

# Waste Water



## Overview of the sector

Until early nineties, wastewater facilities were limited to disparate networks between one region and another. Although main cities are equipped with incomplete wastewater networks, they are still lacking treatment plants. As to small demographic communities, they aren't equipped nor with networks neither with plants. As a result, the issue of water pollution was exacerbating day after day (random sea estuaries polluting the sea and beaches, random sanitation facilities, ground effluents, and streams polluting underground water layers...) therefore threatening the sanitary environment of citizens.

The insufficiency of wastewater services in regions is due to many reasons, most importantly:

- 1) The insufficient spending in the sector, in other terms the lack of investments required to improve, construct and develop facilities up to an appropriate service and environmental level.
- 2) The absence of a convenient administrative and executive structure in the sector to accompany the increasing urgent need for wastewater services, implement new methods followed by the administration and in the field of modern sewage disposal techniques.

In order to face such difficult reality, the CDR has been working since 1992 on different axes:

- 1) Execution of the emergency

rehabilitation works of existing wastewater networks and pumping stations, and resolution of all the recent issues.

- 2) Completion of projects stopped involuntarily and network extension and rehabilitation according to the needs.
- 3) Launching two programs for protecting the Lebanese coasts and water resources from pollution.

In other terms, the objective of this strategy is to address the problem of pollution and wastewater disposal in a radical manner throughout the country, as the Lebanese government worked and is still working on completing and organizing the public service in the wastewater sector.

However, completing the work on the third axe remains the main goal of CDR for the upcoming stage after works have progressed along the two other axes.

At the institutional level, the promulgation of law 221/2000 constituted a primordial step toward the restructuring and modernization of the sectors of water and wastewater, since public water properties were defined (ground and underground), and an integrated water management (potable, irrigation, and wastewater) was entrusted to four public independent investment institutions (except for the Litani River which remained under the

administration of the Litani National Authority to invest its water in irrigation in South of Lebanon, and West Bekaa). Moreover, all water departments have been included in these institutions and subject to the custody of the ministry of Energy and Water.

In 2001, boards of administration for water institutions were formed. In 2005, organizational decrees and new structures thereof were elaborated and enforced in order to achieve many goals, mainly rehabilitating and improving facility services, extending their coverage zone, and maintain the administrative stability and financial balance of institutions.

## Achievements during 1992-2011

The value of projects implemented to date in the wastewater sector reached US\$ 540\* million; the main projects are the following:

- Emergency rehabilitation of wastewater networks (NERP1-first year): This project covered the emergency repair and rehabilitation of wastewater networks in all regions of Lebanon, in addition to the rehabilitation of two wastewater pumping stations in Al Mina-Tripoli and Jounieh, and the construction of about 1000 kilometers of sewage networks.
- Completion of Al Ghadir wastewater pre-treatment plant: The construction and equipping of

the wastewater pre-treatment plant were completed and the relevant sea outfall rehabilitated at a cost of US\$ 10 million. Such plant will serve the southern part of districts of Baabda and Aley, the west-southern part of Greater Beirut and the northern parts of the Shouf district. The plant was put into service in November 1997.

- **Beirut master wastewater coastal collector project:** This project aims to protect the coast extending from Metn to the Shouf district. The project aims to eliminate all existing sea outfalls along the mentioned coastal area by collecting and conveying wastewater to the Dora and Ghadir pre-treatment plants. The conveyor line comprises two sections: the northern section and the southern section.

The northern section, covering about 17 kms of collection pipe, includes Dbayeh-Dora - Ras Beirut-Dora coastal areas, in addition to 5 pumping and lifting stations. All works were completed in year 2000 (costing about US\$ 48 million). This section has been designed to serve 1.5 million inhabitants of Dora area by year 2015.

The southern section covering Carlton-Al Ghadir collector line, which is under completion costing about US\$ 13 million, designed to serve the south western part of Beirut and part of its southern suburb, as well as part of Baabda district and the Damour-Al Ghadir line, executed and amounting to about US\$ 9.5 million, through funding by the Islamic Bank, which is designed to serve a major part of Aley district and part of Shouf district (more than 100,000 inhabitants), the length of the



Wastewater installations in the coastal city of Tripoli

collection pipes is of 30 km and the line has 3 pumping stations.

(\* the amount includes a number of contracts still not moneywise closed)

- Execution of the first phase of rehabilitation of Beirut infrastructure, including the wastewater network (sections 1 and 2) at a cost of about US\$ 25 million. The project in all its phases aims mainly to construct a new storm water network independent of the wastewater network.

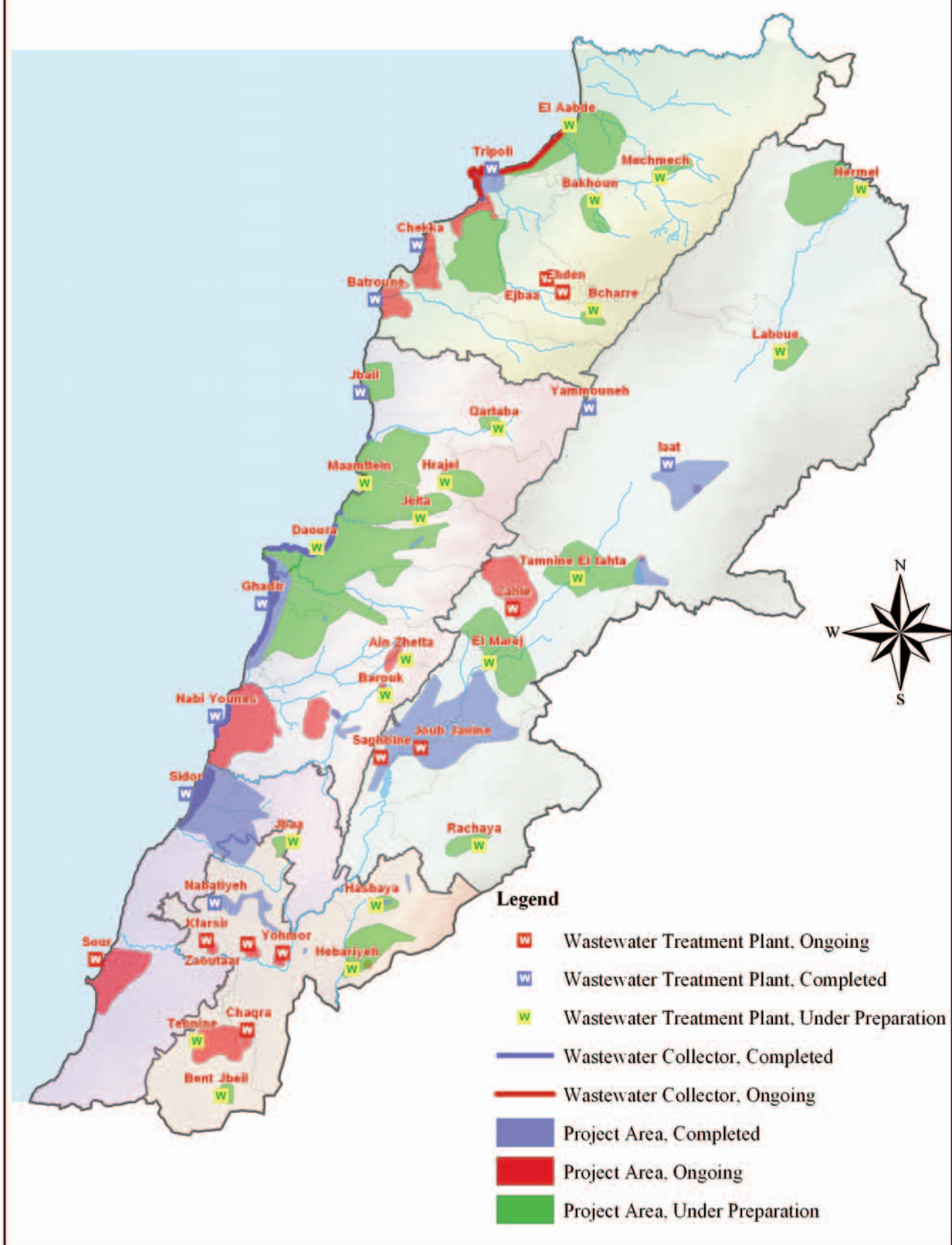
- Completion of the pre-treatment plant in Saida at a cost of about US\$ 21 million funded by Japan Bank for International Cooperation (JIBC) and execution of the first phase of the rehabilitation of wastewater networks in Saida and its suburbs by rehabilitating the existing network and constructing a new

network for wastewater transmission to the new treatment plant.

- Completion of works in the construction of Tripoli for wastewater treatment, at a cost of 92 million euros, in addition to the relevant sea outfall at a cost of 6 million euros, funded by the European Investment Bank (EIB). The project covers Tripoli coastal area, Al Qalamun, some parts of Koura and Zgharta districts, in addition to the coastal areas of Beddawi, Deir Amar and El Minyeh.

- Completion of the works mentioned within the Lebanese-French Protocol Agreement for waste water treatment plants at a cost of about 56 million euros, the works include the construction of waste water treatment plants and sea outfalls (for the coastal plants) in the following regions: Shouf

# Wastewater Completed, Ongoing & Under Preparation Projects



coastal area (Ras en Nabi Younes), Nabatiyeh area (Sharqiyeh), Chekka area, Batroun (ongoing implementation of the sea outfall) and Jbeil. The first plant is designed to serve a big number of villages and cities of the coastal area of Iqlim el Kharoub; the 2nd serves the town of Nabatiyeh and neighboring villages, the third and fourth plants serve the coastal towns and villages of Batroun district, whereas the fifth serves the coastal area in Jbeil district.

- Completion of a waste water treatment plant in Baalback (Iaat) at a cost of about US\$ 6.35 million funded by the IBRD to serve the city of Baalback and several neighboring villages.
- Maintenance and upgrading of wastewater and storm water networks in the main cities: Starting in 1997 pursuant to the decision of the cabinet, works covered periodical maintenance, repair of wastewater and storm water piping utilities in the main cities, in addition to limiting the overflows and preventing problems emanating from breakdowns in the existing drainage networks. The works included cleaning wastewater and storm water piping networks, in addition to installing piping and other necessary works required for improving the efficiency of these networks. The project covered Greater Beirut with its southern and northern suburbs, Tripoli, Zahle, Jounieh, Saida, Sour, Nabatieh and their suburbs. This project was implemented in coordination with the Ministry of Interior and Municipalities.

### **Progress of ongoing projects:**

**1. Protection of the coast against pollution:** Lebanon signed several conventions to protect the Mediterranean waters against pollution, the most important being the Barcelona Convention. The agreements stressed on the necessity of treating wastewater before discharged to the sea in cities and towns with populations exceeding 100 000. Accordingly several projects have been prepared for the construction of wastewater collector networks and treatment plants in the coastal areas of Lebanon. Until now, execution of treatment plants have been carried out with their related collector networks as previously described and currently works are being carried out in:

- Beirut coastal area- southern section of the main wastewater collector, Carlton-Al Ghadir section: This project covers the construction of two wastewater pumping stations and the installation of 9 kilometers of wastewater sewer lines serving a population of 750,000, the execution amounts to US\$ 13 million. The Islamic Development Bank (IDB) financed the Carlton-Al Ghadir collector. Installation of the collector lines is complete and works on connecting electricity to the pumping and lifting stations are progressing in order to put it into service.

- The second phase of the wastewater collector networks in the coastal district of Saida at a cost of about US\$ 22 million, funded by the Japanese Bank for International Cooperation (JBIC). These works are prior to linking these networks with the lines of the achieved wastewater plant, the

work is 95% completed.

- The construction of wastewater networks for an amount of US\$ 6.5 million and a wastewater treatment plant for the coastal area of Sour for an amount of 31 million euros, funded by the European Investment Bank. The plant will serve around 300,000 persons and 40% of the work is achieved until this date

- Phase II of infrastructure project including the sewer network of Beirut city financed by IDB and amounting to about US\$ 38.5 million, and execution of the first lot of phase III, in Ashrafieh and Rmeil at a cost of about US\$ 10 million, financed by the Arab Fund for Economic and Social Development (AFESD); 95% of works are achieved until today.

- The northern coast of main wastewater line collector of Tripoli coastal project (Bared-Beddaoui section) including the main collector line and lifting stations and main, secondary and related networks, thus serving more than 100000 people and that through the grant given by the German government and amounting to 12 million euros; the grantor, in coordination with the CDR is managing and executing the project.

### **2. Protection of water sources against pollution:**

A study was prepared in 1994 to update the instructional plan of the wastewater sector elaborated in 1982. This study defined water basins and priority areas for construction of new wastewater treatment plants to protect water resources against pollution. For such purpose, appropriate financing was secured to construct

collector lines and treatment plants in main inland cities (Zahleh, Baalbeck, Nabatieh, and others); and also in villages/towns close to water sources and springs (Labweh, Qaraoun Lake, Anjar, Hermel, Mechmech, Becharre, Bakhoun, Chabaa, Jbaa, Hasbaya, Chakra, Hrajel and Kartaba).

The Construction of the Baalback wastewater treatment plant, financed by the World Bank, was completed in the summer of the year 2000; whereas Zahle wastewater treatment plant is still being executed and amounts to US\$ 24 million funded through the Italian Protocol (50% executed). Similarly, the works on the wastewater collection and treatment project in Jeb Jannine, Soghbine and neighboring villages are being carried out, amounts to about US\$ 38 million, financed by IDB (95% executed), along with the launching of wastewater collection and treatment project in Labweh, Baalbeck district amounting to about US\$ 4.5 million, funded through the Iranian protocol.

### **Main contracts awarded during 2011**

- Construction project of wastewater networks and pumping stations for Koura, amounting to about US\$ 8 million funded by the French Agency for Development.
- Construction project of wastewater networks and pumping stations for villages in Barouk region, Freides, Ain Zhalta, Nabaa el Safa, El Aazounbe and Ain Dara, amounting to about US\$ 5.5 million funded by the Arab Fund

for Economic and Social Development.

- Construction project of wastewater networks and pumping stations for Kfar Katra region in the Chouf, amounting to about US\$ 1 million locally funded.

### **Main Projects under Preparation (2012-2014)**

**1- Protection of the coastline against pollution:** The Ministry of Energy and Water prepared a comprehensive study for the district of Akkar recommending the elaboration of a general instructional plan for wastewater collection and treatment, including the construction of networks and plants for such purpose along the Abdeh coast. In implementation of such project, CDR obtained a loan from the Arab Fund to execute this project. CDR obtained the necessary funding amounting to 70 million euros to build two wastewater treatment stations on the Keserouan coast from the European Investment Bank and the CDR is going to update tender files of this project.

Also CDR is currently preparing the tender documents of potable water and wastewater networks in the coastal region of Jbeil through Italian funding amounting to 38 million euros, among which 19 million euros for wastewater.

Furthermore, CDR is preparing the project of wastewater in Qarantina and Dora (northern Beirut) and the related networks after funding has been ensured through the European Investment bank amounting to 60 million euros.

- The feasibility study for the extension of Al Ghadir wastewater pre-treatment plant (south Beirut) is being updated. CDR is contacting several funding sources in order to secure funding for the works (European Investment Bank and others)

- The CDR has also secured the funding for the Greater Beirut wastewater treatment project Ghadir Basiin from the German development agency (KfW) amounting to 16 million euro and the required tender documents. This project involves the construction of wastewater collection and transmission networks from Al Ghadir basin region (south east Greater Beirut) to the wastewater treatment plant in Ghadir.

- On the other hand, CDR recently secured financing from AFESD amounting to about US\$ 85 million to finance wastewater systems in a number of Lebanese regions, including Akkar coastal area, where the cost of the project and wastewater collection and treatment is estimated around US\$ 25 million, and currently studies are being updated and it is expected that all tenders will be launched in upcoming months.

**2- Protection of water sources against pollution:** The Ministry of Energy and Water along with CDR have identified approximately 20 wastewater projects near to water sources (springs, rivers, lakes, etc.) in inland Lebanese areas. Detailed studies are complete for many of these projects that mostly fall within the framework of existing financing agreements (Italian

Protocol, IDB and AFESD). Special importance is given to the western Bekaa area, Qaraoun Lake and the Litani River, where the high level of water pollution requires urgent intervention to install wastewater collection and treatment facilities.

The CDR secured funding for the study and implementation of the wastewater project in the upper basin of the Litani River amounting to about US\$ 10 million through a loan agreement with the Arab Fund for Economic and Social Development (AFESD) where the CDR is going to concede required detailed studies; in addition to projects including

Shebaa and neighboring areas (US\$ 6 million), Becharre region where wastewater networks amounts are evaluated to up to US\$ 8 million and As Safa and Barouk areas (US\$ 13 million) and launching of related tenders. It is also expected that the CDR receive an additional grant amounting to US\$ 27 million from the Islamic Bank for Development to complete the wastewater project in West Bekaa.

CDR also received a grant of 6 million euro and signed a grant agreement of 7 million euros with KfW to implement the project of protection of Jeita spring against pollution, and currently execution

of the required studies is carried out. The project is divided into two phases aiming at collecting and treating wastewater emitted from cities and villages falling within the water basin of Daraya, Kleiat, Bekaata, Bkaatouta, Kfardebian and neighboring cities in Keserwan district.

Furthermore, it is expected that CDR receives a grant of approximately US\$ 46 million from the Kuwaiti Fund for Arab Economic Development to execute the collection and treatment of wastewater in numerous neighboring villages in Marjeyoun and Bint Jbeil, in Nabatiyeh Mohafazat.

#### Schedule of main contracts signed in the wastewater sector during 2011

| Project   | Estimated value US\$ | Source of Funding             | Starting | Expected completion |
|---|----------------------|-------------------------------|----------|---------------------|
| Construction project of wastewater networks and pumping stations for Koura region – First phase   | 7,723,224            | French Agency for Development | 1/5/2011 | 30/4/2013           |
| Construction project of wastewater networks and pumping stations for Kfar Katra in Chouf  | 998,499              | locally                       | 1/5/2011 | 30/4/2013           |
| Construction project of wastewater networks and pumping stations in Barouk region, Freides, Ain Zhalta, Nabaa el Safa, El Aazounbe and Ain Dara | 5,562,542            | AFSED                         | 1/8/2011 | 5/3/2013            |

**Schedule of main projects under preparation in the wastewater sector (2012-2014)**

| <b>Project</b>  | <b>Estimated value million US\$</b> | <b>Source of Funding</b>      | <b>Date expected to initiate work</b> | <b>Expected completion</b> |
|---|-------------------------------------|-------------------------------|---------------------------------------|----------------------------|
| <i>Program of Protection of the Lebanese Coast against pollution</i>  |                                     |                               |                                       |                            |
| Construction of Akkar coast collector networks and pre-treatment plants   | 26                                  | AFESD                         | December 2012                         | November 2015              |
| Construction of main wastewater line between Koura and Tripoli (Ras Maska)  | 12                                  | French Agency for Development | December 2012                         | November 2014              |
| Construction of wastewater for Jbeil coast  | 18                                  | Italian Protocol              | July 2012                             | October 2015               |
| Construction of collector networks and 2 pre-treatment plants in the coastal area of Keserwan                                     | 100                                 | EIB                           | July 2013                             | July 2016                  |
| Wastewater networks for Koura – Phases 1 and 2  | 21.5                                | Locally                       | February 2014                         | February 2017              |
| Execution of additional works in Anfeh and creation of secondary wastewater networks linked to the purification station in Chekka | 10                                  | Locally                       | August 2012                           | August 2013                |
| Wastewater networks for Koura – Phases 3  | 5                                   | French Agency for Development | May 2011                              | October 2013               |
| Wastewater network for Jbeil coastal region   | 25                                  | Italian Protocol              | December 2012                         | November 2015              |
| Collector networks and purification stations in Keserwan coastal area   | 100                                 | EIB                           | May 2013                              | July 2016                  |
| Construction of collector networks and 2 pre-treatment plants in Dora and Qarantina   | 85                                  | EIB                           | May 2013                              | November 2015              |
| Completion of execution of wastewater networks in Greater Beirut – Al Ghadir Bassin   | 22                                  | German Agency                 | July 2012                             | May 2015                   |
| Sea outfalls for treatment plant in coastal Sour district   | 12.5                                | EIB                           | March 2013                            | March 2014                 |
| <i>Program of Protection of water sources against pollution</i>   |                                     |                               |                                       |                            |
| Execution of collector networks and purification stations in Mechmech in Akkar  | 11                                  | Italian Protocol              | December 2013                         | December 2014              |

|   |       |                   |                |               |
|---|-------|-------------------|----------------|---------------|
| Construction of collector networks and treatment plant in Bakhun-Denniyeh                                 | 19    | Italian Protocol  | December 2015  | December 2017 |
| Construction of collector networks and treatment plant in Bcharre   | 8     | AFESD             | March 2013     | March 2015    |
| Construction of collector networks and treatment plant in Qartaba-Jbeil                                   | 6     | Italian Protocol  | December 2012  | November 2015 |
| Construction of collector networks and treatment plant in Hrajel-Keserwan                                 | 12    | Italian Protocol  | July 2012      | November 2014 |
| Construction of collector networks and treatment plant in Jeita-Keserwan (Sections 1 and 2)               | 17    | German Agency KFW | December 2012  | June 2016     |
| Construction of treatment plant and wastewater networks in Bint Jbeil and neighboring areas               | 11    | Italian Protocol  | December 2015  | December 2017 |
| Construction of treatment plant and wastewater networks in Hasbaya and neighboring areas                  | 8     | Italian Protocol  | December 2015  | December 2017 |
| Construction of treatment plant and wastewater networks in Arqub  | 6.50  | AFESD             | September 2014 | July 2015     |
| Construction of treatment plant and wastewater networks in Jbaa and neighboring areas in Nbatiyeh         | 7     | Italian Protocol  | December 2015  | December 2017 |
| Construction of treatment plant and collector networks in Hermel and neighboring areas                    | 20    | Italian Protocol  | December 2015  | December 2017 |
| Construction of treatment plant and wastewater networks in Labweh and neighboring areas                   | 4.50  | Iranian Protocol  | December 2012  | August 2014   |
| Construction of treatment plant and wastewater networks in central and northern Bekaa in the Litani basin | 10.50 | AFESD             | October 2013   | December 2015 |



|   |    |                              |               |               |
|---|----|------------------------------|---------------|---------------|
| Construction of treatment plant and wastewater networks in Anjar, Majdal Anjar, Bar Elias, Mraijet, Marj, Chtoura and neighboring areas | 41 | Italian Protocol             | December 2015 | December 2018 |
| Completion of wastewater project in West Bekaa region   | 27 | Islamic Bank for Development | December 2012 | December 2014 |
| Construction of treatment plant and wastewater networks in Rachayya and neighboring areas   | 30 | Kuwait Fund                  | May 2015      | December 2018 |