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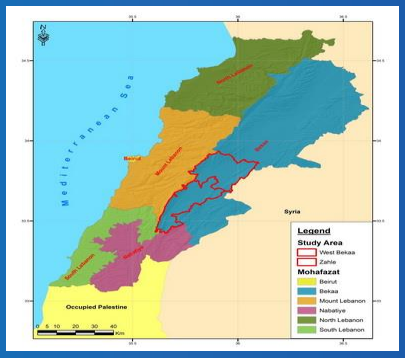

ENVIRONMENTAL AND SOCIAL SAFEGUARD STUDIES FOR LAKE QARAOUN POLLUTION PREVENTION PROJECT

ACTIVITY I

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF)

FINAL REPORT

January 29, 2014

ELARD LEBANON			
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

BWE	Bekaa Water Establishment
CDR	Council for Development and Reconstruction
CESMP	Construction Environmental and Social Management Plan
CoM	Council of Ministers
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ELARD	Earth Link and Advanced Resources Development
EMP	Environmental Management Plan
ESA	Environmental and Social Assessment
ESIA	Environmental and Social Impact Assessment
ESIAR	Environment and Social Impact Assessment Report
ESMF	Environmental and Social Management Framework
ESMMP	Environmental and Social Mitigation and Monitoring Plan
GoL	Government of Lebanon
HSE	Health, Safety and Environment
IEE	Initial Environmental Examination
IMF	Independent Municipal Fund
IMP	Impact Mitigation Plan
IPM	Integrated Pest Management
IUCN	International Union for Conservation of Nature
LRA	Litani River Authority
MoE	Ministry of Environment
MoEW	Ministry of Energy and Water
MoF	Ministry of Finance
MoIM	Ministry of Interior and Municipalities
MoPH	Ministry of Public Health
MoPWT	Ministry of Public Works and Transportation
MSW	Municipal Solid Waste
MW	Mega Watt

NGO	Non-Governmental Organization
NPMPLT	National Physical Master Plan of the Lebanese Territory
NSEQ	National Standards for Environmental Quality
PMU	Project Management Unit
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SEA	Strategic Environmental Assessment
SWM	Solid Waste Management
TOR	Terms of Reference
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
USAID	United States Agency for International Development
USGS	United States Geological Survey
UTC	Universal Time Coordinates
WB	World Bank
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

The report describes the Environmental and Social Management Framework (ESMF) prepared for the Lake Qaraoun pollution prevention project.

Introduction

The Litani River is currently facing major pollution problems that are increasing at an alarming rate. As a result, the water of the lake became undrinkable and is only used for irrigation in certain circumstances. The main sources of pollution are municipal wastewater, industrial wastewater, solid waste, and runoff of agricultural chemicals including non-degradable pesticides (ELARD 2011). In order to reduce the pollution in the Qaraoun Lake, the quantity of untreated municipal sewage, solid wastes and industrial wastes discharged into the Litani must be controlled and the quality of agricultural runoff that empties into the river must be improved.

As a response to this urgent situation and in order to limit pollution, the Ministry of Environment (MoE) established a Business Plan that identifies the most significant sources of pollution in the Qaraoun Lake and recommends appropriate solutions including detailed prioritized investments for each polluting sector, with an estimated financing requirement of US$225 million. In response to the government of Lebanon request, the World Bank will provide technical and financial assistance for some items of the business plan. The three components supported by the World Bank include the following:

- **Component 1:** Improve the collection of the municipal sewage through construction of new networks, rehabilitation of a part of the old ones, and the establishment of new pumping stations.
- **Component 2:** Increase the adoption of Integrated Pest Management (IPM) practices that need to be adopted by farmers.
  Component 3: Support technical studies in solid waste management (SWM). These preparatory studies will be conducted to improve the SWM system (additional landfills, sorting facilities, etc.). Also, this component aims at supporting project management and capacity building by establishing a Project Management Unit (PMU) for a better management of the Litani River and Qaraoun Lake waters.

Objective of the ESMF

The objective of this ESMF is to provide clear procedures and methodologies for environmental and social screening, review, approval and implementation of activities to be financed, in addition to specifying appropriate roles and responsibilities and outlining the necessary reporting procedures for managing and monitoring environmental and social concerns related to the project activities.

This ESMF is intended to be used as a practical tool during project formulation, design, planning, implementation and monitoring to ensure that environment and social aspects are duly considered in the planning and implementation processes. It describes the steps involved in identifying and mitigating the potential environmental and social impacts of proposed investments.

The ESMF will identify potential socio-economic impacts that will require mitigation measures and/or resettlement and compensation. Any resettlement and/or compensation measures will be implemented in accordance with a Resettlement Policy Framework (RPF) and will be implemented prior to commencement of any investment activities.

The ESMF includes an Environmental and Social Management Monitoring Plan (ESMMP) for the project's implementation. The ESMMP summarizes institutional arrangements for the implementation of mitigation measures, monitoring, through certain indicators, of the implementation of these measures, capacity building needs as well as cost estimates for its implementation.

Legislative and Regulatory Considerations

The implementation of the proposed activities under the project must be in compliance with the operational policies of the World Bank (WB) and at the same time compliant to the existing legal framework and the regulations of the Government of Lebanon (GoL).

The Country Environmental Analysis of Lebanon (CEA)[1] conducted an assessment of the Lebanese national EIA system and determined the similarities and difference between the national EIA system and the World Bank operational policy OP 4.01 on environmental assessment and the European Commission (EC) EIA Regulations no. 97/11. The assessment showed that the features of the Lebanese EIA system are compatible with most of the World Bank EA Policy (OP 4.01) and the EC EIA regulations. These features are in: (i) screening; (ii) scoping; (iii) the EIA report content; (iv) the content of the environment management plan; (v) provisions for appeal; and (vi) requirements for monitoring and follow up. There are however gaps in the national EIA system namely: (a) the lack of standard TOR and sector guidelines for specific sectors to be provided to the project proponent for the preparation of the EIA or IEE reports; (b) lack of consultation with stakeholders for projects listed under Annex II (similar to Category B projects in the World Bank OP 4.01);and (c) the lack of disclosure of the EIA summary and Initial Environment Examination (IEE) to the public as required by articles 13 and 14 of the Environment Protection Law – noting that Article 13 of the EIA decree calls for Information Publication. These gaps are addressed in this ESMF by providing guidance to the preparation of safeguards documents, by specifically requiring consultation for IEE projects as well as explicitly requiring that EIA and IEE summaries be subject to disclosure.

World Bank's Safeguards Policies

In preparing this ESMF, all the categories of investments were screened against the 10 WB safeguard policies and it was determined that the following 3 are triggered: OP 4.01 on Environmental Assessment, OP 4.09 on Pest Management, and OP 4.12 on Involuntary Resettlement.

Environmental Assessment (OP 4.01)

For all projects financed by the Bank, environmental screening is conducted according to the environmental impacts expected of the project, and all projects are assigned an

[1] The Country Environment Analysis (CEA) of Lebanon, the World Bank, April 2011

environmental category, A, B, C, or FI, with a decreasing order of environmental impact severity. The instruments for this policy vary from a SEA, ESMF, ESIA, depending on the project particular conditions. At this stage since investment details are not sufficiently known, an ESMF is prepared.

Based on the principles of the OP/BP 4.01, the projects that will be implemented under the proposed investment can be classified as "Category B" projects given that they have the potential to cause adverse environmental impacts but impacts are expected to be site-specific; few if any of them are expected to be irreversible; and in most cases mitigatory measures can be implemented to reduce impact significance to acceptable levels. "Category B" projects require the preparation of an Environmental Management Plan (EMP) with consultation with affected communities and stakeholders.

Pest Management (OP 4.09)

Pest Management (OP 4.09) is triggered since chemicals and pesticides are being used in the agricultural sector. A preferred solution is to use IPM techniques (such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest) and encourage their use in the whole of the sectors concerned. If pesticides have to be used in crop protection or in the fight against vector-borne disease, the Bank-funded project should include a Pest Management Plan (PMP), prepared by the borrower, either as a stand-alone document or as part of an Environmental Assessment (Source: WB, 2012). This policy established a list of chemicals that cannot be financed by the WB. In addition, the policy instrument, i.e., Pest Management Plan should be established for integrated pest management, and procedures and controls for safe use, handling, and disposal of chemicals and equipment.

Involuntary Resettlement (OP 4.12)

Significant efforts are to be made in the design and screening stages of the construction phase to avoid adverse impacts on people, land, property, including people's access to natural and other economic resources, as far as possible. Under component 1 of the project, resettlement may be needed for the construction of wastewater pumping stations and sewage networks installation. An RPF that sets the guidelines for the Resettlement and Compensation Plans will be prepared since the program investment triggers this policy. A RAP would also have to be prepared and approved by the Bank when resettlement needs and areas are identified.

Relevant National Legislative Framework

The national regulatory framework includes important legislation related to environmental and social safeguards:

- The EIA decree 8633/2012;
- Expropriation Law No. 58 dated 29/05/1991 (updated on 8/12/2006); and
- Other environmental legislations dealing with the management of water resources, solid waste and wastewater as well as air quality and pollution control.

Institutional Framework

Institutions relevant to the project include the following:

- World Bank (WB);
- Council for Development and Reconstruction (CDR);
- Ministry of Environment (MoE);
- Ministry of Energy and Water (MoEW);
- Bekaa Water Establishment (BWE);
- Litani River Authority
- Ministry of Public Works and Transportation (MoPWT);
- Ministry of Interior and Municipalities (MoIM);
- Municipalities; and
- Ministry of Agriculture.

Mandates of these institutions with regard to the project are subsequently described.

World Bank (WB)

The WB is funding the three components of the project through the CDR. The WB's responsibility is to:

- Supervise the implementation of the Bank's environment and social safeguards through the implementation of ESMF described in this document;
- Review and clear environmental studies to ensure that the review process of the EIA system in Lebanon is acceptable;
- Provide technical support to the CDR and other relevant stakeholders as required to ensure a reasonable implementation of the Banks' safeguards.

Council for Development and Reconstruction (CDR)

The CDR will lead the execution of the project's components and designate competent parties to implement them. The CDR will also supervise the implementation of the Environmental and Social Management Monitoring Plan (ESMMP) and will make sure that the recommendations of the Environmental Management Plan (EMP) for Zahle wastewater networks (and other EMPs subsequently prepared) are included in the Terms of Reference (TOR) of the contractors executing the construction activities.

The CDR will be also responsible for the expropriation procedures if resettlement is needed during the execution of component 1 activities.

Ministry of Environment (MoE)

MoE will monitor the environmental impacts of the project, the implementation of the environmental management plan for component 1 activities during construction and operation, and the ESMMP for the whole project components.

Ministry of Energy and Water (MoEW)/Bekaa Water Establishment (BWE)/Litani River Authority (LRA)

The MoEW, through the Bekaa Water Establishment (BWE), is responsible for wastewater and potable water management. The MoEW will be responsible for approving the design of wastewater networks, location of pumping stations, and other matters related to water resources management. The Litani River Authority is responsible for monitoring the quality of the Litani River and its tributaries water quality, in addition to the awareness and cleaning campaigns.

The BWE will monitor the EMP/IEE recommendations for component 1 activities during the operation phase.

Ministry of Public Works and Transportation (MoPWT)

According to Decree 13379/1998, the Directorate General of Roads and Buildings of the MoPWT is responsible for the inspection of sewage networks. Moreover, public roads fall under the MoPWT's authority. Consequently, it is very important to coordinate with the MoPWT when implementing infrastructure works such as the activities described in component 1 of the current project.

Ministry of Interior and Municipalities (MoIM)

The Ministry of Interior and Municipalities manages the affairs of Municipalities and Unions of Municipalities. Solid Waste Management falls under MoIM's supervision; therefore, when implementing component 3 of the project it is necessary to coordinate with the MoIM in all the aspects of the studies.

Municipalities

The municipalities will supervise the implementation of the ESMMP and particularly the EMP/IEE recommendations related to the construction activities of component 1 of the project.

Ministry of Agriculture

The Ministry of Agriculture is responsible for the well-organized implementation of component 2 activities of the project (improvement of the quality of agricultural runoff) that include building and strengthening the capacity of farmers in the project area to implement Integrated Pest Management practices and to lower the application of chemical fertilizers. Public awareness campaigns related to environmental and public health concerns related to the excessive use of agro-chemicals will also be carried out by the Ministry.

Description of the Environment

Socio-economic and environmental baseline information related to the cities/ villages of Zahle and the West Bekaa concerned by this project was collected, including the following topics:

- Climate (temperature, wind, precipitation);
- Geology;
- Stratigraphy;
- Hydrogeology and Groundwater Quality;
- Ecology;

- Archaeology; and
- Socio-economic information for cities/villages concerned with various project's components.

Information about the relevant villages was obtained through an extensive desk review of databases which hold socio-economic data on the villages, and through field surveys for various IEEs, EIAs in the West Bekaa and Zahle area that ELARD has prepared. The villages are: Hezzerta, Saadnayel, Ablah, El Ferzol, Chtaura, Taablaya, Qabb Elias, Makse, El Mreyjat, Bawarej, Aitanit, Qaraoun, El Saouiri, El Marej, Zahle, Kaa El Rim, Anjar, Majdel Anjar, Bar Elias, El Rawda, Jdita, and Taanayel.

No major issues of concerns related to baseline conditions that could pose severe constraints on the project implementation were identified.

Environmental and Social Management Procedures

This section covers the cycle of environmental and social assessment (ESA), including screening, preparation, review, and implementation and monitoring. The procedures for environmental and social management shall be in compliance with the operational policies of the World Bank (WB) and at the same time compliant to the existing legal framework and the regulations of the Government of Lebanon (GoL).

The WB executes environmental screening to define the proper extent and type of Environmental Assessment (EA). The WB classifies the proposed project into one of four categories, according to the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. Similarly, according to the Lebanese National decree No. 8633/2012, a project can fall into one of three categories; Category I, Category II or Category III.

Projects under Component 1 require an EMP to be submitted to the WB and an IEE to be submitted to MoE. As agreed with the WB and the MoE, one report (referred to as Environmental Assessment Report or EA report) that combines EMP and IEE including the most stringent requirements of both will be prepared. The IEE structure, which is inclusive of the World Bank's EMP outline, will be used and will be complemented with the EMP requirements that include public consultation and disclosure.

Moreover an RPF shall be prepared for component 1 activities. This RPF will set out the policies, principles, institutional arrangements, schedules and indicative budgets that will take care of anticipated involuntary resettlements as defined in OP 4.12 and the Lebanese regulations. A RAP for Zahle network construction activities shall be considered when the resettlement needs are identified.

Responsibilities

The CDR will have the responsibility for:

a) Reviewing the EA report before being submitted to the WB;
b) Reviewing the screening form before it being submitted to the MOE;
c) Prepare and review the EA report prior to its submission to the MOE;

d) Ensure that the environment and social management plan is included as part of the contracts for civil work;
e) Monitor the implementation of the environment and social management plan during project construction and include a report on the ESMP implementation as part of the bi annual report to the World Bank; and
f) Approve the RPF and RAP.

The Service of the Environment Technology/MOE will be responsible for:

a) Review and make a decision on the EA report; and
b) Supervision of the implementation of the Environment and Social management plan during construction and operation phases.

The World Bank will review and approve the Environment and Social Safeguard reports it will also monitor the implementation of the ESMP.

The EMP/IEE Phase

The purpose of the EMP/IEE process for component 1 is to:

- Identify and analyze potential environment and social impacts and issues, both adverse and beneficial, associated the proposed project;
- Identify measures to avoid, minimize, mitigate, or offset/compensate for adverse impacts on workers, affected communities, and the environment;
- Design an Environmental and Social Management Plan (ESMP) to address the mitigation, and monitoring of these adverse measures, as well as propose institutional measures to manage and monitor the adverse impacts and their remedial measures as needed;
- Identify specific self-monitoring reporting that the CDR would submit to the WB and MOE for the construction and operation phase of the investment project; and
- Ensure that the investment contracts include appropriate, clauses to obligate the contractors to comply with the associated elements of the ESMP and submit also progress reports as part of their contractual obligations.

The outcome of the process is an EMP/IEE report which is further elaborated in Annex 6 of decree # 8633/2012 and must include the following:

- Non-Technical Executive Summary;
- Table of contents;
- Introduction;
- Policy, legal and administrative framework;
- Description of the proposed project;
- Description of the base line of the surrounding environment of the project and its area of influence;
- Public consultation;
- Potential environmental and social impacts of the project;
- Environmental and Social Management plan as described below;

- Self-reporting requirements during the construction and operational phases of the project;
- Summary of project documents;
- Tables and information statements;
- List of scientific and non-scientific references used; and
- List of the names of those who prepared the IEE report (individuals and institutions).

RPF

The framework shall cover all the project's activities, and shall apply to all displaced persons regardless of the total number affected, the severity of impact, and whether or not the affected persons have legal title to the land. Since resettlement often affects the most vulnerable and marginalized groups (economically, politically, and socially), the RPF shall be particularly sensitive to the affects which displacement may have on these groups, including the poor, landless, elderly, women, children, ethnic minorities, or persons with specific mental or physical disabilities. This RPF shall be adopted in case resettlement during the implementation of the project component 1 became inevitable otherwise, efforts should be made to avoid or minimize the need for land acquisition and resettlement.

RAP

Any activity of component 1 that necessitates acquiring a land, results in involuntary resettlement of people or the loss or restriction of access to private or communal resources, will require preparing a Resettlement Action Plan (RAP) or abbreviated RAP depending on the number of people affected or the significance of the resettlement impacts as per the OP 4.12.

Potential Environmental and Social Impacts

No significant negative environmental and social impacts are anticipated to be generated from the implementation of the proposed investment. This shall be confirmed in subsequent environmental and social studies to be conducted for specific project investments, as dictated in this ESMF.

The positive and negative environmental and social impacts of the activities of component 1 are listed in Table 2 and Table 3 respectively.

The positive effects of the other different components are discussed below.

Component 2- Increase the adoption of Integrated Pest Management (IPM) practices that need to be adopted by farmers.

This component suggests the conduction of awareness campaigns mostly targeting big Farmers to introduce the concept of IPM that is based on the reduction of the use of fertilizers, the improvement of irrigation practices and the land preparation practices. Eventually, the pollution of the soil and the Qaraoun Lake from agricultural pesticides will be limited and the technical know-how of the Farmers will be improved along with their sensitivity towards environmental issues. This component mainly has positive impacts on the society and the environment with no negative impacts.

Component 3

Solid Waste Management

This component aims at leading technical, environmental and social studies for the establishment of a sorting facility and a sanitary landfill in Bar Elias in addition to a sorting facility in Rachaya and the 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. These studies will be prepared starting from the second year of project implementation.

Those activities are studies and mostly have positive impacts with no negative impacts on the environment and the society. In case the Government decides to finance the establishment of a sorting facility and a sanitary landfill with their own budget based on the studies conducted under Component 3, an environmental impact assessment will be prepared and disclosed according to the national EIA decree, and the consultation will be held before the physical work is initiated.

Capacity building and Project Management

This component discusses the launch of capacity building programs for the BWE and the LRA. The impacts of those activities are positive given that eventually, the BWE and the LRA would have been provided with enough guidance and technical assistance to monitor water resources, manage the irrigation system, improve the risk management and strengthen institutional capacity to support the implementation of the business plan for combating pollution of the Qaraoun Lake.

Table 2 Positive Environmental and Social Impacts of the Activities of Component 1 and their Corresponding Rankings

Investment	Activity	Primary Impact	Secondary Impact	Persistence	Ranking	Weighting
(i) General impacts at Design Stage						
Design of new sewer networks, pumping stations	Subjecting the entire project to this ESMF process	Sensitizing society on environmental requirements	Could induce attitude change towards environmental conservation	Long-term	High	2P
		Generation of a database on social and physical environment of project location	Improves public awareness	Long-term	Moderate	P
		Local setting and documentation of development priorities	Provides a forum for coordinated and rationalized development	Long-term	High	2P
(ii) Positive impacts during construction phase						
Civil works (excavation, pipes installation, backfilling, construction of pumping stations)	Construction activities	Creation of employment	Addition income to all cadre of staff and their households	Short-term	High	2P
		Increased demand on supplies (raw material, pipes…)	Additional income to commercial institutions in the area	Short-term	High	2P
(ii) Positive impacts at during operation phase						
Sewage Infrastructure	Construction of new sewer networks, pumping stations, , rehabilitation of old network parts	Improved hygiene and sanitation	Improve the health of habitants in the project area by reducing water-borne diseases	Long Term	High	2P
		Decreased discharge of contaminants to water bodies and protection of the water sources in the	Reduction in groundwater and surface water pollution	Long-term	High	2P

Investment	Activity	Primary Impact	Secondary Impact	Persistence	Ranking	Weighting
		watershed of the Litani River and the Qaraoun Lake				

Legend / scale for impact ranking: P, Positive; 2P, Strongly Positive; O, Neutral; N, Negative; 2N Strongly Negative

Table 3 Potential Negative Environmental and Social Impacts of the Activities of Component 1

Phase	Receptor	Impact	Duration	Feasibility of mitigation	Duration of impact	Weighting
Construction	Soil and Groundwater	Temporary or permanent change in topography, soil erosion and collapse from grading, trenching, or excavation	Can be long-term or shorter	Can be both reversible or irreversible	Low (short-term)/ High(long-term)	N
		Change in soil and groundwater quality from: - leakage of fuel, lubrication oil, gear oil and transmission oil to the exposed and excavated soil unearthed in the excavation process from construction/haulage vehicles and equipment - Inadequate storage and disposal of lubrication oil, gear oil and transmission oil used for equipment maintenance; - Inadequate storage and disposal of bitumen material used for asphalting activities; - Spills of potentially contaminating materials such as glues, solvents, or lubricants that are used or stored onsite for pipes installation. The spills can affect the excavated or exposed soil; - Accidental spills from refueling operation; - Improper disposal of concrete wastes resulting from onsite concrete batching or cleaning of ready-mix concrete vehicles; - Surface run-off water that comes into contact with concrete, onsite stockpiled sand and gravel and open excavated trenches during rainy days; - Discharged hydrotest water that come into contact with excavated soils stockpiled along the trenches; - Inadequate disposal of solid wastes and wastewater generated during construction from workers; and - Leakage from old networks during rehabilitation.	Long-term	Reversible	Medium	N
	Surface Water	Change in surface water and sediments quality from: • Possible leakage of fuel/ oil/ chemicals from: - Machinery used during construction and haulage; - Generators; and - Refuelling operations and routine inspection. • Inadequate storage and disposal of wastewater, solid waste (domestic waste and construction waste) and hazardous waste	Short-term	Reversible	Medium	N

Phase	Receptor	Impact	Duration	Feasibility of mitigation	Duration of impact	Weighting
		that will be generated from the construction activities: - Earthworks and construction of access roads; - Pipeline Installation / Trenching and backfilling; - Hydrotesting - Construction of pump stations; and - Chemicals disposal during maintenance of machinery, generators and equipment.				
	Air Quality	Increase in air pollutants due to vehicle and truck movement during mobilization and procurement, in addition to the operation of diesel-operated construction machinery (i.e. power generator, loader, bulldozer, dump trucks).	Short-term	Reversible	Low	N
		Dust emissions from excavation and backfilling activities, temporary storage of excavated soil near the construction trench as well as from the movement of vehicles on unpaved roads, which may impact local ambient air quality	Short-term	Reversible	Low	N
	Ecology	Habitat loss or destruction, altered abiotic/site factors, mortality of individuals, habitat fragmentation, disturbance, and vegetation loss due to: - Site clearance and grading in the pumping station construction location; - Excavation for pipes and pumping stations; - Accidental spills (fuels/chemicals) during construction; and - Inadequate disposal of solid waste and surplus material	Can be long-term or short-term	Can be both reversible or irreversible	Medium (short-term and reversible)/ High (long-term and irreversible e.g. loss of certain species)	N
	Traffic	- Increase in traffic volume due to the deployment of construction vehicles, transport vehicles and equipment; and - Increased travel times for drivers passing through the Project area due to partial or total closure of the roads adjacent to the installed pipelines	Short-term	Reversible	Medium	N
	Noise	Increase in ambient noise levels from: - Mobilization, site clearance, grading and excavation activities; - Construction activities at the pumping stations location (form work, reinforced concrete, interior finishing, exterior finishing); - Movement of vehicles to transport people and materials; and - Operation of equipment and machinery on-site	Short-term	Reversible	Medium	N

Phase	Receptor	Impact	Duration	Feasibility of mitigation	Duration of impact	Weighting
	Occupational Health & Safety	Injuries to the public and workers from: - Open trenches, openly stored or moving construction materials, moving construction equipment and redirected traffic; and - General and construction and pipes installation activities that will increase the workers and public exposed to noise, dust and occupational hazards which will increase the potential accidents	Can be long-term or short-term	Can be both reversible or irreversible	Low	N
	Socio-economy	Land acquisition for pumping stations construction	Long-term	Irreversible	High	2N
Operation	Soil and Groundwater	Temporary change in topography, soil erosion and collapse from excavation activities during maintenance	Short-term	Reversible	Low	N
		Change in soil and groundwater quality from: - leakage of fuel, lubrication oil, gear oil and transmission oil to the exposed and excavated soil unearthed in the excavation process; - Inadequate storage and disposal of bitumen material used for asphalting activities; - Spills of potentially contaminating materials such as glues, solvents, or lubricants that are used onsite for pipes installation. The spills can affect the excavated or exposed soil; - Potential spills of raw wastewater from pipelines or pumping stations.	Long-term	Reversible	Medium	N
	Surface Water	Change in surface water and sediments quality from: - Wastewater leakage along all the pipeline route and in pumping stations location; - Oil and fuel leakage from generators, and fuel tank storage in the pumping stations; - Network maintenance activities; and - Inadequate treatment of wastewater at receiving facility.	Long-term	Reversible	Medium	N
		- Malfunction at pump stations (due to electricity cut-off, pumps break down, etc.) leading to discharge of untreated sewage in surface water	Short-Term	Reversible	Low	N
	Air Quality	- Increase in air pollutants due to the operation of diesel-operated standby power generators; and	Short-term	Reversible	Low	N

Phase	Receptor	Impact	Duration	Feasibility of mitigation	Duration of impact	Weighting
		- Odor emissions at pumping stations				
	Ecology	No major impacts are anticipated in the operation phase of the project	--	--	--	O
	Traffic	Traffic disturbance from maintenance activities	Short-term	Reversible	Low	N
	Noise	Increased noise levels due to usage of equipment during the maintenance period of the wastewater network and the pumping stations. This will depend on the type of work needed and the extent of the network damage. Excavation to expose the damaged pipe is expected in addition to the backfilling, compaction and reinstatement of the excavated road.	Short-term	Reversible	Low	N
	Occupational Health & Safety	Increased health and safety risks due to traffic related accidents and open trenches during pipes repair and spill management.	Short-term	Reversible	Low	N

Legend / scale for impact ranking: P, Positive; 2P, Strongly Positive; O, Neutral; A, Acceptable; N, Negative; 2N Strongly Negative

Proposed mitigations measures and monitoring plan for construction and operation impacts of component 1are summarized in Table 4 and Table 5 respectively.

Table 4 The ESMMP during Construction Phase

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Soil					
Grading, trenching, or excavation	Temporary or permanent change in topography, soil erosion and collapse	Develop appropriate procedures for reinstatement and soil stabilization	- Number of complaints from the municipalities in the project area - Number of complaints from the residents/owners of land adjacent to the excavation sites - Amount of observed soil erosion from the construction site	- Daily visual inspection of the excavation activities - Daily inspection of soil erosion from the site - Monthly record of resident complaints - Monthly record of municipality complaints	- Contractor's civil engineer and foreman - Supervision consultant appointed by CDR - Municipality Engineer
Fuel and chemicals use and storage, improper discharge of solid wastes, wastewater, and spill from old networks	Change in soil quality	Develop procedure for storage and handling of wastes, chemicals, and hazardous wastes.	Amount of contaminated soil visible during inspection	Daily visual inspection to ensure proper implementation and to identify soil stains and location of spills, if any.	- Contractor's civil engineer and environmental officer - Supervision consultant appointed by CDR - Municipality Engineer
Groundwater and Surface Water					
Fuel and chemicals use and storage, improper discharge of solid wastes, wastewater, and	Change in groundwater and surface water quality	Develop procedure for storage and handling of wastes, chemicals, and hazardous wastes.	Water characteristics (physico-chemical parameters, including turbidity, COD, BOD_5, TPH, TDS and heavy metals)	Monthly testing during the construction period	- Contractor's civil engineer and environmental officer - Supervision consultant appointed by CDR

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
spill from old networks					- Municipality Engineer
Air Quality					
Vehicle and truck movement, operation of generators	Increase in air pollutants	Proper maintenance of machines and equipment.	Number of noncompliance reports about machines and equipment routine maintenance	- Daily visual checks of smoke emissions from vehicles and machinery. - Monthly analysis of maintenance records of equipment operated on-site to ensure these are properly maintained and do not lead to excessive emissions	- Contractor's mechanical engineer and environmental officer - Supervision consultant appointed by CDR - Municipality Engineer
Excavation, backfilling, and movement of vehicles on unpaved roads	Dust emission	Implement procedures to minimize dust emissions such as water spraying, covering loaded trucks.	Number of noncompliance reports about trucks - Number of complaints from project area residents/municipalities	- Daily visual monitoring of dust generation from the work zone to ensure that no excessive dust is produced - Conducting/ investigating dust monitoring in response to specific complaints - Monthly records of resident complaints - Monthly records of municipality complaints	- Contractor's civil engineer and environmental officer - Supervision consultant appointed by CDR - Municipality Engineer
Ecology					

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Site clearance, excavation, and waste disposal	Ecological habitat loss or destruction, altered abiotic/site factors, mortality of individuals, habitat fragmentation, disturbance, and vegetation loss	- Conduct ecological surveys to allocate critical ecosystems for conservation. - Analyze alternatives for best route selection to minimize any adverse impact for new pipelines.	- Number of trees damaged or removed - Area of ecosystems/habitats affected	Weekly visual inspection of trees along construction route	- Contractor's environmental officer - Supervision consultant appointed by CDR - Municipality Engineer
Traffic					
Deployment of construction vehicles, transport vehicles and equipment, partial or total closure of the roads adjacent to the installed pipelines	Increase in traffic volume and travel time for drivers passing through the Project area	Keep traffic to designated roads, position necessary diversion signs, schedule transport of workers and materials to avoid peak hours.	Number of complaints from the municipalities/residents.	- Weekly monitoring road safety signs on site roads; - Daily monitoring to ensure compliance with safety standards and the proper positioning of any necessary traffic diversion signs; - Investigating any potential traffic disturbance due to construction activities in response to specific complaints; - Monthly records of complaints from residents along construction route	- Contractor's HSE officer - Supervision consultant appointed by CDR - Municipality Engineer
Noise					

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Construction activities, equipment and machinery operation	Increase in ambient noise levels	Switch off equipment and generators when not in use, equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.	Number of complaints from the municipalities/residents	- Conducting/investigating noise monitoring in response to specific complaints and during noisy activities, - Weekly checking that the results of noise monitoring are communicated to CDR and if needed corrective action is taken. - Monthly records of complaints from the municipalities/residents	- Contractor's HSE officer - Supervision consultant appointed by CDR - Municipality Engineer
Safety Hazards					
Construction activities, equipment and machinery operation	Injuries to the public and workers	Prepare an HSE procedure in accordance with the applicable standards, apply procedures to reduce hazards, and take appropriate measures for storage, handling, transportation, and disposal of all waste	- Number of reported injuries among workers - Number of reported injuries among residents and people crossing the project site - Number of documented instances of workers not observed wearing/using required safety gear/equipment	Daily recording of HSE incidents on-site Monthly records of safety equipment violations by workers	- Contractor's HSE officer - Supervision consultant appointed by CDR - Municipality Engineer

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
		material. Provide basic training in construction, health and safety, first aid and the environment the construction team	- Number of complaints from the municipalities/residents		
Pumping stations construction	Land acquisition	Prepare and implement a RAP	Number of acquired plots	Monthly records on expropriation progress	CDR

Table 5 The ESMMP during Operation Phase

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Soil					
Grading, trenching, or excavation for maintenance	Temporary or permanent change in topography, soil erosion and collapse during maintenance activities	Develop appropriate procedures for reinstatement and soil stabilization	Amount of observed soil erosion from the construction site	- Daily visual inspection of the excavation activities - Daily inspection of soil erosion from the site - Monthly record of resident complaints - Monthly record of municipality complaints	MoEW/BWE representative
Fuel and chemicals use and storage, improper discharge of solid wastes, sludge, and	Change in soil quality	Develop procedure for storage and handling of wastes, chemicals, and hazardous wastes, maintain properly the pipelines and the pumping stations.	Amount of contaminated soil visible during inspection	Daily visual inspection to identify soil stains and location of spills during maintenance period.	MoEW/BWE representative

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
wastewater during maintenance activities		Develop procedures for sludge treatment and disposal according to the treatment plant process			
Groundwater					
Leakage from the network	Change in groundwater quality	Properly maintain the network and manage directly detected leakages and spills	Water characteristics (physico-chemical parameters and fecal coliforms)	Every six months	MoEW/BWE representative
Surface Water					
Discharge of treated wastewater to rivers	Change in surface water quality	Monitor the effluent wastewater quality for compliance with the relevant standards	The parameters that are required in the Lebanese decision 8/1 2001 for the discharge of wastewater into surface water bodies	Monthly	MoEW/BWE representative
Discharge of untreated wastewater		- Provide the pumping station with a standby generator and a standby pump; - Provide a fuel storage tank for the generators (volume capacity should be 24 hours operation)	Monitor the flow of the river for dilution requirements according to Lebanese decision 8/1 2001	Monthly/During malfunctioning periods	
Air Quality					
Operation of generators	Increase in air pollutants	Proper maintenance of generators and installation of filters.	Number of noncompliance reports about machines and equipment routine maintenance	- Monthly analysis of maintenance records of generators to ensure these are properly maintained and do not lead to	MoEW/BWE representative

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
				excessive emissions	
Operation of pumping station	Generation of odors	- Installation of an odor filter; - Installation of air mixers inside the holding tank of the pumping station; and - Construction of an overflow pipeline that divert the raw wastewater in malfunctioning cases	Number of complaints from odor	- Monthly/ During malfunctioning periods	MoEW/BWE representative
Traffic					
Partial or total closure of the roads adjacent to the installed pipelines	Increase in traffic volume and travel time for drivers passing through the Project area	Keep traffic to designated roads, position necessary diversion signs, and schedule maintenance activities to avoid peak hours.	Number of complaints from the municipalities/residents.	During maintenance period: - Daily monitoring road safety signs on site roads; - Daily monitoring to ensure compliance with safety standards and the proper positioning of any necessary traffic diversion signs; and - Investigating any potential traffic disturbance due to maintenance activities in response to specific complaints.	MoEW/BWE representative
Noise					

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Equipment and machinery operation during maintenance, operation of pumping stations.	Increase in ambient noise levels	Switch off equipment and generators when not in use, equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment, isolate pumps room to reduce noise levels in the exterior environment and equip them with silencers, properly maintain the pumps.	Number of complaints from the municipalities/residents	- Conducting/investigating noise monitoring in response to specific complaints and during noisy activities. - Yearly checking the noise monitoring results and if needed corrective action is taken. - Monthly records of complaints from the municipalities/residents	MoEW/BWE representative
Safety Hazards					
Equipment and machinery operation during maintenance activities	Injuries to the public and workers	Prepare an HSE procedure in accordance with the applicable standards, apply procedures to reduce hazards, and take appropriate measures for storage, handling, transportation, and disposal of all waste material. Provide basic training in operation, health and safety, first aid and the environment for the	- Number of reported injuries among workers - Number of reported injuries among residents and people crossing the project site - Number of documented instances of workers not observed wearing/using required safety gear/equipment - Number of complaints from the municipalities/residents	Daily recording of HSE incidents during maintenance period; and Monthly records of safety equipment violations by workers	MoEW/BWE representative

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
		operation team.			

Roles and responsibilities of the different institutions involved in the construction and operation of the future projects with respect to the implementation of the EMP are summarized in Table 6.

Table 6 ESMMP Implementation Plan

Institution/Body	Roles and Responsibilities
CDR	Overall responsibility over the EMMP Implementation during construction
MoE	Conduct site audits as needed to check implementation of EMP during construction and operation
Municipalities	The Municipal engineer in association with the Consultant appointed by CDR will take technical responsibility for supervising the impact mitigation plan during construction following which; a report will be filed and retained at municipality.
MoEW/BWE	Overall responsibility over the EMMP Implementation during operation
Contractor	Prepare a Construction Environmental and Social Management Plan (CESMP) that details how the contractor shall implement the provisions of the ESMMP; Provide a field HSE officer to ensure implementation of the CESMP; Liaise with supervision Consultant and regularly report on implementation of ESMMP; Immediately report to supervision Consultant in case of accidents, spills or other events which have health, safety or environmental implications; In case of incidents, the contractor should fill an incident records form, including how the incident is planned to be addressed.
Supervision consultant(s)	• Supervise the Contractor's implementation of CESMP; • Prepare a checklist to be used to supervise Contractor's works; • Review and approve CESMP prepared by Contractor; • Review and approve Contractor's ESMMP reports; • Coordinate with CDR to ensure appropriate reporting of ESMMP implementation; • Identify training needs of concerned parties to ensure ESMMP requirements are well-understood and can be implemented.

It is recommended that parties responsible for the implementation of this ESMF be trained on the implementation of Environmental Management Plans during construction and operation phases of the project. For instance, no contractor should be allowed to initiate work before he fully understands the requirements of the project's Environmental Management Plan and prepared a Construction Environmental Management Plan (CEMP). Similarly, project operators should be trained on the implementation of the EMP during operation and should prepare an Operation Environmental Management Plan (OEMP).

Public Consultation

A public consultation meeting was held on September 13, 2014 in Chtoura to discuss the findings of this ESMF and to offer the opportunity for stakeholders to express their opinion and concerns, if any.

Participants represented the following main affiliations:

- Ministry of Environment
- Council for Development and Reconstruction
- Municipalities (Alkhyara, Ferzoul, Kaa Alrim, Bar Elias, and Aanjar)
- Union of Municipalities (Zahle, Alsahel)
- Bekaa Water Authority
- Zahle and Bekaa Chamber
- Ministry of Public Health
- Ministry of Interior and Municipalities
- Rafik El Khoury and Partners
- Caritas Lebanon
- Salam Organization
- Université Saint-Joseph
- Lebanese University

The general comments received through the distributed evaluation forms are:

- Industrial wastewater and industrial solid wastes must be considered as the main sources of pollution of the Qaraoun Lake and the Litani River. Short and long-term solutions must be suggested to solve this issue.
- Workshops should not only be done in Chtaura but also in all the Municipalities that surround the Qaraoun Lake and Litani River so that the public becomes involved in all the project's activities. This will eventually lead to the success of the project or any other environmental project.
- Sewer networks must be as far as possible from potable water.
- Emergency measures must be implemented to reduce the suffering of the people who are affected by pollution in the area while awaiting for longer-term solutions. Also, it is important to gain the trust of the local communities to avoid having problems and obstacles while implementing the project's activities.
- Strengthen the role of local Authorities (Municipalities). In addition, a study for the management of the use and consumption of clean water must be prepared given the high number of Syrian refugees.
- Civil society organizations must be empowered to raise people's awareness regarding the environment. The Association "Al Salam" created environmental committees that work to reduce pollution and raise awareness in the 18 towns surrounding the Litani River.
- Find solutions to the negative impacts of bad odors generated at the riverside and of the irrigation water quality.

Table 7 summarizes the main issues raised by participants and how these were taken into consideration, where applicable.

Table 7 Proceedings of the Public Consultation Meeting

Name	Organization	Comment/Question	Answer	Integration of Comments in the Study
Kassem Mathloom	Alkhyara Municipality and Union of Municipalities of the Plain	Some of the presented impacts on groundwater are negative whereas wastewater projects are known to have positive impacts	The overall project impact on groundwater is positive, however, the impacts mentioned in the presentation were related to construction activities and potential leakage of wastewater during operation	Positive impacts of the project are highlighted in Section 6.2.
		Jeb Jannine WWTP was not included in the study though it needs some additional works to be fully functional	There are some financial issues related to the networks that are being worked on at this stage and after confirming the fund availability and the amount, the World Bank's support maybe sought.	--
Lawyer Ghassan Jarrah	Bekaa Water Authority	People and children suffer from diseases, annoyance due to odors, and pollution: • Why doesn't the government implement short term mitigation measures to reduce the severity of the issue until all the financial issues are solved, and long term solutions can be fully implemented to resolve those problems? • Why doesn't the government in the meanwhile solve the industrial wastewater problem which is a major issue?	• The government is implementing several initiatives to control pollution in the Qaraoun lake and its basin • This program financed by the World Bank is part of "The Qaraoun pollution prevention project" that addresses all sources of pollution affecting the lake and its catchment area. It has been endorsed by the government and shall be implemented gradually • The Ministry of Environment, with the support of the World Bank, is also implementing the "Lebanon Pollution Abatement Project (LEPAP)", which aims at supporting industries to comply with environmental standards • Recent environmental legislation has been adopted by the Council of Ministers, that	--

Name	Organization	Comment/Question	Answer	Integration of Comments in the Study
			when enforced, will help alleviate the problem; in particular, the Environmental Compliance Decree (Decree 8471/2012) should play an instrumental role in promoting compliance with environmental legislation; support from from civic society and municipalities is needed to enforce the legislation.	
Lawyer Toufik Al Hindi	Zahle and Bekaa Chamber of Commerce and Industry	Now, water networks are being implemented and installed on public roads and in the next phase wastewater networks will be implemented and excavations will be executed again on public roads. There should be a coordination mechanism to avoid re-excavating the roads	Projects are implemented based on the financing availability which makes the coordination difficult	--
Issam Akiki	Baladi Program - Caritas Lebanon	How much does the fund cover?	World bank usually covers 100% of the consultancy costs and between 90% and 95% of the implementation costs	--
Lawyer Nathrat Andokian	Anjar Municipality	• The study doesn't mention the mechanism for coordination with municipalities • Anjar municipality sent many requests to the CDR to expand the sewage networks but no replies were received so far • If the funds are available for Anjar/Majdel Anjar WWTP and networks, execution should have started	• The main aim of this workshop is to coordinate with municipalities, unions, and organizations, to take their comments and opinions and include them in the study. • Anjar has some networks and lacks others, and funding is available however CDR is waiting for the approval (Italians)	The report describes the role of municipalities in implementing the environmental and social management and monitoring plan especially during the construction phase of the project (Section 7.2).
May Assad	Baladi Program	• People need quicker and tangible solutions rather than only studies.	Works are being executed when funds are available	--

Name	Organization	Comment/Question	Answer	Integration of Comments in the Study
Osama Ibrahim	Al Salam Organization	• Salam Organization has implemented numerous initiatives last year and currently through 18 environmental committees from the civil society distributed in the villages (support from USAID), it is working on environmental matters. Therefore the organization would like to be part in this project in promoting awareness	The support of the local NGOs is needed during the implementation of the project and the workshop aim is to involve these NGOs.	--

1. INTRODUCTION

1.1 CONTEXT OF THE STUDY

The Litani River which is around 170 Km long, originates from the Bekaa valley in the South of Lebanon and empties in the Mediterranean Sea North Tyre. The Qaraoun dam is a remarkable water feature of the Litani River since it created the largest artificial lake in the country, namely the "the Qaraoun Lake", that covers an area of 12 Km^2 and has a capacity of 220 million m^3. The Qaraoun Lake is located in the West Bekaa at an altitude of 800 m and its water is used for hydropower production and irrigation.

The Lake's storage capacity is used to:

- Irrigate 1,400 hectares (ha) of the agricultural area in the Bekaa valley and 36,000 ha in the South of Lebanon
- Generate electricity at Markaba ((34 Mega Watt (MW)), Awali (108 MW) and Joun (48 MW) hydropower plants

The Litani River is currently facing major pollution problems that are increasing at an alarming rate. As a result, the concentrations of metals (Arsenic (As), Cadmium (Cd), Mercury (Hg), Vanadium (V) etc.) in Lake Qaraoun exceed the world average concentration in lakes. Also, high concentrations of ammonia, nitrites, fecal coliforms, urban runoff (TPH) and organic industrial pollution, such as phenols and TPH were found in the waters of the Litani River and the Qaraoun Lake. As a result, the water of the lake became undrinkable and only used for irrigation in certain circumstances. The main sources of pollution are municipal wastewater, industrial wastewater, solid waste, and runoff of agricultural chemicals including non-degradable pesticides (ELARD 2011).

In order to reduce the pollution in the Qaraoun Lake, the quantity of untreated municipal sewage, solid wastes and industrial wastes discharged into the Litani must be controlled and the quality of agricultural runoff that empties into the river must be improved.

As a response to this urgent situation and in order to limit pollution, the Ministry of Environment (MoE) established a Business Plan that identifies the most significant sources of pollution in the Qaraoun Lake and recommends appropriate solutions including detailed prioritized investments for each polluting sector, with an estimated financing requirement of US$225 million. In response to the government of Lebanon request, the World Bank will provide technical and financial assistance for some items of the business plan.

The three components supported by the World Bank include the following:

- **Component 1:** Improve the collection of the municipal sewage through construction of new networks, rehabilitation of a part of the old ones, and the establishment of new pumping stations.
- **Component 2:** Increase the adoption of Integrated Pest Management (IPM) practices that need to be adopted by farmers.
  Component 3: Support technical studies in solid waste management (SWM). These preparatory studies will be conducted to improve the SWM system (additional

landfills, sorting facilities, etc.). Also, this component aims at supporting project management and capacity building by establishing a Project Management Unit (PMU) for a better management of the Litani River and Qaraoun Lake waters.

1.2 OBJECTIVES OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

The objective of this ESMF is to provide clear procedures and methodologies for environmental and social screening, review, approval and implementation of activities to be financed, in addition to specifying appropriate roles and responsibilities and outlining the necessary reporting procedures for managing and monitoring environmental and social concerns related to the project activities.

This ESMF is intended to be used as a practical tool during project formulation, design, planning, implementation and monitoring to ensure that environment and social aspects are duly considered in the planning and implementation processes. It describes the steps involved in identifying and mitigating the potential environmental and social impacts of proposed investments.

The ESMF identifies potential socio-economic impacts that require mitigation measures and/or resettlement and compensation. Any resettlement and/or compensation measures will be implemented in accordance with a Resettlement Policy Framework (RPF) and will be implemented prior to commencement of any investment activities.

Moreover, once the locations of the sewer networks construction are identified, a site-specific EMP shall be prepared.

The ESMF includes an Environmental and Social Management and Monitoring Plan (ESMMP) for the project's implementation. The ESMMP summarizes institutional arrangements for the implementation of mitigation measures, monitoring, through certain indicators, of the implementation of these measures, capacity building needs as well as cost estimates for its implementation.

A site specific IIE/ EMP and LAP are being prepared for Component One / Package 1 (and are available in separate reports). This framework is prepared to guide the preparation of the site specific Environment and Social Management Plans of Component One / Packages 2 and 3 and remaining project activities.

2. PROJECT DESCRIPTION

The development objective of the project is to reduce the pollution in the Qaraoun Lake by taking appropriate measures to limit the discharge of untreated municipal wastewater and solid wastes and to improve the quality of agricultural runoff that flows into the Litani River, in addition to monitoring water resources quality and enhancing management of irrigation systems.

2.1 PROJECT COMPONENTS

The Environmental and Social Management Framework (ESMF) for Lake Qaraoun pollution prevention project addresses the four components described below:

Component 1- Improve the collection of municipal sewage

The proposed project would finance activities that increase sewerage collection in regions of constructed or planned WWTPs. This component's investments are estimated at around 45 Million $.

Package 1- Expansion of sewage collection to connect to Zahlé WWTP

The project will finance:

- The construction of approximately 90 Km of new sewerage network to connect the villages of Kaa El Reem, Hazarta, Ksara, Saadnayel, part of Taalabaya, and Karak to Zahle's WWTP. Zahlé WWTP is currently under construction and is expected to be completed in February 2015;
- The rehabilitation of part of the old network;
- The establishment of 6000 house connections; and
- The introduction of 3 to 5 pumping stations.

Package 2- Expansion of sewage network to connect to Anjar/Majdal Anjar WWTP

The proposed project includes the construction of 120 Km of networks to connect to the WWTP in Anjar/Majdal Anjar. A detailed design study has already been prepared for 6 out of 17 localities to be connected.

The population that would benefit from this package is presented in Table 2-1.

Table 2-1 List of the localities that would be connected to Anjar/Majdal Anjar WWTP and their corresponding populations in the years 2010 and 2025

		Population 2010	Population 2025
6 Localities	**Anjar**	10,000	13,500
	Majdel Anjar	26,500	35,770
	Saouiri	8,000	10,800
	Bar Elias	28,000	37,800
	El Marj	12,000	16,200
	Er Raouda	1,600	2,200
Total		**86,100**	**116,270**
11 localities	**Bouerij**	3,600	4,800
	Chtaura	2,700	3,600
	Mraijet	5,000	6,700
	Jdita	15,000	20,300
	Jlala	2,700	3,600
	Makse	4,500	6,000
	Qabb Elias	32,000	43,200
	Taalabaya	30,000	40,500
	Taanayel	5,000	6,800
	Wadi Delem	3,000	4,000
	Zebdol	1,600	2,200
Total		**105,100**	**141,700**

(Source: TOR, Environmental and Social Safeguard studies for Lebanon: Lake Qaraoun Pollution Prevention Project, March 2014)

Package 3- Expansion of sewage network to connect to Ablah, El Ferzol, Aitanit WWTPs

The proposed project would increase the utilization of three small WWTPs established by USAID (Ablah, El Ferzol and Aitanit WWTPs) by maximizing the sewage network coverage (package 3).

Component 2- Increase the adoption of Integrated Pest Management (IPM) practices

This component's main goal is to strengthen the capacity of farmers who are considered to be the most significant contributors to pollution in the Agricultural sector, by promoting Integrated Pest Management practices (IPM). IPM is an effective and environmentally sensitive approach to pest management that is based on a combination of common-sense practices and that works on reducing fertilizer applications and improving irrigation and land preparation practices in order to decrease water runoff.

Moreover, it will adopt the most practicable technical solutions according to either local or regional existing experiences in the country and will work on endorsing these solutions in the field and promoting their adoption.

Furthermore, the project suggests public awareness campaigns regarding environmental and public health concerns that can result from the excessive use of agro-chemicals.

Component 3

Technical Studies in Solid Waste Management

In 2011, the quantity of Solid Waste generated in the Upper Litani Catchment was estimated at around 650 t/ day. Today, the population increased in an unprecedented way (up to 50%), mostly due to the high number of Syrian Refugees, which lead to the generation of greater amounts of Solid Wastes that need to be managed in an environmentally sound manner. Only one sanitary landfill that receives 130 t/ day of Solid Wastes exists in Zahle. A new landfill is under construction in Baalbeck and funded by the Italian Cooperation (with a capacity of 100 t/ day). A sorting plant under construction is located in Jeb Jannine and funded by the municipality.

Under this project component, it is proposed that technical, environmental and social studies be conducted for:

- Building a sorting and landfilling facility in Bar Elias;
- Building a sorting facility in Rachaya; and
- Ensuring the closure and rehabilitation of dump sites such as, Temmin al Tahta, Qab Elias, Bar Elias, Hawch Al Harim, Al-Khyara, Jeb Jennine, and Gazze or Kayyal.

Those activities are studies and mostly have positive impacts with no negative impacts on the environment and the society. In case the Government decides to finance the establishment of a sorting facility and a sanitary landfill with their own budget based on the studies conducted under Component 3, an environmental impact assessment will be prepared and disclosed according to the national EIA decree, and the consultation will be held before the physical work is initiated.

Capacity Building and Project Management

This component is based on the establishment of a Project Management Unit (PMU) that will provide institutional technical assistance to the Bekaa Water and Wastewater Establishment (BWE) and the Litani River Authority (LRA). It will also support water resources monitoring, management and control of irrigation systems and build-up of the institutional capacity to support the implementation of the business plan.

3. LEGISLATIVE AND INSTITUTIONAL FRAMEWORKS

The implementation of the proposed activities under the project must be in compliance with the operational policies of the World Bank (WB) and at the same time compliant to the existing legal framework and the regulations of the Government of Lebanon (GoL).

The Country Environmental Analysis of Lebanon (CEA)[2] conducted an assessment of the Lebanese national EIA system and determined the similarities and difference between the national EIA system and the World Bank operational policy OP 4.01 on environmental assessment and the European Commission (EC) EIA Regulations no. 97/11. The assessment showed that the features of the Lebanese EIA system are compatible with most of the World Bank EA Policy (OP 4.01) and the EC EIA regulations. These features are in: (i) screening; (ii) scoping; (iii) the EIA report content; (iv) the content of the environment management plan; (v) provisions for appeal; and (vi) requirements for monitoring and follow up. There are however gaps in the national EIA system namely: (a) the lack of standard TOR and sector guidelines for specific sectors to be provided to the project proponent for the preparation of the EIA or IEE reports; (b) lack of consultation with stakeholders for projects listed under Annex II (similar to Category B projects in the World Bank OP 4.01);and (c) the lack of disclosure of the EIA summary and Initial Environment Examination (IEE) to the public as required by articles 13 and 14 of the Environment Protection Law – noting that Article 13 of the EIA decree calls for Information Publication. These gaps are addressed in this ESMF by providing guidance to the preparation of safeguards documents, by specifically requiring consultation for IEE projects as well as explicitly requiring that EIA and IEE summaries be subject to disclosure.

The Implementing Agency has the responsibility to ensure that the project's activities are consistent with the WB policies and guidelines. Furthermore, it is also important to ensure that the activities are in compliance with the national legal framework. The different laws and regulations listed in this section of the report will serve as guidance to the application of the legal and regulatory provisions to the current project context. Roles and responsibilities of the main stakeholders are also outlined in this chapter.

3.1 WORLD BANK'S SAFEGUARDS POLICIES

The World Bank's ten safeguard policies are designed to help ensure that projects suggested for Bank financing are environmentally and socially sustainable, and therefore improve the decision-making process. These operational policies are listed below:

- OP 4.01 Environmental Assessment;
- OP 4.04 Natural Habitats;
- OP 4.09 Pest Management;
- OP 4.11 Physical Cultural Resources;
- OP 4.12 Involuntary Resettlement;
- OP 4.10 Indigenous People;
- OP 4.36 Forests;

[2] The Country Environment Analysis (CEA) of Lebanon, the World Bank, April 2011

- OP 4.37 Safety of Dams;
- OP 7.50 Projects on International Waterways;
- OP 7.60 Projects in Disputed Areas.

In preparing this ESMF, all the categories of investments were screened against the 10 WB safeguard policies and it was determined that the following 3 are triggered; OP 4.01 on Environmental Assessment, OP 4.09 on Pest Management, and OP 4.12 on Involuntary Resettlement.

Environmental Assessment (OP 4.01)

For all projects financed by the Bank, environmental screening is conducted according to the environmental impacts expected of the project, and all projects are assigned an environmental category, A, B, C, or FI, with a decreasing order of environmental impact severity. The instruments for this policy vary from a SEA, ESMF, ESIA, depending on the project particular conditions. At this stage since investment details are not sufficiently known, an ESMF is required.

Based on the principles of the OP/BP 4.01, the project is classified as environmental "Category B" given that it has potential adverse environmental impacts on human populations or environmentally important areas (including wetlands, forests, grasslands, and other natural habitats). Those impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be easily addressed. "Category B" projects require the preparation of comprehensive environmental and social impact assessment accompanied by a thorough consultative process.

Pest Management (OP 4.09)

Pest Management (OP 4.09) is triggered since chemicals and pesticides are being used in the agricultural sector. A preferred solution is to use IPM techniques (such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest) and encourage their use in the whole of the sectors concerned. If pesticides have to be used in crop protection or in the fight against vector-borne disease, the Bank-funded project should include a Pest Management Plan (PMP), prepared by the borrower, either as a stand-alone document or as part of an Environmental Assessment (Source: WB, 2012). This policy established a list of chemicals that cannot be financed by the WB. In addition, the policy instrument, i.e., Pest Management Plan should be established for integrated pest management, and procedures and controls for safe use, handling, and disposal of chemicals and equipment. Appendix A describe the Integrated Pest Management Guidelines and describe the regulatory framework, principle and content of IPM.

Involuntary Resettlement (OP 4.12)

Significant efforts are to be made in the design and screening stages of the construction phase to avoid adverse impacts on people, land, property, including people's access to natural and other economic resources, as far as possible. Under component 1 of the project, resettlement may be needed for the construction of wastewater pumping stations and

sewage networks installation. An RPF that sets the guidelines for the Resettlement and Compensation Plans will be prepared since the program investment triggers this policy. RAPs would also have to be prepared and approved by the Bank when resettlement needs and areas are identified.

The WB requires also that stakeholder consultations be carried out during planning, implementation and operation phases of the project. The draft ESMF report was presented to project-affected groups by conducting one public participation meeting. Following comments received and revisions duly undertaken, the final ESMF was prepared and will be submitted to the World Bank and made publicly available through the Bank's disclosure procedures.

3.2 RELEVANT NATIONAL LEGISLATIVE FRAMEWORK

The national regulatory framework includes important legislation related to environmental and social safeguards:

- The EIA decree 8633/2012;
- Expropriation Law No. 58 dated 29/05/1991 (updated on 8/12/2006); and
- Other environmental legislations dealing with the management of water resources, solid waste and wastewater as well as air quality and pollution control.

EIA Decree 8633/2012

The Lebanese EIA decree 8633/2012 sets principles and measures necessary to assess the environmental impact of projects. The EIA decree describes the various stages of the national EIA process including screening, scoping, implementation, and review of the EIA report, in addition to the period of validity, and the appeal process. The EIA decree also lists all the activities for which EIA or permit conditions are mandatory, and those that require an Initial Environmental Examination (IEE) (refer to Annexes 1, 2 and 3 of the EIA decree). The main steps of the EIA Implementation Process in Lebanon are summarized in the schematic diagram shown in Figure 3-1 as described in Appendix 9 of the EIA Decree.

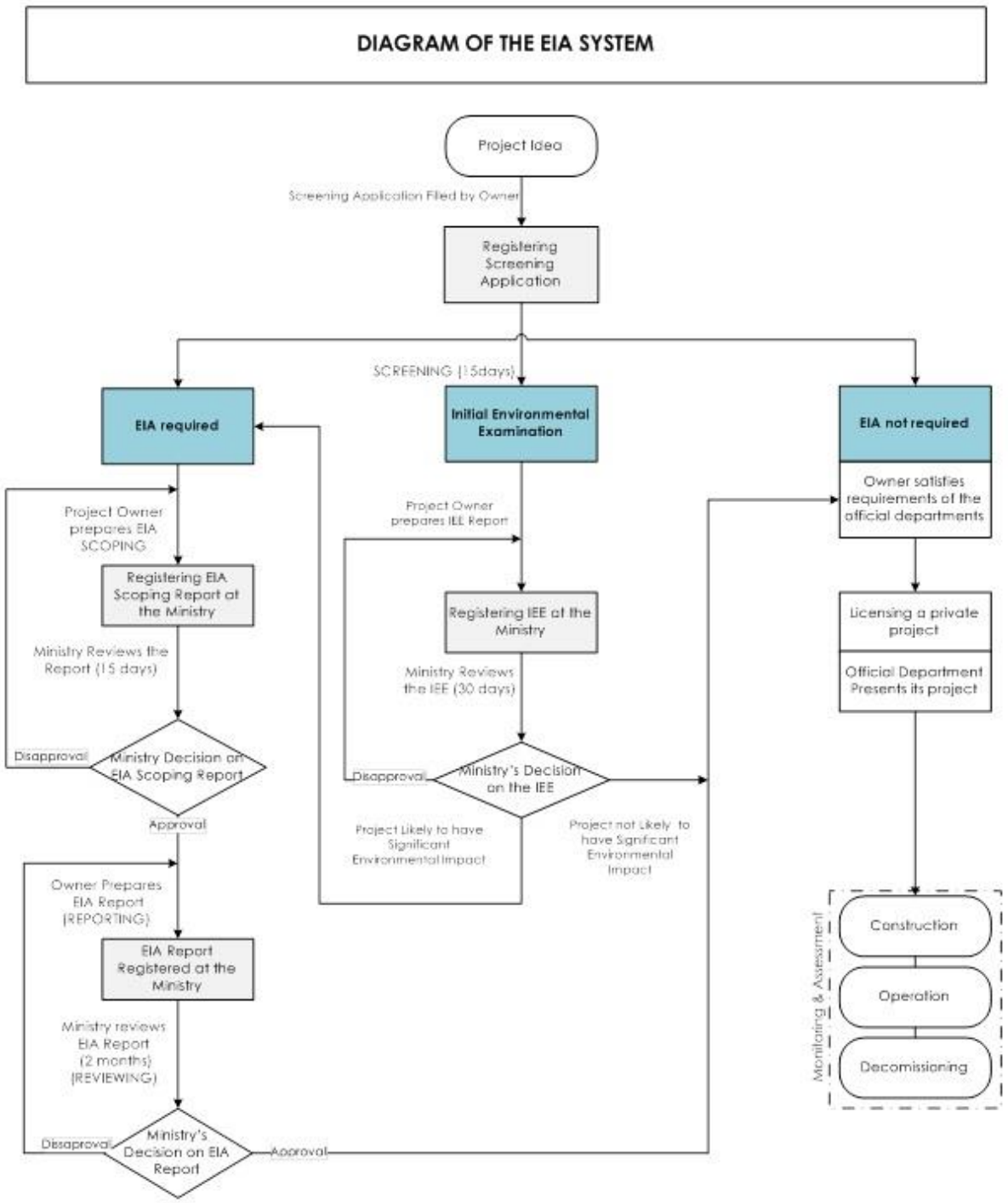


Figure 3-1 Schematic Diagram of the EIA Licensing Procedure

Expropriation Law No. 58 dated 29/05/1991 (updated on 8/12/2006)

The Lebanese Constitution guards and protects the right of private property including landed property and the rights attaching to it. The exercise of eminent domain, in Lebanon, for expropriating private property in the public interest is governed by this Law. This law is extensive and governs many cases.

The State may only expropriate rights when it is to be declared in the public interest, and against payment of a prior and equitable compensation ("indemnité equitable"). All compensation is by monetary award through independent judicial assessment and the process of expropriation itself cannot be halted unless the validity of the public interest decree itself is challenged. At least 65% of the compensation is paid in advance when there is an appeal, and if no structures are found to be existing within expropriation limits, an additional 25% is paid and the expropriation party reserves the right (only if it wishes so) to hold the remaining 10% till the decision of takeover is issued.

Other Environmental Legislations

An overview of the main environmental legislations in Lebanon related to the management of water resources, solid waste and wastewater as well as air quality and pollution control are presented in Table 3-1. These legislations are listed in reverse chronological order.

Table 3-1 Summary of Relevant Environmental Legislations

Year	Law / Decree	Relevant Provisions
2014	Law 251	Designating General Attorneys and Judges for investigating environmental litigation cases.
2012	Environmental Prosecutor Draft Law	Establishing an Environmental Prosecutor
2012	ISMW Draft Law	Integrated Solid Waste Management
2012	Air Act Draft Law	Protection of Air Quality
2012	Decree 8157	Establishing the National Council for the Environment and specifying its mandates and organization
2012	Decree 8633	This EIA decree is under the Framework Environmental Law. It stipulates the EIA procedures and regulations related to all development projects that have a potential impact on the environment.
2012	Decree 8213	Strategic Environmental Assessment of Policies, Plans and Programs in the public sector
2011	Circular 10/1	Monitoring the operation and exploitation of generators
2009	Decree 2275	Application Decree on the Organization and mandates of the Ministry of Environment, its divisions and departments.
2006	Law 60	Amended expropriation law 58 of 1991
2005	Decision 3/1	Environmental Guidelines for the establishment and operation of small-scale wastewater treatment plants
2005	Law 690	Law on the Organization of the Ministry of Environment. The Law gives the Ministry of Environment the prerogative to set the standards and norms for the protection of coastal zone, river beds and different water resources taking into account the protection of the environment and the conservation of its natural resources.
2004	Law 646	Construction Law
2002	Law 444	Environment Protection Law
2002	Decision 5/1	Review of "Initial Environmental Examination" report
2002	Law 432	Accession to the Stockholm Convention on Persistent Organic

Year	Law / Decree	Relevant Provisions
		Pollutants.
2001	Decision 8/1	National Standards for Environmental Quality. Updates/replaces Decision 52/1 by developing National Standards for Environmental Quality (NSEQ) related to air pollutants and liquid waste emitted from classified establishment and wastewater treatment plants
1996	Decision 52/1	Specifying the National Standards for Environmental Quality and the Environmental Limit Values for Air and Water
1994	Law 387	Accession to the Basel Convention concerning the control of the trans-boundary movement of hazardous waste and their disposal.
1991	Law 58	Expropriation law which was modified later on by the Law enacted on 12/08/2006
1988	Law 64/88	Protection against hazardous wastes that could harm air, water, biodiversity, soil, and people
1974	Law 973/74	Relating to solid waste pollution; followed by application Decree No. 8735
1943	Decree Law 22	Natural Sites and Landscapes
1939	Law	Protection of Natural Sites and Landscapes in Lebanon
1933	Decree 2761	Guidelines related to Wastewater Management and Disposal
1932	Decree law 16 L	Mandates the establishment of buffer zones for the protection of all surface and groundwater resources from any type of activity/potential source of pollution. Requirements for buffering are found in Decision 320/26.

3.3 INSTITUTIONAL FRAMEWORK

Main Institutions relevant to the project include the following:

- World Bank (WB);
- Council for Development and Reconstruction (CDR);
- Ministry of Environment (MoE);
- Ministry of Energy and Water (MoEW);
- Bekaa Water and Wastewater Establishment (BWE);
- Litani River Authority (LRA)
- Ministry of Public Works and Transportation (MoPWT);
- Ministry of Interior and Municipalities (MoIM);
- Municipalities; and
- Ministry of Agriculture.

Roles of these institutions with regard to the project, specifically related to the implementation of this ESMF, are subsequently described.

World Bank (WB)

The WB is funding the three components of the project through the CDR. The WB's responsibility is to:

- Supervise the implementation of the Bank's environment and social safeguards through the implementation of ESMF described in this document;
- Review and clear EA studies to ensure that the review process of the EIA system is acceptable;
- Provide technical support to the CDR and other relevant stakeholders as required to ensure a reasonable implementation of the Banks' safeguards.

Council for Development and Reconstruction (CDR)

The CDR will lead the execution of the project's components and designate competent parties to implement them. The CDR will also supervise the implementation of the Environmental and Social Management and Monitoring Plan (ESMMP) and will make sure that the recommendations of the Environmental Management Plan (EMP) for Zahle wastewater networks, as well as for subsequent projects, are included in the Terms of Reference (TOR) of the contractors executing the construction activities.

The CDR will be also responsible for the expropriation procedures if resettlement is needed during the execution of component 1 activities. In addition to that, the CDR will prepare the necessary reports to be submitted to the World Bank.

Ministry of Environment (MoE)

MoE will monitor the environmental impacts of the project, the implementation of the environmental management plan for component 1 activities during construction and operation, and the ESMMP for the whole project components.

Ministry of Energy and Water (MoEW)/Bekaa Water Establishment (BWE)/Litani River Authority (LRA)

The MoEW, through the Bekaa Water and Wastewater Establishment (BWE), is responsible for wastewater and potable water management. The MoEW will be responsible for approving the design of wastewater networks, location of pumping stations, and other matters related to water resources management. The Litani River Authority is responsible for monitoring the quality of the Litani River and its tributaries water quality, in addition to the awareness and cleaning campaigns.

The BWE will monitor the EMP recommendations for component 1 activities during the operation phase.

Ministry of Public Works and Transportation (MoPWT)

According to Decree 13379/1998, the Directorate General of Roads and Buildings of the MoPWT is responsible for the inspection of sewage networks. Moreover, public roads fall under the MoPWT's authority. Consequently, it is important to coordinate with the MoPWT

when implementing infrastructure works such as the activities described in component 1 of the current project.

Ministry of Interior and Municipalities (MoIM)

The Ministry of Interior and Municipalities manages the affairs of Municipalities and Unions of Municipalities. Solid Waste Management falls under MoIM's supervision; therefore, when implementing component 3 of the project it is necessary to coordinate with the MoIM in all aspects of the studies.

Municipalities

The municipalities will supervise the implementation of the ESMMP and particularly the EMP recommendations related to the construction activities of component 1 of the project.

Moreover, during the implementation of component 3, it is highly recommended to coordinate with the relevant municipalities. As a matter of fact, the Municipal Law of 1977 (legislative decree No. 118, Article 49) authorizes municipal councils to build solid waste disposal facilities. Municipalities report to the local governor and the MOIM, which manages the allocation and distribution of funds from the Independent Municipal Fund (IMF), under the control of the Ministry of Finance (MOF). Municipalities use IMF resources to pay for SWM services including street sweeping, waste collection, and disposal. MOIM Decree No. 9093 (dated 15 November 2002) provides financial incentives to municipalities for hosting SWM facilities or landfills. In particular, municipalities that agree to host a sanitary landfill or a SWM facility would according to the decree receive five-folds their annual allocation from the IMF and 10-folds this allocation in case the facility serves 10 municipalities or more. To date, the decree has never been implemented. Several municipalities (Tripoli, Zahle, etc.) have developed their own MSWM services and are providing this service quite successfully (Source: State and Trends of the Lebanese Environment, 2010).

Ministry of Agriculture

The Ministry of Agriculture is responsible for implementation of component 2 activities of the project (improvement of the quality of agricultural runoff) that include building and strengthening the capacity of farmers in the project area to implement Integrated Pest Management practices and to lower the application of chemical fertilizers. Public awareness campaigns related to environmental and public health concerns related to the excessive use of agro-chemicals will also be carried out by the Ministry.

4. DESCRIPTION OF THE ENVIRONMENT

This chapter presents background data and information on the environmental conditions in the cities/ villages of Zahle and the West Bekaa concerned by this project (Figure 4-1).

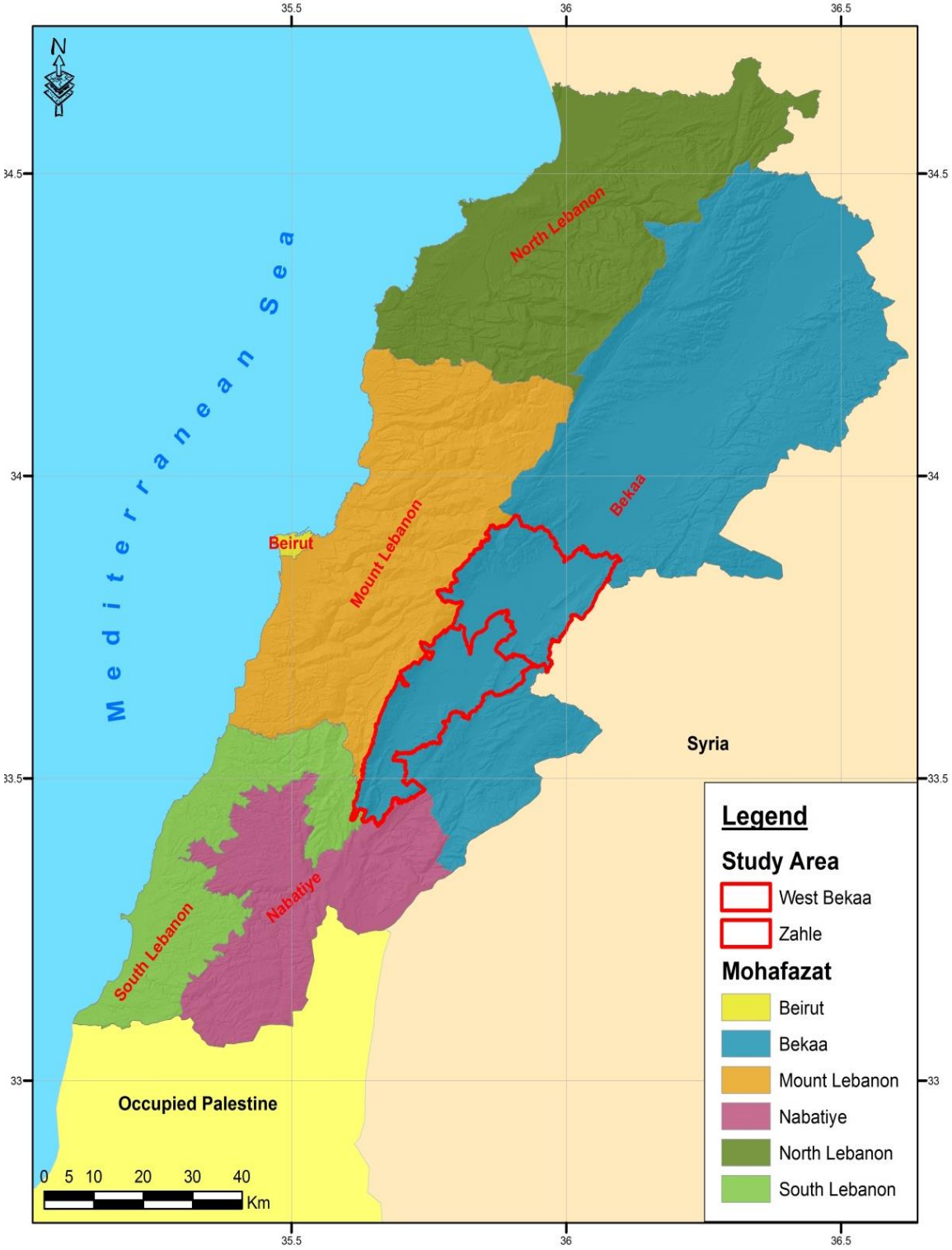


Figure 4-1 Project Location General Overview

Climate

Like the rest of Lebanon, Zahle and West Bekaa enjoy a typically eastern Mediterranean climate characterized by hot and dry summers, and mild to cool winters where most of the precipitation is concentrated. The climate in Zahle features however some continental characteristics due to the town's altitude and inland location, in the rain shadow of the Lebanon Mountains. Data presented below were collected at Houch El Omara Weather Station and Tel Amara Weather Station.

Temperature

The study area features more extreme temperatures (i.e. hotter summers and cooler winters) than coastal areas. Average minimal and maximal temperatures recorded between January 2009 and January 2012 are presented in Figure 4-2. Average monthly temperatures ranged between a minimum of 5.39°C in January 2009 and a maximum of 36 °C in August 2010. Peaks of over 30 °C occurred on a few days each summer (July - August).

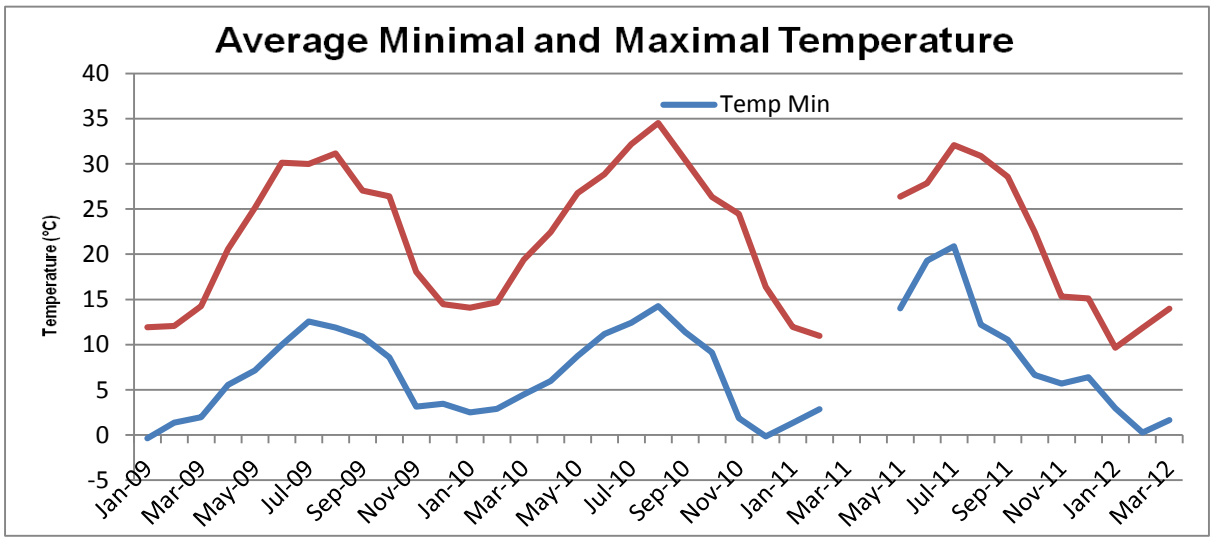


Figure 4-2 Minimum and Maximum Temperatures in Houch el Omara Weather Station (Jan 2009- Jan 2012)

Wind

The maximum wind speed reported at the Tel Amara weather station for the period between January 2009 and January 2012 ranged between 3.38 m/sec in November 2010 and 8.46 m/sec in February 2009, while average speed ranged between 0.97m/sec in November 2010 and 2.46 m/sec in June 2010, as illustrated in Figure 4-3.

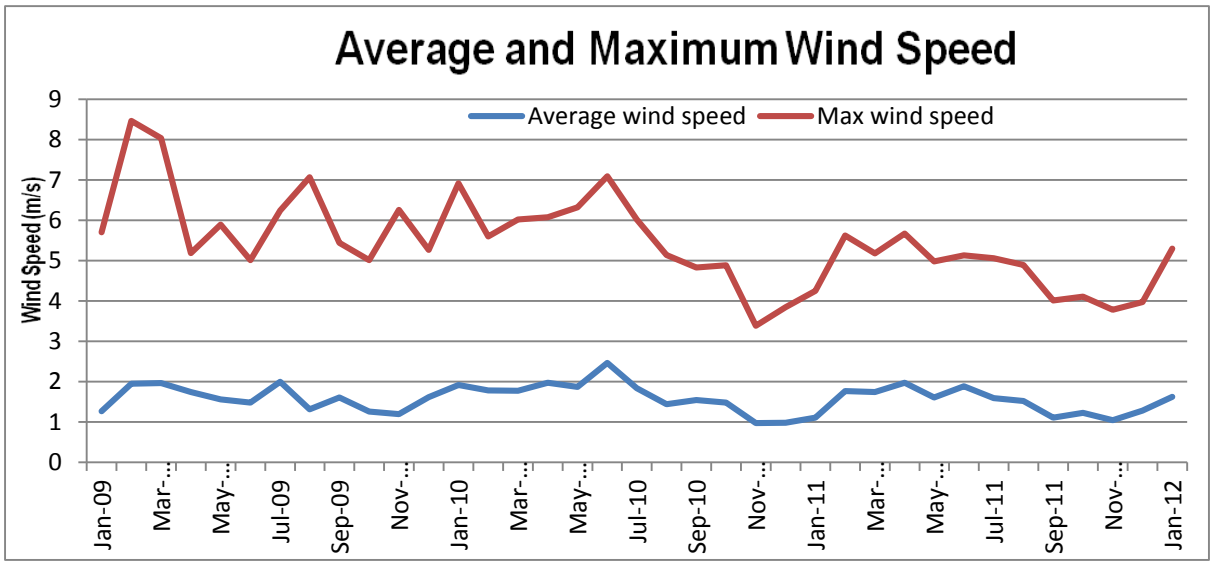


Figure 4-3 Average and maximum wind speeds in Tal Amara Weather Station (Jan 2009 – Jan 2012)

Wind direction results revealed a prevailing yearly average wind blowing from the southwest in West Bekaa area (Figure 4-4) and a prevailing yearly average wind blowing from the southwest and northwest almost equally in Zahle area (Figure 4-5).

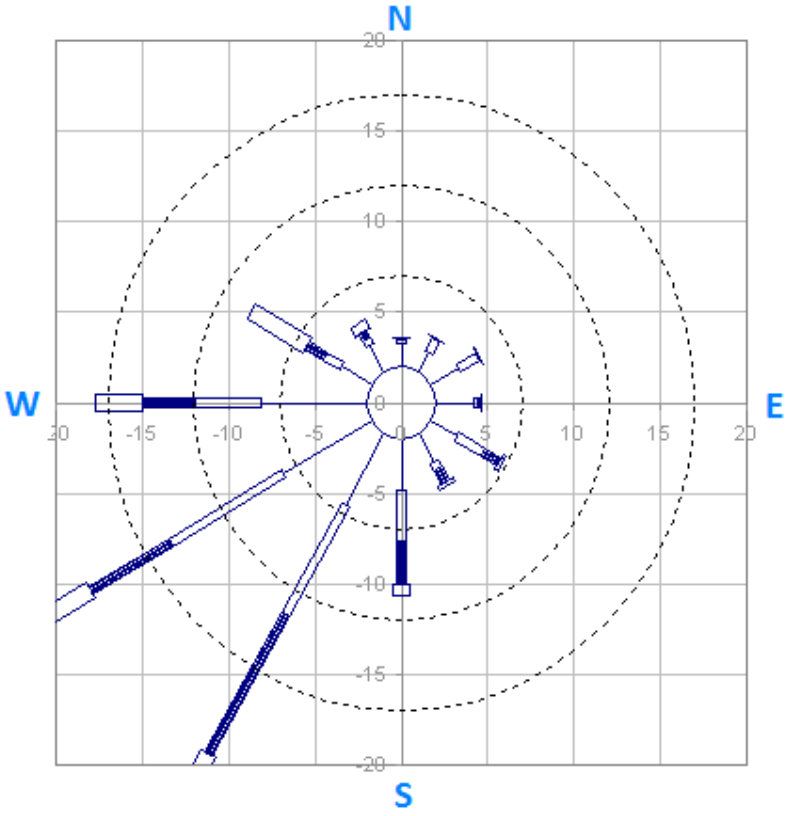


Figure 4-4 Wind Direction at West Bekaa (Source: MOEW/UNDP/CEDRO, 2011. The National Wind Atlas of Lebanon)

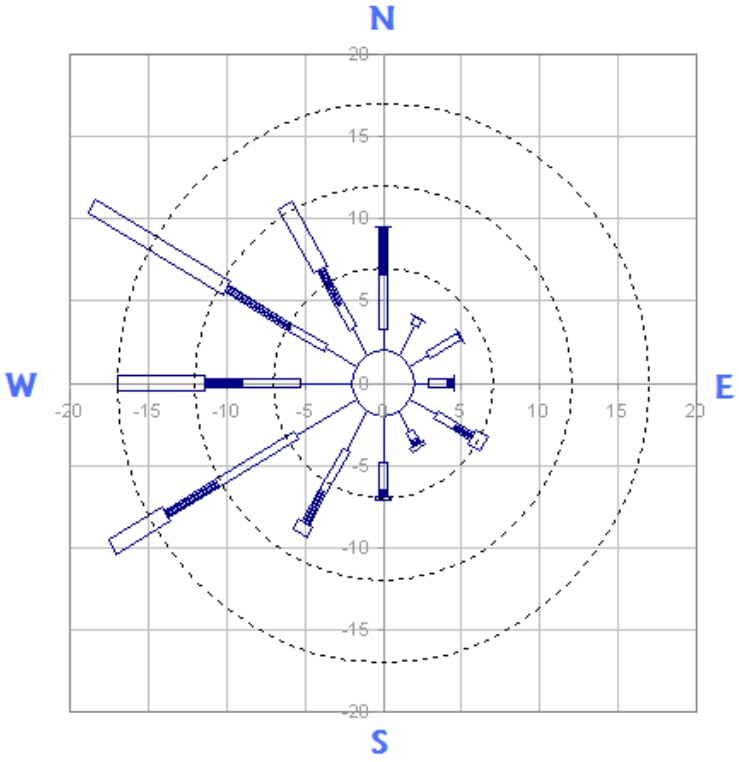


Figure 4-5 Wind Direction at Zahle (Source: MOEW/UNDP/CEDRO, 2011. The National Wind Atlas of Lebanon)

A rainfall map of the Study Area is provided in Figure 4-6, showing that the average yearly precipitation in West Bekaa and Zahle is ranging between 500 and 1300 mm/year.

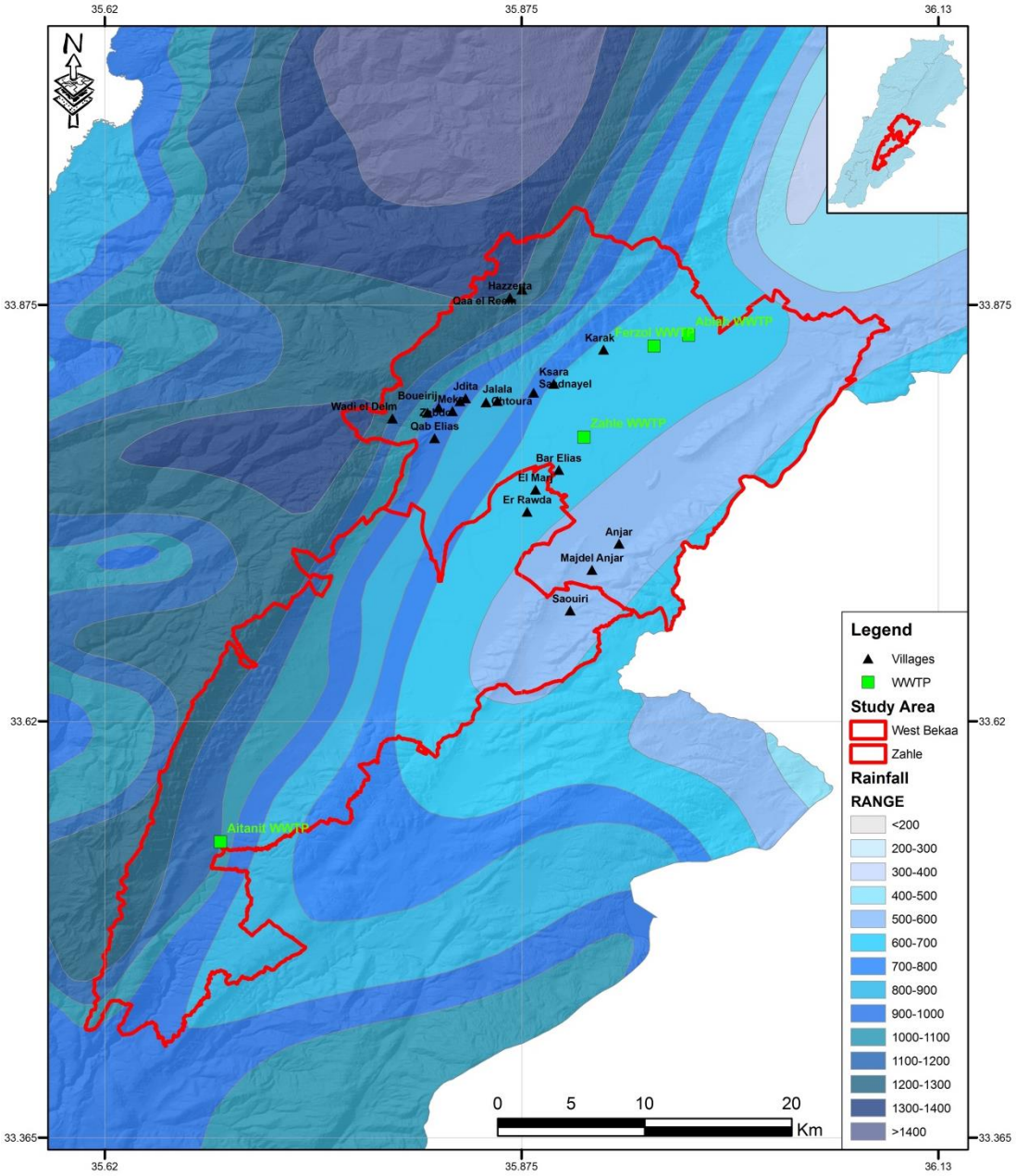


Figure 4-6 Rainfall Map of the Study Area

(Source: Plassard, J., 1972)

Geology

The study area is located in South Bekaa at around 45km inland from the Mediterranean Sea. It is situated in the cadastral boundaries of West Bekaa and Zahle. The geology of the project area was studied over an extent of around 862 km^2 (Figure 4-7 and Figure 4-8).

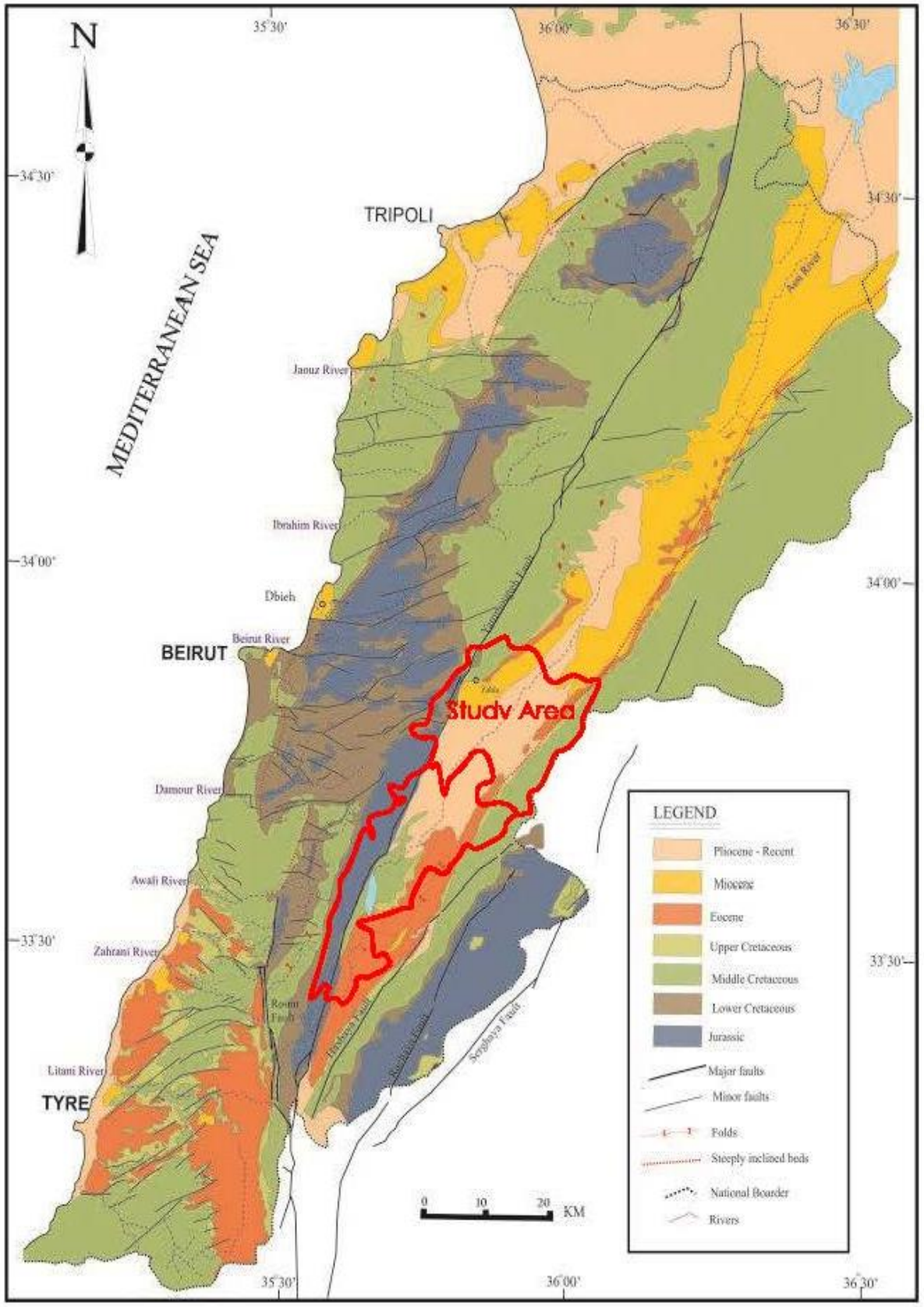


Figure 4-7 General Geological and Tectonic Map of Lebanon Showing the Study Area

(Adapted from Dubertret 1/200,000 Map. 1945)

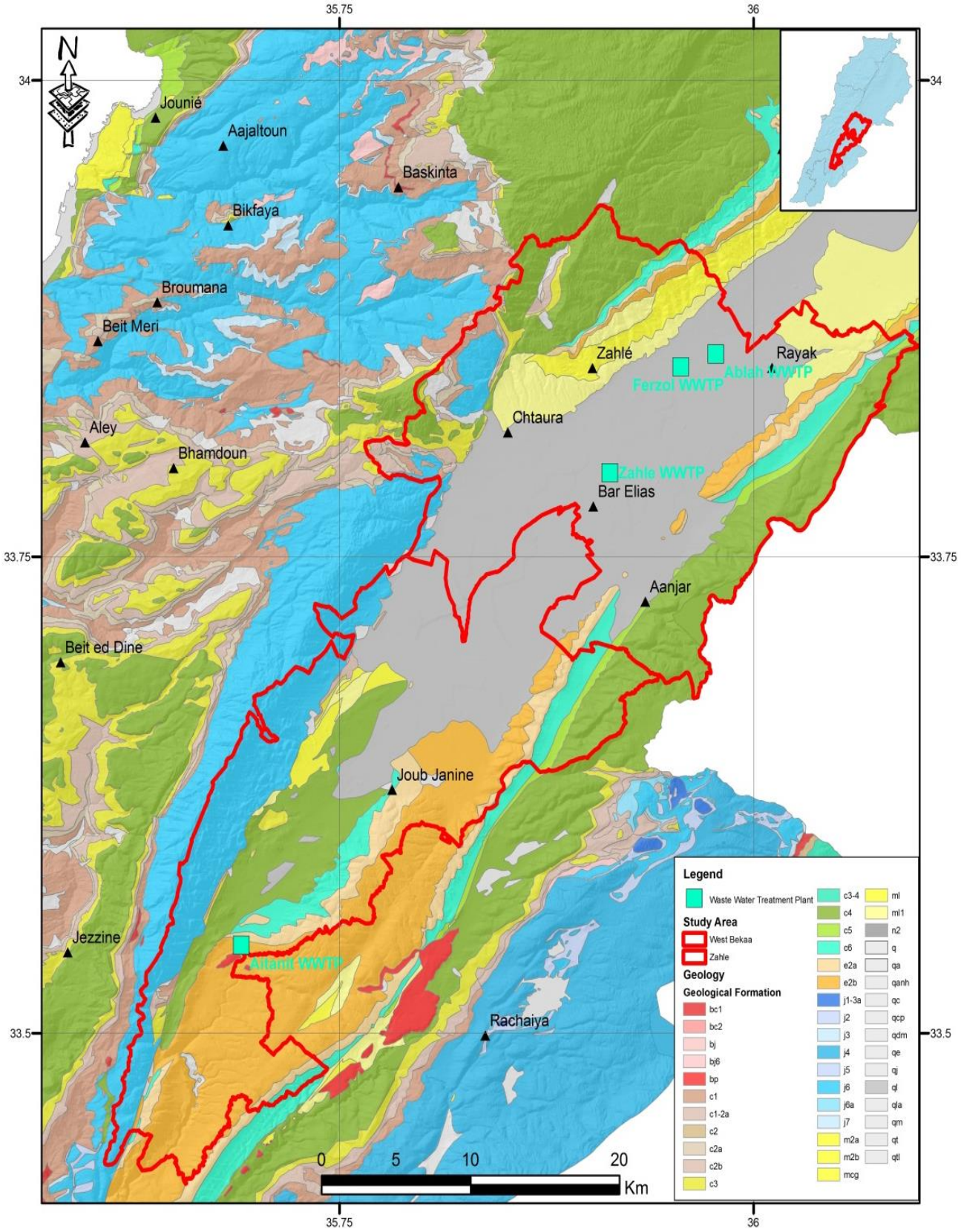


Figure 4-8 Geological Map of the Study Area

(Adapted from Dubertret 1/50,000 Map. 1951)

Stratigraphy

Different geological formations are outcropping within the map, mainly the Quaternary Deposits (Q), Neogene Conglomerates (cg), the Miocene Limestone (mL), the Eocene Limestone (e2b), the Chouf sandstone (C1), the Aptain-Albian limestone Formation (C2-C3) the Cretaceous Limestone (Sannine-Maameltein Formation-C4-C5) and the Jurassic Limestone (Kesrouane Formation-J4). The project extend over five (5) different geologic formations the Kesrouane Jurassic Formation (J4), the Sannine-Maameltein Cretaceous Formation (C4-C5), the Eocene Limestone Formation (e2b), the Miocene Limestone Formation (mL) and the Quaternary-Neogene deposits (Qcg-ncg).

The lithological characteristics of the above-mentioned formations in the study area are described in the following paragraphs:

The Kesrouane Jurassic Formation (J4) is primarily composed of karstified, massive to medium bedded limestone units with horizons of dolomitic limestone, thin marly limestone and chert nodules. It mainly outcrops in the south-western part of the study area. The thickness of the Kesrouane Jurassic formation is estimated to be around 1000m.

The Sannine-Maameltein Formation (C4-C5) in the study area is composed of well bedded limestone and dolomitic limestone with occasional calcareous shale intercalation, with alternating sequence of limestone and marly. The C4-C5 formation is highly jointed and karstified with an estimated thickness ranging between 700 to 900m. The Sannine-Maamiltain Formation is outcropping in the north western and eastern part of the study area.

The Eocene Limestone Formation (e2b) in the study area is mainly composed of Brecia and marly limestone.This is the most exposed formation in the south eastern part of the study area. The thickness of this formation is estimated to range between several tens of meters at the peripheries to around 350-400m towards the core of the Bekaa syncline.

The Miocene Limestone (mL) in the study area is mainly composed of marls, Lacustrine marls (continental succession), lacustrine limestone and conglomerates. The thickness of this formation is estimated to reach a maximum of 200m at the core of the syncline.

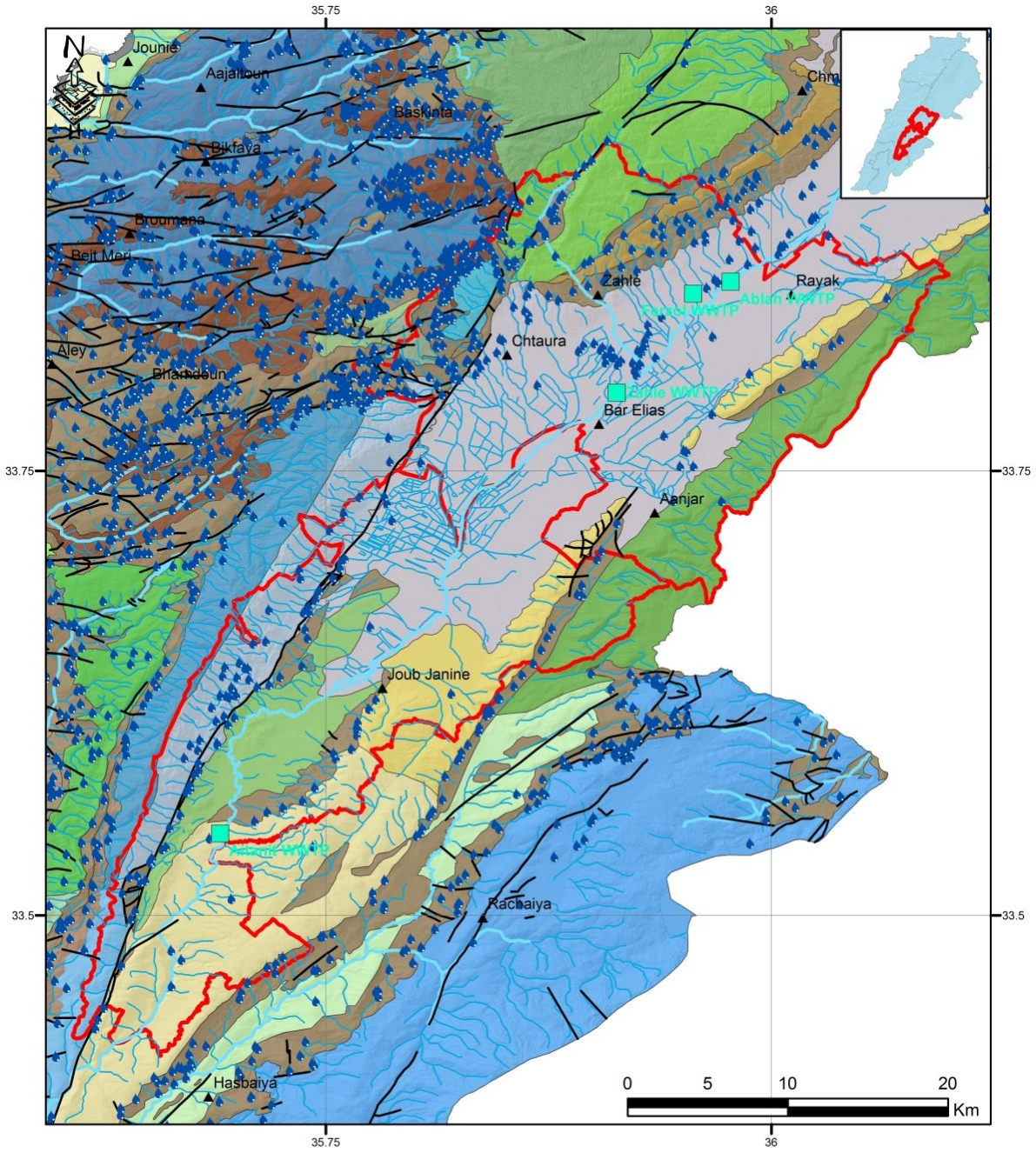
The Quaternary-Neogene Deposits (Qcg-ncg) in the study area are composed of two separate distinctive layers: The first is the Neogene conglomerates with calcareous cement and the second is the Quaternary non-consolidated deposits with a clay matrix and silt. This is the most exposed formation in the northern part on the study area. The thickness ranges from several tens of meters at the peripheries to more than 1km in the central parts close to the axis of the Bekaa syncline.

Hydrogeology and Groundwater Quality

Each of the formations exhibits different hydrogeological characteristics. The major aquifers in the study area are the Kesrouane Jurassic Formation (J4), the Sannine-Maameltein Cretaceous Formation (C4-C5), the Eocene Limestone Formation (e2b), the Miocene Limestone Formation (mL) and the Quaternary-Neogene deposits (Qcg-ncg) (Table 4-1; Figure 4-9). These formations are fractured in nature with groundwater flowing mainly through the fractures

Table 4-1 Major Hydrogeological Units in the Study Area

Formation Name/ Code	Aquifer Type	Description/Karstification
Quaternary Deposits (Q)	Semi Aquifer	Major porous medium semi-Aquifer. Groundwater might percolate to and from the underlying aquifers.
Neogene Conglomerates (ncg)	Semi Aquifer	The conglomerates form a porous medium aquifer where water might leak from the underlying Aquifer
Miocene Limestone (mL)	Aquifer	Acts as an important karstic aquifer under favorable conditions. Groundwater is stored and transmitted in fractures and conduits.
Eocene Limestone (e2b)	Aquifer	Acts as an important aquifer with major karsitification and high recharge. It is mainly present in south lebenon
Sannine-Maameltein (C4-C5)	Aquifer	These limestone formations represent the major water towers in Lebanon; they are widely exposed and highly karstified. Major recharge of this aquifer is from snow.
Kesrouane Jurassic (J4)	Aquifer	One of the major water towers of Lebanon. It is deeply karstified to the lower units. It is one of the widest exposed units in Lebanon with a thickness of1000m. Groundwater is stored and transmitted in fractures and conduits



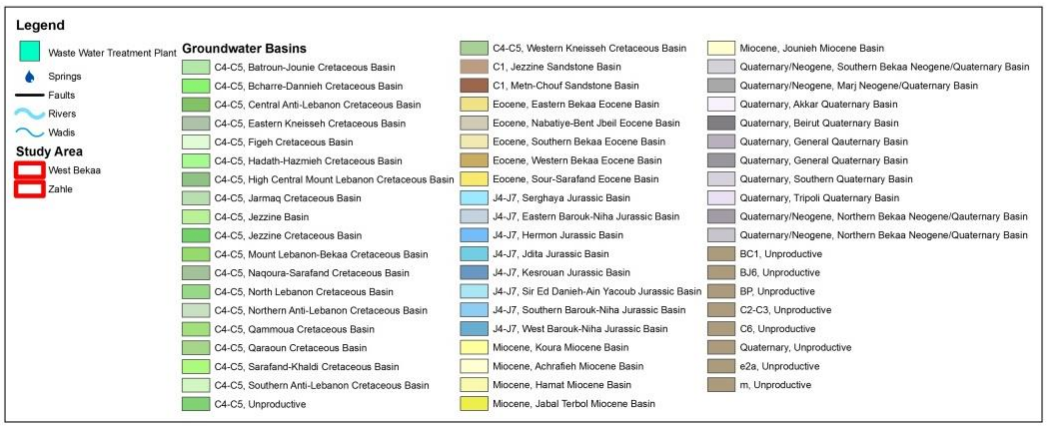


Figure 4-9 Map Showing the Groundwater Basins in the Study Area with the Major Springs

Tectonics and Seismicity

Lebanon is located on the eastern coast of the Mediterranean Sea, along the Dead Sea Transform Fault system. The Dead Sea Transform Fault system in Lebanon has several surface expressions, represented in major faults (Yammouneh, Roum, Hasbaya, Rachaya and Serghaya faults), in uplifts as high mountainous terrain (Mount Lebanon and Anti Lebanon), and from the seismic activity record. Recent work has categorized the Lebanese section of the Dead Sea Transform Fault as being a strong seismic activity zone (Khair et al., 2000).

The Study Area lies to the east of the Yammouneh Fault and west of the Rashaya Fault which are the closest faults to the study area.

In terms of seismicity and according to the United States Geological Survey (USGS) earthquake hazard program, the two recent earthquakes occurred in Lebanon. The first was in off shore Jbail on Sunday May 25, 2014 at 15:22 pm UTC (Figure 4-10). This earthquake had a magnitude of 3.8 on the Richter scale and occurred at a depth of 22.5 km below the surface. The second took place in Saida area south Lebanon on July 6, 2014 it had a magnitude of 4.0 on Richter scale and occurred at a depth of 9km (Figure 4-11).

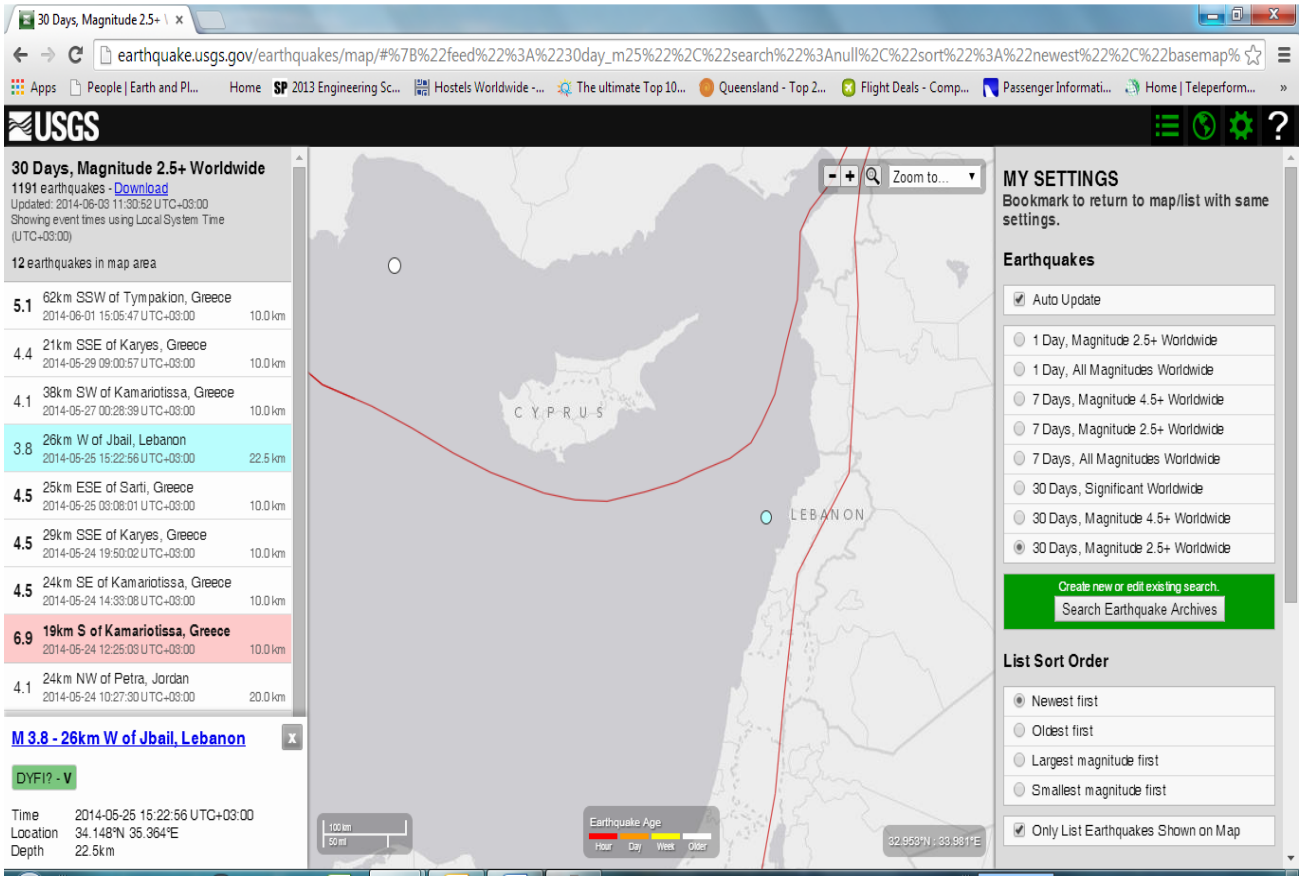


Figure 4-10 Most Recent Earthquake in Jbail, Lebanon

(Source: http://earthquake.usgs.gov)

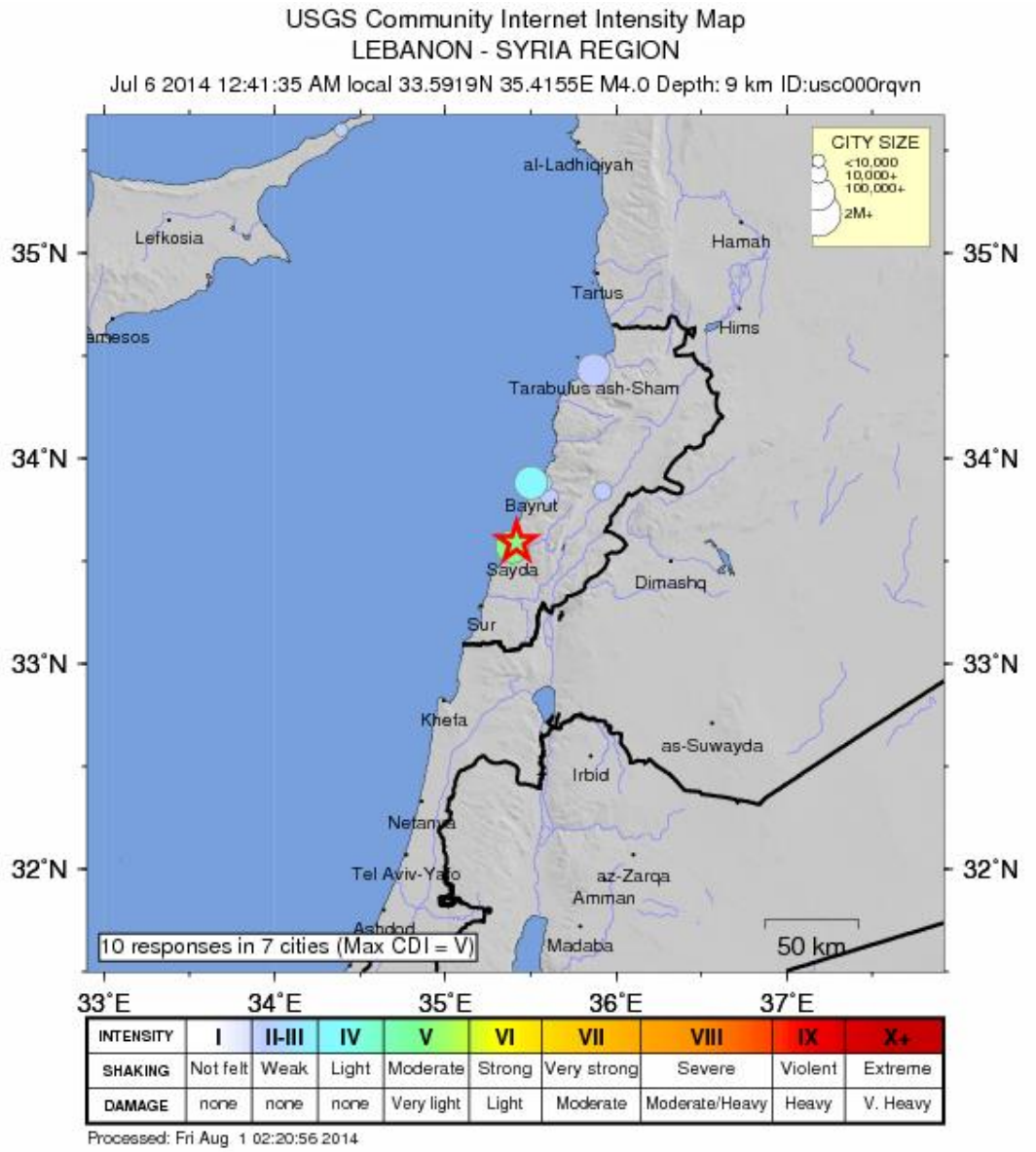


Figure 4-11 Most Recent Earthquake in Saida, Lebanon

(Source: http://earthquake.usgs.gov)

A historical seismicity map and a seismic hazard map of the region are presented in Figure 4-12 and Figure 4-13 respectively.

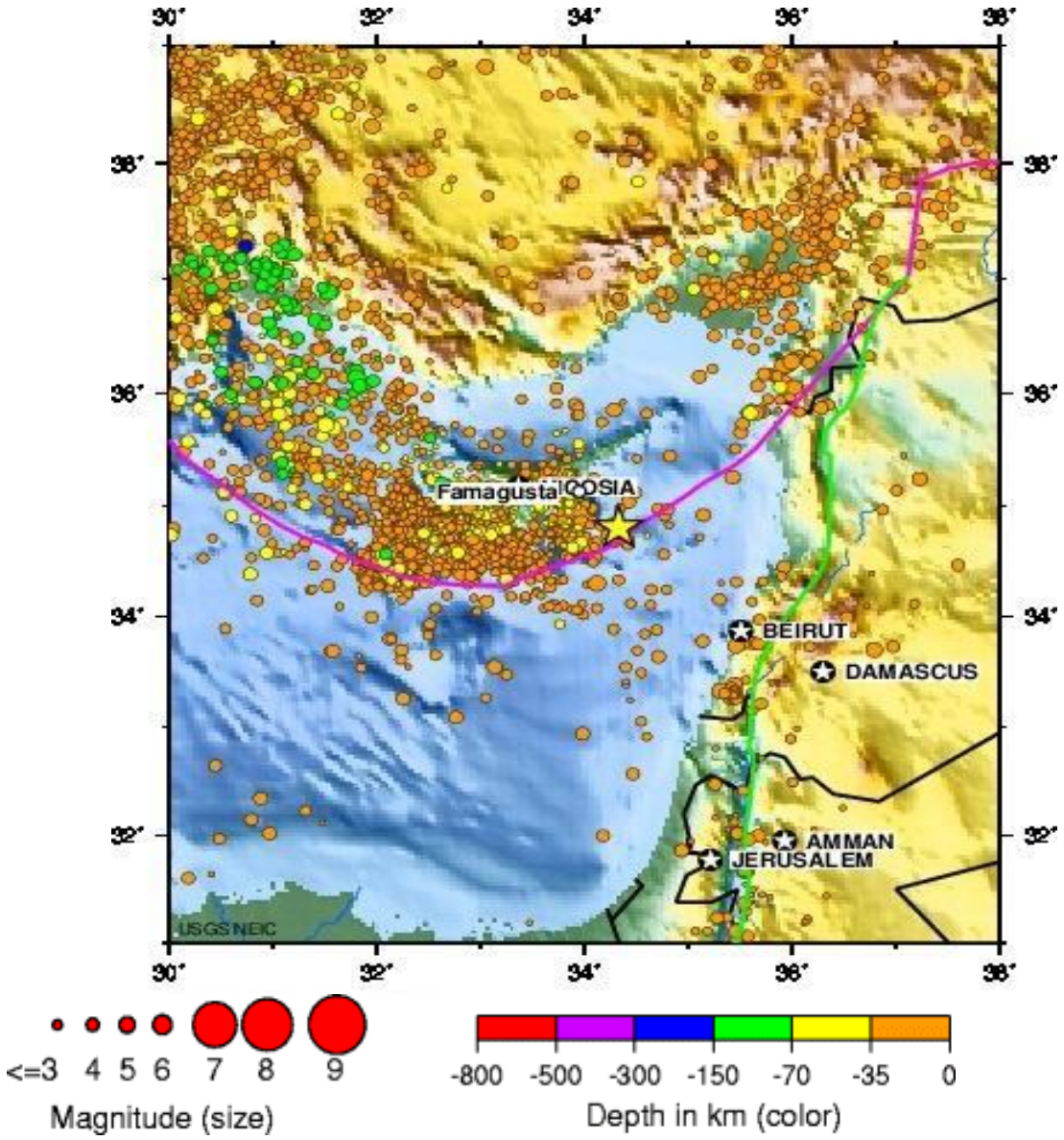


Figure 4-12 Historical Seismicity of the Region (1990 to Present)

(Source: http://earthquake.usgs.gov)

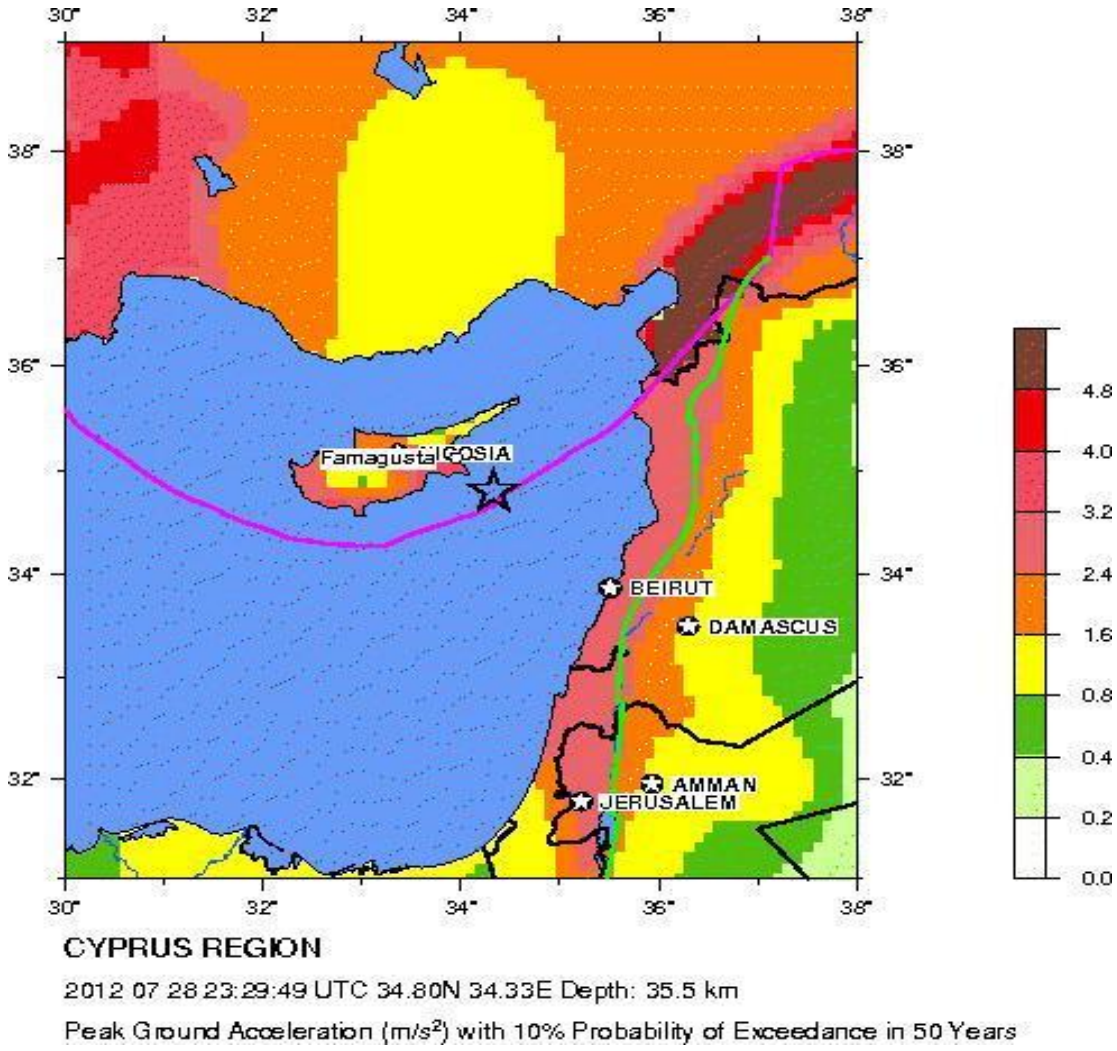


Figure 4-13 Seismic Hazard Map

(Source: http://earthquake.usgs.gov)

Ecology

The most important significant ecological site in Bekaa region is Ammiq wetland. The Ammiq Wetland is the largest remaining freshwater wetland in Lebanon, a remnant of much more extensive marshes and lakes that once existed in the Bekaa Valley. It has been designated an Important Bird Area in the Middle East (Birdlife International, 1994), it is included in the Directory of Wetlands in the Middle East (IUCN, 1995), and it was declared Ramsar Convention site number 978 in 1999, and most recently (2005) it was designated, with Al Shouf Cedar Nature Reserve, a "Biosphere reserve" by UNESCO.

It is not expected that the project activities will take place nearby any important ecological site since wastewater networks construction will be mainly along the public asphalted roads.

Archaeology

The region has many archaeological sites such as Roman ruins located in Anjar, Manara, Rashaya and other regions. However, no area of significance that will be affected by the project activities is located within the sewage network construction area.

Socio-Economic information for Cities/villages concerned by Component 1

Information about the villages of concern were obtained through an extensive desk review of databases which hold socio-economic data on the villages, and through field surveys for various IEEs, EIAs in the West Bekaa and Zahle area that ELARD has prepared.

Hezzerta

Hezzerta covers an area of 6,778,335 m^2 (60% agricultural area and 40% residential area) and is located at an altitude of 1,380 m. The total number of residents is 8,980 residents amongst which 4500 are permanent and 4480 are seasonal residents.

Hezzerta's water supply is from 2 public wells located at the boundary of the village and El Berdaouni spring situated in Kaa El Rim, in addition to private water wells.

On the other hand, Hezzerta has a good sewerage system established in 1997 funded by the state and partially rehabilitated in 2010. Only 70% of the units are connected due to the geographical topography. The sewage is discharged in the Berdaouni River.

10 tons of solid domestic wastes/day are generated. Wastes are discharged in a dumping site located in the village, on the internal main road. The Municipality's infrastructure is composed of 200 L iron bins and pick-ups with a trunk. No Solid Waste treatment center exists in Hezzerta. The Municipality pays 50% of the municipal budget for waste management. No future plans to improve the Solid Waste Management in Hezzerta are being prepared.

Saadnayel

Saadnayel covers an area of 5,000,000 m^2 is located at an altitude of 950 m and is part of the Union of Municipalities of Zahle Caza. The total number of residents is 20,000 amongst which 15,000 are permanent and 5000 are seasonal residents.

Saadnayel's drinking water source is mainly spring water from "Jdita Springs" and private water wells.

Saadnayel has a good sewerage system established in 1980 funded by the residents and partially rehabilitated in 1998. Almost all housing units are connected and the sewage is discharged in the Litani River.

15 tons of solid wastes/day are generated (80% domestic, 5% medical and 15% Butchery Waste). Wastes are discharged in Zahle landfill. The Municipality's solid wastes infrastructure is composed of 200 L iron bins and special trucks. No Solid Waste treatment center exists in Saadnayel. No future plans to improve the Solid Waste Management in Saadnayel are being prepared due to the lack of available land.

Ablah

Ablah covers an area of 5,000,000 m^2 and is located at an altitude of 960 m and is part of the Union of Municipalities of Zahle Caza. The total number of residents is 4,000 amongst which 3,000 are permanent and 1,000 are seasonal residents.

Ablah's water supply is mainly ensured by private water wells.

90% of the units are connected to a sewage network where it's diverted to Ablah's small WWTP and then discharged in the Litani River.

14 tons of domestic solid wastes/day are generated. Solid wastes are discharged in Zahle landfill. The Municipality's solid wastes infrastructure is composed of 200 L iron bins and trucks.

El Ferzol

El Ferzol, located at an altitude of 900-1000 m, covers an area of 18,000,000 m² and is part of the Union of Municipalities of Zahle Caza. The total number of residents varies between 6000-7,000.

El Ferzol's water supply is from two public wells and a spring (EL Habiss Spring).

Approximately 50% of the houses in EL Ferzol are connected to sewer network where domestic wastewater is diverted into a small WWTP before being discharged in the Litani River.

4.5 tons of domestic solid wastes are generated on a daily basis. The Municipality's infrastructure is composed of 200 L iron bins and containers as well as private trucks. The generated solid wastes are disposed in Zahle's sanitary landfill. The municipality pays about 50% of the Municipal budget for solid wastes management.

Chtaura

Chtaura, located at an altitude of 900-950 m, covers an area of 2,000,000 m² and is part of the Union of Municipalities of Zahle Caza. The total number of residents is 1 000 amongst which 600 are permanent and 400 are seasonal residents. Chtaura's water supply is mainly from spring water (Jdita Springs) and private water wells.

The sewerage system that was established in 1974 is functioning properly and 90% of the units are connected.

8 tons of domestic solid wastes are generated daily (30% from commercial sites). Generated solid wastes are disposed in Zahle's sanitary landfill. The Municipality's infrastructure is composed of 200 L iron bins and special trucks. The Municipality pays about 25% of the municipal budget for solid wastes management.

Taablaya

Taablaya, located at an altitude of 900 m, covers an area of 5,000,000 m² and is part of the Union of Municipalities of Zahle Caza. The total number of residents is 45,000 amongst which 44,000 are permanent and 1,000 are seasonal residents. Taablaya's water supply is mainly from spring water (Jdita Springs) and private water wells.

As for the sanitation service, the sewerage system is in a bad condition and the sewage is directly discharged in the Berdawni River.

20 tons of Solid domestic solid wastes are generated daily. The municipality's infrastructure is composed of 200 L iron bins and trucks.

Qabb Elias

Qabb Elias, located at an altitude of 950 m, covers an area of 32,000,000 m^2 and is part of the Union of Municipalities of Central Bekaa in Zahle Caza. The total number of residents is 55,000 amongst which 40,000 are permanent and 15,000 are seasonal residents. Qabb Elias' water supply is from two public wells, spring water from Ra'ess El Ain, and private water wells.

About 90% of the housing units are connected to a sewage network that discharges wastewater into the Litani River.

15 tons of domestic solid wastes are generated daily and collected by the municipality through trucks. The municipality's solid wastes infrastructure is composed of 200 L bins, containers and Municipal trucks. Eventually, those wastes are disposed in the municipality's dumping site. The municipality pays about 15% of the municipal budget for solid wastes management.

Makse

Makse, located at an altitude of 850-900 m, covers an area of 3,000,000 m^2 and is part of the Union of Municipalities of Central Bekaa in Zahle Caza. The total number of residents is 3000 amongst which 2000 are permanent and 1000 are seasonal residents. Makse's water supply is ensured by spring water from "Jdita Springs" and private water wells.

An existing network collect the domestic wastewater from 70% of the houses and discharge it in Makse River.

2 tons of domestic solid wastes are generated daily and collected by a special truck. The municipality's infrastructure is composed of 200 L iron bins and trucks. The Solid Wastes are eventually disposed in Zahle's sanitary landfill. The municipality pays about 17% of the municipal budget for solid wastes management.

El Mreyjat

El Mreyjat, located at an altitude of 1040 m, covers an area of 4,720,000 m^2 and is part of the Union of Municipalities of Central Bekaa in Zahle Caza. The total number of residents is 6,000 amongst which 2,400 are permanent and 3,600 are seasonal residents. El Mreyjat's water supply is ensured by one public well located at the top of the village and 2 springs.

The sewerage system is old and 80% of the housing units are connected to the existing network.

8 tons/day of domestic solid wastes are generated and discharged in Zahle's sanitary landfill. The Municipality's infrastructure is composed of 200 L iron bins and a trailer with an Iron trunk. The Municipality pays about15% of the municipal budget for solid wastes management.

Bawarej

Bawarej, located at an altitude of 1350 m, covers an area of 3,470,000 m^2 and is part of the Union of Municipalities of Central Bekaa in Zahle Caza. The total number of residents is 5000 amongst which 4,000 are permanent and 1000 are seasonal residents. Bawarej's water

supply is ensured by three public wells located at the top of the Village's, spring water and private water wells.

75% of the housing units are connected to a sewer network where part of the sewage is discharged in the orchard and the rest is linked to El Mreyjat Network.

3 tons/day of domestic solid wastes are generated and disposed in Zahle's sanitary landfill. The Municipality's infrastructure is composed of 200 L Iron bins and a trailer with an Iron trunk. The municipality pays about 13% of the municipal budget for solid wastes management.

Aitanit

Aitanit, located at an altitude estimated between 1050 m, covers an area of 13,810,000 m^2 and is part of the Union of Municipalities of the Lake in the West Bekaa Caza. The total number of residents is 5,000 amongst which 4,500 are permanent and 500 are seasonal residents. Aitanit's water supply is ensured by springs.

The sewage is collected by means of a network that discharges the wastewater in Aitanit small WWTP.

Regarding the Solid Waste Management System, 10 tons/day of domestic Solid Wastes are generated and collected by municipal truck. Those wastes are disposed in a dump site in the village.

Qaraoun

Qaraoun, located at an altitude estimated between 900 and1,000 m, covers an area of 25,000, 000 m^2 and is part of the Union of Municipalities of the Lake in the West Bekaa Caza. The total number of residents is 9,000 amongst which 5,000 are permanent and 4000 are seasonal residents. Qaraoun water supply is ensured by four public wells and private water wells.

The existing network doesn't cover all the village. Wastewater is discharged in Aitanit WWTP.

20 tons/day of domestic solid wastes are generated and collected by municipal trucks. Those wastes are emptied at Majdel Balhiss boundaries and burnt uncontrollably. The municipality's infrastructure is composed of 200 L iron bins and hydraulic trucks. The municipality pays about 4% of the municipal budget for solid wastes management.

El Saouiri

El Saouiri, located at an altitude estimated between 1050-1350 m, covers an area of12,000,000 m^2, and is part of the Union of Municipalities of the plain-West Bekaa. The total number of residents is 8000. El Saouiri's water supply is ensured by one public well located at the main road, near the entrance of the Secondary school, spring water (Chamsin Spring) and private water wells. There is no existing sewage network in El Saouiri where all wastewater is discharged into cesspools.

2 tons/day of domestic Solid Wastes are generated and collected 3 times/week and discharged in a dumping, then, those wastes are uncontrollably burnt. The municipality's

infrastructure is composed of 200 L Iron bins and a trailer. The Municipality pays about 20% of the municipal budget for solid waste management.

El Marej

El Marej, located at an altitude of 950 m, covers an area of 20000000 m^2 and is part of the Union of Municipalities of the plain-West Bekaa. The total number of residents is 17000 amongst which 15500 are permanent and 1500 are seasonal residents. El Marej's water supply is ensured by spring water (Chamsin Spring), and private water wells. Not all the housing units are connected to the existing sewer network due to new roads and new buildings. As a result, all the sewage is discharged into the Litani River with no prior treatment. Cesspools also exist and the sewage percolated to the ground.

8 tons/day of solid wastes are generated and collected daily via a truck, then those wastes are disposed in Barra Elias landfill. The Municipality's infrastructure is composed of 200 L Iron bins and a trailer. The municipality pays about 20% of the municipal budget for the solid wastes management.

Zahle

Zahle is located at an altitude of 1010 m and covers an area of 700000000 m^2. The total number of residents is 220000 amongst which 180000 are permanent and 40000 are seasonal residents. Zahle's water supply is ensured by 7 public wells , spring water (El Berdaouni spring), and private water wells. Domestic wastewater is collected by means of a sewage network and discharged in the Berdaouni River.

150 tons/day of solid wastes are generated and collected by hydraulic trucks and then disposed in Zahle's sanitary landfill. The municipality's infrastructure is composed of Iron bins (200 L), containers and Hydraulic trucks.

Kaa El Rim

Kaa El Rim is located at an altitude estimated between 1200 and 1900 m and covers an area of 30000000 m^2. The total number of residents is 2600 amongst which 2000 are permanent and 600 are seasonal residents. Kaa El Rim's water supply is ensured by spring water (El Berdawni spring) located at the North West of the village. There is no existing sewage network and wastewater is discharged into cesspools and eventually disposed in the Berdawni River.

3.5 tons of domestic solid wastes are generated daily and collected by hydraulic trucks then disposed in Zahle's sanitary landfill. The municipality pays about 15% of the municipal budget for solid wastes management.

Anjar

Anjar is located at an altitude of 900 m and covers an area of 18,000,000 m^2. The total number of permanent residents is 5250. Anjar's water supply is ensured by spring water (Anjar Spring and Chamsin Spring) and 2 public water wells.

There is an existing sewer network in Anjar and almost all the housing units are connected.

10 tons of domestic wastes are generated daily and collected by a trailer, then solid wastes are discharged in Zahle's sanitary landfill. The municipality's infrastructure is composed of Iron bins (200 L), containers and private machines.

Majdel Anjar

Majdel Anjar is located at an altitude of 900 m and covers an area of 22,000,000 m^2. The total number of permanent residents is 15000. Majdel Anjar's water supply is ensured by one public well located in the village, spring water (Chamsin Spring), and private water wells. 90% of the units are connected to the existing sewage network. Sewage is discharged in Deir Zounoun River.

15 tons of domestic solid wastes are generated daily and collected by trailers and workers. The Municipality's infrastructure is composed of Iron bins (30 L) and a trailer with an iron trunk. Those wastes are discharged in a private dumping site for the municipality near the Lebanese-Syrian borders and in Zahle's sanitary landfill. The municipality pays about 40% of the municipal budget for solid wastes management.

Bar Elias

Bar Elias is located at an altitude of 870 m and covers an area of 30,000,000 m^2. The total number of residents is 25000 amongst which 20000 are permanent and 5000 are seasonal. Bar Elias's water supply is ensured by spring water (Chamsin Spring), private water wells, and surface water from Litani (for irrigation). Almost all housing units are connected to the existing sewerage network that discharges wastewater in El Ghzayel River.

30 tons of domestic solid wastes are generated daily and collected by the municipality. These wastes are disposed in a dump site owned by the municipality The municipality's solid wastes infrastructure is composed of 200 L Bins, containers, a truck and a Hydraulic truck. The municipality pays about 9% of the municipal budgetfor solid waste management.

El Rawda

El Rawda is located at an altitude estimated between 800-850 m and covers an area of 5,000,000 m^2. The total number of permanent residents is 3000. El Rwda's water supply is ensured by spring water (Chamsin Spring) and private water wells. Almost all housing units are connected to the existing sewage network that discharges wastewater in El Ghzayel River. Approximately 0.5 tons of domestic solid wastes are generated daily and collected twice a week. The municipality's infrastructure is composed of 200 L Iron bins and a hydraulic truck. Solid wastes are discharged in Zahle's sanitary landfill. The municipality pays about15% of the municipal budget for solid wastes management.

Jdita

Jdita is located at an altitude of 1000 m and covers an area of 60,000,000 m^2. The total number of residents is 10,000 amongst which 7,000 are permanent and 3,000 are seasonal residents. Jdita's water supply is ensured by three public wells located at the limits of the village and by private water wells. 95% of the housing units are connected to the existing network that discharges wastewater in Chtaura River. 18 tons of domestic solid wastes are

generated daily and collected by a trailer. The municipality's infrastructure is composed of 200 L iron bins, a hydraulic truck, and a trailer. Wastes are disposed in Zahle's sanitary landfill. The municipality pays about 1/8 of the municipal budget for solid wastes management.

Taanayel

Taanayel is located at an altitude of 900 m and covers an area of 6,000,000 m^2. The total number of residents is 4,000. Taanayel's water supply is ensured by spring water (Jdita Springs), private water wells and surface water from Deir Taanayel for agricultural areas. There is no sewage network in Taanayel where wastewater is discharged into cesspools. About 1.7 tons of solid wastes are generated daily and collected by private trucks owned by a private company and disposed in Zahle's sanitary landfill.

Component 3

Existing Bar Elias Dump

The dump that covers a surface area of 20,000 m^2 is operated by the municipality and receives around 30 t/day of mixed municipal solid wastes **(MSW)** from El Marej and Bar Elias serving a population of 42000. Those wastes are piled to reach a height of 6 m. Open burning of waste is practiced to reduce the volume of the pile and to create space for new incoming wastes. The neighboring El Marej municipality filed many complaints regarding Bar Elias dump.

Rachaya

Rachaya is located at an altitude of 1 200 m and covers an area of 67520000 m^2. The total number of residents is 8500. The planned solid wastes sorting facility in Racahaya is expected to serve the villages of Rachaya, Aiha, Mhaidsseh, Daher El Ahmar, Ein Ata, Tannoura, Ain Hercha, Beit Lahya, Kfarmechki, Al Houch, Al Aqabeh, Kawkaba, Majdel Balhis, and Bakkifa.

The Syrian influx has increased the population of the villages in the upper Litani catchment area which increased the quantity of generated solid wastes estimated at 650 t/day. The number of Syrian refugees as of July 2014 is shown in Figure 4-14.

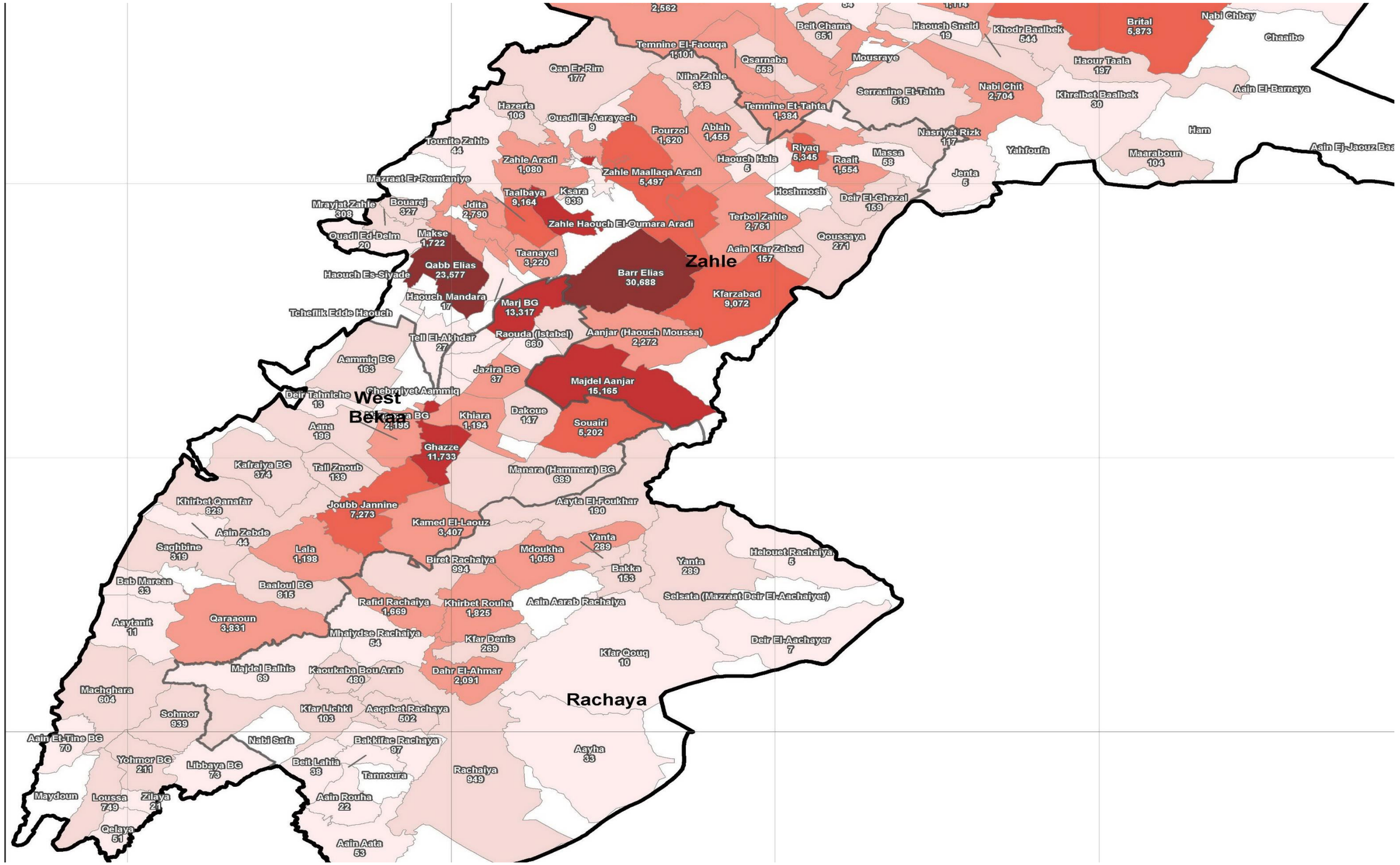


Figure 4-14 Syrian Refugees Distribution in the Area of Study *(Source: UNHCR, The UN Refugee Agency, May 2014)*

5. ENVIRONMENTAL AND SOCIAL MANAGEMENT PROCEDURES

This section covers the cycle of environmental and social assessment (ESA), including preparation, review, and implementation and monitoring. The procedures for environmental and social management shall be in compliance with the operational policies of the World Bank (WB) and at the same time compliant to the existing legal framework and the regulations of the Government of Lebanon (GoL).

5.1 SCREENING PHASE

The first step in the environmental management process is "Screening". The Screening process aims at getting an overview of the nature, scale and significance of the issues in order to define the scope of the ESIA to be consequently undertaken towards preparation of Project reports.

The WB executes environmental screening to define the proper extent and type of Environmental Assessment (EA). The WB classifies the proposed project into one of four categories, according to the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. Similarly, according to the Lebanese National decree No. 8633/2012, a project can fall into one of three categories; Category I, Category II or Category III.

The four categories of the WB are described below and compared to the relevant Lebanese EIA decree categories.

Category A:

Any project that is likely to have important adverse environmental impacts that are sensitive, diverse or unprecedented is classified as Category A. These impacts may influence an area wider than the sites or facilities subject to physical works. EA for a Category A project inspects the project's possible negative and positive environmental impacts, compares them with those of practicable alternatives and suggests any measures needed to prevent, reduce, mitigate, or compensate for adverse impacts and improve environmental performance. Regarding any Category A project, the borrower is charge of the preparation of a report, usually an EIA. Category A is comparable to category I in decree the National Decree No. 8633/2012 that includes the list of sub-projects for which a detailed Environment and Social Impact Assessment Report (ESIAR) is required. Sub-projects falling in this category would have by their magnitude and severity, potential significant adverse social or environmental impacts that are diverse, irreversible, or unprecedented. It is expected that none of the investments under the Project will belong to this category.

Category B:

A Category B project is any project that has potential adverse environmental impacts on human populations or environmentally significant areas (wetlands, forests, grasslands, and other natural habitats) that are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigation measures can be considered more readily than for Category A projects. The scope of EA for

a Category B project may differ from a project to another, but it is more limited than that of a Category A EA. Similar to Category A EA, it studies the project's potential negative and positive environmental impacts and suggests any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. Category B is comparable to category II in the National Decree No. 8633/2012 that includes a list of sub-projects in Annex II of the national EIA decree for which an Initial Environmental Examination (IEE) is required. Sub-Projects in this category will have by their magnitude and severity, potential limited adverse social or environmental impacts that are few in number, site-specific, largely reversible, and readily addressed through mitigation measures. Wastewater networks will be constructed to collect the sewage to specific WWTPs to be treated before being discharged in the Litani River. The construction of those networks has positive and adverse impacts on the environment (details about impacts are provided in the next section). Impacts on the society may exist in cases where their resettlement is needed (depending on the location of the pumping stations). It is expected that projects under component one related to the construction of sewer networks will belong to this category.

Category C:

A project falls under Category C if it is expected to have minimal or no adverse environmental impacts. After the screening process, no further EA action is required for a Category C project. Category C is comparable to category III in the National Decree No. 8633/2012. For a Category III project an Environment and Social Assessment report is not required. Components two, three, and four of the current project belong to this Category where no negative impact on the environment is anticipated from these activities.

Category FI:

A project is classified as Category FI if it includes investment of Bank funds through a financial intermediary, in sub-projects that may end in adverse environmental impacts.

As per items discussed above, only component 1 of the project requires an EMP to be submitted to the WB and an IEE to be submitted to MoE.

As agreed with the WB and the MoE, one report that will combine EMP and IEE including the most stringent requirements of both will be prepared (subsequently referred as EA in this document). The IEE structure will be used given that it is comprehensive and inclusive of the requirements of an EMP and will be complemented with the EMP requirements that include public consultation and disclosure.

Moreover an RPF shall be prepared for component 1 activities. This RPF will set out the policies, principles, institutional arrangements, schedules and indicative budgets that will take care of anticipated involuntary resettlements as defined in OP 4.12 and the Lebanese regulations. A RAP for Zahle network construction activities shall be considered when the resettlement needs are identified.

Responsibilities

The CDR will have the responsibility for:

a) Reviewing the EA before being submitted to the WB;
b) Reviewing the screening form before it being submitted to the MOE;
c) Prepare and review the EA prior to its submission to the MOE;
d) Ensure that the environment and social management plan is included as part of the contract for civil work;
e) Monitor the implementation of the environment and social management plan during project construction and include a report on the ESMP implementation as part of the bi annual report to the World Bank; and
f) Approve the RPF and RAP.

The Service of the Environment Technology/MOE will be responsible for:

a) Review and approval of the EA report; and
b) Supervision of the implementation of the Environment and Social management plan during construction and operation of the implemented projects.

The World Bank will review and make a decision on the EA reports. The WB will also review and approve the RPF and RAP if needed and will monitor the implementation of the ESMP.

5.2 THE EMP/IEE (EA) PHASE

The purposes of the EA process for component 1 are to:

- Identify and analyze potential environment and social impacts and issues, both adverse and beneficial, associated the proposed project;
- Identify measures to avoid, minimize, mitigate, or offset/compensate for adverse impacts on workers, affected communities, and the environment;
- Design an Environmental and Social Management Plan (ESMP) to address the mitigation, and monitoring of these adverse measures, as well as propose institutional measures to manage and monitor the adverse impacts and their remedial measures as needed;
- Identify specific self-monitoring reporting that the CDR would submit to the WB and MOE for the construction and operation phase of the investment project; and
- Ensure that the investment contracts include appropriate, clauses to obligate the contractors to comply with the associated elements of the ESMP and submit also progress reports as part of their contractual obligations.

EA process will be conducted for the following investments: (i) connections to Zahlé WWTP, (ii) connections to Anjar WWTP, and (iii) connections to Aitani WWTP. The outcome of the process is an EA report which must include the following:

- Non-Technical Executive Summary;
- Table of contents;
- Introduction;

- Policy, legal and administrative framework;
- Description of the proposed project;
- Description of the base line of the surrounding environment of the project and its area of influence;
- Public consultation;
- Potential environmental and social impacts of the project;
- Environmental and Social Management plan as described below;
- Self-reporting requirements during the construction and operational phases of the project;
- Summary of project documents;
- Tables and information statements;
- List of scientific and non-scientific references used; and
- List of the names of those who prepared the IEE report (individuals and institutions).

Content of the ESMP:

As part of the EA Report, the ESMP provides a critical link between measures to mitigate adverse impacts and the integration of such measures during the implementation and operation of projects. They summarize the anticipated impacts of project and provide details on the measures, responsibilities and scheduling to mitigate these impacts, costs of mitigation and monitoring and supervision. The ESMP should include:

- Summary of impacts: Predicted adverse environmental impacts and their relationship to social impacts (and any uncertainties about their effects) for which mitigation is necessary should be identified and summarized.
- Description of mitigation measures: Each measure should be briefly described in relation to the impact(s) and conditions under which it is required. These should be accompanied by, or referenced to, designs, development activities (including equipment descriptions) and operating procedures and implementation responsibilities.
- Description of monitoring program: The ESMP identifies monitoring objectives and specifies the type of monitoring required; it also describes environmental performance indicators which provide linkages between impacts and mitigation measures identified in the EA report - parameters to be measured, methods to be used, sampling location and frequency of measurements, detection limits (as appropriate) and definition of thresholds to signal the need for corrective actions. Monitoring and supervision arrangements should ensure timely detection of conditions requiring remedial measures in keeping with good practice; furnish information and the progress and results of mitigation and institutional strengthening measures; and, assess compliance with national and Bank safeguard policies. Such arrangements should be clearly specified in the project implementation/operations manual to reinforce project supervision.
- Legal requirements and bidding and contract documents: The incorporation of detailed mitigation, monitoring and supervision arrangements into legal conditions and covenants is essential. It is good practice to ensure that implementation of major environmental requirements is linked to disbursement conditions. It is important to translate ESMP requirements into bidding and contract documents to ensure that obligations are clearly communicated to contractors.

- Institutional arrangements: Responsibilities for mitigation and monitoring should be defined along with arrangements for information flow, especially for coordination between agencies responsible for mitigation. This is especially important for projects requiring cross-sectorial integration. In particular, the ESMP specifies who is responsible for undertaking the mitigating and monitoring measures, e.g., for enforcement of remedial actions, monitoring of implementation, training, financing, and reporting. Institutional arrangements should also be crafted to maintain support for agreed enforcement measures for environmental protection. Where necessary, the ESMP should propose strengthening the relevant agencies through such actions as: establishment of appropriate organizational arrangements; training; appointment of key staff and consultants; and, arrangements for counterpart funding and on-lending. For projects having significant environmental implications, it is particularly important that there be in the implementing ministry or agency an in-house environmental unit with adequate budget and professional staffing strong in expertise relevant to the project.
- Implementation schedule: The timing, frequency and duration of mitigation measures and monitoring should be included in an implementation schedule, showing phasing and coordination with procedures in the overall project implementation /operations manual. Linkages should be specified where implementation of mitigation measures is tied to institutional strengthening and to the project legal agreements, e.g. as conditions for loan effectiveness or disbursement.
- Reporting: Procedures for providing information on the progress and results of mitigation and monitoring measures should also be clearly stated. Recipients of such information should include those with responsibility for ensuring timely implementation of mitigation measures and for undertaking remedial actions. In addition, the structure, content and timing of reporting to the Bank should be designed to facilitate supervision and should establish arrangements for the timely receipt of monitoring reports and their forwarding to the Bank's environment specialists for review and comment.
- Cost estimates: These should be specified for both the initial investment and recurring expenses for implementing all measures defined in the ESMP, integrated into the total project costs and factored into financing negotiations. As mitigating costs may occur at points during project implementation or operations, indications of cash flow should be provided. It is important to capture all costs – including administrative, design and consultancy, and operational and maintenance costs – resulting from meeting required standards or modifying project design.

The TOR for the EMP/IEE (EA) is in Appendix D. EMP/IEE will be conducted for investments 2 and 3 under component 1

5.3 RESETTLEMENT POLICY FRAMEWORK

The framework shall cover all the project's activities, and shall apply to all displaced persons regardless of the total number affected, the severity of impact, and whether or not the affected persons have legal title to the land. Since resettlement often affects the most vulnerable and marginalized groups (economically, politically, and socially), the RPF shall be particularly sensitive to the affects which displacement may have on these groups, including the poor, landless, elderly, women, children, ethnic minorities, or persons with specific mental

or physical disabilities. This RPF shall be adopted in case resettlement during the implementation of the project component 1 became inevitable otherwise, efforts should be made to avoid or minimize the need for land acquisition and resettlement.

The guiding principles for the RPF are:

- Choosing route locations away from built-up areas or agricultural lands;
- Following existing alignments for constructing networks;
- Modifying the route of the networks to minimize its effects on nearby properties and land uses;
- Limit to the extent possible the amount of involuntary land acquisition to what is strictly necessary to serve the purpose of the design in accordance with World Bank Policy and Lebanese Law;
- Avoid elimination or destruction of any constructed buildings or physical relocation of people; and
- Building pumping stations and installing networks in areas owned by the government or municipalities rather than people.

5.4 RESETTLEMENT ACTION PLAN

A RAP should include the following:

- Description of the project: General description and identification of project site.
- Potential impacts identification: Identifying activities causing resettlement and specifying their impacts, alternatives and mechanisms to minimize resettlement.
- Objectives of RAP: The main objectives of the plan.
- Socio-economic study findings: conducting a census survey to cover PAPs, characteristics of affected households, the magnitude of potential loss of assets, information on vulnerable groups…
- Legal framework: the nature of compensation and the valuation methodology; applicable legal and administrative procedures; relevant law governing land tenure, valuation of assets and losses, compensation, and natural resource usage rights; laws and regulations related to the agencies responsible for resettlement activities implementation; gaps, between local laws the Bank's resettlement policy and the mechanisms to bridge such gaps; and legal steps necessary for effective implementation of resettlement activities.
- Institutional framework: Identifying agencies responsible for resettlement activities and NGOs that might have a role in implementing the project; Assessing the institutional capacity of those agencies; and proposing steps to enhance the institutional capacity of those agencies.
- Eligibility criteria: Defining PAPs and the criteria for their eligibility.
- Valuation and compensation for losses: Methodology to be used for evaluating losses and their replacement costs with a description of the proposed compensation.
- Resettlement and compensation measures: A description of technically and economically feasible compensation and resettlement measures that are compatible with the cultural preferences of the affected persons, and prepared in consultation with them.

- Site selection, site preparation, and relocation: Considering and explaining all possible alternative relocation sites.
- Housing, infrastructure, and social services: Plans to provide or finance housing, infrastructure and social services and plans to ensure comparable services to host populations.
- Environmental protection and management: Describing the boundaries of the relocation area, conducting an EIA and suggesting mitigation measures for the impacts of the proposed resettlement.
- Community participation: Involvement of resettlers and host communities through consultation, summarizing their points of view, reviewing alternatives and choices presented, institutionalized arrangements for communicating concerns with project authorities.
- Integration with host populations: consulting with host communities; arranging for payment for hosts for lands or other assets; addressing any potential conflicts between resettlers and the host community; necessary measures to enhance services in host communities to make them comparable to services available to resettlers.
- Grievance procedures: Affordable and accessible procedures for third party settlement of disputes arising from resettlement.
- Organizational responsibilities: The organizational framework for implementing resettlement, including identification of agencies responsible for delivery of resettlement measures and provision of services.
- Implementation schedule: An implementation schedule that covers resettlement activities, including target dates for the achieving expected benefits to resettlers and hosts and finalizing all forms of assistance.
- Costs and budget: Tables showing cost estimates for resettlement activities, including; timetables for expenditures; sources of funds; and schedules for appropriate flow of funds in areas outside the jurisdiction of the implementing agencies.
- Monitoring and evaluation: Arranging for monitoring of resettlement activities by the implementing agency, supplemented by independent monitors as considered appropriate by the Bank, to ensure objective evaluation.

6. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

The purpose of this section is to determine the potential impacts of the project expected activities and investments to guarantee that design and implementation of investments remains alerted to local baseline challenges and remains focused towards their solution.

6.1 THE GENERIC IMPACTS OF THE PROJECT

Each activity that will be executed for the different components of the project will be assessed for potential Environmental and Social impacts. The potential impacts highlighted in the sections below (sections 6.2 and 6.3) are based on observations made on numerous sites targeted either for rehabilitation (e.g. rehabilitation of old networks/ component 1) or new construction. Initial impact prediction has been made based on consideration of the possible interaction between civil works and the baseline environment of the site according to available tools and checklists. The magnitude, significance, and acceptability of

predicted impacts were assessed in order to determine whether detected adverse impacts are important enough to require mitigation measures. Therefore, predicted impacts were examined against parameters such as geographic spread, persistence, potential for reversibility (feasibility of mitigation for adverse environmental impacts), cumulative tendency, and potential to trigger secondary impacts, among others. Impacts were weighted on the scale of P (Positive Impact), 2P (strongly Positive Impact), O (Neutral Impact), A (Acceptable impact), N (Negative Impact), and 2N (Strongly Negative Impact).

Section 6.2 provides a description of the potential positive social and environmental impacts of the project while Section 6.3 will describe the adverse social and environmental impacts of the project.

6.2 POTENTIAL POSITIVE ENVIRONMENTAL AND SOCIAL IMPACTS

Component 1- Activities for the improvement of the collection of municipal sewage by extending or rehabilitating sewage networks and connecting them to existing, under construction, or planned WWTPs.

The construction of sewage networks is considered to be an environmental enhancement project since its main purpose is to collect domestic sewage and discharge it into a WWTP instead of being discharged into the environment and polluting ground and surface water. Consequently, the overall environment conditions of the area will be improved.

The positive environmental and social impacts of the activities of component 1 during design, construction, and operation phase are listed in Table 6-1.

Table 6-1 The Positive Environmental and Social Impacts of the Activities of Component 1 and their Corresponding Rankings

Investment	Activity	Primary Impact	Secondary Impact	Persistence	Ranking	Weighting
(i) General impacts at Design Stage						
Design of new sewer networks, pumping stations	Subjecting the entire project to this ESMF process	Sensitizing society on environmental requirements	Could induce attitude change towards environmental conservation	Long-term	High	2P
		Generation of a database on social and physical environment of project location	Improves public awareness	Long-term	Moderate	P
		Local setting and documentation of development priorities	Provides a forum for coordinated and rationalized development	Long-term	High	2P
(ii) Positive impacts during construction phase						
Civil works (excavation, pipes installation, backfilling, construction of pumping stations)	Construction activities	Creation of employment	Addition income to all cadre of staff and their households	Short-term	High	2P
		Increased demand on supplies (raw material, pipes…)	Additional income to commercial institutions in the area	Short-term	High	2P
(ii) Positive impacts at during operation phase						
Sewage Infrastructure	Construction of new sewer networks, pumping stations, , rehabilitation of old network parts	Improved hygiene and sanitation	Improve the health of habitants in the project area by reducing water-borne diseases	Long Term	High	2P
		Decreased discharge of contaminants to water bodies and protection of the	Reduction in groundwater and surface water pollution	Long-term	High	2P

Investment	Activity	Primary Impact	Secondary Impact	Persistence	Ranking	Weighting
		water sources in the watershed of the Litani River and the Qaraoun Lake				

Legend / scale for impact ranking: P, Positive; 2P, Strongly Positive; O, Neutral; N, Negative; 2N Strongly Negative

Component 2- Activities for the improvement of the quality of Agricultural Runoff

This component suggests the conduction of awareness campaigns mostly targeting big Farmers to introduce the concept of IPM that is based on the reduction of the use of fertilizers, the improvement of irrigation practices and the land preparation practices. Eventually, the pollution of the soil and the Qaraoun Lake from agricultural pesticides will be limited and the technical know-how of the Farmers will be improved along with their sensitivity towards environmental issues. This component mainly has positive impacts on the society and the environment with no negative impacts.

Component 3-

Solid Waste Management

This component aims at leading technical, environmental and social studies for the establishment of a sorting facility and a sanitary landfill in Bar Elias in addition to a sorting facility in Rachaya and the closure of uncontrolled dumpsites.

Those activities mostly have positive impacts with no negative impacts on the environment and the society.

Capacity building and Project Management

This component discusses the launch of capacity building programs for the BWE and the LRA. The impacts of those activities are positive given that eventually, the BWE and the LRA would have been provided with enough guidance and technical assistance to monitor water resources, manage the irrigation system, improve the risk management and strengthen institutional capacity to support the implementation of the business plan for combating pollution of the Qaraoun Lake.

6.3 POTENTIAL ADVERSE ENVIRONMENTAL AND SOCIAL IMPACTS

The potential negative impacts from the project are likely to be generated from component 1 during the construction and operation phases.

The negative environmental and social impacts of the activities of component 1 and their ranking are presented in Table 6-2

Table 6-2 The Potential Negative Environmental and Social Impacts of the Activities of Component 1

Phase	Receptor	Impact	Duration	Feasibility of mitigation	Duration of impact	Weighting
Construction	Soil and Groundwater	Temporary or permanent change in topography, soil erosion and collapse from grading, trenching, or excavation	Can be long-term or shorter	Can be both reversible or irreversible	Low (short-term)/ High(long-term)	N
		Change in soil and groundwater quality from: - leakage of fuel, lubrication oil, gear oil and transmission oil to the exposed and excavated soil unearthed in the excavation process from construction/haulage vehicles and equipment - Inadequate storage and disposal of lubrication oil, gear oil and transmission oil used for equipment maintenance; - Inadequate storage and disposal of bitumen material used for asphalting activities; - Spills of potentially contaminating materials such as glues, solvents, or lubricants that are used or stored onsite for pipes installation. The spills can affect the excavated or exposed soil; - Accidental spills from refueling operation; - Improper disposal of concrete wastes resulting from onsite concrete batching or cleaning of ready-mix concrete vehicles; - Surface run-off water that comes into contact with concrete, onsite stockpiled sand and gravel and open excavated trenches during rainy days; - Discharged hydrotest water that come into contact with excavated soils stockpiled along the trenches; - Inadequate disposal of solid wastes and wastewater generated during construction from workers; and - Leakage from old networks during rehabilitation.	Long-term	Reversible	Medium	N
	Surface Water	Change in surface water and sediments quality from: • Possible leakage of fuel/ oil/ chemicals from: - Machinery used during construction and haulage; - Generators; and - Refuelling operations and routine inspection.	Short-term	Reversible	Medium	N

Phase	Receptor	Impact	Duration	Feasibility of mitigation	Duration of impact	Weighting
		• Inadequate storage and disposal of wastewater, solid waste (domestic waste and construction waste) and hazardous waste that will be generated from the construction activities: - Earthworks and construction of access roads; - Pipeline Installation / Trenching and backfilling; - Hydrotesting - Construction of pump stations; and - Chemicals disposal during maintenance of machinery, generators and equipment.				
	Air Quality	Increase in air pollutants due to vehicle and truck movement during mobilization and procurement, in addition to the operation of diesel-operated construction machinery (i.e. power generator, loader, bulldozer, dump trucks).	Short-term	Reversible	Low	N
		Dust emissions from excavation and backfilling activities, temporary storage of excavated soil near the construction trench as well as from the movement of vehicles on unpaved roads, which may impact local ambient air quality	Short-term	Reversible	Low	N
	Ecology	Habitat loss or destruction, altered abiotic/site factors, mortality of individuals, habitat fragmentation, disturbance, and vegetation loss due to: - Site clearance and grading in the pumping station construction location; - Excavation for pipes and pumping stations; - Accidental spills (fuels/chemicals) during construction; and - Inadequate disposal of solid waste and surplus material	Can be long-term or short-term	Can be both reversible or irreversible	Medium (short-term and reversible)/ High (long-term and irreversible e.g. loss of certain species)	N
	Traffic	- Increase in traffic volume due to the deployment of construction vehicles, transport vehicles and equipment; and - Increased travel times for drivers passing through the Project area due to partial or total closure of the roads adjacent to the installed pipelines	Short-term	Reversible	Medium	N
	Noise	Increase in ambient noise levels from: - Mobilization, site clearance, grading and excavation activities; - Construction activities at the pumping stations location (form work, reinforced concrete, interior finishing, exterior finishing); - Movement of vehicles to transport people and materials;	Short-term	Reversible	Medium	N

Phase	Receptor	Impact	Duration	Feasibility of mitigation	Duration of impact	Weighting
		and - Operation of equipment and machinery on-site				
	Occupational Health & Safety	Injuries to the public and workers from: - Open trenches, openly stored or moving construction materials, moving construction equipment and redirected traffic; and - General and construction and pipes installation activities that will increase the workers and public exposed to noise, dust and occupational hazards which will increase the potential accidents	Can be long-term or short-term	Can be both reversible or irreversible	Low	N
	Socio-economy	Land acquisition for pumping stations construction	Long-term	Irreversible	High	2N
Operation	Soil and Groundwater	Temporary change in topography, soil erosion and collapse from excavation activities during maintenance	Short-term	Reversible	Low	N
		Change in soil and groundwater quality from: - leakage of fuel, lubrication oil, gear oil and transmission oil to the exposed and excavated soil unearthed in the excavation process; - Inadequate storage and disposal of bitumen material used for asphalting activities; - Spills of potentially contaminating materials such as glues, solvents, or lubricants that are used onsite for pipes installation. The spills can affect the excavated or exposed soil; - Potential spills of raw wastewater from pipelines or pumping stations.	Long-term	Reversible	Medium	N
	Surface Water	Change in surface water and sediments quality from: - Wastewater leakage along all the pipeline route and in pumping stations location; - Oil and fuel leakage from generators, and fuel tank storage in the pumping stations; - Network maintenance activities; and - Inadequate treatment of wastewater at receiving facility.	Long-term	Reversible	Medium	N
		- Malfunction at pump stations (due to electricity cut-off, pumps break down, etc.) leading to discharge of untreated sewage in surface water	Short-Term	Reversible	Low	N

Phase	Receptor	Impact	Duration	Feasibility of mitigation	Duration of impact	Weighting
	Air Quality	- Increase in air pollutants due to the operation of diesel-operated standby power generators; and - Odor emissions at pumping stations	Short-term	Reversible	Low	N
	Ecology	No major impacts are anticipated in the operation phase of the project	--	--	--	O
	Traffic	Traffic disturbance from maintenance activities	Short-term	Reversible	Low	N
	Noise	Increased noise levels due to usage of equipment during the maintenance period of the wastewater network and the pumping stations. This will depend on the type of work needed and the extent of the network damage. Excavation to expose the damaged pipe is expected in addition to the backfilling, compaction and reinstatement of the excavated road.	Short-term	Reversible	Low	N
	Occupational Health & Safety	Increased health and safety risks due to traffic related accidents and open trenches during pipes repair and spill management.	Short-term	Reversible	Low	N

Legend / scale for impact ranking: P, Positive; 2P, Strongly Positive; O, Neutral; A, Acceptable; N, Negative; 2N Strongly Negative

6.4 NET SOCIAL AND ENVIRONMENTAL IMPACTS BEFORE MITIGATION

According to generic impacts, the net social and environmental impact of this project can be described as follows: the project is likely to provide a net positive social and environmental impact; however, during construction and operation of the different networks and pumping stations, negative impacts are also anticipated. In sections below proposed measures to mitigate potential environmental and non-resettlement impacts of the project are highlighted and aim at making those negative impacts acceptable.

7. ENVIRONMENTAL AND SOCIAL MITIGATION AND MONITORING PLAN (ESMMP)

The following section highlights the Environmental and Social Mitigation and Monitoring Plan (ESMMP) suggested for the project that consists of the following four fundamental elements:

- The Impact Mitigation Plan for component 1;
- The Monitoring Plan for component 1;
- Institutional Arrangements; and
- The ESMMP budget

The main approach to mitigation is to avoid impacts. Nevertheless, in situations where conditions force challenges to avoidance, actions to diminish negative impacts while enhancing positive ones have been endorsed.

7.1 THE IMPACT MITIGATION PLAN

The Impact Mitigation Plan (IMP) for component 1 activities of the Project is described in Table 7-1 and Table 7-2 and identifies two comprehensive categories of impacts and mitigation measures for component 1 of the project as follows:

- Specific Construction Phase Impacts and mitigations: impacts and mitigations measures specific to each investment are identified and discussed;
- Specific Operation and maintenance Phase Impacts: impacts and mitigation measures during the operation phase have been recognized and addressed.

Mitigation of potential impacts is essentially feasible as the bulk of impacts are neutralized through application of routine management procedures. After the formulation of mitigation procedures, the net social and environmental worth of the Program is expected to improve radically.

This ESMF perceives that only minor negative impacts are expected to have residual impacts and cannot be totally eliminated through mitigation. Most of those impacts are likely to appear during the construction and operation phases of proposed component 1. In order to fully assess the occurrence of such impacts in the event of which, design of investments will be modified as adequate, this ESMF requires the preparation of detailed EMP study.

The determination of displacement impacts will be achieved through development and application of Resettlement Action Plans (RAPs) after the design stage of investment if required. A second report, the Resettlement Policy Framework (RPF) will describe the modalities of developing the RAPs. The expenses of displacement will be borne in the whole cost of the investment.

Table 7-1 Mitigation of Impacts of Construction Phase*

Activity/Task	Primary Impact	Recommended Mitigation	Impact after mitigation	Indicative Cost
Grading, trenching, or excavation	Temporary or permanent change in topography, soil erosion and collapse	Mitigation measures shall include: - The stabilization of the soils in trenches directly after completion of each stage of works where fill should avoid pockets of segregated materials, it should use well-graded materials, and it should be compacted to recognized standards. - The placement of clear markers indicating the limits of the construction trenches and stockpiling area of excavated materials to restrict the equipment and personnel movement limiting the physical disturbance to land and soils in adjacent areas - The installation of erosion control barriers around work site during site preparation and construction. - Also, excavation works must be avoided during rough weather conditions.	O	1,000 USD per site (Cost of sand and bags to be used as barriers)
Fuel and chemicals use and storage, improper discharge of solid wastes, wastewater, and hydrotest water, spill from old networks	Change in soil , groundwater, and surface water quality	Procedures for storage and handling of wastes, chemicals, and hazardous wastes should include: - The disposal of surplus material at designated waste location - The segregation of wastes that can be salvaged and stored temporarily for later use - The designation of special dumping	O	About 5,000 USD for transportation to the designated places

Activity/Task	Primary Impact	Recommended Mitigation	Impact after mitigation	Indicative Cost
		sites for direct materials that cannot be reclaimed or re-used.		
Vehicle and truck movement, operation of generators	Increase in air pollutants	Proper maintenance of machines and equipment.	A	No additional cost
Excavation, backfilling, and movement of vehicles on unpaved roads	Dust emission	Implement procedures to minimize dust emissions such as water spraying, covering loaded trucks.	A	5000 USD cost of sheets and water for spraying
Site clearance, excavation, and waste disposal	Ecological habitat loss or destruction, altered abiotic/site factors, mortality of individuals, habitat fragmentation, disturbance, and vegetation loss	Conduct ecological surveys to allocate critical ecosystems for conservation. Analyze alternatives for best route selection to minimize any adverse impact for new pipelines.	O	1000 USD/month (part time ecological expert during construction phase)
Deployment of construction vehicles, transport vehicles and equipment, partial or total closure of the roads adjacent to the installed pipelines	Increase in traffic volume and travel time for drivers passing through the Project area	Keep traffic to designated roads, position necessary diversion signs, schedule transport of workers and materials to avoid peak hours.	A	No additional cost
Construction activities, equipment and machinery operation	Increase in ambient noise levels	Switch off equipment and generators when not in use, equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.	A	10,000 USD (mufflers)

Activity/Task	Primary Impact	Recommended Mitigation	Impact after mitigation	Indicative Cost
Construction activities, equipment and machinery operation	Injuries to the public and workers	Prepare an HSE procedure in accordance with the applicable standards, apply procedures to reduce hazards, and take appropriate measures for storage, handling, transportation, and disposal of all waste material. Provide basic training in construction, health and safety, first aid and the environment for the construction team.	A	3,000 USD/month (HSE officer) 15,000 USD (Training of the construction team)
Pumping stations construction	Land acquisition	Prepare and implement a RAP	A	10,000 USD per RAP

Legend / scale for impact ranking: P, Positive; 2P, Strongly Positive; O, Neutral; A, Acceptable; N, Negative; 2N Strongly Negative
* The mitigation measures were developed based on the impacts of Investment package one and the mitigation costs are indicative

Table 7-2 Mitigation of Impacts of Operation Phase

Activity/Task	Primary Impact	Recommended Mitigation	Impact after mitigation	Indicative Cost
Grading, trenching, or excavation	Temporary or permanent change in topography, soil erosion and collapse during maintenance activities	Appropriate measures for reinstatement and soil stabilization	O	Depends on the excavation extent and duration (expected to be minimal)
Fuel and chemicals use and storage, improper discharge of solid wastes, wastewater, leakage from the pumping stations and pipelines.	Change in soil , groundwater, and surface water quality	Develop procedure for storage and handling of wastes, chemicals, and hazardous wastes, maintain properly the pipelines and the pumping stations.	O	--
Operation of pumping station	Odors generation	- Installation of an odor filter; - Installation of air mixers inside the holding tank of the pumping station; and - Construct an overflow pipeline that divert the raw wastewater in malfunctioning cases	A	25,000 USD (filter) 6,000 USD (mixer) 100 USD/meter (overflow pipeline)
Malfunction during the operation of pumping station	Change in surface water quality	- Provide the pumping station with a standby generator and a standby pump; - Provide a fuel storage tank for the generators (volume capacity should be 24 hours operation)	A	20,000 USD (Generator) 10,000 (Pump)
Operation of generators	Increase in air pollutants	Proper maintenance of generators and installation of filters.	O	2000 USD (Filters installation)
Partial or total closure	Increase in traffic volume and travel time	Keep traffic to designated roads, position	A	--

Activity/Task	Primary Impact	Recommended Mitigation	Impact after mitigation	Indicative Cost
of the roads adjacent to the installed pipelines	for drivers passing through the Project area	necessary diversion signs, and schedule maintenance activities to avoid peak hours.		
Equipment and machinery operation during maintenance, operation of pumping stations.	Increase in ambient noise levels	Switch off equipment and generators when not in use, equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment, isolate pumps room to reduce noise levels in the exterior environment and equip them with silencers, properly maintain the pumps	A	--
Equipment and machinery operation during maintenance activities	Injuries to the public and workers	Prepare an HSE procedure in accordance with the applicable standards, apply procedures to reduce hazards, and take appropriate measures for storage, handling, transportation, and disposal of all waste material. Provide basic training in operation, health and safety, first aid and the environment for the operation team.	A	15,000 USD (Training of employees)

Legend / scale for impact ranking: P, Positive; 2P, Strongly Positive; O, Neutral; A, Acceptable; N, Negative; 2N Strongly Negative
* The mitigation measures were developed based on the impacts of Investment package one and the mitigation costs are indicative

7.2 THE ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

The Environmental and Social Management and Monitoring Plan (ESMMP) highlights the main impacts and control measures that were identified in this document, particularly:

- Mitigation measures to be implemented during the construction and operation phases;
- References to control guidelines and standards;
- Responsibilities for the implementation of the plan;
- Verification, monitoring and training requirements; and
- Record keeping and documentation requirements.

The overall objectives of the ESMMP are 1) to ensure the Project's compliance with Lebanese legislation and World Bank's environmental and social safeguard policies; 2) to provide a basis to carry out monitoring activities and compliance inspection programs; and 3) to support the Contractor and relevant stakeholders in the implementation of mitigation and monitoring plans. The EMMP may be subject to updates and modifications throughout the Project lifetime.

Compliance monitoring should be conducted to ensure the environmental soundness of the project. It shall be the responsibility of the CDR during the Construction phase and the MoEW/BWE during the operation phase.

Proposed mitigations measures and monitoring plan for construction and operation impacts are summarized in Table 7-3 and Table 7-4 respectively.

Table 7-3 The ESMMP during Construction Phase

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Soil					
Grading, trenching, or excavation	Temporary or permanent change in topography, soil erosion and collapse	Develop appropriate procedures for reinstatement and soil stabilization	- Number of complaints from the municipalities in the project area - Number of complaints from the residents/owners of land adjacent to the excavation sites - Amount of observed soil erosion from the construction site	- Daily visual inspection of the excavation activities - Daily inspection of soil erosion from the site - Monthly record of resident complaints - Monthly record of municipality complaints	- Contractor's civil engineer and foreman - Supervision consultant appointed by CDR - Municipality Engineer
Fuel and chemicals use and storage, improper discharge of solid wastes, wastewater, and spill from old networks	Change in soil quality	Develop procedure for storage and handling of wastes, chemicals, and hazardous wastes.	Amount of contaminated soil visible during inspection	Daily visual inspection to ensure proper implementation and to identify soil stains and location of spills, if any.	- Contractor's civil engineer and environmental officer - Supervision consultant appointed by CDR - Municipality Engineer
Groundwater and Surface Water					
Fuel and chemicals use and storage, improper discharge of solid wastes, wastewater, and spill from old networks	Change in groundwater and surface water quality	Develop procedure for storage and handling of wastes, chemicals, and hazardous wastes.	Water characteristics (physico-chemical parameters, including turbidity, COD, BOD_5, TPH, TDS and heavy metals)	Monthly testing during the construction period	- Contractor's civil engineer and environmental officer - Supervision consultant appointed by CDR - Municipality Engineer

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Air Quality					
Vehicle and truck movement, operation of generators	Increase in air pollutants	Proper maintenance of machines and equipment.	Number of noncompliance reports about machines and equipment routine maintenance	- Daily visual checks of smoke emissions from vehicles and machinery. - Monthly analysis of maintenance records of equipment operated on-site to ensure these are properly maintained and do not lead to excessive emissions	- Contractor's mechanical engineer and environmental officer - Supervision consultant appointed by CDR - Municipality Engineer
Excavation, backfilling, and movement of vehicles on unpaved roads	Dust emission	Implement procedures to minimize dust emissions such as water spraying, covering loaded trucks.	Number of noncompliance reports about trucks - Number of complaints from project area residents/municipalities	- Daily visual monitoring of dust generation from the work zone to ensure that no excessive dust is produced - Conducting/ investigating dust monitoring in response to specific complaints - Monthly records of resident complaints - Monthly records of municipality complaints	- Contractor's civil engineer and environmental officer - Supervision consultant appointed by CDR - Municipality Engineer
Ecology					
Site clearance, excavation, and waste disposal	Ecological habitat loss or destruction, altered abiotic/site factors, mortality of individuals, habitat fragmentation, disturbance, and	- Conduct ecological surveys to allocate critical ecosystems for conservation. - Analyze alternatives for best route selection to minimize any adverse impact for new pipelines.	- Number of trees damaged or removed - Area of ecosystems/habitats affected	Weekly visual inspection of trees along construction route	- Contractor's environmental officer - Supervision consultant appointed by CDR - Municipality Engineer

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
	vegetation loss				
Traffic					
Deployment of construction vehicles, transport vehicles and equipment, partial or total closure of the roads adjacent to the installed pipelines	Increase in traffic volume and travel time for drivers passing through the Project area	Keep traffic to designated roads, position necessary diversion signs, schedule transport of workers and materials to avoid peak hours.	Number of complaints from the municipalities/residents.	- Weekly monitoring road safety signs on site roads; - Daily monitoring to ensure compliance with safety standards and the proper positioning of any necessary traffic diversion signs; - Investigating any potential traffic disturbance due to construction activities in response to specific complaints; - Monthly records of complaints from residents along construction route	- Contractor's HSE officer - Supervision consultant appointed by CDR - Municipality Engineer
Noise					

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Construction activities, equipment and machinery operation	Increase in ambient noise levels	Switch off equipment and generators when not in use, equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.	Number of complaints from the municipalities/residents	- Conducting/investigating noise monitoring in response to specific complaints and during noisy activities, - Weekly checking that the results of noise monitoring are communicated to CDR and if needed corrective action is taken. - Monthly records of complaints from the municipalities/residents	- Contractor's HSE officer - Supervision consultant appointed by CDR - Municipality Engineer
Safety Hazards					
Construction activities, equipment and machinery operation	Injuries to the public and workers	Prepare an HSE procedure in accordance with the applicable standards, apply procedures to reduce hazards, and take appropriate measures for storage, handling, transportation,	- Number of reported injuries among workers - Number of reported injuries among residents and people crossing the project site - Number of documented instances of workers not observed wearing/using required safety gear/equipment	Daily recording of HSE incidents on-site Monthly records of safety equipment violations by workers	- Contractor's HSE officer - Supervision consultant appointed by CDR - Municipality Engineer

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
		and disposal of all waste material. Provide basic training in construction, health and safety, first aid and the environment the construction team	- Number of complaints from the municipalities/residents		
Pumping stations construction	Land acquisition	Prepare and implement a RAP	Number of acquired plots	Monthly records on expropriation progress	CDR

Table 7-4 The ESMMP during Operation Phase

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Soil					
Grading, trenching, or excavation for maintenance	Temporary or permanent change in topography, soil erosion and collapse during maintenance activities	Develop appropriate procedures for reinstatement and soil stabilization	Amount of observed soil erosion from the construction site	- Daily visual inspection of the excavation activities - Daily inspection of soil erosion from the site - Monthly record of resident complaints - Monthly record of municipality complaints	MoEW/BWE representative
Fuel and chemicals use and storage, improper discharge of solid wastes,	Change in soil quality	Develop procedure for storage and handling of wastes, chemicals, and hazardous wastes, maintain properly the pipelines and the	Amount of contaminated soil visible during inspection	Daily visual inspection to identify soil stains and location of spills during maintenance period.	MoEW/BWE representative

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
sludge, and wastewater during maintenance activities		pumping stations. Develop procedures for sludge treatment and disposal according to the treatment plant process			
Groundwater					
Leakage from the network	Change in groundwater quality	Properly maintain the network and manage directly detected leakages and spills	Water characteristics (physico-chemical parameters and fecal coliforms)	Every six months	MoEW/BWE representative
Surface Water					
Discharge of treated wastewater to rivers	Change in surface water quality	Monitor the effluent wastewater quality for compliance with the relevant standards	The parameters that are required in the Lebanese decision 8/1 2001 for the discharge of wastewater into surface water bodies	Monthly	MoEW/BWE representative
Discharge of untreated wastewater		- Provide the pumping station with a standby generator and a standby pump; - Provide a fuel storage tank for the generators (volume capacity should be 24 hours operation)	Monitor the flow of the river for dilution requirements according to Lebanese decision 8/1 2001	Monthly/During malfunctioning periods	
Air Quality					
Operation of generators	Increase in air pollutants	Proper maintenance of generators and installation of filters.	Number of noncompliance reports about machines and equipment routine maintenance	- Monthly analysis of maintenance records of generators to ensure these are properly maintained	MoEW/BWE representative

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
				and do not lead to excessive emissions	
Operation of pumping station	Generation of odors	- Installation of an odor filter; - Installation of air mixers inside the holding tank of the pumping station; and - Construction of an overflow pipeline that divert the raw wastewater in malfunctioning cases	Number of complaints from odor	- Monthly/ During malfunctioning periods	MoEW/BWE representative
Traffic					
Partial or total closure of the roads adjacent to the installed pipelines	Increase in traffic volume and travel time for drivers passing through the Project area	Keep traffic to designated roads, position necessary diversion signs, and schedule maintenance activities to avoid peak hours.	Number of complaints from the municipalities/residents.	During maintenance period: - Daily monitoring road safety signs on site roads; - Daily monitoring to ensure compliance with safety standards and the proper positioning of any necessary traffic diversion signs; and - Investigating any potential traffic disturbance due to maintenance activities in response to specific complaints.	MoEW/BWE representative
Noise					

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
Equipment and machinery operation during maintenance, operation of pumping stations.	Increase in ambient noise levels	Switch off equipment and generators when not in use, equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment, isolate pumps room to reduce noise levels in the exterior environment and equip them with silencers, properly maintain the pumps.	Number of complaints from the municipalities/residents	- Conducting/investigating noise monitoring in response to specific complaints and during noisy activities. - Yearly checking the noise monitoring results and if needed corrective action is taken. - Monthly records of complaints from the municipalities/residents	MoEW/BWE representative
Safety Hazards					
Equipment and machinery operation during maintenance activities	Injuries to the public and workers	Prepare an HSE procedure in accordance with the applicable standards, apply procedures to reduce hazards, and take appropriate measures for storage, handling, transportation, and disposal of all waste material. Provide basic training in operation, health and safety, first aid and the environment for the	- Number of reported injuries among workers - Number of reported injuries among residents and people crossing the project site - Number of documented instances of workers not observed wearing/using required safety gear/equipment - Number of complaints from the municipalities/residents	Daily recording of HSE incidents during maintenance period; and Monthly records of safety equipment violations by workers	MoEW/BWE representative

Activity/Source	Potential Impact	Mitigation Measure(s)	Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsibility
		operation team.			

7.3 INSTITUTIONAL ARRANGEMENT FOR ESMMP IMPLEMENTATION

In this section of the report, the institutional framework for environmental management within the project is presented. The main purpose of this ESMF is to ensure that environmental and social management is incorporated into the whole development cycle of specific investments to be financed under the concerned project. The following sections will focus on the mitigation process at respective levels of the component 1 of the project.

Mitigation at Construction Stage: Mitigation at construction stage will be part of the contracts for Civil Works.

Mitigation at Operation Phase: A one year Defect Liability Period is allowed by all contracts for Civil Works. During this period, contractors will still be bound to assume impact mitigation together with routine maintenances. Beyond the Defect Liability Period, all mitigation will fall on the MoEW/BWE responsibility.

7.3.1 Supervision of Environmental and Social Management and Monitoring Plan

Roles and responsibilities of the different institutions involved in the construction and operation of the project with respect to the implementation of the EMP are summarized in Table 7-5.

Table 7-5 ESMMP Implementation Plan

Institution/Body	Roles and Responsibilities
CDR	Overall responsibility over the EMMP Implementation during construction.
MoE	Review and provide decision on EA report and conduct site audits as needed to check implementation of EMP during construction and operation.
Municipalities	The Municipal engineer in association with the Consultant appointed by CDR will take technical responsibility for supervising the impact mitigation plan during construction following which; a report will be filed and retained at municipality.
MoEW/BWE	Overall responsibility over the EMMP Implementation during operation
Contractor	Prepare a Construction Environmental and Social Management Plan (CESMP) that details how the contractor shall implement the provisions of the ESMMP; Provide a field HSE officer to ensure implementation of the CESMP; Liaise with supervision Consultant and regularly report on implementation of ESMMP; Immediately report to supervision Consultant in case of accidents, spills or other events which have health, safety or environmental implications; In case of incidents, the contractor should fill an incident records form, including how the incident is planned to be addressed.
Supervision consultant(s)	• Supervise the Contractor's implementation of CESMP; • Prepare a checklist to be used to supervise Contractor's works; • Review and approve CESMP prepared by Contractor; • Review and approve Contractor's ESMMP reports; • Coordinate with CDR to ensure appropriate reporting of ESMMP implementation; • Identify training needs of concerned parties to ensure ESMMP requirements are well-understood and can be implemented.

7.3.2 The Impact Monitoring Program

Monitoring will occur at three levels:

Internal Monitoring

The whole process of supervision that was discussed in previous sections of the report is usually part of the internal monitoring program whereby accruing reports will be reviewed to conclude information on project status. Towards coordination of internal monitoring, the municipal engineer, members of the different ministries and institutions including environmental specialist will attend all monthly site meetings where execution of the ESMMP will form part of the agenda.

External Monitoring

The Qaraoun project will be subjected to external monitoring by the WB. Both internal and external monitoring will be guided by the ESMMP to generate information on:

- Nature of impacts at each project phase and whether the impact was anticipated;
- Proposed mitigation activity for anticipated impacts and possible mitigation of emergent impacts;
- General sensitivity of the ESMMP to project impacts;
- Responsibility for mitigating old and emergent impacts;
- Success or otherwise in mitigation of anticipated and new impacts and reasons for non- achievement;
- Effectiveness of all players in the Impact Mitigation Plan and reasons for non-performance and proposed remedies;
- Effectiveness or otherwise in securing implementation of impact mitigation and measures required to tighten the process; and
- Flow of information in the monitoring process and reasons for non-achievement

Systematic review of the ESMMP and ESMF: According to the information collected from the questions above, the effectiveness of the ESMMP will be reviewed and updated accordingly. Therefore, by updating the ESMMPs, this ESMF will also be submitted to reviews but at a localized level only. This ESMF is not expected to be updated unless the project's implementation suffers undue delay. CDR is responsible to update the ESMF if required.

The investments of the project will be subjected to obligatory annual environmental audits. During the execution of the environmental audit study, the auditor shall confirm that an assessment of all the project activities, counting the production of goods and services, is carried out giving proper consideration to environmental regulatory frameworks, environmental health and safety measures and sustainable use of natural resources (such as water).

7.3.3 Reporting Within the Project

The following reports and documents will be produced under the monitoring plan of the project:

- Monthly report with a section on the ESMMP during construction phase to be prepared by CDR and submitted to the WB;
- Annual report with a Chapter on the ESMMP during construction phase to be prepared by CDR and submitted to the WB; and
- Annual audit report produced after one year of project operation to be prepared by MoEW and submitted to the WB.

7.3.4 Capacity Building Needs

It is recommended that parties responsible for the implementation of this ESMF be trained on the implementation of Environmental Management Plans during construction and operation phases of the project. For instance, no contractor should be allowed to initiate work before he fully understands the requirements of the project's Environmental Management Plan and prepared a Construction Environmental Management Plan (CEMP). Similarly, project operators should be trained on the implementation of the EMP during operation and should prepare an Operation Environmental Management Plan (OEMP).

7.4 THE COST ESTIMATE

Table 7-6 summaries an interim budget for environmental management within the Qaraoun project. This budget does not include the cost of the persons that are implementing the ESMMP of component 1. It is assumed that the cost is included in the contractors and operators' budget.

Table 7-6 Cost Estimate of the ESMF Implementation

Item	Responsible Party	Indicative Cost
Subsequent preparation of EA studies for Component 1 projects	CDR	USD 10,000 per study
Preparation of RAP (for expansion of Ferzol, Ablah, and Aitanit networks if needed)	CDR	USD 10000
Training and capacity building on implementation of EMPs for contractors, relevant municipalities, and BWE	CDR	USD 15000

8. CONSULTATION ON THE ESMF

A consultation meeting was held on September 13, 2014 in Chtaura to discuss the findings of the ESMF. The CDR issued a letter to all key stakeholders at least a week ahead of the consultation inviting them to attend the consultation. The invitation letter was followed up by emails and phone calls to remind people to attend. The consultation session was divided in three parts. The first part includes a welcoming address by the organizing institutions. The second part consists of a presentation of the documents in local language (Arabic) to ensure maximum comprehension and the third part is dedicated to questions and answers. Table 8-1 summarizes the proceedings of the meeting. A photographic documentation of the meeting is provided in Figure 8-1.

Arrival and registration of the participants

Introductory/welcoming speech

Presentation

Overview of participants

Figure 8-1 Photos from the Public Consultation Meeting

The workshop attendees represented the following main affiliations (the list of workshop participants is available in Appendix C):

- Ministry of Environment
- Council of Development and Reconstruction
- Municipalities (Alkhyara, Ferzol, Kaa El Reem, Bar Elias, and Aanjar)
- Union of Municipalities(Zahle, Plain)
- Bekaa Water Establishment
- Zahle and Bekaa Chamber of Commerce and Industry
- Ministry of Public Health
- Ministry of Interior and Municipalities
- Caritas Lebanon
- Salam Organization
- Université Saint-Joseph
- Lebanese University

Table 8-1 Summary of Proceedings of the Public Consultation Meeting

Name	Organization	Comment/Question	Answer	Integration of Comments in the Study
Kassem Mathloom	Alkhyara Municipality and Union of Municipalities of the Plain	Some of the presented impacts on groundwater are negative whereas wastewater projects are known to have positive impacts	The overall project impact on groundwater is positive, however, the impacts mentioned in the presentation were related to construction activities and potential leakage of wastewater during operation	Positive impacts of the project are highlighted in Section 6.2.
		Jeb Jannine WWTP was not included in the study though it needs some additional works to be fully functional	There are some financial issues related to the networks that are being worked on at this stage and after confirming the fund availability and the amount, the World Bank's support maybe sought.	--
Lawyer Ghassan Jarrah	Bekaa Water Authority	People and children suffer from diseases, annoyance due to odors, and pollution: • Why doesn't the government implement short term mitigation measures to reduce the severity of the issue until all the financial issues are solved, and long term solutions can be fully implemented to resolve those problems? • Why doesn't the government in the meanwhile solve the industrial wastewater problem which is a major issue?	• The government is implementing several initiatives to control pollution in the Qaraoun lake and its basin • This program financed by the World Bank is part of "The Qaraoun pollution prevention project" that addresses all sources of pollution affecting the lake and its catchment area. It has been endorsed by the government and shall be implemented gradually • The Ministry of Environment, with the support of the World Bank, is also implementing the "Lebanon Pollution Abatement Project (LEPAP)", which aims at supporting industries to comply with environmental standards • Recent environmental legislation has been	--

Name	Organization	Comment/Question	Answer	Integration of Comments in the Study
			adopted by the Council of Ministers, that when enforced, will help alleviate the problem; in particular, the Environmental Compliance Decree (Decree 8471/2012) should play an instrumental role in promoting compliance with environmental legislation; support from from civic society and municipalities is needed to enforce the legislation.	
Lawyer Toufik Al Hindi	Zahle and Bekaa Chamber of Commerce and Industry	Now, water networks are being implemented and installed on public roads and in the next phase wastewater networks will be implemented and excavations will be executed again on public roads. There should be a coordination mechanism to avoid re-excavating the roads	Projects are implemented based on the financing availability which makes the coordination difficult	--
Issam Akiki	Baladi Program - Caritas Lebanon	How much does the fund cover?	World bank usually covers 100% of the consultancy costs and between 90% and 95% of the implementation costs	--
Lawyer Nathrat Andokian	Anjar Municipality	• The study doesn't mention the mechanism for coordination with municipalities • Anjar municipality sent many requests to the CDR to expand the sewage networks but no replies were received so far • If the funds are available for Anjar/Majdel Anjar WWTP and networks, execution should have started	• The main aim of this workshop is to coordinate with municipalities, unions, and organizations, to take their comments and opinions and include them in the study. • Anjar has some networks and lacks others, and funding is available however CDR is waiting for the approval (Italians)	The report describes the role of municipalities in implementing the environmental and social management and monitoring plan especially during the construction phase of the project (Section 7.2).
May Assad	Baladi Program	• People need quicker and tangible solutions rather than only studies.	Works are being executed when funds are available	--

Name	Organization	Comment/Question	Answer	Integration of Comments in the Study
Osama Ibrahim	Al Salam Organization	• Salam Organization has implemented numerous initiatives last year and currently through 18 environmental committees from the civil society distributed in the villages (support from USAID), it is working on environmental matters. Therefore the organization would like to be part in this project in promoting awareness	The support of the local NGOs is needed during the implementation of the project and the workshop aim is to involve these NGOs.	--

The general comments received through the distributed evaluation forms are (Appendix B):

- Industrial wastewater and industrial solid wastes must be considered as the main sources of pollution of the Qaraoun Lake and the Litani River. Short and long-term solutions must be suggested to solve this issue.
- Workshops should not only be done in Chtaura but also in all the Municipalities that surround the Qaraoun Lake and Litani River so that the public becomes involved in all the project's activities. This will eventually lead to the success of the project or any other environmental project.
- Sewer networks must be as far as possible from potable water.
- Emergency measures must be implemented to reduce the suffering of the people who are affected by pollution in the area while awaiting for longer-term solutions. Also, it is important to gain the trust of the local communities to avoid having problems and obstacles while implementing the project's activities.
- Strengthen the role of local Authorities (Municipalities). In addition, a study for the management of the use and consumption of clean water must be prepared given the high number of Syrian refugees.
- Civil society organizations must be empowered to raise people's awareness regarding the environment. The Association "Al Salam" created environmental committees that work to reduce pollution and raise awareness in the 18 towns surrounding the Litani River.
- Find solutions to the negative impacts of bad odors generated at the riverside and of the irrigation water quality.

9. REFERENCES

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APPENDIX A: INTERGRATED PEST MANAGEMENT GUIDELINES

Introduction

The deteriorating quality of the waters in the Litani River and Lake Qaraoun and the continuous uncontrolled discharge of pollutants necessitate the adoption of proper remedial measures to protect this watercourse and ensure its sustainable utilization. In addition to pollution from domestic and industrial wastewater and solid wastes, intensive agricultural activities in the upper Litani basin also contribute to water quality degradation. The runoff from agriculture contributes to poor water quality, as farmers do not use good agricultural practices for preserving natural resources in soil or irrigation water management, pest and crop management, often overusing agrochemical applications. Studies also show high levels of nitrates in the water, in particular, correlating to the period when farmers apply chemicals to their fields.

The proposed project aims at reducing the Litani River and Qaraoun lake water pollution from agrochemicals. This will be achieved by adopting sustainable crop production systems in the upper Litani basin through introduction and promotion of Integrated Pest Management (IPM) and Good Agricultural Practices (GAP) in the project area.

Regulatory Framework

The Regulatory framework for pesticides management in Lebanon is covered by:

- Law 6/68: Regulation of trade of pesticides
- Decree 5039: legal texts for the regulation of trade of pesticides
- Ministerial Decisions
    - 310/1: Registration of Imported and locally produced pesticides
    - 554/1: Rules of Procedure of the Pesticides Committee
    - 59/1: Regulation of import and registration of Agricultural pesticides
    - 307/1: Registration of Bio-pesticides
    - 311/1: Regulation of Agricultural Pesticides Importation
    - 92/1: Labeling and use requirements of Agricultural Pesticides
    - 94-1: Banning the importation and use of some Agricultural Pesticides

It should be noted that all those texts are binding for companies trading with agricultural pesticides (import, formulation, distribution and selling). Information (use, protection, PHI, Re-entry period, etc…) provided on the labels of agricultural pesticides containers (approved by the Ministry of Agriculture) are mandatory to farmers.

The Strategy of the Ministry of Agriculture for the period 2010-2014 full adopts an Integrated Pest Management approach and promotes and encourages the private sector level -for both users (Farmers) and traders (Companies)- to manage plant pests.

Principles of IPM Implementation

1. Select cultivars and varieties on an understanding of their characteristics, including response to sowing or planting time, productivity, quality, market acceptability, disease and stress resistance, edaphic and climatic, adaptability, and response to fertilizers and agrochemicals.

2. Introduce crop sequences to optimize use of labour and equipment and maximize benefits of cultural practices that maximize biological prevention of pests and diseases, and where appropriate inclusion of non-host crops legumes to provide reservoir for natural enemies a biological source of nitrogen.

3. Apply fertilizers, organic and inorganic, in a balanced fashion, with appropriate methods and equipment and at adequate intervals to replace nutrients extracted by harvest or lost during production.

4. Rational nitrogen application on the basis of plant needs and the amount of nitrogen in the soil;

5. Maintaining vegetation cover of the soil to inhibit the build-up of soluble nitrogen by absorbing mineralized nitrogen and minimizing leaching during periods of rain;

6. Maximize the benefits to soil and nutrient stability by re-cycling crop and other organic residues.

7. Integrate livestock into crop rotations and utilize the nutrient cycling provided by grazing or housed livestock to benefit the fertility of the entire farm.

8. Maintain regular and quantitative assessment of the balance status between pests and diseases and beneficial organisms of all crops.

9. Apply pest and disease forecasting techniques where available.

10. Consider the application of all possible methods with their short- and long-term effects on farm productivity and environmental implications in order to minimize the use of agrochemicals, in particular promotion of IPM approach.

Contents of an IPM Plan

The IPM Plan will contain the following components and activities:

1. ***Technical Assistance***: Technical support services will be provided by FAO. The project will be operated by the FAO Office in Lebanon with the technical support of the FAO Regional Office for the Near East, where the Crop Protection Officer and other involved technical officers are located. The Lead Technical Unit of the project will be the Plant Production and Protection Division at FAO HQs.

2. ***Training and Awareness raising***: MoA professionals and trainers will be trained in IPM-GAP. Specific training and awareness raising activities on IPM-GAP and conservation agriculture practices will be conducted based on the need assessment.

3. ***Supervision***: The required technical support will be in the form of direct supervision of the project activities by relevant FAO technical officers as required, through backstopping field visits to the project site at least once a year and also through other means of communication such as e-mailing and phoning.

4. ***Safety and Storage of Pesticides***: The Ministry of Agriculture and technical staff will develop and implement arrangements for the safe use, handling and storage of pesticides, and the proper use, maintenance and storage of pesticide spraying equipment. Storage should follow the instructions provided. Pesticides should be kept separately, away from humans and animals in a closed, dry and secure place. Any surplus or unwanted pesticides should be reported to the MoA for disposal.

5. ***Monitoring and Reporting***: The project will demonstrate and measure the impact of the new introduced and promoted system including pest monitoring, fertilizing evaluation, soil erosion control and water use efficiency and management. The Project Manager in collaboration with the National Project Coordinator, the FAO staff and national and intentional consultants, will prepare a report on the project inception and formulate detailed work plan for the entire project life span.

APPENDIX B: FILLED EVALUATION FORMS

ورشة العمل حول مشروع وقاية بحيرة القرعون من التلوث

استمارة لتقييم ورشة العمل

1- هل لديكم أي ملاحظات أو اقتراحات إضافية تتعلق بالاثار البيئية والاجتماعية للمشروع؟

لا يمكن ان تعقد ورشة العمل في مشروع ما، يجب
ان تكون دراسات العمل من كل السلبيات التي تؤذي
للنهر والبحيرة حتى يبقى الناس على اطلاع
على ما تقومون به ويكونوا على [illegible]
المشروع أو الاثار البيئية.

2- تقييم المحاضرة

المحاضرة (1= غير جيد، 5= ممتاز)	**1**	**2**	**3**	**4**	**5**
مدى وضوح ورشة العمل			✓		
مدة المحاضرة و إدارة الوقت				✓	
الإلمام بالموضوع				✓	
مستوى التفاعل مع المشاركين				✓	
اقتراحات لتحسين سير ورشة العمل:					

شكراً لمشاركتكم

1

ورشة العمل حول مشروع وقاية بحيرة القرعون من التلوث

استمارة لتقييم ورشة العمل

1- هل لديكم أي ملاحظات أو اقتراحات إضافية تتعلق بالاثار البيئية والاجتماعية للمشروع؟

ضرورة تنفيذ نشاطات فورية لتخفيف أعباء
عن المتضررين وكسب ثقة المجتمعات المحلية بإعطاء
إشراكهم في الدراسة وتنفيذ الخطة البعيدة المدى
لتفادي العراقيل المحلية.

2- تقييم المحاضرة

المحاضرة (1= غير جيد، 5= ممتاز)	1	2	3	4	5
مدى وضوح ورشة العمل				✓	
مدة المحاضرة و إدارة الوقت				✓	
الإلمام بالموضوع				✓	
مستوى التفاعل مع المشاركين					✓
اقتراحات لتحسين سير ورشة العمل:					

شكراً لمشاركتكم

1

ورشة العمل حول مشروع وقاية بحيرة القرعون من التلوث

استمارة لتقييم ورشة العمل

1- هل لديكم أي ملاحظات أو اقتراحات إضافية تتعلق بالاثار البيئية والاجتماعية للمشروع؟

أتمنى عليكم أن الصرف الصحي يكون بعيد عن المياه الطالحة

2- تقييم المحاضرة

المحاضرة (1= غير جيد، 5= ممتاز)	1	2	3	4	5
مدى وضوح ورشة العمل				✓	
مدة المحاضرة و إدارة الوقت				✓	
الإلمام بالموضوع			✓		
مستوى التفاعل مع المشاركين				✓	
اقتراحات لتحسين سير ورشة العمل:					

شكراً لمشاركتكم

1

ورشة العمل حول مشروع وقاية بحيرة القرعون من التلوث

استمارة لتقييم ورشة العمل

1- هل لديكم أي ملاحظات أو اقتراحات إضافية تتعلق بالاثار البيئية والاجتماعية للمشروع؟

تفعيل دور مؤسسات وهيئات المجتمع المدني
في مجال نشر الوعي البيئي والاجتماعي
بين أفراد وابناء المجتمع.
نحن في جمعية سلام عمنا و نقوم بانشاء لجانا
بيئية في ١٨ بلدة على حوض اللطاني وذلك
العمل على تخفيف التلوث ونشر الوعي

اسامه ابراهيم
جمعية سلام
03-284478

2- تقييم المحاضرة

المحاضرة (1= غير جيد، 5= ممتاز)	1	2	3	4	5
مدى وضوح ورشة العمل				✓	
مدة المحاضرة و إدارة الوقت			✓		
الإلمام بالموضوع				✓	
مستوى التفاعل مع المشاركين					✓
اقتراحات لتحسين سير ورشة العمل:					

شكراً لمشاركتكم

1

ورشة العمل حول مشروع وقاية بحيرة القرعون من التلوث

استمارة لتقييم ورشة العمل

1- هل لديكم أي ملاحظات أو اقتراحات إضافية تتعلق بالاثار البيئية والاجتماعية للمشروع؟

معالجة الآثار البيئية السلبية الناجمة
عن هذا المشروع (الروائح الكريهة
على ضفاف نهر الليطاني ومعالجة نوعية
مياه الري للمزروعات).

2- تقييم المحاضرة

المحاضرة (1= غير جيد، 5= ممتاز)	1	2	3	4	5
مدى وضوح ورشة العمل				X	
مدة المحاضرة و إدارة الوقت					X
الإلمام بالموضوع				X	
مستوى التفاعل مع المشاركين				X	
اقتراحات لتحسين سير ورشة العمل:					

شكراً لمشاركتكم

1

ورشة العمل حول مشروع وقاية بحيرة القرعون من التلوث

استمارة لتقييم ورشة العمل

1- هل لديكم أي ملاحظات أو اقتراحات إضافية تتعلق بالاثار البيئية والاجتماعية للمشروع؟

من المهم ان يكون هناك مشاركة للمجتمع المدني

2- تقييم المحاضرة

المحاضرة (1= غير جيد، 5= ممتاز)	1	2	3	4	5
مدى وضوح ورشة العمل					X
مدة المحاضرة و إدارة الوقت				X	
الإلمام بالموضوع				X	
مستوى التفاعل مع المشاركين					X
اقتراحات لتحسين سير ورشة العمل: تخصيص وقت اطول للنقاش					

شكراً لمشاركتكم

1

ورشة العمل حول مشروع وقاية بحيرة القرعون من التلوث

استمارة لتقييم ورشة العمل

1- هل لديكم أي ملاحظات أو اقتراحات إضافية تتعلق بالاثار البيئية والاجتماعية للمشروع؟

المشروع مهم جداً ويساهم في تخفيف التلوث وتأثيرها البيئة على المواطنين على امل ان تعد هيكلية تشغيلية واضحة بهدف استمرار فعالية المحطة على المدى الطويل وان لا تكون فقط محطة وهمية.

2- تقييم المحاضرة

المحاضرة (1= غير جيد، 5= ممتاز)	1	2	3	4	5
مدى وضوح ورشة العمل				X	
مدة المحاضرة و إدارة الوقت				X	
الإلمام بالموضوع					X
مستوى التفاعل مع المشاركين				X	
اقتراحات لتحسين سير ورشة العمل:					

شكراً لمشاركتكم

1

ورشة العمل حول مشروع وقاية بحيرة القرعون من التلوث

استمارة لتقييم ورشة العمل

1- هل لديكم أي ملاحظات أو اقتراحات إضافية تتعلق بالاثار البيئية والاجتماعية للمشروع؟

إعطاء دور إضافي و أهمية أكبر لدور السلطات المحلية الممثلة بالبلديات - القيام ببعض الخطوات و التنفيذ العملي لبعض المشاريع لتخفيض الضرر وكسب ثقة الناس و المواطنين لفتح تعاونهم مستقبلاً.
العمل على وضع دراسة لإدارة استعمال و استهلاك المياه الجوفية في ظل الشح و الزيادة في استهلاك المياه بسبب النزوح السوري.

2- تقييم المحاضرة

المحاضرة (1= غير جيد، 5= ممتاز)	1	2	3	4	5
مدى وضوح ورشة العمل			X		
مدة المحاضرة و إدارة الوقت				X	
الإلمام بالموضوع				X	
مستوى التفاعل مع المشاركين			X		

اقتراحات لتحسين سير ورشة العمل:
الجواب على كافة الأسئلة و الاقتراحات .

شكراً لمشاركتكم

1

ورشة العمل حول مشروع وقاية بحيرة القرعون من التلوث

استمارة لتقييم ورشة العمل

1- هل لديكم أي ملاحظات أو اقتراحات إضافية تتعلق بالاثار البيئية والاجتماعية للمشروع؟

التطرق إلى النفايات الصناعية السائلة والصلبة كسبب رئيسي للتلوث الحاصل في بحيرة القرعون ونهر الليطاني مع طرح الحلول القصيرة والطويلة الأمد لحل/معالجة تلك المشاكل

2- تقييم المحاضرة

المحاضرة (1= غير جيد، 5= ممتاز)	1	2	3	4	5
مدى وضوح ورشة العمل				✓	
مدة المحاضرة و إدارة الوقت				✓	
الإلمام بالموضوع				✓	
مستوى التفاعل مع المشاركين				✓	
اقتراحات لتحسين سير ورشة العمل:					

شكراً لمشاركتكم

1

APPENDIX C: LIST OF PARTICIPANTS

Name	Position	Organization-Occupation	Phone Number	Email
Elie Noureyyi	Notary Public / University Instructor	Saint-Joseph University	03-748086	_
Khaled Abou Chahine	Representative of the director general of Municipalities	Ministry of Interior and Municipalities	70-929492	_
Kassem Mathlom	Head of Alkhyara Municipality and Representative of Union of Municipalities of the Plain	Alkhyara Municipality and Union of Municipalities of the Plain	03-670412	k_mazloum@ostarholdings.com
Manal Msallem	Project Manager / Consultant	Ministry of Environment/UNDP	01-981854	_
Issam Akiki	Baladi Program Employee	Caritas Lebanon	01-901733	_
Hajar Samaha	Public Health Officer	MoPH "Representing Head of Bekaa Health Department"	70-164137	hajarsamaha@hotmail.com
Ibrahim Nasralla	Head of Union of Municipalities pf Zahle Caza	Zahle Union of Municipalities	03-774908	ittihadzahle@gmail.com
Ghassan Jarrah	Member of BWE Administration Board/Lawyer	Bekaa Water Establishment	03-607878	_
Charbel Abi Abdallah	Project Engineer	Rafik El Khoury and Partners	71-498805	Charbel.abiabdallah@rafikelkhoury.com
May Assaad	Baladi Program Manager	Caritas Lebanon	03-703670	may.assaad@caritas-baladi.com
Osama Ibrahim	Manager of Bekaa Branch of Al Salam Organization	Salam Organization	03-284478	osama221077@hotmail.com

Name	Position	Organization-Occupation	Phone Number	Email
Sanaa Hamzo	MoPH-IRD	MoPH	70-525727	sanaahamzo@hotmail.com
Melhem Fayez Ghassan	Head Of Municipality	Ferzoul Municipality	08-950129 03-802555	–
Mazen Makki	Head of Environment Department	Rafik El Khoury and Partners	03-370426	mazen.makki@rafikelkhoury.com
Dr.Ghassan Zalaket	Head of Bekaa Health Authority	Bekaa Health Authority-MoPH	03-802020	ghazzanzalaket@hotmail.com
Dani Alforn	Head of Municipality Representative	Kaa Al Reem Municipality	70-945956	dany@mimosa.com.lb
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Maroun Daher	Project Manager	CDR	01-981375	mdaher@cdr.gov.lb
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Saad Aldin Maita	Head of Municipality	Bar Elias Municipality	03-376280	–
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مشروع وقاية بحيرة القرعون من التلوث

Lake Qaraoun Pollution Prevention Project

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ELARD

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مشروع وقاية بحيرة القرعون من التلوث

Lake Qaraoun Pollution Prevention Project

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ELARD

10

مشروع وقاية بحيرة القرعون من التلوث

Lake Qaraoun Pollution Prevention Project

Email بريد إلكتروني	Phone Number رقم الهاتف	Organization- Occupation المؤسسة- المهنة	Position الصفة	Name الاسم

APPENDIX D: SAMPLE TERMS OF REFERENCE FOR IEE/EMP

The EMP/IEE will

(a) Describe baseline environmental and social conditions in the project area

(b) Assess the potential environmental and social impacts of the project during construction and operation phases of the project.

(d) Identify mitigation measures that will prevent or reduce adverse environmental and social impacts resulting from project activities, both during the construction and the operation phases.

(e) Develop an environmental and social management plan (ESMP).

(f) Present a monitoring plan against which compliance with the EMP/IEE and ESMP can measured; and

(g) Present records of consultations with stakeholders and other public consultations.

The EMP/IEE should include, at a minimum, sections on the following subjects:

Project Description

The Consultant should provide a detailed description of the proposed project. This description should include diagrams, maps, tables, and descriptive text based on existing information (mainly the studies and design documents).

Policy, Legal, and Administrative Framework

The existing policy, legal and administrative framework related to the construction and operation of the proposed project shall be reviewed by the consultant and included within the EMP/IEE report.

The construction of the project may require the involvement of several ministries along with various other government agencies. A description of the role of each shall be included in the EMP/IEE report, all within the context of the proposed project.

Analysis of environmental management and legal-institutional frameworks and capacities shall be conducted by the consultant and included within the EMP/IEE report. It is important to outline sector-specific environmental laws and regulations and put these in the context of the proposed project. International conventions ratified by Lebanon which are of relevance to the proposed project shall also be presented in the EMP/IEE report.

In the context of the proposed project, several standards may be adopted including ambient air quality standards, noise guidelines in different zones, water and soil quality standards, etc. The consultant shall identify, summarize, synthesize, and analyze relevant environmental standards

Environmental and Social Baseline Conditions

The EMP/IEE should include information on the Environmental baseline conditions in the project area. Elements of the environment include its physical (climate and meteorology, surface and groundwater quality, geology and soil, topography, noise levels, air quality, traffic, rivers and waterways), and biological (terrestrial, and riverine biodiversity including flora, fauna, rare or endangered species, sensitive habitats, significant natural sites).

Existing basic documents (such as geological maps, climate and meteorology, geology, hydrogeology, etc.) shall be presented.

The EMP/IEE should also include information on the Social baseline conditions in the project area.

Analysis of the potential environmental and social impacts of the project

The anticipated environmental and social impacts resulting from the project, both during the construction and operation phases, usually include air quality, noise, traffic, surface water, groundwater and soil, biodiversity, landscape, waste generation, resource use, and health and safety, and socio-economic issues. The consultant should assess the potential impacts, and should distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and longer-term impacts. The consultant should identify adverse impacts which are likely to be unavoidable or irreversible.

Identification of possible environmental and social mitigation measures

The primary adverse environmental impacts expected during the construction and operation phases might be eliminated or minimized through adjustments to project design, careful planning and staging of construction activities, adoption of improved management practices during operation, and effective environmental monitoring and training to support management decisions. The consultant shall develop a mitigation plan which identifies possible impact-mitigation and/or control measures to reduce environmental impacts. Mitigation measures are intended to reduce the effect of potentially significant impacts on the environment.

For each negative environmental and social impact (during both the construction and operation phases), the consultant should identify and describe (wherever applicable):

- Measures to mitigate or offset damaging impacts from project activities.
- Costs for each recommended mitigation measure developed to resolve a significant environmental issue.
- Concerned parties responsible for implementing the mitigation measures

Environmental and Social Management Plan (ESMP)

The consultant will prepare an ESMP, including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures, monitoring, etc.

The consultant will also prepare detailed plan to monitor the implementation of mitigating measures and the impacts of the project during construction and operation. To be included in the plan is an estimate of capital and operating costs and a description of other inputs (such as training and institutional strengthening) needed to implement the plan.

Stakeholder and Public Participation

The Consultant will assist the Government in coordinating the EMP/IEE with relevant agencies. The Government will lead the consultations with affected groups likely to be affected by the proposed project and with local NGOs on the environmental and social aspects of the proposed project. The consultant will participate in those consultations and prepare records. The consultant may also hold his own consultations, in coordination and agreement with the Government.

The Consultant would maintain records of the public consultation and the records should indicate: the date and location of the consultation meetings, a list of the attendees and their affiliation and contact address; and, summary minutes.