comparative advantage for high value products in domestic and regional markets, but institutional reforms need to be completed, and investment is required in both infrastructure and product and market development.

The outlook is poor unless strategic actions are taken. Overall, the water sector is delivering poor services at a high fiscal and household cost. Water sector inefficiencies (particularly low collection of tariffs and high water losses) and environmental damage are costing the economy the equivalent of almost 3% of GDP annually. Looking ahead, on present trends, despite its relatively good endowment of water resources, Lebanon will face chronic year-round water shortages by 2020 unless actions are taken to complete reforms in the water sector.



The Ministry of Energy and Water developed a water sector strategy that aims at improving potable water and wastewater and irrigation services within an integrated water resource management framework. Following best practice in integrated water resources management, the proposed Strategy for the Wastewater Sector is designed to fit within Lebanon's overall water sector strategy. However, wastewater challenges in terms of infrastructure, institutional set-up, financing and cost-recovery are specific to the sector, and an integrated approach is required along the chain from wastewater generation through to ultimate reuse or disposal. Therefore, a freestanding wastewater strategy is required.



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Current situation of the wastewater sector

Lebanon is generating large and growing quantities of domestic and industrial wastewater which needs treatment. At present, Lebanon produces about 310 million cubic meters of wastewater annually, of which 250 million cubic meters is municipal/domestic wastewater, and about 60 million cubic meters industrial wastewater.

National policy is to collect and treat all wastewater, in order to prevent pollution of the environment. The wastewater master plan (1982, updated in 1994) provided for coverage of major urban and rural populations, using sizes of plant and technologies appropriate to the scale and nature of settlements. A total of 54 integrated systems (12 coastal and 42 inland) were recommended, including collection, treatment and disposal.

Lebanon has made huge investments in wastewater facilities over the last two decades. Investments in the sector since early 1990s exceed \$1.4 billion and include:

- Council of Development and Reconstruction (CDR) through loans and local funding: \$1265 million: (i) completed projects (mainly rehabilitation of networks): 255, (ii) on-going projects and projects under preparation: 910 investments, and (iii) 100 for maintenance, studies, supervision, etc.
- Ministry of Energy and Water (MoEW): \$60 million spent on networks (1996– 2009)
- Ministry of Housing: \$30 million spent on networks up to 1994
- Municipalities: unknown value of works
- Grants from International agencies:
 - USAID: around \$ 25 million (1996 – 2010)
 - Italians, EU, and others: unknown

Along the coast, much of the planned large scale capacity has been constructed, but little of it is operational. Of the twelve large treatment plants planned on the coast to service 65% of the population, seven are completed (Tripoli, Chekka, Batroun, Jbeil, Ghadir, Nabi Younes and Saïda), one is under construction (Sour), three are under preparation (Aabde, Kesrwane, and Bourj Hammoud), and one require funding (Sarafand). However, to date only two plants (Ghadir and Saïda) are operational based on preliminary treatment only and five completed plants lack collection networks (Tripoli, Chekka, Batroun, Jbeil, and Nabi Younes).

Inland, only two medium-sized collection and treatment schemes are operating – and well below capacity. Of the 42 medium sized collection and treatment schemes planned, 23 are funded. However, only two are operating, and way below design capacity (Baalbek 10%, and Yamouneh 50%). Two plants (Nabatiye and West Beqaa) are completed but not operating. Five (Kfarsir, Yahmour, Zawtar, Tibnine and Zahle) are under construction and 14 plants are under design. A further investment of \$255 million is required to bring all 23 plants into operation. The remaining 19 schemes are not funded at all and would require \$325 million. In addition, around 60 small treatment plants have been constructed inland by municipalities through donor funding without coordination with MoEW or CDR. Today, only a few of these plants are operational, and considerable further investment would be needed for them to operate adequately and to cover all rural areas.

As a result of these investments, about two thirds of the population are connected to wastewater collection networks but only 8% of wastewater reaches the four operational plants (Saïda, Ghadir, Baalbeck and Yamouneh) and is treated. Wastewater collection networks have been conceived and executed piecemeal, leading to a major mismatch between collection and treatment capacity.

Considerable installed treatment capacity is lying idle. Seven major plants (Tripoli, Chekka, Batroun, Jbeil, Nabi Younes, West Beqaa and Nabatiye) are not working at all because of lack of networks.

The environmental costs of this situation are severe. Most wastewater collected is discharged raw, without treatment, into watercourses and the sea. Where there is no network, cess pits are used, with considerable seepage into groundwater. Few industries pre-treat their effluent, so that harmful waste is discharged into the collection system or the environment. The negative environmental impacts of poor wastewater collection and treatment contribute to health costs, to pollution of water resources and soil, to loss of amenity and tourism income.

Main causes of the current situation

Sector

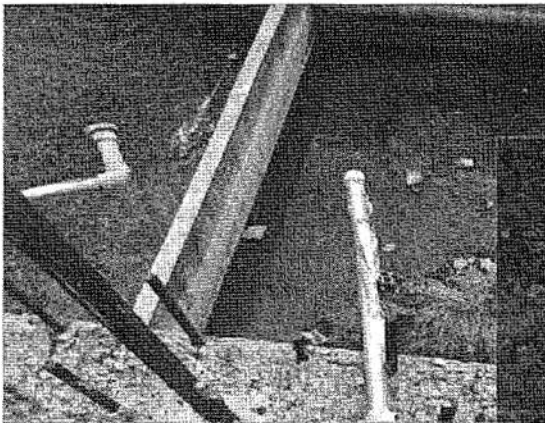
The investment program is not well coordinated. Wastewater collection, treatment and disposal/reuse investments are not implemented as an integrated package. The wastewater master plan is out of date and needs to be revised to reflect actual implementation, and changes in population and rates of wastewater generation. Investments have often been selected from donor, political and regional preferences rather than rational planning. Implementation is slow, with very low disbursement rates. Most projects take at least ten years from inception to completion.

The legal, regulatory and policy frameworks have not established and enforced appropriate standards. Responsibilities for setting and regulating standards are split between Ministry of Environment and MoEW. There is no policy on pre-treatment of industrial wastewater, and no guidelines on the selection of the most cost-effective wastewater treatment techniques. There are no policies for systematic reuse of treated wastewater.

Institutional responsibilities are unclear. Responsibility for planning and implementing projects is lost between CDR, MoEW, Water Establishments (WEs) and municipalities, whereas it should be under the leadership of the MoEW.

There is no workable operational model for service delivery. Although WEs have legal responsibility for operation of the wastewater collection and treatment system, they have no operational framework, no experience and no capacity to do this.

The advantages of partnerships with the private sector have not been explored adequately.



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Sector objectives and targets

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The objectives of the wastewater sector are to collect and treat all wastewater according to national standards and regional agreements and, where economic, to reuse treated wastewater for agriculture, industrial, and amenity in line with national health and safety standards. Cost recovery will be based on the 'polluter pays' principle.

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To meet these objectives, sector targets and initiatives were developed for the short-medium term (2011 – 2015) and the long term (2016 – 2020), and to serve the projected population up to 2025 – 2030.

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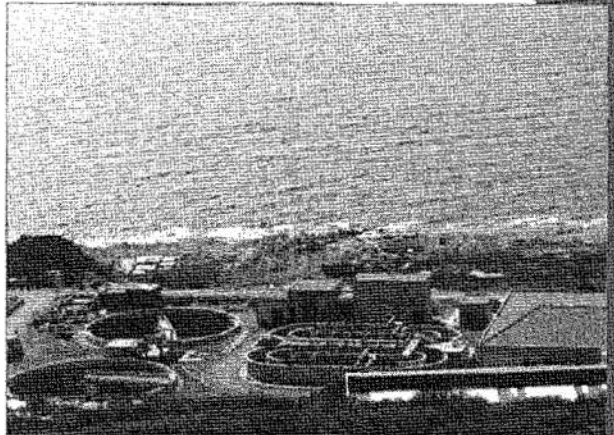
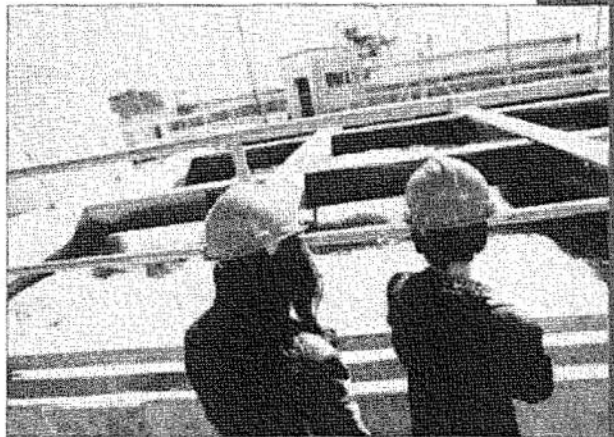
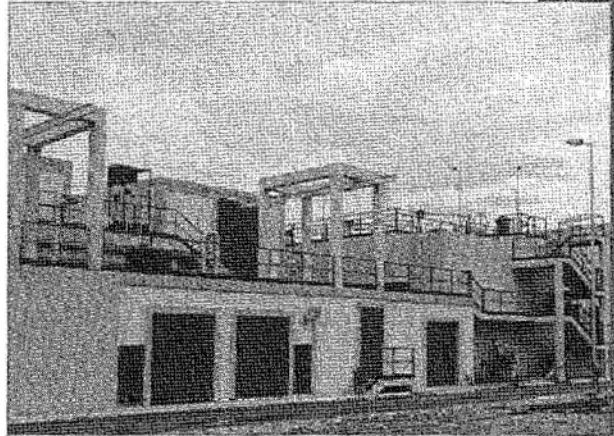
The sector targets 2011-2020 are:

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apacity

- Increase the present wastewater collection (60%) and treatment (8%) to 80% collection and treatment by 2015, and 95% collection and treatment by 2020.
- Pre-treatment of all industrial wastewater by 2020.
- Increase reuse of treated effluent from zero percent in 2010 to 20% of treated wastewater by 2015, and of 50% by 2020.
- Secondary treatment and reuse of all inland wastewater by 2020, and secondary treatment by 2020 of coastal wastewater where reuse is economically justified.
- Full recovery of all O&M costs by 2020 following the 'polluter pays' principle and full recovery for BOT projects.

In order to reach these objectives, the strategy provides for five strategic initiatives:

- An integrated and prioritized investment program to rapidly increase wastewater collection, treatment and reuse rates.
- Legal, regulatory and policy measures to set and regulate standards.
- Institutional measures to define responsibilities and to create capacity for service delivery.
- Financial measures for viability and affordable services.
- Measures to optimize private sector participation in the wastewater sector.



Strategic initiatives

Strategic initiative # 1: An integrated and prioritized investment program for wastewater collection, treatment and reuse

The strategy targets increases in wastewater collection, treatment and re-use rates. To reach these targets, MoEW will take the lead in working with CDR, WEs, the municipalities and the private sector to prepare and obtain financing for an integrated investment program. Top priority will be completing existing treatment plants and rapidly increasing the effective connection network to bring treatment rates to the level of installed treatment capacity.

1.1 An integrated and prioritized immediate investment program will aim at rapid increases in wastewater collection and treatment rates to 30% by end of 2012 through completing the networks of the seven completed treatment plants, and 80% by end 2015 through efficient planning and implementation of investments.

In order to move rapidly on sector targets, MoEW will work with CDR, WEs, the municipalities and the private sector to implement an integrated and prioritized immediate investment program. Priorities for the investment program will be:

- a. Implementing the funded networks of the seven completed treatment plants (Tripoli, Chekka, Batroun, Jbel Nabi Younes, West Beqaa and Nabatiye) so as to put them in operation by end of 2012 alongside the two coastal plants already operational (Saida and Ghadir).
- b. Completing projects for which funding is already available (23 inland schemes and all coastal schemes except Sarafand).
- c. Rapid programming and execution of investments needed to complete existing schemes through completing the collection networks of already constructed or under construction schemes where additional funds are needed (23 inland schemes and all coastal schemes except Sarafand).

1.2 Regional wastewater master plans: each WE, with MoEW support, will work with the municipalities to prepare a regional wastewater master plan. Planning will be for integral systems (not just components) comprising collection and conveyance networks, treatment and reuse.

1.3 Integrated medium to long term national investment program 2013-2020.

- a. Based on the master plans, MoEW (in coordination with CDR and the municipalities) will develop an integrated national investment program 2013-2020, which shall include the 19 unfunded inland schemes, the required schemes for the inland areas that are not covered by the already identified 42 schemes and Sarafand wastewater scheme. MoEW, CDR and the municipalities will be responsible for mobilizing investment from financing institutions and the private sector.
- b. MoEW will hold responsibility for budget execution and project implementation. CDR will continue execution of projects for which resources are already mobilized. Staff and capacity for procurement and contract management will be recruited and capacity built.

1.4 Economic reuse of treated wastewater and sludge:

The strategy targets increases in reuse of treated effluent from zero percent in 2010 to 20% of treated wastewater by 2015, and of 50% by 2020. Preliminary estimates indicate that at least 20 and 150 million cubic meters per year could be reused for irrigation purposes by 2015 and 2020, respectively.

- a. Specific studies of existing plants and of plants under implementation will be undertaken to assess technical and economical reuse potential for each plant. The studies will evaluate infrastructure requirements and propose the appropriate investments and institutional arrangements.
- b. Implementation of required infrastructure for re-use of treated wastewater (storage capacities, pumping stations, networks, etc.) will be undertaken.

Wastewater Strategy: Action plan and budget (US\$ millions) Strategic initiative # 1: An integrated and prioritized investment program for wastewater collection, treatment and reuse

| Action | Lead responsibility | Financed by | Budget 2011-2015 | Implementation | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------|------------------|----------------|---------|
| | | | | From Year | To Year |
| 1.1 An integrated and prioritized immediate investment: (a) Funded networks for the seven completed wastewater plants and the two operational plants along the coast | <i>MoEW, with CDR, and municipalities</i> | GoL, financial institutions, municipalities | 190 | 1 | 2 |
| (b) Completion of already funded projects | | | 490 | 1 | 5 |
| (c) Additional networks for completion of already funded projects (23 inland and 11 coastal plants) | | | 880 | 1 | 5 |
| | | | | | |
| 1.3 Integrated national investment program 2013 - 2020 | <i>MoEW with CDR, municipalities and the private sector</i> | GoL, donors, private sector | | | |
| (a) Preparation and initiating implementation | | | 200* | 3 | 5 |
| (b) MoEW responsibility for budget execution and project implementation, with staff recruitment and capacity building | | | 20 | 1 | 5 |
| 1.4 Economic reuse of treated wastewater and sludge: (a) studies; (b) investment | <i>WEs, MoEW and Ministry of Agriculture, with CDR</i> | GoL, donors, municipalities | 3(a) | 1 | 2 |
| | | | 28(b) | 3 | 5 |
| Total Initiative # 1 | | | 1,815 | | |

(* The 200 million USD represent around 20 of the integrated investment program 2013 2015. The remaining 80% will be implemented 2016 2020.

Strategic initiative # 2: Legal, regulatory and policy measures

In order to set and regulate national standards for wastewater treatment and reuse, MoEW will work with other concerned agencies to put in place the needed legal, regulatory and policy measures.

2.1 Legal and regulatory framework: by-laws will be issued, specifying: (i) responsibilities for setting and regulating standards for wastewater treatment and reuse; (ii) the implementation of the 'polluter pays' principle; (iii) responsibility for pre-treatment by polluting industries; and (iv) responsibilities for monitoring and enforcement.

2.2 Institutional responsibilities: by-laws to Laws 221 and 241 will be issued specifying the roles of the WEs, MoEW, CDR, the municipalities and the private sector with respect to planning, investment programming and implementation.

2.3 National wastewater treatment and reuse standards and options:

- National guidelines and criteria for wastewater treatment and reuse will be reviewed and issued jointly by an inter-ministerial committee.
- Guidelines for small scale plants employing simple techniques will be developed by MoEW.

Wastewater Strategy: Action plan and budget (US\$ millions)

Strategic initiative # 2: Legal, regulatory and policy measures

| Action | Lead responsibility | Financed by | Budget 2011-2012 | Implementation | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------|------------------|----------------|---------|
| | | | | From Year | To Year |
| 2.1 Code de l'eau passed into law and by - laws related to wastewater issued | MoEW | GoL | 1 | 0 | 1 |
| 2.2 By - laws to Laws 221 and 241 prepared and issued | MoEW with concerned ministries | GoL | 1 | 0 | 1 |
| 2.3 National wastewater treatment and reuse standards and options: (a) National guidelines reviewed and reissued (b) Guidelines for small scale treatment plants | MoEW with Ministry of Environment, Ministry of Agriculture, and Ministry of Health | GoL | 3 | 1 | 2 |
| Total Initiative # 2 | | | 5 | | |

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Strategic initiative # 3: Institutional measures to define responsibilities and to create capacity for service delivery

WEs will progressively take over responsibility for service delivery. WE capacity will be developed, and the private sector will be used where appropriate. On a case by case basis, WEs may agree with municipalities that the municipalities operate facilities by delegation. MoEW will build its capacity for sector oversight and support.

3.1 Asset evaluation: WEs will have ownership of all collection and treatment assets, and will have responsibility for their O&M. The process of transfer will begin with a comprehensive asset evaluation.

3.2 Asset transfer and preparing plans: Existing assets and responsibility for O&M will be transferred to the WEs progressively. Where it is more efficient for municipalities to continue to operate assets, WEs will pass contracts for delegated management to municipalities.

3.3 Capacity building for WEs: To build capacity for wastewater management, operation and maintenance, each WE will conduct a capacity needs assessment and propose a phased staffing and training program.

3.4 Capacity building for MoEW: To strengthen capacity for oversight and support of the wastewater sector, MoEW will define the capacity required, and will develop this capacity. It is expected that a core team of 3-5 experts may be required for strategy, investment programming, standards and regulation, and monitoring and reporting.

Wastewater Strategy: Action plan and budget (US\$ millions)

Strategic initiative # 3: Institutional measures to define responsibilities and to create capacity for service delivery

| Action | Lead responsibility | Financed by | Budget 2011-2015 | Implementation | |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------|-------------------------|----------------|---------|
| | | | | From Year | To Year |
| 3.1 Asset evaluation | MoEW with WEs, municipalities, and the private sector | GoL, donors | 5 | 1 | 4 |
| 3.2 Asset transfer and operating plans | WEs with MoEW | GoL, donors | 4 | 1 | 4 |
| 3.3 Capacity building for WEs: (a) needs assessment; (b) capacity building; (c) extra staff recruitment. | WEs and municipalities with MoEW | GoL, donors | 2 (a) 8 (b) 4 (c) | 1 | 5 |
| 3.4 Capacity building for MoEW | MoEW | GoL, donors | 5 | 1 | 5 |
| Total Initiative # 3 | | | 28 | | |

Strategic initiative # 4: Financial measures for viability and affordable services

Following the 'polluter pays' principle, full recovery of O&M costs will be introduced progressively to generate revenues and the conditions of financial viability, and transparent operating subsidies will be paid during the transition period until WEs can cover their costs.

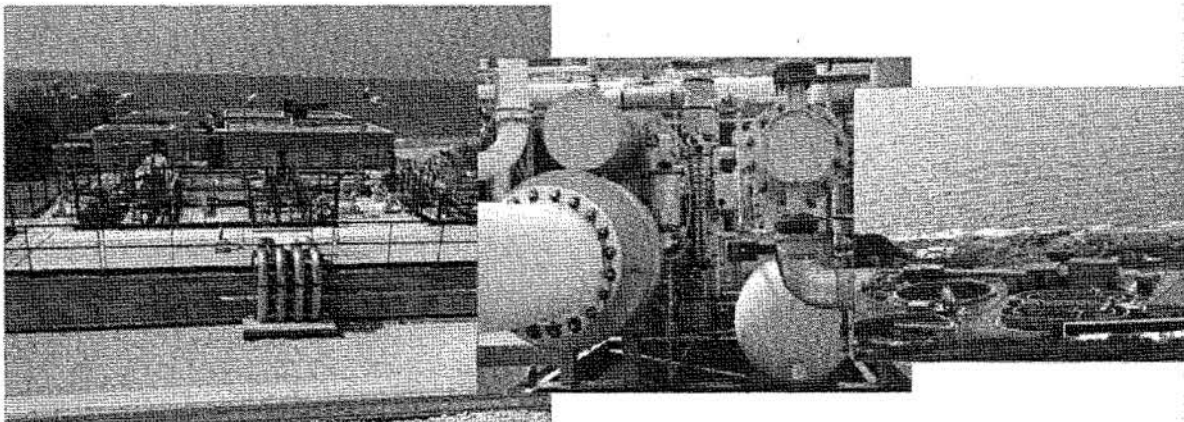
4.1 Cost recovery: Following the 'polluter pays' principle, measures will be introduced progressively to recover from users the full costs of O&M of wastewater services. As volumetric billing for water supply is introduced, wastewater charges will be billed on a volumetric basis together with water charges. Municipalities will continue to handle operation until assets and O&M responsibilities are handed over, after which WEs will collect the fees through water bills. Fees will be increased progressively to reach 100% cost recovery by 2020.

4.2 Transitional subsidy: During the transition period and until adequate levels of cost recovery can be achieved, WE and government will agree on principles of subsidy to cover WE deficits on O&M of wastewater services, and an annual subsidy will be negotiated according to clear criteria.

Wastewater Strategy: Action plan and budget (US\$ millions)

Strategic initiative # 4: Financial measures for viability and affordable services

| Action | Lead responsibility | Financed by | Budget 2011 - 2015 | Implementation | |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------|-------------------------|----------------|---------|
| | | | | From Year | To Year |
| 3.1 Asset evaluation | MoEW with WEs, municipalities, and the private sector | GoL, donors | 5 | 1 | 4 |
| 3.2 Asset transfer and operating plans | WEs with MoEW | GoL, donors | 4 | 1 | 4 |
| 3.3 Capacity building for WEs: (a) needs assessment; (b) capacity building; (c) extra staff recruitment. | WEs and municipalities with MoEW | GoL, donors | 2 (a) 8 (b) 4 (c) | 1 | 5 |
| 3.4 Capacity building for MoEW | MoEW | GoL, donors | 5 | 1 | 5 |
| Total Initiative # 3 | | | 28 | | |



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Strategic initiative # 5: Measures to optimize private sector participation in the wastewater sector.

The advantages of partnerships with the private sector will be explored and private enterprises will be increasingly involved through partnership approaches, including the financing and implementation of investments, and the conclusion of management contracts and possible BoT arrangements.

5.1 Study of options for private sector participation: Options for involving private sector participation in the financing, execution and operation of investments will be considered, including BOT. Municipalities and/or WEs may contract works, particularly inland treatment plants, on a BOT basis, with the assets transferred to the WEs at the term of the arrangement.

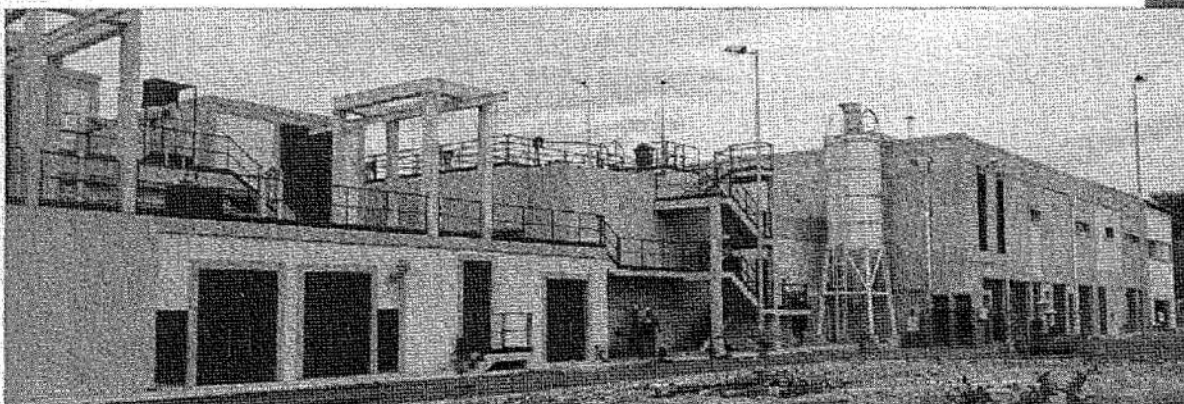
5.2 Test models for private sector participation: One or more pilot projects will be launched for private sector participation. Likely models are BOT contracts for inland treatment plants, and O&M contracts for treatment plants. MoEW will allocate seed money for the preparation and negotiation of these pilot contracts.

5.3 Strengthening WEs capacity to prepare and oversee contracts. Where contracting with the private sector is employed, WE capacity to prepare contracts and oversee their execution will be strengthened.

Wastewater Strategy: Action plan and budget (US\$ millions)

Strategic initiative # 5: Measures to optimize private sector participation in the wastewater sector

| Action | Lead responsibility | Financed by | Budget 2011-2015 | Implementation | |
|----------------------------------------------------------------|------------------------|-------------|------------------|----------------|---------|
| | | | | From Year | To Year |
| 5.1 Study of options for private sector participation | MoEW and WEs, with CDR | GoL | 1 | 1 | 2 |
| 5.2 Test models for private sector participation | MoEW and WEs, with CDR | GoL | 4 | 2 | 5 |
| 5.3 Strengthening WE capacity to prepare and oversee contracts | WEs with MoEW | GoL, donors | 4 | 2 | 5 |
| Total Initiative # 5 | | | 9 | | |



Investment Program

Total In

1. Coastal wastewater systems

| | Equivalent Population (000s) | Already funded (Million USD) | Not yet funded (Million USD) | | | Development period for remaining investments | Annual O&M cost of treatment plants at full operation (US\$ millions) |
|--------------------|------------------------------|------------------------------|------------------------------|------------|-------------|----------------------------------------------------|-----------------------------------------------------------------------|
| | | | Treatment | Networks | Total | | |
| 1. Aabde | 185 | 21.5 | 2 | 95 | 97.0 | 2011 - 2015 | 1.5 |
| 2. Tripoli | 1,000 | 160.0 | 0 | 90 | 90.0 | 2011 - 2015 | 7.0 |
| 3. Chekka | 24 | 20.0 | 0 | 8 | 8.0 | 2011 - 2012 | 0.6 |
| 4. Batroun | 30 | 22.0 | 0 | 15 | 15.0 | 2011 - 2012 | 0.6 |
| 5. Jbeil | 50 | 32.0 | 6 | 30 | 36.0 | 2011 - 2012 | 0.75 |
| 6. Kessrwan | 505 | 140.0 | 0 | 45 | 45.0 | 2011 - 2015 | 3.1 |
| 7. Bourj Hammoud | 2,200 | 75.0 | 205 | 130 | 335.0 | 2012-2015 (pre-treatment) 2015-2020 (secondary) | 0.5 (pre-treatment) |
| 8. Ghadir | 800 | 61.0 | 25 | 35 | 60.0 | 2015-2020 (secondary) | 0.2 (pre-treatment) |
| 9. Ras Nabi Younes | 88 | 33.0 | 0 | 22 | 22.0 | 2011 - 2015 | 1.1 |
| 10. Saida | 390 | 33.0 | 42 | 105 | 147.0 | 2015-2020 (secondary) | 0.20 (pretreatment) |
| 11. Sarafand | 325 | - | 45 | 165 | 210.0 | 2015 - 2020 | 2.5 |
| 12. Tyr | 200 | 50.5 | 0 | 50 | 50.0 | 2011 - 2015 | 1.35 |
| TOTAL | 5,587 | 648.0* | 325 | 790 | 1115 | | 19.40 |

(* 191.0 already disbursed.

2. Inland wastewater systems

| WE Zone | Number of Plants | | Equivalent Population (000s) | | Funds required to complete partly funded schemes (in US\$ millions) | | Requirements for unfunded schemes (in US\$ millions) | O&M costs of treatment (US\$ millions) |
|-------------------------------|------------------|-----------|------------------------------|------------|---------------------------------------------------------------------|----------------|------------------------------------------------------|-----------------------------------------------|
| | Partly funded | Unfunded | Partly funded | Unfunded | Already funded | Not yet funded | Not yet funded | Annual average at full operation (per scheme) |
| North Lebanon | 4 | 6 | 141 | 210 | 37.00 | 25.38 | 98.13 | 0.24 |
| Total North Leb. BML | 10 | | 351 | | 37.00 | 123.51 | | |
| South Lebanon | 6 | 5 | 116 | 153 | 39.40 | 22.88 | 79.91 | 0.28 |
| Total BML | 11 | | 269 | | 39.40 | 102.79 | | |
| Beqaa | 6 | 6 | 260 | 176 | 42.50 | 53.65 | 93.47 | 0.52 |
| Total South Leb. Beqaa | 12 | | 436 | | 42.50 | 147.12 | | |
| Beqaa | 7 | 2 | 803 | 118 | 141.71 | 153.39 | 51.00 | 0.13 |
| Total Beqaa | 9 | | 921 | | 141.71 | 204.39 | | |
| TOTAL | 23 | 19 | 1,320 | 657 | 260.61 | 255.30 | 322.51 | 0.29 for treatment + 0.20 for networks |
| GRAND TOTAL | 42 | | 1977 | | 260.61 | 577.81 | | |

Note: For budget purposes, it is assumed that: (1) all schemes that are currently partly funded will be funded and completed and will become operational by 2015. (2) all schemes that are currently unfunded will be implemented 2013 - 2020. (3) It is estimated that remaining areas not covered by the identified schemes would require around 500 million US\$ and will be implemented 2013 - 2020. (4) Out of the available 260.61 million US\$ funds, 39.0 million US\$ are already disbursed.

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Total

(*) The

Total Investment Requirements

Short and Medium Term (2011 to 2015)

| Strategic Initiative | Short Term 2011 - 2012 (Million US\$) | Medium Term 2013 - 2015 (Million US\$) | Total Budget 2011 - 2015 (Million US\$) |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------------------|-----------------------------------------------|
| Strategic initiative # 1: An integrated and prioritized investment program for wastewater collection, treatment and reuse | 692 | 1,123 | 1,815 |
| Strategic initiative # 2: Legal, regulatory and policy measures to set and regulate standards | 5 | - | 5 |
| Strategic initiative # 3: Institutional measures to define responsibilities and to create capacity for service delivery | 11 | 17 | 28 |
| Strategic initiative # 4: Financial measures for viability and affordable services | 8 | 30 | 38 |
| Strategic initiative # 5: Measures to optimize private sector participation in the wastewater sector | 3 | 6 | 9 |
| Total | 719 | 1,176 | 1,895 |
| Funds already available at CDR | 380 | 300 | 680 |
| Funds to be made available | 339 | 876 | 1,215 |

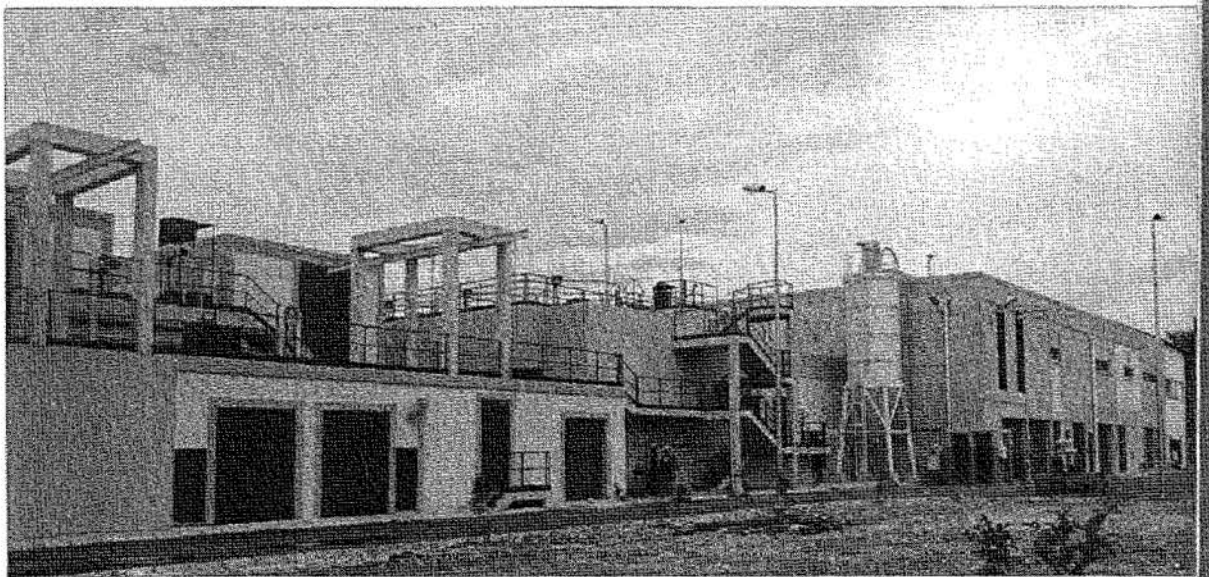
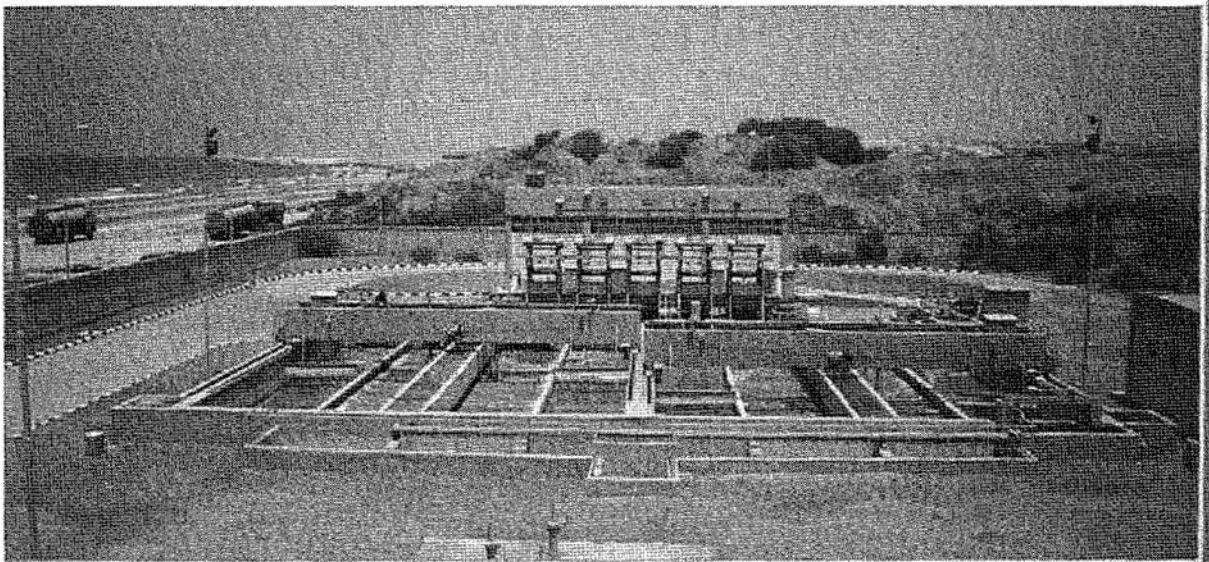
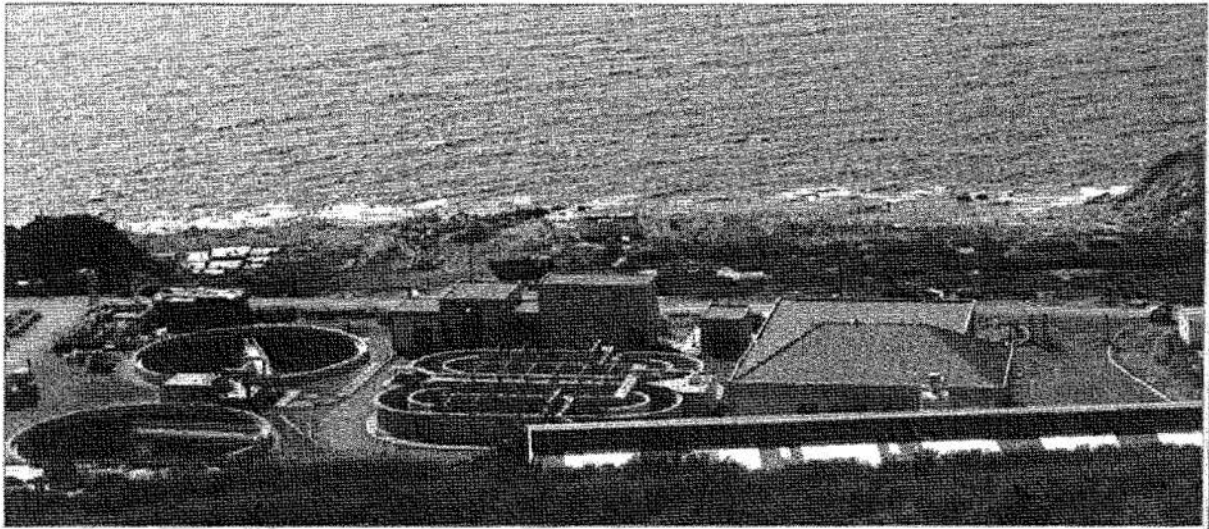
Long Term (2016-2020)

| Initiative | Budget (Million US\$) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Continuation of the integrated national investment program (19 unfunded inland schemes, the schemes of the inland areas not covered by the already identified 42 inland schemes, and Sarafand wastewater scheme). | 835 |
| Upgrading preliminary treatment plants (Bourj Hammoud, Ghadir and Saida) to secondary treatment, and extension of Jbeil treatment plant | 278 |
| Investments for re-use of treated wastewater for irrigation | 100 |
| Total | 1,213 |

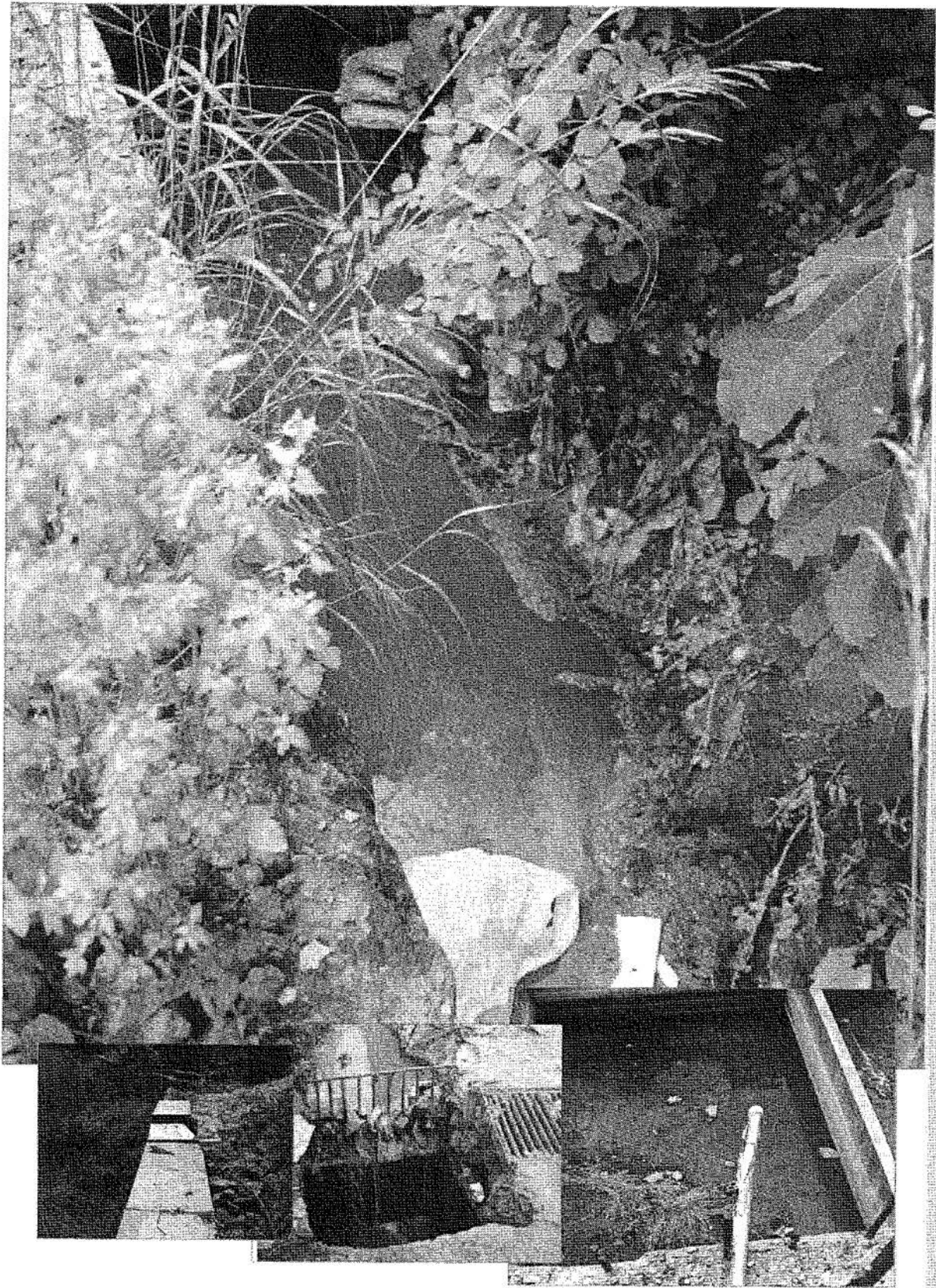
Investment Summary

| | Short - Medium Term (Million US\$) | Long Term (Million US\$) | Total (Million US\$) |
|-----------------------|---------------------------------------|-----------------------------|-------------------------|
| Government of Lebanon | 115 | 113 | 228 |
| Donors | 250 | 250 | 500 |
| Private Sector | 200 | 350 | 550 |
| Municipalities | 650 | 500 | 1150* |
| Available at CDR | 680 | - | 680 |
| Total | 1,895 | 1,213 | 3,108 |

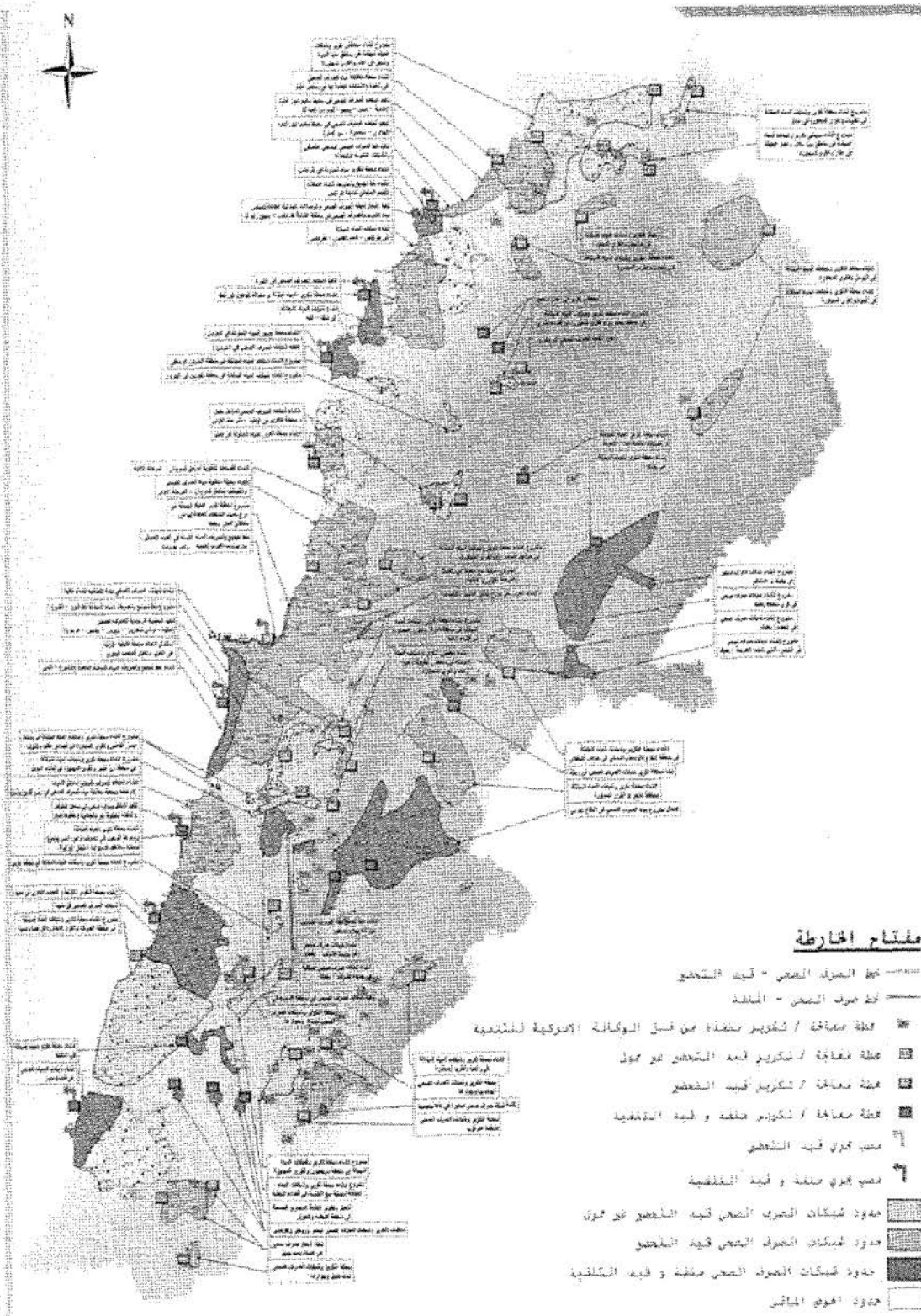
(*) The 650 million USD will be obtained from the mobile revenues of the municipalities



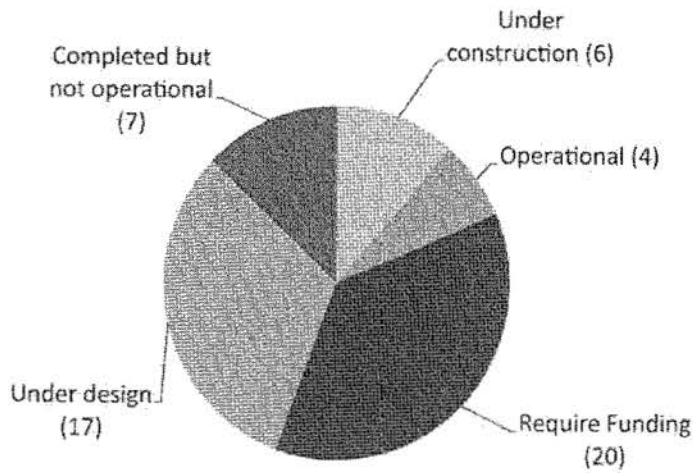
ANNEX A



Current investment program for wastewater infrastructure



Status of the 54 Planned Treatment a Plants



Additional Funds Required for the 54 Planned Schemes

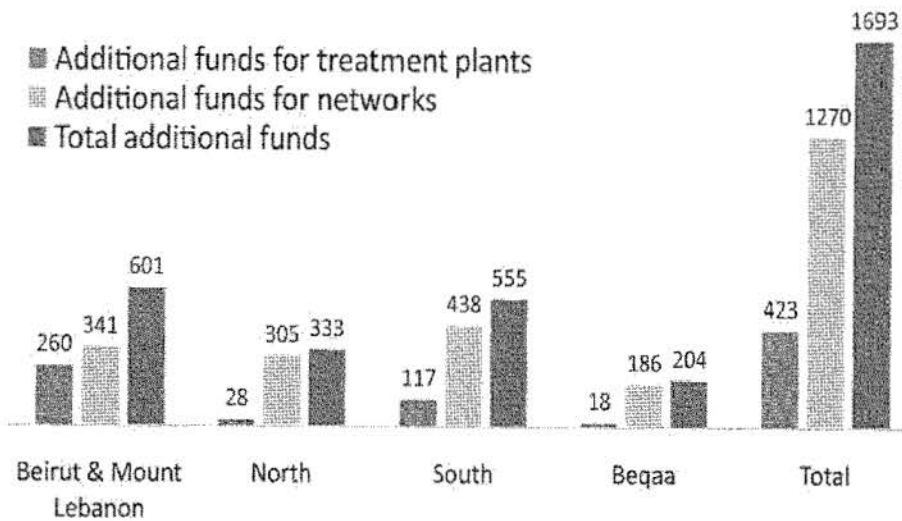


Table A.1: Coastal Wastewater Treatment Plants

| Treatment Plant | Equivalent Population | Status | | | Cost of executed, on going or under preparation - funds available (million USD) | | | Remaining Works - no funds available (million USD) | | | Cost of O&M (million \$/year) | Expected Operation Date |
|-----------------|-----------------------|--------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------|-------|----------------------------------------------------|----------|-------|-------------------------------|-------------------------|
| | | Treatment Plant | Outfall | Collection Networks | WWTP + sea outfall | Networks | Total | Treatment Plant | Networks | Total | | |
| Sabbe | 185,000 | Under preparation | Under preparation | 350 km for Sahel 1 - 115 km for Sahel 2 and 80 km for Sahel 3 - under preparation | 21.5 | 0 | 21.5 | 2 | 95 | 97 | 1.5 | 2015 |
| Tripoli | 1,000,000 | Completed 2010 not operational | 2.5 km, 1500 mm diam. completed | 2.4 km coastal collector under implementation - 12.3 km under implementation (from Koufa to Tripoli, primary + secondary + lateral connections), 2.70 km under preparation | 120 | 40 | 160 | 0 | 90 | 90 | 7 | 2013 @10% |
| Canva | 24,000 | Completed 2006 not operational | 0.7 km, 300 mm diam. completed | 50 km (primary + secondary networks) under implementation - 5 km lateral connections under preparation | 10 | 10 | 20 | 0 | 8 | 8 | 0.6 | 2012 - 2013 |
| Canva | 30,000 | Completed 2010 not operational | 0.35 km, 950 mm diam. completed | 90 km (primary + secondary networks) under implementation - 5 km lateral connections under preparation | 52 | 10 | 22 | 0 | 15 | 15 | 0.6 | 2012 - 2013 |

| Treatment Plant | Equivalent Population | Status | | | Cost of executed, on going or under preparation - funds available (million USD) | | | Remaining Works - no funds available (million USD) | | | Cost of O&M (million \$/year) | Expected Operation Date |
|-----------------|-----------------------|---------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------|-------|----------------------------------------------------|----------|-------|-------------------------------------------|-------------------------|
| | | Treatment Plant | Outfall | Collection Networks | WWTP + sea outfall | Networks | Total | Treatment Plant | Networks | Total | | |
| Beit | 50,000 | Completed 2010 not operational | 0.80 km, 500 mm diam. - under construction | 90 km (main + primary + secondary + tertiary + house connections) awaiting final approval - 215 km (coastal main + primary + secondary + tertiary + house connections) under preparation | 13 | 21 | 37 | 6 | 30 | 36 | 0.75 | 2013 @20% |
| Beit | 505,000 | Under preparation | 1.4 km, 1000 mm diam. - under preparation | 370 km collectors and secondary pipelines under preparation | 105 | 35 | 140 | 0 | 45 | 45 | 2.1 | |
| Beit - Awmoud | 2,000,000 | Under preparation (only pre-treatment) | 2.5 km, 1700 mm diam. to be rehabilitated | 375 km collectors under preparation | 25 | 50 | 75 | 205 | 130 | 135 | 0.5 for the O&M of the pre-treatment WWTP | |
| Beit | 300,000 | Rehabilitated & partly operational (only pre-treatment) | 2.25 km, 1200 mm diam. rehabilitated | 30 km executed, 61 km under implementation, 30 km under preparation | 26 | 45 | 63 | 25 | 35 | 60 | 0.2 for the O&M of the pre-treatment WWTP | operational |

Table: A.1: Coastal Wastewater Treatment Plants

| Treatment Plant | Equivalent Population | Status | | | Cost of executed, on going or under preparation - funds available (million USD) | | | Remaining Works - no funds available (million USD) | | | Cost of O&M (million \$/year) | Expected Operation Date |
|-----------------|-----------------------|--------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------|------------|----------------------------------------------------|------------|-------------|--------------------------------------------|-------------------------|
| | | Treatment Plant | Outfall | Collection Networks | WWTP + sea outfall | Networks | Total | Treatment Plant | Networks | Total | | |
| Ras-Nabi Younes | 88,000 | Completed not operational | 0.45 km, 500 mm diam. completed | 22 km (primary + secondary networks) executed - 120 km under implementation - 40 km under preparation | 11 | 22 | 33 | 0 | 22 | 22 | 1.1 | 2012 |
| Saida | 880,000 | Completed & operational (only pre-treatment) | 2.1 km, 900 mm diam. completed | 180 km existing (primary + secondary networks) 400 km under preparation | 11 | 22 | 33 | 42 | 105 | 147 | 0.18 for the O&M of the pre-treatment WWTP | operat |
| Karafind | 325,000 | No funds available | | around 290 km under preparation | 0 | 0 | 0 | 45 | 185 | 230 | | |
| Jyr | 200,000 | Under construction | 1.5 km, 1100 mm diam. - under construction | 31 km under implementation (primary + secondary networks), 460 km under preparation | 44 | 6.5 | 50.5 | 0 | 50 | 50 | 1.35 | 2012 |
| Total | 5,597,000 | | | | 386.5 | 261.5 | 648 | 325 | 790 | 1115 | | |
| | | Under Study | | | | | | | | | | |
| | | Major problems delaying implementation | | | | | | | | | | |
| | | Operational treatment plants, only pre-treatment | | | | | | | | | | |
| | | Funding Required | | | | | | | | | | |
| | | Completed but not operational | | | | | | | | | | |
| | | Under Construction | | | | | | | | | | |

Table A

| |
|-----------|
| Coastal |
| North |
| Bekho |
| Qharr |
| Mechri |
| 4 treat |
| Qharr |
| Barrak |
| Nabba |
| Hraif |
| Karabaa |
| Leira an |
| 0 treat |
| South E |
| Kursi |
| Habe Se |
| Tibone |
| Aarkob |
| 0 treat |
| Treatm |
| Yegaa |
| Baalbe |
| Yammou |
| Zahie |
| West es |
| Saghba |
| Athyan |
| Lahoua |
| Tunne |
| 7 treat |
| 2.1 plant |

Table A.2: Funded Inland Treatment Plants Requiring Additional Funds

| Treatment plant | Population Equivalent | Status | | | Available Funds (Million USD) | Actual Cost (Million USD) | | | Additional Funds Required (Million USD) |
|--------------------------------|-----------------------|-------------|--------------------|--------------|-------------------------------|---------------------------|------------------------------|-------|-----------------------------------------|
| | | Operational | Under construction | Under design | | Treatment Plant | Networks + house connections | Total | |
| North Lebanon | | | | | | | | | |
| Bakhoun | 48,000 | | | X | 19.80 | 8.25 | 14.05 | 22.30 | 2.50 |
| Bcharré & Al Arz (2 TPs) | 25,000 | | | X | 6.90 | 4.83 | 3.75 | 8.58 | 1.68 |
| Mechmech | 68,000 | | | X | 10.30 | 6.80 | 24.70 | 31.50 | 21.20 |
| 4 treatment plants in North | 141,000 | 0 | 0 | 4 | 37.00 | 19.88 | 42.50 | 62.38 | 25.38 |
| Mount Lebanon | | | | | | | | | |
| Barouk & Fraitis | 8,000 | | | X | | 1.60 | 2.90 | 4.50 | |
| Nabha Safa & Ain Zhalta | 20,000 | | | X | 6.1 | 4.00 | 7.26 | 11.26 | 9.66 |
| Hrajel | 40,000 | | | X | 9.30 | 6.00 | 14.52 | 20.52 | 11.22 |
| Karlabé | 13,000 | | | X | 5.00 | 3.00 | 4.00 | 7.00 | 2.00 |
| Zéttá and Kherzohiane (2 TPs) | 35,000 | | | X | 19.00 | 6.30 | 12.70 | 19.00 | 0.00 |
| 5 treatment plants in Mt. Leb. | 116,000 | 0 | 0 | 6 | 39.40 | 20.90 | 41.38 | 62.28 | 22.88 |
| South Lebanon | | | | | | | | | |
| Farsá, Yalimour & Zawtar | 35,000 | | X | | 9.50 | 4.80 | 9.70 | 14.50 | 5.00 |
| Wabdeh | 100,000 | | X | | 13.80 | 8.90 | 9.90 | 18.80 | 5.00 |
| Tibnine & Chakra | 100,000 | | X | | 14.00 | 8.40 | 41.60 | 50.00 | 36.00 |
| Aarsoub | 25,000 | | | X | 5.20 | 3.75 | 9.10 | 12.85 | 7.65 |
| 6 treatment plants in South | 260,000 | 0 | 5 | 1 | 42.50 | 25.85 | 70.30 | 96.15 | 53.65 |

| Treatment plant | Population Equivalent | Status | | | Available Funds (Million USD) | Actual Cost (Million USD) | | | Additional Funds Required (Million USD) |
|----------------------------------|-----------------------|-------------|--------------------|--------------|-------------------------------|---------------------------|------------------------------|--------|-----------------------------------------|
| | | Operational | Under construction | Under design | | Treatment Plant | Networks + house connections | Total | |
| Beqaa | | | | | | | | | |
| Barbeck | 100,000 | X | | | 17.00 | 6.30 | 19.70 | 26.00 | 9.00 |
| Yimhounch | 6,000 | X | | | 2.60 | 1.05 | 2.55 | 3.60 | 1.00 |
| Zahle | 150,000 | | X | | 35.40 | 32.00 | 20.50 | 52.50 | 17.10 |
| Wes Beqaa (Jib Jenine + Sagbine) | 100,000 | | X | | 37.00 | 12.00 | 35.00 | 47.00 | 10.00 |
| Sinjar | 300,000 | | | X | 36.25 | 30.00 | 66.00 | 96.00 | 59.75 |
| Laboue | 47,000 | | | X | 4.56 | 7.00 | 17.00 | 24.00 | 19.44 |
| Tinnine El Tahla | 100,000 | | | X | 8.90 | 10.00 | 36.00 | 46.00 | 37.10 |
| 7 treatment plants in Beqaa | 803,000 | 2 | 2 | 3 | 141.71 | 98.35 | 196.75 | 295.1 | 153.39 |
| 27 plants in total | 1,320,000 | 2 | 7 | 14 | 260.61 | 164.08 | 350.93 | 515.91 | 255.30 |

Table A.3: Inland Treatment Plants Requiring Complete Funding

| Treatment Plant | Population Equivalent | Funds available (million USD) | Actual Cost of Works (million USD) | | Cost to finalize all works (MUSD) |
|---------------------------------------|-----------------------|-------------------------------|------------------------------------|------------------------------|-----------------------------------|
| | | | Treatment Plant | Networks + house connections | |
| North Lebanon | | | | | |
| Al Bira and Manjaz | 52,500 | 0.00 | 5.50 | 20.00 | 25.50 |
| Beit Mellat and Akkar El Aatika | 75,000 | 0.00 | 7.50 | 27.23 | 34.73 |
| Hasroun | 4,800 | 0.00 | 0.96 | 1.74 | 2.70 |
| Kferhelda | 30,000 | 0.00 | 4.50 | 5.50 | 10.00 |
| Tannourine | 10,200 | 0.00 | 2.00 | 3.70 | 5.70 |
| Qobayet | 38,000 | 0.00 | 5.70 | 13.80 | 19.50 |
| 6 treatment plants in North | 210,500 | 0.00 | 26.16 | 71.97 | 98.13 |
| Mount Lebanon | | | | | |
| Aakoura | 16,250 | 0.00 | 3.25 | 5.90 | 9.15 |
| Deir El Kamar | 42,000 | 0.00 | 6.30 | 15.25 | 21.55 |
| Jisr El Kadi | 40,000 | 0.00 | 6.00 | 15.00 | 21.00 |
| Khinshara | 20,000 | 0.00 | 3.00 | 7.26 | 10.26 |
| Sawfar | 35,000 | 0.00 | 5.25 | 12.70 | 17.95 |
| 5 treatment plants in Mt. Leb. | 153,250 | 0.00 | 23.80 | 56.11 | 79.91 |
| South Lebanon | | | | | |
| Bent Jbeyl | 25,000 | 0.00 | 3.75 | 9.10 | 12.85 |
| Jbaa | 10,500 | 0.00 | 2.10 | 3.80 | 5.90 |
| Jezzine | 30,000 | 0.00 | 4.50 | 11.00 | 15.50 |
| Hassbaya | 26,500 | 0.00 | 4.00 | 9.62 | 13.62 |
| Nabaa El Tasseh - Nabatieh | 54,000 | 0.00 | 8.10 | 19.60 | 27.70 |
| Marjeyoun | 30,000 | 0.00 | 7.00 | 10.90 | 17.90 |
| 6 treatment plants in South | 176,000 | 0.00 | 29.45 | 64.02 | 93.47 |
| Beqaa | | | | | |
| Hermel | 96,000 | 0.00 | 9.60 | 21.00 | 30.60 |
| Rachaya | 22,000 | 0.00 | 8.00 | 12.40 | 20.40 |
| 2 treatment plants in Beqaa | 118,000 | 0.00 | 17.60 | 33.40 | 51.00 |
| 19 Treatment Plants | 657,750 | 0 | 97.01 | 225.50 | 322.51 |

Table A.4: Inland Treatment Plants Funded by USAID

| No. | Treatment Plant | Region | Population Served | Capacity (cum/day) | Completion Date | USAID Investment (USD) |
|----------------------|----------------------------|----------------|-------------------|--------------------|-----------------|------------------------|
| South Lebanon | | | | | | |
| 1 | Haytoura | Jezzine | 1000 | 100 | 2006 | 64,500 |
| 2 | Snayya | Jezzine | 600 | 60 | 2004 | 62,000 |
| 3 | Aychieh | Jezzine | 1500 | 150 | 2005 | 119,000 |
| 4 | Ghobbatieh | Jezzine | 2800 | 250 | 2006 | 183,000 |
| 5 | Wadi Jezzine | Jezzine | 1500 | 150 | 2005 | 78,000 |
| 6 | Barteh | Jezzine | 1300 | 195 | 2002 | 88,000 |
| 7 | El Rihane | Jezzine | 4500 | 820 | 2002 | NA |
| 8 | Jibaa 1&2 | Nabatieh | 1000 | 150 | 2002 | 95,000 |
| 9 | Kfarkila | Hasbaya | 3500 | 525 | 2002 | 93,000 |
| 10 | Chebaa | Hasbaya | 6000 | 900 | 2002 | 100,000 |
| 11 | Hasbaya/Ain Qenya | Hasbaya | 14000 | 2100 | 2002 | 108,000 |
| 12 | Ain Qenya 2 & 3 | Hasbaya | 7500 | 1125 | 2002 | NA |
| 13 | Ain Qenya 4 | Hasbaya | olive press | 8 | 2002 | NA |
| 14 | Khiam | Hasbaya | 6000 | 600 | 2002 | 90,000 |
| 15 | Ouazzani | Hasbaya | 175 | 26 | 2001 | 45,000 |
| 16 | Ain Jarfa 1 | Hasbaya | 2500 | 375 | 2002 | 49,000 |
| 17 | Ain Jarfa 2 | Hasbaya | Olive press | 8 | NA | NA |
| 18 | Abou Qamha | Hasbaya | 600 | 90 | 2002 | 14,000 |
| 19 | Kfeir | Hasbaya | 3000 | 450 | 2002 | 180,000 |
| 20 | Klaya 1 | Marjeyoun | 4000 | 600 | 2002 | 208,000 |
| 21 | Klayaa 2 | Marjeyoun | 1300 | 200 | 2002 | NA |
| 22 | Deir Mimes | Marjeyoun | 1300 | 200 | 2002 | NA |
| 23 | Marj el Zouhour | Hasbaya | 1200 | 120 | 2000 | 133,000 |
| 23 | Total South Lebanon | | 65,275 | 9,202 | | 1,709,500 |
| North Lebanon | | | | | | |
| 1 | Bqerzla | Akkar | 1,800 | NA | 1998 | 177,000 |
| 2 | Hmaira | Akkar | 600 | 40 | 2002 | 65,000 |
| 3 | Charbija | Akkar | 1,152 | NA | 1999 | 80,000 |
| 4 | Kaws Akkar | Akkar Atika | 1,000 | 100 | 2000 | 120,000 |
| 5 | Maakouda | Akkar Atika | 1,000 | 100 | 2002 | 65,000 |
| 6 | El Mrahet | Akkar Atika | 550 | 60 | 2000 | 80,000 |
| 7 | Andeq | Qoubayat | 9,000 | 1350 | 2001 | 299,000 |
| 8 | Markibta | Dennieh | 1,300 | 195 | 1999 | 89,000 |
| 8 | Total North Lebanon | | 16,402 | | | 975,000 |

| No. | Treatment Plant | Region | Population Served | Capacity (cum/day) | Completion Date | USAID Investment (USD) |
|----------------------|-----------------------------------------------------------------------|-----------------------------------------------------------|-------------------|--------------------|-----------------|------------------------|
| Beqaa | | | | | | |
| 1 | Bakka 1 | Bekaa | 1,000 | 160 | 1998 | 87,000 |
| 2 | Bakka 2 | Bekaa | 6,000 | 160 | 2002 | 55,000 |
| 3 | Rachaya | Bekaa | 6,000 | 600 | 2005 | 240,000 |
| 4 | El Housh | Bekaa | 1,000 | 100 | 2005 | 126,000 |
| 5 | Aitanit | Bekaa (Aitanit, Baaloula, Machghara & Qaroun) | 35,700 | 5000 | 2009 | 6,000,000 |
| 6 | Forzol | Bekaa | 7,500 | 1000 | 2009 | 4,000,000 |
| 7 | Ablah | Bekaa | 15,000 | 2000 | 2012 | 4,000,000 |
| 8 | Jabbouleh | Bekaa | 1,000 | 80 | 2001 | 39,900 |
| 9 | Deir El Ahmar | Bekaa | 3,000 | 300 | 2002 | 93,000 |
| 10 | Chouaia | Rachaya | 700 | 50 | 2007 | 117,000 |
| 11 | Al Fardis | Rachaya | 1,200 | 120 | 2007 | 414,500 |
| 12 | Hebbaria | Rachaya | 9,200 | 920 | 2007 | 350,000 |
| 13 | Kfar Hamam | Rachaya | 1,700 | 115 | 2007 | 128,000 |
| 14 | El Mari | Rachaya | 1,300 | 220 | 2007 | 131,000 |
| 15 | Kawkaba | Rachaya | 2,000 | 135 | 2007 | 225,000 |
| 16 | Yanta 1 & 2 | Rachaya | 3,000 | 300 | 2002 | 160,000 |
| 17 | Mimes 1 & 2 | Rachaya | 3,000 | 120 | 2002 | 160,000 |
| 18 | Ain Harcha | Rachaya | 1,200 | 120 | 2002 | 145,000 |
| 18 | Total Beqaa | | 99,500 | 11,500 | | 16,471,400 |
| Mount Lebanon | | | | | | |
| 1 | Ammatour | Chouf | 6000 | 900 | 2007 | 876,000 |
| 2 | Maasser El Chouf, Ammatour, Ain Qani, Baadaran, Haret Jandal | Chouf | 3000 | 450 | 2007 | 518,000 |
| 3 | Bater | Chouf | 6000 | 900 | 2007 | 1,228,000 |
| 4 | Moukhtara | Chouf | 3000 | 450 | 2007 | 530,000 |
| 5 | Mrosti | Chouf | 1500 | 225 | 2007 | 267,000 |
| 6 | Khraibeh | Chouf | 3000 | 450 | 2007 | 880,000 |
| 7 | Jbaa | Chouf | 2000 | 300 | 2007 | 241,000 |
| 8 | Hammana | Baabda | 7000 | 1050 | 2000 | 166,000 |
| 9 | Kornayel | Baabda | 6000 | 900 | 2002 | 183,000 |
| 9 | Total Mount Lebanon | | 37,500 | 5,625 | | 4,889,000 |
| 58 | Grand Total | | 218,677 | | | 24,044,900 |

