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Report No: PAD860

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US\$55 MILLION

TO THE

LEBANESE REPUBLIC

FOR THE

LAKE QARAOUN POLLUTION PREVENTION PROJECT

June 22, 2016

Environment and Natural Resources Global Practice
Middle East and North Africa Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective as of May 30, 2016)

Currency Unit = Lebanese Pound
US\$1 = LBP 1,507

FISCAL YEAR

January 1 - December 31

ABBREVIATIONS AND ACRONYMS

BDL	Banque du Liban – Lebanese Central Bank
BOD	Biochemical Oxygen Demand
BWE	Beqaa Water Establishment
CBA	Cost-benefit Analysis
CDR	Council for Development and Reconstruction
COD	Chemical Oxygen Demand
COM	Council of Ministers
CQS	Selection Based on the Consultants' Qualifications
DA	Designated Account
DU	Dunum
DALY	Disability-adjusted Life Year
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERRP	Emergency Reconstruction and Rehabilitation Project
ESMF	Environmental and Social Management Framework
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FBS	Selection under a Fixed Budget
FFS	Farmer Field Schools
FM	Financial Management
FO	Financial Officer
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GoL	Government of Lebanon
IBRD	International Bank for Reconstruction and Development
IC	Individual Consultant
ICB	International Competitive Bidding
IFR	Interim Financial Report
IPM	Integrated Pest Management
IPSAS	International Public Sector Accounting Standards
IRR	Internal Rate of Return
LBP	Lebanese Pound
LCS	Least-cost Selection
LRA	Litani River Authority
MoA	Ministry of Agriculture
MoE	Ministry of Environment
MoEW	Ministry of Energy and Water

MoF	Ministry of Finance
NCB	National Competitive Bidding
NGO	Nongovernmental Organization
O&M	Operations and Maintenance
PDO	Project Development Objective
PFS	Project Financial Statement
PMU	Project Management Unit
PV	Present Value
QCBS	Quality- and Cost-based Selection
RFP	Request for proposal
SOE	Statement of Expenditure
SSS	Single Source Selection
TOR	Terms of Reference
USAID	United States Agency for International Development
WA	Withdrawal Application
WQI	Water Quality Index
WWTP	Wastewater Treatment Plant

Regional Vice President:	Hafez Ghanem
Country Director:	Ferid Belhaj
Senior Global Practice Director:	Paula Caballero
Practice Manager:	Benoit Blarel
Task Team Leader:	Maria Sarraf

LEBANESE REPUBLIC
Lake Qaraoun Pollution Prevention Project

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PAD DATA SHEET

Lebanon

Lake Qaraoun Pollution Prevention Project (P147854)

PROJECT APPRAISAL DOCUMENT

MIDDLE EAST AND NORTH AFRICA

GENDR

Report No.: PAD860

Basic Information			
Project ID	EA Category	Team Leader(s)	
P147854	B - Partial Assessment	Maria Sarraf	
Lending Instrument	Fragile and/or Capacity Constraints []		
Investment Project Financing	Financial Intermediaries []		
	Series of Projects []		
Project Implementation Start Date	Project Implementation End Date		
14-Jul 2016	30-Dec-2022		
Expected Effectiveness Date	Expected Closing Date		
01-Jun-2017	30-Jun-2023		
Joint IFC	No		
Practice Manager/Manager	Senior Global Practice Director	Country Director	Regional Vice President
Benoit Paul Blarel	Paula Caballero	Ferid Belhaj	Hafez M. H. Ghanem
Borrower: Government of Lebanon			
Responsible Agency: Council for Development and Reconstruction			
Contact:	Ms. Wafaa Charafeddin	Title:	Director of Funding Division
Telephone No.:	(961-1) 981-380	Email:	wafac@cdr.gov.lb
Project Financing Data(in USD Million)			
[X]	Loan	[]	IDA Grant
[]	Credit	[]	Grant
[]		[]	Guarantee
[]		[]	Other
Total Project Cost:	60.00	Total Bank Financing:	55.00

Financing Gap:	0.00									
Financing Source										
										Amount
Borrower										5.00
International Bank for Reconstruction and Development										55.00
Total										60.00
Expected Disbursements (in USD Million)										
Fiscal Year	2018	2019	2020	2021	2022	2023	0000	0000	0000	0000
Annual	5.00	5.00	10.00	10.00	10.00	15	0.00	0.00	0.00	0.00
Cumulative	5.00	10.00	20.00	30.00	40.00	55	0.00	0.00	0.00	0.00
Institutional Data										
Practice Area (Lead)										
Environment & Natural Resources										
Contributing Practice Areas										
Cross Cutting Areas										
[X] Climate Change										
[X] Fragile, Conflict & Violence										
[] Gender										
[] Jobs										
[] Public Private Partnership										
Sectors / Climate Change										
Sector (Maximum 5 and total % must equal 100)										
Major Sector			Sector			%	Adaptation Co-benefits %		Mitigation Co-benefits %	
Agriculture, fishing, and forestry			Agricultural extension and research			10				
Water, sanitation and flood protection			General water, sanitation and flood protection sector			90	50			
Total						100				

O I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Environment and natural resources management	Water resource management	100
Total		100

Proposed Development Objective(s)

The development objectives of the project are to reduce the quantity of untreated municipal sewage discharged into the Litani River and to improve pollution management around Qaraoun Lake.

Components

Component Name	Cost (USD Millions)
Component 1. Improvement of municipal sewage collection	50.50
Component 2. Promotion of good agricultural practices (including integrated pest management)	1.50
Component 3. Solid Waste, Water Quality Monitoring, Capacity Building, and Project Management	3.00

Systematic Operations Risk- Rating Tool (SORT)

Risk Category	Rating
1. Political and Governance	High
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Moderate
7. Environment and Social	Moderate
8. Stakeholders	Moderate
OVERALL	Substantial

Compliance

Policy			
Does the project depart from the CAS in content or in other significant respects?		Yes []	No [X]
.			
Does the project require any waivers of Bank policies?		Yes []	No [X]
Have these been approved by Bank management?		Yes []	No []
Is approval for any policy waiver sought from the Board?		Yes []	No [X]
Does the project meet the Regional criteria for readiness for implementation?		Yes [X]	No []
.			
Safeguard Policies Triggered by the Project		Yes	No
Environmental Assessment OP/BP 4.01		X	
Natural Habitats OP/BP 4.04			X
Forests OP/BP 4.36			X
Pest Management OP 4.09		X	
Physical Cultural Resources OP/BP 4.11			X
Indigenous Peoples OP/BP 4.10			X
Involuntary Resettlement OP/BP 4.12		X	
Safety of Dams OP/BP 4.37			X
Projects on International Waterways OP/BP 7.50			X
Projects in Disputed Areas OP/BP 7.60			X
.			
Legal Covenants			
Name	Recurrent	Due Date	Frequency
Schedule 2. Sect I.A of the Project Agreement		1 month after Effectiveness	
Description of Covenant			
The Project Implementing Entity shall establish, by no later than one (1) month after the Effective Date, a Project Management Unit, and thereafter maintain it throughout the implementation of the Project, with functions, staffing and resources satisfactory to the Bank.			
.			
Conditions			
Source Of Fund	Name	Type	
IBRD	Article V 5.01 of Loan Agreement	Effectiveness	
Description of Condition			
The Additional Condition of Effectiveness consists of the following, namely, that the Subsidiary			

Agreement has been executed on behalf of the Borrower and the Project Implementing Entity.

Team Composition

Bank Staff

Name	Role	Title	Unit
Maria Sarraf	Team Leader (ADM Responsible)	Lead Environment Specialist	GENDR
Sepehr Fotovat Ahmadi	Procurement	Sr. Procurement Specialist	GGODR
Suiko Yoshijima	Team Member and Env Safeguard	Environmental Specialist	GENDR
Amal Talbi	Team Member	Sr. Water & Sanitation Spec.	GWADR
Lelia Croitoru	Sr. Environmental Specialist	Consultant	GEEDR
Mohammed Benouahi	Lead Wastewater Specialist	Consultant	GWADR
Chaogang Wang	Social Safeguards	Sr. Social Development Specialist	GSURR
Garry Charlier	Team Member	Sr. Rural Development Specialist	GFADR
Sally Zgheib	Team Member	Water Supply and Sanitation Specialist	GWADR
Rima Abdul-Amir Koteiche	Financial Management	Sr. Financial Management Specialist	GGODR
Rock Jabbour	Team Member	Financial Management Specialist	GGODR
Mei Wang	Lawyer	Sr. Counsel	LEGAM
Eric Ranjeva	Finance Officer	Finance Officer	WFALA
Marie A. F. How Yew Kin	Team Member	Language Program Assistant	GENDR
Nada Abou-Rizk	Team Member	Program Assistant	MNCLB

Extended Team

Name	Title	Office Phone	Location
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Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
Lebanon	Beqaa	Mohafazat Beqaa	X		

I. STRATEGIC CONTEXT

A. Country Context

1. Lebanon is an upper-middle-income country, with a population of 4.5 million people and a gross domestic product (GDP) of US\$10,058 per capita in 2014.¹ The country is highly urbanized, with more than 85 percent of its population living in cities.² Lebanon has an open economy in which services and trade are the most important sectors with tourism and financial services being a backbone of the national economy³. The economy is driven by a dynamic private sector and dependent on financial flows from the Arab Gulf countries. The country is known for the high quality of its education system.⁴

2. **The Lebanese economy expanded at a moderate pace (3.6 percent annually) during the past five decades.** However, political instability and the spillovers from regional conflicts made this growth erratic and unstable. Moreover, the ongoing conflict in Syria has resulted in unprecedented number of refugees (estimated at 1.5 million⁵), accounting for nearly 30 percent of the country's population. This complex political, social, and security environment put an additional strain on the economy and public services. In fact, the real GDP growth decreased from 8 percent in 2010 to an estimated 1.5 percent in 2015.⁶

3. **Poverty affects nearly 28 percent of the Lebanese population (living on US\$4 per day) and extreme poverty touches 8 percent (living on US\$2.4 per day).**⁷ The highest concentration of poor is found in the North, followed by the South and the Beqaa. In addition, most refugees are concentrated in the already impoverished area of the Beqaa (35 percent) and North Lebanon (35 percent). In addition to the estimated 1.5 million Lebanese living under the poverty line, there are an additional 1.5 million vulnerable Syrian refugees and 320,000 Palestinian refugees, bringing the total vulnerable population in Lebanon today to more than 3.3 million. In light of these challenges, job creation and social protection are among the main development priorities in the country.⁸

4. Lebanon made considerable progress in shaping the legal and institutional framework and restoring infrastructure after the civil war (1975-89) and the more recent conflict with Israel (2006). However, the country is still at an **early stage of transition to environmental sustainability**. The cost of environmental degradation in Lebanon was estimated at 3.2 percent of the country's GDP in 2005.⁹ Water pollution stands out as the country's major environmental problem, costing more than one percent of the GDP per year. This accounts for the damages caused by the discharge of untreated sewage, industrial effluent, and agricultural runoff into valleys, rivers, and the Mediterranean Sea.

¹ World Development Indicator , World Bank.

² World Bank. 2014. Data Development Platform.

³ World Bank. 2015. Lebanon Systematic Country Diagnostic (P151430).

⁴ World Economic Forum. 2013. The Human Capital Forum.

⁵ World Bank. 2016 Country Partnership Framework for the Republic of Lebanon for the period FY17-FY22 (Report 94768-LB). *Forthcoming*

⁶ See World Bank 2016 cited above.

⁷ See World Bank 2015 cited above.

⁸ World Bank. 2014. Jobs or Privileges—Unleashing the Employment Potential of the Middle East and North Africa. Macro and Fiscal Management Global Practice. Middle East and North Africa Region.

⁹ World Bank. 2011. Republic of Lebanon. Country Environmental Analysis. Report No. 62266-LB. Middle East and North Africa. This represents the cost to the national economy and does not account for the damages to global environment.

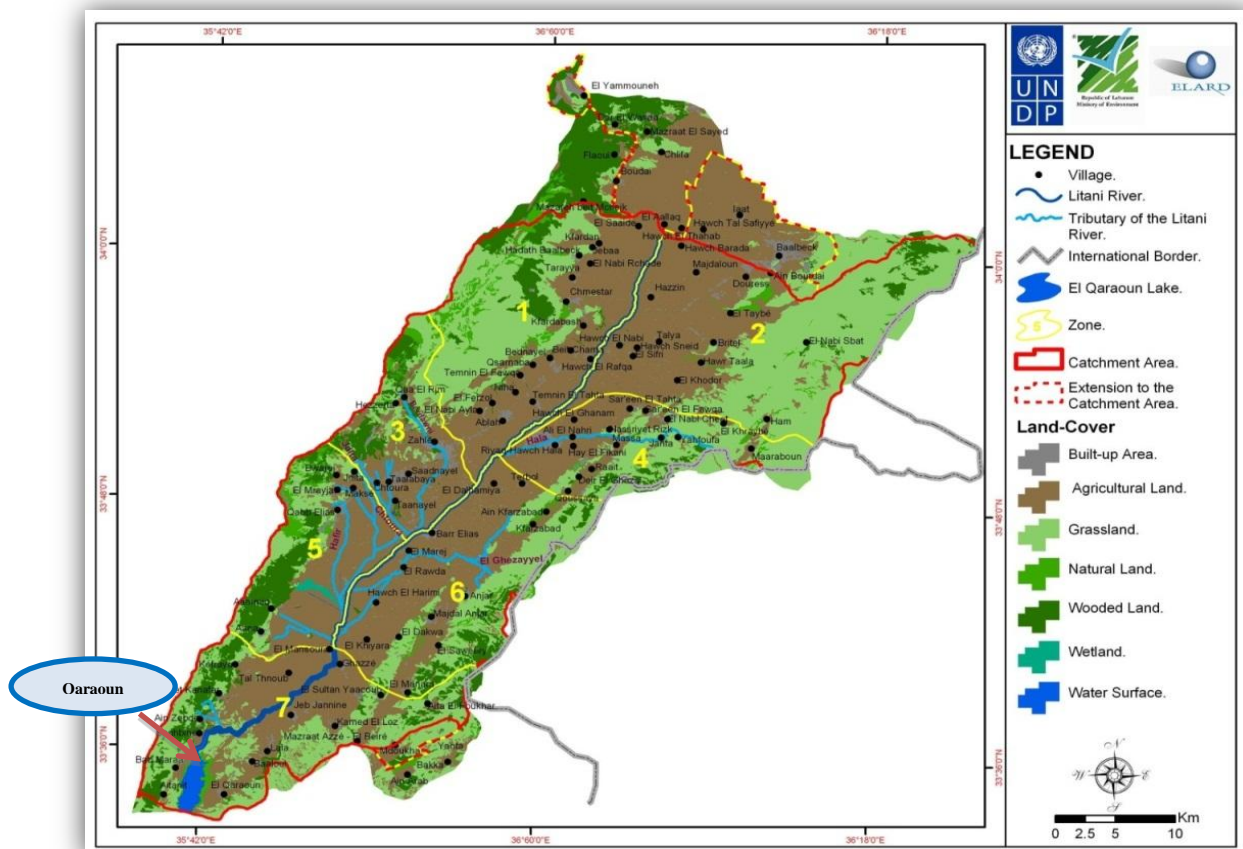
B. Sectoral and Institutional Context

The Litani River and Qaraoun Lake

5. The **Litani River** is the principal artery of Lebanon. Rising from the Olleiq springs close to the city of Baalbeck, it flows for 170 km through the Beqaa valley and the Qaraoun Lake, before it reaches the Mediterranean Sea (Figure 1). The upper Litani River catchment extends over an area of 1,500 km² (10 percent of the Lebanese territory) and comprises 99 towns distributed into four administrative districts: Baalbeck, Zahlé, West Beqaa, and Rachayya.

6. The major water structure along the Litani River is the Qaraoun Dam, which forms the **Qaraoun Lake** (or reservoir). It was built in 1959 to produce hydropower and provide water for irrigation and water supply. Qaraoun Lake is the largest artificial lake in Lebanon. It is situated in West Beqaa at an altitude of 800 m and covers an area of 12 km². The lake has a storage capacity of 220 million m³, of which 160 million m³ are used for irrigation and hydropower and the remaining for dry season storage. The lake's water generates electricity in the Awali (108 MW); Joun (48 MW); and Markaba (34 MW) hydropower plants. It also irrigates about 30 percent of the country's irrigated land, comprising 36,000 ha of agricultural area in the South and 1,400 ha in the Beqaa valley.

Figure 1: Upper Catchment Area of Qaraoun Lake



Source: MoE/United Nations Development Program (UNDP) /Earth Link & Advanced Resources Development (ELARD)

Pollution of Water Resources

7. Large stretches of the Litani River and of Qaraoun Lake are polluted due to four sources of

pollution.¹⁰

- **Municipal wastewater.** In 2010, the volume of wastewater generated in the Beqaa was estimated at 45 million m³ with an annual load of 15,500 tons of Biochemical Oxygen Demand (BOD). Most wastewater is currently discharged untreated into the Litani River.
- **Industrial wastewater.** This is estimated at about 4 million m³ in the Beqaa. There are factories producing effluents that are conveyed to surface water through nearby tributaries. Out of 294 industrial establishments in the region, 120 are large-scale industries located within 400 m of the Litani River, its tributaries, or the Qaraoun Lake.
- **Municipal solid waste.** Waste generated in the upper catchment of Qaraoun Lake is estimated at 650 tons per day. Because of the lack of sanitary landfills, most garbage is dumped in open dumps and in the Litani River along the Qaraoun catchment. Water pollution comes from littering and surface water runoff of solid waste. This is acute when the waste site is close to surface water streams. The main dump sites exerting pressure on the Litani River are Temnin El Tahta, Saadnayel old dump, Qabb Elias, Barr Elias, Hawch El Harimi, El Khiyara, Ghazzé, and Jeb Jennine dump sites.
- **Agriculture.** The largest use of land in the Litani River basin is for agriculture. In 2010, irrigated agriculture in the Beqaa Valley covered about 54,000 ha, primarily concentrated in: Baalbeck, (24,000 ha); Zahlé (16,000 ha); and West Beqaa (10,000 ha).¹¹ Vegetables, fruit trees, and industrial crops are the main irrigated crops in these areas.¹² Agricultural water pollution originates mainly from irrigation overflows and seepage. A field survey conducted in 2010¹³ concluded that farmers in Beqaa are over-fertilizing their crops and many pesticides are being applied at almost twice the recommended rates. As a result, agricultural chemicals and non-degradable pesticides end up in waterways with irrigation overflows.

Business Plan to Combat Pollution in Qaraoun Lake

8. The Ministry of Environment (MoE) commissioned a *Business Plan* in 2010 to help the Government of Lebanon (GoL) identify the major sources of pollution in Qaraoun Lake and recommend appropriate solutions to mitigate them (detailed information is provided in Annex 2). The *Business Plan* was completed in 2011 and endorsed by the Presidency of the Council of Ministers in 2012. The plan includes detailed prioritized investments for each polluting sector, with a financing requirement estimated at about US\$255 million. In February 2013, the GoL requested World Bank assistance to fund priority activities of the *Business Plan*.

9. The *Business Plan* identifies the two largest pressures as municipal wastewater and agriculture. Action on agriculture sources of pollution is needed to improve the overall surface water while continuing to contribute to the agriculture sector, a key sector, in the Beqaa Valley. Municipal wastewater priority actions identified relate to increasing the volume of wastewater treated in Zahlé, Iaat, Temnin El Tahta, Anjar/ Majdel Anjar/ Qabb Elias (hereafter referred to as Anjar Wastewater Treatment Plant -WWTP), Jeb Jannine where the population and economic activity are most dense.

¹⁰ Republic of Lebanon. 2011. Business Plan for Combating Pollution of the Qaraoun Lake. Main report. MOE & UNDP.

¹¹ Ministry of Agriculture. 2010. Agricultural Census: <http://www.agriculture.gov.lb/HTML/rga/>.

¹² In addition to cereals that are usually grown under rain-fed conditions or supplemental irrigation.

¹³ See Republic of Lebanon (2011).

Institutional Context

10. **The Ministry of Environment.** The MoE is empowered to study, propose, and implement national environmental policies. It is considered the only regulatory environmental agency in the country. In relation to the proposed project, the MoE is responsible for regulating the collection and disposal of solid waste.

11. **The Ministry of Energy and Water (MoEW)** is responsible for the strategic planning and management of water resources. Prior to 2000, there were 21 regional water utilities. Water Law 221 of the year 2000 and its amendments merged them into four Water and Wastewater Establishments and one pre-existing river authority: North Lebanon, Beirut/Mount Lebanon, Beqaa, South Lebanon, and the Litani River Authority (LRA). This was a major step towards consolidating the responsibility of these establishments and clarifying their mandate as public agencies empowering them to better manage water and wastewater services. The ultimate role of the water establishment is to have full administrative and financial autonomy over the provision of water and wastewater services and irrigation. In reality, water establishments are not yet fully staffed and operational nor are they financially autonomous. The Beqaa Water and Wastewater Establishment (BWE) is the one responsible for the project area. The BWE inherited distribution networks in poor conditions, with very high levels of illegal connections and very low collection rates from those legally connected. LRA is a public establishment under the MoEW primarily responsible for (a) utilizing hydro electrical power plants; (b) constructing irrigation schemes, (c) conducting preliminary studies and constructing dams, and (d) monitoring the quality of the Litani River.

12. **The Ministry of Agriculture (MoA).** The MoA has overall responsibility for the development of the agriculture sector. While the MoEW has the overall mandate for water resources, including irrigation, the MoA has the prime responsibility for irrigation at the farm level. Sustainable management and conservation of natural resources is considered an important pillar of the MoA's strategy for 2010–2014. The strategy gives high priority to enhancing the efficient use of irrigation, expanding the use of treated wastewater for irrigation, and reducing water pollution from agricultural chemicals. The MoA is also responsible for the regulation of pesticide and fertilizer imports, marketing, and use, and it has launched a series of measures to enhance enforcement of these regulations and promote awareness about the proper use, handling, and disposal of pesticides.

13. **The Council for Development and Reconstruction (CDR).** The CDR, established through Decree no.5 of 1977 is responsible for preparing national development plans, implementing infrastructure projects, and mobilizing external financing to lead the reconstruction and development of the country. The CDR is accountable to the Council of Ministers.

14. **The Qaraoun Committee.** In June 2012, a committee was established¹⁴ to study the pollution problems of the Litani River and Qaraoun Lake and to propose remedial measures. The committee included representation of all key stakeholders and was active in the preparation and review of the *Business Plan for Combating Pollution of the Qaraoun Lake*. Once the Business Plan and subsequent roadmap were agreed upon, the study committee was dissolved. In May 2014, the Qaraoun Committee was established¹⁵ to follow up on the implementation of the roadmap to combat pollution in Qaraoun Lake. The committee includes 16 members representing key stakeholders and has assigned the secretariat responsibility to the Litani River Authority. The recently established Qaraoun Committee has been meeting on a regular basis and will play an oversight role in the proposed project.

¹⁴ Via the Presidency of the Council of Ministers Decision 102/2012 of June 25, 2012.

¹⁵ Via the Council of Ministers Decision 32 of May 9, 2014.

C. Higher-Level Objectives to which the Project Contributes

15. By improving access to basic services in one of the country's poorest regions (Beqaa), the proposed project contributes directly to reducing poverty and ensuring a sustainable increase in the welfare of the less well-off; thereby contributing to the Bank's **strategic goals** of ending extreme poverty and boosting shared prosperity in a sustainable manner.¹⁶ By enhancing service delivery and targeting an impoverished area with a large number of refugees the project contributes to the new **MNA Regional Strategy**¹⁷. The proposed operation is also directly in line with the **Lebanon Country Partnership Framework FY17- FY22 (Report 94768-LB)**, which will be discussed at the Board on July 14th, 2016, which identifies water pollution as one of the main reasons for environmental degradation in the country, contributing to a loss of about 1 percent of GDP annually. Furthermore, Lebanon's climate change model projections suggest a more rapid warm-up than the global average and an annual reduction in precipitation. Snow water storage, which plays an important role in water supply, is also likely to be affected. The combined effect of increased temperature, reduced rainfall and reduced snow water storage will have important consequences on water availability. Adapting to climate change will require a more efficient management of water quantity and quality in Lebanon. In line with MNA's regional *Climate Action Plan*¹⁸, the proposed *Lake Qaraoun Pollution Prevention Project* intends to reduce water pollution to safeguard precious water resources.

16. The proposed project contributes to achieving **Lebanon's National Strategy for the Wastewater Sector** (2012). The strategy's main targets are to: (a) increase wastewater collection (60 percent) and treatment (8 percent) to 95 percent by 2020; (b) increase reuse of treated effluent from 0 percent to 50 percent by 2020; and (c) recover Operation and Maintenance (O&M) costs fully by 2020. The new strategy aims at avoiding mistakes made in the past—whereby wastewater treatments plants were built without being connected to collection networks—and giving top priority to completing existing treatment plants and rapidly increasing the effective connection network to bring treatment rates to the level of installed treatment capacity, thereby, adopting an integrated investment approach for wastewater collection and treatment. The project is also inline with Sustainable Development Goal #6 which calls for ensuring availability and sustainable management of water and sanitation for all.

¹⁶ World Bank. 2014. *The Hidden Dimensions of Poverty: Natural Resources and the Environment*.

¹⁷ World Bank. 2015 *Economic and Social Inclusion for Peace and Stability in the Middle East and North Africa: A New Strategy for the World Bank Group*

¹⁸ MNA input (dated January 31, 2016) to the World Bank Climate Change Action Plan 2016-2020
<https://openknowledge.worldbank.org/bitstream/handle/10986/24451/K88860.pdf>

Box 1. The World Bank Engagement in the Water and Wastewater Sector in the Beqaa Region

The Bank has had a long-term involvement in the water and wastewater sector in Lebanon and has provided assistance to the Government in the preparation of sector strategies and investment projects.

The first phase of Bank assistance started with the FY94 *Emergency Reconstruction and Rehabilitation Project* (ERRP) (US\$175 million) after a devastating 17 years of civil war which destroyed most of the country's infrastructure, education, and public services. The ERRP established the first steps for an enabling environment to restructure and reorganize the power, water, telecommunication, and solid waste management sectors and also initiated sector development policy notes. The project supported the preparation of the Water Law 221 of 2000 that led to the merging of 21 water utilities into four Regional Water and Wastewater Establishments. With regard to water, the ERRP consisted of the rehabilitation and extension of essential water supply and wastewater facilities in the Beqaa Valley and Mount Lebanon and emergency repairs in South Lebanon. A supplemental loan (US\$30 million) included a wastewater treatment facility in Iaat close to the city of Baalbeck. The project did not provide the related influent and effluent network and house connections which was supposed to be undertaken by the local authorities. However, the local authorities did not have the technical or financial capacity to complete the network and the Iaat treatment plant remained idle for several years until a follow-up Bank project in 2002.

The Bank-financed FY02 *Baalbeck Water and Wastewater Project* (US\$43.53 million) had completed the work started under the ERRP and focused on capacity building of the newly created water establishments including the Beqaa which integrated three utilities (Baalbeck, Zahlé, and Chamsine) into one. The project also aimed to rationalize the use of water through the introduction of water meters to be the basis for the volumetric tariff in the future and involve the private sector in the operations and maintenance (O&M) of water supply and wastewater. Tariff (or fee) and tariff collection were very low, covering at the time no more than 50 percent of O&M and leaving the BWE in great financial difficulty, in some instances not being able to pay its staff. The fees proposed were meant to pay water based on consumption and would encourage optimizing the use of water and improve cost recovery. Making people subscribe and pay their water and wastewater bill remains the most challenging issue in Lebanon and in the Beqaa in particular.

The FY07 *West Beqaa Water Supply Project* (US\$15 million) was prepared after the July 2006 conflict with Israel. In the aftermath of the hostilities, the Government sought to secure grant financing from the Bank and a contribution from the Kuwaiti Government to alleviate the precarious conditions of the West Beqaa water supply and sanitation system.

The FY11 *Greater Beirut Awali Water Project* (US\$200 million) aims to increase the provision of potable water to Greater Beirut and Mount Lebanon. Beirut City and the surrounding area were suffering from lack of potable water for a long time. The Bank had made several attempts in the past, particularly between 1997 and 1998, to assist the Government in the preparation of the Awali Beirut Conveyor and the Greater Beirut Water Supply and Wastewater Project. The Awali Conveyor was to be prepared under a Build Operate Transfer scheme, but this could not be implemented as the Lebanese law would not allow it. The proposed wastewater collection and treatment investments under the Greater Beirut Water Supply and Wastewater project were dropped as other donors provided financing. The Greater Beirut Awali Water project consists of mainly transferring water from the Awali River, which is a tributary of the Litani.

The FY15 *Water Supply Augmentation Project* (US\$474 million) is expected to complement the Awali project in addressing and resolving the long-term issue of water resources that are seasonal, with the majority of flow occurring during winter, resulting in severe water supply deficit during the summer in addition to increased irrigation water shortages. The project mainly consists of building the Bisri Dam to improve water supply in Greater Beirut and

17. The GoL embraces **environmental sustainability** as one of the pillars for sustainable growth in Lebanon. While the Government, aided by civil society organizations and the private sector, has made noteworthy strides toward enhancing environmental sustainability in the country, it also acknowledges that more can and should be done to safeguard the environment in Lebanon, protect the natural resource base, and enhance ecosystems services. By reducing pollution of Lebanon's main river (Litani) and lake (Qaraoun) from two major sources (municipal wastewater and agricultural runoff), the proposed project contributes substantially to the GoL's environmental sustainability goal.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

18. The development objectives of the project are to reduce the quantity of untreated municipal sewage discharged into the Litani River and to improve pollution management around Qaraoun Lake.

B. Project Beneficiaries

19. The project will provide **direct benefits** to: (i) an estimated 340,000¹⁹ people, who will get improved access to sanitation through sewer networks and house connections (Component 1); (ii) 750 farmers who will be trained in sustainable production systems and their family members²⁰ in the West Beqaa and Zahlé areas, who will improve the quality of their agricultural products and their welfare by adopting Good Agricultural Practices (GAP), including Integrated Pest Management (IPM) (Component 2); and (iii) at least 50 staff of ministries and agencies, who will receive training related to wastewater and pollution management (MoEW, MoA, MoE, LRA, BWE) (Component 2&3). Overall, direct beneficiaries are about 344,000 people or 7 percent of the country's population (without accounting for refugees), about 49 percent of which are women.

20. In addition, the project will provide **indirect benefits** to a larger population, through (a) improved aesthetic and recreational value and behavioral change due to a cleaner environment along the upper Litani River and its tributaries—especially through the clean-up campaigns and trash removal (Component 3) - and (b) improved quality of agricultural products in the Beqaa governorate²¹, due to reduced utilization of pesticides and nutrients. It is thus considered that indirect beneficiaries cover the population of Beqaa governorate, which is estimated at around **800,000**, or 18 percent of the country's population.²² Furthermore, an additional 525,000 refugees currently residing in the Beqaa area will indirectly benefit from the project²³.

C. PDO Level Results Indicators

- Direct project beneficiaries (number) of which female (percentage) (Core indicator)
- Quantity of municipal wastewater collected and treated under the project (daily flow in m³)
- Nutrient load reduction (Nitrogen[N]) achieved under the project (tons/year) (Core indicator)
- Number of locations monitored monthly for water quality (no.)

III. PROJECT DESCRIPTION

Description

21. ***Rationale for the proposed project.*** River clean-up and pollution prevention require sustained political will and resources over a long period. The Business Plan provides a set of actions that need to be implemented to reduce the pollution of Qaraoun Lake. While the most critical sources of pollution need to be addressed first, the nature and scale of challenges will evolve with time and, therefore, the

¹⁹ This represents a population of 306,430 in 2015 (Zahlé sewers subcomponent [167,590]; Anjar sewers subcomponent [116,150]; and Aintanit sewers subcomponent [22,690]), expected to grow at 1.75 percent till project completion (6 years).

²⁰ Based on a household size of 5 in rural areas, the total beneficiaries of Component 2 are 3,750.

²¹ Governorate = Mohafaza

²² Estimated based on a total population of 4.5 million (World Bank 2014. Data Development Platform) and a ratio of 17.8 percent for Beqaa (Central Administration Statistics of Lebanon online).

²³ UNHCR estimate that 35% of Syrian Refugees reside in the Bekaa Governorate

institutional and investment strategies need to adapt as well. Thus, to prevent pollution in Qaraoun Lake, the Bank will assist the GoL in implementing activities identified in the *Business Plan*.

22. The **investments part under this project**, is the first tranche to be financed (US\$60 million) out of the US\$255 million program identified in the *Business Plan*, focusing on reducing one of the four sources of pollution, municipal wastewater, by extending the sewage network for municipal water and connecting the network to wastewater treatment plants that are either functional or soon to become functional. This is the most strategic investment as it will allow optimizing the functioning of the wastewater plant and hence ensure the sustainability of existing investments. The **technical assistance part of the project** covers two sources of pollution, agriculture and solid waste, by supporting capacity building and preparatory studies respectively. Other donors, especially the European Union (EU), are already funding sorting and landfilling facilities in the upper Litani basin.

23. With regard to industrial wastewater, Lebanon's National Wastewater Strategy requires that by 2020, all industries will have to pre-treat wastewater before discharge into the municipal wastewater network. As such, the Bank-funded *Lebanon Environmental Pollution Abatement Project (P143594)* provides a line of credit and technical support to industries to assist them in installing pretreatment facilities. The project targets industries across Lebanon, including the area upstream of Qaraoun Lake.

A. Project Components

24. The project will comprise the following components:

Component 1. Improvement of municipal sewage collection (IBRD -US\$50.5 million, GoL-US\$5 million)

25. This component will finance activities that increase sewerage collection in areas where wastewater treatment plants have been constructed (or planned to be constructed), to maximize the use of these investments. The criteria used for the selection of the investments on the expansion of the network are the following: (i) network for a currently underserved WWTP; and (ii) network for WWTP completed or expected to be completed within the project implementation period. This component will be implemented by the CDR in close coordination with the Ministry of Energy and Water.

Subcomponent 1.1: Expansion of sewage network to connect to the Zahlé WWTP (IBRD-US\$26 million)

26. The Zahlé Wastewater Treatment Plant (WWTP), which is part of Lebanon's wastewater master plan, is currently under construction with funding from the Italian Protocol. Construction is almost completed (98 percent of mechanical and 95 percent of electrical construction are completed) and the plant is expected to become operational in October 2016. It will have a daily flow capacity of 37,300 m³. The plant can be expanded to a daily flow capacity of 56,000 m³ by 2040. The plant will connect to an existing network of about 350 km. The project intends to finance: the construction of about 108 km of new sewerage network, the rehabilitation of part of the old network, and 6,000 new house connections. According to the final design, the gravity sanitary sewage network will not require any pumping stations. The area that will be covered is: Greater Zahlé (including Karak and Ksara); Saadnayel; part of Taalabay; Quaa El Rim; Hezzerta; and part of Forzol.

Subcomponent 1.2: Expansion of sewage network to connect to the Anjar WWTP (IBRD-US\$19 million, GoL- US\$5 million)

27. The Anjar WWTP, which is located close to the Litani River, is planned to be constructed with funding from the Italian Protocol. A feasibility study has already been completed for the treatment plant to serve 17 localities from the West Beqaa and Zahlé districts. A detailed design study has been completed for the WWTP and 7 of the 17 localities. The Italian Protocol is expected to fund the Anjar WWTP, sewage collection to the following seven localities (Anjar, Majdel Anjar, Saouiri, Barr Elias, El Marj, Er Raouda and Qabb Elias), and one main collector and three pumping stations to convey all wastewater generated from the remaining ten localities. The estimated costs for this task is €28²⁴ million (US\$30 million), including expropriation²⁵ and two years of O&M. In this project, it is proposed to include the expansion of the sewage network to connect ten localities for a total population of 80,000. The Government of Lebanon will also co-finance the expansion of the sewage network (US\$5 million).

28. Funding for Anjar was approved by the Steering Committee of the Directorate General for Development Cooperation/Italian Ministry of Foreign Affairs in April 2015. The Council of Ministers (COM) approved the project and financial agreement with the Italian government in January 2016. Tendering for the construction of the Anjar WWTP is expected to be completed by October 2016.

Subcomponent 1.3: Expansion of sewage network to connect to Aitanit/other WWTP (IBRD US\$3.5 million)

29. During 2010–2013, the United States Agency for International Development (USAID) financed the “Small Village Wastewater Treatment Systems Program” which focused on constructing small treatment facilities for domestic wastewater collected from communities in the northern Litani River basin.²⁶ Three treatment facilities were successfully constructed in Ablah, Ferzol, and Aitanit. They are currently in operation serving eight municipalities.²⁷ The Aitanit plant has a capacity of 5,000 m³ per day²⁸ and is connected to four villages: Baaloul, Qaraoun, Aitanit, and Mashghara, with a total population of 22,300.²⁹ However, it operates sub-optimally (at a flow of 500–700 m³ per day) and has enough capacity to accommodate new connections. It is **proposed** that this component finance the network expansion of the Aitanit WWTP in these four villages. Several donors have expressed interest in providing parallel funding (on a grant basis) for the subcomponent, and if additional funding becomes available, the project will consult with the Government on what additional connections could be financed.

Subcomponent 1.4: Design, supervision, environment and social consultancy services (IBRD US\$2 million)

30. In addition, the project will finance design and supervision consultancies for Component 1; as well as the preparation of safeguards documents (for Subcomponents 1.2 and 1.3) and supervision of safeguard instruments.

²⁴ €26.4 million is from the Italian Protocol and the remaining from GoL contribution.

²⁵ The Decree for expropriation for Anjar WWTP has been issued.

²⁶ USAID. 2010a. Assessment of Sewer Networks for Five Villages around Aitanit WWTP in the Beqaa Valley of Lebanon. Final Report & Recommendations.

²⁷ USAID. 2010b. Assessment study reports for five villages: Aitanit, Baaloul, Lala, Mashghara, and Qaraoun. August 2010.

²⁸ Environmental and social safeguard studies for Lake Qaraoun pollution prevention project, Coordination Meeting, Sept 24, 2014.

²⁹ This includes 4,000 people in Balaoul, 6,000 in Qaraoun, 1,300 people in Aitanit, and 11,000 people in Mashghara (USAID 2010b).

Component 2. Promotion of Good Agricultural Practices (including Integrated Pest Management) (IBRD-US\$1.5 million)

31. Farmers in the upper Litani basin often apply excessive rates of fertilizers³⁰ and pesticides, leading to increased levels of nitrates and pesticides in the Litani River. In addition, inefficient irrigation practices result in excessive leaching and salinization. To improve pollution management around Qaraoun Lake, this component will promote the use of sustainable production systems among farmers in the upper Litani basin, by introducing GAP, including reduced fertilizer application and selected IPM measures - for example, reduced pesticides application. These practices are expected to provide increased quality of agricultural products (without reducing yields); farmers' savings (through decreased cost of production); and reduced pollution of the Litani River.

32. The component will target about 750 large farmers³¹ located in the West Beqaa and Zahlé districts, given their impact and close proximity to Qaraoun Lake and Litani River.³² IPM activities will be implemented through the Farmer Field Schools (FFS) methodology, which is a proven methodology that is based on a participatory approach to train and empower farmers on the use of IPM techniques and on the proper handling and disposal of pesticides. Similar participatory approaches will be used to train farmers on alternative methods and practices for sustainable fertilizer use in the project area. Baseline surveys and regular farm visits will be conducted to monitor the use of agrochemicals by targeted farmers as well as the sales of these chemicals in the project area.

33. The component is based on four steps:

- *Assess current agricultural practices and develop a GAP-IPM program.* Review previous surveys, undertake chemical analysis of soil and water, and identify essential practices to address existing gaps (that is, activities, target farmers, and crops).
- *Train professionals and facilitators in GAP-IPM practices.* Train field technical staff from the MoA, other stakeholders, and facilitators on extension and FFS methods to promote the practices identified above.
- *Implement the GAP-IPM program at the farm.* Identify the FFS curriculum and agricultural inputs needed and establish and run the FFS based on crops and target areas.
- *Evaluate and monitor for sustainability.* Provide the monitoring, review, and follow-up strategy for sustainability of the project outcomes.

34. Since 2004, the Food and Agricultural Organization (FAO) has been implementing a Regional Integrated Pest Management Program in the Near East that covers ten countries (including Lebanon). The MoA has, therefore, requested assistance from the FAO in implementing this component of the project. As explained in the procurement section, the CDR will sign a standard technical assistance agreement with the FAO to implement this component.

Component 3. Solid Waste, Water Quality Monitoring, Capacity Building, and Project Management (IBRD-US\$3 million)

35. This component will improve pollution management around Qaraoun Lake through technical assistance focused on: studies in solid waste management, which will complement the investments made in this sector by other donors; improving water quality and resource modeling, to help the LRA

³⁰ For potatoes, the average application rate for nitrogen fertilizers (30.7 kg/du) is nearly 3 times the recommended rate (11.5 kg/du).

³¹ Land ownership >40 dunums.

³² The West Beqaa district corresponds to Zone 7 and part of Zone 6 (see Figure 1).

in monitoring the quality of the Litani river; trash removal from Litani river bed through outreach activities with local communities and improving the capacity of the BWE to manage water supply, and wastewater in the Beqaa.

36. Subcomponent 3.1: Technical studies in solid waste management (IBRD-US\$0.6 million).

The quantity of solid waste generated in the upper Litani catchment was estimated at about 650 tons per day in 2011, without accounting for Syrian refugees (who are estimated to generate an additional 37.7 percent municipal solid waste in the Beqaa).³³ Widespread dumping of waste along the Litani River bed and open dump sites is a major threat to the water quality of the river and to public health.

37. This subcomponent will fund technical, environmental, and social studies for (a) establishing a sorting facility in Rachaya; (b) closure and rehabilitation of dump sites such as Temmin al Tahta, Qab Elias, Barr Elias, Hawch Al Harim, Al-Khyara, Jeb Jennine, Gazze, or Kayyal; and (c) the recruitment of a solid waste expert to be seconded to the MoE. The estimated cost of this subcomponent is US\$0.6 million based on the Master Plan for Closure and Rehabilitation of Uncontrolled Dumps, 2011.

38. Subcomponent 3.2: Improvement in Water Quality Modeling - LRA (IBRD-US\$0.7 million).

The LRA has been assigned the secretariat responsibility of the Qaraoun Committee that was established to follow up on the *Roadmap for Combating Pollution in the Qaraoun Lake*. To support the LRA in its secretariat role and building on the achievements of the USAID-funded Litani River Basin Management Support Program, this component focuses on (a) improving water quality monitoring network and water resources modeling; and (b) raising awareness for the cleanup of the Litani River. A more detailed description of this component is provided in Annex 2.

39. Subcomponent 3.3: Capacity building of the BWE (IBRD-US\$0.7 million).

The BWE is a public agency with the mandate to manage the water supply, wastewater, and irrigation in the Beqaa. It operates by establishing sources of water, distributing water and connecting new subscribers, maintaining the network, and collecting fees. Of the four newly established water establishments, the BWE covers the largest area (about 45 percent of Lebanon). The BWE still has to fill about 400 vacant positions but has limited financial resources to hire staff while the Government has put a freeze on hiring new staff for public organizations. This is limiting the BWE's capacity to fulfill its mandate. The BWE's capacity to operate and maintain the three water activities needs to be developed, particularly in the wastewater sector. The BWE Business Plan for 2013–2017 has outlined the main deficiencies and recommended actions to be undertaken on various critical issues, in particular (a) BWE organizational structure and management; (b) a human resources program that will prepare BWE staff to assume responsibility for wastewater network and treatment facilities; (c) collection efficiency; (d) documentation of customers, including the reduction of unregistered and illegal users; (e) extension and improvement of service level to the unserved population; (f) introduction of household water metering and consumption-based tariff that takes into account cost of O&M; (g) setting up of utility management standards and monitoring performance in line with the National Water Sector Strategy; and (h) achievement of financial sustainability. A detailed description of the BWE's capacity is provided in Annexes 2 and 4.

40. To increase the BWE's capacity, the proposed project will finance the recruitment of three high-level staff: a wastewater engineer, an administrator/customer relation officer, and a financial officer (FO). These experts will train and accompany the BWE's staff to improve their performance in: (a) supervising the O&M of its wastewater facilities; (b) following up with the private sector service contract for O&M and making sure that wastewater is properly collected and treated according

³³ Lebanon Environmental Assessment of the Syrian Conflict. Sept 2014. Study undertaken by MOE with support from the EU and UNDP.

to acceptable standards; (c) organizing human resources and customers relations functions (that is, identifying customers, having a reliable data base, following up on billing and collection); (d) developing outreach activities aimed at improving fee collection in the areas with poor performance; in preparing BWE financial statements according to international standards; and (e) preparing budgets and following up with all stakeholders (the MoEW, MoF, donors, CDR) on financial and tariff issues and government subsidies.

41. **Subcomponent 3.4: Capacity building of the MoEW (IBRD-US\$0.5 million).** Funding will be provided to the MoEW to assist in overseeing the wastewater sector performance, monitoring the implementation of the *National Wastewater Strategy*, designing/revising the tariff structure and completion of wastewater master plans in districts where they do not exist.

42. **Subcomponent 3.5: Project management (IBRD-US\$0.5 million).** This component will support the establishment of a functioning Project Management Unit (PMU) at the CDR. Funding will cover the cost of consultants, field visits, office equipment, audits, operating costs necessary for project implementation, and activity monitoring and evaluation. This component will be implemented by CDR in close cooperation with the Ministry of Environment (for the solid waste studies); the LRA (for the water monitoring); the BWE and the MoEW (for wastewater works).

B. Project Financing

43. The proposed lending instrument is Investment Project Financing. The total project cost is US\$60 million, of which \$55 million will be financed by an IBRD loan and \$5 million through Borrower contribution. Table 1 provides the detailed cost estimates by component.

Project Cost and Financing

Table 1: Project Costs

Project Components	IBRD Financing (US\$ million)					GOL Financing (US\$ million)	Total Project Costs (US\$ million)
	Works	Goods	Consultant	Contingency	Total		
1. Improvement of municipal sewage collection							
Subcomponent 1.1: Expansion of sewage network to connect to Zahlé WWTP	24.70			1.30	26.00		26.00
Subcomponent 1.2: Expansion of sewage network to connect to Anjar WWTP	18.05			0.95	19.00	5.00	24.00
Subcomponent 1.3: Expansion of sewage network to connect to Aitanit/other WWTP	3.33			0.18	3.50		3.50
Subcomponent 1.4: Design, supervision, environment and social consultancy services			2.00		2.00		2.00
<i>Component 1</i>					50.50		55.50
2. Promotion of Good Agricultural Practices (including Integrated Pest Management)			1.50		1.50		1.50
<i>Component 2</i>					1.50		1.50
Solid Waste Management, Water Quality Monitoring, Capacity Building and Project Management							
Subcomponent 3.1 Technical studies in solid waste management (MOE)							
- Technical studies in solid waste			0.36		0.36		0.36
- Solid waste expert			0.24		0.24		0.24
<i>Sub-total</i>					0.60		0.60
Subcomponent 3.2 Improvement in water quality monitoring (LRA)							
- Water Quality Monitoring Stations		0.10			0.10		0.10
- Hydrologist/Water expert (part time)			0.17		0.17		0.17
- Communication expert			0.18		0.18		0.18
- Trash removal campaigns			0.25		0.25		0.25
<i>Sub-total</i>					0.70		0.70
Subcomponent 3.3 Capacity building of BWE							0.00
- Wastewater engineer			0.21		0.21		0.21
- Customer relation officer			0.24		0.24		0.24
- Financial officer			0.21		0.21		0.21
- Assistant			0.06		0.06		0.06
<i>Sub-total</i>					0.72		0.72
Subcomponent 3.4 Capacity building of MOEW			0.46		0.46		0.46
Subcomponent 3.5 Project Management (CDR)							
- Project Manager			0.27		0.27		0.27
- Procurement specialist (part time)			0.09		0.09		0.09
- Audit report			0.05		0.05		0.05
- Env/Social (as needed)			0.09		0.09		0.09
- Operating costs			0.02		0.02		0.02
<i>Sub-total</i>					0.52		0.52
<i>Component 3</i>					3.00		3.00
Total Project Cost	46.08	0.10	6.40	2.43	55.00	5.00	60.00

C. Lessons Learned and Reflected in the Project Design

44. Lessons learned under previous Bank operations, especially in the water and wastewater sector, have been taken into account in the design of the proposed operation including the following:

45. **Involve line ministries and water establishments from the project onset.** One of the lessons learnt through the Bank's long engagement in the water and wastewater sector is the need to involve line ministries and water establishments from the project onset. Within this proposed project, sectors are associated in every phase of the project. The PMU based at the CDR will be lean as each technical expert will be working out of the related sector premises. In addition, the project steering committee (that is, the Qaraoun Committee) already includes members of key stakeholder groups and the CDR; this will facilitate the flow of information and decisions.

46. **Involve the private sector in the O&M of water and wastewater infrastructure.** BWE has made a number of important investments in recent years in water supply and wastewater systems with the assistance of several donors, in particular the World Bank (about US\$100 million). Given BWE's

low capacity (technical, financial and managerial) to operate and maintain its facilities, the Government and BWE agreed to outsource the O&M of Baalbeck/Nabi Chit potable water supply networks and Iaat wastewater treatment plant designed to serve Baalabeck city and its surroundings. This has improved BWE efficiency by involving the private sector in the delivery of water and wastewater services through the introduction (for the first time) of O&M service contracts.

47. **Ensure proper sequencing of investments.** Ensuring that investments are well-planned and sequenced in time to make optimal utilization of investments already made. As explained in Box 1, due to the emergency nature of the Iaat WWTP, the Bank went ahead with the construction of the WWTP on the understanding that the Government will build the sewage network that will feed into the plants. Building the network did not materialize and the Iaat WWTP stayed idle for several years. During the preparation of this project, every effort was made to give priority to optimize investments already made before tackling new investment.

48. **Using FAO experience in promoting GAP-IPM practices.** In addition, the project learned from the FAO's outstanding technical and operational experience in developing and implementing sustainable strategies for IPM and conservation agriculture. As a leader of three regional IPM programs—in Asia, Near East, and West Africa—and several stand-alone national projects, the FAO is a pioneer in promoting IPM practices. Component 2 of the project will use the FAO's tested approaches (for example, FFS) to crop production and protection, combining different management practices to grow healthy crops and minimize the use of fertilizers and pesticides.

49. **Need to build the capacity of a river basin agency for planning and monitoring at basin level.** While there is not at this stage a river basin agency in the Beqaa, the LRA is in effect the closest institution as it has been given the secretariat role for the implementation of the roadmap of the business plan and it has the mandate of measuring water quality. As such, the project will start strengthening the capacity of the LRA in modeling, water quality monitoring, and communication.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

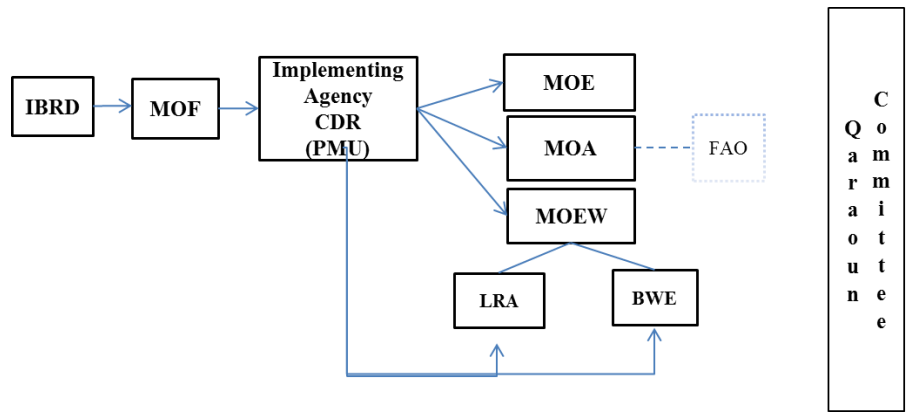
50. **Project Implementing Entity.** The project will be implemented by CDR, in close cooperation with MoEW, MOE, MOA, LRA and BWE and the recently established *Qaraoun Committee*.

51. **Project Management Unit (PMU).** The CDR will be the implementing agency, given the multisectoral aspects of the project, its wide experience with Bank operations, and its familiarity with fiduciary and safeguards aspects. The PMU will be headed by a project coordinator under the CDR's responsibility. The PMU will be responsible for contract management, fiduciary and safeguards oversight, auditing, monitoring and reporting, coordination, and so on. However, as described earlier, line ministries have been involved in the preparation of the project from the onset and will continue to be involved during implementation. As such, technical experts will be recruited by the CDR as part of the PMU but will be assigned to the line ministries/agencies and will report to the PMU project coordinator at the CDR and their respective sectors. This arrangement will facilitate and bridge the gap between the CDR and the line ministries. It will also contribute to raising capacity in the different sectors involved.

52. **The Qaraoun Committee.** As described earlier, the Qaraoun Committee—formally established by COM decision 32 of May 2014—already includes a representative from each

institution involved in pollution management along Qaraoun Lake.³⁴ The committee will have an oversight role in the implementation of the proposed project. Its main role is to ensure coherence and consistency between the proposed project and all other ongoing and planned investment in the upper Litani watershed area.

Figure 1: Implementation Arrangements



B. Results Monitoring and Evaluation

53. Monitoring and evaluation of outcomes and results during implementation will follow standard Bank practices. The PMU will prepare a **Progress Report** every semester (six months). The Project Manager of the PMU will have the overall responsibility of collating information that will be provided by the technical specialists at MoEW, MoE, MoA, LRA and BWE, and FAO. The Progress Report will collate all data related to project performance and will report on the progress of each indicator. The Progress Report will be communicated to all participating Ministries and the World Bank at the latest 45 days after each semester. To enhance transparency, the Progress Report will be published online. With regard to PDO level indicators (i) the quantity for municipal wastewater collected and treated under the project will stem from supervision consultants reports and will be the prime responsibility of CDR; (ii) with regard to the nutrient load reduction (N) achieved under the project this will be measured by total tons reduced per year. The recommended amount of nitrogen is 11.5 kg/du (according to FAO standards); farmers in the Beqaa are currently using three times as much (about 31 kg/du). Through FAO/MOA technical assistance component, the quantity is expected to be reduced by half. This indicator will be monitored by FAO; (iii) the number of locations monitored monthly for water quality is the prime responsibility of LRA. In addition, discharged treated wastewater will be monitored monthly in accordance with the Lebanese standards (Decision 8/1/2001) as further explained in the safeguards documents.

54. In addition, the LRA currently has a sustained – albeit limited—monthly monitoring of ten locations in the upper Litani River Basin for selected indicators³⁵. It uses a simple Water Quality Index (WQI), which presents the advantage of communicating water quality information in an understandable way for all stakeholders. The WQI summarizes a large amount of water quality data scores, reported as a total number between 1 and 100, with (i) 90-100 as excellent, (ii) 75-90 as good,

³⁴ Ministries of Environment, Energy and Water, Industry, Agriculture, Public Health, Interior, and Municipalities; the Council for Development and Reconstruction; the BWE; the LRA; the National Council for Scientific Research; and the Municipalities of Zahlé, Baalbeck, Ferzol, Marj, Anjar, and Jeb Jennin.

³⁵ Ammonia (NH₃), Chlorine (Cl), Conductivity, Dissolved Oxygen (DO), Nitrate (NO₃⁻), Nitrite (NO₂⁻), pH, Phosphate (PO₄³⁻), Sulfate (SO₄²⁻), and Total Dissolved Solids (TDS).

(iii) 60-75 as fair, (iv) 40-60 as marginal, and (v) 0-40 as poor. Under Component 3 of this project it is proposed to increase the number of locations to 20. Although LRA water monitoring will not be able to directly measure the benefits of investments made through this project it will nevertheless provide a good indicator of the overall water quality of the Litani River.

C. Sustainability

55. Sustainability of the proposed project will mainly depend on the capacity of the BWE to operate and maintain its water and wastewater facilities and properly manage the water establishment as a whole, that is, closely follow up on technical, administrative, organizational, financial, and human resources activities. The BWE will have to actively monitor billing and fee collection for water and wastewater services to its consumers and make sure that sufficient financial resources are available to cover the running costs of the utility. A detailed description of the sustainability framework is provided in Annex 2 (subcomponent 3.3) and in Annex 5.

V. KEY RISKS AND MITIGATION MEASURES

Risk Categories	Rating (H, S, M)
Political and Governance	H
Macroeconomic	M
Sector Strategies and Policies	M
Technical Design of Project or Program	S
Institutional Capacity for Implementation and Sustainability	S
Fiduciary	M
Environment and Social	M
Stakeholders	M
Overall	S

A. Overall Risk Rating and Explanation of Key Risks

56. The overall risk of the project is **Substantial**. This is mostly due to the current fragile political situation in the Beqaa region; the institutional capacity of the BWE and the possible delay in the construction of Anjar WWTP through Italian financing.

57. **Political and governance (High)**. Political instability and the ongoing conflict in Syria can further weaken the security situation in the Beqaa. This can limit mobility of consultants/contractors in the area, hinder the Bank's implementation support missions, and impede the capacity of the Government to implement the project. In addition, the absence of presidential elections since May 2014 may hinder the Government's priorities and its ability to reach consensus and make decisions. The Ministry of Environment and the Ministry of Energy and Water expressed high ownership and strong commitment towards this project. MOE has taken all the necessary steps for the preparation, consultation and validation of the *Business Plan to Combat Pollution in Qaraoun Lake* as well as for the establishment of the Qaraoun Committee. MOE has done this in close cooperation with all involved stakeholders including the Environmental Parliamentary Commission. MOE plans to continue its proactive involvement during project implementation by actively reaching out to the COM and Parliamentarians to ensure timely endorsement of the project by Parliament. With regard to the

security situation, the team will maintain a flexible approach and be ready to restructure the project if and when necessary.

58. **Institutional capacity for implementation and sustainability (Substantial).** The implementing agency (CDR) is very familiar with Bank procedures and has already implemented various Bank-funded projects. Its capacity to implement the proposed project is strong. However, the long-term sustainability of water and wastewater infrastructures in the Beqaa is the responsibility of the BWE and MoEW, which has much weaker capacity. To mitigate this risk, the team has ensured that BWE was, from the onset, closely involved in project preparation. It has also dedicated a subcomponent of the project to build BWE's technical and financial capacity and help them raise revenues by improving water and wastewater fee collection. BWE is also an active member of the Qaraoun Committee.

59. **Technical Design of Project (Substantial): delay in construction of Anjar WWTP.** The technical design of components 1 and 2 are straightforward and do not involve any risk. However, the rating has been elevated to Substantial due to the risk of delay in construction of Anjar WWTP. Anjar WWTP will be financed through the Italian Protocol and the Italian Directive Board already approved the financing in April 2015. However, experience from other projects has shown that there is a risk of delay in launching the tender and the subsequent construction of the WWTP. To mitigate this risk, the team has planned construction of the Anjar house connections in the last years of the project to give as much time as possible for the construction of the WWTP.

VI. APPRAISAL SUMMARY

A. Economic and Financial (if applicable) Analysis

Economic Analysis

60. This section describes the justification for public sector provision; the expected project impact; the Bank's value added; and the results of a cost-benefit analysis (CBA) carried out for the project.

61. **Justification for public sector provision.** Water pollution is an externality caused by market failure as there is no penalty for actions polluting water. Therefore, the private sector alone has no incentive to resolve the problem. Without an intervention, these market failures will continue to generate negative externalities to the environment (for example, pollution of the Litani River) and the population living nearby (for example, increased health risk due to pesticide residues in crops). Thus, using public sector funds to finance the project is considered appropriate.

62. **Expected project impact.** The project's expected benefits include (a) reduced pollution of the Litani River and Qaraoun Lake; (b) improved wastewater services in the project area; and (c) improved quality of fresh produce in the upper Litani basin.

63. **Bank value added.** The Bank is uniquely positioned to provide expert technical input based on the lessons learned from several years of operations in the water and environment sectors in Lebanon, particularly in the Beqaa region. Examples include the Baalbeck Water and Wastewater Project (P074042); the West Beqaa Emergency Water Supply Project (P103885); the Solid Waste/Environmental Management project (P005345); and analytical work Lebanon Country Environmental Analysis and the Cost of Environmental Degradation. In addition, the project uses the

FAO's vast experience in applying successfully tested methodologies (for example, FFS) to strengthen farmers' capacity for sustainable crop management in the upper Litani basin.

64. **Cost-benefit analysis.** The economic analysis of the project is based on the CBA approach. The results show that the project generates benefits in excess of their costs, with an Internal Rate of Return (IRR) of **17 percent**. To account for the long-term benefits provided by the project's investments, the analysis covers a 25-year time horizon³⁶. It captures several benefits, such increased aesthetic and recreational value along the Litani River and its tributaries due to sewerage network; reduced incidence of water-borne diseases (diarrhea) due to improved sanitation; and farmers' savings, because of the adoption of GAP-IPM practices. The analysis includes costs related to sewerage networks and farmers' training.

65. At a disaggregated level, the IRR is 17 percent for Component 1 and 30 percent for Component 2. In addition, results of a sensitivity analysis suggest that the project is economically viable also at 20 percent increase in cost (IRR of 13 percent). It remains economically feasible, with an IRR of 15 percent, if downsized to exclude Subcomponent 1.2 - *Expansion of sewage network to connect to the Anjar WWTP* (see Annex 5).

Financial Analysis

66. The BWE is a public agency established under the Water Law 221 of 2000 and its amendments, with a mandate to manage water resources of the Beqaa region. It operates by establishing sources of water, distributing and connecting new subscribers, maintaining the network, and collecting fees. The MoEW finances all capital investments, which after completion, are handed over to the BWE for O&M. The BWE accounts are still based on a cash system. Records are not on accrual basis and there is no disclosure of operational assets or account for liability or depreciation expenses. Despite these limitations, an attempt has been made to analyze the BWE revenues and expenses and to project financial flow in the future.

67. **Water and wastewater fees.** The present water tariff charged is based on a fixed fee. Each household connected is supposed to get 1 m³ of potable water per day. However, given the intermittence of water supply, households are receiving less than what they are billed for. Presently, the water supply fee is set at Lebanese Pounds (LBP) 220,000 per household per year (US\$146). Starting in 2013, a wastewater fee was introduced: it is LBP 10,000 (US\$6.5) for a household connected to a wastewater network and LBP 20,000 (US\$13) for a household connected to a WWTP. A modest fee is also billed for irrigation water at LBP 5,000 per hour.

Past performance

68. **BWE revenues.** Water collection rate has increased substantially over the years but remains below standards. As shown in the BWE records, the collection rate of water fees has increased from 17.5 percent in 2009 to about **35 percent in 2013**. No increase was noticed in 2014, however, given the critical role that bill collection plays, BWE is submitting a new proposal to its Board to reactivate the issue. New subscriptions and the outreach campaign during the previous Bank-funded project and with the assistance of other donors have contributed to improvement in the BWE revenue collection by about 100 percent from 2009 to 2013. Efforts made during the last three years have had a positive impact on BWE finances. BWE is now able to regularly pay its staff and part of its electricity bills. BWE's cash on hand as of August 2014 was equivalent to approximately 1.5 year's worth of staff

³⁶ This corresponds to the lifetime of sewerage network constructed by Component 1.

salaries and benefits, a significant progress under difficult circumstances. However, many issues remain with a large number of households connected to the water system but not paying bills, as well as those connected illegally (estimated between 30 to 50 percent of households). The revenues collected over the past six years are presented in Table 2. To compensate for cash shortfall, the BWE also receives grants from the MoEW mainly earmarked for capital expenditures and for O&M service contracts.³⁷

69. **BWE expenses.** The situation is more complex on the expenditure side. Records are based on a cash accounting system which does not show the entire expenditure picture. For example, electricity consumption, part of personnel payroll arrears, the social security debt as well as depreciation allowances for capital assets are not fully reflected in the accounts. Despite these limitations, available operating expenditures have been collected from the BWE and listed in Table 2.

Table 2: BWE Unaudited Financial Revenues and Expenses

		2008	2009	2010	2011	2012	2013	2014 estimate
REVENUES								
Fees collected								
-Water supply fees	LBP billion	4.59	4.80	6.43	8.45	8.98	10.18	11.11
-Wastewater fees	LBP billion	0.00	0.00	0.00	0.00	0.00	0.22	0.25
-Irrigation fees	LBP billion	0.08	0.07	0.05	0.07	0.13	0.12	0.09
Total		4.67	4.88	6.48	8.51	9.11	10.52	11.45
OPERATING EXPENSES								
Running expenses	LBP billion	4.91	4.64	5.39	7.14	9.18	10.45	12.48
O&M service contract	LBP billion	3.75	3.75	3.75	3.75	3.75	4.50	5.25
Electricity actual estimate	LBP billion	6.50	7.00	7.00	7.00	7.00	7.00	7.00
Total [Operating Expenses without depreciation]	LBP billion	15.16	15.39	16.14	17.89	19.93	21.95	24.73
COST RECOVERY								
		31%					48%	

70. **Cost recovery.** As noted above, efforts made during the last three years to increase revenues have made a positive impact on the BWE's finances. Available data on revenues and expenses show that the BWE contribution to cost recovery increased from 31 percent in 2008 to nearly 50 percent in 2013. The latter estimate is in the same range with the cost recovery of well-functioning water utilities in other countries, such as Tunisia where cost recovery is in the range of 65-70 percent.

Future performance

71. To assess the BWE's future performance, the revenues and costs were projected for the period 2015–2022, based on two scenarios: (a) a conservative scenario, where the collection rate increases gradually to 56 percent by 2022 and (b) an optimistic scenario involving an increase of collection rate to 81 percent by 2022. For both scenarios, the results of the analysis reveal that the BWE is able to improve the cost recovery to an estimated 90 percent (excluding depreciation) by 2022. The details are presented in Annex 4.

B. Technical

72. The project consists of three subcomponents related to the expansion of sewage networks feeding into existing or proposed wastewater treatment plants. Subcomponent 1.1 represents 50 percent

³⁷ Grants received from the MoEW were LBP 13.7 billion in 2011 and 2012 (US\$9.2 million); LBP 4.8 billion in 2013 (US\$3.2 million); and LBP 12.8 billion in 2014 (US\$8.5 million).

of the project costs (Greater Zahlé, Saadanayeh, Quaa El Rim, part of Taalabay, and part of Forzol). It consists of a new network and rehabilitation of the existing network currently discharging in the El Berdaouni River and other small water courses. The proposed package of networks are technically sound, and the design is based on applicable international standards and demand projections that are acceptable with relevant project components representing a least-cost solution. Although the WWTPs are financed by other funding agencies, they form an integral part of the proposed investments to be made under the project. Due diligence is (and will be) made for the technical and environmental design of WWTPs as well as on the expected quality of incoming wastewater and treated effluent. A post environmental audit has been carried out for the Zahlé WWTP, the largest one.

C. Financial Management

73. The CDR has significant experience in implementing construction components for Bank-supported projects and its financial management (FM) performance on past and current projects is considered satisfactory. It has a functional unit undertaking FM responsibilities, including funds flow management, accounting, reporting, and facilitating an acceptable external audit. The CDR external auditor will conduct the audit of the Bank-financed projects. The key FM issue for CDR projects is the lack of proper maintenance of assets lists and some delay in submission of project audit reports.

74. Given the adequate experience in WB reporting requirements guidelines, previous and current satisfactory FM performance, and limited assessed risk related to implementation of FM arrangements, a financial management chapter or manual will not be needed.

75. **The project's unaudited Interim Financial Reports (IFRs).** The IFRs will be prepared in accordance with International Public Sector Accounting Standards (IPSAS) - Cash Basis and generated through the accounting system. The IFRs will be sent to the Bank no later than 45 days after the end of each quarter.

76. **The Project Financial Statements (PFSs).** The statements will be prepared in accordance with IPSAS - Cash Basis and should contain the same information as the quarterly IFRs, but covering an annual period. The PFS will be audited by an independent private external auditor acceptable to the Bank. The audit will cover all activities of the project financed by the loan, including compliance with the Project Financial Manual, review of effectiveness of the internal controls system, and compliance with the Financing Agreement. The audit terms of reference (TOR) will be prepared by the CDR and reviewed by the Bank. The audit will be carried out in accordance with International Standards on Auditing. The audit report and PFSs, along with the management letter, will be submitted to the Bank no later than six months after the end of each fiscal year.

77. **Flow of funds.** The project will be financed through a loan from the World Bank to the Government of Lebanon. A Designated account (DA) for the project's loan funds will be opened at the Banque du Liban (BDL) in USD. The funds from the World Bank will be transferred directly to the project DA with no transit into the Treasury sub-account for Ministry of Finance (MOF), since loans to CDR follow a different procedure. CDR will use this DA to pay for eligible expenditures of activities financed by the World Bank.

78. **Retroactive financing.** The Ministry of Finance (through its letter dated May 8, 2015) has supported CDR's request for retroactive financing of up to 20 percent of the loan amount (equivalent to US\$11 million) for eligible expenditures under categories works, goods, consultant's services and training, and operating costs. Payments for items procured must be in accordance with applicable

Bank Procurement procedures. Payments can be made for eligible expenditures after on or after July 1, 2016.

D. Procurement

79. The World Bank Procurement “Guidelines: Procurement of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits and Grants”, dated January 2011 (revised July 2014) and “Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers”, January 2011 (revised July 2014)); the provisions stipulated in the Legal Agreement; and the World Bank Guidelines on Preventing and Combating Fraud and Corruption in Projects financed by IBRD Loans and IDA Credits and Grants, dated October 15, 2006, and revised in January 2011 and July 2014 will apply to the procurement and implementation of the project components financed by the Bank.

80. An assessment of the CDR’s procurement capacity was undertaken as part of project preparation. The Public Accounting Law of 1963, supplemented by several decrees, constitutes the legal foundation of Lebanon’s organizational and institutional framework for procurement. The current system has remained entirely centralized, with the Department of Tenders being in charge of public procurement. The CDR is, however, exempt from the Public Accounting Law of 1963. Since its establishment in 1977 as a legally and financially autonomous state agency, the CDR has operated under special procurement regulations. This was formalized in 1980 through a decree covering the CDR’s financial and accounting transactions assigned to the CDR by the minister of Finance. As a result, the CDR, under the monitoring of its Board, can adhere to the procurement requirements of donors including the Bank.

81. The CDR has demonstrated its capability to handle large and complex projects by using a combination of its own staff and outsourced staff and consultants to address the capacity needs of each specific project. In a reorganization of its functions in 2003, the CDR created a bureau for monitoring and evaluation as well as for appointing bid evaluation committees. The CDR at times, and when a project team is not adequately staffed, still faces difficulties in managing procurement issues due to the number of projects being implemented. To ensure satisfactory performance under this project, the CDR needs to use qualified outsourced procurement and technical consultants in addition to its own staff. Contract management capacity also needs to be improved to ensure timely decision-making and amendments to contracts as needed. Bank Standard Bidding Documents and Request for Proposals (RFPs) will be used for the Project.

82. A Procurement Plan dated March 7, 2016 for the first 18 months of project implementation has been developed. Procurement support missions will take place along with regular implementation support missions planned for the project (twice a year) and as part of interim reviews. In the event of a need for post review packages, these will be reviewed during Bank implementation support missions. Tender documents for the first procurement package (Zahle network, which represents about 50 percent of loan amount) has been prepared and will be submitted to the Bank for its review by August 2016.

83. As part of the plan, the CDR will use the services of the FAO for Component 2, as the FAO is uniquely qualified for the assignment. This is covered by paragraph 3.15 “Selection of UN Agencies” of the Guidelines for Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants.

E. Social (including Safeguards)

84. The project is expected to have positive social impacts. The intended beneficiaries will benefit from the project through improved access to sanitation services and reduced agrochemical pollutions in the project area. The negative social impacts are mainly associated with the minimal land acquisition for construction of the pipeline networks. Since the detailed design of subcomponents 1.2 and 1.3 will be prepared during implementation, the final sewage pipelines alignments is not yet known; therefore a Resettlement Policy Framework (RPF) has been prepared by following requirements of OP 4.12 and relevant laws and regulations of Lebanon. Although no resettlement and only minor land acquisition are expected, a RPF will be used as a guideline for land expropriation during project implementation. The RPF has already been reviewed and cleared by the Bank and has been disclosed in country (February 11, 2015) and in the Bank's infoshop (February 12, 2015). Citizen engagement will be ensured through multiple consultation during project implementation in particular with regard to safeguard aspects. In addition, IPM activities - under component 2 - will be implemented through the FFS methodology, which is a proven methodology based on a participatory approach to train and empower farmers (including female farmers) on the use of IPM techniques and on the proper handling and disposal of pesticides. Finally, trash removal campaigns (under component 3) will engage youth from the surrounding districts so as to induce a behavioral change towards a cleaner environment. The Grievance Redress Mechanism is described in detail in Box 2 in Annex 3.

85. Construction of 108 km pipelines connected to Zahlé WWTP will pass through 22 plots of privately owned land, belonging to 37 landowners in two villages. The details of land acquisition are shown in the table below. To mitigate the impacts of the land expropriation, a land acquisition plan has been prepared, cleared and disclosed in country (March 13, 2015) and in the Bank's InfoShop (March 18, 2015).

Table 3: Expropriation Area under Subcomponent 1.1

Village	Number of plots	Number of landowners	Total area of plots affected	Total area of expropriation (m ²)
Zahlé	12	25	358,282	5,113.82
Hezzerta	10	12	1,790,804	1,108

86. A retroactive review was carried out for the land used for the Zahlé WWTP. The land was expropriated by the Municipality in 1997 for construction of the WWTP and the sanitary landfill. Total size of the land plot (#508) is 25 hectares, 90,000 square meters of which was used for the WWTP, and the remaining was used for the landfill. The plot of the land was owned by one land owner. The compensation value was determined by the Expropriation Committee based on the market price at the time of expropriation and all compensation has been paid to the affected person. There are no pending issues or disputes over the ownership on the land used for the WWTP. The Aitanit WWTP was built on the land owned by LRA.

F. Environment (including Safeguards)

87. The nature of the project is to bring significant benefits to the environment and public health by reducing the amount of untreated wastewater and agrochemicals discharged in the Litani River. Therefore, the project, by its very nature, is a public good and will result in significant environmental improvements and long-term public health benefits. However, some impacts on the environment are expected, especially for the activities under Component 1 as expansion of sewage networks involves

civil works. Therefore, this project triggers OP4.01 - Environmental Assessment and is categorized as Category B.

88. The connection to the Zahlé WWTP (subcomponent 1.1) has been confirmed and the detailed design has been prepared. Accordingly, the site-specific Environmental Impact Assessment (EIA)/Environmental Management Plan (EMP) has been prepared. For subcomponents 1.2 and 1.3, the details (for example, connection routes, number of households to be connected) are not known and will depend on the detailed design during project implementation. Therefore, an Environmental and Social Management Framework (ESMF) was prepared before appraisal and disclosed on February 12, 2015 through the InfoShop. The site-specific EIA/EMP for subcomponents 1.2 and 1.3 will be prepared before construction starts. The ESMF and EIA/EMP for the Zahlé WWTP have been reviewed and cleared by the Bank. Consultation with government stakeholders as well as public stakeholders was held on September 13, 2014. The documents have been disclosed in-country (February 11, 2015) and through the InfoShop (February 12, 2015). In addition, if the project finances the expansion of network connecting to Aitanit WWTP, the Government has prepared a “Comprehensive Performance and Environmental Audit of Aitanit WWTP” which was reviewed by the Bank and disclosed on September 16, 2015.

G. Other Safeguards Policies Triggered (*if required*)

89. The project triggers OP4.09 - Pest Management because Component 2 includes the promotion of IPM practices. The impacts from this activity will be positive because the project will promote reduction in the use of pesticides and fertilizers through adopting IPM. However, the policy was triggered to ensure that these activities are well-managed. The IPM guidelines have been included in the annex of the ESMF.

H. World Bank Grievance Redress

90. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB’s Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB’s independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank’s attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank’s corporate Grievance Redress Service (GRS), please visit <http://www.worldbank.org/GRS>. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

Annex 1: Results Framework and Monitoring

Country: Lebanon

Project Name: Lake Qaraoun Pollution Prevention Project (P147854)

Project Development Objectives	
PDO Statement	
The development objectives of the project are to reduce the quantity of untreated municipal sewage discharged into the Litani river and to improve pollution management around Qaraoun Lake.	
These results are at	Project Level

Project Development Objective Indicators								
Indicator Name	Baseline	Cumulative Target Values						
		YR1	YR2	YR3	YR4	YR5	YR6	End Target ³⁸
Direct project beneficiaries (Number) - (Core)	0	0	0	0	206,000	211,000	344,000	344,000
Female beneficiaries (Percentage - Sub-Type: Supplemental) - (Core)	0	0	0	0	49	49	49	49
Quantity of municipal wastewater collected and treated under the project (daily flow in m ³)	0	0	0	0	15,000	20,000	30,000	30,000
Nutrient load reduction (Nitrogen [N]) achieved under the project (Tons/year) - (Core)	496	496	496	446	347	298	248	248
Number of locations monitored monthly for water quality	10	10	15	15	20	20	20	20

Intermediate Results Indicators								
Indicator Name	Baseline	Cumulative Target Values						
		YR1	YR2	YR3	YR4	YR5	YR6	End Target
Sewer network constructed in the project area (Km)	0	0	0	50	90	120	200	200
New household sewer connections constructed under the project (Number) (Core)	0	0	0	2,400	4,800	5,000	7,300	7,300
Clients who have adopted an improved agr. technology promoted by the project (Number) - (Core)	0	0	25	75	150	200	225	225
Clients who adopted an improved agr. technology promoted by project - female (Number - Sub-Type: Breakdown) - (Core)	0	0	1	4	8	10	11	11
Quantity of trash removed from Litani river banks (m ³)	0	0	250	500	750	1,000	1,250	1,250
Participants in consultation activities during project implementation (number) (Core)	50	50	100	100	100	100	100	100
Participants in consultation activities during project implementation – female (number) – (Sub-Type: Breakdown) – (Core)	20	20	40	40	40	40	40	40

³⁸ End target estimate for quantity of sewage collected, km of sewer constructed and number of household connection relates to all subcomponents under Component 1.

Annex 2: Detailed Project Description
LEBANESE REPUBLIC
Lake Qaraoun Pollution Prevention Project

Business Plan to Combat Pollution in Qaraoun Lake

91. In 2010, the MoE commissioned a Business Plan to identify the major sources of pollution in Qaraoun Lake and recommend appropriate solutions to mitigate them. The plan includes detailed prioritized investments for each polluting sector, with a financing requirement estimated at about US\$255 million.

92. **The Business Plan methodology.** The Business Plan identified seven zones in the catchment area of the Litani River, based on the river tributaries. For each zone, a socioeconomic and environmental profile was determined as a result of a thorough desk review of previous studies and databases, liaisons with stakeholders, and extensive field data collection. Further, pollution pressures were assessed from the following sources:

- *Solid Waste.* Municipal, industrial, and healthcare waste disposal practices were analyzed across the Litani catchment area. Then, the susceptibility of the surface water to pressure was assessed based on the pressure's distance to the surface water stream, expert judgment from the field examination, and the likelihood of the dumpsite receiving solid waste of hazardous nature.
- *Domestic wastewater.* The severity of the threat from each urban settlement was assessed based on several factors: discharge location, wastewater outflow, presence of a wastewater network, and plans to connect the settlement to a wastewater treatment plant in the future.
- *Industrial wastewater.* The pressures from industrial wastewater were assessed through a field survey of 294 industrial establishments and their prioritization according to their potential direct impact on the Litani River.
- *Agriculture.* The analysis investigated two aspects of agricultural pollution: pesticides and fertilizer use. Two surveys targeting agricultural input suppliers and more than 100 farmers were administered to collect information on the type of pesticides and fertilizers used per crop and the quantities of each compound applied per crop.

93. The *Business Plan* then assessed the quality of surface water and sediments in the Litani River, tributaries, and Qaraoun Lake based on: (a) desktop analysis of more than 15 studies pertaining to water and sediment quality; (b) analysis of contaminant concentrations in surface water and recording of the overall frequency of exceeding guideline values; and (c) test of sediments for exceedances of metal in sediments (for example, cadmium, lead, arsenic, zinc, vanadium, chromium, and copper). The quality of water was determined to be good, average, or poor according to the number of exceedances of standards or guideline values for different end users. Finally, the Business Plan examined the institutional, legal, and financial enabling environments in the solid waste, wastewater, and agricultural sectors and proposed measures to alleviate the pollution in the lake based on the severity of the pressures identified and the gaps in addressing sectoral issues.

94. In February 2013, the GoL requested the Bank's assistance to fund priority activities of the Business Plan. On this basis, the Bank has identified the activities that will be funded through this project and described in detail in the following paragraphs.

Component 1. Improvement of municipal sewage collection (IBRD US\$50.5 million, GoL US\$5 million)

95. This component will finance activities that increase sewerage collection in areas where wastewater treatment plants have been constructed (or planned to be constructed soon) to maximize the use of these investments. It will finance the following subcomponents:

Subcomponent 1.1: Expansion of sewage collection to connect to the Zahlé WWTP (IBRD US\$26 million)

96. **The Zahlé WWTP was already part of the Lebanon Wastewater Master Plan prepared in 1982.** The plan, which was later updated, foresees the construction of a large number of WWTPs to prevent the discharge of untreated wastewater (pollutant) in the sea and the rivers. The Zahlé WWTP, which is under construction with funding from the Italian Protocol, aims primarily to protect the Litani River. Today, large quantities of sewage water in the Litani catchment area are discharged to the river beds in an uncontrolled environment. The plant is expected to become operational in October 2016. The plant is being constructed with a daily flow capacity of 37,300 m³ and can be expanded to a daily flow capacity of 56,000 m³ by 2040.³⁹ The plant will connect to an existing network of about 350km.

97. **Existing sewerage network.** The project area is currently served by an old sewerage network. Existing collectors in Zahlé and Saadnayel mostly discharge into the Berdaouni River. The Hezzerta municipality is split into two areas: the old city served by an old network discharging into the Berdaouni and a new area served by one collector (300mm width) laid in the main road Zahlé-Tarchich and connected to the Zahlé network which also discharges into the Berdaouni water course. Quaa El Rim village is served by an old sewerage system with a new line connected to the Zahlé sewer network. Taalabaya has a part that should be connected to the Zahlé WWTP. Currently all the sewerage systems mentioned above are working in separate systems.

98. **The proposed project intends to finance:** (a) the construction of about 108 km of new sewerage network, (b) the rehabilitation of part of the old network, and (c) about 6,000 house connections. According to the final design, the gravity sanitary sewage network will not require any pumping station. The area that will be covered is Greater Zahlé (including Karak and Ksara), Quaa El Rim, Hezzerta, Saadnayel, part of Taalabay, and a part of Forzol.

Table 2.1: Population and Wastewater Flow Projections

	2015	2030	2040
Zahlé	122,756	159,242	189,412
Saadnayeh	21,255	27,568	32,795
Quaa El Rim	3,821	4,956	5,896
Hezzarta	4,942	6,410	7,624
Taalabaya (part)	10,929	14,175	16,863
Forzol (part)	3,887	5,042	5,997
Population	167,590	217,390	258,590
Equivalent population	217,900	282,600	336,200
Estimated wastewater flow (m ³ /day)	33,500	44,500	56,600

99. **Design criteria.** The design period for the project lasts until 2030 for the Zahlé WWTP and up

³⁹ Republic of Lebanon. CDR. Expansion of Wastewater Networks in Zahlé, Quaa el Rim, Hezzerta, Karak, and Saadnayel Feeding Zahlé Wastewater Treatment Plant – Caza Zahlé. Final Design Report. December 2014. Prepared by Rafik El-Khoury & Partners.

to 2040 for the network. The parameters used to estimate sanitary flow are provided in Table 2.2.⁴⁰ The design of the network is based on a topographic survey using cadastral maps and satellite images showing routes and public domain for existing main networks, networks to be replaced, and the proposed new network. The design is being prepared in line with local and international standards. The designed sewage collection network will only serve municipal wastewater. In the new network the sewer is diluted by infiltration and inflow allowance (10 percent is used for design purpose). The majority of the proposed sewer lines are in the public domain and do not need land acquisition. Some sections are on private land; the estimated land to be expropriated is 6,221 m² (further detail is provided in the Social Safeguards section).

Table 2.2: Wastewater Estimate

Wastewater estimate (l/capita/day)		
	Rural Zone	Urban Zone
- Domestic water consumption	165	180
- Non domestic water consumption (incl infiltration)	49.5	54
- Estimated sanitary flow	189	206

Subcomponent 1.2: Expansion of sewage network to connect to the Anjar WWTP (IBRD US\$19 million, GoL US\$5 million)

100. In 1995, the Ministry of Hydraulic and Electrical Resources—known today as the MoEW—commissioned the formulation of a wastewater master plan for the district of West Beqaa. This plan included the construction of the Anjar WWTP close to the Litani River, with a capacity of 31,000m³ (extendable to 42,300 m³ per day). At that time, the treatment plant was expected to serve seven localities in West Beqaa—Anjar, Majdel Anjar, Saouiri, Barr Elias, El Marj, Er Raouda and Qabb Elias—with a total population of 130,000. In 2004, the CDR requested to foresee the conveyance of wastewater from an additional ten localities of Zahlé district to Anjar WWTP. Currently, it is expected that the Anjar WWTP will be built and connected to 17 localities from West Beqaa and Zahlé districts. In 2004, a feasibility study, an economic/financial study, and an EIA were prepared to assess the feasibility of the Anjar WWTP. In 2010, the feasibility study was updated (to take into account population projections, wastewater flow projections, and wastewater conveyance system redesign), and a detailed design for the Anjar WWTP and the sewer network for the six localities was prepared.⁴¹

101. The Italian Protocol will fund the construction of the Anjar WWTP, the sewage network for the seven localities, one main collector, and three pumping stations to convey all wastewater generated from the remaining ten localities. The estimated cost for this task is €28⁴²million including expropriation⁴³ and two years of O&M.

102. **The proposed project** intends to finance the construction of around 135 km of sewage network to connect the Anjar WWTP to the ten localities. They are **Bouerij, Chtaura, Mrajjet, Jdita, Jjala, Makse**, part of **Taalabaye, Taanayet, Wadi Delem, and Zebdol**, and cover a population of about 80,000 (see Table 2.3). The detailed design of the remaining ten localities will be initiated shortly after project approval.

⁴⁰ Republic of Lebanon. 2014. Cited above.

⁴¹ Republic of Lebanon. CDR. Detailed Design, Preparation of Tender Documents and Assistance during Tendering For Anjar/Majdal Anjar (Al Marj) Wastewater Treatment Plant Project. Design Report. December 2010. Prepared by Bureau Technique pour le Développement (BTD).

⁴² €26.4 million is from the Italian Protocol and the remaining from GoL contribution

⁴³ The Decree for expropriation for Anjar WWTP has been issued.

Table 2.3: Population Projections

Investment 2. Population projections in the served area (Anjar WWTP)			
Localities	2015	2030	2040
Bouerij	3,980	5,370	6,560
Chtaura	2,980	4,030	4,920
Mraijet	5,530	7,460	9,110
Jdita	16,580	22,380	27,330
Jlala	2,980	4,030	4,920
Makse	4,970	6,710	8,200
Taalabaya	33,160	44,750	54,660
Taanavel	5,520	7,460	9,110
Wadi	3,320	4,470	5,470
Zebdol	1,770	2,390	2,910
Total	80,790	109,050	133,190

Subcomponent 1.3: Expansion of sewage network to connect to Aitanit/other WWTP (IBRD US\$3.5 million)

103. During 2010–2013, USAID financed the Small Village Wastewater Treatment Systems Program which aimed at constructing small treatment facilities for domestic wastewater collected from communities in the northern Litani River basin.⁴⁴ Three treatment facilities were successfully constructed: in Ablah, Ferzol, and Aitanit. They are currently in operation serving eight municipalities.⁴⁵ The Aitanit plant is designed to provide secondary treatment level and has a capacity of 5,000 m³ per day⁴⁶ and is connected to four villages: **Baaloul, Qaraoun, Aitanit, and Machgara** with a total population of 22,300.⁴⁷ The Aitanit WWTP is the closest to Qaraoun Lake and is located 400 meters south of the Qaraoun Dam. However, it operates under capacity, at a flow of 500–700 m³ per day. This component will finance the network expansion of the **Aitanit WWTP** in the four villages. Several donors have expressed interest in providing parallel funding for the subcomponent, and if additional funding becomes available, the project will consult with the Government on what additional connections could be financed.

Subcomponent 1.4: Design, supervision, environment and social consultancy services (IBRD US\$2 million)

104. In addition, the project will finance design and supervision consultancies for component 1; as well as the preparation of safeguards documents (for subcomponents 1.2 and 1.3) and oversight of safeguard instruments.

Component 2. Promotion of Good Agricultural Practices (including Integrated Pest Management (IBRD US\$1.5 million)

105. Agriculture plays a significant role in Lebanon’s economy, accounting for five percent of the GDP and providing income to 20 percent of the population. Cultivated land covers 2.3 million dunum (du), or nearly a quarter of the total land; of which, about 1.1 million du is irrigated. Lebanon’s agricultural land is concentrated in the Beqaa Valley, which covers 39 percent of the cultivated area and 66 percent of the irrigated land. In the Beqaa, the main crops cultivated are cereals (46 percent of the cultivated land), followed by vegetables (19 percent) and tubers (18 percent). These are the main

⁴⁴ USAID. 2010a. Assessment of Sewer Networks for Five Villages around Aitanit WWTP in the Beqaa Valley of Lebanon. Final Report & Recommendations.

⁴⁵ USAID. 2010b. Assessment study reports for five villages: Aitanit, Baaloul, Lala, Mashghara, and Qaraoun. August 2010.

⁴⁶ Environmental and social safeguard studies for Lake Qaraoun pollution prevention project, Coordination Meeting, September 24, 2014.

⁴⁷ This includes 4,000 people in Balaoul, 6,000 in Qaraoun, 1,300 people in Aitanit, and 11,000 people in Mashghara (USAID 2010b).

irrigated crops in Zahlé and West Beqaa districts as indicated in table 2.4.

Table 2.4. Distribution of Agricultural Land in the Beqaa Valley

	Cereals		Leguminous		Forage		Vegetables		Tubers		Total
	000 du	%	000 du	%	000 du	%	000 du	%	000 du	%	000 du
Zahlé	58.9	36	7.7	5	3.4	2	39.9	25	51.8	32	162.6
West Beqaa	80.8	61	6.3	5	4.8	4	15.7	12	25.5	19	133.2
Baalbeck	116.4	44	24.0	9	1.9	1	51.8	19	33.9	13	262.6
Hermel	15.6	40	11.3	29	0.1	0	8.7	22	2.6	7	38.9
Rachaya	16.3	66	5.5	22	0.5	2	2	8	0.2	1	24.6
Total Beqaa	287.9	46	54.7	9	10.8	2	118.1	19	114.1	18	621.8

Note: The total agricultural land of Beqaa (621,800 du) includes the areas under each crop reported in the table and the area of industrial crops (36,200 du). The table does not report industrial crops as they are not part of this project.

106. **Farmers' behavior.** The upper Litani basin extends over an area of around 1.8 million du, comprising the country's most fertile lands. The area is cultivated with crops that have high demand for agrochemicals (for example, potatoes, summer vegetables) and crops demanding less agrochemicals (for example, wheat, barley, vineyards). An agricultural survey⁴⁸ conducted among 37 farmers evaluated the impact of the on-farm practices on the quality of the Litani River and Qaraoun Lake. It revealed that farmers tend to use high amounts of fertilizers with the aim of maximizing their benefits. Specifically, more than 88 percent of potato farmers and about 28 percent of vegetable farmers over-fertilized their lands, and over 36 percent of potato farmers apply nitrogen fertilizer rates twice or more the recommended rates. Many of them also complained about the high cost of production but did not perceive that over-fertilization may be an important contributor to this cost.

107. **This component will promote** the use of sustainable production systems among farmers in the upper Litani basin by introducing GAP, which includes: reduced fertilizer application, other conservation practices and selected IPM⁴⁹ measures such as reduced pesticide application. These practices are expected to provide increased quality of agricultural products (without reducing yields); farmers' savings (through decreased cost of production); and reduced pollution of the Litani River.

108. **Target.** There are about 1,500 relatively large farms (> 40 du) in the Zahlé and West Beqaa districts. About 50 percent of them are cultivated with potatoes and vegetables. Thus, the project will target 750 farms. It is expected that at least 30 percent of them will adopt these practices by the end of the project, which corresponds to **225 farmers**. In the targeted farms, the project will focus on reducing the use of fertilizers and pesticides, as described below.

- **Reducing fertilizers.** The main agrochemical polluter of the river is nitrate, while potato is the main crop being over fertilized. The recommended amount of nitrogen is 11.5 kg/du, while farmers are currently using three times as much (about 31 kg/du). This component aims at **reducing this amount by 50 percent**, to about 15 kg/du. It will target 16,000 du, corresponding to 25 percent of the total potato area in the West Beqaa and Zahlé districts. Therefore, the component will reduce the fertilizer use on potato areas by about **248 tons** (15.5 kg/du * 16,000 du).⁵⁰

⁴⁸ The survey was undertaken as part of the Litani Water Quality Management Project/ Litani Basin Advisory Services (BAMAS).

⁴⁹ IPM means careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest population and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM emphasizes the growth of healthy crops with the least possible disruption to the agro ecosystem and encourages natural pest control mechanism (FAO Council, November 2002).

⁵⁰ In addition, on vegetable areas, current problems of nitrate fertilization are related to timing rather than quantity applied. For example, applying too much fertilizer at the beginning can result in high leaching losses below the root zone. Therefore, on these areas, the component will guide farmers to the

- **Reducing pesticides.** Farmers currently rely on application of chemical pesticides, with little knowledge about their handling and management. The project will control the use of pesticides on rational basis according to IPM tactics and practices on farm. This component aims to **reduce pesticides application by about 40-50 percent** of their current use in targeted crops (FAO 2015).

109. **Activities.** IPM activities will be implemented through the FFS methodology, which is a proven methodology based on a participatory approach to train and empower farmers on the use of IPM techniques and on the proper handling and disposal of pesticides. Similar participatory approaches will be used to train farmers on alternative methods and practices for sustainable fertilizer use in the project area. Baseline surveys and regular farm visits will be conducted to monitor the use of agrochemicals by targeted farmers as well as the sales of these chemicals in the project area.

110. **Steps.** The component is based on four steps:

- (a) Assessing current agricultural practices and developing GAP-IPM program. Review previous surveys, undertake chemical analysis of soil and water, and identify essential practices to address existing gaps (that is, activities, target farmers, and crops).
- (b) Train professionals and facilitators in GAP-IPM practices. Train field technical staff from MoA, other stakeholders, and facilitators on extension and FFS methods to promote the practices identified above.
- (c) Implement the GAP-IPM program at the farm. Identify the FFS curriculum and agricultural inputs needed and establish and run the FFS based on crops and target areas.
- (d) Evaluate and monitor for sustainability. Provide the monitoring, review, and follow-up strategy for sustainability of the project outcomes.

111. Given that the FAO has been implementing a Regional Integrated Pest Management Program in the Near East since 2004 that covers ten countries (including Lebanon), the MoA has requested assistance from the FOA in implementing this component of the project.

Component 3. Solid Waste, Water Quality Monitoring, Capacity Building, and Project Management (IBRD US\$3 million)

Technical studies in solid waste management (US\$0.6 million)

112. The quantity of solid waste generated in villages/towns located in the Upper Litani catchment was estimated at about 650 tons per day in 2011. Currently there is one sanitary landfill (constructed through the Bank-funded *Solid Waste Environment Management Project*) in **Zahlé** receiving about 180 tons per day. A sanitary landfill is under construction in **Baalbeck** (with Italian financing) with a capacity of 150 tons per day. A sorting facility with a capacity of 100 tons per day is also under construction in **Jeb Jennin** with funding from the municipality. The EU through the SWAM II⁵¹ project is likely to fund a landfill in Jeb Jennin. Recently the EU through the *Economic and Social Funding Development* will fund the construction of a sorting and landfilling facility in **Barr Elias**. More recently the union of municipalities is preparing a sorting facility in **Sehmor** (to serve the West Beqaa region). Once operational, these facilities will alleviate the amount of solid waste being dumped in uncontrolled dump sites and along the Litani River. Furthermore, the GoL is in discussion with the EU to allocate further funding to solid waste management in areas affected by the Syrian

most appropriate timing of nitrate application, so as to reduce pollution and maintain yields (FAO. 2015. Proposal on Promotion of Integrated Pest Management and Good Agricultural Practices to reduce agrochemical pollution in the upper Litani basin and Qaraoun Lake).

⁵¹ Upgrading Solid Waste Management Capacities in Beqaa and Akkar Regions in Lebanon (SWAM)

crisis.

113. The estimated cost of this subcomponent is US\$0.6 million. It includes technical, environmental, and social studies undertaken for (a) establishing a sorting facility in Rachaya; and (b) closure and rehabilitation of dump sites such as Temmin al Tahta, Qab Elias, Barr Elias, Hawch Al Harim, Al-Khyara, Jeb Jennine, Gazze, or Kayyal (based on the Master Plan for Closure and Rehabilitation of Uncontrolled Dumps [2011]) as well as the recruitment of a solid waste expert (as part of the PMU) to be seconded to the MoE.

Improvement in Water Quality Monitoring and Resources Modeling - LRA (US\$0.7 million)

114. The LRA has been assigned the secretariat responsibility of the Qaraoun Committee established to follow up on the *Roadmap for Combating Pollution in the Qaraoun Lake*. To support the LRA in its secretariat role and building on the achievements of the USAID-funded Litani River Basin Management Support Program, this component of the project focuses on (a) improving water quality monitoring network and water resources modeling; and (b) raising awareness for the cleanup of the Litani River.

115. **Improving water quality monitoring network.** The LRA has a sustained—albeit limited—monthly monitoring of ten locations in the upper Litani basin for the following indicators: ammonia (NH₃); chlorine (Cl); conductivity; dissolved oxygen (DO); nitrate (NO₃); nitrite (NO₂); pH; phosphate (PO₄); sulfate (SO₄); and total dissolved solids (TDS). The LRA then uses a simple Water Quality Index (WQI), which presents the advantage of communicating water quality information in an understandable way for all stakeholders. The WQI summarizes a large amount of water quality data in scores reported as a total number between 1 and 100, with (a) 90–100 as excellent, (b) 75–90 as good, (c) 60–75 as fair, (d) 40–60 as marginal, and (e) 0–40 as poor. Under this component, the number of locations will be increased to 20 and support will be mainly in the form of water quality measurement equipment, which could also expand the water quality indicator measured (such as BOD⁵²).

116. **Improving water resources modeling.** Over time, the LRA will need to develop a system-wide modeling of the upper-catchment (hydrology, water quality, and so on), which will support monitoring progress during the implementation of the MoE's Business Plan for Combating Pollution in Qaraoun Lake. The LRA has already existing surface and groundwater flow models (such as HEC-RAS and Modflow) and these will be a good basis to expand to the wider upper catchment modeling. Under this component, a water expert will be hired to support in assessing existing models, current, and projected water balance and integrate as possible current models to a wider upper catchment modeling. The TOR of the water expert was discussed and is in advanced stage of preparation.

117. **Raise awareness.** The LRA will continue to raise awareness about the need to clean up the Litani River by undertaking awareness and clean-up campaigns. It is important to involve all stakeholders in order to change the behavior of water users. The impact of awareness should be to the extent possible, monitored over time with a simple survey, at an agreed frequency, to assess the change in level of knowledge and engagement of stakeholders who benefitted from the campaign. Under this component, a communication expert and awareness and clean-up campaigns will be funded. The TOR of the communication expert has been prepared.

118. The estimated cost of this component is US\$0.7 million. It includes increasing the number of water quality monitoring locations in the Upper Litani from 10 currently to 20 (for an estimated

⁵²Biochemical oxygen demand is an indicator of the organic pollution of freshwater.

amount of US\$0.1 million); getting specialized assistance in water management (for an estimated amount of US\$0.27 million); and undertaking various clean-up campaigns with support in communication (for an estimated amount of US\$0.43 million).

Capacity building of the BWE (estimate US\$0.7 million)

119. The BWE is a public agency with the mandate to operate and maintain the water supply, wastewater, and irrigation in the Beqaa. Its capacity to conduct these activities needs to be developed, particularly in the wastewater sector. The BWE's Business Plan for 2013–2017 outlined the main deficiencies and recommended actions to improve them. These recommendations focus on the need for (a) a better organizational structure and management; (b) a human resources program that will prepare BWE staff to assume responsibility for wastewater network and treatment facilities; (c) improved collection efficiency; (d) documentation of customers, including the reduction of unregistered and illegal users; (e) extension and improvement of service levels to the unserved population; (f) introduction of household water metering and consumption-based tariff that takes into account cost of O&M; (g) set-up of utility management standards and monitoring performance in line with the National Water Sector Strategy; and (h) achievement of financial sustainability. The BWE needs to raise its capacity at several levels, as outlined in the following paragraphs.

120. **Governance.** The BWE has limited ability to enforce rules and regulations while conducting its activities, primarily making users pay their bills and stopping illegal users of water. This problem is closely related to the country context of political uncertainty, security incidents, and refugee situation.

121. **Organizational structure.** The BWE has submitted a proposal for a new organizational chart to the MoEW. It includes the creation of a new Wastewater Unit to be in charge of the newly expanding wastewater sector in the Beqaa region, in accordance with the Water Law. The MoEW has yet to submit the proposal to the supervising authorities in the Government (Council of Ministers, Civil Service Authority, and so on) to issue a presidential decree, which would make the organizational chart effective. After the decree is issued, the BWE will be able to allocate budget and hire staff for the wastewater activity.

122. **Staffing.** The BWE suffers from shortage of staff, especially in higher-level positions such as engineers and FOs. The water bylaws issued in 2005 require filling 18 engineer positions in the wastewater sector. However, only two engineers were hired during the last eight years. The BWE's difficulties in attracting highly qualified professionals are mainly a result of low salaries provided within the Government's compensation scheme. Outsourcing to the private sector has been so far the solution to respond to the BWE's basic needs. While this is a good practice, having a minimum number of qualified staff would increase the BWE's technical and operational skills to supervise consultants and contractors.

123. **Customer relations/collection rate.** In the past, governance issues and insufficient human and financial resources made relations with customers difficult. Additional effort is required to actively engage with customers in a more efficient and transparent way by continuing training and campaigns to raise awareness. This would help raise subscriptions, avoid illegal connections, improve collection of fees/tariffs, and encourage good practices such as metering and rationalizing water consumption use. Given the critical role that collection plays; BWE has prepared a new proposal to its Board to revisit the issue of how to reinforce the collection effort. The **new proposal** focuses on: undertaking a new customer survey, outreach to political and municipal authorities that interact directly with people explaining the necessity to pay for water consumed, payment modalities and legal implications and

sanctions for those who refuse to pay; review of old debts and consider forgiveness of some old bills.

124. **Financial performance.** The BWE's weak administration and financial management organization led to poor financial performance in the past, as described in Annex 4. However, recent efforts have significantly improved collection, especially in the past three years. In addition, the BWE has been working on the financial module with various donors over time including recent assistance by USAID.

125. **To increase BWE's capacity, the proposed project will finance** the recruitment of three high-level staff: a wastewater engineer, an administrator/customer relation officer, and a Finance Officer (FO). They will train and accompany the BWE's counterpart staff during the implementation phase:

- (a) The wastewater engineer will assist the BWE in the tendering process and supervising the O&M of its wastewater facilities in a professional manner. S/he will prepare the TOR for the O&M contract, assist in tendering, and particularly focus on following up with the service contract of the O&M carried out by the private sector and make sure that wastewater is properly collected and treated according to acceptable standards. S/he will participate in all technical matters related to networks, pumping stations, quantity and quality of effluent and sludge, and procurement of goods and services.
- (b) The administrator/customer relation officer will assist in organizing human resources and customer relations functions, that is, identifying all customers, having a reliable data base, following up on billing and collection, and developing outreach activities aimed at improving fee collection in the areas with poor performance.
- (c) The FO will assist in preparing the BWE financial statements according to international standards. S/he will also prepare budgets and follow up with all stakeholders (the MoEW, MOF, donors, CDR) on financial and tariff issues and government subsidies.

126. While the CDR will be the implementing agency for the proposed project, it will work closely with the BWE throughout the construction phase. This will allow the BWE to operate and maintain the facilities that are handed over by the CDR at completion. The technical assistance specialists will be part of the PMU but will be seconded and based at the BWE offices.

Capacity building of the MoEW (estimate US\$0.4 million)

127. Funding will be provided to the MoEW to assist in overseeing the wastewater sector performance, monitoring the implementation of the *National Wastewater Strategy*, designing/revising the tariff structure and completion of wastewater master plans in districts where it does not exist.

Project management (estimate US\$0.5 million)

128. As described in the Implementation Arrangement section, a PMU will be established at the CDR. The PMU will consist of a full-time Project Manager and a Procurement Specialist (part or full time as needed based on work load at any given time). The CDR currently has the capacity to undertake the FM responsibility of the project. Should it become necessary, the CDR will consider recruiting a part-time FM specialist. In addition, it will hire a part-time environmental/social consultant. As described above, technical specialists will be recruited as part of the PMU, but will be seconded to the respective line ministries/agencies.

Annex 3: Implementation Arrangements

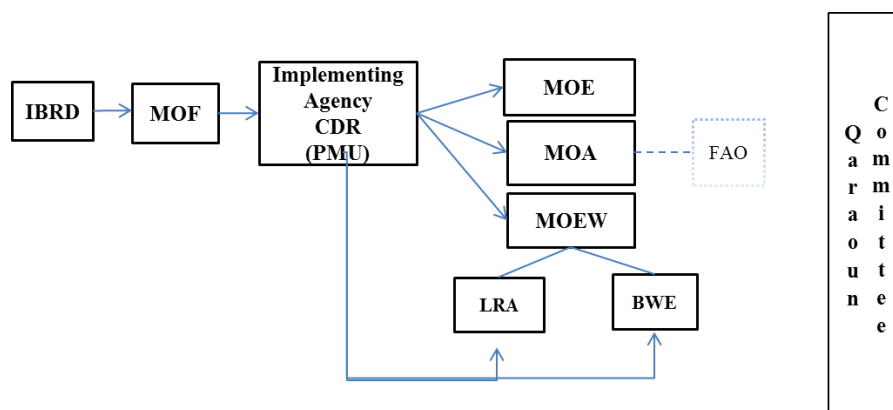
LEBANESE REPUBLIC Lake Qaraoun Pollution Prevention Project

Project Administration Mechanisms

129. **The Qaraoun Committee.** Formally established by the Council of Ministers decision 32 of May 2014, the committee already includes 16 stakeholder representatives. The committee has been active; holding monthly meetings since June 2014 and the first report to the Council of Ministers was submitted in November 2014. The Qaraoun committee will have an oversight role for the implementation of the proposed project. Its main role is to ensure the coherence and consistency between the proposed project and all other ongoing and planned investments in the Upper Litani watershed area.

130. **Project Management Unit.** The CDR will be the implementing agency, given the multisectoral aspects of the project, its wide experience with Bank operations, and its familiarity with fiduciary and safeguards aspects. The PMU will be headed by a project coordinator under the CDR's responsibility. The PMU will be responsible for contract management, fiduciary and safeguards oversight, auditing, monitoring and reporting, coordination, and so on. However, line ministries will be involved in the preparation and implementation of the project from the onset. As such, technical experts will be recruited by the CDR as part of the PMU but will be assigned to the line ministries/agencies and will report to the PMU project coordinator at the CDR and their respective sectors. This arrangement will facilitate and bridge the gap between the CDR and the line ministries. It will also contribute to raising capacity in the different sectors involved.

Figure 3.1: Implementation Arrangements



131. **Line Ministries/Agencies.** These will be closely involved in the implementation of the project. Line ministries/agencies are expected to have technical oversight over their respective sectors and participate in reviewing engineering designs, consultants TOR, and deliverables; accompany the bidding process (as discussed and agreed with the CDR); and actively participate in supervision of works.

- **The MoEW** will have technical oversight of Component 1 (including participating in the review of procurement process) and ensure close coordination with the BWE and LRA as both agencies depend institutionally on the MoEW.
- **The FAO** will implement Component 2 in close coordination with the MoA.

- **The MoE** will have technical oversight over preparation of the solid waste management technical studies under Component 3. A solid waste expert will be recruited as part of the PMU and work out of the premises of MoE.
- **The LRA** will benefit from technical assistance from the project, especially with the recruitment of a water expert and a communications specialist to help them fulfill their mandate of ensuring the overall water quality and water resource management of the Litani River basin.
- **The BWE** will also benefit from technical assistance from the project given its major role in ensuring the long-term sustainability of the infrastructure.

Financial Management, Disbursements, and Procurement

Financial Management

132. Project FM arrangements, including accounting, reporting, and auditing functions will be centralized at the PMU within the CDR. The flow of funds will be undertaken through a DA to be opened for the project. The project financial reports will be prepared by the PMU and submitted to the Bank along with the project progress reports.

133. The CDR has considerable experience in implementing construction components for Bank-supported projects and its FM performance on past and current projects is considered satisfactory. It has a functional unit undertaking FM responsibilities, including funds flow management, accounting, reporting, and facilitating an acceptable external audit. The CDR's external auditor will conduct the audit of the Bank-financed projects. The key FM issue for the CDR is the lack of proper maintenance of asset lists and some delay in submission of timely audit reports. The existing FO of the CDR who is currently handling the FM arrangements related to the other Bank-financed projects will support this new project FM implementation. The CDR FO has adequate experience in managing Bank-financed projects.

134. To mitigate FM-related risks, the CDR will operationalize the assets module of its accounting software to ensure proper management of assets purchased under its component and recruit an acceptable external auditor in the early stages of the project to enable constant audit compliance.

135. **Budgeting.** Loans are still considered as extra budgetary activities and thus, they are not subject to the budget law prior oversight, procedures, and controls. To compensate for this gap, the loan will follow the Bank's guidelines, policies, and procedures for financed projects. A set of FM arrangements will be undertaken to ensure proper project accounting, reporting, controls, and audits. With regard to the project budget, the project's allocation and categories of expenditures will be disclosed in the financing agreement to be approved by the Council of Ministers and ratified by the parliament. A project quarterly and annual budget and disbursement plan will be maintained by the CDR based on the project procurement plan and implementation schedule to ensure timely availability of funds. It will be used as an effective tool for comparing planned expenditures with actual ones and monitoring the existing variances.

136. **Project accounting software.** The CDR has in place customized accounting software that has been used for the FM implementation of the Bank-financed projects and can be used to record the project's accounting transactions and generate the project's unaudited IFRs. The FM team within the CDR PMU headed by the CDR Head of Funding Division will be responsible for accurate and

complete recording of daily transactions in the accounting system and ensuring that the required project IFRs are generated automatically from the system. However, as indicated in the above paragraph, the assets module will need to be effectively operationalized to ensure timely and accurate recording of assets acquired and constructed under the project.

137. **Flow of funds.** The project will be financed through a loan from the Bank to the GoL. A DA for the project's loan funds will be opened at the BDL in U.S. dollars, where funds from the Bank will be received and deposited. The CDR will use this DA to pay for eligible expenditures related to project component activities. The funds from the World Bank will be transferred directly to the project DA with no transit into the Treasury sub-account for Ministry of Finance (MOF), since loans to CDR follow a different procedure. CDR will use this DA to pay for eligible expenditures related to activities financed by the World Bank.

138. In requesting disbursements into the DA for expenditures incurred, the CDR will make use of a statement of expenditure (SOE) record. The SOE could be used for (a) civil works contracts of a value less than US\$1,000,000 equivalent each; (b) goods contracts costing less than US\$500,000 equivalent each; (c) service contracts for individual consultants costing less than US\$100,000 equivalent each and for firms costing less than US\$200,000; and (d) incremental operating costs. Disbursements for services and goods exceeding the foregoing limits will be made in accordance with the respective procurement guidelines and provisions in the Loan Agreement and Disbursement Letter against submission of full documentation and signed contracts.

139. **Retroactive financing.** The project has requested retroactive financing of up to 20 percent of the loan amount for eligible expenditures under categories works, goods, consultant's services and training, and operating costs made on or after July 1, 2016. Payments for items procured must be in accordance with applicable Bank Procurement procedures

140. **Interim Financial Reports.** The project's IFRs, prepared in accordance with IPSAS - Cash Basis and generated through the accounting system, will be sent to the Bank no later than 45 days after the end of each quarter. The format and content of the IFRs was agreed upon with the CDR during negotiations. The IFRs will be composed of (a) statement of cash receipts and payments by category for the year then ending and cumulatively from the inception date up till the year ending, including funds received from third parties; (b) accounting policies and explanatory notes, including a footnote on disclosure schedules; (c) statement of DA reconciling period-opening and end balances; (d) statement of project commitments showing contract amounts committed, paid, and unpaid under each project's signed contract; (e) SOEs by category for the quarter and cumulative; and (f) a comprehensive list of fixed assets.

141. **Project Financial Statements.** The PFSs, prepared in accordance with IPSAS - Cash Basis, should contain the same information as the quarterly IFRs but cover an annual period. The audited PFS should be submitted to the Bank no later than six months after the end of each fiscal year⁵³ (see External Audit in the next paragraph).

142. **External audit.** The PFS will be audited by an independent private external auditor acceptable to the Bank. The audit will cover all project activities financed by the loan, review of effectiveness of the internal controls system, and compliance with the Financing Agreement. The audit will be carried out in accordance with International Standards on Auditing. The audit report and PFSs, along with the management letter, will be submitted to the Bank no later than six months after the end of each fiscal

⁵³ Project fiscal year ends December 31.

year. In addition, the project management letter will contain the external auditor assessment of the internal controls, accounting system, and compliance with financial covenants in the Loan Agreement. The external auditor is expected to be engaged within six months of project effectiveness.

143. Moreover, according to the new Bank disclosure policy effective July 1, 2010, the Bank as well as the borrower make publicly available, the borrower's audited annual financial statements for all investment lending operations for which the invitation to negotiate is issued on or after July 1, 2010. Accordingly, this project's audited annual financial statements once issued and accepted by the Bank will be made available to the public on the CDR website.

Disbursements Arrangements

144. The proceeds of the loan will be disbursed in accordance with the Bank's disbursements guidelines for projects and as outlined in the Disbursement Letter. Transaction-based disbursement will be used under this project. Accordingly, requests for payments from the loan will be initiated through the use of Withdrawal Applications (WAs) for advances, reimbursements, and replenishments to the DA. All WAs will include appropriate supporting documentation including detailed SOE for reimbursements and replenishments to the DA.

Procurement

145. Procurement under the project will be carried out in accordance with the "Guidelines: Procurement of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits and Grants", dated January 2011 (revised July 2014) and "Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers", January 2011 (revised July 2014)); the provisions stipulated in the Legal Agreement; and the World Bank Guidelines on Preventing and Combating Fraud and Corruption in Projects financed by IBRD Loans and IDA Credits and Grants, dated October 15, 2006, and revised in January 2011 and July 2014 will apply to the procurement and implementation of the project components financed by the Bank; and the provisions stipulated in the Legal Agreement.

146. **Procurement of works, goods and non-consulting service.** The project includes three to four work contracts. For National Competitive Bidding (NCB) contracts, a translated version or the version in English of the Bank's International Competitive Bidding (ICB) document, acceptable to the Bank as mentioned in clauses 3.3 and 3.4 of the Procurement Guidelines will be used. Other possible procurement methods for works, goods, and non-consulting services are (a) shopping and (b) direct contracting.

147. **Selection of consultants.** The project is expected to conduct about 12 to 15 consultancy contracts under Components 1, 2, and 3. Procurement methods followed for these include (a) Quality- and Cost-based Selection (QCBS); (b) Selection under a Fixed Budget (FBS); (c) Least-cost Selection (LCS); (d) Selection Based on the Consultants' Qualifications (CQS); (e) Single Source Selection (SSS); and (f) Selection of Individual Consultant (IC), including sole sourcing procedures.

148. **Staff.** The CDR should designate a qualified procurement specialist, preferably already experienced with Bank Procurement Guidelines and practices or someone who can be quickly trained. Contract management capacity needs to be improved by hiring qualified consultants to ensure timely decision-making and amendments to contracts as needed.

149. **Procurement Plan.** A project procurement plan was finalized at appraisal and is summarized

below. The procurement plan will be prepared and updated as needed or at a minimum, on an annual basis.

Goods and Works and Non-consulting services

(a) List of contract packages which will be procured following ICB, NCB, shopping, and direct contracting methods:

Table 3.1: List of Contract Packages

1	2	3	4	5	6	7
Ref. No.	Contract (Description)	Estimated Cost (US\$, millions)	Procurement Method	P-Q (Yes/No)	Review by Bank (Prior/Post)	Expected Bid Opening Date
QC1W1	Expansion of sewage collection to connect to the Zahlé WWTP	26.0	ICB/NCB	No	Prior	December 2016
QC1W2	Expansion of sewage network to connect to the Anjar WWTP	19.0	ICB/NCB	No	Prior	September 2018
QC1W3	Expansion of sewage network to connect to the Aitanit/other WWTP	3.5	NCB	No	Post	September 2017
QC3G1	Purchase of water monitoring stations	0.1	Shopping	No	Prior	September 2017
QC3NC1	Awareness campaigns– LRA (multiple campaigns)	0.25	Shopping/ NCB	No	Prior/Post	2017-18

Consulting Services

(a) List of consulting assignments (QCBS, QBS, FBS, LCS, CQS, SSS, IC methods).

Table 3.2: List of Consulting Assignments

1	2	3	4	5	6
Ref. No.	Description of Assignment	Estimated Cost (US\$, millions)	Selection Method	Review by Bank (Prior/Post)	Expected Proposals Submission Date
QC1C1	Supervision of sewage collection to connect to the Zahlé WWTP	1.04	QCBS	Prior	December 2016
QC1C2	Design of sewage network to connect to the Anjar WWTP	0.3	CQS	Prior	September 2017
QC1C3	Supervision of sewage network to connect to the Anjar WWTP	0.52	QCBS	Prior	September 2018
QC1C4	Design and supervision of sewage network to connect to the Aitanit/other WWTP	0.14	QCBS	Post	September 2017
QC2C1	Promote the use of GAP, including IPM	1.5	SSS (FAO)	Prior	September 2016 (contract signing)
QC3C1	Technical studies and training in solid waste management - MoE	0.35	QCBS	Prior	September 2016
OC3C2	Water expert- LRA	0.17	IC	Prior of TOR	

OC3C3	Communication expert - LRA	0.18	IC	Prior of TOR	
OC3C4	Wastewater engineer - BWE	0.24	IC	Prior of TOR	
OC3C5	Customer relations officer - BWE	0.24	IC	Prior of TOR	
OC3C6	Capacity building and training BWE	0.03			
QC3C7	Financial officer - BWE	0.24	IC	Prior of TOR	
QC3C8	Capacity building and training of MoEW	0.46	IC	Prior of TOR	
OC3C9	Solid waste expert - MOE	0.25	IC	Prior of TOR	
QC3C10	Project management and training (project manager; part-time procurement; part-time environmental/social; part time FM)	0.5	IC	Prior of TORs	
QC3C11	Audit report	0.05	LCS	Prior	February 2017

150. The CDR will use the services of the FAO for one of the components as the FAO is uniquely qualified for the assignment. This is covered by paragraph 3.15 of the Guidelines: Selection of UN Agencies. Agencies of the UN may be single-sourced by borrowers when they are uniquely or exceptionally qualified to provide technical assistance and advice in their area of expertise. The Bank may agree that UN agencies follow their own procedures for (a) the selection of their subconsultants and individual experts and the supply of the minimum necessary goods to perform the contract; (b) small assignments not exceeding US\$300,000; and (c) under certain circumstances in response to natural disasters and for emergency situations declared by the borrower and recognized by the Bank. The borrower shall use the Bank's standard form of agreement between a borrower and a UN agency for the provision of technical assistance agreed by the Bank. The borrower shall submit to the Bank, for its no objection, a complete justification and the draft form of the agreement with the UN agency before signing it.

151. **Prior review thresholds.** Initial prior review and procurement method thresholds for the project are indicated in table 3.3. These may change with experience gained during project implementation through clearance of updated procurement plans. Prior review thresholds are as reflected in the procurement plan and initially are to be US\$500,000 for goods, US\$5,000,000 for works, US\$200,000 for consulting firms, and US\$100,000 for individual consultants (first package using each method will be prior review irrespective of cost estimate).

Table 3.3: Procurement Thresholds

	Prior Review Thresholds (US\$, millions)	Procurement Method Thresholds Proposed (US\$, millions)							
		ICB	NCB	Shopping	QCBS	QBS	CQS	LCS	SSS
Goods	0.5	>0.5	≤0.5	≤0.25					
Works	5	>5	≤5	≤0.25					
Consulting Services	0.2 for firm, 0.1 for individuals, SSS: all				Default	TBD	TBD	TBD	TBD

Note: TBD = To be decided.

152. **Risk rating and mitigation measures:** CDR has a defined system of accountability and responsibilities, including procurement decision-making. In addition to its experienced procurement staff, the agency has the capacity to outsource and benefit from both individual consultants and

consulting firms to enhance its capacity whenever needed. The CDR has the capacity to handle large and complex projects, however, contract management is one of the shortcomings of the CDR, resulting in delayed decision-making and eventual payments, contract amendments, and extensions.

153. To mitigate against the risk, the CDR should continue using the services of qualified outsourced individual technical consultants and make sure they are adequately supported by additional experienced procurement staff. Contract management capacity needs to be improved by hiring qualified consultants to ensure timely decision-making and contract amendments. Procurement plans have been prepared and will be revised and published based on Bank guidelines. Bank Standard Bidding Documents and RFPs are to be used for the project. Publication of contract award will be done as required by the Bank guidelines.

154. Procurement supervision will be along with regular supervision missions planned for the project (twice a year), and if there is a need for any post review packages, this will be reviewed during these supervision missions.

Environmental and Social (including safeguards)

155. The nature of the project is to bring significant benefits to the environment and public health by providing access to wastewater treatment facilities for those who currently have no access and are discharging untreated wastewater directly into the Litani River. Therefore, the project, by its very nature, is a public good and will result in significant environmental improvements and long-term public health benefits. However, some impacts on the environment are expected especially for the activities under Component 1 as expansion of sewage networks involves civil work. Therefore, this project triggers OP4.01 - Environmental Assessment and is categorized as Category B.

156. The connection to the Zahlé WWTP (subcomponent 1.1) has been confirmed and detailed design has been prepared. Accordingly, the site-specific EIA/EMP has been prepared. For subcomponents 1.2 and 1.3, the details (for example, connection routes, number of households to be connected, and so on) are not known and will depend on the detailed design to be conducted during project implementation. Therefore, an ESMF was prepared before appraisal. Site-specific EIA/EMP for subcomponents 1.2 and 1.3 will be prepared before construction starts. The ESMF and EIA/EMP for the Zahlé WWTP have been prepared by the client, cleared by the Bank and disclosed in country of February 11, 2015 and at the InfoShop on February 12, 2015. Consultation with government stakeholders as well as public stakeholders was held on September 13, 2014, and the questions and concerns raised were incorporated in the final documents.

157. Although this project will not finance the construction of the WWTPs, a post-environmental assessment has been undertaken for the Zahlé WWTP, which is under construction, as a first step to assess the feasibility of expanding the sewage network around these plants. The study confirmed that the design of the WWTP is appropriate and the new plant will have enough capacity 37,000 m³ per day (which can be expanded to 56,000 m³ per day horizon 2040) to treat the expected sewage. The study also identified that generated sludge could shorten the life of the existing cell of the Zahlé landfill site. Therefore, the study recommended measures such as composting or the installation of a sludge digestion system to reduce the amount of sludge to be disposed.

158. The Aitani WWTP is an existing WWTP. Therefore, an environmental audit was conducted to verify its compliance with design criteria and national regulations, assess its operation status and treatment efficiency, and identify measures to fill the gaps, if any. The audit report has been reviewed

and cleared by the Bank and disclosed on September 16, 2015.

159. The PMU is responsible for ensuring compliance with the safeguards policies and monitoring and reporting the implementation of safeguards documents such as the ESMF and EIA/EMP. The PMU will make sure that the EMP is part of the contract by inserting the necessary clauses in the contract and ensure that the contractor follows the EMP. A part-time environmental specialist could be hired as needed to provide support to the PMU to fulfill its responsibility.

Box 2. Grievance Redress Mechanism: The project will include multi-level arrangements for registering and addressing grievances and complaints from project-affected people. The primary purpose of the project grievance redress mechanism is to provide clear and accountable means for affected persons to raise complaints and seek remedies when they believe they have been harmed by the project. An effective and responsive grievance redress mechanism also facilitates project progress, by reducing the risks that unaddressed complaints eventually lead to construction delays, lengthy court procedures, or adverse public attention. The process and procedures of grievance redress are as follows:

- The affected person should file his/her grievance in writing, to the concerned Municipalities.
- The grievance note should be signed and dated by the aggrieved person.
- Within a period of 14 days, meetings and discussions should be held with the PAP, and a response should be given by the end of this period.
- If the aggrieved person does not receive a response within the specified period or is dissatisfied with the outcome, he/she lodges his or her grievance to CDR Expropriation Unit.
- The CDR Expropriation Unit will then attempt to resolve the problem (through dialogue and negotiation) within 14 days of the complaint being lodged.
- Grievances that cannot be solved by the CDR Expropriation Unit must be submitted to the Appeals Committee by either the CDR or the affected person Expropriating Agency or concerned municipality or the individual right holder.
- The decisions of the Expropriation Commission may be appealed to the Appeals Committee by either the CDR or the property owner. Appeals Committee may keep the same level of compensation or increase it, and must make a decision within three months of the lodging of the appeal. However the decision is obligatory and final.
- The appellant must be represented by a lawyer. The appeals fee is about \$125 (including stamp and insurance fees to initiate the appeal) plus 3.5% of the increased compensation amount demanded in the appeals case.
- The owner is required to evacuate the property, with rights of sale but not of development, and with access to 75 percent of the compensation. Until the Appeals Committee reaches its final decision these funds should be set aside in a special escrow account.
- If no agreement is reached at this stage, then the complaint can be referred to the Courts of Law according to Lebanese Law.

Annex 4: Financial Sustainability of the BWE

LEBANESE REPUBLIC Lake Qaraoun Pollution Prevention Project

Overview

160. The BWE is a public agency with the mandate to manage the water resources of the Beqaa geographic area. It operates by establishing sources of water, distributing and connecting new subscribers, maintaining the network, and collecting fees. The MoEW has an oversight role defining policy, strategic planning, and regulatory functions. Water Law 221 of year 2000 consolidated the number of water authorities from 21 to 4 water establishments: Beirut/Mount Lebanon, the North, the South, and the Beqaa. The BWE covers the largest geographic area (about 45 percent of Lebanon). Law 221 was put into effect in 2005, but water establishments have not yet filled all the vacancies identified during the merger. The BWE still has to fill about 400 vacant positions. The BWE has limited financial resources to hire qualified professionals and the Government has put a freeze on hiring new staff for public organizations.

161. The four water establishments have a Board of Directors appointed by the Government. The establishments have in fact limited autonomy in terms of procurement, staffing, and finance. Each establishment applies an annual fee for water supply based on 1 m³ consumption per connection. It bills bulk water consumers (1 percent of consumers) per m³ based on meters. Irrigation water is paid on an hourly basis. A new yearly fee for wastewater was introduced in 2013. The BWE current water and wastewater fees are as follows:

- Water supply: LBP 220,000/m³/year (US\$146)
- Wastewater: LBP 20,000/year (US\$13) if connected to a WWTP or LBP 10,000/year (US\$6.5) if connected to sewage network only
- Irrigation: LBP 5,000/hour (US\$3.3)

162. The ongoing wastewater sector program is very ambitious and costly, while water establishments still have limited financial and technical capacity to operate and maintain the built infrastructure. The MoEW finances capital investments of treatment plants, which after completion are handed over to water establishments for O&M.

163. Based on Law 221, water establishments are supposed to prepare financial statements according to corporate accounting principles and auditing standards in line with international practices. This has not yet taken place. Accounts of water establishments continue to be prepared on cash basis. No proper balance sheets or income statements are available. The BWE has benefited from technical assistance from GIZ, the EU, and USAID to develop an integrated information system (ERP) with several modules including financial and accounting systems as well as recording all the establishment assets. BWE has already carried out an important task of asset inventory and evaluation with a fixed asset register showing details of: location of the asset, date of purchase, cost, repair information, depreciation, etc. This work will allow a follow-up of O&M of each asset, its useful life and when is the time for its replacement. It will also be used to calculate depreciation charge for BWE financial accounts. The assets issue is a complicated task and has caused some delay in finalizing the financial and accounting module and the ERP program in general. Current financial information is focused on recording bills and collection and keeping track, with some disbursement of expenses. Table 4.1 shows the revenues and expenses for the period 2008–2014 (estimates). The accounts are usually approved by the MoF and the BWE's board. The MoF has not approved the

BWE's accounts (including before merger) since 1994.

Financial performance (2008–2013 and 2014 estimate)

164. The past financial performance covers years 2008–2013 and 2014 (estimates). It is based on unaudited financial statements prepared on cash basis and consists of collection of bills and disbursement of different operational expenses. No receivables, payables, fixed assets, and other assets or liabilities are recorded in the financial statements presented to the Government. Consequently, no provision for doubtful accounts or depreciation of fixed assets is included. This gives a limited picture of the BWE financial situation. Nevertheless, the project team undertook a financial analysis based on all available data and information.

165. **BWE revenues.** Water collection rate has increased substantially over the years but remains below standards. As shown in the BWE records, the collection rate of water fees has increased from 17.5 percent in 2009 to about **35 percent in 2013**. No increase was noticed in year 2014, however given the critical role that bill collection plays BWE is submitting a new proposal to its Board to reactivate the collection issue. New subscriptions and the outreach campaign during the previous Bank-funded project with the assistance of other donors have contributed to improvement in the BWE revenue collection by about 100 percent from 2009 to 2013. Efforts made during the last three years have had positive impact on BWE finances. BWE is now able to pay regularly its staff and part of its electricity bills. BWE cash on hand at August 2014 was equivalent to approximately 1.5 year's worth of staff salaries and benefits, a significant progress under difficult circumstances. However, many issues remain with a large number of households connected to the water system, but not paying bills and those illegally connected (estimated between 30 to 50 percent). To compensate for cash shortfall, the BWE also receives grants from the MoEW mainly earmarked for capital expenditures and for O&M service contracts.⁵⁴ A list of receivables from customers for previous years amounts to about US\$100 million in arrears. Some of these assets go back to 1992 and some of them may not be collectible and need to be written off.

166. **On the expense side**, the situation is more complex. As mentioned above, the records are based on the cash accounting system, which does not show the entire picture of the BWE's expenditures. Hence, electricity consumption, part of the personnel payroll arrears, the social security debt as well as depreciation allowances for capital assets are not fully reflected in the accounts. Operating expenses are relatively modest, represented mainly by personnel (38 percent); electricity expenses (40 percent); and O&M service contract (22 percent). Neither depreciation charge for fixed assets nor any provision for doubtful accounts is set aside.

167. **Cost recovery.** Efforts made during the last three years to increase revenues have made positive impact on the BWE's finances. The BWE is now able to regularly pay its staff and part of its electricity bills. Available data on revenues and expenses show that the BWE cost recovery for its operating expenses has increased from 31 percent in 2008 to nearly 50 percent in 2013; this is a notable improvement in line with international standards.

⁵⁴Grants received from the MoEW are LBP 13.7 billion in 2011 and 2012 (US\$9.2 million); LBP 4.8 billion in 2013 (US\$3.2 million); and LBP 12.8 billion in 2014 (US\$8.5 million).

Table 4.1: Summary of BWE Unaudited Accounts for 2008–2013 and Estimates for 2014

		2008	2009	2010	2011	2012	2013	2014 estimate
REVENUES								
Fees collected								
-Water supply fees	LBP billion	4.59	4.80	6.43	8.45	8.98	10.18	11.11
-Wastewater fees	LBP billion	0.00	0.00	0.00	0.00	0.00	0.22	0.25
-Irrigation fees	LBP billion	0.08	0.07	0.05	0.07	0.13	0.12	0.09
Total	LBP billion	4.67	4.88	6.48	8.51	9.11	10.52	11.45
EXPENSES								
Running expenses	LBP billion	4.91	4.64	5.39	7.14	9.18	10.45	12.48
O&M service contract	LBP billion	3.75	3.75	3.75	3.75	3.75	4.50	5.25
Electricity actual estimate	LBP billion	6.50	7.00	7.00	7.00	7.00	7.00	7.00
Sub total [Operational Expenses without depreciation]	LBP billion	15.16	15.39	16.14	17.89	19.93	21.95	24.73
Depreciation allowance of fixed assets	LBP billion	4.50	4.50	5.00	5.00	5.00	5.00	5.00
Total [Operational Expenses including depreciation]	LBP billion	19.66	19.89	21.14	22.89	24.93	26.95	29.73

Financial Performance (2014–2022)

168. Projections to assess the BWE financial performance (2014–2022) are based on two main scenarios. The first scenario is based on a conservative revenue projection with an annual increase of only 1 percent in fees and 1 percent in collection rate for the projected period. The second scenario aims at a more aggressive collection rate of 2.5 percent a year for the same period. The result is total revenue of LBP 26.5 billion for scenario 1 in year 2022 while scenario 2 reaches about LBP 35 billion for the same period. In both scenarios, 2013 is considered as the baseline.

169. Based on the above assumptions, financial projections have been prepared until 2022.⁵⁵ This analysis is limited by the lack of audited financial statements prepared in the past. Given the fact that there is no accrual accounting and no fixed assets register to calculate O&M and depreciation charges more accurately, estimates used are based on available data provided by the MoEW and BWE as well as data provided through donor-funded technical assistance programs.

170. In summary, for both scenarios, cost recovery of O&M would reach about 90 percent (excluding depreciation) in 2022 and collection rates for current year billing would reach 56 percent for scenario 1 and 81 percent for scenario 2 by 2022. The different assumptions of financial scenarios have been discussed with the BWE. Details on financial projections and assumptions are provided in the project files.

Conclusion

171. The BWE revenues are currently covering about 50 percent of O&M (without depreciation). Given the specific nature of the wastewater sector, this level of cost recovery could be considered acceptable. However, the wastewater sector in Lebanon is rapidly expanding with large investments financed by several donors. These investments will require considerable effort from both the BWE and the Government. Costs will increase substantially once all ongoing infrastructures are operational.

⁵⁵Financial projections are available in Excel in the project files.

Tariff Policy and Objectives

Since water resources are scarce and their mobilization is costly, they need to be used efficiently. The levels of tariffs should, therefore, be such that users are encouraged not to waste these resources and to consume quantities that are commensurate with cost. Therefore, there are **three main** objectives that need to be taken into account when designing a tariff policy for water sanitation; efficiency, equity and cost recovery:

The first objective is the efficiency incentive that requires pricing water at its long-run marginal cost (LRMC), i.e., at the additional cost required to increase water supply, including capital cost. Under this pricing scheme, no one will use any volume of water if it does not procure him a benefit that is at least as equal as the supply cost.

The second objective is equity. A unique tariff applied to all households and users may result in an excessive burden of the water and sanitation bill for low-income households. Theoretically, the latter's consumption can be subsidized through appropriate schemes. In Chile, for instance, low-income households, which are identified at the municipal level, receive subsidies proportionately to their water bill up to a certain volume and pay the full unique tariff for any consumption above that volume. Ideally, this is a first best policy to deal with both objectives. However, its efficient implementation requires a strong institutional capacity that is lacking in Lebanon and most developing countries.

The third objective is cost recovery. With tight budget constraints for the public sector, the provision of public utilities such as water and sanitation can be sustainable only if costs are recovered, at least in their operating and maintenance components. Otherwise, new facilities would easily fall in neglect and be quickly run down, leading to the recurrence of problems that have become all too familiar under the existing system.

The Existing Tariff System

BEW has been applying a flat fee equal to about US\$146 for the delivery of 1m³ per day to each subscriber. However, the existing system in some cases supplies water intermittently and may deliver less than the promised quantity. With the completion of investments under the Baalbeck projects, it is expected that water will be available on a continuous basis.

The current system does help achieve the objective of efficiency described above since the water bill is independent of the quantity used. It also does not achieve equity since households are charged the same bill regardless of their income and their ability to pay.

The Recommended Tariff Policy and Structure

In view of these general objectives and the weaknesses of the existing system, the following guidelines are proposed:

- Revenues should cover 90 percent of all O&M costs for water and wastewater by the year 2022. Capital cost (depreciation) should be gradually added thereafter for water supply, whereas capital cost for wastewater will continue to be mostly borne by national budget.
- Alternative options may be envisaged for the tariff structure: a volumetric linear tariff, a bloc-tariff structure, etc. Ideally, users should be charged the same efficiency price, which is the long-run marginal cost and low-income households should be subsidized up to a certain volume of water consumption. However, in the absence of an efficient and fair subsidy scheme, a progressive block tariff scheme, which is recommended, would address the equity concern while helping to minimize inefficient use of water.
- Billing should be done jointly for both water and sanitation on the basis of the quantity of fresh water used, which is the practice found in most countries.
- Bills should consist of two components, a fixed component and a variable one that will depend on the quantity of water used. The fixed component should not be too high as not to penalize low-income users and offset the distribution effect of the increasing block tariff structure.

Annex 5: Economic Analysis
LEBANESE REPUBLIC
Lake Qaraoun Pollution Prevention Project

172. A CBA was conducted to determine the economic feasibility of the project. The economic analysis shows that the project generates benefits well in excess of the component costs, with an IRR of 17 percent.

Approach

173. The objectives of the project are to reduce the quantity of untreated municipal sewage discharged into the Litani River and to improve pollution management around Qararoun Lake. Table 5.1 shows the project’s components with the allocated budget for each. The analysis makes reference to the total project cost (US\$60 million), including Bank loan (US\$55 million) and GOL contribution (US\$5 million, in Component 1). The CBA is conducted for Components 1 and 2 and then extended into an aggregated CBA for the entire project. The analysis considers a 25-year time horizon,⁵⁶ 10 percent discount rate and a population growth of 1.75 percent per year.⁵⁷

Table 5.1: Estimated Costs by Component

Component	Million	% of total
1. Improvement of municipal sewage collection	55.5	92
2. Promotion of good agriculture practices (including IPM)	1.5	3
3. Solid waste, water quality monitoring, capacity building and project management	3.0	5
Total	60.0	100

CBA for Component 1 (US\$55.5 million, or 92 percent of the project’s total cost)

174. Component 1 supports a variety of activities aimed at increasing the coverage of sewage collection through the sewerage network and house connections in villages expected to be connected with the Zahlé WWTP (subcomponent 1.1); the Anjar WWTP (subcomponent 1.2); and the Aitanit WWTP (subcomponent 1.3).

175. **Justification for public sector provision.** Water pollution is an externality caused by market failure as there is no penalty for actions polluting water⁵⁸. Component 1 aims at remedying market failures. Without an intervention, these market failures would continue to generate negative externalities to the environment and to the population living nearby (for example, reduced recreational and aesthetic value in and around polluted areas). Given the high investment costs associated with sewerage provision, it would be prohibitive, particularly for low-income households, to finance such large investments via tariffs. As such, public subsidies are needed in order to ensure adequate collection of untreated wastewater.

176. **Bank value added.** Through the proposed component, the Bank is uniquely positioned to

⁵⁶ The lifetime of sewerage network constructed by Component 1.

⁵⁷ Based on the CDR. 2014. Expansion of wastewater networks in Zahlé, Quaa El Rim, Hezzerta, Karak, and Saadnayel feeding the Zahlé WWTP. Prepared by Rafik El-Khoury & Partners.

⁵⁸ Although environmental inspection and enforcement have slightly improved in Lebanon; even with a designated attorney for environment in each governorate in addition to investigation judges and court expert witnesses; actual penalties for water pollution remain nonexistent.

provide expert technical input based on the lessons learned from several years of operations in the water, wastewater, and solid waste sectors in Lebanon, particularly in the Beqaa region. Examples include the Baalbeck Water and Wastewater Project (P074042); the West Beqaa Emergency Water Supply Project (P103885); and the Solid Waste/Environmental Management project (P005345). In addition, the Bank brings deep national and international sector insight and experience to efficiently support the MoEW, the CDR, the BWE and other partners in improving service delivery and in strengthening capacity needed to improve institutional coordination and accountability.

177. **Impact of the project.** In the project rural areas, sewerage coverage remains relatively low due to insufficient network and poor quality (for example, leaking due to lack of maintenance). Without the project, there will be no improvement in sewerage coverage and the number of people not connected will gradually increase as the population grows. This means that over time, more sewage will be dumped in the Litani River and its tributaries. This component is expected to substantially increase the access to sanitation (sewerage coverage) in the affected areas, thus reducing the pollution of the Litani River.

178. **Cost-benefit analysis.** A CBA was conducted to expand the sewerage network and house connections in the project area. Because the major benefit (increased aesthetic and recreational value due to a cleaner environment) is a cumulative result of the three investments (i.e. subcomponents 1.1, 1.2 and 1.3), one single analysis is presented for all of them.

179. **Costs.** The costs include capital costs and O&M costs. For the sewerage connection to the Zahlé and Aitanit WWTPs, it is assumed that capital costs (that is, building the network and house connections) are equally divided among the first three years of the project. For Anjar, the capital costs - covering Bank loan (US\$19 million) and GOL contribution (US\$5 million) will occur during the last years of the project as the WWTP itself is expected to be built later. O&M costs represent 1.5 percent⁵⁹ of the capital costs for all three investments. As a result, the present value (PV) of costs is estimated at **US\$43 million**.

180. **Benefits.** Improved sewerage network is expected to provide a cleaner environment, thus increasing the aesthetic and recreational value in the areas located near the Litani River and its tributaries. In addition, improved sanitation is likely to reduce the incidence of water-borne diseases (e.g. diarrhea) that is currently occurring in the project area. The paragraphs below describe the estimation of these benefits.

181. **Increase in the aesthetic and recreational value.** Expanding the sewerage network is expected to increase the aesthetic and recreational value along the Litani River and its tributaries where sewage is currently discharged untreated. Based on available maps of the upper Litani basin, four areas likely to be affected by this component are identified: Zahlé-Berdanni (by subcomponent 1.1); Anjar-Gzaiel (by subcomponent 1.2); Shtoura (by subcomponent 1.3); and a strip of land along the Litani River (by subcomponents 1.1, 1.2 and 1.3). Communication with local experts suggested that the surface affected by the increase in property value in each of these areas would have a width of 200 m along each side of the Litani tributaries and a width of 100 m along each side of the Litani River. Accordingly, the surface likely to benefit from an increase in property value is estimated at 26.6 km² (see table 5.2 for each area's details).

182. Estimating changes in aesthetic and recreational value is often based on the hedonic price

⁵⁹ This is a conservative estimate. The detailed design for Al Marj assumes that O&M costs are only 1 percent of capital costs. See the CDR. 2010. Detailed design, preparation of tender documents, and assistance during tendering for the Anjar/Majdal Anjar (Al Marj) WWTP, 6-13.

method. The method is commonly used to estimate the value of environmental attributes (landscape quality, air pollution, water pollution, noise) that affect the price of properties. This analysis estimates the expected increase in aesthetic and recreational value through the difference in land price in areas not served by sewage network compared to similar areas where sewage network exist. This approach has been used in other Bank funded projects (e.g. the *Brazil's Espírito Santo Integrated Sustainable Water Management Project*). Thus, the team conducted interviews with mayors, requesting information on (a) the average **current** price of land along the Litani River and its tributaries in each of the four areas and (b) the **observed** increase in property prices in areas served by the sewerage network, compared to similar areas not served by such facilities. The responses indicated an increase of six percent of land price for Zahlé-Berdanni and 25 percent in each of the remaining areas. This analysis conservatively assumes that Component 1 will increase aesthetic and recreational value by only 50 percent of the above figures⁶⁰. Accordingly, Table 5.2 estimates the annual increase in aesthetic and recreational value for each area considered. The PV of this benefit is estimated at **US\$63 million**.⁶¹

Table 5.2: Estimated Increase in the Aesthetic and Recreational Value in the Litani basin

Name of the Area	Length of River/ Tributary ^a (km)	Area ^b (km ²)	Current land price ^(c) (US\$/m ²)	Expected increase in price due to sewage connection ^d (%)	Conservative assumption on expected increase in price (%)	Expected land price after sewage connection (US\$/m ²)	Expected increase in aesthetic and rec. value ^e (US\$, millions)	Expected annual increase in aesthetic and rec. value ^f (US\$ millions)
Zahlé-Berdanni	16.5	6.6	150	6	3	155	31	0.9
Anjar-Gzaiel	16.0	6.4	100	25	13	113	80	2.4
Shtoura	16.5	6.6	150	25	13	169	124	3.7
Litani	34.9	7.0	110	25	13	124	96	2.9

Note: (a) The length of the Litani River (in the overall project area) and of the Litani River tributaries (in the areas of Zahlé-Berdanni, Anjar-Gzaiel, and Shtoura). (b) The surface along the Litani River, with a width of 200 m on each side (200 m * 34.9 km = 7 km²); the surface along the Litani River tributary in the Zahlé-Berdanni area (400 m * 16.5 km = 6.6 km²); in the Anjar-Gzaiel area (400 m * 16 km = 6.4 km²); and in Shtoura (400 m * 16.5 km = 6.6 km²). (c) Represents the average price of land in the affected area, most of which is agricultural land. (d) Expert opinion of mayors in each affected area. (e) Estimated as the expected increase in price * the affected area (e.g., for Zahlé-Berdanni, (US\$155/m²-US\$150/m²) * 6.6 km² = US\$31 million). (f) The annual value of land (rental value) estimated based on 3 percent of its price.

183. **Reduced frequency of diarrhea.** Improved sanitation can result in a reduction of diarrheal diseases, which would otherwise occur due to environmental hazards. In Lebanon, diarrheal mortality due to unsafe sanitation is negligible.⁶² However, diarrheal morbidity among children aged below five years is estimated at 2,300 disability-adjusted life years (DALYs) at national level.⁶³ Only two percent of them are attributable to unsafe sanitation, which corresponds to 46 DALYs.⁶⁴

184. It is assumed that in the project area, the number of diarrheal cases due to unsafe sanitation is proportional with the ratio of population served by this component (351,700 people) and that at the national level (4.5 million people), or eight percent. Accordingly, diarrhea morbidity in children aged below five years due to unsafe sanitation is estimated at only 4 DALYs, or 34 episodes,⁶⁵ if the project is not implemented. Considering that the implementation of Component 1 will result in avoidance of these cases, the health benefit of this component is estimated at:

⁶⁰ This means a land price increase of 3% for Zahlé-Berdanni and 13% of the other three areas. These proportions are in line with several other studies. For example the value of property located near St. Albans Bay declined by as much as 20% due to pollution problems in the river (Young 1984, cited in Boyle and Kiel, 2001)

⁶¹ The estimation of the PV assumes that the annual benefit from Anjar Majdal (subcomponent 1.2) occurs during years 7–25, while the annual benefits from connections to the Zahlé (subcomponent 1.1) and Aitanit WWTPs (subcomponent 1.3) occur during years 4–25. See Table 5.3 for the overall benefit.

⁶² Only 1 case in 2012, based on Pruss-Ustun et al. 2014. Burden of disease from water, sanitation, and hygiene in low resource settings: a retrospective analysis of data from 145 countries. *Journal of Tropical Medicine and International Hygiene*.

⁶³ This is equivalent to about 19,170 episodes per year. WHO. 2014. Global Burden of Disease. WHO Geneva.

⁶⁴ Personal communication with WHO officer.

⁶⁵ Considering a disability weight of 0.12.

- *Avoided diarrheal cases.* At a GDP/capita of US\$9,900 in 2013,⁶⁶ this is estimated at US\$40,000 per year.
- *Avoided treatment and caregiver's costs.* Considering the cost of treating mild diarrhea (US\$10/episode) and the caregiver's daily income (US\$16/day for 3 days), this benefit is estimated at US\$2,000.

185. Adding up the above estimates, the health benefit of this component is US\$42,000 per year. This benefit will fully occur in the fourth year, which marks completion of civil works.⁶⁷ The PV of this benefit over 25 years is estimated at **US\$0.4 million**.

186. **Internal Rate of Return.** Based on the above estimates of costs and benefits, Component 1 is socially profitable, with a net present value (NPV) of US\$20 million and an **IRR of 17 percent** (Table 5.3).

Table 5.3. Cost-benefit Analysis of Component 1 (US\$, millions)

Year	COSTS						BENEFITS			Net Returns	
	subcomponent 1.1		subcomponent 1.2		subcomponent 1.3		Total	Property Value Increase	Health Benefits		Total Benefits
	CC	O&M	CC	O&M	CC	O&M					
2015	8.7	–	–	–	1.2	–	9.8	1.3	0.0	1.3	-8.5
2016	8.7	–	–	–	1.2	–	9.8	2.6	0.0	2.6	-7.2
2017	8.7	–	–	–	1.2	–	9.8	3.9	0.0	3.9	-5.9
2018	–	0.4	–	–	–	0.1	0.4	5.9	0.0	6.0	5.5
2019	–	0.4	12.0	–	–	0.1	12.4	6.7	0.0	6.7	-5.7
2020	–	0.4	12.0	–	–	0.1	12.4	7.4	0.0	7.5	-5.0
2021	–	0.4	–	0.4	–	0.1	0.8	8.2	0.0	8.3	7.5
2022	–	0.4	–	0.4	–	0.1	0.8	8.4	0.0	8.4	7.6
2023	–	0.4	–	0.4	–	0.1	0.8	8.5	0.0	8.5	7.7
2024	–	0.4	–	0.4	–	0.1	0.8	8.6	0.0	8.7	7.9
2025	–	0.4	–	0.4	–	0.1	0.8	8.8	0.0	8.8	8.0
2026	–	0.4	–	0.4	–	0.1	0.8	9.0	0.0	9.0	8.2
2027	–	0.4	–	0.4	–	0.1	0.8	9.1	0.0	9.2	8.4
2028	–	0.4	–	0.4	–	0.1	0.8	9.3	0.0	9.3	8.5
2029	–	0.4	–	0.4	–	0.1	0.8	9.4	0.0	9.5	8.7
2030	–	0.4	–	0.4	–	0.1	0.8	9.6	0.1	9.6	8.8
2031	–	0.4	–	0.4	–	0.1	0.8	9.8	0.1	9.8	9.0
2032	–	0.4	–	0.4	–	0.1	0.8	9.9	0.1	10.0	9.2
2033	–	0.4	–	0.4	–	0.1	0.8	10.1	0.1	10.2	9.4
2034	–	0.4	–	0.4	–	0.1	0.8	10.3	0.1	10.3	9.5
2035	–	0.4	–	0.4	–	0.1	0.8	10.5	0.1	10.5	9.7
2036	–	0.4	–	0.4	–	0.1	0.8	10.6	0.1	10.7	9.9
2037	–	0.4	–	0.4	–	0.1	0.8	10.8	0.1	10.9	10.1
2038	–	0.4	–	0.4	–	0.1	0.8	11.0	0.1	11.1	10.3
2039	–	0.4	–	0.4	–	0.1	0.8	11.2	0.1	11.3	10.5
2040	–	0.4	–	0.4	–	0.1	0.8	11.4	0.1	11.5	10.7
<i>Present</i>							43.4	63.1	0.4	63.4	20.0
										IRR	17%

Note: CC = capital costs; O&M = operation and maintenance costs; Net returns = Total benefits – Total costs.

CBA for Component 2 (US\$1.5 million, or 3 percent of the project's total cost)

187. Component 2 introduces GAP, including selected IPM, among large farmers located in the West Beqaa and Zahlé districts, with the aim of reducing application of fertilizers and pesticides, thus

⁶⁶ Based on World Bank Data Development Platform (DDP).

⁶⁷ During years 1–3, the health benefit gradually increases in proportion with the works realization. After the 4th year, the benefit will increase proportionally with the annual population growth.

decreasing agrochemical pollution of the Litani River and Qaraoun Lake.

188. **Justification for public sector provision.** Component 2 aims at reducing the negative externalities (for example, pollution of the Litani River) created by agrochemical runoff. Without intervention, farmers have little incentive to reduce river pollution. As such, public financing is needed to ensure substantial reduction of agrochemical pollution in the river.

189. **Bank value added.** The Bank has commissioned this component to the FAO. As a leader of three regional IPM programs—in Asia, Near East, and West Africa—and several stand-alone national projects, the FAO is the pioneer in promoting IPM practices. Thus, the FAO brings value added in terms of using successfully tested methodologies (for example, FFS) to strengthen farmers' capacity for sustainable crop management, as well as outstanding experience in developing sustainable strategies for crop management.

190. **Impact of the project.** This component will promote the use of sustainable production systems among farmers in the Upper Litani basin, by introducing GAP, including selected IPM. These practices are expected to provide three major benefits: (a) increased quality of agricultural products (without reducing yields); (b) farmers' savings (through decreased cost of production); and (c) reduced pollution of the Litani River.

191. **Cost-benefit analysis.** A CBA will be conducted on introducing sustainable crop practices that reduce application of fertilizers and pesticides. The component targets about 750 large farmers in the West Beqaa and Zahlé districts. It will introduce GAP-IPM practices on 16,000 du of potato farms and 4,000 ha of vegetable farms. Table 5.4 presents the component's costs and benefits.

192. **Costs.** The cost is spread over four years and includes surveys, equipment, and personnel to train farmers. The PV of costs over 25 years is estimated at **US\$1.2 million**.

193. **Benefits.** The analysis monetarily quantifies only the savings to farmers in terms of reduced cost of production. For **potato growers**, the current cost of fertilizer is US\$200/du and that of pesticides is US\$50/du. Reducing application of fertilizer by 50 percent and of pesticides by 25 percent leads to savings of US\$112/du. On an area of 16,000 du, this means a benefit of US\$1.8 million (i).

194. For **vegetable growers**, the component aims only at reducing application of pesticides by 25 percent. Considering that pesticides cost is US\$35/du and that vegetable (lettuce) cultivation is 4,000 ha, the savings on these areas are estimated at US\$35,000 (ii). Adding up (i) and (ii), the total savings is estimated at US\$1.84 million per year. If we assume that only 30 percent of trained farmers will continue to use the suggested practices in the future, total farmers' savings would be US\$552,000 per year (in the fourth year and after). The PV of costs over 25 years is estimated at **US\$4.9 million**.

195. **Internal Rate of Return.** Based on the above estimates, Component 2 is socially profitable, with an NPV of US\$2.5 million and an **IRR of 30 percent** (Table 5.4).

Table 5.4: Cost-benefit Analysis of Component 2 (US\$, millions)

Year	Costs	Benefits on Potato Area	Benefits on Vegetables Area	Net Returns
2015	0.4	–	–	-0.4
2016	0.4	–	–	-0.4
2017	0.4	–	–	-0.4
2018	0.3	0.5	0.0	0.2
2019	–	0.5	0.0	0.6
2020	–	0.5	0.0	0.6
2021	–	0.5	0.0	0.6
2022	–	0.5	0.0	0.6
2023	–	0.5	0.0	0.6
2024	–	0.5	0.0	0.6
2025	–	0.5	0.0	0.6
2026	–	0.5	0.0	0.6
2027	–	0.5	0.0	0.6
2028	–	0.5	0.0	0.6
2029	–	0.5	0.0	0.6
2030	–	0.5	0.0	0.6
2031	–	0.5	0.0	0.6
2032	–	0.5	0.0	0.6
2033	–	0.5	0.0	0.6
2034	–	0.5	0.0	0.6
2035	–	0.5	0.0	0.6
2036	–	0.5	0.0	0.6
2037	–	0.5	0.0	0.6
2038	–	0.5	0.0	0.6
2039	–	0.5	0.0	0.6
2040	–	0.5	0.0	0.6
Present Value	1.2	4.8	0.1	2.5
			IRR	30%

Source:FAO. 2014. Proposal on promotion of GAP, including IPM practices to reduce agrochemical pollution in the upper Litani basin and Qaraoun Lake.

CBA for the project

196. This economic analysis includes the same benefits as in the sections Approach and CBA for Component 1 in this annex and all project costs. Table 5.5 estimates the project **IRR** at **17 percent**.

Table 5.5: Cost-benefit Analysis of the Project

	Cost (US\$, millions)	IRR
Component 1	55.5	17%
Component 2	1.5	30%
Component 3	3.0	0%
Project cost	60	17%

Sensitivity Analysis

197. A sensitivity analysis is conducted to changes in project costs. Table 5.6 shows that a 20 percent increase in project costs would reduce the project’s IRR to 13 percent.

198. In addition, the expansion network feeding into the Anjar WWTP (subcomponent1.2) depends on the Italian Protocol that is expected to finance the treatment plant. If the plant is not built on time,

the present project will overlook this investment, thus being downsized to US\$36 million⁶⁸. This corresponds to a budget reduction of 40 percent. A sensitivity analysis to this change shows an IRR of 15 percent.

Table 5.6: Sensitivity Analyses

Scenarios	Project's IRR
Base analysis	17%
Cost increase by 20%	13%
Exclusion of Subcomponent 1.2 (Anjar Majdal)	15%

⁶⁸ This represents the difference between the total project cost (US\$60 million) and the cost of Subcomponent 2 Anjar Majdal (US\$24 million).

Annex 6: Implementation Support Plan
LEBANESE REPUBLIC
Lake Qaraoun Pollution Prevention Project

Strategy and Approach for Implementation Support

199. The strategy for implementation support (IS) reflects the nature of the Project and its risk profile and aims to enhance the quality of the client's delivery of proposed project interventions. As such, the implementation support focuses on risks identified throughout the project, as well as the traditional supervision focus areas, including safeguards and fiduciary aspects.

200. Formal implementation support and field visits will be carried out semi-annually and will focus on:

a) **Technical inputs.** Technical inputs are required to review bid documents to ensure fair competition through proper technical specifications and fair assessment of the technical aspects of bids. During construction and commissioning, technical field visits will be conducted twice per year to ensure that the sewage network is built or rehabilitated according to the applicable international standards and that the contractual obligations are met.

b) **Fiduciary inputs.** The Bank's financial management specialist and procurement specialist – both located in Lebanon - will provide support to the PMU's fiduciary staff before the start of project implementation. Supervision of financial management arrangements will be carried out semi-annually as part of the project implementation support plan; support will be provided on a timely basis, to respond to client needs. Procurement supervision will be carried out on a timely basis as required by the client.

c) **Safeguards.** The environmental specialist will provide guidance to relevant counterpart staff. In addition, the team will make sure to include environmental implementation support updates in regular project progress reports. Field visits will be made as required, to respond to social and/or environmental issues that may arise.

d) **Client Relations:** The Task Team Leader will provide day-to-day implementation support of all operational aspects, as well as coordination with the client and among team members. The members of the team based in Lebanon will facilitate the linkage with the client in between formal missions.

e) **Mid-Term Review.** A mid-term review will be carried out in the third year of project implementation in which a comprehensive review of the project implementation experience will be undertaken and adjustments made to improve the project's design and/or execution, if needed.

Implementation Support Plan

201. The main elements are shown in the following table:

Table 6.1 Implementation support plan

Time	Focus	Skills Needed	Resource Estimate	Partner Role
First twelve months	<ul style="list-style-type: none"> - Start-up challenges - Establishing PMU - Engaging consultants - Bidding packages 	Procurement, FM, technical, safeguards	16 staff weeks	Implementation support
12-48 months	Supervision of technical and safeguards project aspects	Technical and safeguards	12 staff weeks	Implementation support
48 months – end of project	General project implementation support	Technical, fiduciary and safeguards	20 staff weeks per year	Implementation support

Skills Mix Required

202. The following table shows the mix of the skills required for the project's implementation support:

Table 6.2 Skill mix required

Skills Needed	Number of Staff Weeks per Year	Number of Trips per Year
Procurement	4	In country
Financial management	2	In country
Technical	4	2
Environment	2	1
Social	2	1