

## WASTE WATER

### Overview of the sector

Until early nineties, wastewater facilities were composed of limited networks disproportionately distributed among the Lebanese regions. While main cities are equipped with incomplete wastewater networks and lack treatment plants, small communities lack both waste water networks and treatment plants. As a result, the issue of water pollution was exacerbating day after day (random sea estuaries polluting the sea and the beaches, random sanitation facilities, ground effluents, and streams polluting underground water layers...) therefore threatening the sanitary environment in Lebanon.

The insufficiency of wastewater services in the 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 management and executive structure that could respond to the increasing urgent need for wastewater services and adopt new management methods and modern wastewater disposal techniques.

To put up with such a difficult reality, the CDR embarked since 1992 on the following waste water development strategy:

- 1) Execution of urgent repairs and renovations of the existing wastewater networks and pumping stations, and tackling the new challenges faced.
- 2) Continuing the comple-

tion of unfinished projects that were interrupted involuntarily, and expanding and rehabilitating networks according to needs.

3) Launching two programs aimed at protecting the Lebanese coasts and water resources from pollution.

The purpose of this strategy was to find a comprehensive solution that would solve the problem of pollution and wastewater disposal across all Lebanese regions. Meanwhile the Lebanese government has worked toward the integration and organization of the public wastewater services.

At the institutional level, the promulgation of law 221/2000 constituted a primordial step towards the restructuring and modernization of the sectors of water and wastewater; public water properties were delimited (ground and underground) and water management (potable, irrigation, and wastewater) was completely vested in four public independent investment institutions (except irrigation in South Lebanon and West Bekaa which remained under the management and exploitation of the Litani River National Authority). Moreover, all water utilities became affiliated with these institutions, under the tutelage 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 the level of services rendered by water utilities and extending their coverage, and maintaining the administrative stability and financial balance of institutions.

### Achievements between 1992 and 2014

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

- Emergency rehabilitation of wastewater networks (within the framework of National Emergency Reconstruction Program NERP1-first year): This project consisted of the emergency repair and rehabilitation of wastewater networks in all Lebanese regions, 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: The purpose of this project is to protect the coast extending from the Metn district to the Shouf district and eliminate all sea outfalls located along this 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 includes the 17 km coastline extending from Dbayeh to Dora and from Ras Beirut to Dora covering, in



addition to five pumping and lifting stations. All works were wrapped up in 2000 (with a cost of US\$ 48 million). This section was designed to serve 1.5 million residents in the area of Beirut River basin by 2015.

The southern section includes Carlton-Al Ghadir collector line, which is underway at an estimated cost of US\$ 14 million, designed to serve the south west part of Beirut and part of its southern suburb, and 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). It includes 30 km long collection pipes and three pumping stations.

- 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 aims mainly at constructing a new rainwater drainage network separated from the wastewater network.
- Execution of the second phase of rehabilitation of Beirut infrastructure, including the wastewater network of Beirut city, through funding granted by the Islamic Bank for Development, estimated at US\$ 38.5 million; and the execution of first component of phase III in Ashrafieh and Rmeil, estimated at US\$ 10 million, funded by the Arab Fund for Economic and Social Development.
- Completion of the pre-treatment plant in Saida and its sea affluent estimated at US\$ 21 million funded by the 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, as well as phase 2 of wastewater collection networks in the coastal area of Sidon, estimated at US\$22 million, funded by Japan Bank for International Cooperation (JIBC) as a preparatory step to connecting these networks with the lines stretching until the completed treatment plant.

- Completion of construction Tripoli wastewater treatment plant, a EUR 92 million project. Also the affiliated sea outfall was completed at EUR 6 million. Both project were funded by the European Investment Bank (EIB). The projects cover Tripoli coastal area, Al Qalamun, some sections of Koura and Zgharta districts, in addition to the coastal areas of Baddaoui, Deir Aamar and Minnieh.
- Completion of the main wastewater collection line in the northern coastal cities of Tripoli (Bared-Baddaoui sections), the project includes the main collection line, the lifting stations, and the main, secondary and subsidiary sewer lines connected with the main collection lines, servicing more than 100,000 people. The EUR 12 million project was funded by a German Government grant. The donor implemented and managed the project in collaboration with the CDR.
- Completion of the works stipulated in the Lebanese-French Protocol Agreement for waste water treatment plants estimated at EUR 56 million; the works include the construction of waste water treatment plants and sea outfalls (for the coastal plants) in the following regions: Shouf coastal area (Ras enNabi 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 Khroub; 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 wastewater networks installation works in the villages of the Union of Soueijani Municipalities in Chouf, at a cost of around US\$ 5,75 million, funded locally.
- Construction of a wastewater treatment plant in Baalback (la'at) at a cost of around US\$ 6.35 million funded by the IBRD to serve the city of Baalback and several neighboring villages.
- Completion of the project aimed at installing sewer lines and additional drinking water distribution lines in Khodor, Khraibeh, Nabi Shit and Baalback, at a cost of around US\$ 5,3 million through a World bank funding.
- Implementation of a pilot project for wastewater treatment in Bcharre in North-Lebanon, through the adoption of bamboo filtering technique, at a cost of around US\$ 700.000, funded by the French Development Agency.
- Maintenance and upgrading of wastewater and storm water networks in main cities: The works started in 1997 upon a Council of Ministers mandate. The works included periodical maintenance, repair of wastewater and rainwater lines in main cities, in addition to limiting the overflows and preventing



breakdowns in the existing networks. The works also included the cleaning of wastewater and rainwater lines, the installation of pipes and other necessary supplies to improve 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 it is discharged to the sea in cities and towns with populations exceeding 100,000 individual. Accordingly, several projects have been prepared for the construction of wastewater collection networks and treatment plants in the coastal areas of Lebanon. To date, the site works at the treatment plants and affiliated collection networks were completed. The following projects are underway:

- 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 750,000 people, estimated at US\$ 15 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 them into service.

Installation of main wastewater lines and sewer networks in the mountainous villages of Aley and Baabda located within the water basin of the Ghadir waste water treatment plant, of a value of around US\$ 16 million, funded by the Government of Germany. 55% of the work has been completed to date.

- Waste water collection and treatment in the northern coastal area of Greater Beirut, servicing 1,3 million people: works have been recently launched to install main wastewater lines and sewer lines in a number of coastal areas in the Metn district located within the Beirut River Water Basin (Dora), at an estimated cost of US\$ 22 million, funded by the European Investment Bank. 10% of the work has been completed to date.

- Installation of wastewater networks estimated at US\$ 15.4 million and a wastewater treatment plant for the coastal area of Sour and the affiliated sea outfall estimated at EUR 50,6 million, funded by the European Investment Bank. The treatment plant is intended to serve around 300,000 persons. 80% of the work has been completed to date.

- Installation of wastewater networks and pumping stations in villages and towns in Chekka region, totaling around US\$ 19 million, funded by the French Development Agency and the Lebanese Government, 90% of the work has been completed to date.

- Installation of wastewater networks and pumping stations in villages and towns in Batroun region, amounting to around

US\$ 17.50 million, funded by the French Development Agency and the Lebanese Government. 90% of the work has been completed to date.

- Installation of wastewater networks and pumping stations for villages and towns in Koura region – Phase I, amounting to around US\$ 13 million, funded the French Development Agency and the Lebanese Government. 90% of the work has been completed to date.

In addition, the CDR recently launched a EUR 38 million project funded by the Government of Italy for the installation of drinking water and wastewater networks in Jbeil coastal area. An amount of EUR 19 million is allocated to wastewater. 10% of the work has been completed to date.

- Southern coastal section of the project on wastewater line collector of Tripoli coastal region, serving regions and parts of Koura, Qalamoun, Bohsas and Tripoli, through the European Bank for Investment, of a total value of US\$ 13.35 million,. 90% of the work has been completed to date.

- Installation of wastewater networks and pumping stations in the coastal villages and towns of the Chouf district, connected with the wastewater treatment plant located in Ras Anabi Youness, estimated at US\$ 15 million, funded by the Arab Fund for Economic and Social Development and the Lebanese Government. 75% of the work has been completed to date.

II. Protection of water sources against pollution: A study was conducted in 1994 to update the Wastewater Master Plan elaborated in 1982. This study defined water basins and



priority areas for the construction of new wastewater treatment plants to protect water resources against pollution. Based on this study, the Ministry of Energy and Water developed in 2010-2011 a Waste Water Strategy that was subsequently adopted by the government.

2. Since the nineties, and in order to protect these basis, funds have been raised 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 (Laboueh, Qaraoun Lake, Anjar, Hermel, Mechmech, Becharre, Bakhoun, Chebaa, Jbaa, Hasbaya, Chakra, Hrajel and Kartaba).

The Construction of the Baalback wastewater treatment plant, funded by the World Bank, was completed in the summer of the year 2000; Also the site works related to wastewater collection and refinement in Jebb Jannine and Saghbine regions and neighboring villages were completed, with a US\$ 39 million financial assistance granted by the Islamic Development Bank.

The CDR implemented recently a pilot project in Becharre to install a waste water treatment plant, adopting the "Filtre a Roseaux" technique, estimated at US\$ 625,000 funded by the French Government

On the other hand, site works are still underway to construct and install a wastewater treatment plant in Zahle and the affiliated lines. The project cost is estimated at around US\$ 29 million, funded by the Italian Protocol (about 85% of the work has been completed); Also site works are still underway to construct two wastewater treatment plants and install wastewater networks and pumping stations

in Barouk, Freidis, AinZhalta, Nabaa el Safa, Al Aazouniye and Ain Dara, at an estimated cost of US\$ 20 million, funded by the Arab Fund for Economic and Social Development (55% completion); Site works are also underway to install wastewater networks in the villages of the Union of Municipalities of Chouf-Souaijani, at an estimated cost of US\$ 9 million locally funded. 75% of the work has completed to date; Continuation of sites works for the rehabilitation, maintenance and operation of three waste water stations in the Souaijani area in Chouf (Jdeidet el Chouf, Ainbal and Ghrifa). The US\$ 2 million project is locally funded and is scheduled for one year (80% of the work has been completed).

In the South of Lebanon, site works continue for the construction of three treatment stations and affiliated wastewater networks in Yohmor, Kfar Sir and Zoutor, at an estimated value of around US\$ 14,7 million, funded by the European Commission. 80% of the work has been completed.

#### **Main contracts signed during 2014**

- Installation of main wastewater lines and sewer networks in a number of the coastal the Metn districted located with the Beirut River Water Basin (Dora), estimated at US\$ 22, and funded by the European Investment Bank.

- Study and execution of the sea outfall of the wastewater treatment plant that is currently under construction in the coastal area of Tyre, at an estimated value of US\$ 16 million, and funded by the European Investment Bank.

- Annex to the contract pertaining to the construction and installation of wastewater

networks and pumping stations in the coastal villages and towns of Chouf connected with the wastewater treatment plant located in Ras Anabi Youness, at an estimated cost of US\$ 2,25 million, funded by the Arab Fund for Economic and Social Development and the Lebanese Government.

- Annex to the contract pertaining to the construction and installation of wastewater networks and pumping stations in the coastal and central villages and towns of Koura – Phase I, at an estimated cost of US\$ 5 million, funded by the French Development Agency and the Lebanese Government.

- Execution of domestic connections connected with waste water networks and pumping stations in the coastal villages and towns of Koura – Phase I, at an estimated cost of US\$ 3 million locally funded.

- Annex to the contract pertaining to the construction and installation of wastewater networks in the Union of Municipalities of Chouf-Souaijani, with a US\$ 3 million local funding.

- Annex to the contract pertaining to the construction of three treatment stations and affiliated wastewater networks in Yohmor, Kfar Sir and Zoutor, at an estimated value of around US\$ 2,4 million, funded by the European Commission and the Lebanese Government.

#### **Main Projects under Preparation (2015-2017)**

1- Protection of the coast-



line against pollution:

The Ministry of Energy and Water conducted a comprehensive study for the district of Akkar. Based on the findings of this study, a Master Plan for wastewater collection and treatment in Akkar was elaborated, including the construction of waste water networks and a treatment plant on the Abdeh coast. To implement this Master Plan, the CDR obtained a loan from the Arab Fund, and preparations are underway to release calls for tenders.

The CDR obtained also a EUR 70 million financial assistance from the European Investment Bank to construct two wastewater treatment stations on the Keserouan coast, and another EUR 70 million fund from the French Development Agency to install the affiliated networks. The CDR is preparing for the release of a call for tenders to update the studies and develop the tender documents pertaining to this project.

The CDR is also preparing to launch the project for wastewater treatment in Qarantina and Dora (northern Beirut) and their affiliated networks after obtaining a EUR 60 million financial assistance from the European Investment Bank.

Also the feasibility study for the upgrading of Al Ghadir wastewater pre-treatment plant (south Beirut) was updated. The CDR raised the necessary funds to cover the costs of phase I of these works, estimated at US\$ 173 million, through negotiations held with the European Investment Bank and the Islamic Development Bank.

On the other hand, the CDR obtained a US\$ 100 million additional funding for the continuation of water wastewater projects in a number of coastal and inland Lebanese regions, including the Akkar coastal area. The cost of the project of wastewater collection and treatment in Akkar coastal Area is estimated at around US\$ 40 million. Preparations are underway to release the first associated call for tenders, and to continue the construction and installation of waste water networks in the Chouf coastal area connected with the wastewater treatment plant in Ras Anabi Youness.

II- Protection of water sources against pollution: The Ministry of Energy and Water and the CDR have identified around 20 wastewater projects near to water sources (springs, rivers, lakes, etc.) in inland Lebanese areas. Detailed studies are completed for many of the projects that mostly fall within the framework of on-going financing agreements (Italian Protocol, the Islamic Development Bank and the Arab Fund for Economic and Social Development (AFESD)). A special focus is directed towards the West Bekaa area, Qaraoun Lake and the Litani River, where the high level of water pollution requires an urgent intervention to install wastewater collection lines and treatment facilities.

The CDR had also raised funds to conduct a study and implement the wastewater project in the upper basin of the Litani River through a US\$ 85 million loan agreement signed with the Arab Fund for Economic and Social Development (AFESD) to finance water and waste water projects in a number of Lebanese areas; same applied to Shebaa and neighboring areas, Becharre, As Safa and Barouk where sites works have been

launched. The CDR is also seeking an additional loan of US\$ 100 million to fill the financial gap and continue the implementation of these projects.

The CDR also obtained a EUR 6 million loan and signed two other US\$ 14 million loan agreements with the German Agency KfW to implement the project aimed at protecting the Jeita spring against pollution, at an estimated cost of US\$ 38 million. The related studies are underway. The project is divided into three phases aiming at collecting and treating wastewater generated from cities and villages falling within the water basin of Dara-ya, Kleiat, Bekaata, Bkaatouta, Kfardebian and neighboring cities in Keserwan district.

The CDR continues to conduct the necessary studies as a preparatory step for the launching of two projects for wastewater collection and treatment in Mechmech – Akkar and Hrajel – Keserwan, estimated at around US\$ 55 million, funded by the Italian Protocol.

The CDR is also preparing to release a call for tenders to outsource the execution of site works to collect and treat waste water in a number of villages in Central Bekaa (Anjar – Majdel Anjar- Souairi-Bar Elias-Kab Elias- Marj...), with a financial assistance from the Italian Protocol.

The CDR also received a US\$ 46 million loan from the Kuwait Fund for Arab Economic Development to install wastewater collection and treatment systems in numerous neighboring villages of Marjeyoun and Bint-Jbeil in Nabatiyeh.



## Schedule of main contracts signed in the wastewater sector during 2014

Project	Estimated value US\$	Source of Funding	Commencement Date	Scheduled Completion Date
Study and implementation of the sea outfall pipeline that discharges the waste water from the treatment plant located in coastal Tyre into the sea	15,820	European Investment Bank	Oct-14	Nov-16
Construction and installation of main waste water collection networks in the coastal area of Metn located in Beirut River Water Basin	21,81	European Investment Bank	May-14	May-16
Annex to the contract pertaining to the construction and installation of wastewater networks and pumping stations in the coastal villages and towns of Chouf connected with the wastewater treatment plant located in Ras Anabi Youness	2,24	Arab Fund for Economic and Social Development and the Lebanese Government	May-14	May-15
Annex to the contract pertaining to the construction and installation of wastewater networks and pumping stations in the coastal and central villages and towns of Koura – Phase I	5,066	French Development Agency and Lebanese government	Aug-14	Mar-15
Execution of domestic connections connected with waste water networks and pumping stations in the coastal villages and towns of Koura – Phase I	2,91	Local	Dec-14	Dec-16
Annex to the contract pertaining to the construction and installation of wastewater networks in the Union of Municipalities of Chouf-Souejani, with a US\$ 3 million local funding.	3,07	Local	Jul-14	Sep-15
Annex to the contract pertaining to the construction of three treatment stations and affiliated wastewater networks in Yohmor, Kfar Sir and Zoutor, at an estimated value of around US\$ 2,4 million, funded by the	2,40	European Commission and the Lebanese Government.	Feb-14	Feb-15
Annex to the contract pertaining to the construction and installation of wastewater networks in the Union of Municipalities of Chouf-Souejani	3,07	Local	Jul-14	Sep-15
Annex to the contract pertaining to the construction of three treatment stations and affiliated wastewater networks in Yohmor, Kfar Sir and Zoutor	2,4 0	European Commission and the Lebanese Government.	Feb-14	Feb-15
Installation of wastewater networks connected with the Kfarkatra Refinement Plant -Chouf	0,998	Local	Nov-14	Nov-15

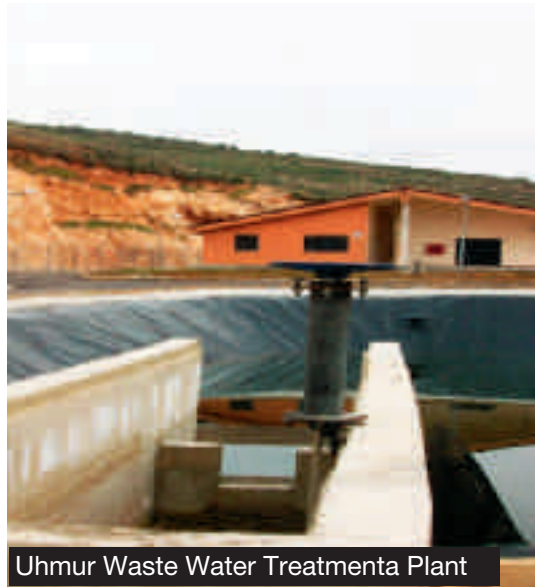
## Schedule of main projects under preparation in the wastewater sector 2015-2017

Project	Estimated value million US\$	Source of Funding	Date expected to initiate work	Expected completion
Program of Protection of the Lebanese Coast against pollution				
Construction of wastewater collection networks and a waste water treatment plant in Akkar coastline	40	Arab Fund + Local Funding	Sep-15	Nov-18
Construction of wastewater collection networks and two wastewater treatment plants in Keserouan coastline	175	European Investment Bank + French Development Agency + EU + NIF	Dec-16	Dec-20
Construction of second part of wastewater collection networks and primary treatment plant in Beirut River Basin	45	European Investment Bank	May-16	May-19
Expansion and upgrading of the wastewater treatment plant in Ghadir south of Beirut	97	Islamic Development Bank	Dec-16	Dec-20
Execution of wastewater networks in Sour coastline – Phase II	39	Local funding	Oct-15	Oct-17
Program of Protection of water sources against pollution				
Execution of collection networks and wastewater treatment plant in Mechmech – Akkar	31	Italian Protocol	Feb-16	Dec-18
Construction of collection networks and wastewater treatment plant in Dannieh	19	Italian Protocol	Dec-17	Dec-19
Construction of wastewater treatment plant in Bcharre	8	AFESD + Local funding	Jun-15	Sep-17
Construction of collection networks and wastewater treatment plant in Hrajel-Keserouan	24	Italian Protocol	Feb-16	Dec-18
Construction of collection networks and wastewater treatment plant in Jeita-Keserouan (Sections 1, 2 and 3)	38	German Agency KFW	Jun-16	Jun-19
Continuation of wastewater networks in Chahhar in Aley district	5	Local Funding	Feb-16	Feb-17
Continuation of wastewater networks in Jezzine	5	Local Funding	Feb-16	Feb-17
Continuation of wastewater networks in BintJbeil and neighboring areas	11	Italian Protocol	Dec-17	Dec-20

Project	Estimated value million US\$	Source of Funding	Date expected to initiate work	Expected completion
Completion of waste water collection network for ghadeer waste water treatment plant in South Beirut	86	European Investment Bank	Dec-16	Dec-20
Wastewater treatment plant and wastewater networks in Hasbaya and neighboring areas	8	Italian Protocol	Dec-16	Dec-20
Waste water treatment plant and wastewater networks in Arqub	30	Arab Fund + Local Funding	Jul-17	Dec-19
Wastewater treatment plant and wastewater networks in Jbaa and neighboring areas in Nabatiyeh	7	Italian Protocol	Jul-17	Dec-19
Construction of wastewater treatment plant and collection networks in Hermel and neighboring areas	20	Italian Protocol	Jul-17	Dec-19
Construction of wastewater treatment plant and collection networks in Laboueh and neighboring areas	15	Local funding	Jul-16	Dec-18
Continuation of water and wastewater networks in a number of villages in Baalback	10	AFESD + Local Funding	Mar-17	Mar-19
Construction of wastewater treatment plant and wastewater networks in central and northern Bekaa in the Litani basin	30	AFESD + Local Funding	Jul-16	Dec-18
Construction of wastewater treatment plant and wastewater networks in Anjar, and MajdalAnjar, Phase I	26	Italian Protocol	Dec-15	Dec-18
Construction of wastewater treatment plant and wastewater networks in Anjar, and MajdalAnjar, Phase II	24	World Bank (promised)	Dec-16	Dec-19
Wastewater collection and treatment in numerous neighboring municipalities of Marjeyoun and BintJbeil districts in Nabatiyeh	58	Kuwait Fund	Mar-16	Mar-19
Construction of wastewater networks in Rachaya and neighboring areas	5	Local funding	Jan-16	Dec-16







# Wastewater Completed, Ongoing & Under Preparation Projects

