Update of the Environmental Impact Assessment

Prepared by CHUD-PMU
(With the contribution of ELARD)

BEIRUT, LEBANON

December 2011
ACKNOWLEDGEMENTS

The authors wish to express their sincere gratitude to all contributors at the Council for Development and Reconstruction and Elard for their assistance and support throughout the preparation and the updating of the present Environmental Impact Assessment report. Special thanks are extended to the municipalities of Baalbeck, Byblos, Saida, Tripoli, and Tyre for their cooperation, and for coordinating and participating in the public meetings.
EXECUTIVE SUMMARY

INTRODUCTION
This report presents an update of the Environmental Impact Assessment (EIA) for the ongoing Cultural Heritage and Urban Development Project (CHUD) in Lebanon. The CHUD is implemented by the Government of Lebanon represented by the Council of Development and Reconstruction (CDR) through a loan from the World Bank, the French Development Agency, and the Italian Cooperation. The objectives of the EIA are to provide a sound basis for decision-making about the design of project components that takes environmental considerations including social and economic impacts into account, ensure that the project is implemented with full awareness of environmental factors, inform the public when and how the project implementation may affect their environment, and facilitate public participation in the decision-making process. The scope of work implemented in the preparation of the EIA report includes the definition of existing legal and administrative framework, description of the project, definition of baseline environmental conditions, identification and analysis of potential environmental impacts, analysis of alternatives, development of an environmental management plan mitigation plan (mitigation, monitoring, and institutional strengthening), and solicitation public participation.

LEGAL AND ADMINISTRATIVE FRAMEWORK
Lebanon has many laws related to the preservation/management of cultural heritage, some dating back to the 1930’s. Recently, new project laws have been drafted in order to update the old legislative framework governing this sector, some of these laws were approved, while the remaining still await ratification. Enforcement of existing laws is weak and responsibilities are unclear. The CHUD project is multi-sectorial in nature involving several institutions at various levels. While the CDR is coordinating the preparatory work of all concerned agencies and facilitating project preparation, the institutions that are closely involved in the project include the Directorate General of Antiquities (DGA) at the Ministry of Culture (MoC), the Directorate General of Urban Planning (DGU) at the Ministry of Public Works, and the Municipalities of the concerned cities. Although not as closely involved, other institutions that are concerned with the project include the Ministry of Environment (MoE), the Ministry of Tourism (MoTo), the Ministry of Interior and Municipal Affairs (MoIMA), and the Ministry Transport (MoT).

PROJECT DESCRIPTION
The CHUD project encompasses five Lebanese secondary cities: Tripoli, Byblos (Jbail), Saida, Tyre and Baalbeck (Figure I). The objective of the project is to promote national and international
cultural tourism in order to boost the local economy in these five old cities. The three main components of the proposed project are:

- Preservation and management of archaeological sites and development of their surroundings, thus enhancing visitor experience;
- Rehabilitation of historic city centers and urban infrastructure improvements which are carried out in and around the old towns to complement ongoing private conservation initiatives, attract and service tourists, and benefit the local community;
- Institutional strengthening to assist the specified agencies in playing their respective roles in preserving cultural heritage and deriving economic benefits for the country and the residents of the cities concerned.

Originally, the implementation of the CHUD project started in 2004 and was supposed to be completed by the end of 2009, with a total cost of 62.2 MUSD financed through a loan agreement between the World Bank, the Lebanese Government, the French Development Agency (AFD) and the Italian Cooperation. The rehabilitation of historic city centers and urban infrastructure improvements component constituted around 68.6 percent of the total project cost while the archaeological sites conservation and management component constitute 22.2 percent leaving 9.2 percent for the institutional strengthening and project management component. After two extensions of time, an additional financing of 27 Million $ and an extension of time until the end of 2014 is requested from the World Bank to finalize the ongoing contracts and to implement the remaining essential works from the initial agreement put on hold due to unavailability of Budgets.

Figure I. General location of the project cities
Moreover, the AFD has also approved an additional financing of 21 Millions Euros and an extension of loan closing date until the end of 2017.

DESCRIPTION OF THE ENVIRONMENT

Table I provides a brief summary of various physical and socio-economic indicators related to the five cities (Tripoli, Byblos, Saida, Tyre and Baalbeck).
Table I. Summary indicators of the five cities

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Tripoli</th>
<th>Byblos</th>
<th>Saida</th>
<th>Tyre</th>
<th>Baalbeck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (2002)</td>
<td>588,200</td>
<td>16,910</td>
<td>75,615</td>
<td>61,000</td>
<td>55,000</td>
</tr>
<tr>
<td>Working population, %</td>
<td>NA</td>
<td>38</td>
<td>27</td>
<td>NA</td>
<td>70</td>
</tr>
<tr>
<td>Occupation</td>
<td>Service sectors, commercial activities, employees, industry</td>
<td>Service sector, industry, agriculture, maritime</td>
<td>Vendors, daily workers, employees, fishermen, drivers</td>
<td>Fishing, public sector, commercial activities</td>
<td>Agriculture Industry Services</td>
</tr>
<tr>
<td>Property and Tenure</td>
<td>Private, Waqf, &amp; Public</td>
<td>Private, Waqf, &amp; Public</td>
<td>Private, Waqf, &amp; Public</td>
<td>Private, Waqf, &amp; Public</td>
<td>Mainly home owners</td>
</tr>
<tr>
<td>Precipitation, mm</td>
<td>1,015</td>
<td>1,015</td>
<td>660</td>
<td>750</td>
<td>410</td>
</tr>
<tr>
<td>Humidity, %</td>
<td>70</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>56</td>
</tr>
<tr>
<td>Temperature, °C</td>
<td>20</td>
<td>20</td>
<td>19.5</td>
<td>37 summer, 14 winter</td>
<td>15 °C</td>
</tr>
<tr>
<td>Wind</td>
<td>W and SW</td>
<td>W and SW</td>
<td>SW</td>
<td>W and SW</td>
<td>NE and SW</td>
</tr>
<tr>
<td>Geology</td>
<td>Karstic</td>
<td>NA</td>
<td>Karstic from Cenomanian age</td>
<td>Turonean, Cenomanian, and Eocene formations</td>
<td>Turonean formations</td>
</tr>
<tr>
<td>Water sources</td>
<td>Hab, Racheine, &amp; aquifers</td>
<td>Afqa, Er Roueiss, Qatra springs, and underground wells</td>
<td>Kfarwe spring and underground wells</td>
<td>Ras el Ain and Rashidiyey springs, and private and public wells</td>
<td>Loujouj &amp; Ain Bourdai springs and 7 boreholes</td>
</tr>
<tr>
<td>Water quality</td>
<td>Requires improvement</td>
<td>NA</td>
<td>Requires improvement due to contamination</td>
<td>Polluted in upper layer</td>
<td>Ras el Ain spring is contaminated</td>
</tr>
<tr>
<td>Major rivers</td>
<td>Abou Ali</td>
<td>Nahr Ibrahim</td>
<td>Awwali and Sainiq</td>
<td>Litani river</td>
<td>Ras el Ain river</td>
</tr>
<tr>
<td>Coastal areas status</td>
<td>Polluted, sewage discharge, solid waste</td>
<td>Acceptable microbiological quality; pollution with oil and fuel from fishing boats</td>
<td>9 sewage outlets discharge to the sea; Water unsuitable for any type of human contact</td>
<td>Polluted by sewage discharge, 6 sewage outlets; Water unsuitable for any type of human contact</td>
<td>None</td>
</tr>
<tr>
<td>Wastewater collection systems</td>
<td>Inadequate, is being improved</td>
<td>Not available, coastal collector Under construction</td>
<td>Inadequate, discharge to sea, require a costal collector Being improved</td>
<td>Old system, pumping station requires extensive maintenance, development ongoing</td>
<td>Being improved</td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td>Secondary treatment serving the whole caza and parts of Zghata and</td>
<td>Secondary treatment serving the caza of Jbeil (capacity 9,000 m³/d) to</td>
<td>Secondary treatment serving the caza of Saida (capacity 33,600 m³/d) on</td>
<td>Secondary treatment serving the caza of Sour to the north of the city (under</td>
<td>Secondary treatment serving the surrounding area, located in Iaat,</td>
</tr>
<tr>
<td>Indicator</td>
<td>Tripoli</td>
<td>Byblos</td>
<td>Saida</td>
<td>Tyre</td>
<td>Baalbeck</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------------------</td>
<td>---------------------------------------------</td>
<td>--------------------------------------------</td>
<td>-------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Effluent discharge</td>
<td>Koura (1,740,000 persons in 2040) located on mouth of Abou Ali River (under construction)</td>
<td>the North of the city (under construction)</td>
<td>the Sainiq river operational construction</td>
<td>operational. Capacity 12,500 m³/d and can be doubled.</td>
<td></td>
</tr>
<tr>
<td>Stormwater drainage</td>
<td>Bad conditions, mixing with sewage, is being improved</td>
<td>Old system, mixing with sewage Being improved</td>
<td>Old system, mixing with sewage Being improved</td>
<td>Mixing with sewage Being improved</td>
<td>Being improved Outfall discharge in an open ditch</td>
</tr>
<tr>
<td>Solid waste</td>
<td>382 t/d, in landfill on Abou Ali River</td>
<td>13 t/d in open dump at Hbaline; existing SWTP not operational</td>
<td>53 t/d disposed in open dump South of Saida</td>
<td>49 t/d disposed in open dumps</td>
<td>45 t/d disposed in open dump at Roman quarry</td>
</tr>
<tr>
<td>Solid waste plans</td>
<td>-</td>
<td>Rehabilitation of the existing dump and refurbishment of the existing SWTP</td>
<td>Anaerobic digestion facility (300 tpd) just started operating</td>
<td>Material recovery facility and composting pant serving the region operational</td>
<td>Construction of a 70-80 tpd material recovery facility, composting pant and sanitary landfill serving the region to start soon in the industrial region</td>
</tr>
<tr>
<td>Air Quality</td>
<td>CO, SO₂, NO₂, TSP above WHO standards</td>
<td>PM₁₀ and SO₂ levels exceed WHO standards</td>
<td>SO₂ levels exceed WHO standards</td>
<td>PM₁₀ levels exceed WHO standards</td>
<td>PM₁₀ and SO₂ levels exceed WHO standards</td>
</tr>
<tr>
<td>Noise levels</td>
<td>Exceed standards at all times</td>
<td>Exceed standards</td>
<td>Exceed standards</td>
<td>Exceed standards</td>
<td>Exceed standards</td>
</tr>
</tbody>
</table>

NA = Not Available
IMPACT ANALYSIS

The environmental impact analysis showed that the greatest environmental impacts occur during the construction phase particularly with respect to dust and noise emissions, re-routing of traffic, visual intrusion, waste generation, water quality, safety concerns, potential damage to archaeological sites, and socio-economic impacts associated with loss of income and resettlement. Other potential but insignificant impacts include temporary alterations in drainage patterns and expansion of existing quarries for construction materials. During the operation phase, the analysis showed that the project will result mostly in positive environmental impacts when compared with the case of not implementing the project, all while recognizing that certain aspects associated with the project are in dire need for the adoption of proper management practices to ensure the sustainability of the project and its expected benefits (solid waste, wastewater, archaeological sites monitoring). In this respect, infrastructure works relating to water supply, wastewater and solid waste management are currently underway in parallel with the project. Given the highly urbanized nature of the cities involved, the CHUD project is not anticipated to have significant environmental impacts from project-induced growth or land use changes. Most lands in the vicinity of rehabilitated areas have been built and are largely occupied by low and medium-rise commercial and residential buildings. Table II provides a qualitative summary of the significance of potential environmental impacts that are associated with both the construction and operation phases.

Table II. Summary of potential environmental impacts

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Construction</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>-</td>
<td>0/++</td>
</tr>
<tr>
<td>Air quality</td>
<td>-</td>
<td>-/+/-/+</td>
</tr>
<tr>
<td>Noise</td>
<td>-</td>
<td>0/+</td>
</tr>
<tr>
<td>Landscape and visual intrusion</td>
<td>-</td>
<td>+++</td>
</tr>
<tr>
<td>Waste generation</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Water quality / supply</td>
<td>-</td>
<td>-/-/+/-/+</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Archaeology and cultural heritage</td>
<td>-/-0</td>
<td>-/+</td>
</tr>
<tr>
<td>Socio-economics</td>
<td>-</td>
<td>+++</td>
</tr>
</tbody>
</table>

+++ High positive impact
++ Moderate positive impact
+ Low positive impact
0 Neutral impact
-/- Moderate negative impact
- Low negative impact
- High negative impact

However, it is worth noting that concerns were voiced during implementation over three components of the project particularly: the platform over Abu Ali River in Tripoli; the fishermen port in Tyre and the parking facility and public garden in Byblos. These concerns related to solid waste and wastewater disposal and accumulation in Abu Ali river potentially leading to high...
pollution loads; pollution loads from wastewater disposal in Tyre’s fishermen port; and the location of the parking in Byblos that replaced an agricultural parcel. These are adequately addressed by the project through its EMP.

**ANALYSIS OF ALTERNATIVES**

The analysis of alternatives in the context of the CHUD aimed at optimizing environmental quality in the urban areas of the various cities. The “do nothing” option is not favorable given the general consensus about the degrading quality of the urban fabric around valuable cultural heritage features and since desired urban conservation objectives would not be achieved. While the cities have similar rehabilitation elements that do not lend themselves into an analysis of alternatives, each city is characterized with peculiar features for which different options were considered. In *Tripoli* the analysis of alternatives focused on four elements: Khan El-Askar Resettlement, relocation of the fruits and vegetables market and traffic management, parking facilities, as well as rehabilitation activities. In *Byblos*, several pilot projects for intervention regarding the cultural heritage and tourism development in the old city were proposed. Due to budget limitations, not all projects were selected for further development. Selection was based on the importance of the project and its priority with respect to the municipality, the DGA, and local residents. The analysis of alternatives focused on three components: the medieval wall promenade, the old harbor, and the pier extension. In *Tyre*, wastewater management options were examined in the event the project is completed prior to the planned wastewater treatment plant for the entire area. In *Baalbeck*, the analysis of alternatives focused on traffic circulation, Gouraud Barracks, brick houses, access to Al Qalaa, and upgrading of the market. For the other project components, the options were mostly functional and did not entail other choices of intervention.

**ENVIRONMENTAL MANAGEMENT PLAN**

**Mitigation**

An environmental mitigation plan was developed in order to minimize the negative impacts of the CHUD. Tables III, IV, and V present a summary of the proposed elements of the mitigation plan that are considered during the various phases of the project namely: design, construction, and operation. The tables also include the implementing and responsible agencies/parties in the cost allocation. The cost pertaining to the design and construction phases are part of the cost allocated for the implementation of the CHUD. During the operation phase, the elements of the mitigation plan will become the responsibility of the DGA and/or the municipality. Most mitigation measures at the operation phase are an integral part of routine maintenance activities undertaken.
by the DGA or the municipalities. As such, the cost of the mitigation plan during the operation phase is not directly related to the proposed project.

An evaluation of the implementation of the EMP and CDR’s HSE requirements has taken place twice during the project implementation (in March 2009 and in April 2011). This evaluation revealed poor implementation, supervision and reporting of EMP and HSE requirements. Additional efforts will be spent in the next phase to promote better implementation, supervision and reporting through closer follow up by the CDR-PMU and the EMP Consultant.
Table III. Summary of proposed elements of the mitigation plan during the design phase

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsibility</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>• Public participation&lt;br&gt;• Modification of design to reflect public consultation processes&lt;br&gt;• Development of re-routing schemes&lt;br&gt;• Assessment of projected increase in traffic vs. congestion and change in circulation patterns</td>
<td>CDR/ Design Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td>Air quality</td>
<td>• Definition of existing standards and regulations&lt;br&gt;• Assessment of vehicle-induced emissions vs. traffic increase and change in circulation patterns&lt;br&gt;• Provide regular monitoring of vehicular induced emissions near the archaeological and heritage sites to meet ambient air quality standards and limit potential decay that may be caused by the formation of acid rain or smog</td>
<td>CDR EMP Consultant/&lt;br&gt;Design Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td>Noise level</td>
<td>• Definition of existing standards, regulations&lt;br&gt;• Assessment of vehicle noise emissions vs. traffic increase and change in circulation patterns&lt;br&gt;• Consideration for porous material, flexible joints and supports&lt;br&gt;• Consideration for sound barriers where necessary</td>
<td>CDR/ Design Consultant/&lt;br&gt;EMP Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td>Landscape and visual intrusion</td>
<td>• Documentation of existing conditions&lt;br&gt;• Blending color(s) of paint&lt;br&gt;• Blending exterior construction material&lt;br&gt;• Blending architectural features&lt;br&gt;• Provisions for visual screens or greenbelts</td>
<td>CDR/ Design Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td>Land use change</td>
<td>• Relocation of agricultural trees planted in the site of the new parking in Jbeil to another agricultural site located outside the city&lt;br&gt;• Compensation of the trees removed by trees planted in the parking lot and a public garden, as well as softscaping of the garden</td>
<td>CDR/ Design Consultant</td>
<td></td>
</tr>
<tr>
<td>Waste generation</td>
<td>• Locate nearby disposal sites and secure permit for waste disposal&lt;br&gt;• Plan for adequate provision and location of waste bins in souks and markets&lt;br&gt;• Explore waste material recycling or re-use potential&lt;br&gt;• Assessment of projected increase in solid waste generation&lt;br&gt;• Assessment of projected increase in wastewater generation&lt;br&gt;• Development of solid waste management plan at archaeological sites</td>
<td>CDR/ Design Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td>Water quality/supply</td>
<td>• Provisions for proper surface and ground water drainage&lt;br&gt;• Use of non-toxic and readily biodegradable chemicals&lt;br&gt;• Assessment of projected increase in water demand</td>
<td>CDR/ Design Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td>Category</td>
<td>Details</td>
<td>Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>--------------------------</td>
</tr>
</tbody>
</table>
| Health and safety              | • Develop and/or review and update general health and safety plans  
• Enforce CDR health and safety guidelines on all contractors                                                                                           | CDR/ Design Consultant            | Included in final design |
| Archaeological and cultural    | • Develop rehabilitation/construction monitoring plans  
• Follow Archaeological Chance Find Procedures                                                                                                         | CDR/DGA/ Design Consultant        | Included in final design |
| heritage                       |                                                                                                                                                                                                       |                                    |                          |
| Socio-economics                | • Eliminate or minimize land acquisition and population resettlement  
• Ensure community participation  
• Develop proper compensation and resettlement plans  
• Avoid stringent fast track plan to remove any establishment not conforming with zoning regulations  
• Provision of relocation incentives for the populations to be displaced in the Palestinian refugee camp in Tyre and the residents of Khan El-Askar in Tripoli (71 families or 333 individuals along with 64 existing commercial activities)  
• Avoid gentrification in the case of Khan El-Askar in Tripoli  
• Ensure the development of a mixed socio-economic character to the different rehabilitated sites  
• Protect the interests of tenants who remain and tenants who leave  
• Create conditions for enhancing the income of remaining tenants  
• Provide public private partnership incentives  
• Ensure that the housing project will provide a qualitative improvement in the physical environment of the inhabitants  
• Ensure that each family will be given an apartment commensurate with family size  
• Ensure that residents would be charged affordable rents in a fair and just manner                                                                 | CDR/ Design Consultant            | Included in final design  |
Table IV. Summary of proposed elements of the mitigation plan during the construction phase

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsibility</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>• Public communication</td>
<td>CDR Supervision Consultant</td>
<td>Included in construction</td>
</tr>
<tr>
<td></td>
<td>• Implementation of re-routing schemes</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Extended construction hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provision of clear and adequate signing at least 500 meters around construction sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Adopting clear delineation and channeling measures at least 500 meters around construction sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Limiting movement of heavy machinery to off-peak hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Providing prior notification about work and heavy equipment movement schedule</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Re-opening roads adjacent to construction sites as early as possible, even before final readiness of the site</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Providing close coordination with local traffic control departments in each city</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td>• Site and stock pile enclosure</td>
<td>CDR Supervision Consultant</td>
<td>Included in construction</td>
</tr>
<tr>
<td></td>
<td>• Spraying of long term stockpiles with chemical bonding agents</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• On-site mixing in enclosed or shielded areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Proper unloading operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Water damping of stockpiles when necessary (dry conditions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sealing of completed earthworks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Providing re-vegetation as soon as possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Medium and heavily used haul routes permanently surfaced</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Damping un-surfaced haul routes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Keep hauling routes free of dust and regularly cleaned</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maintain low traffic speeds on-site with proper enforcement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maintenance and repair of construction machinery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise level</td>
<td>• Construction of site enclosure</td>
<td>CDR Supervision Consultant</td>
<td>Included in construction</td>
</tr>
<tr>
<td></td>
<td>• Control of timing of noise emissions</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Informing the local people when noisy activities are planned</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Proper road maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Enforcement of speed limits</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Employ low noise machinery, or machinery with noise shielding and/or sound absorption materials (e.g. on-site power generator enclosure)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Proper maintenance of equipment and machinery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact</td>
<td>Mitigation measure</td>
<td>Responsibility</td>
<td>Cost</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Landscape and visual intrusion</td>
<td>• Preserve existing vegetation when feasible&lt;br&gt;• Blending color(s) of paint&lt;br&gt;• Blending exterior construction material&lt;br&gt;• Blending architectural features&lt;br&gt;• Provisions of visual screens or greenbelts&lt;br&gt;• Implementing appropriate landscaping&lt;br&gt;• Confirming to area building codes</td>
<td>CDR Supervision Consultant Contractor, Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Waste generation</td>
<td>• Waste transport and disposal at designated disposal sites&lt;br&gt;• Implement solid waste management plan at archaeological sites</td>
<td>CDR/DGA/ Contractor Superv. Consultant Municipality</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Water quality supply</td>
<td>• Proper surface and ground drainage&lt;br&gt;• Decrease water usage during the construction phase&lt;br&gt;• Minimize soil exposure time during the construction phase&lt;br&gt;• Minimize chemical usage (lubricants, solvents, petroleum products) and use non-toxic biodegradable products</td>
<td>CDR Supervision Consultant Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Health and safety</td>
<td>• Provide pedestrian walk ways&lt;br&gt;• Install proper warning signs&lt;br&gt;• Provide protective clothing and equipment&lt;br&gt;• Create buffer zones around major construction zones&lt;br&gt;• Follow CDR’s written procedures stipulated in the developed health and safety guidelines</td>
<td>CDR Consultant Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Archaeological and cultural heritage</td>
<td>• Documentation of buried sites and conservation of materials&lt;br&gt;• Implementing a documentation operation on all removed stones within the sites and old city centers&lt;br&gt;• Avoiding the use of harsh abrasives and toxic chemicals&lt;br&gt;• Encouraging the use of biodegradable, water-based (instead of solvent based), non flammable, fire resistant, non sparkling, and breathable materials for rehabilitation works&lt;br&gt;• Implementation of Archaeological Chance Find Procedures, if needed&lt;br&gt;• Covering abraded areas with low impact temporary installations like wooden platforms&lt;br&gt;• Controlling vegetation growth using appropriate biocides after mechanical removal&lt;br&gt;• Fixing of loose stone parts by gluing with appropriate resins, injections, insertion of steel and fiberglass bars and clamps&lt;br&gt;• Cleaning areas in need of consolidation by mechanical or chemical methods</td>
<td>CDR Supervision Consultant Contractor, Contractor DGA</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Socio-economics</td>
<td>• Ensure community participation&lt;br&gt;• Implementation of the developed resettlement plan during the design phase</td>
<td>CDR Supervision Consultant, Contractor</td>
<td>Included in construction</td>
</tr>
</tbody>
</table>
Table V. Summary of proposed elements of the mitigation plan during the operation phase

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsibility</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>• Maintenance of traffic signs and parking spaces</td>
<td>Municipalities</td>
<td>Not directly part of project</td>
</tr>
<tr>
<td></td>
<td>• Maintenance of new parking lots, roads, and underpasses (Tripoli)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Relocating the fruits and vegetables market to the platform over Abou Ali river</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Constructing two new passes that will cross the Moutran square transversally to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>allow for pedestrian movement in Baalbeck</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Improving access to archaeological site by building sidewalks and rehabilitating</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pedestrian paths</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td>• Implementation of long term strategies (beyond the scope of the CHUDP)</td>
<td>Municipalities</td>
<td>Not directly part of project</td>
</tr>
<tr>
<td>Noise level</td>
<td>• Sound insulation and pavement maintenance</td>
<td>Municipalities</td>
<td>Not directly part of project</td>
</tr>
<tr>
<td></td>
<td>• Limiting vehicle speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Implementation of long term strategies (beyond the scope of the CHUDP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landscape and visual</td>
<td>• Maintenance of exterior material, visual screens or greenbelts</td>
<td>Municipalities</td>
<td>Not directly part of project</td>
</tr>
<tr>
<td>intrusion</td>
<td>• Enforcing compliance with building code as well as developed architectural plans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water quality/ supply</td>
<td>• Maintenance of surface water drainage</td>
<td>Municipalities/ Water</td>
<td>Not directly part of project</td>
</tr>
<tr>
<td></td>
<td>• Prohibiting disposal of untreated wastewater in areas with limited flushing</td>
<td>Authority</td>
<td></td>
</tr>
<tr>
<td></td>
<td>capabilities (Tyre)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Providing incentives for the efficient use of water (beyond the scope of the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHUDP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Initiating a water quality monitoring program (beyond the scope of the CHUDP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste generation</td>
<td>• Maintenance of waste management system at archaeological sites</td>
<td>DGiA</td>
<td>Not directly part of project</td>
</tr>
<tr>
<td></td>
<td>• Distribution and promotion of the use of properly sized waste bins to shop owners</td>
<td>Municipality Water</td>
<td></td>
</tr>
<tr>
<td></td>
<td>in markets to minimize littering</td>
<td>Authority</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Development and implementation of environmental management plans for markets in</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tripoli and Tyre, awareness promotion among shop owners</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Regular cleanup of the river until the desired results are achieved (minimization</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>of littering)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and safety</td>
<td>• Maintenance of signs and warnings</td>
<td>Municipalities</td>
<td>Not directly part of project</td>
</tr>
<tr>
<td></td>
<td>• Mark developed tourist tracks clearly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Introduce proper orientation sign posting such as “you are here” panels at</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>parking facilities and along developed tourist tracks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Providing appropriate lighting in archaeological sites, tracks, and parking</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Providing guards and guides during visiting hours at archaeological sites, tracks,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>parking facilities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Archaeological and cultural heritage | Providing an emergency medical center or first aid facility in all five cities  
Eliminating structural situations presenting risks for visitors  
Routine monitoring and maintenance  
Develop visitor’s code of behavior at archaeological sites to be printed on the back of the entrance ticket or on the free brochure for the site  
Controlling vegetation growth using appropriate biocides after mechanical removal  
Implementing waste collection and management plan at the sites  
Fixing of loose stone parts by gluing with appropriate resins, injections, insertion of steel and fiberglass bars and clamps  
Cleaning of areas in need of consolidation by mechanical or chemical methods | DGA municipality | Not directly part of project |
Monitoring
Impact and compliance monitoring is being practiced during the construction and operation phases of the CHUD. The monitoring plan focuses on selected environmental indicators, the compliance with standards, and the assessment of the level of impacts on the environment. The costs for the implementation of the monitoring plan during the construction and operation phases in each of the five cities including the definition of indicators, frequency, and monitoring locations are outlined in Tables VI and VII.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Location in Tripoli</th>
<th>Location in Byblos</th>
<th>Location in Saida</th>
<th>Location in Tyre</th>
<th>Location in Baalbeck</th>
<th>Samples</th>
<th>Frequency</th>
<th>Phase</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>Qualitative: Emir Fakhreddine Street and Rachid Karamme Corniche.</td>
<td>Qualitative description along the historical center, the harbor area and parking lots</td>
<td>Qualitative description along the sea and the vicinity of the Souk, archeological sites and parking lots. Quantitative survey on Chakrieh road.</td>
<td>Qualitative: Hamra Street.</td>
<td>Qualitative and quantitative (traffic count) surveys.</td>
<td>Qualitative and quantitative (traffic count) surveys.</td>
<td>Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td>CDR / Consultant (during construction); Municipality (during operation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At stations Ty1, Ty2, Ty3.</td>
<td>24 hours/ location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td>At stations T1, T2, T3.</td>
<td>At stations B1, B2.</td>
<td>At stations S1, S2-A, S2-B.</td>
<td>At stations Ty1, Ty2, Ty3.</td>
<td>At stations B1, Ba2, Ba3, Ba4.</td>
<td>At stations B1, Ba2, Ba3, Ba4.</td>
<td>24 hours/ location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(TSP, CO)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>At stations T1, T2, T3.</td>
<td>At stations B1, B2.</td>
<td>At stations S1, S2-A, S2-B.</td>
<td>At stations Ty1, Ty2, Ty3.</td>
<td>At stations B1, Ba2, Ba3, Ba4.</td>
<td>At stations B1, Ba2, Ba3, Ba4.</td>
<td>24 hours/ location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$L_{eq}$, $L_{min}$, $L_{max}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Central neighborhood and along the Abou Ali River</td>
<td>Main entrance of the old city; Old city; Seafront</td>
<td>Seafront facing fishermen’s port, Chakrieh Street</td>
<td>Eastern and western quays,</td>
<td></td>
<td></td>
<td>Visual inspection/ Photographic documentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seawater Quality (pH,</td>
<td>NA</td>
<td>At stations B3, B4, B5.</td>
<td>At stations S3, S4, S5.</td>
<td>At stations Ty4, Ty5, Ty6.</td>
<td>NA</td>
<td>Two samples/ location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Location in Tripoli</td>
<td>Location in Byblos</td>
<td>Location in Saida</td>
<td>Location in Tyre</td>
<td>Location in Baalbeck</td>
<td>Samples</td>
<td>Frequency</td>
<td>Phase</td>
<td>Responsibility</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>-------------------</td>
<td>------------------</td>
<td>----------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------</td>
<td>-----------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>BOD, TSS, TC, FC</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Upstream and downstream locations of the project sites (T4 and T5)</td>
<td>Two samples/location</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
</tr>
<tr>
<td>River Water Quality (pH, COD, Pb, Cu, Cr, Zn, TC, FC)</td>
<td>Upstream and downstream locations of the project sites (T4 and T5)</td>
<td>At excavation sites</td>
<td>At excavation sites</td>
<td>At excavation sites</td>
<td>Visual inspection/Photographic documentation</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>At excavation sites</td>
<td>At excavation sites</td>
<td>At excavation sites</td>
<td>At excavation sites</td>
<td>At excavation sites</td>
<td>Police/newspaper records</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
</tr>
<tr>
<td>Health and safety/Hygiene</td>
<td>Within project boundaries</td>
<td>Within project boundaries</td>
<td>Within project boundaries</td>
<td>Within project boundaries</td>
<td>Visual inspection/photographic documentation</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td></td>
</tr>
<tr>
<td>T1: facing Mahmoud Bek Mosque</td>
<td>B1: within UNESCO Square</td>
<td>B2: at the intersection between Roman Street facing UNESCO Square and street leading to Harbor area</td>
<td>B3: within the fishing port (facing harbor dock), 1 m deep</td>
<td>S1: Square facing the fishermen syndicate building</td>
<td>Ty1: Facing the parking lot at Rue Hamra</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td></td>
</tr>
<tr>
<td>T3: Corniche Rashid Karameh facing St Gilles Citadel and Mawlawiyah park</td>
<td>S1: Square facing the fishermen syndicate building</td>
<td>S2- A: along Chakrieh Street near Khan el Keshleb</td>
<td>S2-B: at the end of Chakrieh Street</td>
<td>S3: within the fishermen port near the harbor dock, 1 m deep</td>
<td>Ty2: road intersection 40 m SW from vegetable market in Bawabeh Square</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td></td>
</tr>
<tr>
<td>T4: upstream Abu Ali river</td>
<td>S4: within the fishermen port near the harbor dock, 1 m deep</td>
<td>S5: within the fishermen port near the harbor dock, 1 m deep</td>
<td>S6: within the fishermen port near the harbor dock, 1 m deep</td>
<td>S7: within the fishermen port near the harbor dock, 1 m deep</td>
<td>Ty3: facing fishermen syndicate building near the port</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td>Continuous Operation phase: annually</td>
<td></td>
</tr>
<tr>
<td>Ba1: On the road facing the market area facing Moutran building</td>
<td>Ba2: Qalaa road facing the entrance gate of the archeological sites</td>
<td>Ba3: Ras el Ain Boulevard facing the public park area near the historic mosque</td>
<td>Ba4: Intersection road facing the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Location in Tripoli</td>
<td>Location in Byblos</td>
<td>Location in Saida</td>
<td>Location in Tyre</td>
<td>Location in Baalbeck</td>
<td>Samples</td>
<td>Frequency</td>
<td>Phase</td>
<td>Responsibility</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>------------------</td>
<td>----------------------</td>
<td>---------</td>
<td>-----------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>T5: downstream Abu Ali river</td>
<td>B4: outside the fishing port entrance, 1 m deep</td>
<td>B5: north of the port along the public beach (facing the new parking lot), 1 m deep</td>
<td>S4: to the west of pedestrian bridge linking the sea castle to the shore, 1 m deep</td>
<td>S5: between samples S3 and S4, 1 m deep</td>
<td>Ty4: middle of fishermen port</td>
<td>Ty5: northern edge of the commercial port</td>
<td>Ty6: western sewer outfall of Tyre city</td>
<td>Palmyra Hotel (Mutran Square parking area)</td>
<td></td>
</tr>
</tbody>
</table>
Table VII. Summary of the annual environmental monitoring costs

<table>
<thead>
<tr>
<th>Phase</th>
<th>Tripoli (USD)</th>
<th>Byblos (USD)</th>
<th>Saida (USD)</th>
<th>Tyre (USD)</th>
<th>Baalbeck (USD)</th>
<th>Annual Cost (USD)</th>
<th>Project Duration (years)</th>
<th>Program Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction (USD)</td>
<td>16,500</td>
<td>14,500</td>
<td>14,500</td>
<td>16,500</td>
<td>18,500</td>
<td>80,500</td>
<td>5</td>
<td>402,500</td>
</tr>
<tr>
<td>Operation (USD)</td>
<td>8,000</td>
<td>6,000</td>
<td>6,000</td>
<td>8,000</td>
<td>10,000</td>
<td>38,000</td>
<td>3</td>
<td>114,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>516,500</td>
</tr>
</tbody>
</table>

**Institutional strengthening**

In the context of the CHUD project, the need for institutional strengthening in environmental management falls within several sectors ranging from archaeology and cultural heritage to solid waste / wastewater management, and water quality. Appropriate environmental management dictate that construction and operation should be implemented in accordance to the current state of the art and knowledge regarding environmental protection. This is accomplished by hiring competent personnel with the appropriate educational and professional background and instituting periodic training programs and site specific plans that are adequate for protecting the general public and the environment as well as contributing to the mitigation of potential environmental impacts. For this purpose, contractors and consultants involved in the construction and operation of the various components of the proposed project were among those required to attend an environmental workshop organized in each of the 5 cities. The objective of these workshops was to ensure appropriate environmental awareness, knowledge and skills for the implementation of environmental mitigation measures. Follow up meetings are also held periodically with them during the construction phase. These meetings were conducted at a central location (i.e. Beirut) to allow similar traveling distance for participants from the various cities.

In an effort to strengthen institutional capacity and environmental awareness, training sessions on the CHUD project were opened for individuals from concerned ministries and agencies such as the MoC, MoTo, MoC, MoTPW, MoIM, CDR, NGOs, etc. In addition, the scope of the training sessions was not limited to just issues related to the CHUD. Other environmental management topics were also addressed in these sessions. This training session addressed various topics including:

- Environmental laws, regulations, and standards
- Pollution health impacts
- Pollution prevention measures
- Sampling techniques and environmental monitoring guidelines (air, noise, water)
• Protection of archaeological and cultural heritage sites
• Air quality management
• Solid waste management
• Wastewater management
• Traffic and pedestrians safety measures

The environmental monitoring and management plans is implemented by an entity designated by the CDR independent of contractors and consultants involved in any component or tasks in any of the five cities. Figure II depicts the contribution of the CHUD project to potential institutional strengthening in environmental management.

**PUBLIC PARTICIPATION**

In initial consultation meetings, the municipal councils in selected cities that have significant cultural heritage enthusiastically supported the idea of restoring active and productive urban life, conserving cultural heritage, rehabilitating the degraded urban fabric, capitalizing on the tourism potential, and improving the standard of living of local community. Following the initial consultation meetings, town meetings were conducted in the cities of Tyre, Tripoli, and Byblos to further discuss various environmental aspects of the proposed project. These meetings solicited stakeholders’ feedback concerning the overall scope of the project in general and the potential...
environmental impacts in particular. Most participants (~90%) foresee a positive impact on preservation of the cultural heritage of the city, improvement in the social level of locals, and development of tourism. In Tyre, some were afraid that the transformation of the fishing port to a tourist attraction center would disturb and affect the normal life of fishermen and the fishing industry. Concerns about wastewater management were also expressed. In Tripoli, concerns about the low forecasted increase in the number of tourists were voiced with emphasis on the need for a marketing and advertising strategy to promote tourism. In Byblos, higher awareness and public participation were noticed. Many indicated that the project benefits will be limited to employment in the old souks, restaurants, handicrafts and artisanal works, commercial spaces, hotels and cafes. Concerns about air quality and wastewater management were also evident.

An opinion survey was then conducted by the CDR shortly after the start of Phase I works in order to assess the impact of the interventions from the point of view of residents, local businesses and visitors. In general, issues related to management and/or current conditions of the old city and archeological site were poorly ranked in all cities.

Towards the completion of Phase I works and initiation of Phase II works, training workshops were also conducted in each of the five cities to enhance the capacities of municipalities. These covered the following aspects:

- Presentation of the baseline environmental conditions and city profile;
- Presentation on the cost of environmental degradation;
- Presentation on environmental legislation and regulations in Lebanon and the role of municipalities;
- Presentation on the implementation of the environmental management plan;
- Presentation and discussion of phase I challenges;
- Presentation on guidelines for environmental management in ports and markets, as relevant to each city; and
- Group work on the development of an environmental management plan for the cities.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>TITLE PAGE</td>
</tr>
<tr>
<td>II</td>
<td>ACKNOWLEDGEMENTS</td>
</tr>
<tr>
<td>III</td>
<td>EXECUTIVE SUMMARY</td>
</tr>
<tr>
<td>XX</td>
<td>TABLE OF CONTENTS</td>
</tr>
<tr>
<td>XXIII</td>
<td>LIST OF TABLES</td>
</tr>
<tr>
<td>XXIV</td>
<td>LIST OF FIGURES</td>
</tr>
<tr>
<td>XXVI</td>
<td>LIST OF APPENDICES</td>
</tr>
<tr>
<td>XXVII</td>
<td>LIST OF ABBREVIATIONS</td>
</tr>
</tbody>
</table>

## 1 INTRODUCTION

1.1 Background

1.2 EIA objectives

1.3 Scope of work

## 2 LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 Legal framework

2.2 Concerned authorities

2.3 EIA procedures and guidelines

## 3 PROJECT DESCRIPTION

3.1 Project needs

3.2 Project components

3.3 Implementation schedule and costs

3.4 Implementation arrangements

## 4 DESCRIPTION OF THE ENVIRONMENT

4.1 Tripoli

4.1.1 Physical environment

4.1.2 Socio-economic environment

4.2 Byblos

4.2.1 Physical environment

4.2.2 Socio-economic environment

4.3 Saida

4.3.1 Physical environment

4.3.2 Socio-economic environment
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1. List of Legislation relevant to the preservation of cultural heritage</td>
<td>3</td>
</tr>
<tr>
<td>Table 2. Legal and institutional arrangements for the implementation of CHUD project components</td>
<td>4</td>
</tr>
<tr>
<td>Table 4. Main activities of the first two components of the CHUD project</td>
<td>11</td>
</tr>
<tr>
<td>Table 5. Institutional strengthening component of the CHUD project</td>
<td>17</td>
</tr>
<tr>
<td>Table 6. Implementation schedule of the CHUD project</td>
<td>17</td>
</tr>
<tr>
<td>Table 7. Initial/updated project cost estimate</td>
<td>18</td>
</tr>
<tr>
<td>Table 8. Summary indicators of the five cities</td>
<td>22</td>
</tr>
<tr>
<td>Table 9. Chemical and bacteriological analysis for samples from the Miocene limestone aquifer in the Tripoli area (Khayyat, 2001)</td>
<td>27</td>
</tr>
<tr>
<td>Table 10. Average day and night time concentrations of CO, SO2 and NO2 and daily average concentration of TSP in Tripoli (JICA, 2001)</td>
<td>32</td>
</tr>
<tr>
<td>Table 11. Expected population growth in Tripoli</td>
<td>38</td>
</tr>
<tr>
<td>Table 12. Main landmarks at the main entrance of the old city</td>
<td>50</td>
</tr>
<tr>
<td>Table 13. Main landmarks in the old city</td>
<td>51</td>
</tr>
<tr>
<td>Table 14. Main landmarks on the seafront</td>
<td>51</td>
</tr>
<tr>
<td>Table 15. Population indicators for Byblos</td>
<td>52</td>
</tr>
<tr>
<td>Table 16. Main landmarks in the Seafront area</td>
<td>62</td>
</tr>
<tr>
<td>Table 17. Main landmarks in the Seafront area</td>
<td>63</td>
</tr>
<tr>
<td>Table 18. Population projections for the city of Saida</td>
<td>63</td>
</tr>
<tr>
<td>Table 20. Main landmarks on the Port Waterfront</td>
<td>73</td>
</tr>
<tr>
<td>Table 21. Main landmarks in the Bawabeh Square</td>
<td>74</td>
</tr>
<tr>
<td>Table 22. Main landmarks in Hamra Street</td>
<td>74</td>
</tr>
<tr>
<td>Table 23. Chemical and bacteriological analysis of the springs in Baalbeck (World Bank, 2001)</td>
<td>82</td>
</tr>
<tr>
<td>Table 24. Main landmarks of the North-Western part along Ras el-Ain Boulevard</td>
<td>91</td>
</tr>
<tr>
<td>Table 25. Main landmarks of the South-Western part</td>
<td>91</td>
</tr>
<tr>
<td>Table 26. Classification of potential environmental impacts</td>
<td>94</td>
</tr>
<tr>
<td>Table 27. Typical noise levels at a building construction site (USEPA, 1972 cited in Canter, 1996)</td>
<td>97</td>
</tr>
<tr>
<td>Table 28. Lebanese noise guidelines in different zones (Ministry of Environment, 1996)</td>
<td>98</td>
</tr>
<tr>
<td>Table 29. Growth rate of tourists with corresponding expenditure for Tripoli and Tyre (Information International, 2002)</td>
<td>105</td>
</tr>
<tr>
<td>Table 30. Summary of potential environmental impacts</td>
<td>110</td>
</tr>
<tr>
<td>Table 31. Measures to be undertaken by consultant and contractor</td>
<td>124</td>
</tr>
<tr>
<td>Table 32. Mitigation measures to be undertaken during the operation phase to alleviate traffic congestion</td>
<td>125</td>
</tr>
<tr>
<td>Table 33. Mitigation for landscape and visual intrusions</td>
<td>128</td>
</tr>
<tr>
<td>Table 34. Mitigation plans for wastewater discharge in the city of Tyre if proposed Abbasiyeh facility is delayed beyond the CHUD project completion</td>
<td>130</td>
</tr>
<tr>
<td>Table 35. Summary of proposed monitoring plan for Tripoli</td>
<td>146</td>
</tr>
</tbody>
</table>
Table 45. Summary of the annual environmental monitoring costs .................................................................155

LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1. General location of the project cities .................................................................</td>
<td>8</td>
</tr>
<tr>
<td>Figure 2. Arrangements for the implementation of the CHUD project ....................................</td>
<td>20</td>
</tr>
<tr>
<td>Figure 3. CHUD Study Area and Summary Description of Project Works in Tripoli ..................</td>
<td>25</td>
</tr>
<tr>
<td>Figure 4. Main wastewater collection system - General layout – Tripoli ...............................</td>
<td>30</td>
</tr>
<tr>
<td>Figure 5. Uncontrolled disposal of waste in the Abou Ali River ..........................................</td>
<td>31</td>
</tr>
<tr>
<td>Figure 6. Waste awaiting collection in the vegetables market ................................ ...............</td>
<td>32</td>
</tr>
<tr>
<td>Figure 7. Traffic congestion in the neighborhood of Abou Ali River ..................................</td>
<td>33</td>
</tr>
<tr>
<td>Figure 8. Saint-Gilles Citadel in Tripoli .................................................................................</td>
<td>34</td>
</tr>
<tr>
<td>Figure 9. Tripoli and its environs ..........................................................................................</td>
<td>37</td>
</tr>
<tr>
<td>Figure 10. Small scale industries in Tripoli: Copper working and soap drying .......................</td>
<td>38</td>
</tr>
<tr>
<td>Figure 11. General land use in the Tripoli area .....................................................................</td>
<td>40</td>
</tr>
<tr>
<td>Figure 12. Aerial photograph of the old city of Byblos .........................................................</td>
<td>41</td>
</tr>
<tr>
<td>Figure 14. CHUD Study Area and Summary Description of Project Works in Byblos ...............</td>
<td>42</td>
</tr>
<tr>
<td>Figure 15. Seawater pollution at the fishing port and at the bathing area .............................</td>
<td>44</td>
</tr>
<tr>
<td>Figure 16. Proposed sewage network inside the old city of Byblos ........................................</td>
<td>45</td>
</tr>
<tr>
<td>Figure 17. Overview of Byblos fishing harbor and Historic Sea Castle ................................</td>
<td>47</td>
</tr>
<tr>
<td>Figure 18. Archaeological sites of Byblos City ......................................................................</td>
<td>48</td>
</tr>
<tr>
<td>Figure 19. Byblos Land Castle ..............................................................................................</td>
<td>49</td>
</tr>
<tr>
<td>Figure 20. UNESCO Square in Byblos historic market centre ..................................................</td>
<td>49</td>
</tr>
<tr>
<td>Figure 21. Artisanal products and restaurants in Byblos .........................................................</td>
<td>53</td>
</tr>
<tr>
<td>Figure 22. Land ownership in the old city of Byblos .............................................................</td>
<td>54</td>
</tr>
<tr>
<td>Figure 23. CHUD Study Area and Summary Description of Project Works .........................</td>
<td>56</td>
</tr>
<tr>
<td>Figure 24. Proposed wastewater collection and disposal system for Saida caza ......................</td>
<td>58</td>
</tr>
<tr>
<td>Figure 25. Solid waste manual collection in the old souks of Saida .....................................</td>
<td>60</td>
</tr>
<tr>
<td>Figure 26. Aerial Photograph of Tyre .....................................................................................</td>
<td>65</td>
</tr>
<tr>
<td>Figure 27. CHUD Study Area and Summary Description of Project Works in Tyre ................</td>
<td>66</td>
</tr>
<tr>
<td>Figure 28. Outfalls and channels discharging wastewater directly into the sea in Tyre ........</td>
<td>68</td>
</tr>
<tr>
<td>Figure 29. Existing sewer layout in the city of Tyre .............................................................</td>
<td>69</td>
</tr>
<tr>
<td>Figure 30. Proposed wastewater collection and disposal system in Tyre ..............................</td>
<td>69</td>
</tr>
<tr>
<td>Figure 31. Archaeological site along the Hamra Street .........................................................</td>
<td>72</td>
</tr>
<tr>
<td>Figure 32. Fishing activities in the old city of Tyre ...............................................................</td>
<td>76</td>
</tr>
<tr>
<td>Figure 33. CHUD Intervention Area (phases I and II) and Summary Description of Project Works in Baalbek</td>
<td>78</td>
</tr>
<tr>
<td>Figure 34. Baalbeek archaeological site ..............................................................................</td>
<td>79</td>
</tr>
<tr>
<td>Figure 35. Ras El Ain spring, channel running parallel to the boulevard, water pumps and pipelines across the channel ..........................................................</td>
<td>80</td>
</tr>
<tr>
<td>Figure 36. Primary water supply network for Baalbeck .........................................................</td>
<td>81</td>
</tr>
</tbody>
</table>
# LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Detailed description of the interventions in each of the five cities of the project</td>
<td>A1</td>
</tr>
<tr>
<td>B. Environmental Baseline Monitoring and City Profiles- CHUD Phase II Intervention Area</td>
<td>B1</td>
</tr>
<tr>
<td>C. Calculation of impact of construction activities on air quality</td>
<td>C1</td>
</tr>
<tr>
<td>D. Calculation of impact of construction activities on noise quality</td>
<td>D1</td>
</tr>
<tr>
<td>E. Safety, Health, and Environmental Regulations</td>
<td>E1</td>
</tr>
<tr>
<td>F. Detailed design of works for Tripoli</td>
<td>F1</td>
</tr>
<tr>
<td>G. Archaeological Chance Find Procedures</td>
<td>G1</td>
</tr>
<tr>
<td>H. First report on the evaluation of implementation of EMP and HSE requirements</td>
<td>H1</td>
</tr>
<tr>
<td>I. Second report on the evaluation of implementation of EMP and HSE requirements</td>
<td>I1</td>
</tr>
<tr>
<td>J. Environmental questionnaire for public consultation</td>
<td>J1</td>
</tr>
<tr>
<td>K. Public participation record</td>
<td>K1</td>
</tr>
<tr>
<td>L. Executive Summary of the EMP Training Workshops in the Five Cities</td>
<td>L1</td>
</tr>
</tbody>
</table>
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDR</td>
<td>Council for Development and Reconstruction</td>
</tr>
<tr>
<td>CHUD</td>
<td>Cultural Heritage and Urban Development</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon Monoxide</td>
</tr>
<tr>
<td>DGA</td>
<td>Directorate General of Antiquities</td>
</tr>
<tr>
<td>DGU</td>
<td>Directorate General of Urban Planning</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>HSE</td>
<td>Health, Safety and Environment</td>
</tr>
<tr>
<td>IBRD</td>
<td>International Bank for Reconstruction and Development</td>
</tr>
<tr>
<td>JICA</td>
<td>Japanese International Cooperation Agency</td>
</tr>
<tr>
<td>MIUs</td>
<td>Municipal Implementation Units</td>
</tr>
<tr>
<td>MoC</td>
<td>Ministry of Culture</td>
</tr>
<tr>
<td>MoE</td>
<td>Ministry of Environment</td>
</tr>
<tr>
<td>MoIMA</td>
<td>Ministry of Interior and Municipal Affairs</td>
</tr>
<tr>
<td>MoPWT</td>
<td>Ministry of Public Works and Transport</td>
</tr>
<tr>
<td>MoT</td>
<td>Ministry of Transport</td>
</tr>
<tr>
<td>MoTO</td>
<td>Ministry of Tourism</td>
</tr>
<tr>
<td>MPW</td>
<td>Ministry of Public Works</td>
</tr>
<tr>
<td>MUSD</td>
<td>Million United States Dollar</td>
</tr>
<tr>
<td>NGO</td>
<td>Non Governmental Organization</td>
</tr>
<tr>
<td>NO₂</td>
<td>Nitrogen Dioxide</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>PM</td>
<td>Particulate matter</td>
</tr>
<tr>
<td>PMU</td>
<td>Project Management Unit</td>
</tr>
<tr>
<td>RAP</td>
<td>Resettlement Action Plan</td>
</tr>
<tr>
<td>SO₂</td>
<td>Sulfur Dioxide</td>
</tr>
<tr>
<td>SWEMP</td>
<td>Solid Waste Environmental Management Plan</td>
</tr>
<tr>
<td>SWTP</td>
<td>Solid Waste Treatment Plant</td>
</tr>
<tr>
<td>TAU</td>
<td>Technical Assistance Unit</td>
</tr>
<tr>
<td>ToRs</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>TSP</td>
<td>Total Suspended Particulates</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollar</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>WWTP</td>
<td>Wastewater Treatment Plant</td>
</tr>
</tbody>
</table>
INTRODUCTION

Background

Cultural heritage represents a set of unique assets that Lebanon can leverage to promote national and international cultural tourism. Its cultural heritage assets, as well as good climate and hospitality, are the hallmarks of a land of history and culture. Since the early 1990s, many Lebanese institutions, often in partnership with international organizations, have undertaken significant initiatives to protect, rehabilitate, restore, and revitalize the cultural heritage that suffered from neglect and damage during 16 years of war. In this context, the magnitude and importance of Lebanon’s cultural heritage and its diversity and presence throughout the country, surpass the currently available management capacity and resources. Currently, many difficulties hinder the development of these amenities namely an outdated 1933 law, scarce qualified human resources, budgetary constraints, and limited public investments. Some important archaeological sites are currently endangered due to inadequate protection of ancient artifacts within the sites, unreliable boundary enclosures, encroachment of illegal housing, intrusion of public roads and buildings, and urban redevelopment plans. These intrusive developments are encouraged by the fact that local residents derive no economic benefit from archaeological sites. In addition, local urban developers and investors often view this heritage as a hindrance for further urban development needed to accommodate population growth. As a result, Lebanon’s main archaeological sites and historic urban cores are generally surrounded by relatively new and poor urban areas that often lack basic infrastructure.

In recognition of the tourism potential growth and the interest in capturing its revenue streams for the local economy, Lebanese cities will have to make the investments needed to provide visitors with comfortable access, parking facilities, pedestrian routes, and a visually improved environment surrounding heritage or natural sites. In areas around archaeological sites and old town centers, there is a need to ensure a framework and a process for spatial planning and development that will include the following:

- Maintain the integrity of the sites themselves, with provision for their future extension or reintegration where feasible;
- Provide for the needs of the tourist industry and urban regeneration in areas adjacent to sites, particularly with regard to facilities and development of the immediate environment, such as preserving pedestrian zones, tourist circuits, etc.;
- Respond to the socio-economic characteristics and development needs of residents; and
• Designate an appropriate location for other developments that may be inconsistent with the first three objectives.

This report presents an update to the Environmental Impact Assessment (EIA - 2002) of the Cultural Heritage and Urban Development Project (CHUD). The CHUD is prepared by the Government of Lebanon represented by the Council of Development and Reconstruction (CDR) and funded by the World Bank, AFD and DGCS. The three main components of the project are:

• Preservation and management of archeological sites and development of their surroundings, thus enhancing visitor experience.
• Rehabilitation of historic city centers and urban infrastructure improvements are carried out in and around the old towns of the five project cities of Baalbeck, Byblos, Saida, Tripoli and Tyre in order to complement ongoing private conservation initiatives, attract and service tourists, and benefit the local community.
• Institutional strengthening to assist the specified agencies in playing their respective roles in preserving cultural heritage and deriving economic benefits for the country and the residents of the municipalities concerned.

EIA objectives
The objectives of the EIA are to provide a sound basis for decision-making about the design of project components that takes environmental considerations including social and economic impacts into account, ensure that the project is implemented with full awareness of environmental factors, inform the public when and how the project implementation may affect their environment, and facilitate public participation in the decision-making process.

Scope of work
Besides this introductory Chapter, the scope of work implemented in the preparation of the EIA report includes the following:

• Definition of existing legal and administrative framework (Chapter 2)
• Description of the project (Chapter 3)
• Definition of baseline environmental conditions (Chapter 4)
• Identification and analysis of potential environmental impacts (Chapter 5)
• Analysis of potential alternatives (Chapter 6)
• Development of an environmental mitigation plan (Chapter 7)
• Development of an environmental monitoring plan (Chapter 8)
• Development of an environmental management plan (Chapter 9)
• Soliciting public participation (Chapter 10)

LEGAL AND ADMINISTRATIVE FRAMEWORK

Legal framework
Lebanon has many laws related to the preservation/management of cultural heritage, some dating back to the 1930’s. Recently, new project laws have been drafted in order to update the old legislative framework governing this sector; some of these laws were recently approved by the parliament, while the remaining still await ratification. Enforcement of existing laws is weak and responsibilities are unclear. Moreover, regulations lack clarity and precision, and coordination between authorities is inadequate. Poor enforcement and the lack of regular monitoring and maintenance constitute the major factors responsible for the ineffectiveness of the current legislation. The weak enforcement is a result of staffing constraints, lack of proper training for staff, low level of fines, and socio-cultural traits. Another important issue is that there is a lack of awareness of regulations amongst personnel who are supposed to enforce them (i.e. archaeological inspectors, police officers, as well as the general public that is supposed to abide by the regulations). Relevant laws pertaining to the protection of historic monuments and cultural heritage is presented in Table 1. Similarly, relevant regulations governing the implementation of the different CHUD project components are outlined in Table 2.

Table 1. List of Legislation relevant to the preservation of cultural heritage

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Date</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decree law 166</td>
<td>7/11/1933</td>
<td>Antiquity law</td>
</tr>
<tr>
<td>Decree law 225</td>
<td>28/09/1934</td>
<td>Basis for setting infractions made to antiquity and historic monuments</td>
</tr>
<tr>
<td>Decree law 111</td>
<td>12/06/1959</td>
<td>Organization of the government and public administration</td>
</tr>
<tr>
<td>Decree law 112</td>
<td>12/06/1959</td>
<td>General status of government employees</td>
</tr>
<tr>
<td>Decree 14969</td>
<td>30/12/1963</td>
<td>General accountability</td>
</tr>
<tr>
<td>Decree 5743</td>
<td>1966</td>
<td>Organization of the Ministry of Tourism and determination of its administrative framework</td>
</tr>
<tr>
<td>Decision 14</td>
<td>8/03/1987</td>
<td>Organization of commerce and trading in antiquities</td>
</tr>
<tr>
<td>Decision 8</td>
<td>27/02/1990</td>
<td>Suspension of the authorization for trading and export of antiquity</td>
</tr>
<tr>
<td>Law 215</td>
<td>02/04/1993</td>
<td>Creation of the Ministry of Culture and Higher Education</td>
</tr>
<tr>
<td>Project law</td>
<td>14/12/2001</td>
<td>Re-organization of the Ministry of Culture</td>
</tr>
<tr>
<td>Project law</td>
<td>14/12/2001</td>
<td>Preservation and protection of historic monuments</td>
</tr>
<tr>
<td>Project law</td>
<td>25/07 2002</td>
<td>Protection and promotion of monuments and sites having a particular historic, architectural or cultural heritage value</td>
</tr>
<tr>
<td>Arrangement</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Expropriation</td>
<td>Law 58 enacted in 1991 authorizes the expropriation of private property in the public interest but only after fair compensation has been made. The compensation is determined through an assessment by an independent judicial committee and is always a monetary award. The expropriation is considered final unless the public interest claim is itself challenged by an individual directly affected. Procedures and details for expropriation including timeline for action are assigned in this law.</td>
<td></td>
</tr>
<tr>
<td>Compensation</td>
<td>Compensation is determined by an expropriation commission set up by a decree in accordance with proposals from the relevant ministers. The expropriation commission, composed of a chairperson (a judge), an engineer and a property evaluator, determines all compensation for any economic prejudice, decides on requests by owners for total expropriation and full compensation, defines the value of small portions of land which cannot be used for building and resolves disputes over the division of compensation between shareholders. Compensations are always monetary and are based on prevailing local market rates.</td>
<td></td>
</tr>
<tr>
<td>Land tenure</td>
<td>There is little contestation over ownership, legal rights or boundaries of land since plots are generally well surveyed and title is recorded at an administrative service based in the Ministry of Finance (with the exception of areas affected by uncontrolled movement and settlement due to the civil war). The survey unit also maintains cadastral maps that are regularly updated. Since land ownership is recorded in shares, along with all those whoever held title to it, the exact value of any transaction for an individual owner can be determined. In addition, land laws in Lebanon are gender neutral. However, the situation with regard to historic urban cores is much less clear, with informal land subdivisions not represented in the cadastre, and complex vertical layers that do not always correspond to horizontal boundaries.</td>
<td></td>
</tr>
<tr>
<td>Tenancy law</td>
<td>A new rent law enacted in 1991 relaxed rent control and gave the landlord the right to repossess the property at the end of the contract. Rent laws prior to 1992, however, permitted tenants automatically to renew their contracts and capped rent increases. Moreover, tenants could sublease the property to third parties with only minor increases in the rent at the signing of each new contract. As a result, rent contracts signed after 1991 favor the landlord and those signed previously favor the tenant.</td>
<td></td>
</tr>
<tr>
<td>Antiquities laws</td>
<td>According to the Antiquities Law of 1933, historic monuments can be either publicly or privately owned. Although archaeological finds are considered state property, the parcels on which archaeological discoveries are made can remain the property of private individuals or institutions. Under this law, private property owners of listed historical buildings are responsible for the repair and maintenance of the structure. The discovery of important archaeological remains could also lead to the expropriation of private property or to limitations on its use. If a building is placed on the list of classified monuments, the owner receives no compensation for the freezing of development rights. However, if the listing is erroneous the owner may eventually be compensated.</td>
<td></td>
</tr>
<tr>
<td>Maritime public</td>
<td>Lebanese Law provides that the entire inter-tidal shore is public domain. This law has not been fully enforced. In some places, such as at Tyre, a small number of semi-permanent informal business structures have been erected that are inconsistent with the World Heritage character of the site.</td>
<td></td>
</tr>
<tr>
<td>domain</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Concerned authorities

The CHUD project is multi-sectoral in nature involving several institutions at various levels. While the CDR is coordinating the work of all concerned agencies and facilitating project implementation, the institutions that are closely involved in the project include the Directorate General of Antiquities (DGA), the Directorate General of Urban Planning (DGU), and the Municipalities of the concerned cities. Although not as closely involved, other institutions concerned in the project include the Ministry of Environment (MoE), the Ministry of Tourism (MoTO), the Ministry of Interior and Municipal Affairs (MoIMA), and the Ministry of Public Works and Transport (MoPWT). A brief statement of the mission/responsibilities of these institutions is summarized in Table 3. It is anticipated that the CDR will continue to be the project’s implementing agency and will closely coordinate with the Ministry of Culture (MoC), the DGA, the DGU, and the municipalities and local communities of the five target cities.

Table 3. Summary of functional responsibilities of archaeology/cultural heritage involved agencies

<table>
<thead>
<tr>
<th>Agency</th>
<th>Mission</th>
</tr>
</thead>
</table>
| Council for Development and Reconstruction (CDR) | • Plans and arranges for financing of projects including relations with donors and loan management  
• Executes projects in all sectors  
• Manages contracts in all sectors, including the planning, design, and construction  
• Coordinate and liaise with the official and key partners of the project |
| Ministry of Culture (MoC)                  | • Manages archaeological finds  
• Reviews and approves project specific “Archaeological Chance Find” procedures which would be used by construction contractors, consulting engineers and archaeological consultants to address actions to be undertaken if unrecorded archaeological materials are encountered during the course of project implementation  
• Organizes and executes archaeological excavations  
• Protects archaeological sites and historical monuments  
• Evaluation of excavation requests and supervision scientific excavation missions  
• Creates and administers museums and organizes archaeological and historical exhibitions  
• Controls commerce and export of antiquities |
| Directorate General of Antiquities (DGA)    | • Collects and analyzes relative data and statistics and operates a road materials lab  
• Performs and oversees road design  
• Performs and supervises road studies and execution  
• Performs road maintenance  
• Take care of traffic safety in cooperation with other ministries / government agencies  
• Develops master plans for cities and villages, and establish land use regulations  
• Develops road and street plans within cities and villages  
• Develop and issue building regulations and masterplans |
| Ministry of Public Works (MoPW)¹            | • Organizes and supervises land, maritime and air transport  
• Constructs, equips, manages and exploits publicly owned transport modes and facilities and develops them in harmony with the social and economic development and according to the needs of the country  
• Supervises the safety of transport means and facilities, their maintenance, modernization, and development  
• Prepares plans and conducts techno-economic studies aiming at operating |
| Ministry of Transport (MoT)¹                |                                                                                                                                                                                                 |

¹ Some responsibilities and mandates overlap between MoPW and MoT
<table>
<thead>
<tr>
<th>Agency</th>
<th>Mission</th>
</tr>
</thead>
</table>
| Ministry of Municipal and Rural Affairs (MoMRA)²    | • Contributes to strengthening decentralization and activation of local government  
• Supervises municipal government units and ensures conformity with administrative and financial regulations  
• Coordinates among municipal units  
• Provides technical assistance and support to municipal governments  
• Cooperates and coordinates with other administrations on issues related to municipal and rural affairs |
| Ministry of Interior (MoI)²                          | • Manages vehicle registration and inspection, and driver licensing  
• Enforces country laws and regulations  
• Organizes and manages civil defense activities and traffic related functions |
| Ministry of Tourism (MoTO)                           | • Promotes tourism projects on a national level  
• Classifies, organizes, coordinates and monitors professions and business enterprises dealing with tourists and tourisms  
• Applies laws pertaining to tourism including hotels, restaurants, recreational facilities, and other resorts under the same jurisdiction  
• Plans and runs publicity campaigns abroad for tourism in Lebanon |
| Ministry of Environment (MoE)                        | • Monitors and controls of environmental protection, preservation of natural sites and amenities  
• Prevents pollution, protects wildlife, and preserves environmental balance  
• Sets environmental standards, specifications and guidelines  
• Manages natural resources and amenities  
• Coordinates and encourages environmental awareness programs |

¹ MoT and MPW have recently been combined into a single ministry  
² MoI and MoMRA have recently been combined into a single ministry

**EIA procedures and guidelines**

A Lebanese Environmental Code has reportedly been drafted and submitted for governmental approval several years ago. The code was finally approved in an amended form by the Lebanese Parliament in July 2002 and is known as Law 444. Within this code, provisions are proposed to conduct an EIA for developmental projects. Furthermore, while there are currently no approved EIA procedures in Lebanon, efforts are underway at the MoE to pass an EIA draft decree that defines such procedures. Within the draft decree, these procedures follow to a great extent the guidelines recommended by the World Bank Operational Directives¹. The EIA draft decree provides a list of project types that require an EIA. Projects that involve cultural heritage  

---

¹ World Bank Operational Directive 4.01, “Environmental Assessment”;  
World Bank Environmental Assessment Sourcebook (3 Volumes);  
World Bank Environmental Assessment Sourcebook Update No. 7, “Coastal Zone Management in Environmental Assessment”;  
World Bank Environmental Assessment Sourcebook Update No. 8, “Cultural Heritage in Environmental Assessment”;  
World Bank Environmental Assessment Sourcebook Update No. 19, “Assessing the Environmental Impact of Urban Development”;
rehabilitation are included in this list. The decree outlines the elements to be examined in an EIA report, which are consistent with the scope of work described above.

PROJECT DESCRIPTION

The magnitude and importance of Lebanon’s cultural heritage and its diversity and presence throughout the country surpass the currently available management capacity and resources. The CHUD project which encompasses five Lebanese secondary cities: Tripoli, Byblos (Jbail), Saida, Tyre and Baalbeck (Figure 1), is an essential milestone in providing the needed capacity and resources. The objective of the CHUD project is to promote national and international cultural tourism in order to boost the local economy in these five old cities. Lebanese cities will have to make the investments needed to provide tourists with comfortable access, parking facilities, pedestrian routes, a visually improved environment surrounding heritage and natural sites, and maintain the integrity of the sites themselves. The strategic rationale for the CHUD project lies in its focus on the area of overlap between the three major essential stakeholder interests namely, antiquities, tourism, and the municipalities and local communities of secondary cities rich in cultural heritage. Effective management of cultural assets, urban regeneration and enhanced cultural tourism are at the core of the proposed project. The long-term objectives of the program include the development of “well functioning” cities with an environment capable of attracting private sector investment.
Figure 1. General location of the project cities

**Project needs**

In Lebanon, areas around archaeological sites and old town centers are in need of spatial planning and development that will maintain the integrity of the sites, setting provisions for their future extension and catering for the needs of the tourist industry. The project primarily addresses the most pressing needs of the five secondary cities in terms of cultural heritage preservation, urban
regeneration and tourism site operation, as well as supports necessary institutional development activities. In this context, the project assists the MoC and the DGA in the preservation, rehabilitation and development of sites with key attraction potential. The CHUD supports the MoTO in promoting cultural heritage tourism. It also involves the participation of municipalities and local communities in developing and implementing urban development plans that encompass the preservation of major cultural heritage sites and ensure economic benefits to the local populations. The project’s central social development outcome should be a reduction in the existing disconnect between the Lebanese society and its physical cultural heritage. This present disconnect takes three main forms:

- The tension between the existence of “very special places” of great intrinsic value and rich historical associations, and their physical and social contexts of deprivation and even squalor;
- The gap between the general value placed on the heritage (particularly by outsiders and visitors) and the obstacles that the regulatory and investment environment imposes to initiatives (particularly by local inhabitants and entrepreneurs) that would realize economic opportunities and meet current socio-economic needs; and
- The difficulty in translating the high intrinsic existence values of cultural heritage entities into tangible use values that can be harvested and can contribute to their conservation as well as to economic growth.

The project aims to contribute to a reversal of this situation: to improve the condition of the sites and their contexts (which is an end in itself); to bridge the physical and economic gap between sites and their contexts; and to enable Lebanese to identify more closely with and value more highly their physical cultural heritage assets.

**Project components**

The project consists of three main components listed below with the elements of the first two components being outlined in Table 4, and the elements of the third one outlined in Table 5. A detailed description of the interventions in each of the five cities is provided in Appendix A. An extension to the project with additional elements in each city was requested from the World Bank and AFD. While awaiting the World Bank’s approval, the AFD approved an additional financing and extension until the end of 2017.

1. *Rehabilitation of historic city centers and urban infrastructure improvements*. These activities are carried out in and around the old towns of the five project cities of Baalbeck, Byblos, Saida, Tripoli and Tyre. This component includes:
a. Upgrading of and improvements to public spaces;
b. Conservation and adaptive reuse of monuments and historic buildings;
c. Support to local economic development, cultural tourism, private sector participation and communication;
d. Support to the rehabilitation of the housing stock;
e. Enforcement of city center zoning regulations;
f. Traffic and parking improvements for historic centers;
g. Protection and landscaping of coastal and green areas; and
h. Studies for urban redevelopment adjacent to historical cores. In the case of Tripoli and Tyre, they are implemented in conjunction with a parallel project addressing the deficiencies of water and wastewater infrastructure.

2. Archeological Sites Conservation and Management. These activities are taking place primarily in Baalbeck and Tyre, two of the main archeological sites of Lebanon, both inscribed on the UNESCO World Heritage list. Additional activities are ongoing in Tripoli (St Gilles citadel) and Saida (land castle). This component includes the following activities:
   a. Research and documentation;
   b. Conservation of surfaces and structures;
   c. Site presentation to visitors;
   d. Site management; and
   e. Further archaeological studies.

3. Institutional strengthening, which includes the provision of technical assistance and capacity building to involved stakeholders, particularly directed towards:
   a. Management of historic centers by municipalities and DGU;
   b. Reform of the cultural heritage institutional and regulatory framework;
   c. Restructuring and strengthening of the DGA; and
   d. CDR project management.
<table>
<thead>
<tr>
<th>City</th>
<th>Component</th>
<th>Sub-Comp</th>
<th>Project</th>
<th>Status</th>
<th>Financing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Rehabilitation of historic city centers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baalbeck</td>
<td></td>
<td></td>
<td>• Rehabilitation of Moutran and Citadel square</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Improvement of the sidewalks and creation of pedestrian circuits for visitors within the historical central district</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Refurbishment and re-use of heritage buildings and complexes and support to the rehabilitation of mudbrick vernacular housing</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Provision of parking for visitors and residents at the southern and northern entrances of the city</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Support to local economic development, cultural tourism, private sector participation and communication</td>
<td>Ongoing</td>
<td>Additional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Rehabilitation of Serail Baalbeck</td>
<td>Ongoing</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Completion of the improvement of the sidewalks and creation of pedestrian circuits for visitors within the historical central district (Saleh Haidar and Hajjar streets)</td>
<td>Planned</td>
<td>Additional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Completion of development of pedestrian links</td>
<td>Planned</td>
<td>Additional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Urban infrastructure improvements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Reorganization of traffic circulation away from archaeological sites</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Provision of parking for visitors and residents at the southern and northern entrances of the city</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Improvement to the water supply, sanitation and utility connections in the Old City.</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Completion of provision of parking for visitors and residents at the southern entrance of the city</td>
<td>Planned</td>
<td>Additional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Completion of improvement to the water supply, sanitation and utility connections in the Old City.</td>
<td>Planned</td>
<td>Additional</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>City</th>
<th>Component</th>
<th>Sub-Comp</th>
<th>Project</th>
<th>Status</th>
<th>Financing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Rehabilitation of historic city centers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Rehabilitation of Moutran and Citadel square</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Improvement of the sidewalks and creation of pedestrian circuits for visitors within the historical central district</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Refurbishment and re-use of heritage buildings and complexes and support to the rehabilitation of mudbrick vernacular housing</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Provision of parking for visitors and residents at the southern and northern entrances of the city</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Support to local economic development, cultural tourism, private sector participation and communication</td>
<td>Ongoing</td>
<td>Additional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Rehabilitation of Serail Baalbeck</td>
<td>Ongoing</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Completion of the improvement of the sidewalks and creation of pedestrian circuits for visitors within the historical central district (Saleh Haidar and Hajjar streets)</td>
<td>Planned</td>
<td>Additional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Completion of development of pedestrian links</td>
<td>Planned</td>
<td>Additional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Urban infrastructure improvements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Reorganization of traffic circulation away from archaeological sites</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Provision of parking for visitors and residents at the southern and northern entrances of the city</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Improvement to the water supply, sanitation and utility connections in the Old City.</td>
<td>Completed</td>
<td>Original</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Completion of provision of parking for visitors and residents at the southern entrance of the city</td>
<td>Planned</td>
<td>Additional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Completion of improvement to the water supply, sanitation and utility connections in the Old City.</td>
<td>Planned</td>
<td>Additional</td>
</tr>
<tr>
<td>Category</td>
<td>Project</td>
<td>Description</td>
<td>Status</td>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>-------------</td>
<td>--------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>Archeology</td>
<td>Conservation and management of the archaeological sites BTAP-I infrastructure.</td>
<td>Ongoing</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archeology</td>
<td>Conservation and management of the archaeological sites BTAP-I Conservation.</td>
<td>Planned</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archeology</td>
<td>Conservation and management of the archaeological sites BTAP-II Conservation.</td>
<td>Planned</td>
<td>Additional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban</td>
<td>Creation of a pedestrian promenade through the Via Romana.</td>
<td>Completed</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban</td>
<td>Rehabilitation of public squares and spaces in the Old city (Unesco Square, Citadel Square…).</td>
<td>Completed</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban</td>
<td>Rehabilitation of historical buildings and planning their adaptive use for cultural activities (Old Serail house).</td>
<td>Completed</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban</td>
<td>Rehabilitation of public spaces in the Via Romana – Serail Road.</td>
<td>Completed</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban</td>
<td>Improvements to the harbor areas and the coastal zone.</td>
<td>Completed</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban</td>
<td>Support to local economic development, cultural tourism, private sector participation and communication.</td>
<td>Ongoing</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban</td>
<td>Rehabilitation of public spaces and squares in the Aqualina Souk.</td>
<td>Planned</td>
<td>Additional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban Urban infrastructure improvements</td>
<td>Rehabilitation of the access to the old town and construction of a visitor’s center.</td>
<td>Completed</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban Urban infrastructure improvements</td>
<td>Provision of an integrated parking system and pedestrian circuits from the exit of the national highway to the harbor.</td>
<td>Completed</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban Urban infrastructure improvements</td>
<td>Provision of a pedestrian circuit from the harbor to the archaeological site on the maritime border.</td>
<td>Completed</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban Urban infrastructure improvements</td>
<td>Improvement to the water supply, sanitation and utility connections Rehabilitation of public spaces along Via Romana – Serail Road.</td>
<td>Completed</td>
<td>Original</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Byblos Urban Urban infrastructure improvements</td>
<td>Construction of a new Parking at the northern entrance of the City.</td>
<td>Planned</td>
<td>Original/Additional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td>Urban</td>
<td>Rehabilitation of historic city centers</td>
<td>Archeology</td>
<td>Archeology</td>
<td>Tripoli</td>
</tr>
<tr>
<td>--------</td>
<td>-------</td>
<td>----------------------------------------</td>
<td>------------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>Saida</td>
<td></td>
<td>• Improvement to the water supply, sanitation and utility connections the Aqualina Souk.</td>
<td>Planned</td>
<td>Original/Additional</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rehabilitation and conservation of existing building facades along the pedestrian visitor’s circuits to link and help promote various cultural activities within the old town.</td>
<td>Completed</td>
<td>Original</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Support to local economic development, cultural tourism, private sector participation and communication.</td>
<td>Ongoing</td>
<td>Original/Additional</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Total Rehabilitation of Khan el-Echle</td>
<td>Ongoing</td>
<td>Original</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Improvement to the water supply, sanitation and utility connections in the main square within the old town (Bab El Serail Square).</td>
<td>Completed</td>
<td>Original</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Improvement to the water supply, sanitation and utility connections along the pedestrian visitor’s circuits.</td>
<td>Completed</td>
<td>Original</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Completion of the improvement to the water supply, sanitation and utility connections along the pedestrian visitor’s circuits.</td>
<td>Ongoing</td>
<td>Original</td>
<td></td>
</tr>
<tr>
<td>Tripoli</td>
<td></td>
<td>• Conservation and presentation of the Land Castle</td>
<td>Ongoing</td>
<td>Original</td>
<td></td>
</tr>
<tr>
<td>Tripoli</td>
<td></td>
<td>• Rehabilitation of public spaces, squares and facades along the Old Souks (Bazerkkan, Haraj, Nahassine).</td>
<td>Completed</td>
<td>Original</td>
<td>Original</td>
</tr>
</tbody>
</table>
### Urban Centres

- Rehabilitation of Souwayka’s facades.  
  - Completed  
- Rehabilitation of Khan El-Askar and its adaptive reuse for cultural and social activities.  
  - Ongoing  
- Rehabilitation of public spaces, squares and facades along the Souks (Bazerkan, Haraj, El Kendarjieh, El-Attarine, El-Khodar, El-Kameh, Tallaat el Rifayia, around the citadel).  
  - Planned  
- Rehabilitation of Khan Al Aarsat and Hammam Al Nouri.  
  - Planned  
- Facades rehabilitation along Abu Ali River.  
  - Planned  
- Rehabilitation and support to some housing clusters (lot#131) and creation of tourism circuits.  
  - Planned

### Urban Infrastructure Improvements

- Construction of a building complex, a parking, commercial facilities and needed infrastructure for the development of temporary housing units to accommodate the families and activities that are currently occupying Khan El-Askar.  
  - Completed
- Improvement to the water supply, sanitation and utility connections along the Old Souks (Bazerkan, Haraj, Nahassine).  
  - Completed
- Improvement of the banks of the Abou Ali River and the traffic system around the historical city center and reorganization of street parking.  
  - Ongoing
- Improvement of the various access nodes to the historic city including management of street parking, treatment and landscaping of the vehicular access streets.  
  - Ongoing
- Relocation of the fresh produce market on a platform above the Abou Ali River and treatment of traffic circulation and street frontage.  
  - Ongoing
<table>
<thead>
<tr>
<th>Project Area</th>
<th>Action</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archeology</td>
<td>Conserved the St. Gilles citadel and equipment of the Tripoli Museum</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Tyre Urban</td>
<td>Creation of a cultural promenade at the interface of the archaeological site of El Mina and historical areas.</td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>Rehabilitation and support to some housing clusters.</td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>Rehabilitation of the Hammam square, Menchieh square and the Hamra street</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>Support to local economic development, cultural tourism, private sector participation and communication</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>Rehabilitation of the harbor square and the Ottoman building, relocation of Fisherman Association.</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>Rehabilitation of Khan Al Rabou and its adaptive reuse into cultural center.</td>
<td>Planned</td>
</tr>
<tr>
<td></td>
<td>Rehabilitation of the orientation the Tower</td>
<td>Planned</td>
</tr>
<tr>
<td></td>
<td>Rehabilitation of facades &amp; public spaces along the old Souks.</td>
<td>Planned</td>
</tr>
<tr>
<td></td>
<td>Protection, landscaping and creation of a promenade along the coastal zone from the rest house to the Phoenician harbor including visitor platforms and public gardens</td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>Improvement to the water supply, sanitation and utility connections in the Old City.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Archeology</td>
<td>• Reorganization of the El Bawaba square and the creation of a public space and a vegetable market and an integrated parking scheme.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>• Completion of the Coastal Promenade toward Ras el-Jamal.</td>
<td>Planned</td>
</tr>
<tr>
<td></td>
<td>• Tyre Archeological mapping.</td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>• Tyre sea wall protection.</td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>• Conservation and management of the archaeological sites of El-Mina and of El-Bass BTAP-I infrastructure</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>• Conservation and management of the archaeological sites of El-Mina and of El-Bass BTAP-I Conservation</td>
<td>Planned</td>
</tr>
<tr>
<td></td>
<td>• Conservation and management of the archaeological sites of El-Mina and of El-Bass BTAP-II Conservation.</td>
<td>Planned</td>
</tr>
</tbody>
</table>
Table 5. Institutional strengthening component of the CHUD project

<table>
<thead>
<tr>
<th>Ministry/Council</th>
<th>Institutional strengthening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Culture (MoC)</td>
<td>• Study of the legal aspects of the protection of historical urban areas in the context of the existing Lebanese legislation and identification of possible amendments aimed at improving their future protection&lt;br&gt;• Detailed assessment of DGA’s current status and design of administrative, technical and financial reform</td>
</tr>
<tr>
<td>Municipal management of historic centers</td>
<td>• Technical assistance to the 5 municipalities for the integration of Municipal Implementation Units in their permanent organization&lt;br&gt;• Tripoli City Development Strategy and assistance to other municipalities to promote their cultural and tourism potential&lt;br&gt;• Advisory services to the DGU for the formal adoption of special planning and building regulations for historic cities as part of their management tools&lt;br&gt;• Hands-on training of the staff of the DGU at central level</td>
</tr>
<tr>
<td>Ministry of Tourism (MoTO)</td>
<td>• To be determined</td>
</tr>
<tr>
<td>Council for Development and Reconstruction (CDR)</td>
<td>• Staffing of the Project implementation Unit with technical, legal and administrative professionals</td>
</tr>
</tbody>
</table>

Implementation schedule and costs

The implementation of the CHUD project in the five cities officially started in 2004 and will last until the end of 2012 for a total duration of around 9 years (as compared to the planned duration of 65 months). Table 6 summarizes the implementation schedule for each of the three components.

Table 6. Implementation schedule of the CHUD project

<table>
<thead>
<tr>
<th>Component</th>
<th>Component name</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rehabilitation of historic city centers and urban infrastructure improvements</td>
<td>1st quarter 2003</td>
<td>3rd quarter 2012</td>
</tr>
<tr>
<td>2</td>
<td>Archeological sites conservation and management</td>
<td>3rd quarter 2003</td>
<td>4th quarter 2012</td>
</tr>
<tr>
<td>3</td>
<td>Institutional strengthening and project management</td>
<td>1st quarter 2003</td>
<td>4th quarter 2012</td>
</tr>
</tbody>
</table>

The main activities of the World Bank additional financing will be completed by the end of 2014, for a total duration of 2.5 years.

The CHUD project initial cost around 62.2 MUSD financed through a loan agreement between the World Bank, AFD and the Italian Cooperation on one hand, and the Lebanese Government on the other hand. The rehabilitation of historic city centers and urban infrastructure improvements component constituted around 68.6 percent of the financing while the archaeological sites conservation and management component constituted 22.2 percent, leaving 9.2 percent for the institutional strengthening and project management component. Table 7 provides a summary of the cost estimate for the 3 components.
As for the estimated cost of phase III, it consists of:

- Completion of ongoing contracts  13 Million USD
- Implementation of phase III: 39 Million USD

Table 7. Initial/updated project cost estimate

<table>
<thead>
<tr>
<th>Project Components</th>
<th>Initial Costs(^1) (Million USD)</th>
<th>Updated Costs (Million USD)</th>
</tr>
</thead>
</table>

Rehabilitation of historic city centers and urban infrastructure improvements

<table>
<thead>
<tr>
<th>City</th>
<th>Initial Costs</th>
<th>Updated Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baalbeck</td>
<td>9.148</td>
<td>8.041</td>
</tr>
<tr>
<td>Byblos</td>
<td>3.079</td>
<td>5.349</td>
</tr>
<tr>
<td>Saida</td>
<td>3.647</td>
<td>8.863</td>
</tr>
<tr>
<td>Tripoli</td>
<td>19.287</td>
<td>45.404</td>
</tr>
<tr>
<td>Tyre</td>
<td>7.433</td>
<td>22.286</td>
</tr>
</tbody>
</table>

Total Component 1 42.594 89.943

Archaeological sites conservation and management

<table>
<thead>
<tr>
<th>City (site)</th>
<th>Initial Costs</th>
<th>Updated Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baalbeck - site of Al-Qalaa</td>
<td>5.556</td>
<td>8.086</td>
</tr>
<tr>
<td>Tyre - sites of El Mina and El Bass</td>
<td>5.219</td>
<td>6.840</td>
</tr>
<tr>
<td>Detailed studies and supervision services for Baalbeck and Tyre</td>
<td>1.475</td>
<td>1.973</td>
</tr>
<tr>
<td>Archeological works</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tripoli Citadelle St Gilles</td>
<td>0.364</td>
<td>1.248</td>
</tr>
<tr>
<td>Saida Chateau de la Terre (Land Castle)</td>
<td>0.880</td>
<td>0.849</td>
</tr>
<tr>
<td>Further archaeological studies</td>
<td>0.168</td>
<td>0.128</td>
</tr>
</tbody>
</table>

Total Component 2 13.662 19.124

Institutional strengthening and project management

Technical Assistance and Project Management support for the Municipalities 1.856 2.678
Technical Assistance and capacity building for the Directorate General of Antiquities 1.449 1.063
Technical Assistance to the Directorate General of Urban Planning for historical city centers management 0.281 0.464
Project Management by CDR\(^2\) 1.740 3.750

Total Component 3 5.326 7.955

Total of three components 61.582 117.022
Front-End Fee (IBRD Loan) 0.315 0.382

Total Project Cost 61.897 117.404

\(^1\) costs include 14.5 percent contingencies

\(^2\) includes costs of environmental monitoring

Implementation arrangements

The CHUD is implemented by CDR on behalf of the five participating Municipalities and the DGA. For this purpose, a Project Management Unit (PMU) was set up by CDR. Given its management role, the PMU has a simple organizational structure and consists of a limited number of qualified professionals: a Project Manager (CDR Staff), tow Team Leaders (PMU Staff), and three other professionals - a Municipal Engineer (Civil Engineer) with a proven expertise in the use of Project Management tools/software and experience in public procurement, an Architect-Planner with conservation expertise, and a Social Scientist. One financial officer from CDR’s
Finance Department processes project’s financial transactions and prepares the necessary financial reports required by the IBRD and the other project’s co-financiers. The PMU may have additional technical, financial and support staff. All posts have clear Terms of Reference (ToRs) and measurable performance indicators that are reviewed annually. The PMU handles consulting and civil works contracts for the implementation of the CHUD, and also supervise the work of the Municipal Implementation Units (MIUs) located in the five Municipalities. Figure 2 shows the organizational arrangements for the implementation of the CHUD project.
Figure 2. Arrangements for the implementation of the CHUD project
DESCRIPTION OF THE ENVIRONMENT

This chapter presents background data and information regarding the environmental conditions in the five secondary cities involved in the proposed project, namely, Tripoli, Byblos, Saida, Tyre and Baalbeck. The data and information have been synthesized and are presented independently for each city, although coastal cities (Tripoli, Byblos, Saida, and Tyre) tend to exhibit many similar characteristics. Note that the project areas in the five cities are mostly urbanized and often exceeding 90 percent development. Therefore, the data and information presented in this chapter focuses on the physical and socio-economic environment rather than on the biological environment that is practically absent in such highly urbanized areas. Table 8 provides a brief summary of various physical and socio-economic indicators related to the five cities, which are further described in the following sections.
### Table 8. Summary indicators of the five cities

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Tripoli</th>
<th>Byblos</th>
<th>Saida</th>
<th>Tyre</th>
<th>Baalbeck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (2002)</td>
<td>588,200</td>
<td>16,910</td>
<td>75,615</td>
<td>61,000</td>
<td>55,000</td>
</tr>
<tr>
<td>Working population, %</td>
<td>NA</td>
<td>38</td>
<td>27</td>
<td>NA</td>
<td>70</td>
</tr>
<tr>
<td>Occupation</td>
<td>Service sectors, commercial activities, employees, industry</td>
<td>Service sector, industry, agriculture, maritime</td>
<td>Vendors, daily workers, employees, fishermen, drivers</td>
<td>Fishing, public sector, commercial activities</td>
<td>Agriculture Industry Services</td>
</tr>
<tr>
<td>Property and Tenure</td>
<td>Private, Waqf, &amp; Public</td>
<td>Private, Waqf, &amp; Public</td>
<td>Private, Waqf, &amp; Public</td>
<td>Private, Waqf, &amp; Public</td>
<td>Mainly home owners</td>
</tr>
<tr>
<td>Precipitation, mm</td>
<td>1,015</td>
<td>1,015</td>
<td>660</td>
<td>750</td>
<td>410</td>
</tr>
<tr>
<td>Humidity, %</td>
<td>70</td>
<td>70</td>
<td>71</td>
<td>72</td>
<td>56</td>
</tr>
<tr>
<td>Temperature, °C</td>
<td>20</td>
<td>20</td>
<td>19.5</td>
<td>37 summer, 14 winter</td>
<td>15°C</td>
</tr>
<tr>
<td>Wind</td>
<td>W and SW</td>
<td>W and SW</td>
<td>SW</td>
<td>W and SW</td>
<td>NE and SW</td>
</tr>
<tr>
<td>Geology</td>
<td>Karstic</td>
<td>NA</td>
<td>Karstic from Cenomanian age</td>
<td>Turonean, Cenomanian, and Eocene formations</td>
<td>Turonean formations</td>
</tr>
<tr>
<td>Water sources</td>
<td>Hab, Racheine, &amp; aquifers</td>
<td>Afqa, Er Roueiss, Qatra springs, and underground wells</td>
<td>Kfarwe spring and underground wells</td>
<td>Ras el Ain and Rashidiyye springs, and private and public wells</td>
<td>Loujouj &amp; Ain Bourdai springs and 7 boreholes</td>
</tr>
<tr>
<td>Water quality</td>
<td>Requires improvement</td>
<td>NA</td>
<td>Requires improvement due to contamination</td>
<td>Polluted in upper layer</td>
<td>Ras el Ain spring is contaminated</td>
</tr>
<tr>
<td>Major rivers</td>
<td>Abou Ali</td>
<td>Nahr Ibrahim</td>
<td>Awwali and Sainiq</td>
<td>Litani river</td>
<td>Ras el Ain river</td>
</tr>
<tr>
<td>Coastal areas status</td>
<td>Polluted, sewage discharge, solid waste</td>
<td>Acceptable microbiological quality; pollution with oil and fuel from fishing boats</td>
<td>9 sewage outlets discharge to the sea; Water unsuitable for any type of human contact</td>
<td>Polluted by sewage discharge, 6 sewage outlets; Water unsuitable for any type of human contact</td>
<td>None</td>
</tr>
<tr>
<td>Wastewater collection systems</td>
<td>Inadequate, is being improved</td>
<td>Not available, coastal collector</td>
<td>Under construction</td>
<td>Inadequate, discharge to sea, require a coastal collector</td>
<td>Old system, pumping station requires extensive maintenance, development ongoing</td>
</tr>
<tr>
<td>Wastewater treatment</td>
<td>Secondary treatment serving the whole caza and parts of Zghata and Koura (1,740,000)</td>
<td>Secondary treatment serving the caza of Jbeil (capacity 9,000 m³/d) to the North of the city</td>
<td>Secondary treatment serving the caza of Saida (capacity 33,600 m³/d) on the Sainiq river operational</td>
<td>Secondary treatment serving the caza of Sour to the north of the city (Under construction)</td>
<td>Secondary treatment serving the surrounding area, located in Iaat, operational. Capacity</td>
</tr>
<tr>
<td>Indicator</td>
<td>Tripoli</td>
<td>Byblos</td>
<td>Saida</td>
<td>Tyre</td>
<td>Baalbeck</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>persons in 2040) located on mouth of Abou Ali River (under construction)</td>
<td>(under construction)</td>
<td></td>
<td></td>
<td>12,500 m³/d and can be doubled.</td>
</tr>
<tr>
<td>Effluent discharge</td>
<td>Sea outfall</td>
<td>Sea outfall</td>
<td>Sea outfall</td>
<td>Sea outfall</td>
<td>Outfall discharge in an open ditch</td>
</tr>
<tr>
<td>Stormwater drainage</td>
<td>Bad conditions, mixing with sewage, is being improved</td>
<td>Old system, mixing with sewage Being improved</td>
<td>Old system, mixing with sewage Being improved</td>
<td>Mixing with sewage Being improved</td>
<td>Being improved</td>
</tr>
<tr>
<td>Solid waste</td>
<td>382 t/d, in landfill on Abou Ali River</td>
<td>13 t/d in open dump at Hbaline; existing SWTP not operational</td>
<td>53 t/d disposed in open dump South of Saida</td>
<td>49 t/d disposed in open dumps</td>
<td>45 t/d disposed in open dump at Roman quarry</td>
</tr>
<tr>
<td>Solid waste plans</td>
<td>-</td>
<td>Rehabilitation of the existing dump and refurbishment of the existing SWTP</td>
<td>Anaerobic digestion facility (300 tpd) just started operating</td>
<td>Material recovery facility and composting pant serving the region operational</td>
<td>Construction of a 70-80 tpd material recovery facility, composting pant and sanitary landfill serving the region to start soon in the industrial region</td>
</tr>
<tr>
<td>Air Quality</td>
<td>CO, SO₂, NOₓ, TSP above WHO standards</td>
<td>PM₁₀ and SO₂ levels exceed WHO standards</td>
<td>SO₂ levels exceed WHO standards</td>
<td>PM₁₀ levels exceed WHO standards</td>
<td>PM₁₀ and SO₂ levels exceed WHO standards</td>
</tr>
<tr>
<td>Noise levels</td>
<td>Exceed standards at all times</td>
<td>Exceed standards</td>
<td>Exceed standards</td>
<td>Exceed standards</td>
<td>Exceed standards</td>
</tr>
</tbody>
</table>

NA = Not Available
Tripoli
The city of Tripoli is located along the Mediterranean coast in the Mohafaza of North Lebanon, around 80 Km north of Beirut (Figure 1). The map below illustrates the CHUD Study Area and the components of the project in Tripoli Old City. These cover:

- Traffic management plan for the Old City;
- Housing Rehabilitation (Lot #131);
- The Northern neighborhood souks;
- The Southern neighborhood souks (from Rachid Rida Street to Moussa Café Square/Berket Bab el-Ramel);
- The Maoulawiyah Park and around the Rachid Karame Corniche;
- The central neighborhood souks (around Hammam el Nouri);
- The surroundings of the St. Gilles Citadel;
- Resettlement housing and commercial spaces (Blocks A,B and C);
- Restoration and Re-use of Monuments (Khan El-Askar, Khan el-Arassat, Hammam el-Nouri, Khan el-Saboun, And Rifi watermill);
- Rehabilitation of the Souwayqa Elevations; and
- Abou Ali River area and surrounding markets.
Figure 3. CHUD Study Area and Summary Description of Project Works in Tripoli
**Physical environment**

**Climate**
The climate in the region of Tripoli is sub-tropical, Mediterranean with warm and dry summer and fall (May to October), and moderately cold, windy, and wet winter (October to April). The average annual precipitation is 1,015 mm (Batroun station, altitude 20 m) while the average annual humidity is 70 percent. The average temperature is 28°C in summer, 10°C in winter, and the annual mean temperature is 20°C. The maximum daily-recorded temperature has been 39.6°C. Temperatures above 30°C occur for around 46 days per year. Days with temperature below 0°C are very seldom. The difference between day and night temperatures is usually 7°C. Prevailing winds are from the West and Southwest, while winds from the East and Northeast occur less frequently (85 percent vs 15 percent).

**Hydrogeology**
The karst within the region of Koura-Zgharta-Tripoli has no impermeable cover on synclines and faults, and thus is vulnerable to environmental stress. Continuous aggression to the environment (sewage inflows, domestic solid wastes, industrial, agricultural and gas station effluents and discharges) contributes to the degradation of soils and groundwater quality. It is thus of utmost importance to eliminate or reduce these aggressions.

The quality of water in the Koura-Zgharta-Tripoli Miocene limestone aquifer was tested chemically and bacteriologically at 11 locations (Table 9). The results indicate that samples collected from locations outside the Tripoli area were generally of adequate quality for domestic and agricultural use. Samples collected from the Tripoli area, exhibited high levels of nitrite, ammonium and hardness when compared to the Lebanese and World Health Organization (WHO) standards and thus were found unacceptable for domestic use. Note that, the groundwater in the Tripoli area suffers from seawater intrusion and sewage contamination, which is the most common problem in Lebanese coastal cities.
Table 9. Chemical and bacteriological analysis for samples from the Miocene limestone aquifer in the Tripoli area (Khayyat, 2001)

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Sankari</th>
<th>El Jisr</th>
<th>Kroum El Laouz</th>
<th>Manara</th>
<th>Caserine</th>
<th>Saadoun</th>
<th>Standards(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.52</td>
<td>7.21</td>
<td>7.49</td>
<td>7.38</td>
<td>7.62</td>
<td>6.62</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>Calcium</td>
<td>72.5</td>
<td>80.7</td>
<td>55.7</td>
<td>91.4</td>
<td>48.5</td>
<td>37.7</td>
<td>200</td>
</tr>
<tr>
<td>Magnesium</td>
<td>24.7</td>
<td>11.9</td>
<td>25.6</td>
<td>20.2</td>
<td>46.9</td>
<td>22.6</td>
<td>50</td>
</tr>
<tr>
<td>Sodium</td>
<td>31.8</td>
<td>17.7</td>
<td>20.1</td>
<td>17.8</td>
<td>30.1</td>
<td>16.5</td>
<td>150-200</td>
</tr>
<tr>
<td>Potassium</td>
<td>3.8</td>
<td>2.1</td>
<td>4.2</td>
<td>3.1</td>
<td>4.3</td>
<td>1.9</td>
<td>12</td>
</tr>
<tr>
<td>Chloride</td>
<td>58.9</td>
<td>36.9</td>
<td>41.3</td>
<td>36.9</td>
<td>56.8</td>
<td>30.9</td>
<td>200</td>
</tr>
<tr>
<td>Sulfate</td>
<td>17.4</td>
<td>12.6</td>
<td>47.3</td>
<td>81.3</td>
<td>183.5</td>
<td>25.2</td>
<td>250</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>255</td>
<td>228</td>
<td>190</td>
<td>220</td>
<td>120</td>
<td>155</td>
<td>-</td>
</tr>
<tr>
<td>Iron</td>
<td>0.04</td>
<td>1.2</td>
<td>0.02</td>
<td>0.07</td>
<td>0.12</td>
<td>0.22</td>
<td>0.3</td>
</tr>
<tr>
<td>Nitrate</td>
<td>0.18</td>
<td>0.16</td>
<td>0.28</td>
<td>0.48</td>
<td>0.72</td>
<td>0.09</td>
<td>45-50</td>
</tr>
<tr>
<td>Nitrites</td>
<td>0.13</td>
<td>0.01</td>
<td>0.08</td>
<td>0.05</td>
<td>0.08</td>
<td>0.01</td>
<td>0.05-3</td>
</tr>
<tr>
<td>Ammonium</td>
<td>0.23</td>
<td>0.27</td>
<td>0.17</td>
<td>0.08</td>
<td>0.33</td>
<td>0.05</td>
<td>0-1.5</td>
</tr>
<tr>
<td>Silica</td>
<td>0.42</td>
<td>0.58</td>
<td>0.94</td>
<td>0.52</td>
<td>3.54</td>
<td>1.25</td>
<td>-</td>
</tr>
<tr>
<td>TDS</td>
<td>414</td>
<td>353</td>
<td>398</td>
<td>498</td>
<td>669</td>
<td>302</td>
<td>500-1000</td>
</tr>
<tr>
<td>Hardness</td>
<td>280</td>
<td>248</td>
<td>242</td>
<td>309</td>
<td>310</td>
<td>185</td>
<td>500</td>
</tr>
<tr>
<td>Phosphates</td>
<td>0.03</td>
<td>0.03</td>
<td>0</td>
<td>0.06</td>
<td>0.03</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total coliforms</td>
<td>0</td>
<td>0</td>
<td>present</td>
<td>0</td>
<td>present</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\(^{1}\) Based on Lebanese and WHO standards

Water is supplied to the greater Tripoli area from three main sources that have a combined flow of 50,000 m³/d. The three sources are: The Hab spring, the Racheine springs, and groundwater aquifers. The Hab source supplies Tripoli with more than 40,000 m³/d. Its water treatment works are currently not operational, and thus poor and uncontrolled quality water may be supplied directly to the system. In addition, the system is not capable to meet current water demands, the major part of the network is very old, undersized and a high percentage of water is wasted through leaks and careless practices. It is estimated that overall losses due to leakage, illegal connections, and losses at households reach around 60 percent of the capacity of the water flowing into the system.

The Abou Ali River, which runs across the CHUD study area, is at the heart of the historic city center, of which it constituted an important landmark of the geomorphology and urban development of the city of Tripoli. Several pedestrian bridges were built over the river in ancient times to cross from one bank to the other. The river has flooded twice, in 1942 and 1955, causing extensive property damage and loss of life. As a result, the banks of the Abou Ali River were built by the end of 1968. The CHUD touches on a small potion of the western and eastern embankments of the river. The river is currently highly contaminated since it is used as an open dump for solid waste (mostly organic waste, damaged goods and products and sometimes rubble).
and wastewater for decades from uncontrolled discharge from the populations living and markets along adjacent streets, resulting in a significant unsightly visual appearance of the river bed and acting as a breeding zone for vector diseases (e.g. rodents, flies, insects) raising significant complaints by the residents. Despite the several attempts in the past by the municipality to control these actions, the situation prevails till this date due to lack of enforcement, monitoring and adherence of the market users.

Wastewater outfalls discharging into the river were diverted to the sea via a covered pipeline running along the river bed. However, wastewater discharges into the river from upstream villages and towns continuous to take place resulting in the bacteriological contamination of the river water. The situation further deteriorates during the olive oil pressing season where most of the upper stream olive mills discharge their olive mill wastewater.

As part of the environmental baseline survey conducted in 2008-2009, two samples were taken upstream (at the level of the Citadel) and downstream (at the level of the Tripoli old refinery) the river. They were analyzed for pH, biochemical oxygen demand (BOD), fecal coliforms, total coliforms, chromium, copper, lead and zinc. Both samples present high total and fecal coliform counts, as well as high BOD levels, exceeding the WHO permissible limits. The permissible fecal coliform count is exceeded for both Class I and Class II, making the water unsuitable for primary as well as secondary contact. The BOD values is expected to increase significantly during the olive oil pressing season with the discharge of olive mill wastewater from upstream villages.

For details of the the water quality monitoring survey, please refer to the “Environmental Baseline and City Profile” report prepared by ELARD (Appendix B).

Coast

The coast and the beaches around Tripoli suffer from the uncontrolled discharge of untreated wastewater and open dumping of solid waste. This practice is adversely affecting the quality of the coastal waters. Another problem is sand dredging from the seabed, which has a significant impact on marine ecology, coastal morphology, beaches, and fisheries. Furthermore, the seabed might have become a pollution sink as a result of long term contamination of coastal water and any major disturbance of the seabed such as dredging for sand, could release many contaminants into the marine environment.

Wastewater collection systems

Tripoli is generally served by a wastewater system and a separate storm water drainage system, although at some places the system is a combined one. At present, sewage is either directly discharged into the sea through pipelines and channels or indirectly via coastal streams. The
existing wastewater collection system (some 130 km of pipelines) does not cover the entire city. An average of 70 percent of the population are connected to the system which was constructed in the 60’s for a planning horizon up to the year 2000 and a population of 220,000 only. The system is consequently undersized and non functional due to the destruction of crucial facilities such as the El Mina pumping station and the sea outfall during the war and the clogging and silting of numerous sewer lines. In the absence of a proper collection system, several houses resorted to the discharge of their sewage to an old network of irrigation canals. As a result, raw sewage is directly discharged to land, rivers, and sea at more than thirty points in the city. Pollution and eutrophication all along the coastline constitute a serious threat to public health. The most polluted sections are near the temporary storage outlet at the tip of El Mina and the mouth of Wadi Bahsas at the southern side of Tripoli. In the old city center, the wastewater collection system is obsolete. Wastewater is directly discharged to the Abou Ali River or to an irrigation channel. In other cases, wastewater is discharged in septic tanks or indirectly to the soil through artificial wells. In some locations, the situation is extremely intolerable for hygienic reasons and the odors emanating to the vicinity are unbearable.

In order to alleviate this situation, a new secondary wastewater treatment plant (activated sludge) has been built at the northern entrance of the city, at the outlet of the Abou Ali River. The effluent water will be discharged into the sea through a long sea outfall. The plant was designed to treat the wastewater collected from Tripoli and neighboring areas with an estimated population projection of 1,740,000 persons for the year 2040. Similarly, the entire network across the city and the neighboring region is currently being renovated, and a new system of main collectors and pipelines has been designed (Figure 4) to cope with the increasing flows and the need to change the direction of some of the flows as to reduce the environmental impact on land, coastal streams, the Mediterranean sea and the coastal beaches. The design study indicates that around 155 km of main collectors and 130 km of secondary collectors must be installed before 2020.
Stormwater drainage
The stormwater drainage system consists of the three main components: the natural rivers of Nahr Abou Ali and Nahr el Bahsas, the storm water along the highways, and the existing urban stormwater drainage/irrigation facilities. Most of the existing drainage facilities consist of ditches and of short lengths of pipelines, all of which became undersized and in bad conditions after 20 years of negligence. Moreover, new roads have cut off a number of pipes and channels and interrupted flows in these areas. The system is in need for upgrade and extension to cope with the expansion of the city. The new sewage network design includes 285 km of storm water drainage pipes ranging in size between 200 and 300mm and serving Tripoli, including the old city till the year 2020. This project is currently under execution.
Solid waste

The average generation rate of solid waste in Tripoli is about 0.65 kg/capita/day, thus resulting in a total of 382 t/d that have long been dumped in an open area on the exit of the Abou Ali River. The inefficiency of garbage collection has transformed the river and the streets of the old town into a dumping ground (Figure 5). Solid waste can also be seen dumped along the roadsides, in vacant lots, or directly burned in the streets causing various problems. Industrial solid waste and medical waste are mixed with municipal waste. Waste lubricating oils are disposed of at waste dumps or directly into sewers. In 1997, the Tripoli Municipal Union benefited from the Solid Waste Environmental Management Plan (SWEMP)- World Bank project and received street cleaning and washing vehicles, as well as waste collection trucks and curbside containers. The project also aimed at the rehabilitation of the old dump and transforming it into a sanitary landfill. Municipal solid waste from Greater Tripoli is currently collected by a private company, and disposed of in the Tripoli landfill.

Figure 5. Uncontrolled disposal of waste in the Abou Ali River

Solid waste in the old city streets is collected manually since the roads of the souks are narrow and are inaccessible to standard collection vehicles. Waste bins are not available in those streets and litter and bad odors were noted in the streets during the filed visit. For instance, in the fruits and vegetables market, waste and leftovers are thrown in front of the stores, and sweepers from the municipality collect the waste in the late afternoon (Figure 6).
Air quality

A field monitoring survey was conducted at a total of 10 stations representing different areas of Tripoli (Table 10). Measurements were made at several intersections inside the busy streets of Tripoli and inside the old city. Results showed that Carbon Monoxide (CO), Sulfur Dioxide (SO₂) and Nitrogen Dioxide (NO₂) and Total Suspended Particulates (TSP) concentrations exceed WHO standards at most locations during daytime, due primarily to traffic congestion (Figure 7) and associated vehicle-induced emissions, and construction activities.

Table 10. Average day and night time concentrations of CO, SO₂ and NO₂ and daily average concentration of TSP in Tripoli (JICA, 2001)

<table>
<thead>
<tr>
<th>Sampling station</th>
<th>CO 1-hour WHO standard 9 ppm</th>
<th>SO₂ 1-hour WHO standard 0.134 ppm</th>
<th>NO₂ 1-hour WHO standard 0.21 ppm</th>
<th>TSP WHO standard 150 µg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
<td>Night</td>
<td>Day</td>
<td>Night</td>
</tr>
<tr>
<td>S1</td>
<td>10.3</td>
<td>5.1</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>S2</td>
<td>8.3</td>
<td>7.0</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>S3</td>
<td>16.0</td>
<td>11.9</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>S4</td>
<td>12.3</td>
<td>11.0</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>S5</td>
<td>8.9</td>
<td>2.3</td>
<td>1.8</td>
<td>1.5</td>
</tr>
<tr>
<td>S6</td>
<td>13.5</td>
<td>5.0</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>S7</td>
<td>16.4</td>
<td>2.6</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>S8</td>
<td>13.7</td>
<td>1.2</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>S9</td>
<td>11.8</td>
<td>3.4</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>S10</td>
<td>11.6</td>
<td>11.0</td>
<td>1.7</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Later on, and as part of the environmental baseline survey conducted in 2008-2009, ambient air quality monitoring was conducted in three locations:

- At the Bourtassi Mosque facing the taxi stop station;
- At the Mohamad Bek Mosque; and
- Along Corniche Rashid Karame facing the Citadel.

The ambient air quality at the the Citadel monitoring location exceeded the WHO guidelines for PM$_{10}$ and SO$_2$. The Rashid Karame Boulevard near the Citadel is affected by heavy traffic congestions and flow during the evening period when most of the people are returning back from work. Similarly, the two other locations monitoring locations revealed high SO$_2$ concentrations during daytime exceeding WHO guidelines due to traffic congestion during peak noon time were most of the commercial activities take place along the market area.

The detailed results of the air quality monitoring survey are available in the “Environmental Baseline and City Profile” report prepared by ELARD (Appendix B).

Noise levels
In the JICA air quality study, the noise level was recorded inside the old city center during daytime and nighttime hours on an hourly basis. Most average noise values ($L_{eq}$) exceeded the US Federal Highway Administration (FHWA) noise abatement criteria of 72 dBA in developed and urbanized lands. The noise levels recorded during the night were similar to those measured during the day, highlighting the nightlife activities in the city. Lebanese and WHO noise standards are as low as 50 dBA during the night and were exceeded in all measurements.

Noise monitoring was also conducted as part of the environmental baseline survey in 2008-2009, at the same locations as those selected for air quality monitoring. The ambient noise level ($L_{eq}$) readings for the three monitoring locations exceed the Lebanese maximum allowable noise limit
standards for both daytime and nighttime period (40 to 60 dBA). The main source of noise pollution is the traffic and commercial activities in the area.

Archaeological and Cultural Heritage Sites
The historic old city is a maze of narrow alleyways, colorful souks, hammams, khans, mosques and theological schools (madrassah). It is a very lively place where artisans, including jewelers, tailors and coppersmiths, continue to work as they have done for centuries. In addition to religious buildings (mosques) there are a couple of ancient hammams. The Hammam en-Nouri and the Hammam al-Jadid are both in the old city which are currently not in use.

Other commercial buildings are the khans, or caravanserais, where merchants brought their goods for sale and storage. Several of these are still in use as workshops and storage areas. Tailors have worked here and in the nearby Souk al-Haraj since the 14th century.

The old city is dominated by the vast citadel, known as Qalaat Sanjil in Arabic or the Saint-Gilles Citadel, which occupied the hill overlooking the valley, the town and the coast. The Citadel is the most visible and well-known monument in Tripoli, and the main attraction for the visitors to the historic old city.

Figure 8. Saint-Gilles Citadel in Tripoli
Transportation and Traffic

A qualitative survey was conducted on two circuits: Emir Fakherddine Street behind St. Grilles Citadel and Rachid Karame Corniche in the old city. A quantitative survey was fixed on 3 positions: Rachid Karame Corniche – eastern side of the river, Zgharta – Maoulawiyah access and Emir Fakherddine Street. These were conducted on December 3, 2008, covering morning and afternoon time.

The Rashid Karame Corniche and Emir Fakhreddine Street is very populated and overcrowded by various users and vehicles. From the beginning of the day till the afternoon, the circuits are almost saturated. Most of the parked cars are taxi cars. Traffic at the eastern side of the river, which consists of one lane 2 directions separated by a small median, is quite uniform during the day, with small difference for the peak and the off-peak hours. The peak hour is noticed to be between 13:00 and 14:00 which is also the peak hour of the parked vehicles for the nearby circuit.

On the Zgharta-Mawlawiyah access, which is a high speed road section consisting of 2 lanes 2-way, the peak hour is noticed to be between 16:00 and 17:00. The peak hour at this direction is in the afternoon between 14:00 and 15:00.

In the Emir Fakhreddine Street, which is a narrow one lane two-way road where cars park from both sides, the peak hour is noticed to be between 15:00 and 16:00. The traffic flow at this direction is very uniform during the whole survey period. The peak hour does not differ enough from the others.

Landscape and Cityscape

Central Neighborhood

The main landmarks in the Central Neighborhood are presented in the following table:

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rashid Reda Street</strong></td>
<td>The Buildings and urban fabric typology is mainly homogeneous (different periods, colors, material and typologies) with numerous low to medium rise buildings (3-5 floors). Except the Khan, all buildings are used for residential and retail purposes. The khan is currently under restoration, most the building are in medium to bad condition often post 50’s style. Some stone old houses with red tiles exist. Roads and networks consist of large carriageway constructed from tar and currently in good condition, however, intruded by Jumbled parking. Narrow sidewalks constructed from molded cement and currently in medium condition. No open public spaces were observed. The urban furniture includes many electrical posts and lamps of non-aesthetic quality with few road signs and many parking counter machines. Many trees (palm) are planted in public garden with some landscape (flowers) in the round about of good maintained condition.</td>
</tr>
<tr>
<td>Khalil Bin Qulwan roundabout</td>
<td></td>
</tr>
<tr>
<td>Public garden</td>
<td></td>
</tr>
<tr>
<td>Khan</td>
<td></td>
</tr>
<tr>
<td><strong>Old Souk (from Rachid Rida Street to Moussa Café Square/ Berket Bab el-Ramel)</strong></td>
<td>The Buildings and urban fabric typology is mainly homogeneous with</td>
</tr>
</tbody>
</table>
### Berket Bab el Ramel
- Old Souk
- Moalek Mosque
- Hammam al Jadd

Compacted urban fabric. Some medium-rise buildings (6 floors) and some with typical old souk fabric style (e.g. winding alleys, etc.). Many houses have various architectural styles. The hammam has similar traditional style. Most of the buildings are in bad condition with few building recently restored. Most of the buildings are used for retail and residential purposes. Roads and networks consist of wide carriageway constructed from tar and currently in good condition, however, intruded by jumbled parking. Narrow or mostly in-existent sidewalks constructed from molded cement and currently in good to medium condition often intruded by cafe terraces and displayed stands. No open public spaces were observed. The urban furniture includes many electrical posts and lamps of non-aesthetic quality. Two public gardens exist mostly covered with grass and planted with many palm and pheicus trees in a well maintained condition.

### Abou Ali River

The main landmarks along the Abou Ali river are presented in the following table:

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Northern section</strong></td>
<td></td>
</tr>
<tr>
<td>Abou Ali river</td>
<td>The Buildings and urban fabric typology along the left bank is mainly homogeneous with massive medium-rise buildings (5 floors). Whereas, along the right bank, is mainly homogeneous with compacted low-rise buildings (&lt;3 floors). Most of the buildings are in medium to bad condition with no particular architectural style or value. Most of the buildings are used for retail and residential purposes. The old marker is highly insightful mostly compacted and constructed from metal structures that do not blend with the surrounding urban fabric. Roads and networks consist of wide carriageway constructed from tar and currently in good condition, however, intruded by jumbled parking. Narrow (related to road dimensions) sidewalks constructed from molded cement mostly in very bad condition often intruded by jumbled parking, many stalls, storage and rubbles. The river bed is wide and deep and constructed mainly from reinforced concrete steel. Several pedestrian bridges exist along the river. The river bed is currently in bad condition with many open holes and damaged walls and has become a main dumping area for market solid waste and rubble. The urban furniture includes many electrical posts and lamps of non-aesthetic quality with few scattered trees along the river basin.</td>
</tr>
<tr>
<td>Mahmoud Bek Mosque</td>
<td></td>
</tr>
<tr>
<td>Market</td>
<td></td>
</tr>
<tr>
<td><strong>Southern Section</strong></td>
<td></td>
</tr>
<tr>
<td>Bourtassi Mosque and Square</td>
<td>The Buildings and urban fabric typology along the left bank is mainly low-rise houses. Whereas, along the right bank, is mainly medium-rise buildings. Some (facing Bourtassi Mosque on right bank) are low-rise stone buildings currently in bad condition. Most of the buildings have been recently restored. Most of the buildings are used for the retail and residential purposes. Some old houses without particular style and value whereas many large impressive houses with traditional Lebanese topologies (e.g. triple arches, verandas, bay-windows, diwan, etc.) Roads and networks consist of wide carriageway constructed from tar and currently in good condition, however, intruded by jumbled parking. Narrow sidewalks constructed from molded cement mostly in good to medium condition often intruded by displayed stands. A large open space covered with tar currently used as a parking lot. The urban furniture includes few electrical posts and lamps of non-aesthetic quality with very few road signs still in good condition. The only landscaped area is the Burtasi mosque garden and vegetation cover below the citadel.</td>
</tr>
<tr>
<td>St-Gilles Citadel</td>
<td></td>
</tr>
<tr>
<td>Abi Samra parking (Seif el Deen Square)</td>
<td></td>
</tr>
</tbody>
</table>
Socio-economic environment

General aspect

Tripoli is considered Lebanon’s second capital and the capital of the Northern Mahafaza. Figure 9 depicts the general city layout with respect to its environs. The city of Tripoli was more or less clustered on two hills (Abou Samra and El-Qoubbeh) around a central core or the old city. The area of Greater Tripoli is around 873 ha, of which 39 ha constitute the old city of Tripoli. Currently, the city itself comprises three municipalities, namely, Tripoli (includes Tripoli center, Qoubbeh and Abou Samra), El Mina (located in the west at the tip of a peninsula), and El Baddawi (in the north-east).

![Figure 9. Tripoli and its environs](image)

Population

The population in Tripoli and its immediate surroundings grew rapidly from 54,876 in 1932 (French Mandate Census) to around 500,000 in 1995 (used in various studies). This population
growth took concrete form in the expansion of the old city. The population of Tripoli is expected to follow a linear declining growth rate starting at 2.3 percent and reaching 2.0 percent as presented in Table 11.

Table 11. Expected population growth in Tripoli

<table>
<thead>
<tr>
<th>Year</th>
<th>1995</th>
<th>2005</th>
<th>2010</th>
<th>2020</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>500,000</td>
<td>626,000</td>
<td>698,000</td>
<td>865,000</td>
<td>1,302,000</td>
</tr>
</tbody>
</table>

The Tripoli old city inhabitants are largely of local origin and are poorer and less educated than the national average. About 2/3 of them are from Tripoli, and almost 90% from North Lebanon. The great majority of workers (96% of souq workers) are Lebanese. The population is stable and is well rooted (over half of them settled before 1975, and only 1/5 since 1995). The average population density in the old city center is 260 persons/ha, varying between 100 person/ha in Nouri to 500 persons/ha in Al Soueika and Haddadin.

Socio-economic activities

Present industries include small industries scattered throughout the greater Tripoli residential neighborhoods and include car repair workshops, food processing establishments, furniture and wood crafts, soap making, and different commercial shops (selling clothes, cosmetics, books, leather goods, toys, spices, coppersmiths, food and household products) (Figure 10). The famous copper market was displaced by the construction of a road. The ground floor of souks is generally occupied by shops, workshops, and warehouses, while the first floor consists of residential units for workers mainly.

Most large industries in the Bahsas area have closed down during the war (steel mill, compressed wood mill, seed oil, and sugar refinery). In the same manner, the oil refinery in El Beddawi stopped operating and its future is uncertain.

Figure 10. Small scale industries in Tripoli: Copper working and soap drying
The CHUD intervention areas host a mix of residential, commercial, and industrial activities, and are characterized by an overall low socio-economic level. Many carts selling various goods, especially along the Rachid Karame Corniche, along which many illegal settlements selling vegetables, fruits, shoes, clothes, furniture, etc. are scattered. Those will be resettled to the platform over the river, in more organized and presentable structures.

A Resettlement action plan will be implemented at the end of the construction phase. Several parks can be found in Tripoli, the most important of which is the Menshiyeh park situated in the middle of the Tell area that was built by the Municipality in 1922. Two other small green spaces were identified within the Study Area, the Maoulawiyah Park and the Public Square near the southern access to the city, are to be landscaped by the CHUD project.

Socio-cultural activities
Except for the Rabita al Thakafi ah that organizes socio-cultural activities (conferences, art exhibitions, annual book fair), Tripoli suffers from insufficient cultural and recreational facilities such as theatres, public libraries, recreational areas and parks.

Property and tenure
Figure 11 depicts the general land use in the Tripoli area. Like most other historic cores in Lebanon, land ownership in the ancient core of the city is subdivided into three general categories:

- Private ownership traditionally by the older families of Tripoli who lived at one point in the city center,
- Waqf ownership or land held in endowment for one of the religious groups, sects or families, and
- Public land owned by ministries or the municipalities.
Only half of the householders rent properties (rents being exceptionally low), the remainder being owners in whole or part. Three-quarters of all properties are privately owned (mostly familial) while Waqfs (property owned by the different churches and Islamic sects) comprise almost a quarter of the properties.

**Byblos**

*Physical environment*

Byblos is located 38 Kms North of Beirut along the Mediterranean coast, and stands halfway between Tripoli and the capital, Beirut (Figure 1). The city itself is part of the caza of Jbeil that includes 84 other villages grouped into 20 municipalities. The municipal boundaries of the city cover an area of 75 ha, of which 10 ha constitute the ancient core of the old city of Byblos, one of the oldest settlements of the cities of the East (Figures 10 and 11).
The map below illustrates the Study Area in Byblos City, which covers three main locations falling west of the highway:

- The city entrance;
- The historic city center; and
- The harbor area and coastal zone leading to the land castle area.
Figure 14. CHUD Study Area and Summary Description of Project Works in Byblos
Climate
Similar to Tripoli, the climate in the region of Byblos is of the subtropical, Mediterranean type with warm and dry summer and fall (June to September), and moderately cold, windy, and wet winter (November to April). The average annual precipitation is 1,015 mm (Batroun station, altitude 20 m) while average annual humidity is 70 percent. The average temperature in summer in Byblos is 28°C, while in winter it is 10°C. The annual mean temperature is 20°C. Temperatures above 30°C occur on average 46 days per year. Days with temperature below 0°C are very seldom. Prevailing winds are from the West and Southwest, while winds from the East and Northeast occur with less frequency (85 percent vs 15 percent).

Water resources
The water demand for the city of Byblos was estimated at 3,225 m³/d in 1995 and is expected to reach 6,277 m³/d in 2020 (based on a supply of 215 L/person/day). Water is supplied to Byblos and the whole caza of Jbeil from the following water resources:

- Afqa spring supplies a yield of 15,000 m³/d during summer;
- Er-Roueiss spring supplies a yield of 20,000 m³/d during summer (also used for irrigation);
- Qatra spring supplies a yield of 75 m³/d during summer; and
- Several public and private wells to supply the remaining water demand during peak times.

These sources also supply the rest of the district of Byblos. Water is distributed through a network that was recently renovated by the local water authority. This has led to an increase in water supply and pressure that were previously lost due to leakages from the old network. As for water and groundwater quality, no relevant information or studies were found, and no quality monitoring system was reported.

Seawater Quality
Seawater samples were taken at three locations in Byblos:

- In the middle of the fishermen port;
- At the edge of the port, near the wave breaker facing the seas castle; and
- At the public beach to the north of the harbor area.

Samples were analyzed for pH, biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliforms, and total coliforms.
The analysis results show that seawater in Byblos complies with MoE and WHO standards with respect to all tested parameters. Coliform bacteria are absent in the sample taken at the public beach, and very few were found in the port region. This can be explained by the absence of a wastewater network in the city discharging domestic sewage into the sea (within the Study Area). Traces of oil, fuel and other pollutants were slightly observed in the harbor water as a result of the daily fishing activities and boats operation. 

For detailed sampling results, please refer to the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).

Wastewater and storm-water drainage

Byblos does not have a sewage network, neither in the old city nor in the modern settlements. All buildings rely on septic tanks for sewage discharge. In the old city, a section of the medieval sewage system is still operational. It is currently used for the drainage of rainwater. During the past years, overflows from septic tanks were diverted to this channel. The contaminated rainwater is drained downhill through the medieval discharge pipe located next to the old harbor southern jetty (Figure 15). Consequently, new wastewater and drainage systems are considered a priority and were integrated within the CHUD project (Figure 16). A total length of 2,000 m of new sewer lines is being installed to collect the wastewater from the old city of Byblos. Two pumping stations are to be constructed: one at the current sea discharge point and another one close to the “Byblos sur Mer” resort. These stations will serve to pump wastewater to the main network passing through Jbeil and divert it to a treatment plant that was constructed in the Northern part of the city.

Figure 15. Seawater pollution at the fishing port and at the bathing area
According to the master plan for the collection, treatment and disposal of wastewater generated in the caza of Jbeil (prepared in 1999), a new wastewater collection system covering most of the villages of the caza of Jbeil is envisaged. A main coastal collector will convey the wastewater to the sewage treatment plant located to the North of Byblos city. The system is of the biofiltration system and is designed to serve a total population of nearly 51,500 until the year 2040. The plant will be receiving an average daily flow of 9,000 m³/d, and the treated effluent will be discharged through a sea outfall that will extend some 600 m into the sea.

Solid Waste Management
The average waste generation rate in the city of Byblos is 0.75 kg/capita/day, resulting in a total of 13 t/d. The whole caza of Jbeil, comprising of 69,000 residents generates around 59 t/d. Solid waste generated from the city of Byblos and the caza of Jbeil have been disposed of, for more than 20 years, in the open dump of Hbaline, 5 km from the coastal zone of Jbeil (Error!}
Reference source not found.). Waste management practices at this site were based on open dumping and burning to decrease the accumulated volume. These practices are environmentally unacceptable and were stopped two years ago by the municipalities of the area. However, burning of waste still occurs due to the generation of biogas in the dump. Currently, waste is being compacted and covered on a daily basis to prevent the emission of odors, while gases are discharged into the atmosphere through passive wells. It is worth noting that the Hbaline dump was ranked third out of the 670 dumps in Lebanon after Saida and Tyre (MoE, 2011), requiring closure and rehabilitation.

A solid waste management complex was built in 2005 next to the dump in Hbaline by the Union of Jbeil Municipalities with the support of the Pontifical Mission and funding from the USAID. The plant was supposed to serve the whole caza of Jbeil and comprised composting and sorting facilities, in addition to a landfill that was supposed to be built. However, the plant did not operate as planned, and open dumping is still ongoing until a solution is found. The Union was granted funding by the EU following the construction of the SWTP in order to add a sorting line and procure street bins and trucks for the member municipalities for the storage and collection of waste generated in these municipalities.

Solid waste in the city of Byblos is collected on a daily basis and transported to the Hbaline dumpsite. The field surveys revealed a high degree of street cleanliness with no observed littering or illegal dumping or spillage from storage containers.

A tender for the refurbishment, operation and maintenance of the SWTP in Hbaline, as well as the closure and rehabilitation of the existing dump is currently being prepared by the Union of Municipalities in order to solve the caza’s waste management problem.

Ambient Air Quality

Ambient air quality monitoring was conducted in two locations, namely, within the UNESCO square and at the intersection between the Roman Street Facing UNESCO Square and the street leading to Harbor area (facing the old mill).

Slightly elevated level of SO₂ reading at the first location is most likely influenced by the presence of nearby power generator used during the rehabilitation of nearby building during the air monitoring period.

Concentrations of PM₁₀ and SO₂ were higher than WHO guidelines at the second location. The main sources of air pollution include the stack emission form nearby old mill and the traffic along adjacent street especially during peak noon and night hours where traffic is busiest at this intersection. For detailed results of the air quality sampling, please refer to the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).
Noise Pollution
Baseline noise level monitoring was conducted at the same locations as those of the air quality monitoring locations).
At the first location, noise pollution is mostly attributed to commercial activity at the square which increases during nighttime period as compared to the daytime period when most of the restaurants and coffee shops are closed.
The ambient noise level (Leq) readings at the second location exceeded the Lebanese maximum allowable noise limit standards for residential and commercial areas during daytime and nighttime period (40 to 60 dBA). This is mostly attributed to the proximity of the B2 location to a busy traffic intersection in Byblos city. The main source of noise pollution at this location is the traffic and commercial activities in the area.
For detailed results of the noise monitoring, please refer to the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).

Archeological and Historic Sites
Byblos is one of the oldest cities in Lebanon. It is a main tourist destination mainly because of its rich history and scenic mountains overlooking the Mediterranean. It is a touristic and archeological site emphasizing very important ruins of 17 civilizations and monuments from the Roman till the Ottoman era.
In the southeast section of the historic city, the old harbor of Byblos is used for fishing and for boat rides to the nearest islands.

Figure 17. Overview of Byblos fishing harbor and Historic Sea Castle
Today, the city is designated as a UNESCO World Heritage Site. The plan below shows the archeological sites in Byblos City.

![Archaeological sites of Byblos City](image)

Figure 18. Archaeological sites of Byblos City

The archeological and touristic sites include:

Ancient Phoenician Temples: the Great Temple (also known as L-Shaped temple) built in 2700 BC, Temple of Baalat Gebal built in 2700 BC, and Temple of the Obelisks built around 1600 BC.

Byblos Castle, built by the Crusaders in the 12th century, located in the archaeological site near the port.

The Medieval City Wall: the old medieval part of Byblos is surrounded by walls running about 270m from east to west and 200m from north to south.

Byblos Wax Museum: it displays wax statues of characters from Phoenician times to current days, providing a quick and entertaining introduction to Lebanon's past.

St John the Baptist Church: Work on the church started during the crusades in 1150. It was damaged during an earthquake in the 12th century and also during several conflicts.

The Byblos Fossil Museum, which has a collection of fossilized fish, sharks, eel, flying fish, and other marine life, some millions of years old, from the village of Haqel in the district of Jbeil at an altitude of around 650 m.

Historic Quarter and Souks: In the southeastern section of the historic city, near the entrance of the archaeological site, is an old market where tourists can shop for souvenirs and antiques, or simply stroll along the old cobblestone streets and enjoy the architecture. The souks were restored by the Department of Antiquities. It is a paved street prohibited for vehicles and opened for pedestrians only.
Moreover, the Byblos International Festival, an annual summer event that takes place in the historic quarter, attracts hundreds of tourists and visitors every year. A cultural committee also exists in Byblos, and an exhibition and symposium are held in the Ottoman Souk, the old city, and the port.

In addition, the building of the Directorate General of Antiquities, that used to be a UNESCO office, is being rehabilitated by the Municipality, and will serve as a cultural center comprising a public library and an electronic information center for the public. It is located in the phase I study area.

Transportation and Traffic
The traffic survey was restricted to a qualitative description of traffic conditions and spot survey of parking spaces along the historical center and the harbor area as well as the existing parking
lots. The survey was conducted on the 21st of October 2008 for two periods in order to cover the morning and the afternoon time.

The qualitative traffic monitoring showed that the central souk of Byblos city, where all activities are located by the employees and the tenants of the city, is very crowded. A lot of car parking violation is observed, especially in the surrounding of banks.

The touristic areas were acceptable and no congestion was noticed during a normal weekday. However, during weekends and holidays, the harbor zone and the roads leading to it are usually very congested and parking lots are fully occupied.

Landscape and Cityscape

**Main entrance of the old city**

The main landmarks at the main entrance of the old city are presented in the following table:

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Serail Street</strong></td>
<td>The buildings and urban fabric typology is mainly homogeneous consisting of low-rise houses (3 floors maximum) except for the Serial building (4 floors). Few buildings are mostly in medium condition. The architectural style is a continuity of old buildings; some were post 50’s stone buildings. Some of the buildings are used for both retail (administrative and offices) and residential purposes. Roads and networks consist of wide carriageway constructed from tar and currently in medium condition. The carriageway is intruded by jumbled parking facing the Serail building whereas regulated parking was observed along the rest of the streets. Narrow sidewalks exist, constructed from molded cement and stones currently in medium to bad condition. The urban furniture mainly consists of several electrical posts and lamps of old and non-aesthetic quality. Few road signs and bollards exist and are in medium to good quality. The landscape floor is mostly soil with lots of trees and bushes of variety of species and maintained in good condition.</td>
</tr>
<tr>
<td><strong>DGA Street</strong></td>
<td>The buildings and urban fabric typology is mainly homogeneous consisting of low-rise houses (single ground floor) mostly in medium condition. Many are stone buildings whereas some are more recent but of insignificant architectural value. All buildings are used for retail purpose. Roads and networks consist of wide carriageway constructed from tar and currently in medium condition. The carriageway is intruded by jumbled parking. Narrow sidewalks (except at the entrance) exist and constructed mostly from molded cement and in medium to bad condition. The urban furniture mainly consists of very few electrical posts and lamps of non-aesthetic quality. Very few road signs and bollards exist of good quality. No open spaces or landscape exist.</td>
</tr>
</tbody>
</table>

**Old City**

The main landmarks in the old city are presented in the following table:
Table 13. Main landmarks in the old city

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Citadel Square</strong></td>
<td></td>
</tr>
<tr>
<td>Square overview</td>
<td>The buildings and urban fabric typology is mainly homogeneous consisting of low-rise houses. All are in good condition (recently restored) comprising mainly of old and traditional high-value architectural style (stone, red tiles, wooden shutters). Archeological site also located on the major part of the square. Most of the buildings are used for retail activities and some are used for worship. Roads and networks consist of very narrow carriageway constructed from tar and currently in medium condition. No sidewalks exist. The square itself is a large open space mainly designed from stone floor-covering and currently in good condition. The urban furniture mainly consists of few electrical posts and lamps of non-aesthetic quality. Few road signs, bollards and bind exist and are in medium to good quality. The landscape floor is mostly soil with lots of trees and bushes of variety of species and maintained in good condition.</td>
</tr>
<tr>
<td>Old Souk entrance</td>
<td></td>
</tr>
<tr>
<td>Archeological site entrance</td>
<td></td>
</tr>
</tbody>
</table>

| **UNESCO Square (Ottoman Souk)** |                                                                                                                                                                                                           |
| Square                         | The building and urban fabric typology is homogeneous comprising of low-rise buildings. The architectural style mainly comprises traditional old stone buildings (vaulting, wooden shutters, etc…) restored and in good condition. Some more recent elevations built with old patterns (stone…) also exist. The buildings are mainly used as retail and office. Some include restaurants, cafés and residential units. The road network consists of large carriageway (pedestrian) constructed from designed stone floor-covering and in good condition. The sidewalks are narrow made of stone and in good condition intruded by café terrace and plants. A large open space (private garden) covered with grass and in good condition is also observed. The urban furniture mainly consists of few electrical posts and lamps of non-aesthetic quality with few road signs and markings. The landscape of the area consists mainly of many wooden planters along the private garden with lots of palm trees along the sidewalk. The maintenance of the landscape is mainly in good condition. |
| UNESCO Garden                  |                                                                                                                                                                                                            |

**Seafront**
The main landmarks on the seafront are presented in the following table:

Table 14. Main landmarks on the seafront

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Harbor Entrance</strong></td>
<td>Building fabric is homogeneous comprising mainly of one large and middle-rise building. The building’s architectural style resembles post 50’s tourist building style and is in medium state of repair. The buildings are mainly used as hotels, restaurants, cafés on seaside. The road networks consist of wide carriageway with no sidewalks constructed from tar and currently in good condition. Urban furniture includes few electrical posts and lamps of non-aesthetic quality. Landscape consists of some bushes observed along the hotel’s façade.</td>
</tr>
<tr>
<td><strong>Harbor Quay</strong></td>
<td></td>
</tr>
<tr>
<td>General overview from the main entrance</td>
<td>Building fabric is homogeneous consisting mainly of low-rise individual houses. The architecture style is mainly old traditional Lebanese houses</td>
</tr>
</tbody>
</table>
Medieval wall and Sea Castle (arches, stone, red tiles, etc.) These buildings are mainly used as restaurants and cafes and currently in good state of repair condition. The urban furniture included several benches in good shape with very few electrical posts of non-aesthetic quality. The road networks and public places consisted of large carriageway constructed from concrete blocks with large open spaces. In general, the roads and open spaces are in very bad condition. In addition, no sidewalks existed. Several encroachments were observed including unorganized parking, boats and fishing nets. There is no clear borderline between carriageways, sidewalks and open spaces. The natural coast located under the archeological site is disused and hardly accessible. Moreover, the downhill of the archeological site is threatened by erosion.

Socio-economic environment

Population

According to a 1999 survey, the population of Byblos has more than doubled during the last twenty years. Future population projections for Byblos city until the year 2040 (based on a population growth of 2.35 percent per year) have been estimated and are presented in Table 15. Other population demographics in Byblos are presented in Table 16.

<table>
<thead>
<tr>
<th>Year</th>
<th>1995</th>
<th>2005</th>
<th>2015</th>
<th>2025</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>14,296</td>
<td>18,034</td>
<td>22,750</td>
<td>28,698</td>
<td>40,660</td>
</tr>
</tbody>
</table>

Table 15. Population estimates for Byblos city

| Number of residents during summer | 15,300 |
| Number of residents during winter | 17,000 |
| Number of households | 4,250 |
| Average family size | 4 |
| Gender distribution | 49.5% males, 50.5% females |
| Age group distribution | <20 years: 38 % |
| | 20-39 years: 34 % |
| | 40-59 years: 20 % |
| | >60 years: 8 % |

Table 16. Population indicators for Byblos

Socio-cultural activities

The working population in Byblos constitutes 38 percent of the total population. The majority of this workforce is in the services sector (65 percent), while others are distributed on industry, agriculture and maritime sectors at 15, 10, and 10 percent, respectively. Female employment constitutes 30 percent of the total workforce.
Byblos is today one of Lebanon's top tourist attractions, mainly because of its rich history and cultural heritage, and the scenic mountains of the district overlooking the Mediterranean. Its sand beaches and resorts, as well as nearby mountain destinations attracts local and foreign tourists. Art and culture are tightly linked to tourism through archeological sites such as the old city, the port, the Citadel and old churches.

The main economic sectors in the Study Area consist of commerce, tourism (restaurants, pubs, etc…), fishing, and other services (banks, schools, health care facilities…). Byblos is benefiting from the development of industrial activities to the south and north of the city such as cables industry, paper and cardboard, tapestry, cosmetics, beer, metal works, as well as the development of greenhouses that has expanded the agricultural area. The old Souks of Jbeil constitute the historic commercial centers of the city. They are composed primarily of paved narrow alleyways with small commercial activities selling artisanal clothes and shoes, small gifts, books, coppersmiths, and local food (Figure 21). In addition to the intense culunar and night life activities in the historic core of the ancient city, Byblos benefits from a yearly International summer Musical Festival that attracts a total of an audience estimated more then 50,000 people.

Figure 21. Artisanal products and restaurants in Byblos
Property and Tenure
Similar to Tripoli, land ownership in Byblos is subdivided into three general categories (Figure 22):

- Private ownership traditionally by the older families who lived at one point in the city center (22.7 percent),
- Religious ownership or land held in endowment for one of the religious groups, sects or families (27.7 percent), and
- Public land owned by ministries or the municipalities (49.6 percent).

![Figure 22. Land ownership in the old city of Byblos](image)

**Saida**

*Physical environment*

Saida is located 35 Km South of Beirut along the Mediterranean coast (Figure 1). It sits at the edge of now severely eroded agricultural plains, mainly citrus orchards. Saida is the administrative center for the Mohafaza of South Lebanon. The city is subdivided into three cadastral zones, the historic core, the Dekerman, and Wastani. The historic core accounts for a total area of 20 ha. In the last two decades, the city has witnessed significant growth and urbanization over its adjacent hillsides. The CHUD intervention Area and the components of the
project in Saida city are concentrated in the historic core as illustrated in the following map. The Study Area covered in this baseline study is as follows:

- The city entrance and around Khan el Franj (coastal/harbour zone facing the fishermen port);
- Along Chakrieh Street starting from Khan el Keshle to the end of street along the market area;
- The souk (restoration of the faceades and electricity works)
- Restoration and reuse of khan el Keshle
- The rehabilitation of the land castle
Figure 23. CHUD Study Area and Summary Description of Project Works
Climate
Similar to other coastal cities in Lebanon, the climate in the region of Saida is Mediterranean characterized by mild wet winters and dry summers. The average annual precipitation over Saida is around 660 mm/yr (Saida station, altitude 5 m). On average, there are about 60 days of rain per year with a monthly precipitation ranging between 170 mm in January to 0.5 mm in July and August. Humidity ranges from an average of 66 percent in winter to 75 percent in summer. The average yearly temperature in Saida is around 19.5°C, ranging between an average of 9°C in winter and 31°C in summer. The prevailing wind in the coastal region is mostly southwesterly bringing humid air masses and rainfall in winter. It also brings humidity in summer, which stays on the coast or rises on the slopes to turn into fog. The wind is relatively calm most year round. The average wind speed ranges between 3 and 5 m/s.

Water resources
Saida falls within two watershed basins, namely Bisri-Awali and Sainiq. Bisri starts at an elevation of 1,921 m at the Barouk hills with a length of 48 km and an area of 302 km². Sainiq has a length of 20 km and an area of 111 km². The average monthly discharge of the Awali and Sainiq rivers is 0.329 m³/s and 0.452 m³/s, respectively. About 60 percent of the actual domestic water demand of Saida is extracted from 6 wells, of which 5 are located within Saida and one at Ain el Helwe (total yield of 27,100 m³/day). The remaining 40 percent are withdrawn from the Kfarwe spring (yield 10,000 m³/d in dry season and 20,000 m³/d during wet season).

Coastal front
The coastal ecosystem is a flat strip with an average width of 1,200 m. The northern and central parts of the coastal plain are mostly built and heavily populated. Vegetation is moderate with very little agricultural activities. The seafront beaches are straight and mostly sandy to gravel in nature. There is little construction at the seafront except in the central area (touristic site and port facilities). About 9 major outlets are discharging their effluents of domestic raw sewage and industrial wastewater directly or indirectly (through storm water culverts and open stream channels) into the sea.

Wastewater and stormwater drainage systems
The city of Saida is served by a sewerage network that discharges directly to the seashore, or into a storm water culvert, which eventually discharges into the sea, or overland into natural stream channels of dry bed wadis. About 9 major outlets were discharging their effluents of domestic raw sewage and industrial wastewater directly or indirectly (through storm water culverts and
open stream channels) into the sea and within the Fishermen harbor area. Today, a wastewater interceptor running along the coastline, starting to the North of Saida and reaching Sainiq River is constructed and all generated effluent (including those from the CHUD Study area) are diverted to a wastewater treatment plant located south of the city. The wastewater treatment plant, with an area of 4 ha, is designed to serve a population of 234,000 up to year 2015 and an average daily flow of 33,600 m$^3$/d. Treated effluent is discharged through an 800 mm diameter sea outfall extending for 1,700 m to a depth of 31 meters.

Seawater Quality

Untreated sewage discharge into the marine environment is contaminating seawater, sediment, and marine flora and fauna with various contaminated effluent discharges causing health hazard to bathers or individuals consuming seafood next to outlet areas. An increased level of organic and inorganic nutrients is leading to eutrophication of shallow protected areas near the shore which is manifested by a high degree of algal growth. Deterioration of seawater quality in terms
of increased turbidity, coloration, odors, and other visual aesthetic criteria are affecting amenities of local residents and tourists.

Under the baseline survey conducted in 2008-2009, seawater samples were taken at three locations in Saida:

- In the middle of the fishermen port;
- Midway between port and the sea castle; and
- Near the pedestrian bridge connecting the sea castle with the shore.

Samples were analyzed for pH, biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliforms, and total coliforms.

The seawater along the coast was found to be polluted due to the discharge of raw sewage into the sea, particularly in the harbor area. The seawater in the harbor area is also polluted from oil, fuel, solid waste and other pollutants as a result of fishermen’s daily activities, boats engine leaks and maintenance activities. The water breaker along the fishing port further aggregates the pollution level in the seawater due to limited flushing capacity in the harbor.

The analysis results showed that seawater in Saida does not comply with MoE and WHO standards with respect to most tested parameters, especially near the pedestrian bridge. Thus, the water is unsuitable for secondary contact with the sea, i.e., fishing, etc. In the latter location, the water is unsuitable for swimming purposes or any other type of primary contact.

Consequently, sea water in the vicinity of Saida is subject to wastewater discharges and continuous discharge of organic waste (fishing activity) eventhough the wastewater interceptor is supposed to collect discharges and convey them to the WWTP for treatment. Traces of oil and fuel were also observed within the port, mainly due to regular maintenance, refueling and leaking engines, as already mentioned.

For detailed results of seawater quality monitoring, please refer to the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).

Solid waste

The average solid waste generation rate for Saida is 0.7 Kg/capita/day. Consequently, Saida generates around 53 t/d of solid waste that is being collected by the municipality (Figure 25) and is disposed of in an open dump at the Southern entrance of the city. The Saida dump was ranked first among 670 dumps in Lebanon based on a risk sensitivity index that was assigned to each dump (MoE, 2011). The presence of this dump in this area is environmentally unacceptable and has been a source of several environmental catastrophes in the area due to frequent collapse of tons of unstable solid waste into the sea, and due to fire outbreaks causing significant air pollution. The municipality has proposed an integrated solid waste management plan for Saida.
and its surroundings with the assistance of foreign investors. An anaerobic digestion facility with a capacity of 300 t/day has been constructed; a recent independent assessment of this facility has however identified several constraints to the operation of the facility, which is still not operational. Similar to Tripoli, solid waste in the old city streets is collected manually since the roads are narrow and are inaccessible to standard collection vehicles (Figure 25). The waste collection in the old city has been identified as a key problem for the municipality.

![Solid waste manual collection in the old souks of Saida](image)

Figure 25. Solid waste manual collection in the old souks of Saida

### Ambient Air Quality

Ambient air quality monitoring was conducted in three locations:

- At the Corniche facing the fishermen syndicate building;
- At the road intersection facing Khan al Keshle at the beginning of Chakirieh Street; and
- At the end of the Chakirieh Street.

SO₂ readings exceeded the WHO guidelines at the first two locations. The main sources of SO₂ in both areas are identified to be the traffic in the adjacent road, a number of nearby backup diesel power generators that were operational during the monitoring activity, and small scale shops (mostly furniture, bakery, etc.). For more details on the results of air quality monitoring, please refer to the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).
Noise Pollution
Baseline noise level monitoring was conducted in the same three locations as air quality monitoring locations.
The ambient noise level (Leq) readings for the three monitoring locations exceeds the Lebanese maximum allowable noise limit standards for residential and commercial areas for both daytime and nighttime period (40 to 60 dBA). The main source of noise pollution is the traffic and commercial activities in the area. Detailed results are available in the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).

Archaeological and Cultural Heritage Sites
The Saida historic Sea Castle located within the coastal zone of the CHUD Study Area is a fortress built by the Crusaders in the early 13th century. It is built on a small island connected to the mainland by a causeway. A climb to the top leads to the roof where there is a good view of the port and the old part of the city. It is one of the most important tourist attracting landmarks within the CHUD Study Area. However, the offensive odor, color and turbidity of the seawater due to pollution along the pedestrian bridge connecting the castle to the shore are a major drawback of this important tourist attraction landmark.
The Khan el Franj, which means “Caravan of the Foreigners”, was built by Emir Fakhreddine in the 17th century to accommodate merchants and goods. This is a typical khan with a large rectangular courtyard and a central fountain surrounded by covered galleries and one of the main tourist attraction landmarks in the CHUD Study Area.
Debbane Palace is a historical residence built in 1721 AD and is open for the public for visitors to witness the Arab-Ottoman architecture and details of that era (18th Century). It is currently transformed into the History Museum of Saida.
Between the Sea Castle and the Castle of St. Louis (land castle) stretches the old town and a picturesque vaulted old market which is currently under the rehabilitation of CHUD project.

Transportation and Traffic
A qualitative description of traffic conditions and spot survey of parking spaces along the sea side and the vicinity of the souk and archaeological sites as well as the existing parking lots were conducted on the 22nd of October, 2008 for two periods in order to cover the morning and the afternoon time.
A quantitative survey was also carried out from Wednesday 4th February, 2009 till Friday 6th February, 2009 on Chakrieh road in order to compute the traffic figures traveling along the road in a normal day.
The qualitative survey at the sea side and harbor area revealed that the parking area is almost fully occupied except the parking lot. Most of the cars belong to visitors and commuters in the nearby area. For a typical touristic day or weekend day, it is expected that the number of parked cars would increase significantly and that would cause traffic congestion on that route.

The available parking spaces in the area facing the sea side are indeed not in adequacy with the demand of a typical touristic or weekend day. Some of the restaurants have taken the liberty of reserving parts of the circuit for their own uses by placing barriers along the sides of the circuit. The number of parked cars on a weekend or holiday would increase significantly beyond the capacity of the circuit causing congestions in the traffic flows.

In the area around the Khan el-Franj and the entrance to the old souk, a large number of cars belong to the visitors of the touristic sites. A number of cars used the sidewalks for parking. On holiday or weekend periods, the number of cars would be beyond the capacity of the circuit.

As for the quantitative survey, an automatic traffic count was carried out on Chakrieh road at two positions. The road is located in a popular and commercially active area and consists of one way one lane road with a parking lane on the left side. Traffic volume is more important on Friday morning than on Thursday, while the evening peak hour is on Thursdays.

Detailed results of the traffic survey can be found in the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).

Landscape and Cityscape

**Seafront (facing fishermen’s port)**
The main landmarks in the old city are presented in the following table:

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mosque</td>
<td>The Buildings and urban fabric typology is mainly homogeneous consisting of low-rise houses (3-4 floors maximum) of unordered entanglement of buildings and very compact fabric. Most are in bad or very bad condition. The architectural style is a continuity of old buildings with unsightly breeze blocks. Some have recently been increased in height. One stone arched gallery is abandoned. Most of the buildings are used for residential purposes with few retail and garages. The Khan el-Franj is the key monument of the site. It is multifunctional (tourist place, cafés, etc.) and well-maintained. It has a very high value architecture style and is in a good condition. The carriageway is large, paved and in good condition with well ordered parking spaces. Wide sidewalks exist along the seaside with stone pavement of good condition. Whereas, narrow sidewalks are observed on the cityside, mainly constructed from molded cement and stones currently in very bad condition. Very large open spaces exist within the entire area without any pavement and in very bad condition. Khan el-Franj frontage also has a large open space with stone pavement of very good condition. The urban furniture mainly consists of numerous electrical posts of old and...</td>
</tr>
<tr>
<td>Khan el Franj</td>
<td></td>
</tr>
<tr>
<td>Sea Castle</td>
<td></td>
</tr>
<tr>
<td>Fishermen port</td>
<td></td>
</tr>
</tbody>
</table>
non-aesthetic quality. Numerous street lights of well designed quality also exist. No road signs or street benches exist. Very few bollards exist of well designed characteristics. The landscaped area is only observed along the renovated part of the area (i.e. seaside and Khan el-Franj frontage) consisting mostly of palm trees of good condition.

**Chakrieh Street**

The main landmarks in the Chakrieh Street are presented in the following table:

Table 18. Main landmarks in the Seafront area

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debbane Palace</td>
<td>The Buildings and urban fabric typology is mainly heterogeneous (repetitious facades, similar outline and volume) consisting of low-rise houses (2-3 floors maximum) as well as one large building (Debbané Palace). Few buildings were in bad condition (e.g. khan el keshle). Whereas, the majority are in medium condition with only one that has recently been restored (Debbané Palace). The architectural style is a continuity of old buildings with similar old style, Debbané palace edified in an eclectic style with a number of triple-arched houses identified. Most of the buildings are used for retail and residential purposes. Roads and networks consist of wide carriageway constructed from tar currently in medium condition. However, intruded by several displayed stands and jumbled parking. Narrow sidewalks exist, mainly constructed from molded cement currently in medium condition and intruded by several displayed stands from retail shops. The urban furniture mainly consists of many electrical posts of old and non-aesthetic quality with numerous unsightly hanging electric cables. No open spaces or landscape exist along the street.</td>
</tr>
<tr>
<td>Khan el Keshle</td>
<td></td>
</tr>
<tr>
<td>Marketplace</td>
<td></td>
</tr>
</tbody>
</table>

**Socio-economic environment**

Population

The city’s urban development is evident in the encroachment of structures over Saida’s surrounding hills and along its coastline. The population has increased from a low of 15,000 in 1946 to more than 85,000 today. Population projections for the city of Saida are presented in Table 19.

Table 19. Population projections for the city of Saida

<table>
<thead>
<tr>
<th>Year</th>
<th>1995</th>
<th>2000</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>63,365</td>
<td>72,869</td>
<td>86,597</td>
<td>94,752</td>
<td>99,610</td>
<td>100,611</td>
</tr>
</tbody>
</table>

The population in the old city of Saida reaches 14,000 residents with a density exceeding 485 persons/ha. Similar to other Lebanese towns and cities, families in the old City of Saida are relatively large with 57 percent consisting of more than five members. The population is marked by its relative youth whereby more than 60 percent is under the age of 25.
The residents of the Old City of Saida are highly impoverished and except for a small segment which has been well rehabilitated by the Audi Foundation, much of the Old Town is severely degraded. The Old Town is perceived as a location to escape from and the number of younger residents is diminishing. The majority of the business operators in Saida (as well as customers) are residents of the Old City and therefore, an improvement in the business environment (encouraging non-residents) to venture to the Old City for shopping will mean enhancing the quality of life of the residents.

Socio-cultural activities
Around 27 percent of the old city’s residents are employed with males constituting around 86.5 percent of the workforce and females the remaining 13.5 percent. The types of jobs include small-scale vendors, daily workers, construction workers, employees, fishermen, drivers, teachers, and traders. Major trade activities existing in the old city center include food, furniture, cloth and accessories, construction material, mechanical parts for boats, general services, and coffee houses. With the exception of few restaurants and coffee shops, no entertainment or leisure activities exist in the historic core of the ancient city.

Property and Tenure
Similar to Tripoli and Byblos, land ownership in Saida is subdivided into three categories:

- Private ownership traditionally by older families who lived at one point in the center,
- Religious ownership or land held in endowment for one of the religious groups, sects or families, and
- Public land owned by ministries or the municipalities.

Tyre
Physical environment
Situated along the Mediterranean coast, around 80 km to the south of Beirut and 26 km north of the Lebanese southern borders (Figure 1), Tyre functions as the administrative and regional center of the Mohafaza of the South Lebanon. It is a small, rocky peninsula on one of the largest and richest plains of the Lebanese coastline. The seashore to the south of Sour has the longest and widest stretch of sand beaches. The fishing harbor surrounded by fishing installations and traditional living quarters constitute the heart of the ancient city. An aerial photograph of Tyre is shown in Figure 26.
The map below illustrates the CHUD intervention area in Tyre Old City, which covers three main locations:

- The fishing harbor area (port waterfront);
- The Bawabeh Square area;
- The Hamra (or Hiram) Street from Martyr Square to Awqaf Square;
- The coastline Zone;
- Cultural promenade and restoration of five historical building;
- Restoration and reuse of Khan al Rabu;
- Infrastructure works in the old city;
- Infrastructure and conservation city in the archaeological sites; and,
- The public market.

Figure 26. Aerial Photograph of Tyre
Figure 27. CHUD Study Area and Summary Description of Project Works in Tyre

Climate

A Mediterranean climate characterized by dry summers and wet winters prevails in the Tyre region. The coastal region receives an amount of 700 to 800 mm of rainfall per year concentrated...
in the winter during a period of four months from November to February. Temperatures vary with
the seasons. The average values of the mean monthly temperature in summer and winter are 37
and 14 °C, respectively. The humidity is relatively constant being always high with a maximum
of 80 percent during the month of August. The difference in temperature and relative humidity
for winter and summer months usually ranges between 10 to 15 °C and 10 to 12 percent,
respectively. The prevailing wind direction and speed vary with the season. During February to
August, the Southwestern winds prevail. During the rest of the year, the western winds are strong
enough to be easily detected. There are also local winds known as coastal winds, blowing from
the coast in the afternoon, and shore winds blowing from the sea during daytime.

Water resources
South Lebanon is known for the scarcity of its surface water in spite of its relatively abundant
rainfall. The geological layers dip towards the west and northwest, and the geographical slope
also runs in approximately the same direction, at no more than 40 meters per kilometer. The
gеologiсаl formаtіоnѕ аrе еxtreаmеlу frаgmеntеd wіth аn іmреrреrаblе lауеr оftеn sераrаtіng
them. As a result of this combination, a large quantity of groundwater is available in the Tyre
region. In fact, while devoid of perennial surface water sources, the Tyre region is sitting on a
groundwater basin whose estimated flow might exceed 50 million cubic meters per year.

Water quality
The major groundwater source is the Cretaceous limestone layer. The water from this aquifer is
of very good quality with no microbial pollution. The upper Eocene layer, which is also used as a
source of water for private wells in the Tyre area, is very polluted as a result of the poor condition
of the sewerage network and the presence of large numbers of septic tanks in nearby areas not yet
served by a collection system. Seawater intrusion due to over pumping is also a remarked
phenomenon along the coastline area. The Litani River, lying to the northern boundary of the
study area is polluted due to wastewater and industrial wastes discharges. The seawater along the
coast is polluted due to the discharge of wastewater into the sea, particularly in the harbor area,
which is targeted for rehabilitation under the proposed CHUD project. Drinking water quality is
variable. While the water is filtered and chlorinated before being distributed to users, damage and
neglect to the distribution system give rise to irregular supply pressures and can pollute the
network.
Water supply system

The city of Tyre is supplied by water from Ras El Ain and Rashidiyeh springs at an estimated volume of 10,000 to 15,000 m$^3$/day and 6,600 m$^3$/day, respectively. The water supply is regular and constant, although the city suffers from the inadequacy of supply during the summer months. As such, many private and community wells have been drilled to supply the region with drinking water, in addition to the Government’s wells of Ouadi Jilo (15,000 to 20,000 m$^3$/day). The water distribution system inside the old city is connected to the main distribution line. Some pipes are installed in an inadequate manner on the ground surface, or are insufficiently backfilled, which makes them susceptible to pollution. No storage reservoir exists in the area. The water consumption is currently in the order of 100 l/c/d while the future daily water demands require 260 l/c/d (for the year 2040). Recent water supply studies kept the existing system and developed a design of a new network around the city to meet its future demands.

Wastewater and storm water drainage systems

Part of the wastewater in the old city is conveyed to a pumping station neighboring the fishing port that pumps the wastewater to an old sea outfall on the western side of the city (Figure 28). A new wastewater treatment plant with a sea outfall is under construction in the Abbassiyeh area for the overall caza of Tyre. The present wastewater collection system consists mainly of pipes in principal venues, rectangular channels in internal streets serving both for wastewater and storm water drainage, and main pumping lines from the pumping station to the sea discharge point (two 500 mm pipes). The wastewater that is mixed with the storm water drainage system is also discharged into the sea through 5 main outlets to the north of the fishing port (Figure 29). The pumping station receives wastewater from several regions outside the study area, namely from El Ramli, El Basset, and Abbassiyeh. The pumping station consists of three pumps with one of them is not operational and the others suffer from major maintenance problems causing wastewater overflows into the sea.

The raw sewage disposed north of the commercial port facing the Bawabeh parking lot is resulting in the generation of offensive odor in the vicinity of the CHUD Study Area, mainly along the planned port waterfront development area.

Figure 28. Outfalls and channels discharging wastewater directly into the sea in Tyre
Figure 29. Existing sewer layout in the city of Tyre

New developments in the wastewater collection system are underway for the region of Sour with wastewater mains (400 mm diameter) being constructed to separate the drainage system from the wastewater collection system. Wastewater will be pumped to a gravity sewer leading to the future wastewater treatment plant to the north of the city of Tyre (Figure 30), where it will be discharged to the sea through a submerged sea outfall after treatment.

Figure 30. Proposed wastewater collection and disposal system in Tyre
Due to the importance of this specific area where the CHUD project is directly affected, the construction of a new network for the old city has been initiated and consists of the following:

- Installation of a pumping station L1 at the base of the existing sea outfall on the western side of the city. This station pumps the wastewater to an existing covered concrete channel that starts next to the Ahiram restaurant and goes inside the small alleys to reach the fishing port. The length of this pumping main is 154 m and its diameter is 100 mm.

- Wastewater flows through the existing concrete channel for about 186 m whereby a new gravity pipeline – Line C will intercept and collect the wastewater that was discharged into the fishing port from the two sides (from one side, the diameter is 300 mm, from the other side, the diameter is 200 mm). The two branches of Line C meet at the lowest point where a new pumping station L2 is installed and pump the wastewater through a 150 mm pipe for a distance of 270 m and discharge in a manhole in front of the main pumping station M3.

- The existing pumping station in the parking area will be dismantled and a larger capacity station will replace it to pump the collected wastewater via a 500 mm diameter main and discharge it into a collection manhole some 1250 m away along the Bass collector. From there the wastewater will flow by gravity and then through a lifting station to the planned wastewater treatment plant in the Abbassiyeh area.

Seawater Quality

Seawater samples were taken at three locations in Tyre:

- In the middle of the fishermen port;
- At the northern edge of the commercial port; and
- At the western sewer outfall of Tyre city.

Samples were analyzed for pH, biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliforms, and total coliforms.

Fecal coliform counts for the samples collected in Tyre exceed the WHO recommended limits for Class II (200 CFU/100ml) making the sea water unsafe for fishing purposes. One of the samples also recorded a fecal count of 200,000 CFU/100 ml which is well above the allowable limits for Class I waters (i.e. 2,000 CFU/100ml) making the water unsafe for swimming purposes or any other type of primary human contact. Two of the samples also exceeded BOD and TSS standards. These results are explained by the discharge of raw sewage into the sea, particularly in the harbor area, which is targeted for rehabilitation under the CHUD project. The seawater in the harbor area
is also polluted from oil, fuel, solid waste and other pollutants as a result of fishermen daily activities and boats engine leaks and maintenance activities. The water breaker along the fishing port further aggregates the pollution level in the seawater due to limited flushing capacity in the harbor resulting in a stagnant effect resulting in dark color water, with high turbidity level and emissions of offensive odor. Detailed results of the sampling are available in the “Environmental Baseline and City Profile” report prepared by ELARD (Appendix B).

Solid waste
The average solid waste generation rate for Tyre is reported at 0.7 to 0.9 Kg/capita/day. Thus, Tyre generates around 49 t/d of solid waste that is being collected by the municipality and is currently disposed of improperly in open dumps in the area surrounding the city. Solid waste from the old market (at Bawabeh square) is collected and stored in a large storage container located in parking lot. Field observation evidently shows waste littering commonly found along most of the CHUD area. Under-capacity waste storage bins also exist along Hiram Street resulting in inadequate waste storage around the bins causing visual intrusion, odour and leachate spills to the surrounding street.
A material recovery and composting plant is constructed and completed in mid 2011, but still partially operational. The proposed plant will serve Tyre city and several village located in the Tyre Caza.

Ambient Air Quality
Ambient air quality monitoring was conducted in three locations:
- At the Awqaf square facing the police station;
- At the center of the fishing harbor facing the fishermen syndicate building; and
- Along the Hamra (Hiram) Street.
Ambient air quality readings for SO₂ and CO concentration levels at the three monitoring locations were below the WHO guidelines. However, PM_{10} concentration exceeded the limits at the Awqaf square and along Hamra (Hiram) Street. This is mainly attributed to the high traffic congestion at the square (two way streets) during peak commercial activity time in the morning and noon time and during nighttime along the Hamra Street. Traffic congestion at both locations is mainly attributed to the high commercial activities in both streets and in many cases due to limited traffic flow (narrow streets with two way direction), frequent drop off stops and double parking resulting the lower traffic speed and regular traffic congestion.
Noise Pollution
Baseline noise level monitoring was conducted at the same locations as those selected for air quality monitoring locations. The ambient noise level ($L_{eq}$) readings for the three monitoring locations exceed the Lebanese maximum allowable noise limit standards for residential and commercial areas for both daytime and nighttime period (45 to 60 dBA). The main source of noise pollution is the traffic and commercial activities in the area. The lowest noise level was recorded in the Harbor area which has lower traffic flow especially during the afternoon period when most of the commercial activities (fishing, shops, etc.) and the administrative activities (Saraya, etc.) are closed.

Archaeological and Cultural Heritage Sites
One of the most significant archaeological sites within the CHUD Study Area is located along the end strip of the Hamra Street. The site consists of a single building in good condition visible at street level and the ruins of several building foundations and columns below street level. The site is fenced from all sides.

Figure 31. Archaeological site along the Hamra Street

Transportation and Traffic
A qualitative survey was done along the Hamra Street, and a quantitative survey was fixed on two positions: Hamra Street and Banque du Liban Street. These were conducted on the 27th of November 2008 covering the morning and the afternoon time.

In Hamra Street, which consists of 1 lane 2-way road with an on-street parking on both sides of the road, a remarkable off-peak is noticed between 13:00 and 14:00 on the east direction, while another one is noticed between 14:00 and 15:00 for the west direction. In addition, along the road, the on-street parking is not controlled then people double park reducing by that the width of the
road and its capacity to accommodate traffic, sometimes blocking one direction. However, several cars park on the sidewalk.

In the Banque du Liban Street, which is a one-way road consisting of 3 lanes with a parking lane on both sides, cars sometimes double park reducing by that the number of lanes and causing congestion. Most of the traffic traveling along Banque du Liban Street consist of light vehicles (car, vans, pick-ups...). In addition, the average speed is 24 km/h. This range of speed is consistent with the characteristics of the area: various activities, on-street parking along the street, pedestrian cross this road without any traffic signals which oblige the drivers to reduce their speed.

Landscape and Cityscape

**Port Waterfront**

The main landmarks in the port waterfront are presented in the following table:

Table 20. Main landmarks on the Port Waterfront

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eastern Quay</strong></td>
<td></td>
</tr>
<tr>
<td>Port entrance</td>
<td>The Buildings and urban fabric typology is mainly homogeneous consisting of low-rise houses (2-3 floors maximum) as well as old one-floor storehouse. The architectural style is a continuity of old buildings; some were post 50’s stone buildings. Most buildings are in medium to bad condition. Few buildings have recently been restored. The architectural style is a continuity of stone buildings; some were post 50’s stone buildings. Many storehouses also exist with arched galleries and a number of three-arched buildings. Some of the buildings are used for both retail (administrative and offices). Roads and networks consist of large carriageway constructed from tar and currently in good condition, however, intruded by Jumbled parking. Very narrow to non-existent sidewalks currently in bad condition with many electrical posts and wild vegetation cover. The area includes large open spaces constructed from tar in bad condition often intruded by informal parking and waste littering with no clear borderline between carriageways, sidewalks and open spaces. The urban furniture mainly consists of several electrical posts and lamps of old and non-aesthetic quality. Few road signs and bollards exist with many unsightly waste dumpsters. Large landscaped area with diverse tress (e.g. palm, laurels, etc.) of low maintenance condition.</td>
</tr>
<tr>
<td>Elias Sharbin Square</td>
<td></td>
</tr>
<tr>
<td>Fishermen’s Syndicate</td>
<td></td>
</tr>
<tr>
<td>Menshieh’s square (official name: Doctor Shekrallah Haddad Square)</td>
<td></td>
</tr>
<tr>
<td><strong>Western Quay</strong></td>
<td></td>
</tr>
<tr>
<td>Saraya (government buildings and local prison)</td>
<td>The Buildings and urban fabric typology is mainly homogeneous (different periods, colors, material and typologies) with few old stone houses, a single traditional Lebanese house style and one modern house with gallery. Most of the buildings are low-rise houses (2-3 floors maximum) with a single unduly and uncompleted high-rise (9 floors) building. The majority of the buildings are in medium to bad condition. Few buildings have recently been restored and one building is partially destroyed. Roads and networks consist of narrow carriageway constructed from tar and</td>
</tr>
<tr>
<td>Cafe Terrace</td>
<td></td>
</tr>
<tr>
<td>Quay edge</td>
<td></td>
</tr>
</tbody>
</table>
currently in medium condition, however, intruded by Jumbled parking, fishing nets, café terrace and emerged boats. Very narrow to non-existent sidewalks currently in bad condition with many electrical posts and wild vegetation cover. The area includes one large open space beside the government and prison building (i.e. Saraya building) constructed from tar in medium condition often intruded by informal parking. The quay, the street and the pedestrian ways are merged due to the proximity of buildings with the port. The urban furniture is restricted to electrical posts and lamps on old and non-aesthetic quality. Very few palms trees also exist in the area.

Bawabeh Square
The main landmarks in the port waterfront are presented in the following table:

Table 21. Main landmarks in the Bawabeh Square

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hammam Square</td>
<td>The Buildings and urban fabric typology consists mainly of wide open spaces, surrounded by different type of urban fabric. On the western side of the square (from vegetable market to UNIFIL headquarters), the built fabric is mainly homogeneous buildings with the majority being rather old and of low-rise. Whereas, on the eastern side of the square (around parking lot), the built fabric is mainly heterogeneous buildings, low-rise as well as high-rise. In addition, a single large vegetable market consisting of one-floor rise steel structure also exists within the parking lot. The architectural style in the area is mainly heterogeneous (different periods, colors, materials and typologies) with many post-50’s buildings (in both sides) and some traditional or/and stone houses (especially in the western side). The majority of the buildings are in medium to bad condition. A block of several old buildings have recently been restored. The buildings are mainly used as offices and retail shops with very few residential units. Some restaurants/café with terraces also exists in addition to the large vegetable market. Roads and networks consist of wide carriageway constructed from tar and currently in good to medium condition mostly used for parking. Wide sidewalks exist near the Awqaf square. Square constructed from stone pavement in good condition mostly intruded by café terraces. Similarly, a wide sidewalk exists in other areas constructed from molded cement currently in medium to bad condition. Very large open spaces exist mainly constructed from Tar currently in medium condition used as a parking lot. The urban furniture mainly consists of several electrical posts and lamps of old and non-aesthetic quality with very few road signs. A large and well maintained landscaped area exist near the Hammam Square (Awqaf Square) mostly including short olive trees, palm trees, clump, etc. The landscape in the remaining area is mostly smaller often restricted to variety of palm trees mostly along the Corniche sidewalk.</td>
</tr>
<tr>
<td>(Awqaf Square)</td>
<td></td>
</tr>
<tr>
<td>Vegetable market</td>
<td></td>
</tr>
<tr>
<td>Vast parking lot</td>
<td></td>
</tr>
<tr>
<td>Corniche waterfront sidewalk</td>
<td></td>
</tr>
</tbody>
</table>

Hamra Street (Hiram Street)
The main landmarks in Hamra Street are presented in the following table:

Table 22. Main landmarks in Hamra Street

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Roundabout: Martyr’s Square</td>
<td>The Buildings and urban fabric typology are mainly heterogeneous built fabric and architectural styles. The majority are almost post-50’s style with various elevations creating irregular forms. Most of the buildings are high rise (till 9 floors). Most of the buildings are in good to medium condition and mostly used for residential purposes with many ground-floors used as retail shops. Roads and networks consist of wide carriageway constructed from tar and currently in good to medium condition mostly used intruded by side parking. Narrow sidewalks exist constructed from tar and molded cement currently in medium to bad condition. A vast public parking lot exists along the street facing the seafront. The parking is not paved or leveled and currently in bad condition. The urban furniture mainly consists of several electrical posts and lamps of old and non-aesthetic quality with very few road signs and some unsightly waste dumpsters. No landscaped floor. Several trees are irregularly planted, but well maintained, exist along the street especially at the entrance.</td>
</tr>
<tr>
<td>Hamra Street entrance</td>
<td></td>
</tr>
<tr>
<td>Unpaved parking lot</td>
<td></td>
</tr>
<tr>
<td>Archeological site</td>
<td></td>
</tr>
</tbody>
</table>

**Socio-economic environment**

**Population**

High population densities and haphazard growth characterize Tyre. Similar to the other Lebanese cities, it grew at an increasingly rapid pace during the second half of the twentieth century. It comprises five principal residential areas: the historic city, the Al-Raml quarter, the Palestinian camp of Al-Bass, Jal el Baher and al Rashidiyye area. In 1998, Tyre population accounted for some 58,000 residents. Population densities vary between 250 to 500 persons per hectare. The population in Tyre is expected to grow at a decreasing annual rate starting at 2.2 percent until 2005, at a rate of 2 percent until the year 2015, and then at a rate of 1.8 percent until the year 2040 to reach a population size of 87,000. The age distribution of the population is 42.6 percent lower than 18 years, 51.5 percent are between 18 and 64 years, and 5.9 percent are above 64 years.

A detailed census of old city inhabitants provides basic information on occupation, demography, education and declared incomes. There are significant socio-economic differences between the Christian and Muslim sectors that occupy the old city. The Christian sector (Maronite, Greek Catholic, Greek Orthodox, and 12% Muslim) has a population of 1,251 and is a little over half what it had been 30 years ago, the decline in population being particularly marked in the under-20 age bracket. Over 90 percent are from Tyre. The standard of living and education is relatively higher and the proportion of economically active (39%) is higher. Nearly 35 percent are owners of their residences but 21 percent of houses are unoccupied. The Muslim sector has a population of 2,353 (Shiite, Sunni and 6% Christians), has also decreased in the last 30 years by about 1/3 and has a higher proportion of more recent arrivals. Eighty percent are from Tyre. The proportion of economically active is lower (29%) and the same percentage are home owners. The old city consists mostly of poor tenants, mostly fishermen. The fishing industry has suffered severe
decline and is characterized by significant poverty as the focus of economic activity has moved away from the old town.

Socio-cultural activities
Tyre city is a small rocky peninsula on one of the largest and richest plains of the Lebanese coastline. The seashore to the south of the city has the longest and widest stretch of sand beaches. Tyre is surrounded by orchards and agricultural plains, which employ local population living in the city or its immediate environment. Nearly 77 percent of the areas in Tyre and its immediate surrounding are uninhabited including agricultural plains, archaeological sites and beaches. Around 20 percent of families living in the old city of Tyre are involved in the fishing industry. The daily pattern of most of this community is marked by periodic trips to the sea, depending on the sea and weather. As in other Lebanese coastal cities, the fishing methods used in the region are primitive. Motorboats are used, with fishing rods, lamps and nets (Figure 32). The rest of the historic core residents are employed in the public sector, mainly in banks, or they run small commercial enterprises consisting of stores selling household appliances and products, groceries, furniture making, bakeries, meat, fish and vegetable markets. With the exception of few restaurants and coffee shops, no entertainment or leisure activities exist in the historic core of the ancient city.

The CHUD Area hosts the fishing harbor and the old market (cloth, meat, fish, vegetable, others) which constitute the heart of the old city and a major area for tourist attraction and commercial activities. The rest of the CHUD Area covers the modern city which includes various commercial activities including banks, commercial enterprises consisting of stores selling household appliances and products, groceries, furniture making, bakeries, markets with few restaurants and coffee shops. A new market will be constructed in the same location of the old market. A complete sensus and a RAP for the stakeholders were prepared. After completion of the work, the RAP will be implemented according to the resettlement framework policy of the World Bank.

Figure 32. Fishing activities in the old city of Tyre
Property and Tenure

Similar to the other cities, land ownership in Tyre is subdivided into three general categories; private, public, and Waqf. Private property is dominated by old families that are mostly Christian. Waqf property is primarily belonging to the Catholic Waqf who owns a couple of churches and large tracts of land around the historic core of the city. Public property in the ancient city is significantly high due to the presence of large archaeological sites that belong to the DGA.

Baalbeck

Physical environment

Baalbeck is located 86 km east of Beirut, at an altitude of 1,100 m, and is surrounded by vast agricultural plains of the North Bekaa region (Figure 1). Baalbeck city, the administrative capital of the region, is located in a micro-region that includes the three adjacent villages of Younine, Douris, and Iaat. The major cultural heritage zone in Baalbeck includes the historic core of the city and the archaeological sites, namely the Roman temple of Jupiter, Venus and Bachus, located inside the Qalaa (Figure 34), as well as the adjacent site known as the Bouleuterion.

The CHUD Intervention Area covered:

- Upgrading of the northern and southern entrances and construction of parking spaces for visitors and locals;
- The Mutran Square area;
- The Market Area from Souq mosque to Ras el Ain Spring (along Ras el Ain boulevard) was delayed due to the lack of financing; only the rehabilitation of Abdul Halim Hajjar and Saleh Haidar streets well be maintained from this action;
- The Qalaa Square facing the Jupiter Temple site;
- Gouraud Barrack: due to a lack of financing to implement a proper resettlement for the occupants of the Barrack, the funding was shifted to the restoration of the Grand Serail in the middle of the city;
- Infrastructure and conservation works in the archaeological site;
- Restoration of the mudbrick houses.
Figure 33. CHUD Intervention Area (phases I and II) and Summary Description of Project Works in Baalbek
Climate
The climate in Baalbeck is dry and arid, with low precipitations due to its geographic location in the Bekaa plain between two mountain chains (East and West). Winters are cold while summers are hot and dry. Rain showers are scattered between October and May and accompanied with snowfall between December and February. The annual cumulative rainfall is about 410 mm. The mean annual humidity is 56 percent reaching 67 percent in winters and decreasing to 46 percent in summers. Temperatures vary with seasons from a low of -6.2°C in February to as high as 40°C in August with a mean monthly temperature of 15°C. The prevailing winds are normally Northeast and southwest due to the geographical location of Baalbeck within the internal corridor between the two mountain chains. The northeast wind prevails normally during the winter while the southwest wind prevails for the remaining of the year.

Water resources
The geological formations, notably the Turonian, form an exploited aquifer in the region with many springs.

Water supply system
The existing source of domestic water supply for Baalbeck consists of 2 springs (Loujouj and Ain Bordai) and seven wells providing 19,650 m³/day (Figure 36). The Ras el Ain spring is not suitable for domestic water use without prior treatment due to environmental aggression (Error! Reference source not found.). Field observation revealed that Ras El Ain spring and the channel is connected to a series of water pumps and pipelines withdrawing water for domestic and cleaning use purposes (as shown below).
An additional seven boreholes were also installed (Oumouchki and Al Moudawar area) with an estimated yield of 23,700 m$^3$/day. The combined flow is in the order of 44,790 m$^3$/day. The storage facilities consist of four main reservoirs with a capacity of 10,750 m$^3$/d. The total storage capacity is about 50 percent of the water demand for the year 2017, considering that each household has a one-day storage capacity. Baalbeck water demands are estimated at 110 l/c/d in 2007 and are expected to reach 122 l/c/d in 2017. The water distribution system is generally old and in poor conditions. It does not extend to the new areas of the city and has not been renovated since the 1970s. The Baalbeck authority continues to distribute water through gauges that are not calibrated. In addition, many service connections were damaged by infrastructure works. The water losses are high and exceed 30 percent. Pipe connections between the main water distribution facility and many households are non-existent. People depend largely on polluted wells or resort to buying water in cisterns for their daily water supply.

Rehabilitation and upgrading of the water network is ongoing in parallel with the CHUD project.
The water quality analysis of water wells and existing springs (Table 23) in 2001 indicated that the water quality is chemically acceptable, exhibiting indicator levels below the maximum allowable standards set by the Lebanese Government, the WHO and the CEE. However, bacteriological results showed the presence of fecal coliforms and streptococcus, which indicates that the water is contaminated by municipal wastewater, which is the cause of contamination in the absence of an adequate collection network and the usage of septic systems.
Table 23. Chemical and bacteriological analysis of the springs in Baalbeck (World Bank, 2001)

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Ras El Ain</th>
<th>Loujouj Ain</th>
<th>Jouzeh Dardara</th>
<th>Delbe Sbat</th>
<th>Shat Shah</th>
<th>Standardsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductivity</td>
<td>286</td>
<td>290</td>
<td>240</td>
<td>263</td>
<td>253</td>
<td>279</td>
</tr>
<tr>
<td>Dry residue</td>
<td>195</td>
<td>210</td>
<td>165</td>
<td>195</td>
<td>180</td>
<td>205</td>
</tr>
<tr>
<td>Total alkalinity</td>
<td>120</td>
<td>115</td>
<td>105</td>
<td>100</td>
<td>105</td>
<td>125</td>
</tr>
<tr>
<td>pH</td>
<td>7.99</td>
<td>7.64</td>
<td>7.61</td>
<td>7.68</td>
<td>7.89</td>
<td>7.51</td>
</tr>
<tr>
<td>Calcium</td>
<td>37</td>
<td>37.5</td>
<td>30.8</td>
<td>33.4</td>
<td>34.2</td>
<td>41.4</td>
</tr>
<tr>
<td>Magnesium</td>
<td>9.1</td>
<td>6.63</td>
<td>8.05</td>
<td>4.4</td>
<td>5.4</td>
<td>6.6</td>
</tr>
<tr>
<td>Sodium</td>
<td>10.6</td>
<td>12.2</td>
<td>6.8</td>
<td>8.4</td>
<td>4.5</td>
<td>4.7</td>
</tr>
<tr>
<td>Potassium</td>
<td>1.3</td>
<td>1.8</td>
<td>0.92</td>
<td>1.1</td>
<td>0.6</td>
<td>0.4</td>
</tr>
<tr>
<td>Chlorides</td>
<td>17.7</td>
<td>22.5</td>
<td>10.9</td>
<td>13.9</td>
<td>7.4</td>
<td>7.1</td>
</tr>
<tr>
<td>Sulfates</td>
<td>8.2</td>
<td>2.9</td>
<td>1.6</td>
<td>1.3</td>
<td>2.1</td>
<td>5.6</td>
</tr>
<tr>
<td>Nitrates</td>
<td>0.55</td>
<td>0.26</td>
<td>0.23</td>
<td>0.09</td>
<td>0.07</td>
<td>0.05</td>
</tr>
<tr>
<td>Iron (µg/l)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fecal coliforms/100ml</td>
<td>&gt;80</td>
<td>12</td>
<td>24</td>
<td>7</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Fecal Streptococcus/100ml</td>
<td>&gt;80</td>
<td>11</td>
<td>13</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

a WHO or CEE standards

As part of the environmental baseline survey conducted for the city in 2008-2009, two samples of water were taken, upstream at the Ras El Ain Spring and downstream at the exposed water channel facing the Jupiter site at the Qalaa Square. The two samples were analyzed for pH, biochemical oxygen demand (BOD), fecal coliforms, total coliforms, chromium, copper, lead and zinc. The analysis results were compared to the Ministry of Environment Standards and the WHO standards.

High Fecal Coliform counts were recorded at the different sampling locations with both samples exceeding the recommended standards for Class I and Class II waters and MoE standards.

The bacteriological results show the presence of fecal coliforms and streptococcus, which indicates that the water is contaminated by municipal wastewater, in the absence of an adequate collection network and the usage of septic systems upstream.

Thus, the water in Ras El Ain was found to be unsuitable for any type of human contact.

Samples collected from the Study Area also yielded high levels of BOD particularly in the downstream sample (12 mg/l), which indicates potential emissions of organic effluent by human activities (recreational, industrial, etc…).

Copper and zinc concentrations also exceeded the recommended background values. Given the commercial and recreational nature of this area, increases in heavy metals concentrations can be linked to urban effluent discharge and runoffs from nearby streets.

For detailed results of the sampling results, please refer to the Environmental Baseline and City Profile prepared by ELARD (Appendix B).
Wastewater collection system

A 1997 system indicated that 60.5 percent of the total population of Baalbeck is connected to a sewer network. In the year 2017, this would be equivalent to approximately 30 percent of the population if no further extension occurs. Nearly 75 percent of the existing trunk sewers (23 km of sewers in Baalbeck city ranging in size from 150 to 600 mm) were replaced under the Baalbeck/Nabi Chit project and the remaining were upgraded. The new network reinforces and replaces the old one, however it does not cover all urban areas. It will however, eliminate the uncontrolled flows and discharges of wastewater into the channels flowing along and through the archaeological Roman Temples of Baalbeck. A secondary wastewater treatment plant (activated sludge) was constructed in the middle of Iaat plain at 2 kms from Baalbeck city (Figure 39). The capacity of the plant is 12,500 m³/d with the possibility of extension to 25,000 m³/day after 2008. The treatment plant is designed to discharge an effluent suitable for agricultural reuse.

While the study Area is generally well served by a network of sewer lines, observation of effluent outfalls, runoffs and surface drainage channels indicates that some of the effluent generated in the city is still discharged into the channel as shown below. Run offs from the market area is generated from the washing activity from the butcher shops. Such waste streams typically contain high organic waste. These could be the main sources of pollution in the water stream.

Figure 37. Wastewater discharge locations and sources within Baalbek CHUD Study Area
Figure 38. Ras El Ain River downstream facing the Qalaa square (archaeological site)

Figure 39. Primary sewage network for Baalbeck
Solid waste

Baalbeck currently generates around 45 tons per day of municipal solid waste. A private contractor undertakes collection and disposal of the waste for the Municipality who provides the facilities and equipment. Solid waste is currently being disposed of in an open dump at Al-Kayyal area, adjacent to the monolith Roman Quarry (Figure 40). Dumping is uncontrolled and open burning is practiced to decrease the waste volume. Waste collection containers are distributed throughout the city on street corners but the waste is often burned instead of being collected. The waste containers need to be regularly cleaned and maintained. Works are underway to improve the solid waste infrastructure serving the city through the construction and operation of a Material Recovery and Composting plant. A new sanitary landfill for the disposal of solid waste generated in Baalbek caza is also planned. The project is undertaken by the Ministry of Environment with funding from the Italian Government. The landfill is located in an industrial zone 3.3 km to the north of Baalbeck. The site is expected to receive between 70 and 80 t/d generated from the caza of Baalbeck.

Figure 40. Solid waste dump at the Kayyal area

Waste collection and storage containers are properly distributed throughout the Study Area. No waste bins are over capacity and most are in good condition. Waste littering along the Study Area is minor.
However, solid waste accumulation along the river was evident at several locations along the channel. The municipality has taken several measures to reduce the illegal waste littering in the channel such as screens to capture the floating solid waste upstream and awareness signs (as shown below). The characteristics of the observed solid waste indicate that most of the waste is mainly discharged at the Ras El Ain upstream where most of the restaurants, cafes and visitors are present. The channels are regularly cleaned, however, the accumulation of the floating waste has negative visual impact along the channel.
One of the main areas of solid waste management concern is the Mercury Temple. Historic evidence of illegal waste dumping and burning is observed as shown in the photograph below. The site is also full of waste littering (Figure 43). This is most likely due to the remote nature of the site and the presence of many nearby residential units.

Ambient Air Quality

Ambient air quality monitoring was conducted in four locations namely, at the road facing the market area, at the Qalaa road near the entrance gate of Jupiter Temple Archaeological site, at the public park area facing the Ras El Hussein Historic Mosque near the Ras El Ain Spring, and finally at the parking lot facing the Mutran Square area.
The ambient air quality readings at the monitoring locations exceed the WHO guidelines for PM$_{10}$ and SO$_2$ in most locations. The Market area and the city entrance at the Mutran Square are characterized by high traffic flow during the morning and evening period when most of the residents are either visiting the market for shopping purposes or returning from work outside the city. Similarly, both monitoring locations in addition to the parking lot facing the historic mosque revealed elevated SO$_2$ concentrations during daytime and nighttime exceeding WHO guidelines due to traffic congestion during peak noon time, when most of the commercial activities take place along the market area and during the nighttime when more people visit the public garden and nearby recreational facilities.

For detailed results of air quality monitoring in Baalbeck, please refer to the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).

Noise Pollution
Baseline noise level monitoring were conducted in four locations (same as air quality monitoring locations).

The CHUD study area is classified, according to Decision No. 52/1, as a residential area with commercial activities and located near a road. The ambient noise level (Leq) readings for the four monitoring locations exceed the Lebanese maximum allowable noise limit standards for both daytime and nighttime period (40 to 60 dBA). The main source of noise pollution observed is the traffic and commercial activities in the area. The highest noise level readings were recorded, as expected, at the market area and Moutran square were most noisy activity take place.

Detailed noise monitoring results are available in the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).

Archaeological and Historic Sites
Baalbek is famous for its exquisitely detailed yet monumentally scaled temple ruins of the Roman period. It is Lebanon's greatest Roman treasure, and it can be counted among the wonders of the ancient world. The largest and most noble Roman temples ever built, they are also among the best preserved.

Baalbek is one of the finest examples of Imperial Roman architecture at its apogee. The UNESCO listed Baalbek city as a World Heritage Site in 1984. The protected area includes the entire town within the Arab walls, as well as the south-western extramural quarter between Bastan-al-Khan, the Roman site and the historic mosque of Ras El Ain.

The sanctuary of Jupiter, one of the largest temple complexes in the Roman world, consisted of a temple with two successive courtyards. Huge substructures or rather podiums were constructed in
the whole area, in order to elevate the complex above the plain. Only six columns of the outer colonnade of this temple as well as parts of the pediment are preserved.

Figure 44. The six preserved columns of the temple of Jupiter

Figure 45. Ras el Hussein Bin Ali Historic Mosque (Zaher Beybers Mosque)

The Mercury temple was built in Roman times on the Sheikh Abdallah hill. The remains of the temple of Mercury were almost completely destroyed during the Lebanese civil war, but small parts of the temple podium were recently found in surroundings. Its material remains as well as the monumental stairway.
Transportation and Traffic

A qualitative parking survey was conducted on circuits along Ras El Ain road. The circuits were divided into several segments to facilitate the count. These are identified in the section below. Automatic traffic counts were also fixed at 2 stations: 1) Al Imam Al Mahdi Mosque at the beginning of Ras Al Ain Street, and 2) near al Marjeh at the end of Ras Al Ain road.

Both surveys were carried out on the 3rd of February 2009 covering the morning and the afternoon periods.

The qualitative survey revealed that Ras Al Ain Street is not fully occupied. However, a small part of the circuit is over-occupied where vehicles are parked at a prohibited place. Noon time is noticed to be the peak hour for on-street parking.

The quantitative survey showed the following:

- Ras Al Ain Street near Al Imam Al Mahdy Mosque: traffic is quite uniform during the day. This section of the road consists of a one way one lane road with a parking lane on their both sides.
- Ras Al Ain Street near Al Marjeh (two-way road without median in the middle): the evening peak period differs from one direction to the other. The morning peak period is found to be between 11:00 and 12:00, while the evening peak hour on along Ras Al Ain Street should be set to 16:00 – 17:00.
- Bechara Al Khoury Street: this section of Bechara El Khoury Street is a two-way road with no median in the middle, and in general it is narrow road where people park at its both sides. The heavy vehicles volume is quite minor, i.e., only 1% for both directions.

For details on the qualitative and quantitative surveys and results, please refer to the Environmental Baseline and City Profile report prepared by ELARD (Appendix B).
Landscape and Cityscape

**North-Western part along Ras el-Ain Boulevard**
The main landmarks of the North-Western part along Ras el-Ain Boulevard are presented in the following table:

Table 24. Main landmarks of the North-Western part along Ras el-Ain Boulevard

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables and meat Market; Mehdi Mosque; Parking lots; and Mercury Temple.</td>
<td>The Buildings and urban fabric typology is mainly homogeneous consisting of continuity of aligned low-rise buildings (2-3 floors maximum) with some individual old houses with private gardens. Most of the buildings are used for both retail and residential purposes. A single large vegetable and poultry market exists. Most of the buildings are in medium condition while some have recently being restored. The architectural style is a continuity of insignificant architectural value with some epitomes of Lebanese traditional architectural style. The carriageway along the vegetable market is narrow constructed from tar, in medium condition and intruded by jumbled parking. Whereas, the sidewalks are wide constructed from molded cement and in good condition. On the other hand, the carriageway beyond the market is wide and in similar condition. Whereas the sidewalk is narrow (partially due to the canal) and widens as it reaches the parking lot after the Mehdi Mosque. Two large open space areas exist. The first is a well maintained parking lot covered by tar; while the second (facing the police station) is non-paved and currently in a non-maintained state (rubble and gravels). This site was converted to a parking lot under CHUD Phase II works. The urban furniture mainly consists of few electrical posts and lamps consisting of two types (iron and wood) of old and non-aesthetic quality. Many street bins exist in a well maintained condition. No trees were noticed from the market area to parking lots, but a row of trees exists between the parking lots and the end of the street.</td>
</tr>
</tbody>
</table>

**South-western part**
The main landmarks of the North-Western part along Ras el-Ain Boulevard are presented in the following table:

Table 25. Main landmarks of the South-Western part

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public garden (Merjet Ras el-Ain) Recreational Pond Ras el-Ain Spring; and Historic mosque</td>
<td>The Buildings and urban fabric typology is mainly heterogeneous consisting of large building and some small to medium-rise buildings of post 50’s without particular architectural value. In addition, several luxurious Lebanese traditional villas (triple-arch, red tiles, stones, balustrades…) also exist along the Ras el-Ain boulevard. The majority of the buildings are exclusively residential and in good condition. The carriageway along the Ras el-Ain boulevard is wide and in good condition with ordered parking. Also, a wide sidewalk constructed from molded cement in good condition but intruded by a number of café terraces. On the other hand, the carriageway around the public garden is very wide, in medium to bad condition and intruded with jumbled parking. The sidewalk around the garden is narrow and in medium to bad condition, often intruded</td>
</tr>
</tbody>
</table>
by café terraces. A large open space exists facing the historic mosque constructed from tar and in good condition. Similarly, a very large and properly landscaped open space (i.e., the Ras el Ain public garden) currently exists in an excellent condition. The urban furniture mainly consists of benches, many electrical posts and lamps of old and non-aesthetic quality. Very few road signs of old and used-up condition exist. Many street bins exist in a well maintained condition.

Socio-economic environment

Population

Baalbeck consists of dense residential fabric extending from the citadel and throughout the valley. Nearly one third of its population consists of non-residents, having migrated to other parts of the country or emigrated abroad. It is characterized by a young population whereby 52 percent are less than 24 years old. Its total population is estimated at 55,000 with a density of 234 residents per hectare. An additional 38,000 residents live in the adjacent villages of Douris, Younine and Iaat. Moreover, Baalbeck houses an additional 25,000 to 30,000 Palestinian refugees in the Wavel camp, south west of the city center. The population of Baalbeck city is expected to grow to reach a size of 98,300 to 118,000 at growth rate of 2.5 and 3.5, respectively (Dar El Handassah, 1998). Gender distribution in the city is almost balanced but literacy rates are low compared to other regions of the country with 13.6 percent of residents over the age of 10 being illiterate.

Socio-cultural activities

Most Baalbeck’s households are characterized by a low income although its micro-region contains an important portion of economic activity found in the north Bekaa as a result of its proximity to the principle axis linking Beirut to Damascus. Despite being the main economic sector in the region, agriculture attracts only 21 percent of the population. Another 25 percent are absorbed by industrial production (local industries, construction, artisanal products). The remaining 54 percent are employed in services, which are subdivided into public services (administration, health, education, and army) and the private sector (medical services, banks, tourism and leisure activities). Professional and commercial activities are concentrated in the city center (within the market area) and near the Qalaa and Mutran square area (historic center) and include barbers, tailors, carpenters, private offices and institutions, government offices, touristic services, vegetable and meat market, restaurants, clinics, dispensaries, and a hospital. The Ras El Ain Boulevard mostly hosts recreational facilities, restaurants and cafés servicing the Ras El Ain recreational pond and public park visitors.
Unemployment rate is estimated at 30 percent with only 5 percent of the total female population in the labor force. Employment rates reach 80 percent in the age range of 25 to 44 for males and 11.4 percent for females.

There is poor integration of the local economy and poor spatial integration with the key heritage sites. The tourist circuit at present does not incorporate the city market center, which would enable local shops and businesses to benefit from the presence of tourists. Any development of the site, which encourages tourists to spend more time in the city and to diversify their activities, should be encouraged.

Property and tenure
The average household size in Baalbeck is 5.5 residents per household, which is slightly higher than the national average of 4.6. The city is marked by a significantly high portion of home owners (73.7 percent), although an increasing demand on house rentals is becoming evident especially in the city center. Figure 47 provides the land use pattern in the city of Baalbeck.

Figure 47. Land use in Baalbeck
IMPACT ANALYSIS

Rehabilitation activities of cultural heritage sites are typically designated as a Category B both under the provisions of the EIA Draft Decree developed by the MoE and the World Bank Operational Directive 4.01. The CHUD project incorporates both rehabilitation activities and in some cases, infrastructure development/upgrading (i.e. Tyre), and as such, it was conducted according to the requirements of Category A projects. Such projects are usually linked with major or irreversible environmental impacts and require a full EIA study with public participation and consultation activities. This chapter examines the potential environmental impacts associated with the CHUD during the construction and operation phases. The environmental impact analysis has focused on comparing the expected evolution of the five cities with and without the implementation of the CHUD components. The magnitude of these impacts varies with time and site management. The typical parameters that may be affected in this context are presented in Table 26.

Table 26. Classification of potential environmental impacts

<table>
<thead>
<tr>
<th>Category</th>
<th>Phase</th>
<th>Duration (yrs)</th>
<th>Potentially impacted parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term</td>
<td>Construction</td>
<td>&lt; 2 - 5</td>
<td>• Traffic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Air quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Noise</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Landscape and visual intrusion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Waste generation (construction/demolition)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Water quality (surface, groundwater, seawater)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Health and safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Archaeology and cultural heritage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Socio-economics</td>
</tr>
<tr>
<td>Long term</td>
<td>Operation</td>
<td>&gt; 2</td>
<td>• Traffic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Air quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Noise</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Landscape and visual intrusion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Waste generation (solid waste and wastewater)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Water quality and supply (surface, groundwater, seawater)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Health and safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Archaeology and cultural heritage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Socio-economics</td>
</tr>
</tbody>
</table>

While the impacts of some parameters can be assessed quantitatively using analytical and mathematical means (e.g., air, noise), the impacts of other parameters can only be described by relying on a qualitative approach. In the present EIA report, the major activities are related to rehabilitation and renovations of existing cultural heritage facilities and no major new facilities
will be constructed. As such the impacts are addressed in general for such activities while pointing out special cases that are characteristic of certain cities.

**Traffic**

During the construction phase, traffic circulation will be negatively impacted in all five cities particularly at and around a site under rehabilitation. Traffic problems will occur when traffic must be moved through or around construction areas. Construction zones present to motorists unexpected and unusual situations in their traffic movements, such as, abrupt changes in geometry, lane narrowing, lane transitioning and lane dropping. These situations will require motorists to reduce their speed thereby creating congestion and delays.

During the operation phase traffic circulation is likely to improve in some cities (Tripoli) or not be affected in others (Tyre and Byblos). Traffic management plans in the cities will further improve the situation. Several streets in these cities will be converted for pedestrians only. Such an occurrence will naturally affect circulation patterns. The most significant intervention in this respect is in Tripoli where a main street in the heart of the old city will be closed. There is also improved intersection designs, installation of traffic signals, and improved on-street parking design. This intervention was tested using a travel-forecasting model to conduct a network analysis for the Tripoli area with and without the proposed closure and diversion of the traffic flow to an existing boulevard along Nahr Abou Ali. The analysis showed that while vehicles may travel longer distances, traffic circulation will not be affected. Indeed, today traffic congestion is a permanent occurrence along the street proposed for pedestrian and the conversion will have various benefits on air quality and noise levels. In addition, the construction of a four lane tunnel (2 in each direction) along the northern bank of the Abou Ali river, and the relocation of the fruits and vegetables market on the slab of the tunnel will definitely resolve the congestion problem and ensure a smooth traffic flow for people not desiring to stop by the market. In the other cities, the streets converted to pedestrians carry low side traffic and as such no not impact overall traffic circulation patterns. On the contrary, pedestrian safety as well as air quality and noise levels have and will continue to improve. In addition, the construction of several parking lots at the entrances of the old cities of Tripoli, Baalbeck, Tyre, and Byblos (Figure 48) will reduce traffic congestion.
Air quality
The dust emissions resulting from the construction had a temporary impact on local air quality. Emissions during the construction phase in general are a function of land clearing, stone cleaning, excavation schemes, cut and fill operations, and the machinery used on-site. Emissions consist primarily of particulate matter (PM) released as a result of rehabilitation activities, and to a lesser extent of emissions from the on-site usage of construction equipment. Dust emissions often vary substantially from day to day, depending on the specific operations, level of activity, and prevailing meteorological conditions. For this phase, negative impacts on air quality occurred in and around the immediate locality of a site under construction. In order to quantify this impact, the total construction emissions resulting from the rehabilitation of a typical site and the corresponding ambient PM concentration under typical meteorological conditions are estimated (Appendix C). Rehabilitation activities are having a temporary negative impact on air quality in the immediate vicinity of site, in terms of dust emissions. However, such an impact is not significant, given the relatively small construction areas at one time and the short duration of the construction phase, particularly that proper management measures are adopted.

During the operation phase, the air quality along streets converted to pedestrian only are benefiting from improved air quality as a result of the elimination of vehicle-induced emissions along these roads. However, air quality may be negatively impacted at a global and local scale depending on the city under consideration. At a global scale, one of the objectives of the CHUD project is to attract more visitors/tourists who will invariably visit the various cities by car thus increasing total vehicle-induced emissions. Within the same city, the conversion of some streets
to pedestrian, such is the case of Tripoli, increased travel distances around the old city for drivers to reach their destination. Hence, overall emissions increased as well. In both cases, the impact of increased emissions is typically much less than the potential gain from converting a highly frequented street into a pedestrian one. At a local scale, air quality impact can be significant under certain conditions. For instances, in most cities, proposed parking areas/facilities can bring a high number of cars into one single location. Atmospheric dispersion simulations conducted at proposed parking areas/facilities in various cities indicate that CO levels (used as an indicator for air quality) will increase in the vicinity of these areas (within less than 100 meters) and often exceed the WHO and Lebanese air quality standards. Note that within an underground parking facility, the concept of the box model can be applied to estimate indoor exposure levels and air ventilation requirements. In this case, pollutant concentration estimates are compared to maximum allowable contaminant exposure levels in an occupational setting to assess the extent of impacts from car exhaust emissions on workers and customers inside the parking facility. Occupational exposure is generally not considered within the scope of an EIA process.

**Noise**

Construction noise can be a significant source of community noise. Impacts on construction workers and people residing near the construction site are of concern. The construction phase noise impacts are a function of the excavation scheme and the machinery used on site. Typical construction activities associated with the rehabilitation activities include ground clearing, excavation, foundations, erection, and finishing. During this process various machinery and heavy equipment are used. Table 27 shows typical energy-equivalent noise levels associated with various work phases at a building construction site, when all pertinent equipment is present.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Noise level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground clearing</td>
<td>84</td>
</tr>
<tr>
<td>Excavation</td>
<td>89</td>
</tr>
<tr>
<td>Foundations</td>
<td>78</td>
</tr>
<tr>
<td>Erection</td>
<td>87</td>
</tr>
<tr>
<td>Finishing</td>
<td>89</td>
</tr>
</tbody>
</table>

The noise levels generated from the different construction activities exceed the Lebanese daytime noise standard set for urban residential areas and business districts (Table 28).
Table 28. Lebanese noise guidelines in different zones (Ministry of Environment, 1996)

<table>
<thead>
<tr>
<th>Area classification</th>
<th>Maximum accepted noise level dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
</tr>
<tr>
<td>Business district</td>
<td>55 – 65</td>
</tr>
<tr>
<td>Residential area with few construction sites,</td>
<td>50 – 60</td>
</tr>
<tr>
<td>commercial activities or on highway</td>
<td></td>
</tr>
<tr>
<td>Urban residential area</td>
<td>45 – 55</td>
</tr>
<tr>
<td>Residential suburb</td>
<td>40 – 50</td>
</tr>
<tr>
<td>Rural residential, hospital, public garden</td>
<td>35 – 45</td>
</tr>
<tr>
<td>Industrial zone</td>
<td>60 – 70</td>
</tr>
</tbody>
</table>

1 7 a.m. to 6 p.m.  
2 6 p.m. to 10 p.m.  
3 10 p.m. to 7 a.m.

Noise from construction operations is different from noise from other sources because it is caused by many types of equipment, and the resulting adverse effects are temporary since the operations are relatively short term. In order to assess the extent of potential noise impacts at a typical construction site, a noise model specific for construction operations was applied (Appendix D). The simulated noise levels at different radii away from the site are presented in Figure 49, which indicates that the daytime Lebanese noise standard for an urban area will be exceeded. As such, residential units in the vicinity of the site will experience temporary periods of high noise levels, typical of any construction activity.

Figure 49. Noise levels at different radii around the site during construction

A noise level monitoring was undertaken at the beginning of the implementation of the CHUD activities (refer to the report ‘Environmental baselein and City Profile’”) and will be compared to the monitoring results at the operation stage.

At the operational level, which represents the long-term phase of the project, the impact is less significant. In fact, noise levels will decrease in the areas where pedestrian streets are created. While this indicates that no negative impacts will result from the project as compared to base conditions, it sometimes does not preclude the need for mitigation measures to address the
starting base condition. This will be particularly true at newly created parking areas / facilities. Note that within an underground parking facility, noise levels can be compared to allowable exposure levels in an occupational setting to assess the extent of impacts from vehicle noise emissions on workers and customers inside the parking facility or an underpass. Occupational exposure is generally not considered within the scope of an EIA process.

**Landscape and visual intrusions**

Negative impacts on existing landscape at very few locations and visual intrusion at some works sites for rehabilitation were inevitable during the construction phase. The presence of equipments, materials, soils heaps, and borrow pits presented an unsightly view. Such impacts are common to any construction site and are limited to the construction period. During this phase, visual impacts were avoided where possible with implementation of proper mitigation measures (Chapter 0).

At the operational level however, the impacts of the CHUD on the landscape will certainly be positive since this is a rehabilitation project to improve the current conditions of the various sites (Figures 34 and 35). Rehabilitating damaged buildings; sidewalks, access roads, archaeological sites, as well as increasing green areas will greatly improve the aesthetic value of the targeted areas. Field surveys to collect information about the urban landscape at selected locations have been conducted. The survey consisted of a visual assessment and photographic documentation including recording existing vegetation (where it exists) and current site usage. The survey indicates that the areas surrounding most sites are used primarily for a combination of residential and commercial activities. Hardly any location visited to date had any landscaping with the exception of the Nawfal Palace in Tripoli, which is located across a public garden. No major rehabilitation is occurring at that location; hence the impact on the landscape will be limited during the construction phase.
Figure 50. Positive visual impacts for the renovation of buildings (above picture is an example for buildings before renovation, and below picture is for the same buildings after renovation)

Figure 51. Positive impact on the landscape in Baalbeck through the introduction of greeneries
Land use change
In Byblos, the construction of the new parking facility and public garden leads to the removal of an existing 19,000 m² agricultural plantation with trees, greenhouses and vegetation. This could have negative effects on the biological environment. Potential loss of habitat may occur to a lesser extent since trees are agricultural and the surrounding is inhabited. Only the parking will be financed by CHUD project while the construction of the public garden was financed and completed by the ministry of Environment; the totality of the site was cleared and prepared under the supervision of the Ministry of Environment.

Waste generation
Construction activities are inherently associated with the generation of waste from building material. The extent of waste generation from the CHUD project can be significant particularly at sites where complete rehabilitation may occur (such is the case in Tyre and Byblos) or if an underground parking facility is planned. The impact of the generated waste is minor due the adopted waste management option during the construction phase. All dumping sites are allocated by the concerned local and central authorities.

At the operational level, the project will result in increased quantities of solid waste and wastewater generation in the vicinity of the rehabilitated sites due to increased attraction of visitors/tourists that typically generate high waste generation rates per capita as compared to the local indigenous population. The increased quantities of solid wastes and the change in composition will stress the existing inefficient solid waste management plans within the five cities. While a surge in the volume of the generated wastewater will exceed the carrying capacity of sewer networks that are in need of upgrading prior to CHUD implementation:
Baalbeck was of particular concern in this respect given that the old management of wastewater and solid waste was impacting archaeological resources. Currently the wastewater infrastructure are upgraded and connected to a treatment plant newly constructed in the vicinity of the city; regarding the solid waste, a treatment plant facility is currently under construction.
The fishing port of Tyre was also another location of concern, whereby wastewater collected from the old city was openly discharged into the old fishing port (which is an integral part of the CHUD rehabilitation plan for Tyre) that is characterized by low flushing capacity, as indicated in Chapter 0. The CHUD project implemented the construction of a new collector and pumping stations to insuring diverting of the waste water to new under construction treatment plant in the Aabassiyeh area to the north of the city.
Regarding waste disposal into the Abu Ali River in Tripoli, the construction of the platform is supposed to reduce this practice; especially with the new organization of the market and the waste management plan and awareness activities that are planned to take place. These measures also apply to Tyre’s market. Wastewater will also be diverted from the Abu Ali river to the wastewater treatment plant.

Fortunately, plans for the better management of solid wastes (through the construction of material recovery facilities, composting plants and sanitary landfills) and wastewater (through secondary wastewater treatment plants and networks) in the CHUD encompassed cities are near completion or are underway. When these plans materialize, the current and the projected increase in solid waste and wastewater generation rates will be within the handling capacity of the planned facilities. Note that if the attraction rates of visitors/tourists increase dramatically as what is observed in some coastal and cultural heritage cities in Europe or Turkey, the design capacity of most planned facilities will not be adequate and serious mitigation measures would be necessary. However, no dramatic increase in the total population of these cities as a result of tourism is expected in the near future.

**Water quality**

Construction activities particularly rehabilitation work generates significant amounts of dirt and dust. In addition, lubricants and solvents are commonly used in similar construction projects. These may impact the surface water, groundwater, and seawater quality particularly following rainfall events. During such events, runoff will occur and carry the litter and pollutants to undesirable locations. This can be of particular concern for coastal work along the seashore in Byblos, Saida, and Tyre.

During the operation phase, the potential increase in visitors/tourists is likely to exert more water demand, which in turn is translated into more water exploitation that is often extracted from groundwater resources. Overexploitation of the latter can affect its water quality, which is already exhibiting seawater intrusion and bacteriological contamination. Increased numbers of visitors / tourists tend to increase littering which can have a negative impact on seawater quality in coastal cities. The vehicle fleet and average daily trips will also increase thus increasing pollutants (i.e. oil, lubricants) from non-point sources. Compared to the amount of pollutants in industrial and domestic wastewater, the amount attributable to road transport is extremely small. Therefore, it is not expected that non-point sources related to transport activities will have any additional impact on water quality.
Similar to increased solid waste and wastewater generation rates, the projected increase in water demand and vehicle trips due to the attraction of visitors/tourists can be accommodated with existing resources. However, if attraction rates increase dramatically as what is observed in some coastal and cultural heritage cities in Europe or Turkey, the design capacity of most planned and existing facilities will not be adequate and serious planning and mitigation measures would be necessary in such an eventuality which is not expected in the near future.

**Health and safety**

Health and safety are considered primarily in terms of potential exposure and accident occurrence (direct and indirect) to workers on-site, pedestrians, operators or visitors during both the construction and operation phases. In this respect, CDR has developed specific site health and safety guidelines for contractors involved in construction projects (Appendix E). These guidelines have been adopted in the bidding documents relative to all works contracts. In the context of archaeological sites, the safety of visitors/tourists can become a major concern. Therefore proper management procedures are adopted.

Note that, in the absence of accident data in Lebanon in general and the project cities in particular, and the difficulty in obtaining unit costs for fatal, injury and property damage crashes in Lebanon, the changes in accident rates for the proposed project were not estimated. However, it is important to note that the project will result in increased long distance trips during the operation phase, which may have negative impacts on traffic safety, based on international experience. Given that the current traffic intensity and the informal parking organization are discouraging to pedestrians, the creation of pedestrian walkways and platforms along main roads in Baalbeck and Byblos improved the safety conditions for pedestrians and visitors.

**Archaeology and cultural heritage**

As indicated in the project description (Chapter0), the main components of the CHUD project consist of archaeological sites conservation and management (Tyre and Baalbeck, and Tripoli and Saida citadels) as well as the rehabilitation of historic city centers (Tripoli, Byblos, Saida, Tyre, and Baalbeck). The sites are presently threatened by a series of bottlenecks such as poor conservation, poor presentation, lack of integration with the living culture and with the urban context, poor site management, and a weak administrative context. The project will prevent further degradation of historical and cultural sites, thus ensuring their preservation for future generations.
The construction phase can presumably be well controlled however; the operational phase is projected to attract a larger number of visitors/tourists who will naturally be roaming or visiting archaeological sites and newly rehabilitated city centers and buildings. While this is a desired outcome of the CHUD project, it can bring about negative impacts if proper management practices are not adopted and implemented with commitment and strict enforcement. The conservation/rehabilitation phase involves various construction activities (removal of stones, backfilling of areas, consolidation of loose sections and deposits, consolidation of walls and structures, structural conservation and strengthening measures, surface cleaning and conservation measures, conservation of mosaics and pavements) that can impact the existing conditions negatively if they are not systematically planned and organized, carefully implemented, and well-managed.

In the archaeological sites (Tyre and Baalbeck), some exposed structures would be backfilled for protection purposes, while others would undergo surface conservation interventions so as to minimize the damages induced by weather, time, improper use of the sites and visitors’ abuse. The project will also improve the archaeological site presentation to the visitors with the provision of appropriate signage, and the use of visitor support devices such as audio wands and explanatory site brochures. Visitor centers will be created and existing museums expanded, providing overall introduction to the sites’ history via plans, photographs, film documentaries, slide shows, and temporary exhibitions. Visitor circuits will be provided with rest areas, benches, and overview platforms to make the visit an enjoyable and pleasurable experience. In Tripoli, the St Gilles citadel will benefit from a series of conservation measures on the medieval structures and surfaces, improvement of the site accessibility and safety through the introduction of handrails, signage and other devices. In addition, a central area within the Citadel will be fully equipped to become the Tripoli Museum that will contain local antiquities, panels and artifacts pertaining to the history of the city and of the Citadel itself. In Saida, the Land Castle, which dates from the Crusaders and Fatimid periods, will be liberated from the accumulated strata of soil, documented, conserved, and presented to visitors through an appropriate site management plan. In addition to the Saida Sea Castle, the Land Castle will represent an important cultural and tourist attraction to the visitor. Monuments, historic buildings, and traditional heritage complexes in the five cities will be refurbished for commercial, cultural, or revenue generating uses (such as small restaurants and lodges in Baalbeck) and will contribute in job creation and economic development.
Socio-economics
A stakeholder analysis and social assessment for the CHUD project has been done (Information International, 2002). A continuous survey is ongoing in the CHUD intervention area to monitor the influence of the CHUD project during and after completion of the work. The implementation of the project components will result in various socio-economic impacts, which are summarized below.

Potential positive impacts
The potential positive impacts expected to be associated with the implementation of the CHUD include the following:

- **Increase in the number of tourists and increase in their expenditures.** Baalbeck attracts an estimated 89,000 visitors yearly (highest annual turnover in the country) due to its internationally renowned archaeological sites and its International summer festivals. This number is expected to grow rapidly upon the implementation of the project. Moreover, there will be the potential to integrate Baalbeck into a wider network of tourist itineraries including eco-tourism. Similarly, Byblos, the second most visited city after Baalbeck, Tripoli and Saida are expected to benefit from an annual increase in the number of tourists. Quantitatively, the expected growth in the number of tourists in Tripoli and Tyre will vary from 6 to 17 percent (Table 29).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Tripoli</th>
<th>Tyre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of tourists in 2001</td>
<td>17,487</td>
<td>19,000</td>
</tr>
<tr>
<td>Expected growth rate, %</td>
<td>6 to 10</td>
<td>10 to 17</td>
</tr>
<tr>
<td>Expected number of tourist</td>
<td>33,000 in 2008</td>
<td>45,000 in 2010</td>
</tr>
<tr>
<td>Increase in the expenditure of a local tourist, USD/person/day</td>
<td>From 41 in 2001 to 52 in 2008</td>
<td>From 32 in 2001 to 41 in 2010</td>
</tr>
<tr>
<td>Increase in the expenditure of a foreign tourist, USD/person/day</td>
<td>From 57 in 2001 to 94 in 2008</td>
<td>From 38 in 2001 to 52 in 2010</td>
</tr>
</tbody>
</table>

- **Creation of new employment opportunities.** Direct job creation will result from the employment of workers involved in the management of rehabilitated sites, execution of works (rehabilitation of facades, public spaces, infrastructure works, rehabilitation of monuments, commercial spaces, parking). Indirect employment will occur as a result of the increase in the expenditure of tourists, creation of new markets in the newly formed commercial spaces, hotels, and development of micro-credit activities.
The reuse of the Khans in Tripoli, Saida and Tyre will open new opportunities for the city’s inhabitants.

Improve accessibility and connections to the old cities: This would be the result of improvement to the existing circulation network and the creation of parking structure on the city’s peripheries, and the reorganization of parking spaces. The construction and reorganization of vehicle and bus parking facilities, as well as shuttle services will add the benefits of availability of organized and shaded parking spaces outside the limit of the old city, the opportunity of how to approach the city, and a contribution to economic development through creation of income generating activities (employment through the operation and maintenance of the shuttle service, in commercial activities, and along access itineraries).

Improvement in the quality of life of inhabitants. Upgrading of the physical infrastructure such as solid waste management, water and wastewater networks, electrical connections, and the improvement in the landscaping, creation of green areas and public places will improve the quality of life for inhabitants of the area and the city, as well as improve the value of land and the value of assets. In Tripoli the constructed three blocks improved the quality of services for the resettled occupants of Khan al Askar.

Support to local economic development, cultural tourism, private sector participation and communication. For instance, in Baalbeck support will be through training to improve tourism services (Bed and Breakfast, small restaurants, municipal guides training etc.); provision of information and guidance on accessing financial and technical resources for business development; support to the development of a website to attract more visitors and investment in goods and services for cultural tourism; and information to enable tourists to enjoy the city’s offerings in an appropriate way. The new market in Tyre and Tripoli will attract more visitors and will enhance the economic cycle of the old city. On the other hand, in Tripoli, contribution to the economic development of the old city will enhance business skills of small entrepreneurs operating in the visitor services sector (training for local guides, business plan development, management, customer relations etc); support for marketing goods and services for cultural tourism; leveraging credit and grant resources for small projects; organizing information on Tripoli’s goods and services for promotional materials.

Revival of the urban core and its functional re-integration into the city as a whole through the upgrading and generation of new activities. This will result in drawing more residents as well as government and educational institutions to the core of the city.

Enhancement of functional and visitor diversity to the center through the introduction of
cultural and educational centers as well as thematic tourist itineraries. This will result in an increase in the local productivity and ensure survival of near extinct trades (handicrafts, artisanal works, and specialized construction techniques). The rehabilitation of some of the old Souks and the restoration of monuments and transforming them to hotels or cultural centers will improve tourism (transformation of Khan El-Askar to a cultural center, Khan el Rabou to an agro-industrial center, home made or organic food products).

- **Improvement of the quality of the urban environment and life for inhabitants and visitors** through the potential relocation of polluting industries to open available spaces for more varied economic functions. In Tyre, the relocation of the fish and meat market that exists within the old city to an outside area will result in a net environmental improvement. In Saida, the relocation of furniture making to an industrial area outside the old city, the regrouping of specific traditional activities to facilitate deliveries, the creation of public spaces to relieve the density of residential neighborhoods, reorganization of the meat, poultry and the fish markets will improve the quality of the urban environment. The infrastructure works executed in the five cities enhanced and improved the environmental surrounding.

- **Inform tourists about the historical importance of the cities** through the creation of pedestrian access in one of the most dramatic approaches to the old cities. The provision of sidewalks along roads helps in improving the safety of pedestrians.

- **Improvement in the landscape and greeneries and creation of public spaces** in the five cities help in *eliminating the visual negative impact caused by the poor architectural aspect* of buildings boarding the roadsides. The positive impacts are already apparent today.

- The treatment of the waterfront in Tyre through the upgrading of the fish market and fisherman association will *improve their economic status* as well as the *reviving of the fishing industry* with all its parallel activities including restaurants, boat building, and net making.

- *Reviving of certain agriculture-based products* such as jam and food processing and empowerment of the production of local women that are involved in handicrafts, sewing, and wood making, particularly in Baalbeck and in Tripoli through social programs that will cover the inhabitants of the CHUD area (e.g. Women in the Khan).

- The implementation of rehabilitation and renovation activities may help *prevent the degradation of archaeological remains* and the encroachment of unauthorized construction onto some of these sites as well as the haphazard restoration of individual
Monitoring and record keeping of socio-economic and development indicators over time by CDR is ongoing in order to monitor the impacts of the CHUD project. These indicators include:

- Number of seats in cafes & restaurants;
- Number of cafes & restaurants;
- Number of individuals working in the sector of culture, tourism and heritage related local businesses;
- Approval of landmark conservation laws;
- Number of rehabilitation permits for classified historical properties;
- Number of employees in DGA dedicated to archaeological sites;
- Area of pedestrian public squares / spaces;
- Length of rehabilitated / constructed sewer network;
- Length of rehabilitated / constructed potable water network;
- Length of rehabilitated / constructed drainage;
- Length of rehabilitated electricity network;
- Number of rehabilitated lighting posts; and,
- Surface area of facades of historic buildings rehabilitated.

Potential negative impacts

The potential negative socio-economic impacts expected to be associated with the implementation of the CHUD during the construction and operation phases include the following:

- Loss of income at exiting sites targeted for rehabilitation during the construction phase as a result of poor tourist access.
- Relocation of employment centers as a result of the potential relocation of some industries and warehouses outside the old city center (relocation of car repair garages in Baalbeck, gas station in Byblos, and small polluting industries in Tripoli).
- Marginalization of current inhabitants and their potential eventual relocation outside the historic quarter.
- Disturbances to residents during rehabilitation, renovation, and infrastructure works.
- Disruption of daily activities as a result of the rehabilitation works.
- Consolidation of dilapidated structures and the renovation of large monuments currently occupied by displaced populations such as Khan el Askar in Tripoli will entail the
relocation of a small group of residents. Khan el Askar, which is currently owned by the Lebanese government and managed by the municipality of Tripoli, is strategically situated in the Al Zahrieh district at the outskirts of historic core of Tripoli. The Khan was constructed in the late 13th early 14th century to house Mamlouk Troops. The Ottomans subsequently restored the Khan in the 18th century. As a result of the flood of the Abou Ali River in 1958, the municipality settled some residents as an emergency and temporary measure until securing an alternative permanent accommodation. Following the floods and to this date, all attempts to relocate the residents of the Khan to more suitable and healthy living environments have failed. The Khan is one of the largest covered spaces occupying around 5,200 m² and is surrounded by severely dilapidated privately owned structures. The Khan was never set up and or intended as a residential space. Current residents live in physically deplorable conditions lacking proper sanitary infrastructure, water and electric supplies. The Khan was characterized by high levels of overcrowding whereby the average family size of tenants was 7 persons per household occupying rooms that are 12m² in size. Similarly, the renovation and adaptive reuse of the Gouraud Barracks in Baalbeck and Khan el Rabu in Tyre entail the relocation of displaced population, which must be resettled if these elements are retained in the project.

**Summary of impact analysis**

The environmental impact analysis showed that the greatest environmental impacts occur during the construction phase particularly with respect to dust and noise emissions, re-routing of traffic, visual intrusion, waste generation, water quality, safety concerns, potential damage to archaeological sites, and socio-economic impacts associated with loss of income and resettlement. Other potential but insignificant impacts include temporary alterations in drainage patterns and expansion of existing quarries for construction materials. During the operation phase, the analysis showed that the project will result mostly in positive environmental impacts when compared with the case of not implementing the project, all while recognizing that certain aspects associated with the project are in dire need for the adoption of proper management practices to ensure the sustainability of the project and its expected benefits (solid waste, wastewater, archaeological sites). Given the highly urbanized nature of the cities involved, the CHUD project is not anticipated to have significant environmental impacts from project-induced growth or land use changes. Most lands in the vicinity of rehabilitated areas have been built and are largely occupied by low and medium-rise commercial and residential buildings.
In fact, the CHUD project will result in an overall improvement to the urban environmental quality as well as the quality of life of the residents in the five cities (Saida, Tripoli, Tyre, Baalbeck, Byblos). This improvement is mainly the result of the rehabilitation of degraded cultural sites, improvement of public accessibility to these sites; improvement of social life in and around the old city centers; enhancement of traffic circulation within the city centers; conversion of many streets to pedestrian, as well as achievement in parking management. The primary benefits from the implementation of the CHUD are expected to materialize in an increase in the socio-economic growth due to the expected surge in visitor/tourist attraction rates. Other benefits include reduced noise and vehicular emissions resulting from traffic along the streets converted to pedestrian, as well as enhanced access to city centers and cultural heritage sites. Another significant positive environmental impact relates to the elimination of wastewater discharge into enclosed ports (i.e. the city of Tyre and to some extent in Byblos). Table 30 provides a qualitative summary of the significance of potential environmental impacts that are associated with both the construction and operation phases.

Table 30. Summary of potential environmental impacts

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Construction</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>-</td>
<td>0/+</td>
</tr>
<tr>
<td>Air quality</td>
<td>-</td>
<td>-/++</td>
</tr>
<tr>
<td>Noise</td>
<td>-</td>
<td>0/++</td>
</tr>
<tr>
<td>Landscape and visual intrusion</td>
<td>-</td>
<td>+++</td>
</tr>
<tr>
<td>Waste generation</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Water quality / supply</td>
<td>-</td>
<td>-/0/++</td>
</tr>
<tr>
<td>Health and Safety</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Archaeology and cultural heritage</td>
<td>-/0</td>
<td>+/-</td>
</tr>
<tr>
<td>Socio-economics</td>
<td>-</td>
<td>+++</td>
</tr>
</tbody>
</table>

+++ High positive impact
++ Moderate positive impact
+ Low positive impact
0 Neutral impact
- - - High negative impact
- - Moderate negative impact
- Low negative impact
ANALYSIS OF ALTERNATIVES

The alternatives or options for intervention in every city were briefly described in the preliminary design studies of each project. The “do nothing” option is not favorable given the general consensus about the degrading quality of the urban fabric around valuable cultural heritage features and since desired urban conservation objectives would not be achieved. Moreover, not undertaking the project would have led to further environmental degradation, destruction and continued deterioration of sensitive cultural sites and landscapes, irretrievable loss of tourist revenues, opportunity cost of foregone revenue and potential for expansion of the sector and the economy in the cities, preferential attraction of tourist to other cities that are preserved (not necessarily in Lebanon), and last but not least, the opportunity cost of lost job opportunities in the tourism and cultural heritage sector.

Concerning the sitting of facilities, the project offers limited opportunities for the analysis of alternatives given that the stress is put on certain specific sites whereby rehabilitation or renovation works are required. The remaining options aim at optimizing environmental quality in the urban areas of the various cities. While the cities have similar rehabilitation elements that do not lend themselves into an analysis of alternatives, each city is characterized with peculiar features for which different options were considered and are outlined below by city.

Tripoli

In Tripoli the analysis of alternatives focused on four elements: Khan El-Askar Resettlement, relocation of the fruits and vegetables market and traffic management, parking facilities, as well as rehabilitation activities.

Resettlement - Khan El-Askar

With the exception of Khan El-Askar, population resettlement in the entire CHUD project has been kept at a minimum. At Khan El-Askar the resettlement is inevitable for the rehabilitation of the old city and the do nothing scenario would certainly not accomplish the much desired objectives of the project. One alternative that was considered by the municipality is to offer compensation through the expropriation committees. These tend to compensate tenants for expropriated properties according to the market price per square meter of occupied land, and according to the yearly income and rent for tenants. This option was deemed inappropriate because the residents of the Khan have only informal tenure and as such do not fall within the compensation criteria of the expropriation committees. Consequently, a re-housing scheme
proposed in the CHUD was the only viable alternative, although it faced several reservations at the beginning of the project.

Relocation of the fresh produce market and traffic management

The Japanese International Cooperation Agency (JICA) study for the organization of traffic in Tripoli has recommended the transformation of the eastern bank of the Abou Ali River to a four-lane artery (two in each direction) provided that the fresh produce market is removed from its present location to enable the use of the whole passageway in both directions. Currently, the fresh produce market that caters to the population of the area has spilled over on the riverside boulevard causing significant traffic congestion on a main through-traffic artery. The initial option that was considered, stipulated that the market should be moved to the tip of the Abou Ali River on the opposite direction of the Abou Ali roundabout, some 500 m away from its current location. The new location however, was refused since it disrupts the local habits of residents and will have a negative impact on the socio-economic situation of these people, an option not favored by this project. The other alternative was to build a concrete platform on the Abou Ali River (Figure 52), complete with appropriate water and sanitary facilities and waste collection devices, manage the traffic, and relocate the fruits and vegetables market. This new municipal facility, in view of its location, will also help to reconnect the Bab El Tebbaneh neighborhood with the rest of the historic city, in the proximity of the Khan El-Askar and Al Tawbeh Mosque.

Figure 52. Option of a concrete platform on the Abou Ali River
In this scenario, three different alternatives were considered for traffic management (Figure 53), these include:

- **Alternative 1**: Development of a crossing on grade along with the adoption of traffic management measures;
- **Alternative 2**: Development of an underpass (4.5m vertical clearance) which ensures that vehicular circulation does not interfere with the pedestrian space;
- **Alternative 3**: Development of an underpass having 3m vertical clearance.

(a) Crossing on grade

(b) Underpass with 3 m vertical clearance
Financially, the first alternative was the most cost effective (0.2 to 0.25 Million United States Dollar (MUSD)), while the second and third alternatives were estimated to cost around 3.7 MUSD and 2.5 MUSD, respectively. Detailed traffic analysis conducted during final design has shown that a grade separation is not warranted and its construction is not justified. Pedestrian traffic can be handled safely at grade using pedestrian traffic signals. The saving realized by dropping the vehicular grade separation was channeled to enlarge the proposed platform. The Municipality of Tripoli, in fact, was concerned that the size of the platform as originally envisioned would have proven less than required to take all the vegetables and fruit stands and associated services. The final adopted design is depicted in Appendix F.

Parking facilities
Several underground and open space parking facilities were proposed to resolve the parking problem around the old city center as a result of restricting most internal streets to pedestrian access only. Two potential underground parking garages were proposed at the base of the Citadel but were rejected by the DGA due to their proximity to the garden of a historic mosque. Alternatively, a large parking, bus and shuttle station was proposed on the northern entrance of the city in the neighborhood of Khan El-Askar, on a plot of land owned by the municipality. This option was considered unnecessary at the present time given that it would result in the deterioration of the air quality and increase the noise levels as a result of increased traffic. While this parking has not been approved, it remains a potential option. The final design included better designed on-street car parking around the Burtassieh Mosque and tourist coaches parking closer to the Citadel.
Rehabilitation activities

Originally, the preliminary design considered two scenarios, a strategic large-scale scenario and a limited small-scale scenario. Both scenarios proposed several interventions in various zones of old Tripoli. A series of interventions were selected within the context of the small-scale scenario due primarily to financial limitations.

Byblos

In Byblos, several pilot projects for intervention regarding the cultural heritage and tourism development in the old city were proposed. Due to budget limitations, not all projects were selected for further development. Selection was based on the importance of the project, and its priority with respect to the municipality, the DGA, and the local residents. The analysis of alternatives focused on three components, namely:

- The medieval wall promenade;
- The old harbor; and,
- The pier extension.

Medieval wall promenade

The medieval wall promenade, one of the most important cultural heritage components of the old city of Byblos, was amongst several minor alternatives that were considered. It consisted of the construction of wooden deck promenades along the wall surrounding the old city. The proposed alternative entailed the digging and uncovering of the wall in some parts where it is completely hidden or partly built on (some houses were already constructed on the wall and uncovering it requires the demolition of parts or the whole of these houses). The alternative was rejected since it involves the relocation and resettlement of some people. As a compromise, it was agreed to create the wall promenade on the northern section of the wall only.

The old harbor

Another proposal related to the improvement of the old harbor was the enlargement of the quay area through extending it by means of wooden decks. This enlargement would help reorganize traffic circulation and pedestrian access to the port. The fishermen rejected this alternative since the extension would reduce the available spaces for their fishing boats. The proposal was thus dismissed since one of the objectives of the project is to preserve the cultural habits on the fishing port and promote the fishing industry.
Pier extension
This alternative which was considered at the request of the MoPWT, consisted of extending the current pier westward above water level to provide protection for boats parked in the fishing port in order to increase the anchorage capacity of the harbor, and to cater for ferry boats to reach Byblos. This project was incompatible with the DGA plans to build the pier as a submerged reef which at the same time will provide protection to the boats and will not obstruct the sea view of the old city. In addition, the municipality expressed its concern of transforming this pier into a commercial port. As such, the MoPWT agreed to rehabilitate the existing pier only by paving it thus reducing environmental stress on the marine environment and diverting the allocated funds elsewhere in the old city (Figure 54).

Figure 54. Pier extension in Byblos

Tyre
In Tyre, 26 pilot projects were identified at the early stages of the CHUD project. Of these, only seven were retained. The other 19 were either repackaged into the retained projects or completely abandoned. Out of the 19 proposed pilot projects, 8 involve the conservation and management of archaeological sites that include the conservation of surfaces and structures of archaeological sites, and the development of sites and environs to enhance the visitor’s experience. These proposals were integrated within an archaeological site conservation study that is being
conducted by the Italian firm ARS Projetti. The reasons for abandoning the remaining projects were due to budget limitations, the undertaking of some of these projects by the municipality, and the need to relocate houses, school and commercial units, and the need for land expropriation.

Wastewater in the old city surfaced out as a peculiar problem in the context of the CHUD project. At present, wastewater from the old city is discharged directly by means of submerged pipes and channels into the fishing port, which is proposed to be rehabilitated through the project. The concern is related to the possibility that the project will be completed prior to the completion of a wastewater treatment facility planned for the city of Tyre and its surroundings in the nearby Abbasiyeh area.

Wastewater collection and treatment
At present, wastewater from the old city is discharged in the fishing harbor through several short and submerged pipes. The CHUD project includes the rehabilitation of the port which means that the old city’s wastewater can no longer be discharged into the fishing port and must be diverted to a nearby pumping station. From this station, the wastewater is supposed to be pumped to the planned wastewater treatment plant for the entire area in Abbasiyeh north of Tyre. In the event the Abbasiyeh plant do not come into operation by the time the Tyre component of the CHUD project is completed, the wastewater can be pumped to a surface outfall located to the west of Tyre. If the pumping capacity is exceeded (an event that is currently occurring) due to the additional sources to be linked to the station, the wastewater is discharged into the sea through a surface outfall on the eastside of Tyre not far from the fishing port. In order to resolve this situation, two other alternatives were considered:

- Prevent further discharge in the old port and in the eastern outfall, ensure the capacity and operation of the pumping station, elongate the western surface outfall, and continue to discharge until the planned Abbasiyeh facility is operational. To achieve this objective, it is recommended to undertake the following activities (refer to Figure 55): construct Line C (both branches), construct and install pumping station PSL2, repair and operate the pumps at the existing pumping station in the parking area so that all the wastewater will be diverted to the western outfall by pumping, and extend the western sewer outfall into the sea to ensure better wastewater dilution. It will not be necessary at this stage to construct the pumping station PSL1 since this station will pump wastewater away from the sea outfall. In this solution, the western outfall will be temporarily receiving the wastewater from the old city of Tyre, new Tyre (through the pumping station next to Elyssar coffee shop that will discharge into the Bass collector) and the flows of the Bass collector. The remaining sea outlets will be
used for storm water drainage within the city. Note that a more detailed assessment of the adequacy of the outfall will be required.

- Prevent further discharge in the port and in the eastern outfall (by constructing line C and the pumping station PSL2 as described in the first solution, as well as ensuring the capacity and operation of the pumping station PSM3) as well as constructing a temporary treatment plant near the pumping station in order to treat the wastewater and use the effluent for landscaping or discharge to the sea until the planned Abbasiyeh facility is operational.

Figure 55. Sewage interceptor line and pumping stations along the fishing harbor

**Baalbeck**

In Baalbeck, the analysis of alternatives focused on traffic circulation, Gouraud Barracks, brick houses, access to Al Qalaa, and upgrading of the market. For the other components, the options were mostly functional and did not entail other choices of intervention.

*Traffic circulation around Moutran Square*

Two solutions were evaluated to regulate the traffic in Baalbeck, particularly around Moutran Square (Figure 56). Option 1 proposes Moutran square as an exit from the city center: the pedestrian piazza will be adjacent to the building of the Christian Church compound to be rehabilitated. The bus stop and taxi park will also be located on the eastern side and provide an immediate and safe access to schools. In this option, the incoming traffic to the city center is
channeled to the road next to the Palmyra hotel. Option 2 was studied after discussions with the DGA and the municipality. The option is to keep Moutran Square as the entrance to the city center and separate the pedestrian piazza from the built front of the Christian Church compound. The bus stop and taxi park will be moved to the western side in order to ensure a smoother traffic flow. In both options, two new passes will cross the square transversally and permit walking from the hill in the archaeological site and vice versa. These will follow two historical traces, those of the ancient city walls and those of the access road to the Christian church compound.

Figure 56. Alternative circulation plans around Moutran Square
**Gouraud Barracks**

Two alternatives for the end use of the Gouraud Barracks were considered: either transforming them to a hotel by inviting an international hotel chain to invest at that location or using it as a government administrative office building, or university/research institute. Both alternatives require a change in the character of the site to reinforce the building which is not acceptable to the DGA and both were considered too risky for the preservation of archaeological sites, in particular the Roman/Arab wall, because of potential heavy traffic.

**Brick houses**

The choice of residential complexes to be rehabilitated (brick houses) was made based on their accessibility, potential appeal once they are refurbished, functional use, and potential private sector co-investment. The alternative of the type of intervention would be to let the houses collapse or to provide room for the redevelopment of the entire area. Redevelopment is likely to occur along modernized lines, resulting in a further loss of cultural heritage and negative consequences for other parts of the city.

**Access to Al Qalaa**

Apart from keeping the access point to al Qalaa at the location where it is today, one alternative was to move it further out, and provide a shuttle bus service. This alternative was rejected because the experience internationally indicates that this is unappealing to tourists, and in many ways logistically complicated. Another alternative was to switch tourist bus arrival to Ras El Ain Street and to let tourists walk to the Qalaa through the souk. This option was rejected because it disrupts local life due to both tourist and bus traffic and since the general urban environment is not yet there. The market slaughterhouses and heavy traffic on this path would not serve to present Baalbeck’s most attractive side. This sort of intervention could be considered down the line as an additional point of entry to the city once the remaining components, particularly the souk, are complete. The selected alternative was to create parking lots within walking distance, and to improve access to the archaeological site by building sidewalks and rehabilitating the pedestrian path along the road, and downhill toward the Qalaa.

**Upgrading of the market**

The market upgrading had practically no alternative. In addition to the market’s important local and regional role for commercial activity, it must be upgraded for environmental reasons, in particular to alleviate hygienic problems emanating from the numerous slaughterhouses and to reduce pollution from traffic. As such, the only real alternative to upgrading the market area is
unacceptable as it would be to continue to redevelop the area with more high-rise buildings that would attract additional traffic that the city could not absorb. In addition, such a development would hide important heritage buildings as happened in the 1980s and 1990s. The Baalbeck municipality is playing a crucial role in avoiding unplanned development within the market area and is seeking to implement a plan that will stress on low density development within the central area of the city. The overall project seeks to reduce noise and visual pollution through traffic reorganization and reduction, landscape improvement, the removal of non-required components as well as the improvement of public lighting, wiring and signage.

**Baalbeck and Tyre archaeological sites**

Two alternative scenarios were considered for the conservation and management of the archaeological sites in Baalbeck and Tyre. These alternatives relate to the enhancement of the visitors’ experience, making it unique and memorable through the enhancement of the cultural and educational potential of the sites as well as improving the articulation of their potential significance (Figures 41 and 42). These two alternatives are referred as:

- The Aesthetics scenario
- The Discovery scenario.
**Aesthetics scenario**

In this scenario, the objective of enhancing and enriching the visitors’ experience is achieved by emphasizing the aesthetics aspects, provoking deep sensation, concentrating the attention on the most attractive themes and spots. The visitor will be lead to perceive and feel the site rather than to analyze, read and understand the complexity of the site history. The needed measures will be based on developing a presentation of themes mostly related to the Roman period, cleaning and restoring surfaces in order to improve their appearance, adopting intuitive explanations with few analytical details (with emphasis on particular viewpoints from where to observe the monuments through brochures, boards and headphones), organizing exclusive visits for small groups, as well as adopting a landscaping program for the gardens and areas surrounding the monuments.

**Discovery scenario**

In this scenario, emphasis will be placed on discovering and understanding history through the visit. The monumentality of the place is put in relation to its history rather than emphasizing on its aesthetics. Focus will be placed on the variety of subjects, presentation themes, sites, historical layers, continuity of history, and the diverse ways to see and understand history on different interpretation angles. In this scenario, more areas will be opened to the visitors along with the various spots scattered outside the core attraction. There will be more thematic paths among which to choose. Each one would be marked with specific signs on the ground and sustained through ad hoc explanations. Explanatory material and communication means will be designed to
make the understanding attractive, stimulating and easy. The organization of visitors’ paths is more complex in this case, with more resting areas, more points of exit and entrance, more security and safety measures.

The retained scenario for both the Baalbeck and Tyre archaeological sites was based mainly on the Discovery scenario, because of its ability to better integrate the local cultural, socio-economic and urban context with the existing archeological sites. The Discovery scenario was also selected for its ability to set shadow on the different historical layers present, its potential of generating better quality tourism, as well as its capability to distribute visitors over large areas.

**MITIGATION PLAN**

The primary adverse environmental impacts that are associated with the construction and operation phases of the CHUD can be minimized by careful planning and staging of construction activities, the adoption of proper management practices during operation as well as relying on environmental monitoring to support management decisions. Mitigation measures are typically recommended whenever the potential impact is significant with the ultimate purpose of eliminating or reducing the negative impact. The mitigation plan proposes several potential impact-mitigation or control measures that should earn the CHUD project more environmental and social acceptability, by eliminating or reducing to the extent possible many of the impacts that were outlined in Chapter 0. Note that, mitigation measures are highly dependent on the significance of the predicted impact, the nature of the impact (permanent vs. temporary), as well as the phase of the project (construction vs. operation). This chapter represents the relevant mitigation measures in the context of the CHUD project.

**Mitigating potential traffic impacts**

The primary measures to mitigate traffic impacts during the construction phase include the proper dissemination of information regarding construction schedule (along with any potential change to the initial schedule), as well as providing alternate routes during all phases of construction. Proper planning and development of a traffic control plan that takes into account the reservations and inputs of local stakeholders is essential to minimize the effects and inconvenience of construction activities on commuters as well as ensure the safety of motorists, pedestrians and workers in the vicinity of construction zones. The basic principle in the development of traffic control plans is that motorists should be guided through construction zones in a clear and safe
manner. This should be done through adequate warning, signing, delineation and channeling at least 500 m down and up-gradient from the construction sites. These measures will provide motorists with positive guidance prior to and through the work zone, especially if the traffic control departments within each city are available for coordination. Preliminary routing schemes covering the various construction phases must be developed and communicated early on to the public. In addition, limiting the movement of heavy machinery during the construction phase to off-peak hours and providing prior notification are crucial measures to minimize the potential negative impacts of traffic.

At the bidding stage, contractors must include a traffic re-routing plan during construction. The construction period should take into consideration the possibility of night construction, if it does not disturb neighboring residents and commercial establishments. The tender documents should require contractors to present detailed plans for utility relocation, approved by the concerned utilities, before excavating the site. Without compromising safety of workers, pedestrians, or vehicles, traffic roads should be re-opened as early as possible, even before the final readiness of the site, in order to minimize the impact on traffic during the construction period. A summary of specific measures to be undertaken to control traffic impacts during construction are presented in Table 31.

<table>
<thead>
<tr>
<th>Supervising Consultant</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>o Dissemination of information regarding construction schedule</td>
<td>o Guiding motorists through construction zones</td>
</tr>
<tr>
<td>o Planning and development of traffic control and re-routing plans during all phases of construction</td>
<td>o Installation of warning signs in and around the site</td>
</tr>
<tr>
<td>o Traffic monitoring and guiding of motorists outside the boundaries of the site</td>
<td></td>
</tr>
</tbody>
</table>

During the operation phase, traffic signs and adequate parking spaces are needed to guide visitors to the sites and reduce the required time needed for finding available parking areas. The need to restrict vehicular access along several roads in order to create pedestrian areas was a major constraint hampering the implementation of the CHUD within the five cities. The project has addressed these issues and has developed a mitigation plan for each of the five cities through the creation of new parking lots, roads and underpasses, as well as developing internal circulation routes. The main concern was in Tripoli where a main street in the heart of the old city would have to be closed for exclusive pedestrian use. The detailed mitigation measures with respect to each city are presented in Table 32.
Table 32. Mitigation measures to be undertaken during the operation phase to alleviate traffic congestion

<table>
<thead>
<tr>
<th>City</th>
<th>Mitigation measures</th>
</tr>
</thead>
</table>
| Tripoli  | o Relocating the fruits and vegetables market to the platform constructed over River Abou Ali channel  
|          | o Constructing a large parking, bus and shuttle station was proposed on the northern entrance of the city in the neighborhood of Khan El-Askar  
|          | o Organizing on-street parking  
|          | o Install modern signal control on busy intersections to provide for better vehicular flow and safer pedestrian crossing  
|          | o Introduce spot geometric improvements at few intersections  
|          | o Providing adequate traffic signs  |
| Tyre     | o Providing parking lots at the entrances of the old city  
|          | o Providing adequate traffic signs  |
| Byblos   | o Providing parking lots at the entrances of the old city  
|          | o Providing adequate traffic signs  |
| Baalbeck | o Providing parking lots within walking distance at the entrances of the old city and archaeological sites  
|          | o Constructing two new passes that will cross the Moutran square transversally to allow for pedestrian movement  
|          | o Improving access to the archaeological site by building sidewalks and rehabilitating the pedestrian path  
|          | o Stressing on low density development within the central area of the city  
|          | o Providing adequate traffic signs  |
| Saida    | o Providing adequate traffic signs  |

Mitigating potential air quality impacts

During the construction phase, it is essential to adopt strategies to prevent or minimize dust emissions. The main control measures towards this purpose should be included within the construction contracts and be considered as requirements from contractors. These measures include proper site and stock enclosure, on-site mixing and unloading operations; maintaining minimal traffic speeds on-site; ensuring adequate maintenance and repair of construction machinery; proper water spraying when necessary; sealing of completed earthworks; permanently surfacing medium and heavily used haul routes; damping un-surfaced haul routes as well as ensuring proper house-keeping at construction sites. The supervising consultant will have the responsibility of ensuring the implementation of these measures.

At the operational level, with the exception of the parking facilities, the CHUD project will not result in substantial negative air quality impacts. In addition, provisions should be made to implement a regular monitoring plan for ambient air quality near archaeological sites (Jupiter temple in Baalbeck, Byblos Citadel, Saida Citadel, Tripoli Citadel and Khan El Askar as well as the Roman ruins in Tyre) to ensure that ambient air quality standards are maintained thus limiting any decay that may be caused by potential formation of acid rain or smog. Nevertheless, such a plan should be implemented independently of the CHUD project across the five urban cities. At a
global scale, long term mitigation plans are necessary to address existing air quality problems particularly that traffic-induced emissions constitute the major source of air pollutants in urban areas. In this regard, policy studies on urban air quality management are planned in the context of the Beirut Urban Transport Project and can ultimately benefit the cities of this project as well.

**Mitigating potential noise impacts**

The major mitigation measures required are during the construction phase. Nevertheless, construction activities are characterized by their relatively short duration, presence of mobile sources, and variable working hours thus restricting the implementation of mitigation measures. Moreover, the fact that much of the work is performed in the open and in densely populated areas renders overly restrictive working measures ineffective since they might unreasonably prolong the construction phase. Typical mitigation measures that should be enforced during the construction phase to minimize noise levels are:

- Choices of inherently quiet equipment
- Proper site logistics and planning
- Proper maintenance of equipment
- Limiting site working hours if possible
- Machines that are intermittent in use should be shut down between work periods or should be throttled down to minimum
- Informing the local population through the municipalities about the schedule of noisy activities
- Placing muffling devices to reduce vibration
- Scheduling noisy activities during the morning hours
- Enforcing noise monitoring
- Keeping equipment speed as low as possible

The adopted noise control measures should be included within the construction contracts and considered as requirements for contractors. The supervising consultant will have the responsibility of ensuring the implementation of these measures. Modeling results (Appendix D) have shown that sound barriers are not needed since most construction activities will not exceed the Occupational Safety and Health Administration (OSHA) 8-hour standard. In addition, the consultant should consider the impact of adopting porous material as well as flexible joints and supports in the design phase of the different implemented components within the CHUD project on noise generation rates.
At the operational level, the project will not result in significant negative noise impacts. Yet measures such as adopting proper traffic management practices, creating pedestrian areas as well as enforcing speed limits are expected to enhance the overall environment of the five cities with respect to noise levels.

**Mitigating landscape and visual intrusion impacts**

Landscape impacts are limited to the rehabilitation of the old city cores and archaeological sites along with rehabilitation of public gardens and planting of trees. Most mitigation measures should be adopted during the construction phase since the CHUD will have a predominantly positive impact during the operation phase (Chapter 0). In this context, provisions must be made to re-vegetate and conserve the old cultural sites back to their original status. Visual intrusion during the construction phase should be minimized by proper site fencing and housekeeping within the site proper. The final design of the CHUD should adopt provisions to minimize visual intrusion by blending color of paints, using appropriate exterior construction material, blending architectural features as well as implementing appropriate landscaping with visual screens and greenbelts where necessary. Mitigation measures for visual intrusion and landscape alteration at the construction and operational phases of the CHUD are listed in Table 33.
Table 33. Mitigation for landscape and visual intrusions

<table>
<thead>
<tr>
<th>Mitigation Measure</th>
<th>Stage to be Implemented</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction</td>
</tr>
<tr>
<td>Preserve existing vegetation when feasible</td>
<td>✓</td>
</tr>
<tr>
<td>Avoiding onsite storage of wastes and equipment</td>
<td>✓</td>
</tr>
<tr>
<td>Selecting appropriate paint colors for the exterior of the new and rehabilitated</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>facilities/amenities/buildings/infrastructure in the CHUD region of influence</td>
<td>✓</td>
</tr>
<tr>
<td>Selecting construction materials for the exterior of the new and rehabilitated</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>facilities/amenities/buildings/infrastructure in the CHUD region of influence in</td>
<td>✓</td>
</tr>
<tr>
<td>order to ensure blending with the historical backgrounds of the five cities</td>
<td>✓</td>
</tr>
<tr>
<td>Selecting architectural designs that will make the rehabilitation projects blend</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>with the surrounding architectural features of the general milieu</td>
<td>✓</td>
</tr>
<tr>
<td>Enforcing compliance with building codes of the area and avoiding the construction of elevated structures and assuring low density development</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Planning, implementing and maintaining an appropriate landscaping program for the</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>site that takes into account restoration or creation of native vegetation cover with local fauna and flora</td>
<td>✓</td>
</tr>
<tr>
<td>Provisioning and maintaining a greenbelt to bar any unsightly intrusion the project may have on the milieu</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Selecting and enforcing designs that will maximize the unbarred view of the sea from most areas within the CHUD region of influence</td>
<td>✓ ✓</td>
</tr>
</tbody>
</table>

✓ = Applicable    NA = Not applicable

The control measures for landscape impacts and visual intrusion should be included within the bid specifications and construction contracts. The supervising consultant will have the responsibility of ensuring the implementation of these measures.

**Mitigating land use change**

In order to reduce the impacts of the new parking on land use change, the agricultural trees planted in the site of the new parking in Byblos will be relocated to another agricultural site located outside the city. Moreover, the trees removed will be compensated by the trees planted in the parking lot and public garden as well as the softscaping of the garden.

**Mitigating waste generation**

During rehabilitation projects of this magnitude, there may be a tendency to dispose the generated construction wastes from the proposed project on seashores given that most of the cities are located along the coast. The construction wastes generated from the CHUD should be reused in filling activities at the site whenever deemed possible. Non-reusable construction wastes should be disposed of at proper disposal sites. At present, the disposal facilities in all cities are not
adequate although the construction and operation of several material recovery facilities, composting plants and landfills has been or is about to be initiated in various parts of Lebanon. Many of these proposed facilities are expected to have a limited capacity and/or may not be completed by the time the project is implemented. Therefore, an agreement must be reached with the respective municipalities to designate an area in each city for the disposal of construction wastes. When excavating in the vicinity of archaeological sites, care should be taken to follow “Chance Find Procedures” (Appendix G) whenever new archaeological remains, antiquity or any other object of cultural or archaeological importance are encountered during construction. Last but not least, considerations should be given whenever feasible for waste material recycling and re-use. Note that all existing waste management facilities belong in principle to the Government and they are often operated by an independent contractor through the municipality. Specific routes should be designated by the supervising consultant to control and manage the movement of large amounts of waste through city streets to the final disposal sites. To the extent feasible, these routes should be selected in a way to minimize potential traffic congestion and avoid peak hours. Weight limits for trucks and measures to control potential dust emissions (by covering or water spraying) should be adopted by the contractor. The control measures for waste collection and disposal should be included within the bid specifications and construction contracts. The supervising consultant has the responsibility of ensuring the implementation of these measures.

During the operation phase and since one of the main objectives of the CHUD project is the attraction of a larger number of visitors/tourists, it is expected that increased solid waste and wastewater generation rates will occur. As such, ensuring the enforcement of an adequate solid waste and wastewater collection system in the five old city cores and archaeological sites is of utmost importance. While the projected additional rates are not significant to cause an environmental impact under normal conditions in a typical city, it should be noted that the existing solid waste and wastewater infrastructure in all five cities require upgrading and better management irrespective of the CHUD project. As such, various projects/programs are underway across Lebanon in general and in the cities involved in particular. The capacity of these projects/programs once completed will easily accommodate the projected increased rates associated with the implementation of the CHUD project. In this context, the situation in the old city of Tyre is of most concern since at present wastewater from the old city is discharged directly into the old fishing port, which is proposed to be rehabilitated through the CHUD project. As mentioned above, the concern is related to the possibility that the CHUD project will be completed prior to the completion of the wastewater treatment plant for the city of Tyre and its surroundings. In case such a scenario materializes, two mitigation alternatives were considered
(Table 34) and should be further evaluated in due course if necessary (refer to analysis of alternatives, Chapter 0).

Table 34. Mitigation plans for wastewater discharge in the city of Tyre if proposed Abbasiyeh facility is delayed beyond the CHUD project completion

<table>
<thead>
<tr>
<th>Mitigation Option # 1</th>
<th>Mitigation Option # 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prevent further discharge in the old port and through the eastern outfall</td>
<td>• Prevent further discharge in the port and through the eastern outfall (by constructing line C and the pumping station PSL2 as described in option #1, as well as ensuring the capacity and operation of the pumping station PSM3)</td>
</tr>
<tr>
<td>• Ensure the capacity and operation of the pumping station</td>
<td>• Construct a temporary treatment plant near the pumping station in order to treat the wastewater and use the effluent for landscaping or discharge to the sea until the planned Abbasiyeh facility is operational</td>
</tr>
<tr>
<td>• Elongate the western surface outfall, and continue to discharge until the planned Abbasiyeh facility is operational</td>
<td>• Repair and operate the pumps at the existing pumping station in the parking area so that all the wastewater will be diverted to the western outfall by pumping</td>
</tr>
<tr>
<td>• Construct Line C (both branches)</td>
<td>• Extend the western sewer outfall into the sea to ensure better wastewater dilution</td>
</tr>
<tr>
<td>• Construct and install pumping station PSL2</td>
<td></td>
</tr>
<tr>
<td>• Repair and operate the pumps at the existing pumping station in the parking area so that all the wastewater will be diverted to the western outfall by pumping</td>
<td></td>
</tr>
</tbody>
</table>

Additional measures to limit waste generation and resulting pollution consist of such measures as:

• Developing an operation and management plan for the five entire old cities in coordination with the municipalities;
• Developing operation and management manuals and regulations for all delivered facilities within the CHUD project such as new markets, housing…
• Forbidding slaughtering in markets (Tripoli and Tyre);
• Developing and implementing waste management plans in markets;
• Acquiring appropriately sized bins and trucks for different regions (small trucks and bins for narrow streets inside souks);
• Promoting awareness on proper waste management practices among market operators and shop owners, for the purpose of reducing litter and improving hygienic conditions in the cities.

It should be noted that significant investments would be required if the attraction rates of visitors/tourists increase dramatically as observed in some coastal and cultural heritage cities in Europe or Turkey. In such an unlikely case, the design capacity of most planned facilities will not be adequate and serious mitigation measures would be necessary. On the other hand, the relocation of some polluting activities to industrialized or specialized areas (butchers and car repair shops in Baalbeck, and some polluting industries in Khan El-Askar in Tripoli) will
definitely improve the environmental conditions in the old cities and help in promoting cultural tourism.

**Mitigating water quality/supply impacts**

The most appropriate mitigation measures to ensure minimal water quality impacts include provisions for proper surface drainage during both the construction and operation phases, minimization of on-site water and chemical usage (oil, lubricants and fuel), as well as limiting the exposure of the soil to accidental releases of pollutants during the construction phase. As such, all utilized chemicals should preferably be non-toxic and readily biodegradable. It should be noted, that currently there are no provisions or regulations in Lebanon for the proper disposal of oil, lubricants and fuel used by construction equipment. These wastes when mixed with other construction wastes are typically disposed of in a landfill and as such they will be handled similar to what is described in Section 0.

During operation, water quality impacts arise mainly from the improper disposal or leakage of the wastewater generated. The mitigation of such impacts were presented in Section 0. Initiating a regular water quality monitoring program is also a central mitigation measure that has to be launched in order to assure public and tourist safety. As for the mitigating measures needed for limiting excessive water consumption, water metering as well as providing financial incentives are crucial steps that need to be coupled with infrastructure upgrade. While such measures are highly desirable, they are beyond the scope of mitigation actions that could be undertaken in the context of the CHUD project.

**Mitigating health and safety impacts**

Health and safety at construction sites is considered primarily in terms of potential exposure to PM and noise, and more importantly potential accident occurrence to workers on-site and to pedestrians or animals. Typical health guidelines related to occupational exposure to PM and noise, include the provision of dust masks to workers near high PM concentrations (loading, unloading and transfer operations), and ear plugs for workers around noisy devices (compactors, front-loaders, backhoes, tractors, concrete mixers…). In this respect, the CDR has developed specific site health and safety guidelines for contractors involved in construction projects (Appendix E). The guidelines should be included within the bid specifications and construction contracts. The supervising consultant will have the responsibility of ensuring the implementation of these guidelines. Note that a health-based economic valuation of air or water quality is beyond the scope of the present EIA.
During operation, health and safety impacts are mostly related to potential accident occurrence among visitors within the sites and on the access roads. Such impacts can be mitigated through proper signage whereby pedestrian areas are clearly marked and provided with permanent physical barriers to hamper vehicle circulation. In addition, the tourist tracks to be developed within the sites should be clearly marked and contained to limit any potential of wandering to hazardous locations. Proper sign posting indicating the different roads to follow in order to reach the archaeological sites as well as panels inside the site indicating “you are here” should be introduced for proper orientation. Security of visitors must be ensured by preventing people from accessing potentially dangerous sites, warning them about risks of falling off areas, and preventing them from climbing stones, columns, niches, and decorated features across the site. Proper lighting should be provided within the site in order to avoid accident occurrence. The presence of guards and guides is crucial and visitors should not be allowed to enter the sites unaccompanied. An emergency medical center or first aid facility should be mobilized to the vicinity of each of the five sites. Finally, proper maintenance of tracks, lighting, faults or cracks in the sites should be conducted on a regular basis. Structural situations presenting risks for visitors such as unstable stone elements or open excavations should be eliminated.

Mitigating archaeological and cultural heritage impacts

As indicated above, the impacts of the construction phase can be minimized through proper planning and careful implementation. The removal of stones within the sites and old city centers should undergo a complex documentation operation: stones need to be catalogued, numbered, marked and described, their function and possible provenance ascertained, their existing location marked in precise scaled plans, and moved with care to another location. In addition, the cleaning of stones (walls and facades) requires the use of a suitable technology that must be based on low impact blast method, avoid the use of harsh abrasives and toxic chemicals, encourage the use of biodegradable, water-based (instead of solvent based), non flammable, fire resistant, non sparking, and breathable materials. When excavating in the vicinity of archaeological sites, care should be taken to follow the “Chance find procedures” (Appendix G) whenever new archaeological remains, antiquity or any other object of cultural or archaeological importance are encountered during construction.

The operational phase is associated with an increased number of visitors/tourists who will frequent archaeological sites and newly rehabilitated city centers and buildings. A visitors’ code of behavior inside archaeological areas with the purpose of safeguarding the fragile historic
property from direct or indirect harmful actions must be developed. The code can be summarized by a set of points which can be printed on the back of the entrance ticket or on the free brochure for the site (examples: please avoid touching decorated features, do not climb on top of stones nor climb into niches, etc.). Abraded areas should be covered with low impact temporary installations like wooden platforms. These measures can be made more effective through constant control by site personnel. In addition, guards should be placed in specific locations all time and be instructed to enforce the site regulations, without harassing the visitors, but rather educating them in proper protective measures. Provisions must be made to eliminate the effects of littering through the development and implementation of a waste collection and management plan at the sites. Small panels throughout the site indicating photo snapshots could be introduced as a mean to extend visitors’ stay length inside the sites.

Other mitigation measures that should be adopted both during the construction and operation phases include the prevention of decay of stone surfaces by controlling vegetation growth using the appropriate biocides after mechanical removal, fixing of loose stone parts by gluing with appropriate resins, injections, insertion of steel and fiberglass bars and clamps, cleaning of selected areas in need of consolidation by mechanical or chemical methods, and localized consolidation of heavily decayed areas using appropriate resins.

**Mitigating socio-economic impacts**

While the CHUD project will bring about positive socio-economic impacts, it is not without negative impacts particularly during the construction phase. The most significant in this context is the premature displacement of economic establishments, encroachments and squatting on protected areas as well as the gentrification and resettlement of the dwellers of Khan El-Askar in Tripoli.

*Premature displacement of economic establishments*

All CHUD sites contain certain economic activities that are to some extent incompatible with the general historical character of the area (for example the presence of vehicle repair shops and plastic furniture enterprises within the historic sites); yet these establishments are almost invariably of a small scale. The adoption of a gradual approach based on education, public and environmental awareness, provision of financial incentives as well as providing technical assistance and guidance is expected to reduce the impacts of these “alien” establishments within all historical sites. Such an approach would limit the adverse socio-economic impacts of adopting a stringent fast track plan to remove any establishment not conforming to the zoning regulations.
Encroachments and squatting on protected areas

Mitigating encroachments and squatting on protected areas is currently not a major priority and is linked with the geo-political stability of the country (e.g. the encroachments of the Palestinian refugee camp on the edge of El-Bass in Tyre). At present, they can be tolerated, and dealt with through the provision of relocation incentives (provision of alternative temporary housing units).

Gentrification

Gentrification refers to the risk that many of the targeted historic areas are inhabited by a poor and vulnerable population that may be dislocated when these sites are upgraded and rehabilitated. Gentrification could lead to the relocation of this exposed segment of society to alternative areas that are characterized by poor living conditions. The Stakeholder Analysis Report clearly identified the desire of (resident and non-resident) landowners to upgrade their properties in order to benefit from higher rents resulting from the growth potential expected from the implementation of the CHUD.

The governmental revisions to the Rent Act in 1992 provide the landlords with opportunities to increase rent and have weakened the previously almost unassailable position of sitting tenants. A proposed revision to the Rent Law is expected to further strengthen the landlord side if ratified. As such, it is likely that the gentrification of the area would occur irrespective of this project. Great care should be taken in the implementation of this project, through planning and contractual mechanisms, to ensure that the living standards of the poor are protected. In addition, relocation of populations should be limited in order to enable the poor populations to remain and benefit from the CHUD improved areas. Such an approach would ensure the development of a mixed socio-economic character within the different rehabilitated sites. In addition, residents who are displaced either temporarily (while improvements are being conducted) or permanently would be presented with acceptable alternatives. The project should provide positive social-economic impacts within the targeted areas namely by:

- Ensuring that owners seeking to improve their buildings conform with the building code in order to preserve the cultural character of the place, and enabling them to realize increased asset value while contractually protecting the interests of the tenants (those that remain as well as those that leave)
- Creating conditions for enhancing incomes in order to meet increased rents (see above)
- Providing public private partnership incentives that can encourage poor proprietors to
invest in upgrading their residences and/or establishments.

Resettlement Action Plan (RAP)

The implementation of the CHUD project involves, amongst its various tasks, the rehabilitation and renovation of Khan El-Askar, and transforming it into a cultural and artisanal exhibition center for regional products and handicrafts. This component involved the resettlement of the current residents 71 families and the relocation of 64 of the existing commercial establishments and warehouses in the area into a complementary housing project newly constructed. The objective of the resettlement plan for the Khan provided current residents with improved living conditions while allowing the municipality to recuperate its property and transform it into an economically viable enterprise on a citywide scale. The project preserved the local social fabric and the existing community networks and triggered minimal disruption to the daily patterns of residents. More importantly, the housing project ensured a qualitative improvement in the physical environment of the inhabitants.

The Khan El-Askar component is be executed in three phases. This is expected to result in long-term positive impacts on the concerned resident population by bringing about a dramatic improvement in their living conditions, minimizing the disruption of community links by limiting the resettlement option within the old city, as well as minimizing the disruption of the livelihood of commercial tenants by maintaining them in place. The three phases include the following:

- **Phase I**: it concerned the renovation and rehabilitation of the Khan and the resettlement of part of its residents. This phase involves the re-housing of 38 families and the relocation of 29 small business enterprises and warehouses from their present location in the Eastern block of the Khan to the 2 newly constructed social housing blocks A & B located in the immediate vicinity of the Khan in a way that largely maintains the social fabric and community relations.

- **Phase II**: it initiated the re-housing of the remaining residents in the other half of the Khan. This phase involved 33 families from their present location in the Western block of the Khan to the third newly constructed social housing block C located also in the immediate vicinity of the Khan.

- **Phase III**: During the execution of the restoration of the Khan and for its sustainable reuse program, the project reconsidered the relocation of the external shops, and hence to plan a third phase; it involves the resettlement of 35 small business enterprises and warehouses located at the external facades of the whole Khan.
These phases allowed starting the rehabilitation of the Khan as a visitor’s center and a regional artisanal hub, thus contributing to the economic regeneration of the city, while greatly improving the living conditions of some of the city’s poorest inhabitants.

Eligibility and benefits
The municipality, which owns the Khan, committed to resettling all residents and tenants in an appropriate alternative housing complex. The basic principles of the resettling project ensured that each family is given an apartment commensurate with family size, and that residents are charged affordable rents in a fair and just manner that would ensure no economic hardships to the individual families. The municipality however, retains full ownership for these units.

All units on the interior of the khan were relocated to the new complex. In total, 29 commercial occupants were relocated to the ground floor of the new buildings A, B and C with direct access to the street (stores ranging in size from 10 to 15 m²); while 35 external shops and warehouses will be relocated in the ground floor and underground units of the complex.

The World Bank finance 80 percent of the project, while the Lebanese Government is contributing the remaining 20 percent.

Summary of impact mitigation
Tables 25, 26, and 27 present a summary of the elements of the mitigation plan that were considered during the various phases of the project namely: design, construction, and operation. The tables also include the implementing and responsible agencies/parties in the cost allocation. The cost during the design and construction phases are part of the cost allocated for the implementation of the CHUD. During the operation phase, the elements of the mitigation plan are the responsibility of the DGA and/or the municipality. Most mitigation measures at the operation phase are an integral part of routine maintenance activities undertaken by the DGA or the municipalities. As such, the cost of the mitigation plan during the operation phase is not directly related to the project.
Table 25. Summary of proposed elements of the mitigation plan during the design phase

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsibility</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>• Public participation</td>
<td>CDR/Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td></td>
<td>• Modification of design to reflect public consultation processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Development of re-routing schemes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Assessment of projected increase in traffic vs. congestion and change in circulation patterns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td>• Definition of existing standards and regulations</td>
<td>CDR/Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td></td>
<td>• Assessment of vehicle-induced emissions vs. traffic increase and change in circulation patterns</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provide regular monitoring of vehicular induced emissions near the archaeological and heritage sites to meet ambient air quality standards and limit potential decay that may be caused by the formation of acid rain or smog</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise level</td>
<td>• Definition of existing standards, regulations</td>
<td>CDR/Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td></td>
<td>• Assessment of vehicle noise emissions vs. traffic increase and change in circulation patterns</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Consideration for porous material, flexible joints and supports</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Consideration for sound barriers where necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landscape and visual intrusion</td>
<td>• Documentation of existing conditions</td>
<td>CDR/Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td></td>
<td>• Blending color(s) of paint</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Blending exterior construction material</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Blending architectural features</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provisions for visual screens or greenbelts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste generation</td>
<td>• Locate nearby disposal sites and secure permit for waste disposal</td>
<td>CDR/Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td></td>
<td>• Plan for adequate provision and location of waste bins in souks and markets</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Explore waste material recycling or re-use potential</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Assessment of projected increase in solid waste generation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Assessment of projected increase in wastewater generation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Development of solid waste management plan at archaeological sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water quality/supply</td>
<td>• Provisions for proper surface and ground water drainage</td>
<td>CDR/Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td></td>
<td>• Use of non-toxic and readily biodegradable chemicals</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Assessment of projected increase in water demand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and safety</td>
<td>• Develop and/or review and update general health and safety plans</td>
<td>CDR/Consultant</td>
<td>Included in final design</td>
</tr>
<tr>
<td></td>
<td>• Enforce CDR health and safety guidelines on all contractors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archaeological and cultural heritage</td>
<td>• Develop rehabilitation/construction monitoring plans</td>
<td>CDR/DGA/ Municipality/</td>
<td>Included in final design</td>
</tr>
<tr>
<td></td>
<td>• Follow Archaeological Chance Find Procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-economics</td>
<td>Consultant</td>
<td>Included in final design</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>------------------</td>
<td>--------------------------</td>
<td></td>
</tr>
<tr>
<td>• Eliminate or minimize land acquisition and population resettlement</td>
<td>CDR/Consultant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ensure community participation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Develop proper compensation and resettlement plans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Avoid stringent fast track plan to remove any establishment not conforming with zoning regulations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Provision of relocation incentives for the populations to be displaced in the Palestinian refugee camp in Tyre and the residents of Khan El-Askar in Tripoli (65 families or 333 individuals along with 78 existing commercial activities)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Avoid gentrification in the case of Khan El-Askar in Tripoli</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ensure the development of a mixed socio-economic character to the different rehabilitated sites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Protect the interests of tenants who remain and tenants who leave</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Create conditions for enhancing the income of remaining tenants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Provide public private partnership incentives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ensure that the housing project will provide a qualitative improvement in the physical environment of the inhabitants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ensure that each family will be given an apartment commensurate with family size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ensure that residents would be charged affordable rents in a fair and just manner</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 26. Summary of proposed elements of the mitigation plan during the construction phase

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measure</th>
<th>Responsibility</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>• Public communication</td>
<td>CDR Consultant Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td></td>
<td>• Implementation of re-routing schemes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Extended construction hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provision of clear and adequate signing at least 500 meters around construction sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Adopting clear delineation and channeling measures at least 500 meters around construction sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Limiting movement of heavy machinery to off-peak hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Providing prior notification about work and heavy equipment movement schedule</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Re-opening roads adjacent to construction sites as early as possible, even before final readiness of the site</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provide close coordination with local traffic control departments in each city</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td>• Site and stock pile enclosure</td>
<td>CDR Consultant Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td></td>
<td>• Spraying of long term stockpiles with chemical bonding agents</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• On-site mixing in enclosed or shielded areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Proper unloading operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Water damping of stockpiles when necessary (dry conditions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sealing of completed earthworks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Providing re-vegetation as soon as possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Medium and heavily used haul routes permanently surfaced</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Damping un-surfaced haul routes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Keep hauling routes free of dust and regularly cleaned</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maintain low traffic speeds on-site with proper enforcement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maintenance and repair of construction machinery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise level</td>
<td>• Construction of site enclosure</td>
<td>CDR Consultant Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td></td>
<td>• Control of timing of noise emissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Informing the local people when noisy activities are planned</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Proper road maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Enforcement of speed limits</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Employ low noise machinery, or machinery with noise shielding and/or sound absorption materials (e.g. on-site power generator enclosure)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Proper maintenance of equipment and machinery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact</td>
<td>Mitigation measure</td>
<td>Responsibility</td>
<td>Cost</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Landscape and visual intrusion</td>
<td>• Preserve existing vegetation when feasible&lt;br&gt;• Blending color(s) of paint&lt;br&gt;• Blending exterior construction material&lt;br&gt;• Blending architectural features&lt;br&gt;• Provisions of visual screens or greenbelts&lt;br&gt;• Implementing appropriate landscaping&lt;br&gt;• Confirming to area building codes</td>
<td>CDR Consultant Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Waste generation</td>
<td>• Waste transport and disposal at designated disposal sites&lt;br&gt;• Implement solid waste management plan at archaeological sites</td>
<td>CDR/DGA Consultant Contractor Municipality</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Water quality supply</td>
<td>• Proper surface and ground drainage&lt;br&gt;• Decrease water usage during the construction phase&lt;br&gt;• Minimize soil exposure time during the construction phase&lt;br&gt;• Minimize chemical usage (lubricants, solvents, petroleum products) and use non-toxic biodegradable products</td>
<td>CDR Consultant Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Health and safety</td>
<td>• Provide pedestrian walk ways&lt;br&gt;• Install proper warning signs&lt;br&gt;• Provide protective clothing and equipment&lt;br&gt;• Create buffer zones around major construction zones&lt;br&gt;• Follow CDR’s written procedures stipulated in the developed health and safety guidelines</td>
<td>CDR Consultant Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Archaeological and cultural heritage</td>
<td>• Documentation of buried sites and conservation of materials&lt;br&gt;• Implementing a documentation operation on all removed stones within the sites and old city centers&lt;br&gt;• Avoiding the use of harsh abrasives and toxic chemicals&lt;br&gt;• Encouraging the use of biodegradable, water-based (instead of solvent based), non flammable, fire resistant, non sparking, and breathable materials for rehabilitation works&lt;br&gt;• Implementation of Archaeological Chance Find Procedures, if needed&lt;br&gt;• Covering abraded areas with low impact temporary installations like wooden platforms&lt;br&gt;• Controlling vegetation growth using appropriate biocides after mechanical removal&lt;br&gt;• Fixing of loose stone parts by gluing with appropriate resins, injections, insertion of steel and fiberglass bars and clamps&lt;br&gt;• Cleaning areas in need of consolidation by mechanical or chemical methods</td>
<td>CDR Consultant Contractor DGA</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Socio-economics</td>
<td>• Ensure community participation&lt;br&gt;• Implementation of the developed resettlement plan during the design phase</td>
<td>CDR Consultant, Contractor</td>
<td>Included in construction</td>
</tr>
<tr>
<td>Impact</td>
<td>Mitigation measure</td>
<td>Responsibility</td>
<td>Cost</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>-------------------------------------------</td>
</tr>
</tbody>
</table>
| Traffic                | • Maintenance of traffic signs and parking spaces  
• Maintenance of new parking lots, roads, and underpasses (Tripoli)  
• Relocating the fruits and vegetables market to the platform over Abou Ali river  
• Constructing two new passes that will cross the Moutran square transversally to allow for pedestrian movement in Baalbeck  
• Improving access to archaeological site by building sidewalks and rehabilitating pedestrian paths | Government     | Not directly part of project             |
| Air quality            | • Implementation of long term strategies (beyond the scope of the CHUDP)                                                                                                                                              | Municipalities | Not directly part of project             |
| Agriculture            |                                                                                                                                                                                                                | Government     | Not directly part of project             |
| Noise level            | • Sound insulation and pavement maintenance  
• Limiting vehicle speed  
• Implementation of long term strategies (beyond the scope of the CHUDP)                                                                                                                                              | Municipalities | Not directly part of project             |
| Traffic                | • Sound insulation and pavement maintenance  
• Limiting vehicle speed  
• Implementation of long term strategies (beyond the scope of the CHUDP)                                                                                                                                              | Traffic police | Not directly part of project             |
| Municipalities         | Not directly part of project                                                                                                                  |                |                                           |
| Landscape and visual intrusion | • Maintenance of exterior material, visual screens or greenbelts  
• Enforcing compliance with building code as well as developed architectural plans                                                                                                                                 | Municipalities | Not directly part of project             |
| Water quality/ supply  | • Maintenance of surface water drainage  
• Prohibiting disposal of untreated wastewater in areas with limited flushing capabilities (Tyre)  
• Providing incentives for the efficient use of water (beyond the scope of the CHUDP)  
• Initiating a water quality monitoring program (beyond the scope of the CHUDP)                                                                                                                                        | Municipalities | Not directly part of project             |
| Waste generation       | • Maintenance of waste management system at archaeological sites  
• Distribution and promotion of the use of properly sized waste bins to shop owners in markets to minimize littering  
• Development and implementation of environmental management plans for markets in Tripoli and Tyre, awareness promotion among shop owners  
• Regular cleanup of the river until the desired results are achieved (minimization of littering)                                                                                                                | DGA            | Not directly part of project             |
| Health and safety      | • Maintenance of signs and warnings  
• Mark developed tourist tracks clearly  
• Introduce proper orientation sign posting such as “you are here” panels at parking facilities and along developed tourist tracks  
• Providing appropriate lighting in archaeological sites, tracks, and parking facilities  
• Providing guards and guides during visiting hours at archaeological sites, tracks, parking facilities  
• Providing an emergency medical center or first aid facility in all five cities                                                                                                                                         | Municipalities | Not directly part of project             |
- Eliminating structural situations presenting risks for visitors

| Archaeological and cultural heritage | Routine monitoring and maintenance
- Develop visitor’s code of behavior at archaeological sites to be printed on the back of the entrance ticket or on the free brochure for the site
- Controlling vegetation growth using appropriate biocides after mechanical removal
- Implementing waste collection and management plan at the sites
- Fixing of loose stone parts by gluing with appropriate resins, injections, insertion of steel and fiberglass bars and clamps
- Cleaning of areas in need of consolidation by mechanical or chemical methods | DGA municipality | Not directly part of project |
ENVIRONMENTAL MONITORING

Impact and compliance monitoring is being practiced during the construction phase and will also be during operation phases of the CHUD. The monitoring focuses on selected environmental variables, the determination of compliance with standards, and the assessment of the level of impacts on the environment in order to:

- Verify the environmental impacts predicted in the EIA study;
- Monitor the performance of the project and the effectiveness of mitigation measures;
- Determine project compliance with national and international requirements and standards;
- Take remedial action if unexpected problems and unanticipated impacts arise;
- Improve cultural heritage site management and environmental control.

The following sections describe a general outline of the proposed monitoring plan undertaken during the construction and operation phases in each of the five cities.

Monitoring during the construction and rehabilitation phases
During the construction and rehabilitation phases, monitoring was conducted at varying frequencies depending on the parameter monitored. Monitoring took place at specific locations whereby the environmental impacts are thought to be most important. The parameters monitored include:

- Traffic counts at identified monitoring stations;
- Air quality using selected indicators at selected locations;
- Noise level using selected indicators at selected locations;
- Seawater quality using selected indicators at selected locations;
- Runoff water quality using selected indicators at selected locations;
- Landscape through visual inspection and photographic documentation;
- Waste generation through visual inspection and photographic documentation;
- Archaeological deposits, when applicable, through visual inspection and photographic documentation;
- Health and safety through visual inspection and photographic documentation in addition to the maintenance of a record of injuries and accidents, specifying their underlying cause and describing their location;
Monitoring during the operation phase

During the operation phase, monitoring will be conducted for the following parameters:

- Traffic counts at identified monitoring stations;
- Air quality using selected indicators at selected locations;
- Noise level using selected indicators at selected locations;
- Seawater quality using selected indicators at selected locations;
- Landscape through visual inspection and photographic documentation;
- Waste generation through visual inspection and photographic documentation;
- Maintenance of a record of injuries and accidents, specifying their underlying cause and describing their location; and,
- Deterioration of archaeological sites through inspection and photographic documentation.

Monitoring plan implementation

The Government of Lebanon (through the CDR) is responsible for funding and undertaking the environmental monitoring activities. During the construction phase, the EMP consultants undertook the monitoring for the CDR PMU at the beginning of the project, and will do so again upon the completion of works. At the present time, it is assumed that CDR through the CHUD PMU will continue to be responsible for the implementation of the monitoring plan until the end of the project.

During the course of the operational phase, depending on its capabilities and resources, the MoE may become responsible for implementing the monitoring, with the support of consultants as appropriate. Since the municipalities were trained on environmental management and the necessary tools to conduct it, they will be handed over (upon completion of the project) the project’s final report including the results of environmental monitoring at the beginning and end of the project, as well as the environmental monitoring plan to be implemented on a yearly basis.

The required equipment and technical skills for the implementation of a proper environmental monitoring plan are generally lacking at the professional level in Lebanon; particularly, with respect to the availability of analytical equipment to conduct air and water chemical analysis. Academic institutions and the private sector are currently best equipped to assist in the implementation of the proposed plan. As such, the monitoring plan can be implemented in a collaborative effort between municipalities and academic institutions/ the private sector. In order to ensure the proper implementation of the proposed environmental plan in each of the five cities, it was essential to maintain proper environmental monitoring particularly during the construction phase. For this purpose, qualified personnel were designated. The detailed yearly staffing requirements for the implementation of the monitoring plan during the construction and operation
phases in each of the five cities including the definition of indicator, frequency, and monitoring locations are provided in Tables 28 to 38.

**Data reporting**

Monitoring activities are of great importance in the process of increasing the knowledge on the related impacts of urban development in general, and rehabilitation of cultural sites in particular; especially that such information practically does not exist in Lebanon. The collected monitoring data has initiated the development of a database that will allow for the better characterization of urban development-related impacts in the future. Periodic environmental monitoring reports are being prepared by the EMP consultants (at the construction phase) to analyze the data collected, assess monitoring activities and provide recommendations to ensure the effectiveness of the overall environmental monitoring and management plan during the project life span. A comprehensive report will be generated at the end of the project to present results of monitoring activities and evaluate the adequacy of environmental control measures in each of the involved cities. The contents of the report will include the original measurements, sampling locations, time of sampling, influencing factors (weather information, activities on site), environmental quality assessment and data analysis. The reports will be submitted to the CDR, DGA, MoE, and the World Bank. When national standards for environmental quality that are issued by the MoE (Decision 8/1 dated January 2001) are exceeded, notifications will be issued to the contractor and site engineer to take immediate corrective actions.
Table 35. Summary of proposed monitoring plan for Tripoli

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Location</th>
<th>Samples</th>
<th>Frequency</th>
<th>Phase</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>Qualitative: Emir Fakhreddine Street and Rachid Karamme Corniche</td>
<td>Qualitative and quantitative (traffic count) surveys</td>
<td>Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td>CDR PMU/ EMP Consultant (during construction); Municipality (during operation)</td>
</tr>
<tr>
<td></td>
<td>Quantitative: Rachid Karamme Corniche – eastern side of the river, Zgharta – Mawlawiyah access and Emir Fakhreddine Street.</td>
<td></td>
<td>Operation phase: annually</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality (TSP, CO)</td>
<td>At stations T1, T2, T3</td>
<td>24 hours/ location</td>
<td>Construction/ Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise (L_{eq}, L_{min}, L_{max})</td>
<td>At stations T1, T2, T3</td>
<td>24 hours/ location</td>
<td>Construction/ Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Central neighborhood and along the Abou Ali River</td>
<td>Visual inspection/ Photographic documentation</td>
<td>Construction/ Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>River Water Quality (pH, COD, Pb, Cu, Cr, Zn, TC, FC)</td>
<td>Upstream and downstream locations of the project sites (T4 and T5)</td>
<td>Two samples/ location</td>
<td>Construction/ Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>At excavation sites At archaeological sites</td>
<td>Visual inspection/ Photographic documentation</td>
<td>Continuous Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation phase: annually</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accidents (cars/ pedestrians)</td>
<td>In the old city and at entrances</td>
<td>Police/ newspaper records</td>
<td>Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation phase: annually</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and safety/ Hygiene</td>
<td>Within project boundaries</td>
<td>Visual inspection / photographic documentation</td>
<td>Continuous Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation phase: annually</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

T1: At the entrance of the proposed parking facility
T2: At the bridge crossing Abou Ali River after the Bortassiah mosque
T3: At one point along the Souk
Table 36. Estimated requirements for the implementation of the environmental monitoring plan in Tripoli

<table>
<thead>
<tr>
<th>Parameter/Activity</th>
<th>Staff category</th>
<th>Number</th>
<th>Schedule</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSTRUCTION &amp; REHABILITATION PHASE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic / Accidents</td>
<td>Traffic engineer</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Landscape architect</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>Urban archaeologist*</td>
<td>1</td>
<td>Full-time</td>
<td></td>
</tr>
<tr>
<td>Air / Noise / Water</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Equipment and laboratory analysis fees</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Health and Safety officer</td>
<td>1</td>
<td>Full time</td>
<td></td>
</tr>
<tr>
<td>(Construction engineer)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td><strong>Total annual monitoring cost during the construction and rehabilitation phase</strong></td>
<td></td>
<td></td>
<td></td>
<td>16,500</td>
</tr>
</tbody>
</table>

| **OPERATION PHASE**         |                                |        |            |            |
| Traffic / Accidents / Landscape | Traffic engineer                 | 1      | Part-time  |            |
| Archaeology                 | Urban archaeologist             | 1      | Part-time  |            |
| Air / Noise / Water         | Environmental specialist        | 1      | Part-time  |            |
| Equipment and laboratory analysis fees | -                                | -      | -          | -          |
| Training                    | Environmental specialist        | 1      | Part-time  |            |
| Reporting                   | Environmental specialist        | 1      | Part-time  |            |
| **Total annual monitoring cost during the operation phase** |                                |        |            | 8,000      |

* The archaeologist and the Health and Safety officers will be among the teams of the contractors executing the works
Table 37. Summary of proposed monitoring plan for Byblos

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Location</th>
<th>Samples</th>
<th>Frequency</th>
<th>Phase</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>Qualitative description along the historical center, the harbor area and parking lots</td>
<td>Qualitative and quantitative (traffic count) surveys</td>
<td>Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td>CDR PMU/ EMP Consultant (during construction); Municipality (during operation)</td>
</tr>
<tr>
<td>Air quality (TSP, CO)</td>
<td>At stations B1, B2</td>
<td>24 hours/ location</td>
<td>Construction/ Operation</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>Noise (L_{eq}, L_{min}, L_{max})</td>
<td>At stations B1, B2</td>
<td>24 hours / location</td>
<td>Construction/ Operation</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Main entrance of the old city; Old city; Seafront</td>
<td>Visual inspection/ Photographic documentation</td>
<td>Construction/ Operation</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>Seawater Quality (pH, BOD, TSS, TC, FC)</td>
<td>At stations B3, B4, B5</td>
<td>Two samples/ location</td>
<td>Construction/ Operation</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>At excavation sites At archaeological sites</td>
<td>Visual inspection/ Photographic documentation</td>
<td>Continuous Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>Accidents (cars/ pedestrians)</td>
<td>In the old city and at entrances</td>
<td>Police/ newspaper records</td>
<td>Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>Health and safety/ Hygiene</td>
<td>Within project boundaries</td>
<td>Visual inspection/ Photographic documentation</td>
<td>Continuous Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
</tbody>
</table>

B1: Facing entrance of parking on highway ellipse  
B2: Lower end of Decumanus Maximus road  
B3: Facing the municipality parking  
B4: At 10 m offshore, 1 m deep  
B5: At 20 m offshore, 1 m deep  
B6: At 100 m offshore, 1 m deep
Table 38. Estimated requirements for the implementation of the environmental monitoring plan in Byblos

<table>
<thead>
<tr>
<th>Parameter/Activity</th>
<th>Staff category</th>
<th>Number</th>
<th>Schedule</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSTRUCTION &amp; REHABILITATION PHASE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic / Accidents</td>
<td>Traffic engineer</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Landscape architect</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>Urban archaeologist*</td>
<td>1</td>
<td>Full-time</td>
<td></td>
</tr>
<tr>
<td>Air / Noise / Water</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Equipment and laboratory analysis fees</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Health and safety</td>
<td>Health and Safety officer (Construction engineer)*</td>
<td>1</td>
<td>Full time</td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td><strong>Total annual monitoring cost during the construction and rehabilitation phase</strong></td>
<td></td>
<td></td>
<td></td>
<td>14,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>OPERATION PHASE</strong></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic / Accidents / Landscape</td>
<td>Traffic engineer</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>Urban archaeologist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Air / Noise / Water / Archaeology</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Equipment and laboratory analysis fees</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Training</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td><strong>Total annual monitoring cost during the operation phase</strong></td>
<td></td>
<td></td>
<td></td>
<td>6,000</td>
</tr>
</tbody>
</table>

* The archaeologist and the Health and Safety officers will be among the teams of the contractors executing the works.
Table 39. Summary of proposed monitoring plan for Saida

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Location</th>
<th>Samples</th>
<th>Frequency</th>
<th>Phase</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic qualitative description along the sea and the vicinity of the Souk, archeological sites and parking lots. Quantitative survey on Chakrieh road.</td>
<td>Qualitative and quantitative (traffic count) surveys</td>
<td>Construction phase: beginning and end of the project; Operation phase: annually</td>
<td>Construction/Operation</td>
<td>CDR PMU/EMP Consultant (during construction); Municipality (during operation)</td>
<td></td>
</tr>
<tr>
<td>Air quality (TSP, CO)</td>
<td>At stations S1, S2-A, S2-B</td>
<td>24 hours/ location</td>
<td></td>
<td>Construction/Operation</td>
<td></td>
</tr>
<tr>
<td>Noise (L_{eq}, L_{max}, L_{min})</td>
<td>At stations S1, S2-A, S2-B</td>
<td>24 hours / location</td>
<td></td>
<td>Construction/Operation</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Seafront facing fishermen’s port, Chakrieh Street</td>
<td>Visual inspection/Photographic documentation</td>
<td>Construction/Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seawater Quality (pH, BOD, TSS, TC, FC)</td>
<td>At stations S3, S4, S5</td>
<td>Two samples / location</td>
<td></td>
<td>Construction/Operation</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>At excavation sites At archaeological sites</td>
<td>Visual inspection/Photographic documentation</td>
<td>Continuous Construction phase: beginning and end of the project; Operation phase: annually</td>
<td>Construction/Operation</td>
<td></td>
</tr>
<tr>
<td>Accidents (cars/pedestrians)</td>
<td>In the old city and at entrances</td>
<td>Police / newspaper records</td>
<td>Construction phase: beginning and end of the project; Operation phase: annually</td>
<td>Construction/Operation</td>
<td></td>
</tr>
<tr>
<td>Health and safety/Hygiene</td>
<td>Within project boundaries</td>
<td>Visual inspection/Photographic documentation</td>
<td>Continuous Construction phase: beginning and end of the project; Operation phase: annually</td>
<td>Construction/Operation</td>
<td></td>
</tr>
</tbody>
</table>

S1: On the road along the seafront facing the sea castle
S2: At the entrance of the parking outside the eastern perimeter of the old city
S3: Along rehabilitation activities
S4: At 10 m offshore, 1 m deep
S5: At 20 m offshore, 1 m deep
S6: At 100 m offshore, 1 m deep
Table 40. Estimated requirements for the implementation of the Environmental Monitoring Plan in Saida

<table>
<thead>
<tr>
<th>Parameter/Activity</th>
<th>Staff category</th>
<th>Number</th>
<th>Schedule</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSTRUCTION &amp; REHABILITATION PHASE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic / Accidents</td>
<td>Traffic engineer</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Landscape architect</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>Urban archaeologist*</td>
<td>1</td>
<td>Full-time</td>
<td></td>
</tr>
<tr>
<td>Air /Noise / Water</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Equipment and laboratory analysis fees</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Health and Safety officer</td>
<td>1</td>
<td>Full time</td>
<td></td>
</tr>
<tr>
<td>(Construction engineer)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td><strong>Total annual monitoring cost during the construction and rehabilitation phase</strong></td>
<td></td>
<td></td>
<td></td>
<td>14,500</td>
</tr>
</tbody>
</table>

| **OPERATION PHASE**                |                              |        |               |            |
| Traffic / Accidents / Landscape    | Traffic engineer             | 1      | Part-time     |            |
| Archaeology                        | Urban archaeologist          | 1      | Part-time     |            |
| Air /Noise/ Water / Archaeology    | Environmental specialist     | 1      | Part-time     |            |
| Equipment and laboratory analysis fees |                              | -      | -             | -          |
| Training                           | Environmental specialist     | 1      | Part-time     |            |
| Reporting                          | Environmental specialist     | 1      | Part-time     |            |
| **Total annual monitoring cost during the operation phase** |                              |        |               | 6,000      |

* The archaeologist and the Health and Safety officers will be among the teams of the contractors executing the works
Table 41. Summary of proposed monitoring plan for Tyre

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Location</th>
<th>Samples</th>
<th>Frequency</th>
<th>Phase</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>Qualitative: Hamra Street Quantitative: Hamra Street and Banque du Liban Street.</td>
<td>Qualitative and quantitative (traffic count) surveys</td>
<td>Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td>CDR PMU/ EMP Consultant (during construction); Municipality (during operation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation phase: annually</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td>At stations Ty1, Ty2, Ty3</td>
<td>24 hours/ location</td>
<td></td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>(TSP, CO)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>At stations Ty1, Ty2, Ty3</td>
<td>24 hours / location</td>
<td></td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>(L_{eq}, L_{min}, L_{max})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Eastern and western quays,</td>
<td>Visual inspection / Photographic documentation</td>
<td></td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>Seawater Quality</td>
<td>At stations Ty4, Ty5, Ty6</td>
<td>Two samples / location</td>
<td></td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>(pH, BOD, TSS, TC, FC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>At excavation sites At archaeological sites</td>
<td>Visual inspection / Photographic documentation</td>
<td>Continuous Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation phase: annually</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accidents</td>
<td>In the old city and at entrances</td>
<td>Police / newspaper records</td>
<td>Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td>(cars/pedestrians)</td>
<td></td>
<td></td>
<td>Operation phase: annually</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and safety/Hygiene</td>
<td>Within project boundaries</td>
<td>Visual inspection / Photographic documentation</td>
<td>Continuous Construction phase: beginning and end of the project</td>
<td>Construction/ Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operation phase: annually</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ty1: Facing the parking area towards the intersection of Rue Hamra
Ty2: Along rehabilitation activities and inside the archaeological sites
Ty4: At 10 m offshore, 1 m deep
Ty5: At 20 m offshore, 1 m deep
Ty6: At 100 m offshore, 1 m deep
Table 42. Estimated requirements for the implementation of the environmental monitoring plan in Tyre

<table>
<thead>
<tr>
<th>Parameter/Activity</th>
<th>Staff category</th>
<th>Number</th>
<th>Schedule</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSTRUCTION &amp; REHABILITATION PHASE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic / Accidents</td>
<td>Traffic engineer</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Landscape architect</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>Urban archaeologist*</td>
<td>1</td>
<td>Full-time</td>
<td></td>
</tr>
<tr>
<td>Air /Noise / Water</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Equipment and laboratory analysis fees</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Health and Safety officer (Construction engineer)*</td>
<td>1</td>
<td>Full time</td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td><strong>Total annual monitoring cost during the construction and rehabilitation phase</strong></td>
<td></td>
<td></td>
<td></td>
<td>16,500</td>
</tr>
<tr>
<td><strong>OPERATION PHASE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic / Accidents / Landscape</td>
<td>Traffic engineer</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>Urban archaeologist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Air /Noise/ Water / Archaeology</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Equipment and laboratory analysis fees</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Training</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td><strong>Total annual monitoring cost during the operation phase</strong></td>
<td></td>
<td></td>
<td></td>
<td>8,000</td>
</tr>
</tbody>
</table>

* The archaeologist and the Health and Safety officers will be among the teams of the contractors executing the works.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Location</th>
<th>Samples</th>
<th>Frequency</th>
<th>Phase</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>Qualitative survey along Ras el Ain road</td>
<td>Qualitative and quantitative (traffic count) surveys</td>
<td>Construction phase: beginning and end of the project</td>
<td>Construction / Operation</td>
<td>CDR PMU/ EMP Consultant (during construction); Municipality (during operation)</td>
</tr>
<tr>
<td></td>
<td>Quantitative survey at Al Imam Al Mahdi Mosque and near Al Marjeh</td>
<td></td>
<td>Operation phase: annually</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air quality (TSP, CO)</td>
<td>At stations Ba1, Ba2, Ba3, Ba4</td>
<td>24 hours / location</td>
<td>Construction / Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noise (L_{eq}, L_{min}, L_{max})</td>
<td>At stations Ba1, Ba2, Ba3, Ba4</td>
<td>24 hours / location</td>
<td>Construction / Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Landscape</td>
<td>North-western part along Ras el Ain Boulevard, south-western part</td>
<td>Visual inspection / Photographic documentation</td>
<td>Construction / Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>River Water Quality (pH, COD, Pb, Cu, Cr, Zn, TC, FC)</td>
<td>Upstream and downstream locations of the project sites (Ba5 and Ba6)</td>
<td>Two samples / location</td>
<td>Construction / Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Archaeology</td>
<td>At excavation sites at archaeological sites</td>
<td>Visual inspection / Photographic documentation</td>
<td>Construction / Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accidents (cars / pedestrians)</td>
<td>In the old city and at entrances</td>
<td>Police / newspaper records</td>
<td>Construction / Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health and safety / Hygiene</td>
<td>Within project boundaries</td>
<td>Visual inspection / Photographic documentation</td>
<td>Construction / Operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ba1: On the road facing the parking area towards the southern entrance of Baalbeck
Ba2: Along the main road facing the entrance to the parking in Moutran Square
Ba3: Along the main road facing the entrance of the northern parking along Hermel-Baalbeck road
Ba4: Inside the archaeological site
Table 44. Estimated requirements for the implementation of the Environmental Monitoring Plan in Baalbeck

<table>
<thead>
<tr>
<th>Parameter/Activity</th>
<th>Staff category</th>
<th>Number</th>
<th>Schedule</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSTRUCTION &amp; REHABILITATION PHASE</strong></td>
<td></td>
<td></td>
<td></td>
<td>18,500</td>
</tr>
<tr>
<td>Traffic / Accidents</td>
<td>Traffic engineer</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Landscape architect</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Archaeology</td>
<td>Urban archaeologist*</td>
<td>1</td>
<td>Full-time</td>
<td></td>
</tr>
<tr>
<td>Air / Noise / Water</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Equipment and laboratory analysis fees</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Health and Safety officer (Construction engineer)*</td>
<td>1</td>
<td>Full time</td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td>Environmental specialist</td>
<td>1</td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Total annual monitoring cost during the construction and rehabilitation phase</td>
<td></td>
<td></td>
<td></td>
<td>18,500</td>
</tr>
</tbody>
</table>

| **OPERATION PHASE**                 |                             |        |               | 10,000     |
| Traffic / Accidents / Landscape     | Traffic engineer            | 1      | Part-time     |            |
| Archaeology                         | Urban archaeologist         | 1      | Part-time     |            |
| Air / Noise / Water / Archaeology   | Environmental specialist    | 1      | Part-time     |            |
| Equipment and laboratory analysis fees |                             | -      | -             | -          |
| Training                            | Environmental specialist    | 1      | Part-time     |            |
| Reporting                           | Environmental specialist    | 1      | Part-time     |            |
| Total annual monitoring cost during the operation phase |                             |        |               | 10,000     |

* The archaeologist and the Health and Safety officers will be among the teams of the contractors executing the works

Table 45. Summary of the annual environmental monitoring costs

<table>
<thead>
<tr>
<th>Phase</th>
<th>Tripoli (USD)</th>
<th>Byblos (USD)</th>
<th>Saida (USD)</th>
<th>Tyre (USD)</th>
<th>Baalbeck (USD)</th>
<th>Annual Cost (USD)</th>
<th>Project Duration (years)</th>
<th>Program Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>16,500</td>
<td>14,500</td>
<td>14,500</td>
<td>16,500</td>
<td>18,500</td>
<td>80,500</td>
<td>5</td>
<td>402,500</td>
</tr>
<tr>
<td>Operation</td>
<td>8,000</td>
<td>6,000</td>
<td>6,000</td>
<td>8,000</td>
<td>10,000</td>
<td>38,000</td>
<td>3</td>
<td>114,000</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL MANAGEMENT

In order for the EIA recommendations to be effectively implemented, the presence of proper environmental management at the national level is helpful. Historically, environmental management in many developing countries has not been accorded the attention its evident importance merits leading to high economic costs in terms of adverse impacts on human health, productive resources, and ecosystems. This is particularly true in Lebanon where a pattern of environmental miss-management has prevailed for years due to weak institutional capacity and environmental regulations. Although environmental regulations have been evolving in the country, the main problem remains that of monitoring and enforcement, which in turn is related to
the country’s institutional capacity for environmental management. In this context, institutional capacity for environmental management in Lebanon is weak, which constrains the potential range and effectiveness of policy options for environmental management. Lebanon has a large body of environmental related laws, but there is a need to update and consolidate them. Law enforcement is generally weak due to the lack of clarity in responsibilities and coordination as well as insufficient deterrent value. The creation of the MoE has contributed to strengthening the institutional framework for the design and implementation of environmental policy. While measures are being taken to establish an integrated environmental management system under the MoE, the institutional framework for environmental management remains fragmented because the MoE’s broad mandate overlaps with those of a number of other ministries or governmental agencies (Agriculture, Energy and Water, Industry and Petroleum, Public Health, Transport and Public Works, as well as CDR). This constrains the ability of the MoE to have a real impact on the coordination of various sector initiatives and on facilitating the integration of environmental policy into general development initiatives. In addition, the resources and staffing levels provided are such that the ministry’s capacity for environmental management (including monitoring and enforcement) is limited. In this respect, there is considerable potential for increasing involvement of the private sector and Non Governmental Organisations (NGOs) in environmental management. While the MoE has by law a broad mandate over environmental issues, it not only overlaps with other agencies but lacks provisions for a unit or body to carry out its tasks as well. For instance, monitoring functions have been accorded to the MoE however, enforcement lies within the prerogatives of the Ministry of Interior. In conclusion, there is a considerable need in general to strengthen the existing institutions with responsibilities for environmental management. This effort should be focused on the MoE with encouragement to private sector participation in providing environmental services and NGOs for monitoring and enforcement. Strengthening and enhancing cross-sectoral coordination and planning control mechanisms are also needed. Once again, such an effort should also be led and coordinated through the MoE in conjunction with other ministries such as the ministries of transport, industry, and public health.

In the context of the CHUD project, the need for institutional strengthening in environmental management falls within several sectors ranging from archaeology and cultural heritage to solid waste / wastewater management, and water quality. While Lebanon in general and the CHUD project cities in particular, suffer from problems associated with the lack of proper management of basic sectors (water, wastewater, solid waste, and transport/traffic) that may be impacted by such a project. In recent years, plans have been developed and often are being implemented to initiate proper environmental management. These plans provide the project with the infrastructure
for managing basic urban environmental services adequately. On the other hand, appropriate environmental management dictates that construction and operation be implemented in accordance to the current state of the art and knowledge regarding environmental protection. This is accomplished by hiring competent personnel with the appropriate educational and professional background and instituting periodic training programs and site specific plans that are adequate for protecting the general public and the environment as well as contributing to the mitigation of potential environmental impacts. For this purpose, contractors and consultants involved in the construction and operation of the various components of the project were required to attend an environmental training course prior to the initiation of project activities. The objective of this training course was to ensure appropriate environmental awareness, knowledge and skills for the implementation of environmental mitigation measures. Follow up meetings are also being conducted annually during the construction phase and during the operation phase for three years in order to prevent pollution and accidents. These meetings are conducted at a central location (i.e., Beirut) to allow similar traveling distance for participants from the various cities.

In this context, an evaluation of the implementation of mitigation measures and of the EMP proposed in this EIA was conducted in March 2009 and again in April 2011. The first inspection started in 2008 and was based on field visits to the project sites; consultation meetings with municipalities, contractors and supervision consultants; and review of consultants’ monthly inspection reports regarding the supervision of EMP implementation as well as published newspaper articles. This inspection revealed the following:

- A lack of familiarity of both contractors and supervision consultants with the EMP or CDR HSE requirements although these were stipulated in the contractual agreement;
- Limited implementation of these requirements;
- Lack of reporting by supervision consultants of monitoring activities needed to adequately evaluate the contractor’s implementation of environmental mitigation measures required in the EMP or CDR HSE;
- The shortage of qualified personnel for carrying out these monitoring activities among all contractors and the supervision consultant in Tripoli;
- The lack of cooperation of the contractors with supervision consultants on ground regarding the implementation of the EMP and HSE requirements;
- The lack of cooperation of the general public with traffic and safety measures on the ground.

The supervision consultants were subsequently requested to inspect and submit a report on the implementation of the EMP and CDR HSE requirements in all sites in November 2008, and to
enclose the supervision and implementation of the Environmental Mitigation Plan in all future monthly progress reports as of December 2008.

Based on the reports submitted, the following recommendations were formulated by the EMP Consultant:

<table>
<thead>
<tr>
<th>Target group</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase II construction contractors</td>
<td>Get familiar with the EMP and CDR HSE requirements prior to the commencement of works;</td>
</tr>
<tr>
<td></td>
<td>Get familiar with national environmental regulations and standards;</td>
</tr>
<tr>
<td></td>
<td>Incorporate the EMP and CDR HSE requirements in the development of the detailed construction work program and Method Statements;</td>
</tr>
<tr>
<td></td>
<td>Provide an environmental training course for all staff and workers prior to the initiation of project activities to ensure appropriate environmental awareness, knowledge and skills for the implementation of environmental mitigation measures with emphasis on pollution prevention measures;</td>
</tr>
<tr>
<td></td>
<td>Appoint a “Safety Officer” or a competent “Site Engineer” who shall be responsible, in addition to general safety issues, for the proper implementation of the EMP and CDR HSE requirements;</td>
</tr>
<tr>
<td></td>
<td>Organization and proper arrangement of coordination with the supervisor engineers regarding daily monitoring and recording of the EMP implementation onsite;</td>
</tr>
<tr>
<td></td>
<td>Daily inspection, monitoring and reporting of the implementation of the EMP and CDR requirements;</td>
</tr>
<tr>
<td></td>
<td>Promote the use of the environmental monitoring checklist presented in the report or other similar checklist by the safety officer on site for daily monitoring of the implementation of the measures required and for reporting any non-compliances and problems encountered;</td>
</tr>
<tr>
<td></td>
<td>All accidents to workers or general public on site shall be documented in a “Site Accident Book”; and</td>
</tr>
<tr>
<td></td>
<td>The site accident book, daily environmental monitoring checklist and any recorded non-compliance comments/written communications shall be available at all times for inspection by the supervisor consultants.</td>
</tr>
</tbody>
</table>

| Phase II supervisor consultants     | Get familiar with the EMP and CDR HSE requirements prior to the commencement of works; |
|                                     | Get familiar with national environmental regulations and standards;           |
|                                     | Consultant shall observe, review and ensure that all environmental mitigation measures (EMP and CDR HSE regulations) are well addressed and adequately accounted for in the contractor’s detailed construction work programs and method statement for each site and stage of works; |
|                                     | Review of all written and documented procedures relevant to environment and safety used by the contractor; |
|                                     | Coordinate, organize and agree on the methodology of work/inspection for daily monitoring of EMP implementation with the contractors to synchronize the efforts prior to work commencement; |
Assign an in-house personnel with safety and environmental background knowledge or provide in-house training to on-site supervisor engineers to conduct regular field inspections and to review the daily inspection reports issued by the contractor safety officer;

Use the proposed environmental monitoring checklist or other similar checklist for documentation during field inspections;

The supervisor consultant shall comply with the tasks and activities stated in Task series 3 (Environmental Mitigation Control) stipulated in the CHUD Supervision of Construction Contracts;

Attend with the contractor all public consultation meetings relevant to this task and follow up contractor’s procedures and actions to mitigate any complaints raised during the construction phase;

Identify and present non-compliances by the contractor observed during field inspections, complaints filed by the general public or municipality, or contractor’s failure to report on daily basis the implementation of the required measures;

Advise the contractor on all non-compliances and take all necessary actions to ensure that the contractor will remedy any non-compliances within 24 hrs from the date of complaint or notification;

Coordinate the work with CDR CHUD PMU and EMP Consultants to ensure highest possible standards of environmental protection and technical assistance, if needed;

A comprehensive and detailed review and description of all implemented individual mitigation measures per work stage/activity/site, their effectiveness and residual impacts and technical limitations should be presented in the supervisor consultant’s monthly progress report; and

The consultant shall provide with all progress reports, photographic documentation of all measures taken to implement the mitigation measures or non-compliances, any written complaints filed by the general public, municipality or contractor (in case of obstacles facing them), all communication records relevant to this activity (faxes, letters, e-mails, minutes of meetings, etc.), follow-up actions (evidence showing that a certain complaint was properly mitigated by the contractor), summary of the daily monitoring checklist/comments issued by the contractor safety officer, a final summary matrix comparing the individual EMP and HSE requirements and ongoing monthly progress of field inspections with all relevant comments/observations.

General Recommendations:

EMP consultants and CDR PMU should introduce all awarded Phase II contractors and supervisor consultants to the EMP and CDR HSE regulations stipulated in their contractual agreement prior commencement of works;

The establishment of an appropriate standardized environmental progress reporting methodology and format should be encouraged among all supervisor consultants in coordination with the EMP consultants and CDR PMU;

The concerned municipalities should develop a complaint system specific for the Phase II works whereby any complaints filed by the general public is documented, registered and filed to CDR PMU; and

All complaints, relevant communications and monthly progress reports should be conveyed in timely manner to the EMP consultants to effectively evaluate the implementation of the mitigation measures.
A more active role was advocated for municipalities during the construction phase in addition to its planned role during the operation phase, since they are the local authorities in CHUD intervention areas.

A second report on the evaluation of the implementation of mitigation measures and of the EMP proposed in this EIA was submitted in April 2011, and was based on the review of reports submitted by supervising consultants and published articles in the media, as well a meeting with supervising consultants at CDR. This report revealed improved reporting by one supervising consultant that is in charge of the cities of Baalbeck, Byblos, Sidon and Tyre, where the implementation of the EMP and HSE requirements seemed to have improved. On the other hand, the review of newspaper articles revealed complaints about an increase in traffic congestion and delays in works that led to economic losses in the city of Tyre.

Reporting relevant to the city of Tripoli was not as good, and again, a review of newspaper articles revealed complaints about unacceptable works quality and design, lack of communication with citizens, construction rubble that was not removed and led to increased traffic congestion and dust generation. Such issues, as inappropriate use of PPE and protection of workers at elevated sites, were noticed in some places.

Similar recommendations to those developed in the first report were made, since little improvement in EMP and HSE measures was noted. Particularly, the need to better enforce the usage of PPE was highlighted as unsatisfactory employee compliance with health and safety guidelines was noted in the five cities. According to the CDR HSE requirements, breaches in personal protective equipment usage are subject to a basic deduction from payment of 100 USD/person/day. An additional general recommendation stipulated that EMP consultants shall coordinate closely with the CDR PMU, supervising consultants and contractors on a weekly basis to closely follow up on the proper implementation of HSE requirements, their proper monitoring and enforcement, as well as relevant adequate reporting (on a monthly basis).

The two reports on the evaluation of the implementation of the EMP and HSE requirements can be found in Appendices H and I.

In an effort to strengthen institutional capacity and environmental awareness, training sessions on the CHUD project were opened for individuals from concerned ministries and agencies such as the MoC, MoTo, MoC, MoTPW, MoIM, CDR, NGOs, etc. In addition, the scope of the training sessions was not limited to just issues related to the CHUD. Other environmental management topics were also addressed in these sessions. Public education in itself creates a valuable positive feedback in
environmental management. For example, if people are aware of the connections between respiratory diseases and particulate matter emitted from badly maintained vehicles, they may be more receptive to regulations requiring regular vehicle maintenance. The training sessions addressed various topics including:

- Environmental laws, regulations, and standards;
- Pollution health impacts;
- Pollution prevention measures;
- Sampling techniques and environmental monitoring guidelines (air, noise, water);
- Protection of archaeological and cultural heritage sites;
- Air quality management;
- Solid waste management;
- Wastewater management; and
- Traffic and pedestrians safety measures

The environmental monitoring and management plans is implemented by an entity independent of contractors and consultants involved in any component or tasks in any of the five cities. Figure 43 depicts the contribution of the CHUD project to potential institutional strengthening in environmental management.

Figure 43. Contribution of the CHUD project to institutional strengthening
PUBLIC PARTICIPATION

In initial consultation meetings, the municipal councils in selected cities that have significant cultural heritage enthusiastically supported the idea of restoring active and productive urban life, conserving cultural heritage, rehabilitating the degraded urban fabric, capitalizing on the tourism potential, and improving the standard of living of local community. They appeared committed to ensuring that municipal development strategies and initiatives have to be well coordinated with the needs of cultural heritage preservation. They welcomed the project as having significant potential to contribute to national and local economic development, bringing improvements to the quality of life of the residents of the municipalities concerned.

Following the initial consultation meetings, town meetings were initiated to further discuss various environmental aspects of the proposed project components. Several such meetings were completed in the cities of Tyre, Tripoli, and Byblos on May 30, June 22, and June 24, respectively. A questionnaire (Appendix J) was developed specifically for the CHUD project, translated into Arabic, and administered during the meetings. A full record of these meetings is presented in Appendix K including a list of people who attended, their comments, and the results of the questionnaire. Note that a meeting was conducted at the early stages of the project in Baalbeck in the context of getting the feedback of owners of establishments regarding traffic organization and tourism revitalization but not environmental impacts. A questionnaire was then distributed to owners of establishments (188 owners) to collect their opinion regarding traffic organization and tourism revitalization options for Baalbeck. No public meeting is expected for Saida where the level of intervention is relatively minimal.

The meetings solicited stakeholders’ feedback concerning the overall scope of the project in general and the potential environmental impacts in particular. Most participants (~ 90 %) did foresee a positive impact on preservation of the cultural heritage of the city, improvement in the social level of locals, and development of tourism. In Tyre, some were afraid that the transformation of the fishing port to a tourist attraction center would disturb and affect the normal life of fishermen and the fishing industry. Concerns about wastewater management were also expressed. In Tripoli, concerns about the low forecasted increase in the number of tourists were voiced with emphasis on the need for a marketing and advertising strategy to promote tourism. In Byblos, higher awareness and public participation were noticed. Many indicated that the project benefits will be limited to employment in the old souks, restaurants, handicrafts and artisanal
works, commercial spaces, hotels and cafés. Concerns about air quality and wastewater management were also evident.

An opinion survey was then conducted by the CDR shortly after the start of works in order to assess the impact of the interventions from the point of view of residents, local businesses and visitors (CDR, 2006).

In Tripoli, the survey revealed an overall unsatisfactory rating of the management of the old city and archeological site by local residents and businesses. Local residents ranked the works that were taking place as not having a positive impact on the management of these sites, quality of life, activities, tourism, etc.; while businesses gave them an average ranking. Both groups valued the impact on issues related to the archeological site management better than that on economic and social issues, such as visitors’ spending and social interaction. Issues related to the current conditions of the old city were not highly ranked either, especially those related to the Abou Ali River market and street furniture. Visitors gave slightly higher ranking than residents and businesses for the aspects mentioned.

In Byblos, the survey revealed satisfaction of all three groups of respondents with the management of the old city and archeological site, notably with respect to the presentation of the old city and preservation of the archeological site. The three groups also thought the works that had taken place had a positive impact on the management of the old city and archeological site, quality of life, activities, tourism, etc. However, issues related to current conditions of the old city were poorly ranked by residents and businesses, especially those related to street furniture and infrastructure, contrarily to visitors.

In Saida, the survey revealed an overall satisfaction with the management of the old city and the archeological site, especially with respect to their preservation. In general, the works that have taken place in the old city and archaeological site have had good positive impact on the management, quality of life, activities, tourism, etc. The impact on issues related to tourists and economy was valued better by business than that on site management issues and specific resident-related ones, such as quality of life and social interaction.

Issues related to current conditions of the old city were poorly ranked by both residents and businesses, especially those related to infrastructure and street furniture, cleanliness and aesthetics, and facilities for social events.

Higher satisfaction with the management of the old city and archeological site were observed among surveyed visitor than residents and businesses, especially with respect to their preservation. The impact on issues related to tourists and economy was valued better than that on site management issues.
In Tyre, the survey revealed issues related to current conditions of the old city were poorly ranked, especially those related to street furniture, fishing issues, infrastructure, and cleanliness. The impact on issues related to tourists and economy was valued better than that on site management issues and specific resident-related ones, such as traffic regulation and social interaction.

In general the CHUD works that had taken place have had good positive impact on the management of the old city and archaeological sites, quality of life, activities, tourism, etc. Even the least-graded issue, impact on social interaction, had a fairly high grade. The impact on issues related to the archaeological site management was valued better than that on economic and social issues, such as visitors’ spending and cultural activities.

In Baalbeck, around 90% of visitor respondents surveyed revealed their willingness to visit the city again, which reveals the attractiveness and friendliness of the city. The visitors seemed to be most satisfied with tourism information services. The ranking indicates huge potential in terms of services.

The management of the old city and archeological site were generally ranked as unsatisfactory by the residents surveyed. In general, the works that had taken place were ranked as not having a positive impact on their management, quality of life, activities, tourism, etc. The impact on issues related to the archaeological site management was valued better than that on economic and social issues, such as visitors’ spending and tourism services. Issues related to current conditions of the old city were poorly ranked, especially those related to street furniture and infrastructure; hygiene and aesthetics; and the market area (such as infrastructural facilities at the market). The least-graded issue was impact on traffic regulation.

Towards the completion of Phase I works and initiation of Phase II works, training workshops were conducted in each of the five cities to enhance the capacities of municipalities in various areas, notably:

- Implementation of an Environmental Management Plan for the sustainable operation of the CHUD projects;
- Environmental mitigation and monitoring in the second phase of the project;
- Identifying mechanisms and resources needed to implement the proposed EMP; and
- Identifying the main constraints to enhancing the municipal role, and proposing concrete means of overcoming them.

The workshop also underlined the necessity of involving municipalities in priority setting, particularly regarding the environmental needs of their own city. It emphasized their role in
guaranteeing the sustainability of the CHUD project by promoting civil society’s feeling of ownership of the project.

The workshops were structured as follows:

- Presentation of the baseline environmental conditions and city profile;
- Presentation on the cost of environmental degradation;
- Presentation on environmental legislation and regulations in Lebanon and the role of municipalities;
- Presentation on the implementation of the environmental management plan;
- Presentation and discussion of phase I challenges;
- Presentation on guidelines for environmental management in ports and markets, as relevant to each city; and
- Group work on the development of an environmental management plan for the cities.

The executive summary of the workshops can be found in Appendix L.
BIBLIOGRAPHY

Consulting Engineers Salzgitter GMBH (Germany), Bureau Technique pour le Development (BTD), and LYSA Lyonnaise des Eaux (France), 1998. Feasibility study for Tripoli Sewerage (Final Report), CDR and Ministry of Hydraulic and Electric Resources, Beirut, Lebanon.
Khayyat, Z., 2001. Groundwater conditions in the Koura-Zgharta Miocene Limestone Aquifer,
MS Thesis, Department of Geology, American University of Beirut, Beirut, Lebanon.


CONTRIBUTORS

The 2002 EIA report was prepared by Dr. Mutasem El-Fadel, Professor of Environmental Engineering at the American University of Beirut. Dr. El-Fadel is being assisted on as needed basis by several individuals who are listed below with their academic background.

Mr. Farouk Merhebi  BS Chemistry, BS Agricultural Eng, MS Environmental Eng
Mr. Ibrahim Alameddine  BS Biology, MS Environmental Technology
Ms. Marianne Kazopoulo  BS Physics, MS Environmental Technology
Ms. Rania Maroun  BS Environmental Health, MS Environmental Technology
Mr. Raja Bou Fakr  BS Civil Engineering, MS Environmental Engineering
Mr. Ziad Khayat  BS Geology, MS Hydrogeology
Mr. Rayan Bsat  BS Civil Engineering, MS Water Resources Engineering

APPENDICES

Appendix A. Detailed description of the interventions in each of the five cities of the project
Appendix B. Environmental Baseline Monitoring and City Profiles- CHUD Phase II Intervention Area
Appendix C. Calculation of impact of construction activities on air quality
Appendix D. Calculation of impact of construction activities on noise quality
Appendix E. Safety, Health, and Environmental Regulations
Appendix F. Detailed design of works for Tripoli
Appendix G. Archaeological Chance Find Procedures
Appendix H. First report on the evaluation of implementation of EMP and HSE requirements
Appendix I. Second report on the evaluation of implementation of EMP and HSE requirements
Appendix J. Environmental questionnaire for public consultation
Appendix K. Public participation record
Appendix L. Executive Summary of the EMP Training Workshop in the Five Cities
APPENDIX A

Detailed description of the interventions in each of the five cities of the project

Interventions in Tripoli

General layout plan of the old city of Tripoli

1. River-side circulation, parking improvements and landscaping: The Western river-side of Corniche Rachid Karame will be renovated up to the Al Bourtassi Sq. with the introduction of sidewalks, the planting of trees, the narrowing of the carriageway and the creation of parking areas on either side for residents and visitors. Through-traffic will be diverted to the Eastern river-side so as to relieve congestion in the historic city. The Al Bourtassia Sq. will become a totally pedestrian space and will be landscaped as such, while the access to the adjacent bridge will be redesigned for a more limited vehicle flow. The dead-end street below the Citadel will lead to a parking area for visitor buses and cars, and the Maoulawiya Park will be fully landscaped for the benefit of the local residents.

2. Resettlement housing and commercial space: To accommodate the families and activities that are currently occupying Khan El-Askar, alternative housing will be built on nearby public land, and municipal retail space will be allocated accordingly in neighboring areas. The first phase will entail the provision of 38 apartments and of 29 commercial units, while the second phase will cover 33 apartments, and finally the third phase will covers 35 commercial units. The phasing of the construction will precede the rehabilitation of Khan El-Askar, so as to enable the resettlement to take place.

3. Northern neighborhood, Khan el-Askar, public space and street frontage: A key anchor to the renewal of the historic city will be provided by the rehabilitation of Khan el-Askar. Once rehabilitated in two phases, the Khan will house the Lebanese University Center for Restoration and Conservation of Monuments and Historic Sites, the Municipality’s technical office for rehabilitation of the historic city, and other cultural, educational and community facilities to be determined. The square between the Khan and the Al-Taweb Mosque will become fully pedestrian and connect to the entry to the main Souk Al Bazerkan. Significant improvements will take place in the souk, in the adjoining pedestrian streets and in the Berket al Mallaha and Souk El Haraj squares, affecting both public spaces and the rehabilitation of the elevations of the surrounding buildings. The Western intersection between Abdel Hamnid Karame and the Souk al Najjarine, providing access to the historic city, will be upgraded and landscaped, while the Souk al Najjarine leading to the Al Bourtassia Mosque Sq. will become partially pedestrian, and a drop-off round-about will be provided.
with movable bollards in front of Khan el Masiyyin. On the Western border of the neighborhood, the Rue des Eglises will benefit from the rehabilitation of its sidewalks and other improvements to its appearances.

4. **Central neighborhood, Hammam El Nouri, public space and street frontage:** In the central neighborhood the spine of the Souk Al Attarine up to Tallaat Rifayia St. and some adjacent pedestrian streets would be rehabilitated with improvements to the public space. El Nejmeh Sq., another important access to the historical city would be upgraded and landscaped, as well as the vehicular street leading to the Great Mosque. The Hammam al Nouri, a monument of significant architectural and historical value, situated next to the Great Mosque and belonging to the Waqf, will also be restored and become a museum of traditional religious and historical manuscripts and calligraphy.

5. **Southern neighborhood, public space and street frontage:** The Southernmost vehicular access to the historic city takes place in proximity of a public square that will be renovated, paved and landscaped; the street leading to Mosque Arghoun Shah and the pedestrian path leading to the Great Mosque, as well as Daftardar Sq. and el Moallak Sq., and the final section of the Souk Al Attarine, will be also upgraded according to the same general standards applied in other areas of the historic city.

6. **Circulation and landscaping around the St. Gilles Citadel:** Emir Fakhreddine St. running parallel to the Citadel will become one-way in the direction of the bridge and Al Bourtassi Sq., its carriageway will be reduced, sidewalks and street furniture will be introduced. A bus stop will be created on Emir Fakhreddine St. opposite the Citadel to enable the drop-off of tourists. New pedestrian alleyways and stairs will be built or upgraded to enable visitors and residents to reach the parking and the Maoulawiya Park, so that once the visit will be completed the buses will be able to cross the river directly.

7. **Bab El Tebbaneh, fresh produce market Khan el Aarsat and street frontage:** The Eastern side of the historical city has degraded due to the encroachment of modern high-rise apartment blocks and the poverty of the Bab El Tebbaneh neighborhood. The vegetable and fruit market that caters to the population of this area has spilled over on the riverside boulevard causing significant traffic congestion on a main through-traffic artery. A large platform over the Abu Ali River would be built to host the market, complete with appropriate water and sanitary facilities and waste collection devices. This new municipal facility, in view of its location, will also help to reconnect the Bab El Tebbaneh neighborhood with the rest of the historic city, in the proximity of the Khan El-Askar and Al Taweb Mosque. The traditional granaries street souk will be rehabilitated and the adjacent building elevations will be renovated, including shop entrances and overhangs, shutters and building elevations. The Khan El Aarsat, belonging to the Wakf, will be renovated and a social center will be created in addition to the current commercial usage in its currently unoccupied Eastern wing, to cater to the pressing community needs of this underserved neighborhood.

8. **Improved access to the Moulawiyia bridge:** Vehicular access to the historic city will be improved by enabling access to the Moulawiyia bridge to the Northern traffic coming from Zghorta; this will entail the re-construction of access and exit ramps on the Eastern side of the river. The street connecting the bridge to Fakhreddine St. will be upgraded as it will accommodate dual sense traffic, as well as its final intersection in the proximity of the Citadel.

9. **Support to housing rehabilitation (lot # 131):** A pilot housing rehabilitation operation will be conducted in the block at the corner of Fakhreddine St. and Souk Al Najjarine that contains the recently restored Al Ouwaysiya Mosque, very visibly located in the proximity of Al Bourtassi Sq. The project will support the rehabilitation of some housing units by providing professional expertise, administrative services, and financial contributions for the maintenance of the communal parts of the buildings, such as external and courtyard elevations, roofs, and stairs, for up to 50% of total rehabilitation costs. The operation will also include the infill re-construction of housing units by the Wakf, and of a hotel and restaurant complex by an investor, for which the project would only provide technical and administrative expertise.

10. **Study for urban redevelopment of the Northern Zone:** Situated in the proximity of the Khan El-Askar and with its front on the Rachid Karame Corniche, a large tract of urban land resulting from the alignment of the river after the flood from the ‘50 could be the object of a major urban re-development operation. The public domain resulting from the original surface occupied by the river and some municipal parcels account for 44 percent of the area. The Municipality could therefore promote a re-assembly of the largely unoccupied land jointly with the other owners, and promote the redevelopment of the area. This could provide much needed space for public and community facilities, as well as apartment blocks and a commercial center on the Northern side of Tripoli. The feasibility study will explore the potential of the site in technical, financial and administrative terms, and provide the municipality with the required tool to pursue the operation beside the scope of this project.
11. Study for traffic management and parking in the historic city: Further adjustments will be required to the circulation plans and to the parking provisions for residents and visitors in order to ensure that the introduction on pedestrian areas and the decrease of vehicular traffic within the historic city will have overall positive impacts. The study will also explore the feasibility of creating additional parking areas in the proximity of the historic city, on a profit basis. These scenarios could be then pursued by the municipality or private operators beside the scope of this project.

12. Water supply, sanitation and utility connections in the historic city. In those neighborhoods where the project will finance the improvement to public spaces, access to water supply and sanitation by the neighboring buildings will be improved, prior to the paving of the pedestrian areas; based on existing infrastructure schemes, water mains and sewer lines will be upgraded, electric and telephone cables will run underground.

13. Support to local economic development, cultural tourism, private sector participation, and communication: A contribution to the economic development of the old city will be enhanced business skills of small entrepreneurs operating in the visitor services sector (training for local guides, business plan development, management, customer relations etc); support for marketing goods and services for cultural tourism; leveraging credit and grant resources for small projects; organizing information on Tripoli’s goods and services for promotional materials (website, brochures, visitor’s center, directory of businesses & NGOs). The development of cultural tourism will be done in harmony with local values through information campaigns on the expectations of tourists (for residents) and those of the inhabitants (for tourists). The priority social development needs (health, education, skills training & youth) of the inhabitants of the old city will be determined in a participatory manner and reflected in the adaptive uses of the renovated historic buildings (Khan al-Askar and Khan Aarsat). All components of the project including resettlement are implemented in consultation and with the participation of the local community and affected persons.

14. Archaeological site of the St. Gilles Citadel: The Citadel is the most visible and well-known monument in Tripoli, and the main attraction for the visitors to the historic city. A number of conservation measures will be carried out on the Citadel’s medieval structures and surfaces, and site accessibility and safety of visitors will be improved with the introduction of hand-rails, signage and other devices. In addition, a central area within the Citadel that has already been partially renovated will be fully equipped in order to become the Tripoli Museum, that will contain local antiquities, panels and artifacts pertaining to the history of the city and of the Citadel itself.

15. Rehabilitation of Souwayqa facades: located on the eastern hill of the old city and facing the citadel, the Souwayqa zone overlooks Abu Ali river from the Moulawyia Bridge down stream till Abu Ali Bridge; its urban fabric is the result of the stratification of different historical periods; the rehabilitation of the Souwayqa Facades will improve the quality of the housing stock and urban space, hence improving the quality of life of the population.

16. Rehabilitation of khan el Saboun: located in the central Souks at the vicinity of the Great Mosque, khan el Saboun is one the several important Mamluk monuments in the Old City. Build for the traditional soap industry and trade, the khan kept its original function and still in our days hosting some of the soap makers of the Old City; upon the request of the Municipality of Tripoli, the complete rehabilitation of the khan was added to the preliminary list of actions planned in the Old City. The complete rehabilitation of the khan will help to preserve and to make a better usage of the monument, hence allowing the soap makers to develop their artisanal industry.
Interventions in Byblos

1. **Improved access to the historic center and parking facilities:** A new parking for visitor buses and cars will be built at the exit of the North Highway, to include an information center and a pedestrian bridge over the highway; the pedestrian access to the historic city will occur via the landscaped archaeological site of the Roman road, that will also serve as a visual introduction to the history of the city and to the visit. Additional interventions related to the accessibility of the historical city and to availability of parking include: improved pedestrian crossings in the proximity of the souk; the removal of a gas station to open the view over the cemetery garden; the rehabilitation of the access to the old city and to the Ottoman souk; the creation of a parking area for a shuttle service connecting the new parking next to the Highway to the harbor; the rehabilitation of the main northern gate and the reopening of the Tripoli gate in the medieval walls; the reorganization of the municipal parking; and improved pedestrian access to the harbor area.

2. **Rehabilitation of public spaces and infrastructure in the historic center:** The main square facing the entrance to the archaeological site and to the Citadel will be rehabilitated and provided with trees and various landscaping elements; to make it into a more welcoming pedestrian area, the adjacent parking lot will be separated from the square and secluded from its view. The garden of the Fossils Museum and the UNESCO square will be rehabilitated, repaved and provided with appropriate urban furniture. Exhibition space and sanitary facilities. Paving and lighting of some streets in the historic city will take place, as well as improvements to the sewerage network and the provision of two pumping stations.

3. **Improvements to the harbor areas and to the coastal zone:** Vehicular access to the harbor will be limited and regulated by access bollards, so that its pedestrian use can increase; the entire quay area will also be upgraded and renovated while the new pier will be repaved and provided with public lighting. From the jetty, a sea-side pedestrian natural promenade will surround the foot of the archaeological site, enabling visitors to access the Southern side of the historic city.
4. **Upgrading of the southern souk and complete rehabilitation the Old serial (DGA House):** located at the end of the Via Romana, this souk is one of the three major parallel alleys in the old city. While the two other alleys were rehabilitated prior to the project, the rehabilitation of this alley will serve two major objectives: connecting the Visitors Parking -Via Romana with the old city, and completing the intra-muros pedestrian network. Vehicular access to the souk will be limited and regulated by access bollards, so that its pedestrian use can increase; the entire souk will be repaved and provided with public lighting; the facades will be renovated and equipped with adequate door shutters and awnings. The Old serial, located at the other extreme of the souk and property of DGA, will be completely restored and reused at the ground level as an exit and a boutique for the visitors of the archeological site and, an information booth for the visitors of the city; while the first floor will host the accommodation and working place for archeological missions.

5. **Support to local economic development, cultural tourism, private sector participation, and communication:** The project will support the municipality’s ongoing efforts to promote cultural tourism through linkages with related activities in the surrounding area. Information on goods and services will be produced, through a website, brochures, visitors’ center etc. Demand based training activities for small local entrepreneurs (business development, management etc.) and for employment will be provided. The development of cultural tourism will be done in harmony with local values through information campaigns on the expectations of tourists (for residents) and those of the inhabitants (for tourists). All components of the project are implemented in consultation and with the participation of the local community and affected persons.

6. **Construction of a municipal development on a land area of 19,000 m² within the city of Byblos.** The project comprises a parking lot which accounts for a parking capacity of 290 cars, a public garden of an area of approximately 3,800 m², a municipal technical warehouse, a bus station which allows for approximately 25 buses and a rest area along with public bathrooms, as illustrated below. The development is located within the city of Byblos in proximity to the historical neighborhood.
Interventions in Saida

1. Rehabilitation of public spaces in the historic center: In support of the on-going infrastructure investments by the municipality, a series of key public spaces and a circuit of pedestrian alleys connecting the main squares and monuments will be rehabilitated. This will include paving, lighting, provision of street furniture, as well as the restoration of adjacent building elevations, where doors, shutters, shop-front overhangs, water-spouts and other external elements will be renovated according to the traditional design patterns and building materials. In particular, the Bab Al Saray Square in the proximity of the Khan el Franj will be rehabilitated to become one of the key public spaces of the historic city. Covered pathways, a salient feature of the historic city, will be also improved.

2. Water supply, sanitation and utility connections in the historic city. In those neighborhoods where the project will finance the improvement to public spaces, access to water supply and sanitation by the neighboring buildings will be improved; based on existing infrastructure schemes, electric and telephone cables will run underground.

3. Support to housing rehabilitation: Given the high percentage of renters among the population of the historic city, and to avoid a process of renovation of the housing stock that would exclude them, incentive mechanisms will be introduced including the co-financing of the maintenance and restoration of the communal parts of some building blocks, on condition of guaranteeing the occupancy by the present inhabitants. Internal renovations will be left to unit owners and inhabitants. A focused study will be conducted to assess the respective socio-economic needs of owners and tenants and develop an appropriate intervention.

4. Khan El-Echle, adaptive re-use of historical building: In the vicinity of the souks and one of the main access to the historic city, one historic building of the 17th century Khan El-Echle will be restored and rehabilitated, assuming the owner, the Municipality of Saida, agrees to its reuse for cultural, tourist and traditional arts and crafts, and to host a socio-cultural and craft center.
5. **Research, documentation, conservation and presentation of the Land Castle:** Built on the site of the ancient acropolis of Sidon and situated at the summit of the historic city, the Land Castle dates from the Crusaders and Fatimid periods. Excavated in the ’20s, will be liberated from the accumulated strata of soil, and documented, conserved, and presented to visitors through an appropriate site management plan. It will represent an important cultural and tourist attraction to the visitor, in addition to the Sea Castle.

6. **Support to local economic development, cultural tourism, private sector participation, and communication:** The highly depressed economic conditions of the residents of the old city, especially the fishermen, require specialized interventions. Priority social development needs (health, education, Its remains, initially skills training and youth development needs) will be evaluated in a participatory manner. Links with expert organizations (such as NGOs, and other support) will be built to develop, finance and implement programs to address these needs. The project will also support marketing goods and services for cultural tourism and organize demand based training for the neediest communities to access these resources. The development of cultural tourism will be done in harmony with local values through information campaigns on the expectations of tourists and those of the inhabitants from the growth in tourism.
Interventions in Tyre

1. **Improvements to the Port waterfront, public spaces and historic buildings:** The harbor will be thoroughly rehabilitated so as to enhance its traditional fishing-related activities and its attractiveness and use as a public space. Vehicular access will be restricted to residents and to certain times of the day. The basin will be partially reconfigured and regularized so as to increase mooring spaces and a new fishing dock will be added. The main quay will be freed of parking and landscaped as a public square, and the fisherman’s syndicate’s intrusive private construction will be replaced by a new suitable building and an open-air fish market. The Eastern quay area currently occupied by the Port Authority will be used for the construction of storage and boat-repair facility; the Western quay will be freed of illegal encroachments. Neighbouring Menshieh Sq. with its garden and municipal building will fully integrate the public spaces. The remains of a historical building on the harbor front will be restored. The rehabilitation of eight heritage buildings by their owners will be supported with technical and administrative means, and will benefit from up to 50% co-financing of the total costs of the works, in view of their adaptive re-uses related to their prime location on the harbor front.

2. **Bawabeh Square, parking and municipal facilities:** The Eastern Façade of the historical entrance to Tyre is currently being rehabilitated by the Municipality. Land reclamation works of the ‘80s and ‘90s have created a wide seaside boulevard that constitutes the main access to Tyre, and that terminates into a very large space, bordering the ancient Bawabeh or entrance to the city. This space, currently occupied by UNIFIL headquarters, a vegetable market and a vast parking lot, will be better structured to offer selective parking options for residents and visitors, bus and taxi stops, a modern vegetable market, and a facility for public entertainment and cultural open-air events.

3. **Hamra Street and Hammam Square, public space and street frontage improvements:** This modern street goes from the Western exit of the Al Bass archaeological site to the Hammam Sq. in the proximity of the entrance to the historical city and to the souk. It will be transformed into a one-way street, carriageway will be consequently reduced, the pavements will be widened and repaired, and appropriate tree planting, street-
8. **Facades Rehabilitation & Public Spaces in the Souks**: one main old pedestrian souk insuring the link between the Bawabeh Sq. and the Menshieh Sq. will be completely renovated and repaved; the traditional granaries street souk will be rehabilitated and the adjacent building elevations will be renovated, including shop entrances and overhangs, shutters and building elevations.

5. **Water supply, sanitation and utility connections in the historic city**: In those neighborhoods where the project will finance the improvement to public spaces, access to water supply and sanitation by the neighboring buildings will be improved, prior to the paving of the pedestrian areas; based on existing infrastructure schemes, water mains and sewer lines will be upgraded, electric and telephone cables will run underground.

6. **The Khans, adaptive re-use of historical buildings**: In the midst of the historic urban fabric and well located in the vicinity of the souk and of the main access, two historic buildings of the 17th century the Khan el Rabu and the smaller Khan El-Ashkar will be restored and rehabilitated, assuming their private owners agree to their reuse for cultural, tourist and traditional arts and crafts, and to host a socio-cultural and craft center. Financial incentives would be made available to this effect for up to 50% of the rehabilitation costs, as well as technical and administrative assistance, given their historical value and central location.

7. **“Cultural promenade” at the interface of the archaeological and historical areas**: At the interface between the El Mina archaeological area and the historic city, a pedestrian path will link the Hammam Sq. with the Western sea-side water-front. Along this path and overlooking the site, three historical buildings belonging to the Direction General of Antiquities will be restored and rehabilitated, as well as a large administrative complex that also belongs to the DGA. The historical buildings are located on Manara Sq., a small pedestrian area; the biggest one may be transformed into a socio-cultural facility for the community of the Old City of Tyre, the smallest one into a public library, and the third into the regional offices of the DGA. The administrative complex will be available to host the Under-water Archeology Center that would come into an agreement with the DGA to that effect.

8. **Coastal zone protection and promenade**: The natural beauty of the Tyre site needs to be preserved against encroachments and pollution, but also made more enjoyable to residents and visitors. For this purpose, the coastal zone from the archaeological site of El Mina to the Port will be protected and made accessible: all illegal structures will be removed, a vehicular road will be constructed along the western coast of the old city of Tyre, parking places will be organized all along, an all-weather pedestrian path will be built at the interface of the archeological sea site and the so-called Egyptian port, limited access to the beaches will be organized and supported with sanitary facilities, a public garden will be upgraded, public access to the Northern lighthouse in the vicinity of the port will be improved, in addition to cleaning the beaches from rubbish and the sea to 100m length from concrete blocks.

9. **Support to housing rehabilitation**: The rehabilitation of traditional housing clusters in the historic city will be supported by providing professional expertise, administrative services, and financial contributions for the maintenance of the communal parts of the buildings, such as external and courtyard elevations, roofs, and stairs. The municipality will identify which clusters are of higher priority given the revenue levels of its inhabitants. Within the respect of the zoning and building regulations, infill operations and the reconstruction of housing, commercial and productive units in place of ruined buildings will also be encouraged. It is expected that in support of these investments the municipality will order the demolition of the top floors of the six high-rise buildings illegally built in the proximity of the Port, currently unfinished and unoccupied, as they undermine the overall value of the historic city.

10. **Support to local economic development, cultural tourism, private sector participation, and communication**: The lower-income residents (fishermen, small shopkeepers and restaurant owners) will be assisted through a concerted partnership effort between the residents, the municipality and locally represented NGOs to develop and diversify a greater range of local products and services for visitors. Measures will be investigated with the cooperative and relevant authorities that would increase fishing productivity and returns, including artificial reefs, restocking, marine aquaculture, income support to permit a fallow period for stock recovery from over-fishing, improved enforcement of fish conservation regulations and regulations on fishing methods. Additionally wide range of identified possible opportunities to be researched for demand projections and feasibility exists, including locally produced and processed foods and spices, restaurants, hire of boats and marine leisure equipment, boat trips and marine observation, development of the fishing museum with a systematic contribution from local knowledge, and better facilities for boat building and boat repair and assistance will be given to individuals and groups for micro-finance support. Improved access to affordable health, education, skills for employment and empowerment.
and other social services will be promoted, based on adapting and scaling up successful local initiatives. Through a regular program of expanded information and consultation, a common vision of the future old city and its residents and workers will be built, focused on a harmonious and participatory development between different groups of residents and stakeholders and the visitor contribution to economic growth, and applying lessons learned from successes and disappointments.

11. *Research, documentation, conservation and presentation of the El Bass and El Mina archaeological sites*: The two archaeological sites will be thoroughly researched and documented, filling some important knowledge gaps due to the interruption of the excavations during the civil war. While the two sites will remain physically separate, a unified site management plan will be in place, with some key elements in common, such as the visitor center and site museum and a storage area or *lapidarium*; a system of accesses, visitor circuits, rest areas and facilities will encompass both sites, and support the presentation to visitors via panels and other information devices. In the Al Bass site the funerary complexes, the Roman arch, the hippodrome, the palaestra of the blue team, and the crusader chapel will be subject to conservation of structures and surfaces; a pedestrian exit will ensure the continuity of the visit by connecting the site to Hamra St. The Hiram fountain site accessible from Hamra St. will be subject to studies, conservation and presentation. In the El Mina site the Egyptian harbor, the hexagonal building, the arena, the baths, the great and small alleys, the palaestra, the residential quarter, the crusader church area, and the crusader tower will be subject to conservation of structures and surfaces.
Interventions in Baalbeck

1. **City entrances and interfaces, new public spaces and parking**: The through-traffic will be distanced from the archaeological area, the street that provides the Northwestern boundary to the site will become a pedestrian promenade overlooking the site, parking areas for tourists and residents will be provided at the South and North city entrances, Moutran Square will be entirely rehabilitated, sidewalks will be improved, through-traffic will be diverted, and a new building will house a cluster of productive activities in order to relocate some of those that are currently on the street facing the archaeological site, car-repair workshops and others;

2. **Rehabilitation and revitalization of the historic street pattern**: a number of historic pedestrian circuits will be rehabilitated, so as to regain the connectivity for residents and visitors to various monuments and spots of cultural interest, cutting across vehicular streets; paving, lighting and signage will enhance the quality of the following pathways: Interface to Hay el Sohl; Ummayad Mosque to Serail Square; Moutran Sq. to Hay Qalaa, Venus Temple area, and Ras el Ain; Souk el Moutran; Catholic Church to Mercury Temple hill; Souk el Moutran to Mercury Temple hill; this pedestrian network will reinforce the links with and between the Moutran Souk, that is being already rehabilitated by the municipality, and the market square, which is the hub of commercial Baalbeck;
3. **Redevelopment of the Market area:** Situated next to the Serail Square at one of the most central locations, the market area will undergo an extensive redevelopment in order to guarantee a hygienic operation of the meat, fruit and vegetable produce sale; a covered market structure complete with vending areas will replace the current sprawl of informal stalls and will entail the provision of water, sanitation and waste management infrastructure, under municipal management; on the Ras El Ain boulevard, a new two-story commercial building will provide street frontage where recent demolitions have created a void, and integrate the market area with enclosed space for commerce and service activities.

4. **Water supply, sanitation and utility connections in the historic city.** In those neighborhoods where the project will finance the improvement to public spaces, access to water supply and sanitation by the neighboring buildings will be improved, prior to the paving of the pedestrian areas; based on existing infrastructure schemes, water mains and sewer lines will be upgraded, electric and telephone cables will run underground.

5. **Support to vernacular housing rehabilitation:** Despite the extensive reconstruction of the last thirty years, there are six clusters of inhabited vernacular architecture made of units originally built with rubble stones and mud-bricks, that still maintain much of the original character; these clusters are mostly located in the proximity of the archaeological area, and provide a testimony to the traditional housing of Baalbeck, as well as a good location for tourism-oriented commercial and productive activities. One cluster will be entirely rehabilitated for demonstrational purposes, and financial incentives as well as technical administrative assistance will be made available to the inhabitants of the surrounding units to rehabilitate them following the traditional construction techniques; a total of five units will be rehabilitated by the project while 15 other units are expected to be rehabilitated by the municipality.

6. **Support to local economic development, cultural tourism, private sector participation, and communication:** The city’s initiatives and vision for local economic development and promotion of cultural tourism will be supported through training to improve tourism services (B&B, small restaurants, municipal guides training etc.); provision of information and guidance on accessing financial and technical resources for business development; support to the development of a website to attract more visitors and investment in goods and services for cultural tourism; and information to enable tourists to enjoy the city’s offerings in an appropriate way. A continued program of consultation between the city and residents and various stakeholders will enable them to contribute better to the realization of the city’s vision, and to evaluation of the outcomes.

7. **Research, documentation, conservation and presentation of the archaeological site of Al-Qalaa:** The main area of the Great Hexagonal Court, of the Temple of Jupiter and of the Temple of Bacchus will be thoroughly researched, surfaces and structures will be conserved, and the site will be liberated from scattered fragments. The adjacent area of the Temple of Venus will be connected to the main site; the secondary sites of Bustan Nassif, Bustan el-Khan, Bustan Raad, Bustan Zein, the quarries, and Qubat Douris will also be partially researched and conserved. The entire archaeological site will benefit from site presentation interventions and from a comprehensive site management plan that will include a Site Visitors Center and other essential infrastructure.
APPENDIX B
Environmental Baseline Monitoring and City Profiles –
CHUD Phase II Intervention Area
APPENDIX C
Calculation of the impact of construction activities on air quality

Step 1: Estimation of the total construction emissions using the area wide method.

In this method, the quantity of particulate matter emissions from construction operations is considered proportional to the area being worked and to the level of construction activity. Emissions from heavy construction operations are positively correlated with the silt content of the soil (particles with a diameter <75 micrometers (µm)), as well as with the speed and weight of the average vehicle, and negatively correlated with the soil moisture content. An approximate emission factor (EF) for the construction activities that is used in the estimation of total emissions (USEPA, 1995) is:

\[
EF = 0.3 \text{ Kg/m}^2/\text{month of activity}^2
\]

Hence, the temporal emission factor for a total construction area of 1,000 to 5,000 m\(^2\) and a duration of 6 months of activity, considering 30 days/month and 8 hours/day of work is:

\[
S = 0.3 \times (1000 \text{ to } 5000) / (30 \times 8 \times 3600)
\]

\[
S = 0.35 \text{ to } 1.75 \text{ g/s}
\]

Step 2: Summary of key meteorological parameters with regard to air pollution dispersion namely, mixing height, inversion height, and mean annual wind speed (Table B1).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Typical scenario</th>
<th>Worst case scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixing height</td>
<td>1000(^a) m</td>
<td>1 m</td>
</tr>
<tr>
<td>Average wind speed</td>
<td>4(^b) m/sec</td>
<td>1 m/sec</td>
</tr>
<tr>
<td>Wind direction</td>
<td>West</td>
<td>West</td>
</tr>
</tbody>
</table>

\(^a\) De Nevers, 1995  
\(^b\) Average monthly wind speed for the years 1995-1999 recorded by the AUB weather monitoring station

Step 3: Application of the Fixed Box Model to calculate ground-level concentration of PM (De Nevers, 1995)

To compute the air pollutant concentration using this model, the site was represented by a parallelepiped (Figure B1) and the following simplifying assumptions were made (DeNevers, 1995):

- Mixing of pollutants occurs within a layer of height H, confined from above by a layer of stable air
- The concentration of pollutant in the entire city is constant and uniform, and equals to \(c\)
- The wind velocity is constant and independent of time, elevation, and height above the ground
- The concentration of pollutant entering the city (at \(x = 0\)) is constant, and equals to the base line measured PM concentration, \(b\)
- No pollutant enters or leaves the top of the box, nor the sides that are parallel to the wind direction.
- The destruction rate inside the box is zero

\(^2\) The value is most applicable to construction operations with (1) medium activity level, (2) moderate silt contents, and (3) semiarid climate.
\[ c = b + \frac{SL}{WLH} \]

Where,
- \( c \) = Concentration of PM in the entire site (\( \mu g/m^3 \))
- \( b \) = Background PM concentration (\( \mu g/m^3 \))
- \( S \) = Emission rate of PM (\( \mu g/s \))
- \( L \) = Site length (m)
- \( W \) = Site width (m)
- \( H \) = Mixing height (m)
- \( u \) = Wind speed (m/s)

The input data for the site under study are summarized in Table B2, taking into consideration two scenarios: the typical scenario and the worst-case scenario.

**Table B2. Input data for the box model**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Typical scenario</th>
<th>Worst case scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>( W )</td>
<td>14 m</td>
<td>14 m</td>
</tr>
<tr>
<td>( L )</td>
<td>14 m</td>
<td>14 m</td>
</tr>
<tr>
<td>( H )</td>
<td>1000 m</td>
<td>1 m</td>
</tr>
<tr>
<td>( b^1 )</td>
<td>116 ( \mu g/m^3 )</td>
<td>116 ( \mu g/m^3 )</td>
</tr>
<tr>
<td>( u )</td>
<td>4 m/s</td>
<td>1 m/s</td>
</tr>
<tr>
<td>( S )</td>
<td>350,000 ( \mu g/s ) to 1,750,000 ( \mu g/s )</td>
<td>350,000 ( \mu g/s )</td>
</tr>
</tbody>
</table>

\(^1\) Average TSP concentration in Beirut (El Fadel M. and Massoud M., 2000)

By direct substitution of the values in Equation 1, the predicted total PM concentration at a typical site is expected to range between 586.25 \( \mu g/m^3 \) (if the emission rate is 0.35 g/s) and 2931.25 \( \mu g/m^3 \) (if the emission rate is 0.35 g/s under typical conditions), as well as between 25,580 \( \mu g/m^3 \) (if the emission rate is 0.35 g/s) and 127,900 \( \mu g/m^3 \) (if the emission rate is 0.35 g/s under typical conditions) under worst-case conditions. For typical conditions, the expected PM emissions are above the proposed Lebanese 8-hr standard (120 \( \mu g/m^3 \)).
APPENDIX D

Calculation of impact of construction activities on noise quality

The first step in the noise quantification is the determination of the total site $L_{eq}$ from the different operations listed in Table 27 using the following equation.

$$L_{eq} = 10 \log \left( \frac{1}{T} \sum_{i=1}^{N} T_i (10)^{L_i/10} \right)$$

Where

- $L_i = L_{eq}$ for the $i$th phase (Table 27)
- $T_i =$ Total time duration for the $i$th phase
- $T =$ Total time of operation from the beginning of the initial phase ($i=1$) to the end of the final phase ($i=N$)
- $N =$ Number of phases

Taking into consideration the five construction phases listed in Table 27, with each having an estimated average duration of 1 month, the total $L_{eq}$ for the site was estimated at 86.8 dBA. This noise level exceeds the Lebanese guidelines (Table C1) for a zone with the characteristics of the Project Area (65 dBA). However, this value is lower than the OSHA standard for an 8-hr exposure (90 dBA). In this case, the exposure of workers to noise during their work shift is acceptable.

<table>
<thead>
<tr>
<th>Area classification</th>
<th>Maximum accepted noise level dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day¹</td>
</tr>
<tr>
<td>Business district</td>
<td>55 – 65</td>
</tr>
<tr>
<td>Residential area with few construction sites, commercial activities or on highway</td>
<td>50 – 60</td>
</tr>
<tr>
<td>Urban residential area</td>
<td>45 – 55</td>
</tr>
<tr>
<td>Residential suburb</td>
<td>40 – 50</td>
</tr>
<tr>
<td>Rural residential, hospital, public garden</td>
<td>35 – 45</td>
</tr>
<tr>
<td>Industrial zone</td>
<td>60 – 70</td>
</tr>
</tbody>
</table>

¹ 7 a.m. to 6 p.m. ² 6 p.m. to 10 p.m. ³ 10 p.m. to 7 a.m.

To determine the propagation of noise levels at various radial distances from the construction site, $L_{eq}$ can be corrected using the following equation.

$$L_{eq, adjusted} = -20 \log(x + 250) + 48$$
Safety, Health, and Environmental Regulations
APPENDIX F

Detailed design of the Platform in Tripoli
APPENDIX G
Archaeological Chance Find Procedures

These procedures were developed in accordance with the Lebanese regulations and the World Bank Guidelines - OP 4.11 of August 1999.

These procedures are included as standard provisions in construction contracts to ensure the protection of cultural heritage.

A clause for “Protection of Archaeological and Historical Sites” was added to all bidding documents for the works contract which explains the steps to follow whenever new archaeological remains, antiquity or any other object of cultural or archaeological importance are encountered during construction.

Protection of Archaeological and Historical Sites

1- Excavation in sites of known archaeological interest should be avoided. Where this is unavoidable, prior discussions must be held with the Directorate of Antiquities in order to undertake pre-construction excavation or assign an archaeologist to log discoveries as construction proceeds. Where historical remains, antiquity or any other object of cultural or archaeological importance are unexpectedly discovered during construction in an area not previously known for its archaeological interest, the following procedures should be applied:
   a) Stop construction activities.
   b) Delineate the discovered site area.
   c) Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over.
   d) Notify the responsible foreman/archaeologist. Who in turn should notify the responsible authorities, the General Directorate of Antiquities and local authorities (within less than 24 hours).
   e) Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out.
   f) An evaluation of the finding will be performed by the General Directorate of Antiquities. The significance and importance of the findings will be assessed according to various criteria relevant to cultural heritage including aesthetic, historic, scientific or research, social and economic values.
   g) Decision on how to handle the finding will be reached based on the above assessment and could include changes in the project layout (in case of finding an irrevocable remain of cultural or archaeological importance), conservation, preservation, restoration or salvage.
   h) Implementation of the authority decision concerning the management of the finding.
   i) Construction work could resume only when permission is given from the General Directorate of Antiquities after the decision concerning the safeguard of the heritage is fully executed.

2- In case of delay incurred in direct relation to Archeological findings not stipulated in the contract (and affecting the overall schedule of works), the contractor may apply for an extension of time. However the contractor will not be entitled for any kind of compensation or claim other than what is directly related to the execution of the archeological findings works and protections.
APPENDIX H

First report on the evaluation of implementation of EMP and HSE requirements
APPENDIX I
Second report on the evaluation of implementation of EMP and HSE requirements
APPENDIX J

Environmental questionnaire for public consultation

<table>
<thead>
<tr>
<th>Tick the appropriate city</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Tripoli</td>
</tr>
<tr>
<td>□ Saida</td>
</tr>
<tr>
<td>□ Byblos</td>
</tr>
<tr>
<td>□ Tyre</td>
</tr>
<tr>
<td>□ Baalbeck</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>□ &lt;20</td>
</tr>
<tr>
<td>□ 20-30</td>
</tr>
<tr>
<td>□ 30-40</td>
</tr>
<tr>
<td>□ 40-50</td>
</tr>
<tr>
<td>□ &gt;50</td>
</tr>
<tr>
<td>Education level</td>
</tr>
<tr>
<td>□ Primary</td>
</tr>
<tr>
<td>□ Secondary</td>
</tr>
<tr>
<td>□ University</td>
</tr>
<tr>
<td>□ Technical</td>
</tr>
<tr>
<td>□ None</td>
</tr>
<tr>
<td>Profession</td>
</tr>
<tr>
<td>Type of activity</td>
</tr>
</tbody>
</table>

Do you live in the ancient city area?  □ Yes  □ No

Do you work in this area?  □ Yes  □ No

Have you heard about the Cultural Heritage and Tourism Development Project?  □ Yes  □ No

If yes, how did you hear about it?  □ In newspaper  □ From municipality  □ From CDR  □ Attended a workshop  □ Other: ...........................................

What are the activities related to the project that you heard about?  □ Rehabilitation and preservation of old city historic and archaeological sites  □ Improvement of the general appearance of the souks  □ Improvement of the general appearance of houses  □ Transformation of some areas to pedestrian areas  □ Traffic circulation organization  □ Creation of new parking places  □ Infrastructure status improvement (water, wastewater, solid waste)  □ Public places management
Planting of trees and greeneries and improving the landscape
Improving the port area and surroundings
Creation of tourist information centers and of tourist circulation routes
Other

**Environmental attributes**

**Impacts on cultural heritage promotion**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think that this project will promote cultural heritage and cultural tourism in the area?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think that the number of tourists visiting the area will increase?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think that tourism will be solely depending on tourists from outside the city?</td>
<td></td>
<td>Other: ........................................</td>
</tr>
</tbody>
</table>

**Socio-economic impacts**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think that the implementation of the project will create job opportunities for local workers?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think that the project will increase the indirect employment in other sectors (touristic guides, artisanal workers, cafes, industry, commerce, handicrafts, etc.)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think that the impact will only affect the rehabilitated area or the whole city will benefit from it?</td>
<td>Only the rehabilitated area</td>
<td>The whole city will benefit from it</td>
</tr>
<tr>
<td>Which of these activities do you believe will benefit from this project?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Historical sites and monuments</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Old Souks</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Hotels</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Restaurants</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Cafes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Leisure activities</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Commerce activities</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Activity</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>Residents</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Artisanal and handicraft workshops</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Transport network</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Industry</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Fishing</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
</tbody>
</table>

**Impacts on residents**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think that the project will improve the quality of life of local residents?</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Do you think that local residents will view the improvement of the built environment positively?</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
</tbody>
</table>

**Impacts on land resources**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think that the project will improve the value of land and assets in the area?</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Do you think that introducing landscaping and greenery and transforming some areas into public squares and spaces will improve the general perception of the citizens to the old city?</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
</tbody>
</table>

**Impact on traffic**

<table>
<thead>
<tr>
<th>Question</th>
<th>Improve the circulation</th>
<th>Worsen the circulation</th>
<th>Positive effect</th>
<th>Negative effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think that the reorganization of the existing circulation network and the provision of new parking spaces will affect traffic in the city?</td>
<td>☐</td>
<td>☐</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think that reorganizing the circulation in the city and transforming some area into pedestrian areas will have an effect on the economic situation and the daily activities of shops?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
</tbody>
</table>

**Air quality and noise**

<table>
<thead>
<tr>
<th>Question</th>
<th>Improve air quality</th>
<th>Worsen air quality</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think that air quality will be affected by the traffic reorganization component?</td>
<td>☐</td>
<td>☐</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Do you think that noise level will be affected by the traffic reorganization component?</td>
<td>☐</td>
<td>☐</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
</tbody>
</table>

**Impacts on infrastructure**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think that the current status of infrastructure (water and wastewater, solid waste, electricity and telephones) is hindering tourism and commerce activities in the area?</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
</tbody>
</table>
Do you think that improving the infrastructure (wastewater collection and disposal, solid waste collection and disposal, water supply networks, electricity and telephone networks) of the area will improve the general tourism and commerce activities?

☐ Yes

☐ No

Which of these activities you think will be affected after the completion of the rehabilitation works proposed by the project?

Increase in wastewater generation

☐ Yes

☐ No

Increase in solid waste generation

☐ Yes

☐ No

Increase in the demand for domestic water

☐ Yes

☐ No

Do you think that the improvement in the infrastructure (mainly solid waste and wastewater) of the area will affect seawater, river water, and groundwater quality?

☐ Improve the situation

☐ Worsen the situation

Do you think that health and safety requirements will be improved as a result of the project?

☐ Yes

☐ No

Potential negative impacts

Do you think that the project will have any potential negative impacts?

☐ Yes

☐ No

If Yes, what could they be?

Mitigation and monitoring

What do you suggest as mitigation measures to reduce the negative impacts of the project?

What do you suggest to monitor during the rehabilitation and operation phases of the project?

☐ Yes

☐ No

Do you think that management capabilities and capacity building of stakeholders (training, institutional reform, environmental management, cultural) is needed for the success of the project?

☐ Yes

☐ No
دراسة تقييم الأثر البيئي
التراث الثقافي والتطوير العمراني في لبنان

بعلبك جبيل صور صيدا طرابلس المدينة:

معلومات عامة

الاسم: 

العمر:
 أقل من 20  30 - 40  أكثر من 50 

المستوي التعليمي
جامعي
ثانوي
ابتدائي
تقرني
غير متعم

المهنة: 

نوع العمل:

6. هل تقيم في المدينة القديمة؟
نعم
كلا

7. هل تعمل في المدينة القديمة؟
نعم
كلا

معلومات حول المشروع

8. هل سمعت قبل اليوم عن مشروع الحفاظ على الآثار وتطوير السياحة في المدينة القديمة؟
نعم
كلا

9. في حال الإيجاب، كيف سمعت عنه؟
قرأت عنه في الصحف عن طريق البلدية
ورشات العمل
هناك

10. حضرت إحدى ورشات العمل بطريقة أخرى

15
10. ما هي الأعمال المتعلقة بهذا المشروع التي سمعت عنها؟
- إعادة تنظيم حركة السير.
- إحداث مواصفات للسيارات.
- تحسين أسواق الداخلة القديمة.
- تحسين وتأهيل بعض المنازل القديمة.
- تحويل بعض الطرق إلى ممرات للمساعدة فقط.
- تحسين أعمال البنية التحتية (مياه، صرف صحي، نفايات صلبة).
- إدارة الأماكن العامة.
- زراعة أشجار وزيادة المناطق الخضراء (إحداث حدائق عامة).
- تحسين وإحياء منطقة المرفا (مرفاً الصيادين).
- إحداث مرافق استعمالات للسياح وتنظيم خطوط سياحية داخلية غيرها.

الأثر البيئي ج.

11. هل تعتقد أن المشروع سوف يدعم الحفاظ على الأثار والسياحة الثقافية في المنطقة؟
- نعم
- كلا

12. هل تعتقد أن عدد السياح سوف يزداد نتيجة لهذا المشروع؟
- نعم
- كلا

13. هل تعتقد أن السياحة سوف تقتصر فقط على سياح من خارج المدينة؟
- نعم
- كلا، أهل المنطقة سوف يستفيدون منها أيضاً.
- غيرها

14. هل تعتقد أن هذا المشروع سوف يخلق فرص عمل جديدة للمواطنين المحليين؟
- نعم
- كلا

15. هل تعتقد أن هذا المشروع سوف يخلق فرص عمل غير مباشرة في قطاعات أخرى (دليل سياحي، عامل حرفي، مقاهي، الصناعة، التجارة، الحرفيات، وغيرها)؟
- نعم
- كلا
16. هل تعتقد بأن أثر هذا المشروع سوف يؤثر فقط على المناطق المعنية مباشرة بالمشروع أم سيطال أثره على المدينة بأكملها؟
فقط المناطق المرممة والمؤهلة
كل المدينة سوف تستفيد
غيرها

17. أي من هذه الأعمال سوف تستفيد من هذا المشروع حسب رأيك؟
الأسواق القديمة
المطاعم
الفنادق
المقاهي
مناطق التسليه
مناطق التجارة
السكان (سكان المنطقة المؤهلة)
الأعمال الحرفية واليدوية
شبكات النقل
المصانع
صيد الأسماك

18. هل تعتقد أن هذا المشروع سوف يحسن المستوى المعيشي لسكان المنطقة القديمة في لبنان؟
نعم
كلا

19. هل تعتقد أن سكان المنطقة القديمة في المدينة سوف ينظرون إلى التحسينات في أعمال البناء
Ýلإيجابية؟
نعم
كلا

20. هل تعتقد أن المشروع سوف يحسن أسعار الأراضي والممتلكات في المنطقة؟
نعم
كلا

21. هل تعتقد أن إدخال الأشجار والخضار وتحويل بعض المناطق إلى ساحات وحدائق
عمادة سوف يحسن إنجاز المواطنين حيال المدينة القديمة؟
نعم
كلا

22. هل تعتقد أن إعادة تنظيم حركة السير واستحداث مواقف جديدة للسيارات وإلغاء بعض
المواقف سوف يؤثر على زحمة السير في المدينة؟
سوف يحسن حركة السير
سوف يعرقل حركة السير
23. هل تعتقد أن إعادة تنظيم حركة السير في المدينة وتحويل بعض الشوارع إلى شوارع للمشاة من شأنه أن يؤثر على الحركة الاقتصادية والأعمال اليومية للمحلات التجارية؟

أثر إيجابي

4. هل تعتبر أن نوعية الهواء (أثر سلبي) سوف تتاثر بإعادة تنظيم حركة السير؟

تحسين نوعية الهواء

25. هل تعتبر أن مستوى الضجيج سوف يتاثر بإعادة تنظيم حركة السير؟

نعم

26. هل تعتبر أن الوضع الحالي للبنى التحتية (مياء، صرف صحي، نفايات صلبة، كهرباء، هاتف) يعيق حركة السياحة وأعمال التجارة في المنطقة؟

نعم

27. هل تعتبر أن تحسين البنية التحتية (شبكات توزيع المياه، تجميع ومعالجة مياه الصرف الصحي، عمليات جمع ومعالجة النفايات الصلبة، شبكات الكهرباء والهاتف) في المنطقة سوف يؤدي إلى تحسين السياحة وأعمال التجارة؟

لا

28. بالرأيك، أي من هذه الأعمال سوف تتاثر بعد استكمال أعمال التأهيل والتحسين التي

بنص عليها هذا المشروع؟

زيادة في كمية مياه الصرف الصحي
زيادة في كمية النفايات الصلبة
زيادة الطلب على المياه

29. هل تعتبر أن تحسين البنية التحتية (لا سيما المتعلقة بالبيئة والصرف الصحي) في المنطقة يؤثر على نوعية مياه البحر، مياه الأنهار، والمياه الجوفية؟

يحسنها

30. هل تعتقد أن معايير السلامة والأمان سوف تتحسن نتيجة لتنفيذ هذا المشروع؟

لا

31. هل تعتبر أن يكون لهذا المشروع آثار سلبية؟

لا
32. في حال الإيجاب، ما هي برأيك هذه الآثار؟

33. ماذا تقترح كإجراءات عملية لتفعيل من حدة هذا الآثار السلبية؟

34. ما هي برأيك الأعمال التي يجب مراقبتها للحفاظ على بيئة عمل سليمة خلال أعمال التأهيل والوقت التي تليها؟

35. هل تعتقد أن المعنيين بالأمر في هذا المشروع لديهم القدرات من حيث الإدارة والتدريب (إدارة البيئة، الثقافة والسياحة) لإدارة المشروع تعد تنفيذها أم تعتقد أنه يلزمهم بناء لقدراتهم؟

_LENGTH_
APPENDIX K
Public participation record

Public participation - Tyre

A public consultation meeting was organized on the 30th of May 2002 at the Municipality of Tyre to discuss the potential environmental impacts of the proposed activities of the project of the Conservation of Cultural Heritage in Tyre. The meeting was coordinated by the Head of the Municipality of Tyre, Mr. Abdul Muhsen El Husseini, CDR Project Manager, Mr Maged Fattal, and the environmental consultants Dr. Mutasem El Fadel. The meeting was attended by 10 participants whose names are listed below with selected photos.

List of Participants in the consultation meeting in Tyre

<table>
<thead>
<tr>
<th>Name</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mr Maged Fattal</td>
<td>CDR- Project Manager</td>
</tr>
<tr>
<td>2. Dr. Mutasem El Fadel</td>
<td>Environmental consultant</td>
</tr>
<tr>
<td>3. Mr. Farouk Merhebi</td>
<td>Environmental consultant</td>
</tr>
<tr>
<td>4. Mr. Abdul Muhsen El Husseini</td>
<td>Head of the Municipality of Tyre</td>
</tr>
<tr>
<td>5. Mr. Abdallah Khadra</td>
<td>Member of the Municipal Council</td>
</tr>
<tr>
<td>6. Mr. Hassan Dbouk</td>
<td>Member of the Municipal Council</td>
</tr>
<tr>
<td>7. Mr. Mahmoud Halawi</td>
<td>Vice president – Municipality of Tyre</td>
</tr>
<tr>
<td>8. Mr. Nasr Sharaf El Dine</td>
<td>Member of the Municipal Council</td>
</tr>
<tr>
<td>9. Dr. Khalil Joudy</td>
<td>Member of the Municipality Council</td>
</tr>
<tr>
<td>10. Dr. Kamel Yassine</td>
<td>Member of the Municipality Council</td>
</tr>
<tr>
<td>11. Mr. Eid Fakhoury</td>
<td>Member of the Municipality Council</td>
</tr>
<tr>
<td>12. Mr. Ahmad Faraj</td>
<td>Local NGO - Protection of the Environment</td>
</tr>
<tr>
<td>13. Dr. Farhat Farhat</td>
<td>Local NGO - Amwaj Al Bia’a</td>
</tr>
</tbody>
</table>

Pictures from the consultation meeting in TYRE

After a brief presentation of the various project interventions by Mr. Fattal, the environmental consultant, Dr. El-Fadel, discussed with the participants their views about the environmental impacts associated with the project. A questionnaire (refer to Appendix F) was then was administered and filled by the participants.

Outcomes of the meeting and questionnaire

- Most participants were aware of the project through their participation in its development since its inception or have attended previous discussion sessions related to the project.
The participants had good awareness of the interventions that will be executed in Tyre.

The participants were eager to have the project start as they foresee a positive impact on the preservation of the cultural heritage of the city, the improvement in the social level of locals, and the development of tourism (increase in number of tourists, creation of direct and indirect employment activities, improvement of standard of living, the cost of land and real estate, hotels, cafes, handicrafts, etc).

The reorganization of the parking structure for cars and tourist buses and the reorganization of circulation in some streets are perceived to improve the traffic and to reduce congestion problems in the old city center. Most attendants were aware that the increase in the number of tourists may worsen the air quality and increase the noise levels at some locations (parking area) and improve the situation in other locations.

The participants were aware that the present inadequate conditions of infrastructure whereby wastewater collection and disposal is hindering the development of tourism in the port area and must be improved to be able to attract tourists. Wastewater from the old city needs to be collected and diverted from the port area. Two alternatives were discussed: wastewater diversion to the existing sea outfall to the west of the city through a pumping station in the parking area near the old port, or installation of a package wastewater treatment plant near the parking area and discharge the treated effluent into the sea or use in landscaping.

The participants were aware that the development of tourism in Tyre will cause negative impacts due to the increase in wastewater generation, solid waste generation and water demand because the existing systems cannot accommodate for sudden population and tourist increase.

According to participants, solid waste collection in the old city streets is well organized. Homes are provided with wheel bins in which solid waste is collected manually by a contractor and transported by trucks to open dumps outside the city. Pedestrian streets should be provided with bins for the collection of waste generated by tourists.

Negative impacts of the project are perceived during construction and rehabilitation works. These are associated with noise, dust emissions, traffic congestions and increase in demolition waste. Mitigation measures of these impacts include the spraying of water and the use of curtains to minimize dust emissions, working during daytime hours and the use of proper equipment to prevent noise disturbance. As for demolition waste, it was proposed that waste could be disposed of on municipal land to the east of the city or into private property.

Some participants were afraid that the transformation of the fishing port to a tourist attraction center would disturb and affect the normal life of fishermen and the fishing industry. Waste from the fishing market should not be disposed of in the port area, a collection system should be provided.

Public participation - Tripoli

A public consultation meeting was organized on the 22nd of June 2002 at Nawfal Palace in Tripoli to discuss the environmental impacts of the proposed activities of the project of the Conservation of Cultural Heritage in Tripoli. The meeting was coordinated by the Head of the Municipality, Mr. Samir Chaarani, the CDR Project Manager, Mr Maged Fattal, the architect Mr. Habib Debs, and the environmental consultant Dr. Mutasem El Fadel. The meeting was attended by 52 participants whose names are listed below with selected photos.

<p>| List of Participants in the consultation meeting in Tripoli |  |
|---|---|---|---|
| <strong>Name</strong> | <strong>Occupation</strong> | <strong>Name</strong> | <strong>Occupation</strong> |
| 1 Mr. Samir Chaarani | Head of the Municipality | 27 Mr. Riad Sankari | Engineer - Libanconsult |
| 2 Mr Maged Fattal | CDR- Project Manager | 28 Mr. Mohammad Seif | Journalist |
| 3 Mr. Habib Debs | Architect – Debs and Tabet | 29 Mr. Mosbah El Rajab | Architect |
| 4 Dr. Mutasem El Fadel | Environmental consultant | 30 Mr. Omar Tadmori | University Professor |
| 5 Mr. Farouk Merhebi | Environmental consultant | 31 Mr. Samir Sharkas | Head of a local NGO |
| 6 Mr. Ibrahim Ghamraoui | Bacteriologist | 32 Mr. Samir El Hajj | Head of NGO – Al Lijan Al Ahliiah |
| 7 Dr. Mervat El Hoz | CDR Environmental advisor | 33 Mr. Rachid Jamali | Al Rabita al Sakafiah |
| 8 Dr. Bachir Zaouk | Engineer and Professor | 34 Mr. Diran Harmandian | Architect |</p>
<table>
<thead>
<tr>
<th>Name</th>
<th>Occupation</th>
<th>Name</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Nada el Ayoubi</td>
<td>President of mothers association</td>
<td>Dr. Nabil Harb</td>
<td>Urban planner</td>
</tr>
<tr>
<td>Mrs. Fayza Sbai Karami</td>
<td>Head of the legal department at the municipality</td>
<td>Ms. Maha Kayyal</td>
<td>University Professor - Anthropology</td>
</tr>
<tr>
<td>Mrs. Sabah Mawloud</td>
<td>President of a local NGO</td>
<td>Mr. Shawki Fatfat</td>
<td>Architect</td>
</tr>
<tr>
<td>Mrs. Hala Makhlof Ajam</td>
<td>School teacher</td>
<td>Mr. Maan Omar Hallab</td>
<td>Waqf of Tripoli</td>
</tr>
<tr>
<td>Ms. Wafaa Moghrabi</td>
<td>Member of the women’s association for social care</td>
<td>Mrs. Mona Hijazi</td>
<td>Member of Ria’yat al Bi’at</td>
</tr>
<tr>
<td>Ms. Amoun Harmouch</td>
<td>Teacher at Ministry</td>
<td>Mr. Shawkia Fayyad</td>
<td>Member of Ria’yat al Bi’at - NGO</td>
</tr>
<tr>
<td>Mr. Ali Lagha</td>
<td>University professor</td>
<td>Ms. Nivine Abbas</td>
<td>Member of Ria’yat al Bi’at - NGO</td>
</tr>
<tr>
<td>Mr. Fadl Ziadeh</td>
<td>University professor</td>
<td>Mr. Farouk Jarkas</td>
<td>Member of Ria’yat al Bi’at - NGO</td>
</tr>
<tr>
<td>Mr. Riad Awaydah</td>
<td>Director of the Arts Institute</td>
<td>Mr. Ismail al Kobtan</td>
<td>Member of Ria’yat al Bi’at - NGO</td>
</tr>
<tr>
<td>Mr. Philippe Hardouin</td>
<td>Centre culturel francais</td>
<td>Ms. Aaicha Mousalli</td>
<td>University Professor in Sociology</td>
</tr>
<tr>
<td>Mr. Jalal Aabas</td>
<td>Engineer/Municipal Council</td>
<td>Mr. Moustafa Hwalla</td>
<td>Civil Engineer</td>
</tr>
<tr>
<td>Mr. Marwan El Sayyed</td>
<td>Retired financial inspector</td>
<td>Mr. Michel Karkouf</td>
<td>Engineer</td>
</tr>
<tr>
<td>Mr. Farouk Sibaii</td>
<td>Civil engineer – industrial management</td>
<td>Dr. Riad Yamak</td>
<td>Municipal Council</td>
</tr>
<tr>
<td>Mr. Kanaan El Halabi</td>
<td>General commerce</td>
<td>Mr. Abdel Ghani Chahine</td>
<td>Urban planner</td>
</tr>
<tr>
<td>Dr. Nazih Kabbara</td>
<td>Lawyer and University Professor</td>
<td>Mr. Marwan El Mawwas</td>
<td>Municipal Council</td>
</tr>
<tr>
<td>Mr. Mu’tazz Mokaddem</td>
<td>General Commerce</td>
<td>Mr. Fawwaz Raad</td>
<td>Manager of Lavajet – Solid waste collection</td>
</tr>
<tr>
<td>Mr. Aamer Haddad</td>
<td>Engineer</td>
<td>Mr. Amin Marhaba</td>
<td>Engineer</td>
</tr>
<tr>
<td>Mr. Abdallah Abdel Wahab</td>
<td>Engineer - Fayha’ Municipal Union</td>
<td>Mr. Ahmad Sabouneh</td>
<td>Municipal Council</td>
</tr>
</tbody>
</table>

Pictures from the consultation meeting in Tripoli

After a presentation of the different project interventions by Mr. Debs, the environmental consultant, Dr. Fadel discussed with the participants their views about the potential environmental impacts associated with the project and a questionnaire (refer to Appendix F) was then administered to collect their opinion related to the project, its expected impacts (positive and negative), the ways to mitigate them, and the ways to monitor the environment. A total of 36 questionnaires were filled during this meeting.
Outcomes of the meeting and questionnaire

- The majority of respondents (95%) seem to be aware of the project as they have heard about it from the Municipality, read about it in the newspaper, or participated in previous workshops and discussions.

- The majority of respondents are aware of most of the interventions that will be executed in Tripoli. Among the activities that are most recognized is the preservation and conservation of historic and cultural city centers and the improvement of the general appearance of the souks.

- The majority of respondents are eager to see the project begin as they foresee a positive impact on the preservation of the cultural heritage of the city, the improvement in the social level of locals, and the development of the tourism sector (increase in number of tourists, creation of direct and indirect employment activities, improvement in the standard of living, etc). Few people were a bit surprised about the low forecasted increase in the number of tourists and emphasized the need for marketing and advertising strategy to promote tourism in Tripoli.

- According to the respondents, the activities that will benefit the most from the project in terms of direct or indirect employment are the old souks, restaurants, handicrafts and artisanal works, commercial spaces, hotels, cafes, and transport networks. Although 80% believe that the cost of land will improve as a result of the implementation of the project, 20% are believe that the cost of land will not be affected, rather it needs time to improve.

- The reorganization of the parking structure for cars and tourist buses and the reorganization of circulation in some of the streets is seen by 95% of the respondents to improve the circulation and to reduce congestion problems in the old city center. Most respondents are aware that the increase in the number of tourists will worsen the air quality and increase the noise levels at some points (parking areas) and improve the situation in some other places in the city.

- The majority of the respondents (90%) are aware that the existing conditions of infrastructure, mainly solid waste and wastewater collection and disposal, are hindering the development of tourism in the old city center and must be improved to be able to attract tourists.

- About 83% of respondents are aware that the development of tourism in Tripoli will result in an increase in wastewater generation, solid waste generation and water demand. However, the majority of the respondents believe that the impact of such an increase is minimal on the collection networks and treatment systems (given the low forecasted number of tourists). For instance, the Tripoli wastewater treatment plant that will be located at the mouth of the Abou Ali River is over designed and has a capacity of 850,000 people equivalent, and as such it will be able to easily incorporate the flows coming from the additional forecasted tourist numbers.

- Surprisingly, 55% of respondents believe that the project does not have any negative impact, while 14% did not answer this question. The negative impacts cited by the remaining 31% were associated with the construction phase such as noise, dust emissions, traffic congestions and increase in demolition waste. Potential negative social impacts such as resettlement, reduction in commercial activities during project implementation, cultural differences between locals and tourists were also cited.

- Mitigation measures to reduce the above cited negative impacts include the spraying of water and the use of curtains to minimize dust emissions, working during daytime hours and the use of proper equipment to prevent noise disturbance. Public consultation and involvement of the local community in the project is a must. Experts in Tripoli should be consulted and all planned projects for Tripoli should be considered within this study. Improvement of other sectors such as agriculture and industry should be promoted along with tourism promotion. Integrated planning of activities is also useful in abating negative impacts. An awareness campaign about the purpose of the project is also essential to reduce the cultural gap between social classes.

- Monitoring requirements during project implementation that were cited by respondents include air quality, noise, traffic, water quality, groundwater, dust and cleanliness, as well as waste disposal.

- About 83% of respondents believe that training in environmental management is necessary for stakeholders who will be dealing with the implementation of this project.

Public participation - Byblos

A public consultation meeting was organized on the 24th of June 2002 at Ounotech Jbeil to discuss the environmental impacts of the proposed interventions of the project of the Conservation of Cultural Heritage in Byblos. The meeting was coordinated by the Head of the Municipality, Mr. Raphael Sfeir, the CDR Project
Manager, Mr. Maged Fattal, the architect conducting the conservation study in Byblos, and the environmental consultant Dr. Mutasem El Fadel. The meeting was attended by 116 participants whose names are listed below with selected photos.

### List of Participants in the consultation meeting in Byblos

<table>
<thead>
<tr>
<th>Name</th>
<th>Occupation</th>
<th>Name</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. Raphael Sfeir</td>
<td>Lawyer – Head of Municipality</td>
<td>59</td>
</tr>
<tr>
<td>2</td>
<td>Mr. Majed Fattal</td>
<td>CDR</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Mutasem Fadel</td>
<td>Environmental consultant</td>
<td>61</td>
</tr>
<tr>
<td>4</td>
<td>Ms. Rania Maroun</td>
<td>Environmental consultant</td>
<td>62</td>
</tr>
<tr>
<td>5</td>
<td>Mr. Joseph Abi Chebel</td>
<td>Moukhtar of Byblos</td>
<td>63</td>
</tr>
<tr>
<td>6</td>
<td>Mr. Georges Trad</td>
<td>Freres School</td>
<td>64</td>
</tr>
<tr>
<td>7</td>
<td>Mr. Adonis Akra</td>
<td>University professor</td>
<td>65</td>
</tr>
<tr>
<td>8</td>
<td>Mr. Melhem El Haj</td>
<td>Hotel operator</td>
<td>66</td>
</tr>
<tr>
<td>9</td>
<td>Mr. Antoine Nassar</td>
<td>Accounting Expert</td>
<td>67</td>
</tr>
<tr>
<td>10</td>
<td>Mr. Fadi Saliba</td>
<td>Engineer at the Urban Planning Office</td>
<td>68</td>
</tr>
<tr>
<td>11</td>
<td>Mr. Joseph Kallab</td>
<td>Moukhtar of Byblos</td>
<td>69</td>
</tr>
<tr>
<td>12</td>
<td>Mr. Daniel Salame</td>
<td>Moukhtar of Byblos</td>
<td>70</td>
</tr>
<tr>
<td>13</td>
<td>Mr. Wadid Abi Ghosn</td>
<td>Moukhtar of Byblos</td>
<td>71</td>
</tr>
<tr>
<td>14</td>
<td>Mrs. Claude Nasr</td>
<td>Head of NGO</td>
<td>72</td>
</tr>
<tr>
<td>15</td>
<td>Ms. Tamam Zgeib</td>
<td>Member of NGO</td>
<td>73</td>
</tr>
<tr>
<td>16</td>
<td>Mr. Raymond Wehbe</td>
<td>Contractor</td>
<td>74</td>
</tr>
<tr>
<td>17</td>
<td>Mr. Joseph Raphael Sfeir</td>
<td>Jbeilote</td>
<td>75</td>
</tr>
<tr>
<td>18</td>
<td>Mr. Zakiya Malhama</td>
<td>Jbeilote</td>
<td>76</td>
</tr>
<tr>
<td>19</td>
<td>Mrs Laila Hawwat</td>
<td>Instructor</td>
<td>77</td>
</tr>
<tr>
<td>20</td>
<td>Mrs. Nouhad el Haj</td>
<td>School Instructor</td>
<td>78</td>
</tr>
<tr>
<td>21</td>
<td>Mr. Nabil Nassar</td>
<td>Church committee</td>
<td>79</td>
</tr>
<tr>
<td>22</td>
<td>Mr. Samir El Khoury</td>
<td>Church committee</td>
<td>80</td>
</tr>
<tr>
<td>23</td>
<td>Mr. Michel El Khoury</td>
<td>Church committee</td>
<td>81</td>
</tr>
<tr>
<td>24</td>
<td>Mr. Georges Lahhoud</td>
<td>Teacher</td>
<td>82</td>
</tr>
<tr>
<td>25</td>
<td>Mr. Hassan El Akra</td>
<td>Archaeologist</td>
<td>83</td>
</tr>
<tr>
<td>26</td>
<td>Mr. Nassib Cha'eib</td>
<td>Owner of restaurant</td>
<td>84</td>
</tr>
<tr>
<td>27</td>
<td>Reem Zgeib</td>
<td>Architect – Urban planner</td>
<td>85</td>
</tr>
<tr>
<td>28</td>
<td>Mr. Roukoz Zgeib</td>
<td>Civil Engineer</td>
<td>86</td>
</tr>
<tr>
<td>29</td>
<td>Mr. Joseph El Khoury</td>
<td>Construction contractor</td>
<td>87</td>
</tr>
<tr>
<td>30</td>
<td>Ms. Evat Doumit</td>
<td>YWCA</td>
<td>88</td>
</tr>
<tr>
<td>31</td>
<td>Ms. Illham Nassar</td>
<td>YWCA</td>
<td>89</td>
</tr>
<tr>
<td>32</td>
<td>Mr. Hassan Kallab</td>
<td>Municipal Council</td>
<td>90</td>
</tr>
<tr>
<td>33</td>
<td>Mr. Georges Aasaker</td>
<td>Director of a bank</td>
<td>91</td>
</tr>
<tr>
<td>34</td>
<td>Mr. Gaby Sfeir</td>
<td>Literature teacher</td>
<td>92</td>
</tr>
<tr>
<td>35</td>
<td>Mr. Antoine Bassil</td>
<td>Teacher</td>
<td>93</td>
</tr>
<tr>
<td>36</td>
<td>Mr. Pierre El Aakra</td>
<td>Commercant</td>
<td>94</td>
</tr>
<tr>
<td>37</td>
<td>Mr. Joseph Kabrianos</td>
<td>Architect</td>
<td>95</td>
</tr>
<tr>
<td>38</td>
<td>Mr. Bassam Al Moujabber</td>
<td>University Professor</td>
<td>96</td>
</tr>
<tr>
<td>39</td>
<td>Mr. Naj Sfeir</td>
<td>Architect</td>
<td>97</td>
</tr>
<tr>
<td>40</td>
<td>Ms. Najwa Bassil</td>
<td>Social Worker YWCA</td>
<td>98</td>
</tr>
<tr>
<td>41</td>
<td>Ms. Hoda Sadaka</td>
<td>Head of the YWCA</td>
<td>99</td>
</tr>
<tr>
<td>Name</td>
<td>Occupation</td>
<td>Name</td>
<td>Occupation</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>42 Mr. Wissam El Khoury</td>
<td>100 Mr. Claude chbeir</td>
<td>Civil Engineer</td>
<td></td>
</tr>
<tr>
<td>43 Mr. Pierre Saliba</td>
<td>101 Mr. Nadim Saliba</td>
<td>Architect</td>
<td></td>
</tr>
<tr>
<td>44 Mr. Jamal El Mawla</td>
<td>102 Mr. Youssef Dakkache</td>
<td>Civil Engineer</td>
<td></td>
</tr>
<tr>
<td>45 Mr. Chawki Abi Hassan</td>
<td>103 Ms. Josephine Semaan</td>
<td>Agricultural Engineer</td>
<td></td>
</tr>
<tr>
<td>46 Mr. Salim Al Lakkis</td>
<td>104 Mr. Semaan Semaan</td>
<td>Mechanical Engineer</td>
<td></td>
</tr>
<tr>
<td>47 Mr. Salim Mansour</td>
<td>105 Mr. Youssef Farid Karam</td>
<td>Architect</td>
<td></td>
</tr>
<tr>
<td>48 Mr. Tony Khoury</td>
<td>106 Mr. Eid Al Laziki</td>
<td>Lawyer</td>
<td></td>
</tr>
<tr>
<td>49 Mr. Farid Ghanem</td>
<td>107 Liger Belair</td>
<td>Architect - AAA</td>
<td></td>
</tr>
<tr>
<td>50 Mr. Salim Zeidan</td>
<td>108 Mr. Joseph Abi Saad</td>
<td>Architect - AAA</td>
<td></td>
</tr>
<tr>
<td>51 Mr. Ra’f Georges Bitar</td>
<td>109 Mr. Michel Aakiki</td>
<td>Engineer</td>
<td></td>
</tr>
<tr>
<td>52 Mr. Elias Bilan</td>
<td>110 Mrs. Micheline Nakouzi</td>
<td>Engineer</td>
<td></td>
</tr>
<tr>
<td>53 Mr. Edward Eghnatios</td>
<td>111 Mr. Nabil Saliba</td>
<td>Commercant</td>
<td></td>
</tr>
<tr>
<td>54 Mr. Michel Krayyem</td>
<td>112 Mr. Ghattas El Khoury</td>
<td>Topograph</td>
<td></td>
</tr>
<tr>
<td>55 Mr. Nour El Lakkis</td>
<td>113 Mr. Ibrahim Al Sabbah</td>
<td>Press</td>
<td></td>
</tr>
<tr>
<td>56 Mr. Charbel El Hajj</td>
<td>114 Mr. Hilmi Kaddoum</td>
<td>Commercant</td>
<td></td>
</tr>
<tr>
<td>57 Mr. Antoine Tawile</td>
<td>115 Mr. Fadi Habboub</td>
<td>Commercant</td>
<td></td>
</tr>
<tr>
<td>58 Mr. Georges Sfeir</td>
<td>116 Mr. Chawki Yarak</td>
<td>Private business</td>
<td></td>
</tr>
</tbody>
</table>

Pictures from the consultation meeting in Byblos

After a presentation of the different project interventions by the consultant architect, the environmental consultant, Dr. Fadel discussed with the participants their views about the potential environmental impacts associated to the project and a questionnaire (refer to Appendix F) was then administered to collect their opinion related to the project, its expected impacts (positive and negative), the ways to mitigate them, and the ways to monitor the environment. A total of 39 questionnaires were filled and returned back during this meeting.

**Outcomes of the meeting and questionnaire**

- Except for four persons, all other participants seem to be aware of the project as they have heard about it previously from the municipality, read about it in the newspaper, or participated in previous workshops and discussions. Among the respondents to the questionnaire, 75% are above 40 years of age, 71% have a university degree, and 30% live and work in the old city.

- The majority of the participants are aware of most of the interventions that will be executed in the old city of Byblos. Among the activities that are most recognized is the preservation and conservation of historic and cultural city centers, the improvement of the general appearance of the souks, and the reorganization of traffic.

- The majority of participants are eager to see the project begin as they foresee a positive impact on the preservation of the cultural heritage of the city (92%), the improvement in the standard of living of locals.
(90%), and the development of the tourism infrastructure [increase in number of tourists (95%), creation of direct and indirect employment activities (94%), etc].

- According to the respondents, the activities that will benefit the most from the project in terms of direct or indirect employment are the old souks, restaurants, handicrafts and artisanal works, commercial spaces, hotels and cafes. Although 82% believe that the cost of land will improve as a result of the implementation of the project, 18% are reluctant and believe that the cost of land will not be affected; rather it needs time to improve.

- The reorganization of the parking structure for cars and tourist buses and the reorganization of circulation in some of the streets is seen by 90% of the respondents to improve the circulation and to reduce congestion problems in the old city center. However most attendants are aware that the increase in the number of tourists will worsen the air quality and increase the noise levels at some points (parking areas) and improve the situation in some other places in the city.

- The majority of the respondents (77%) are aware that the present condition of infrastructure, mainly solid waste and wastewater collection and disposal is hindering the development of tourism in the old city center and must be improved to be able to attract tourists.

- The respondents are aware that the development of tourism in Byblos will result in an increase in wastewater generation (74%), solid waste generation (69%) and water demand (84%). However, the majority of the respondents believe that the impact of such an increase is minimal on the collection networks and treatment systems.

- Surprisingly, 61% of the respondents believe that the project does not have any negative impact, while 18% did not answer this question. Among the negative impacts cited by the remaining 21% were associated to construction impacts such as noise, dust emissions, traffic congestions at entrance of Byblos and increase in demolition waste. Other negative impacts include decline in commercial activities during construction, annoyances caused by tourist activities, and relocation of some businesses (fuel station and three other shops).

- According to the respondents, an administrative body should be created to monitor the execution phases of the project. This administrative body must consist of technical people rather than politicians to ensure transparency and public participation and involvement. Technical experts in Byblos should be consulted and all planned projects for Byblos should be considered within this project. Information of residents on the objectives of the project is also essential to reduce the cultural gap between social classes. Pamphlets, brochures, and signs should be distributed to explain the project. Among the mitigation measures to alleviate the negative impacts during construction are proper planning of activities, the spraying of water and the use of curtains to prevent dust, working during daytime hours and the use of adequate equipment to prevent noise disturbance. As for demolition waste, a specific site must be designated for the disposal of these wastes. The construction of the wastewater treatment networks and plant is necessary to complement this project. Vehicles entry to the old city must be banned and residents must be allocated a time where they can enter their cars.

- Monitoring requirement during project implementation that were cited by the respondents include monitoring air quality, noise, traffic, safety, water quality, groundwater, dust, cleanliness, and waste disposal. Construction activities should be monitored through proper supervision.

- Among the respondents, 38% believe that capacity building is necessary for the stakeholders that will be dealing with the implementation of this project, while 31% believe that stakeholders do not need capacity building. Another 31% did not respond to this question.

Public participation - Baalbeck

A meeting was conducted at the early stages of the project in Baalbeck in the context of getting the feedback of owners of establishments regarding traffic organization and tourism revitalization but not environmental impacts. A questionnaire was then distributed to owners of establishments (188 owners) to collect their opinion regarding traffic organization and tourism revitalization options for Baalbeck. The outcomes of this questionnaire are summarized below:

Reorganization of traffic: Baalbeck city is characterized by a serious traffic problem especially in the morning and midday. The municipality had approved several plans to reorganize traffic, of which one was executed beginning 2002 but was interrupted due to the complaint of some merchants since the traffic was converted to one way from Ras el Ain to Moutran Square. When asked about their opinion regarding the Municipality traffic
reorganization plan, 43.8 % of the owner of establishments agree on the plan, 40.6 % do not agree at all, while 15.6% did not hear about it. However, most of them are aware of the traffic crisis and 93.6 % encourage proposing new measures to alleviate the traffic problems and believe that any plan must be very well studied and discussed among the related stakeholders in order to succeed. The proposals of owners of establishments concerning traffic regulation are summarized below:

<table>
<thead>
<tr>
<th>Proposal</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not want to change the traffic situation in their streets</td>
<td>16</td>
</tr>
<tr>
<td>Authorization to park on one side</td>
<td>33</td>
</tr>
<tr>
<td>Forbid completely to park in the street if parking lots are provided</td>
<td>29</td>
</tr>
<tr>
<td>Forbid to park in the street and transform it to a pedestrian street</td>
<td>6</td>
</tr>
<tr>
<td>Provide parking lots and enlargement of the streets</td>
<td>4</td>
</tr>
<tr>
<td>Others (combination of the above proposals)</td>
<td>12</td>
</tr>
</tbody>
</table>

Tourism revitalization: The outcomes of the questionnaire regarding the proposals for the revitalization of tourism in the study zone are summarized below:

<table>
<thead>
<tr>
<th>Proposal</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleanliness of buildings, shops and streets</td>
<td>98</td>
</tr>
<tr>
<td>Improvement of the windows of shops</td>
<td>96</td>
</tr>
<tr>
<td>Restoration and transformation of historic buildings into museums</td>
<td>94</td>
</tr>
<tr>
<td>Organization of traffic</td>
<td>93</td>
</tr>
<tr>
<td>Forbidding illegal use of sidewalks and public squares</td>
<td>92</td>
</tr>
<tr>
<td>Projection of a film on Baalbeck in public squares</td>
<td>92</td>
</tr>
<tr>
<td>Exhibition of traditional handicrafts</td>
<td>91</td>
</tr>
<tr>
<td>Infrastructure improvement</td>
<td>91</td>
</tr>
<tr>
<td>Restoration of mud houses</td>
<td>88</td>
</tr>
<tr>
<td>Resolving the problem of illegal buildings</td>
<td>84</td>
</tr>
<tr>
<td>Forbidding street merchants</td>
<td>83</td>
</tr>
<tr>
<td>Transform some streets to pedestrian</td>
<td>82</td>
</tr>
<tr>
<td>Organizing folkloric activities in the squares</td>
<td>77</td>
</tr>
</tbody>
</table>

Additional proposals to improve tourism were proposed by owners of establishments including:

- Building a tourism infrastructure such as hotels, restaurants, cafes, entertainment and leisure centers
- Giving more importance to the improvement of Baalbeck by the Government
- Improve the security conditions and openness of the city to tourist without fanaticism
- Marketing tourism in Baalbeck through advertisement
- Organization of artistic exhibitions

Note that 72 % of owners of establishments entrust the Municipality to implement such measures as compared to others (18%) who would like to involve other bodies (committee of traders, NGOs, committee related to a party, etc), while 10% are not willing to cooperate with anyone.

The main obstacles to the development of tourism in Baalbeck as foreseen by owners of establishments by order of importance were distributed as follows:

- Lack of infrastructure
- Traffic congestions and lack of parkings, pavement and large streets
- Negligence of the Government
- The general economic situation
- The weakness of marketing in Baalbeck
- The religious strictness (fanatism)
- The bad image given to inhabitants of Baalbeck and the region
• The high prices and the rip offs
• The lack of cleanliness
• The security situation in the city and the caza
• The lack of awareness of the inhabitants
• The negligence of the municipality and other civil organizations

Public participation - Saida

No public meeting is expected for Saida where the level of intervention is relatively minimal.
APPENDIX L

Executive Summary of the EMP Training Workshop in the Five Cities